

Quantifying the Sensitivity of EU Debt Sustainability Analysis

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Abstract

The reformed EU fiscal rules derive each country's required fiscal adjustment from a debt sustainability analysis (DSA). Using a replication of the European Commission's 2024 reference trajectories for all 27 member states, this paper quantifies how sensitive the resulting structural primary balance targets are to the forecasts, model parameters, modelling choices and calibration settings of the DSA. Because the target is the highest balance required by any of several criteria, an input matters only where it acts on the binding criterion. When forecasts and parameters are drawn jointly from the distribution of past forecast errors and published estimates, the DSA target of the countries with adjustment requirements rises by 0.65 percentage points of GDP on average at the 75th percentile of the draws and falls by 0.36 points at the 25th percentile, against an average required adjustment of 2.6 points over four years. Large fiscal multipliers, as estimated for crisis conditions, can make meeting the debt sustainability safeguard implausible. Because the deterministic stress tests and the deficit criterion set the targets of most countries, the specification of the stochastic analysis matters only in a few cases. Within the alternatives considered, the calibration of the rules, in particular the size of the stress tests and the period over which ageing costs must be covered, can move the targets by amounts comparable to the uncertainty about forecasts and parameters.

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1 Introduction

Since April 2024, the EU fiscal rules have set fiscal targets for each member state through a debt sustainability analysis (DSA). Member states with government debt above 60 percent of GDP or a deficit above 3 percent of GDP receive from the European Commission a reference trajectory for net expenditure over an adjustment period of four to seven years. The trajectory follows from the structural primary balance (SPB), that is, the primary balance corrected for cyclical variations and one-off measures, that the country must reach by the end of the adjustment period. The Commission sets this SPB target such that the projected debt ratio declines, or remains below 60 percent of GDP, in a baseline projection, in three stress tests and in a stochastic simulation. Numerical safeguards and the excessive deficit procedure (EDP) can raise the target further.

The DSA makes these targets country-specific, but it also makes them depend on multiple forecasts, parameters and methodological choices. Governments can argue for different inputs in their medium-term fiscal plans, at times with large consequences for the required adjustment (Zettelmeyer et al., 2025), and the regulation foresees a review of the DSA methodology (European Parliament and Council of the European Union, 2024). Both the assessment of national plans and the review require an understanding of how much the targets depend on each input.

This paper quantifies the sensitivity of the SPB targets of the 27 EU member states to the inputs of the Commission's DSA. It uses the replication of the DSA that we present in Darvas et al. (2023, 2024). This replication reproduces the reference trajectories of the Commission's prior guidance of 2024. I divide the inputs into four blocks: forecasts, model parameters, the specification of the stochastic analysis and the calibration of the rules. I vary inputs both individually and jointly, by taking draws from the distribution of forecasts and parameters. For each change, I report the effect on the target required by the DSA criteria, as well as on the binding target, which in addition meets the safeguards and the minimum adjustment of the EDP. Because the target is the highest of several requirements, an input moves it only through the binding criterion. In the baseline, the deficit criterion and the adverse interest-growth stress test set the DSA target for 23 of the 27 countries. The effects of the inputs are therefore concentrated on these two criteria. They are also asymmetric, because a favourable input lowers the target only until another criterion binds, whereas an adverse input raises it without such a limit.

The first block contains the forecasts that set the central projection of debt: interest rates and inflation ten years ahead, potential growth, and ageing costs. The second block contains the model parameters that link the SPB to output: the fiscal multiplier, the persistence of the multiplier effect, and the budget semi-elasticity. I first shift each forecast by the size of a typical past forecast error and vary each parameter within the range of published estimates. Potential growth and the long-term interest rate ten years ahead have the largest effects. I then draw the forecasts and the parameters jointly. The forecasts come from the distribution of past forecast errors. I define favourable and adverse combinations of assumptions as the 25th and 75th percentiles of the resulting targets. For the 21 countries with positive adjustment requirements,

the favourable combination lowers the DSA target by 0.36 percentage points of GDP on average and the adverse combination raises it by 0.65 points. The average required adjustment is 2.6 points over four years. Per year, the two changes amount to about 0.09 and 0.16 points. The adverse change over four years is thus about as large as the cumulative threshold for deviations in the control account (Council of the European Union, 2024). Because I demean each error series to correct for period specific biases, the draws measure the size of forecast errors but not country specific bias.

The stochastic criterion, which featured prominently in previous reform proposals (Blanchard et al., 2021), only sets the target for Finland. As a result, planned revisions of the stochastic DSA by the Commission, which would allow for persistent and non-normal shocks (Bec et al., 2025), affect average targets little. A VAR bootstrap that addresses both points raises the DSA target of the countries with adjustment requirements by 0.02 points on average. It changes the target substantially only for Finland.

The calibration of assumptions that determine how much risk policymakers are willing to accept has considerable effects on targets. These assumptions are the probability threshold of the stochastic criterion, the size of the stress tests and the period for covering rising ageing costs. I refer to these settings as the risk standard. Within the alternatives I consider, these settings can move the targets by amounts comparable to the uncertainty about forecasts and parameters. A strict combination of assumption increases target sby 0.18, while a lenient lowers it by 0.4. For the 21 countries with adjustment requirements, adverse interest-growth shocks of 0.75 instead of 0.5 percentage points raise the DSA target by 0.16 points. Comparing the shock size in the adverse $r - g$ test with past forecast errors shows that the baseline shock size of 1 percentage point is exceeded in 30 percent of cases. The test thus roughly corresponds to insuring against the 70 percent of cases in which forecasts overestimate $r - g$, the same level as the stchastic probability threshold. Because the stochastic criterion rarely binds, this stress test is the main protection of the rules against errors in the central projection.

Assumptions about the fiscal multiplier matter mostly through their interaction with the debt sustainability safeguard. The safeguard requires the debt ratio to decline by a minimum amount during the adjustment. A larger multiplier slows this decline, so that the binding targets of Finland, Austria and Germany rise with the multiplier. With an exceptionally high multiplier of 1.5, as estimated for crisis conditions, Finland and Spain cannot meet the safeguard at all. The multiplier mainly delays the decline in debt, however. After the adjustment, debt falls at a similar pace whatever the multiplier.

A repayment profile based on Eurostat's residual debt maturity data mainly affects the targets of Greece and Finland. Repeating the sensitivity analysis with more recent input data from September 2026 barely affects the abovementioned results. Three conclusions can be drawn for the review of the DSA. First, the size of the stress tests and the ageing cost period deserve as much attention as the stochastic simulations. Second, the debt sustainability safeguard's test of debt decline during the adjustment can introduce adverse feedback via the fiscal multiplier.

Third, the level of risk that the rules implicitly accept via stress tests and probability thresholds should be justified explicitly.

The paper relates to a growing literature that evaluates the reformed EU rules and the role of the DSA in them (Heimberger, 2023; Pench, 2024, 2025; Cottarelli, 2024; Wieland, 2024; Jousten, 2025; Erce, 2025; Gros and Hofer, 2026; Boivin and Darvas, 2025; European Fiscal Board, 2025). In Darvas et al. (2023, 2024), we use a replication of the Commission’s DSA to evaluate the Commission’s proposal and the adopted rules. Several of these studies identify the inputs of the DSA as a source of uncertainty or discretion, but most do not quantify how much the targets depend on them. Other work, including our own, examines single inputs: the size and persistence of the fiscal multiplier (Heimberger et al., 2024), demographic risks (Darvas et al., 2025b), the growth assumptions in Germany’s medium-term plan (Zettelmeyer et al., 2025), the specification of the stochastic DSA (Darvas et al., 2025a), and the effect of public investment and structural reforms on potential growth (Gottschalk et al., 2025). This paper complements these studies by quantifying the effects of a wider set of inputs in one framework, with ranges based on past forecast errors and published estimates.

The rest of the paper is organised as follows. Section 2 describes how the DSA sets the fiscal adjustment targets and classifies the inputs. Section 3 reports the effects of the forecasts and the model parameters, including the joint draws. Section 4 turns to the stochastic analysis, the stress tests and the calibration of risk tolerance, and compares their effects with those of the forecasts and parameters. Section 5 covers the repayment profile of debt and repeats the checks with newer data. Section 6 concludes and discusses channels that the DSA leaves out.

2 Fiscal adjustment targets

2.1 Debt sustainability analysis in the EU fiscal rules

The baseline of the sensitivity analysis is the replication of the Commission’s DSA that we present in Darvas et al. (2024), applied to the prior guidance of June 2024. The model projects the debt ratio with the debt-dynamics identity of the Commission’s Debt Sustainability Monitor (European Commission, 2024b). Nominal growth, the primary balance and the average interest rate on debt are model variables, which depend on the SPB path through a fiscal multiplier and budget semi-elasticities (Carnot and de Castro, 2015; Mourre et al., 2019). Annex 2 of Darvas et al. (2024) and the repository describe the method in detail. The input data are those of the Commission’s prior guidance calculation sheets for 2024, so that the reference year is 2024, the four-year adjustment period runs from 2025 to 2028 and the seven-year period from 2025 to 2031.

SPB targets are determined by searching for the lowest SPB at the end of the adjustment period that meets a given set of criteria. The *DSA target* is the lowest SPB that meets the criteria of the DSA alone. Under the deterministic debt criteria, the debt ratio must decline, or stay

below 60 percent of GDP, over the ten years after the adjustment period, both in a baseline scenario and in three stress tests (see below for how the two conditions combine). Debt declines if it falls in each of these ten years. The stress tests assume a lower SPB, a higher interest-growth differential ($r - g$) and a temporary rise in market interest rates. Under the deficit criterion, the deficit must stay below 3 percent of GDP over the same ten years. Under the stochastic criterion, the debt ratio must decline over the five years after the adjustment period with a probability of at least 70 percent. This probability is computed from simulated shocks to growth, interest rates, exchange rates and the primary balance.

The *binding target* adds to the DSA criteria the adjustment floor described below, the minimum adjustment under the EDP, the debt sustainability safeguard and the deficit resilience safeguard. The debt sustainability safeguard requires debt to fall on average by at least 1 percentage point of GDP per year while debt exceeds 90 percent of GDP, and by at least 0.5 points while it lies between 60 and 90 percent, over the adjustment years outside the EDP. The deficit resilience safeguard requires a minimum annual adjustment until the structural deficit is below 1.5 percent of GDP.

I implement the rules as in the Commission's prior guidance calculation sheets. Four features of this implementation matter for the results. First, the debt criteria apply in one of two variants to all scenarios at once. Either debt declines in the baseline, in the three stress tests and, with a probability of at least 70 percent, in the stochastic analysis, or debt stays below 60 percent of GDP in the baseline and the three stress tests. The less demanding variant applies, and only the first includes the stochastic criterion. Second, the annual adjustment is constant. The Commission rounds it up to 0.01 percentage points. I do not round the DSA target, since the rounding only reflects the presentation of the calculation sheets, but the binding target is searched in steps of 0.01 points a year. Where a constant annual adjustment sets the binding target, it therefore changes in steps of 0.04 points over four years. Where the minimum steps of the EDP or the deficit resilience safeguard bind, the path is not constant and this grid does not apply. Third, the annual adjustment cannot be negative for countries that receive a reference trajectory. I refer to this constraint as the adjustment floor. The Commission applies the floor to the DSA-based adjustment. I count it with the binding target instead, like the safeguards, so that the DSA target reflects the DSA criteria alone. Fourth, countries with debt below 60 percent and a deficit below 3 percent of GDP receive only technical information. For these countries, only the deficit criterion and the requirement that debt stays below 60 percent in the baseline scenario apply, the debt sustainability safeguard does not apply, and the floor is -1 percentage point per year.

2.2 Replication of the Commission targets

Table 1 compares the baseline with the Commission's targets. The baseline departs from a pure replication in one respect, namely the specification of the fiscal multiplier. Following Darvas

et al. (2023, 2024), a one percentage point increase in the SPB lowers output by 0.75 percent in the same year, and the effect then fades over the following two years. The Commission's prior guidance instead lets the output gap from an SPB change close in steps, to two thirds and one third of its size in the following two years. During a multi-year adjustment, the output gaps of successive changes add up, so that the output loss grows with the length of the adjustment. I use the former specification because the effect of each SPB change fades over a fixed number of years, which allows me to vary its persistence. Table A6 in the Annex repeats the multiplier checks with the Commission's rule. For the DSA target, on the Commission's definition with the adjustment floor and the rounding, the median absolute difference from the Commission's targets is 0.04 percentage points, and the largest difference is 0.28 points, for Finland. For the binding target, the median difference is 0.01 points and the largest is 1.04 points, again for Finland, where the debt sustainability safeguard binds. The multiplier specification explains the gaps for the three countries in which the safeguard binds. The model gives binding targets of 4.83, 2.22 and 2.46 percent of GDP for Finland, Austria and Germany, against 5.87, 2.58 and 2.74 in the Commission's sheets. With the Commission's rule for the output gap, the model gives 5.99, 2.58 and 2.78 (Table A6), within 0.12 points of the Commission's targets. Section 3.3 shows that the multiplier results do not depend on this specification. In the baseline, a constraint other than the DSA criteria sets the binding target in 12 countries: the deficit resilience safeguard in five, the adjustment floor and the debt sustainability safeguard in three each, and the minimum adjustment of the EDP in one.

2.3 Determining the binding criterion

Each criterion requires its own SPB, and the DSA target is the highest of these. In the baseline, the deficit criterion sets the DSA target for 14 countries and the adverse $r - g$ stress test for nine. The lower-SPB stress test sets it for two countries, and the baseline debt criterion and the stochastic criterion each for one, the latter for Finland. For Cyprus, Denmark and Estonia, all DSA criteria require a lower SPB than in 2024, and the adjustment floor sets the binding target. These counts refer to the DSA target without the floor. On the Commission's definition in Table 1, the floor sets the DSA target of these three countries, so that the deficit criterion sets it for 11 countries. Figure 1 shows the SPB that each DSA criterion and each constraint of the binding target requires in the baseline. The debt criteria are shown in the variant that applies to each country. For Cyprus, Slovenia, Germany, Slovakia, Poland, Malta and Romania, the variant in which debt stays below 60 percent of GDP over the ten years after the adjustment period is less demanding and therefore applies, and countries without a reference trajectory are subject only to the deficit criterion and to debt staying below 60 percent in the baseline scenario. For the constraints of the binding target, the figure shows the SPB that each requires on its own. For the debt sustainability safeguard, this is the SPB implied by the lowest constant annual adjustment that meets it, including the minimum steps of the EDP and the deficit resilience safeguard, for

Table 1: Baseline SPB targets and Commission prior guidance, four-year adjustment (percent of GDP)

	2024		DSA target		Binding target		DSA criterion (7)	Binding constraint (8)
	Debt (1)	SPB (2)	Comm. (3)	Model (4)	Comm. (5)	Model (6)		
Greece	153.9	1.73	2.37	2.33	2.61	2.58	Adverse $r - g$ test: debt declines	Deficit resilience
Italy	138.6	-1.05	3.35	3.31	3.35	3.31	Adverse $r - g$ test: debt declines	DSA criteria
France	112.4	-2.97	0.79	0.75	0.79	0.75	Adverse $r - g$ test: debt declines	DSA criteria
Spain	105.5	-0.85	2.59	2.59	2.59	2.59	Adverse $r - g$ test: debt declines	DSA criteria
Belgium	103.4	-2.03	1.25	1.21	1.25	1.21	Adverse $r - g$ test: debt declines	DSA criteria
Portugal	95.6	2.20	2.52	2.52	2.52	2.52	Adverse $r - g$ test: debt declines	DSA criteria
Finland	80.5	-0.53	2.11	1.83	5.87	4.83	Stochastic	Debt safeguard
Austria	79.5	-1.34	0.90	0.82	2.58	2.22	Adverse $r - g$ test: debt declines	Debt safeguard
Hungary	74.3	0.03	2.67	2.67	2.67	2.67	Adverse $r - g$ test: debt declines	DSA criteria
Cyprus	70.6	3.48	3.48	3.48	3.48	3.48	Adjustment floor	Adjustment floor
Slovenia	68.1	-1.24	0.52	0.52	0.52	0.52	Lower-SPB test: debt below 60% at end	DSA criteria
Germany	62.5	-1.02	1.14	1.02	2.74	2.46	Adverse $r - g$ test: debt below 60% at end	Debt safeguard
Croatia	59.5	-1.96	–	-0.44	-0.36	-0.36	Baseline: debt below 60% at end	Deficit resilience
Slovakia	58.5	-4.26	0.94	0.82	0.94	0.82	Lower-SPB test: debt below 60% at end	DSA criteria
Poland	53.7	-2.61	0.67	0.59	0.67	0.59	Deficit below 3%	DSA criteria
Malta	52.0	-2.90	-1.14	-1.22	-0.87	-0.87	Deficit below 3%	EDP minimum adjustment
Romania	50.9	-4.41	0.47	0.27	0.47	0.27	Deficit below 3%	DSA criteria
Netherlands	47.1	-0.64	–	0.08	0.08	0.08	Deficit below 3%	DSA criteria
Czechia	45.2	-0.09	–	0.39	0.39	0.39	Deficit below 3%	DSA criteria
Latvia	44.5	-1.36	–	-1.24	-0.14	-0.13	Deficit below 3%	Deficit resilience
Ireland	42.5	2.53	–	-0.63	–	-0.63	Deficit below 3%	DSA criteria
Lithuania	38.3	-0.37	–	0.27	0.27	0.27	Deficit below 3%	DSA criteria
Sweden	32.0	0.69	–	-1.75	-0.83	-0.74	Deficit below 3%	Deficit resilience
Luxembourg	27.1	0.10	–	-0.22	–	-0.22	Deficit below 3%	DSA criteria
Denmark	26.5	2.91	–	-1.09	-1.09	-1.09	Adjustment floor	Adjustment floor
Bulgaria	24.5	-2.09	–	-2.05	-0.87	-0.88	Deficit below 3%	Deficit resilience
Estonia	21.4	-0.29	-0.29	-0.29	-0.29	-0.29	Adjustment floor	Adjustment floor

Source: Author's calculations based on the European Commission's prior guidance calculation sheets of 2024.

Note: SPB at the end of the adjustment period (2028). Columns (3) and (5) are the Commission's targets. Column (3) is the SPB in 2024 plus four times the DSA-based annual adjustment. Countries receiving technical information report no DSA-based adjustment. Columns (4) and (6) are the model baseline. Columns (3), (4) and (7) follow the Commission's definition of the DSA target, which includes the adjustment floor and the rounding of the annual adjustment; in the rest of the paper, the DSA target excludes both. Column (7) is the DSA criterion that sets the DSA target. Column (8) is the constraint that sets the binding target: the DSA criteria, the adjustment floor, the debt sustainability safeguard, the deficit resilience safeguard or the minimum adjustment of the EDP. Countries are ordered by debt in 2024.

countries with a reference trajectory and debt above 60 percent of GDP. For the deficit resilience safeguard and the minimum adjustment of the EDP, it is the SPB when their minimum steps are added to the path to the DSA target, for the countries to which they apply. The adjustment floor is the SPB in 2024 for countries with a reference trajectory and 4 percentage points below it otherwise. Among these constraints, the debt sustainability safeguard requires more than the DSA criteria in Finland, Austria and Germany, the deficit resilience safeguard in Greece, Croatia, Latvia, Sweden and Bulgaria, and the minimum adjustment of the EDP in Malta.

This structure determines when an input matters. An input changes the DSA target only if it moves the highest criterion or lifts another criterion above it, so that inputs acting on a lower criterion leave the target unchanged. Moreover, a favourable input lowers the target only until the next criterion takes over, and for the binding target also the adjustment floor, whereas an adverse input raises the target without such a limit.

For this reason, I report each effect at three levels. The *own criterion* of an input is the criterion on which it acts directly. For the size of a stress test, this is the stress test itself, and for the settings of the stochastic analysis it is the stochastic criterion. For all other inputs, I use the debt criterion of the baseline scenario. The first level is the change in the SPB required by the own criterion, the second is the change in the DSA target, and the third is the change in the binding target.

2.4 Classification of the inputs

Table 2 lists the inputs in four blocks. For each input, it shows where the input enters the projection, its baseline value and the values I consider. To see how the sensitivity analysis differs from the stochastic analysis in the DSA, it helps to consider how the stochastic analysis is built. The Commission simulates many debt paths from historical shocks to growth, interest rates, exchange rates and the primary balance. The distribution of these paths is called the fan chart. The fan chart is centred on the baseline projection. It enters only the stochastic criterion. In the baseline, this criterion sets the target for one country. The deterministic criteria take the central projection as given.

The central projection rests on forecasts of a few key values, such as market interest rates ten years ahead and long-run potential growth, the anchors of the projection. An error in an anchor moves the central projection. It therefore shifts the centre of the fan chart and every deterministic criterion. The fan chart describes shocks around the central projection. It does not describe errors in the central projection itself. The sensitivity analysis varies these forecasts directly in the first block. In the other blocks, it varies the model parameters, the settings of the stochastic analysis and the calibration of the rules. The stochastic analysis holds all of these inputs fixed. Within the rules, the deterministic stress tests and the calibration of the rules are the main protection against errors in the central projection.

Table 2: Inputs of the DSA by block

Input	Where it enters	Baseline	Values checked
<i>1. Forecasts: distribution of past forecast errors</i>			
Real short-term rate, $T + 10$	Interest on new and refinanced debt	Commission	± 1 pp.
Real long-term rate, $T + 10$	Interest on new and refinanced debt	Commission	± 1 pp.
Inflation, $T + 10$	Nominal growth and rates	Commission	± 0.75 pp.
Potential growth, $T + 10$	Real growth	Commission	± 1 pp.
Ageing costs, change 2024–2038	SPB after the adjustment	Ageing Report	± 0.2 pp. of GDP
Rates and inflation, $T + 30$	Long-run rates and growth	Commission	± 0.5 and ± 0.25 pp. ^a
<i>2. Model parameters: range of published estimates</i>			
Fiscal multiplier	Output effect of the adjustment	0.75	0.5 to 1.0; 1.5 ^b
Persistence of the multiplier	Output effect of the adjustment	3 years	2 to 5 years
Budget semi-elasticity	Cyclical balance	Commission	$\times 0.9$ and $\times 1.1$
<i>3. Estimation of risk: alternative choices</i>			
Start of stochastic projection	Stochastic criterion	After adjustment	First adjustment year
Horizon of stochastic projection	Stochastic criterion	5 years	10 years
Start of shock sample	Stochastic criterion	2000	1990, 2010
Shock frequency	Stochastic criterion	Quarterly	Annual
Shock distribution	Stochastic criterion	Normal	VAR bootstrap
Winsorisation of shocks	Stochastic criterion	5th/95th pct.	1st/99th pct., none
<i>4. Risk standard: alternative settings</i>			
Probability threshold	Stochastic criterion	70%	60%, 80%
Adverse $r - g$ shock	Stress test	0.5 pp.	0.25, 0.75 pp.
Financial stress shock	Stress test	1 pp.	0.5, 1.5 pp.
Lower-SPB shock	Stress test	0.5 pp.	0.25, 0.75 pp.
Ageing cost period	SPB after the adjustment	10 years	5 years
<i>Data</i>			
Repayment profile of debt	Refinancing	Historical average	Eurostat residual maturity

Note: Values of the forecasts are deviations from the baseline, in percentage points (pp.), of about the size of typical past errors; the joint draws use the full distribution of past errors. Forecasts and model parameters are varied one at a time and drawn jointly. All other inputs are varied one at a time. Table A1 in the Annex reports the sources of the forecast errors. ^a Interest rates ± 0.5 pp., inflation ± 0.25 pp.; individual checks only, since there is no evidence on errors at this horizon. ^b Individual check only, for crisis conditions.

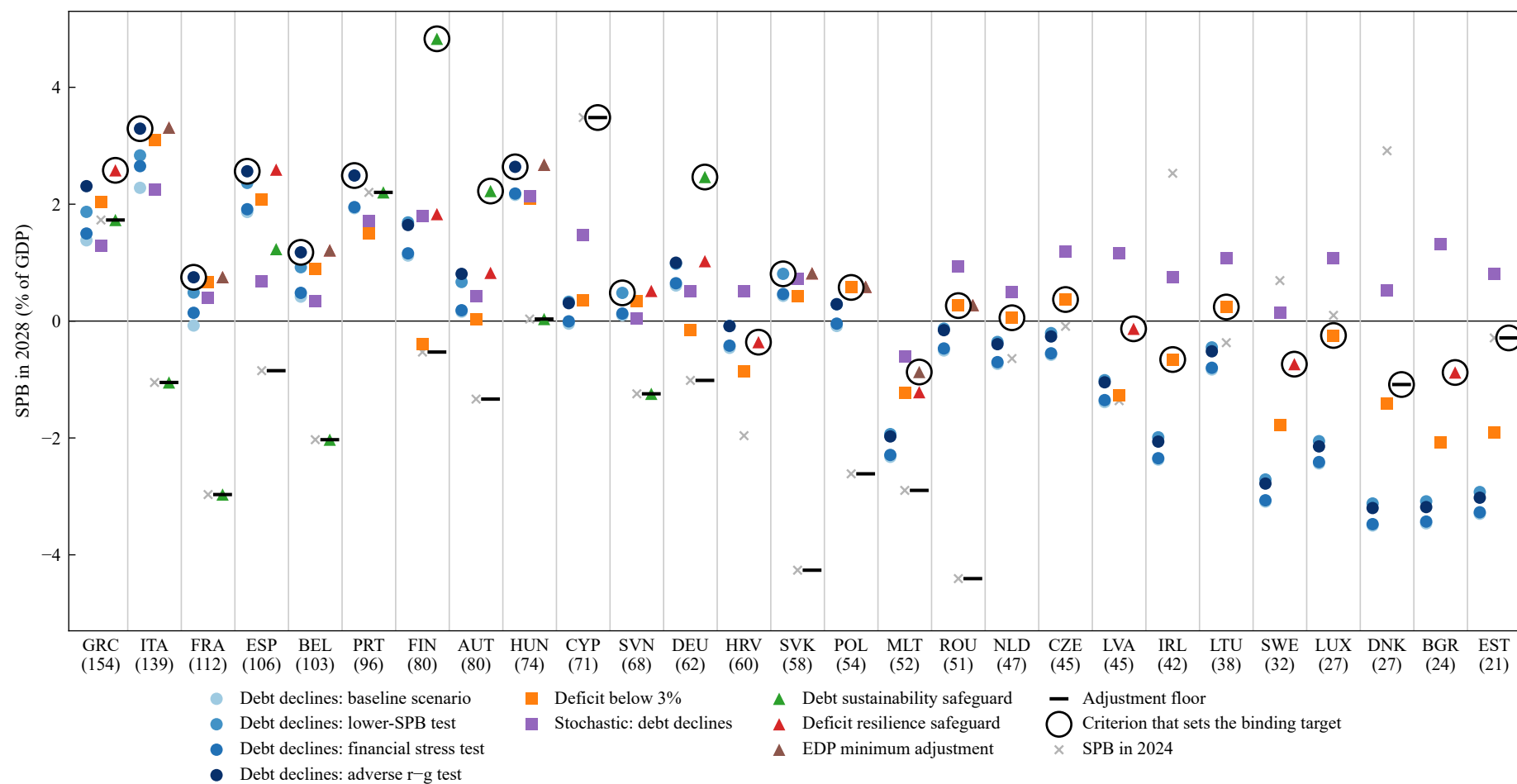


Figure 1: SPB required by each criterion in the baseline, four-year adjustment (percent of GDP)

Source: Author's calculations. Note: SPB at the end of the adjustment period (2028). Each column shows one country, ordered by debt in 2024 (in brackets), with the debt criteria (circles), the deficit and stochastic criteria (squares) and the constraints of the binding target (triangles) side by side. The open circle marks the criterion that sets the binding target. The bar shows the adjustment floor, for countries with a reference trajectory or where it binds. Grey crosses show the SPB in 2024. The debt criteria are shown in the variant that applies to the country. Section 2 defines the constraints.

3 Forecasts and model parameters

3.1 Ranges of forecasts and model parameters

In the individual checks, I shift each forecast by about half of the interquartile range of past errors: 1 percentage point for interest rates and potential growth, 0.75 points for inflation and 0.2 points of GDP for ageing costs. Symmetric shifts show directly whether a target responds more to adverse than to favourable errors. In the joint draws of Section 3.4, I instead draw the errors from their full distribution. A forecast error here is defined as the realised value minus the forecast, and the distribution is the same for all countries. Table A1 in the Annex reports the sources and percentiles of the errors.

For growth and inflation, I use the forecasts of autumn vintages of the IMF’s World Economic Outlook (WEO) from 2000 to 2018 (Ech-charfi, 2024). For each vintage and EU country, I average the errors over the five forecast years, and remove each country’s average error. On average, growth was over-forecast by 0.7 percentage points per year. This average error largely reflects the decline in trend growth over the sample, whereas this paper is concerned with the size of forecast errors. Official forecasts in the euro area have also been optimistic on average (Frankel and Schreger, 2013), so that the ranges do not cover the risk of a persistent bias in the central projection. The interquartile range is -0.84 to $+1.08$ percentage points for growth and -0.74 to $+0.64$ points for inflation. Because these are errors in actual rather than potential growth and include recessions, the range is wide for a shift in potential growth.

For interest rates, the DSA takes market rates ten years ahead from forward rates. I therefore compare the forward rates on the Bundesbank’s German zero-coupon curve at each year end from 1986 to 2015 with the rates realised ten years later, since only Germany has a public yield curve of that length. Forward rates exceeded the realised 10-year rate by 3.0 percentage points on average. This bias reflects the term premium and the decline in rates since the 1990s, and I remove it. The interquartile range is -1.24 to $+0.89$ points for the long-term rate and -1.22 to $+0.40$ points for the short-term rate. By using the German curve, I leave out errors in the spreads of other countries over Germany. These errors are largest for high-debt countries such as Italy and Greece, so that the ranges likely understate interest rate risk for countries with high spreads. Also, because I apply nominal errors to real rates while also varying inflation, the implied range of nominal rates is somewhat wider than in the data.

For ageing costs, I use the eight scenarios of the 2024 Ageing Report that vary demographic, labour market and health cost assumptions (European Commission, 2024a). The interquartile range of their deviations from the baseline change in ageing costs between 2024 and 2038, the end of the DSA horizon for a four-year adjustment, is -0.24 to $+0.14$ percentage points of GDP.

Interest rates, inflation and potential growth are shifted at the anchor ten years ahead ($T + 10$). The shift rises linearly from zero in the last forecast year to its full size in $T + 10$ and then returns to zero by $T + 30$, in line with the Commission’s interpolation between anchors. Real growth moves with potential growth, so that the output gap is unchanged. The shift in ageing costs

grows linearly from 2024 and reaches its full size in 2038. Since the rate assumptions are real rates, nominal interest rates move one for one with inflation when I shift inflation.

The ranges of the model parameters come from the literature. The baseline multiplier is 0.75, as in Carnot and de Castro (2015). Most estimates of spending multipliers lie between 0.6 and 1 (Ramey, 2019; Ramey and Zubairy, 2018), and Barro and Redlick (2011) find 0.4 to 0.5 on impact. I therefore vary the multiplier between 0.5 and 1.0, in the individual checks and in the joint draws. Higher multipliers apply under particular conditions. Multipliers were about 1.5 in the European consolidations after 2010, when interest rates were at their lower bound and many countries consolidated at the same time (Blanchard and Leigh, 2013). Estimates for regions of a monetary union, where monetary policy does not respond, are also 1.5 or more (Nakamura and Steinsson, 2014; Chodorow-Reich, 2019). These estimates compare regions and capture spending financed from outside the region, so that they do not directly measure the effect of a consolidation that a country finances through its own budget. I treat a multiplier of 1.5 as an additional individual check that represents such conditions, and I do not include it in the joint draws. In the baseline, the effect of the multiplier fades over three years, and I vary this persistence from two to five years. Cumulative multipliers over two years are at least as large as impact multipliers (Barro and Redlick, 2011; Ramey and Zubairy, 2018), and consolidations can have lasting effects on output (Fatás and Summers, 2018; Gechert et al., 2019). Finally, I scale the budget semi-elasticity by 0.9 and 1.1, since the largest revisions of the Commission's estimates between the 2014 and 2018 updates were about 10 percent (Mourre et al., 2019).

3.2 Individual variation of inputs

Tables 3a and 3b report the change in the SPB relative to the baseline for each individual check and for the alternative settings of the risk standard, at the three levels. For each level, they show the mean across the 21 countries with adjustment requirements and the largest change among them, with the country concerned. These are the countries whose baseline binding target lies above their SPB in 2024. All means across countries in this paper refer to them. Tables A2a and A2b in the Annex report the same for a seven-year adjustment period.

Among the forecasts, potential growth and the long-term interest rate have the largest effects. Potential growth 1 percentage point lower in $T + 10$ raises the DSA target by 0.42 percentage points on average, and by 1.21 points for Italy, 1.05 for France and 0.90 for Greece. Growth 1 point higher lowers the target by only 0.29 points on average and by at most 0.65 points, for Spain. The SPB that the baseline debt criterion requires responds almost symmetrically, rising by 0.54 points and falling by 0.51 points. The favourable shift moves the target less because it soon makes another criterion, often the deficit criterion, bind.

A real long-term rate 1 point higher in $T + 10$ raises the DSA target by 0.23 percentage points on average and by more than 0.1 points in 18 of the 21 countries, with the largest effect for Greece (0.47). A rate 1 point lower reduces the target by 0.23 points on average. The short-term

rate has almost no effect.

With real rates unchanged, inflation affects the targets of few countries. Inflation 0.75 points lower raises the targets of Italy and France by 0.45 and 0.43 percentage points and that of Greece by 0.30 points, because lower inflation slows the erosion of debt issued in the past at fixed rates.

Ageing costs and the long-run anchors at $T + 30$ have small effects. A shift in ageing costs of 0.2 percentage points of GDP by 2038, the end of the DSA horizon, changes the DSA target by 0.08 points on average and no target by more than 0.16 points. The scenarios of the Ageing Report differ little from its baseline by 2038 (Table A1). The long-run anchors change no target by more than 0.04 points.

The model parameters change the DSA target little on average. A multiplier of 1.0 raises it by 0.06 percentage points on average and by at most 0.38 points. In the crisis case of 1.5, the DSA target rises by 0.28 points on average, with the effect concentrated in France (1.77), Poland (1.11), Romania (0.86) and Italy (0.75), the countries for which the deficit criterion sets the target or comes close to it. A larger multiplier widens the output gap during the adjustment, which raises the cyclical deficit and thus the SPB needed to keep the deficit below 3 percent of GDP. The persistence of the multiplier and the semi-elasticity change the DSA target by less than 0.1 points on average.

3.3 Fiscal multiplier and debt sustainability safeguard

The multiplier has larger effects on the binding target. A multiplier of 1.0 raises the binding target of Finland by 1.6 points, of Austria by 1.0 and of Germany by 0.8. A persistence of five years raises the binding target of Finland by 1.2 points. An exceptionally high multiplier of 1.5 raises the binding target of Austria by 8.6 percentage points and that of Germany by 4.1 points, while Finland and Spain cannot meet the debt sustainability safeguard even with an annual adjustment of 5 percentage points, the largest adjustment that the model searches in all runs. The mean change of the binding target in Table 3a leaves out these two countries and therefore understates the effect.

The reason for the strong increase is that the safeguard tests the average decline in the debt ratio during the adjustment period. A larger multiplier slows this decline because the adjustment lowers nominal GDP, and a larger adjustment lowers GDP further. With a large and persistent multiplier, additional adjustment may therefore fail to reduce the debt ratio fast enough. This is the mechanism we describe in Heimberger et al. (2024).

A simple calculation shows the size of this effect (see also Boussard et al., 2012; Eyraud and Weber, 2013). Ignoring interest, inflation and the fading of the output effect, an increase in the SPB by x percentage points lowers the debt ratio by about $x(1 - \varepsilon m)$ through the balance, where m is the multiplier and ε the budget semi-elasticity. It raises the debt ratio by about bmx through lower GDP, where b is the debt ratio as a fraction of GDP. On impact, the debt ratio therefore falls only if $m(b + \varepsilon) < 1$. For a debt ratio of 80 percent and a semi-elasticity of 0.5,

Table 3a: Change of the SPB relative to the baseline: forecasts and model parameters, four-year adjustment (percentage points of GDP)

Input	Value	Own criterion		DSA target		Binding target	
		Mean	Largest	Mean	Largest	Mean	Largest
1. Forecasts							
Real short-term rate, $T + 10$	−1 pp.	−0.04	−0.15 ITA	−0.04	−0.14 ITA	−0.03	−0.12 PRT
	+1 pp.	+0.04	+0.15 ITA	+0.04	+0.14 ITA	+0.03	+0.16 ITA
Real long-term rate, $T + 10$	−1 pp.	−0.26	−0.52 GRC	−0.23	−0.52 GRC	−0.17	−0.44 ESP
	+1 pp.	+0.25	+0.53 GRC	+0.23	+0.47 GRC	+0.17	+0.40 ITA
Inflation, $T + 10$	−0.75 pp.	+0.18	+0.46 ITA	+0.11	+0.45 ITA	+0.10	+0.44 ITA
	+0.75 pp.	−0.16	−0.45 ITA	−0.04	−0.26 FIN	−0.03	−0.20 HUN
Potential growth, $T + 10$	−1 pp.	+0.54	+1.23 ITA	+0.42	+1.21 ITA	+0.35	+1.20 ITA
	+1 pp.	−0.51	−1.18 ITA	−0.29	−0.65 ESP	−0.20	−0.64 ESP
Ageing costs	−0.2 pp.	−0.09	−0.15 AUT	−0.08	−0.14 AUT	−0.06	−0.16 BEL
	+0.2 pp.	+0.09	+0.15 AUT	+0.08	+0.14 AUT	+0.06	+0.12 ESP
Real short-term rate, $T + 30$	−0.5 pp.	0.00	−0.01 PRT	0.00	−0.01 PRT	0.00	−0.04 PRT
	+0.5 pp.	0.00	+0.01 PRT	0.00	+0.01 PRT	0.00	0.00
Real long-term rate, $T + 30$	−0.5 pp.	−0.01	−0.03 GRC	−0.01	−0.02 GRC	−0.01	−0.04 PRT
	+0.5 pp.	+0.01	+0.03 GRC	+0.01	+0.02 GRC	0.00	+0.03 GRC
Inflation, $T + 30$	−0.25 pp.	+0.01	+0.04 GRC	+0.01	+0.04 GRC	0.00	+0.03 GRC
	+0.25 pp.	−0.01	−0.04 GRC	−0.01	−0.04 GRC	−0.01	−0.04 PRT
2. Model parameters							
Fiscal multiplier	0.5	−0.01	−0.07 SVK	−0.04	−0.25 POL	−0.13	−1.00 FIN
	1	+0.01	+0.07 SVK	+0.06	+0.38 FRA	+0.22	+1.64 FIN
	1.5	+0.04	+0.22 SVK	+0.28	+1.77 FRA	+0.95	+8.56 AUT
Multiplier persistence	2 years	−0.01	−0.05 SVK	−0.03	−0.18 POL	−0.08	−0.64 FIN
	4 years	+0.01	+0.06 SVK	+0.04	+0.24 FRA	+0.10	+0.68 FIN
	5 years	+0.03	+0.13 FIN	+0.08	+0.45 FRA	+0.18	+1.20 FIN
Budget semi-elasticity	×0.9	−0.01	−0.03 DEU	−0.01	−0.08 POL	−0.05	−0.40 FIN
	×1.1	+0.01	+0.03 DEU	+0.01	+0.08 POL	+0.06	+0.40 FIN

Source: Author's calculations. Note: Mean of the change across the 21 countries with adjustment requirements, and the largest change in absolute terms among them with its country. Own criterion: SPB required by the criterion the check acts on (Section 2). Runs in which the debt sustainability safeguard cannot be met are left out of the binding target. These are the runs with a multiplier of 1.5 for Finland and Spain.

Table 3b: Change of the SPB relative to the baseline: estimation of risk, risk standard and data, four-year adjustment (percentage points of GDP)

Input	Value	Own criterion		DSA target		Binding target	
		Mean	Largest	Mean	Largest	Mean	Largest
3. Estimation of risk							
Start of stochastic projection	first adjustment year	+0.20	+0.87 GRC	0.00	+0.09 FIN	0.00	0.00
Horizon of stochastic projection	10 years	+0.14	+0.69 GRC	−0.01	−0.11 FIN	0.00	0.00
Start of shock sample	1990	−0.02	−0.08 GRC	0.00	0.00	0.00	0.00
	2010	+0.01	+0.35 SVN	0.00	+0.09 FIN	0.00	0.00
Shock frequency	annual	−0.14	−0.55 MLT	0.00	+0.07 FIN	0.00	0.00
Shock distribution	VAR bootstrap	+0.06	+0.70 GRC	+0.02	+0.46 FIN	0.00	0.00
Winsorised shocks	P1 and P99	+0.52	+1.11 ESP	+0.04	+0.36 FRA	+0.02	+0.36 FRA
	off	+0.83	+1.70 ESP	+0.09	+0.63 AUT	+0.04	+0.64 FRA
4. Risk standard							
Threshold, start, horizon	60%, after adj., 5 years	−0.49	−0.77 GRC	−0.01	−0.11 FIN	0.00	0.00
	80%, after adj., 5 years	+0.58	+1.05 GRC	+0.03	+0.46 FIN	+0.01	+0.08 FRA
	60%, after adj., 10 years	−0.26	−0.93 FIN	−0.01	−0.11 FIN	0.00	0.00
	80%, after adj., 10 years	+0.59	+1.61 GRC	+0.03	+0.58 GRC	+0.02	+0.45 GRC
	60%, first adj. year, 5 years	−0.42	−0.71 MLT	−0.01	−0.11 FIN	0.00	0.00
	80%, first adj. year, 5 years	+0.93	+2.51 GRC	+0.15	+1.48 GRC	+0.09	+1.23 GRC
	60%, first adj. year, 10 years	−0.17	−0.91 FIN	−0.01	−0.11 FIN	0.00	0.00
	70%, first adj. year, 10 years	+0.32	+1.56 GRC	+0.02	+0.54 GRC	+0.02	+0.39 GRC
Adverse $r - g$ shock	80%, first adj. year, 10 years	+0.89	+3.03 GRC	+0.13	+2.00 GRC	+0.11	+1.75 GRC
	0.25 pp.	−0.28	−0.50 ITA	−0.06	−0.27 GRC	−0.05	−0.28 BEL
	0.75 pp.	+0.28	+0.49 ITA	+0.16	+0.49 ITA	+0.12	+0.48 ITA
Lower-SPB shock	0.25 pp.	−0.23	−0.28 FIN	0.00	−0.05 SVK	−0.01	−0.08 SVN
	0.75 pp.	+0.23	+0.28 FIN	+0.06	+0.19 SVN	+0.04	+0.20 SVK
Financial stress shock	0.5 pp.	−0.02	−0.06 FRA	0.00	0.00	0.00	0.00
	1.5 pp.	+0.02	+0.10 FRA	0.00	0.00	0.00	0.00
Ageing cost period	5 years	−0.22	−0.93 ESP	−0.24	−0.89 ESP	−0.20	−0.88 ESP
All settings	lenient	−0.22	−0.93 ESP	−0.40	−1.25 ESP	−0.27	−1.28 ESP
	strict	0.00	0.00	+0.18	+0.49 ITA	+0.13	+0.48 ITA
Data							
Repayment profile	Eurostat profile	−0.01	−0.46 GRC	−0.01	−0.57 GRC	0.00	−0.42 GRC

Source: Author's calculations. Note: Mean of the change across the 21 countries with adjustment requirements, and the largest change in absolute terms among them with its country. Own criterion: SPB required by the criterion the check acts on (Section 2). Runs in which the debt sustainability safeguard cannot be met are left out of the binding target. The own criterion of the settings of the stochastic analysis and of the stress tests applies only to countries with a reference trajectory, and its statistics cover the 15 of them with adjustment requirements. Threshold, start, horizon: probability threshold of the stochastic criterion, start of the stochastic projection (after the adjustment period or in its first year) and horizon after the adjustment period. The baseline has a threshold of 70 percent, a start after the adjustment period, a five-year horizon, shocks of 0.5, 1 and 0.5 percentage points in the adverse $r - g$, financial stress and lower-SPB tests and an ageing cost period of ten years. Lenient: threshold of 60 percent, shocks of 0.25, 0.5 and 0.25 points and ageing cost period of five years. Strict: threshold of 80 percent and shocks of 0.75, 1.5 and 0.75 points. Hungary, Luxembourg and the Netherlands are left out of the repayment profile check for lack of data.

this requires a multiplier below 0.77. Over several years, the output effect fades while the lower deficit keeps reducing debt, so that the safeguard can still be met at higher multipliers. With a large and persistent multiplier, the output effect fades too slowly for that. Panel (a) of Figure 2 shows the constant annual adjustment that the safeguard requires, against the multiplier, for the four countries where it binds or cannot be met. For this figure, I extend the search to annual adjustments of up to 20 percentage points, in steps of 0.05 points. At the baseline multiplier of 0.75, the safeguard requires an annual adjustment of 0.55 to 1.35 percentage points on this grid. The requirement rises slowly up to a multiplier of about 1.2 and steeply above it. For Finland, it reaches 4.2 points a year at a multiplier of 1.44, and from a multiplier of 1.45 no annual adjustment of up to 20 points meets the safeguard. For Spain, it reaches 4.0 points at a multiplier of 1.48, and from 1.49 no adjustment meets the safeguard. For Spain, the average decline in the debt ratio peaks below the required 1 point, however large the adjustment. For Finland, a larger adjustment lowers GDP enough to raise debt above 90 percent of GDP in the first years, which raises the required decline. The limit of 5 points on the annual adjustment that the model searches is therefore not what makes the safeguard impossible to meet.

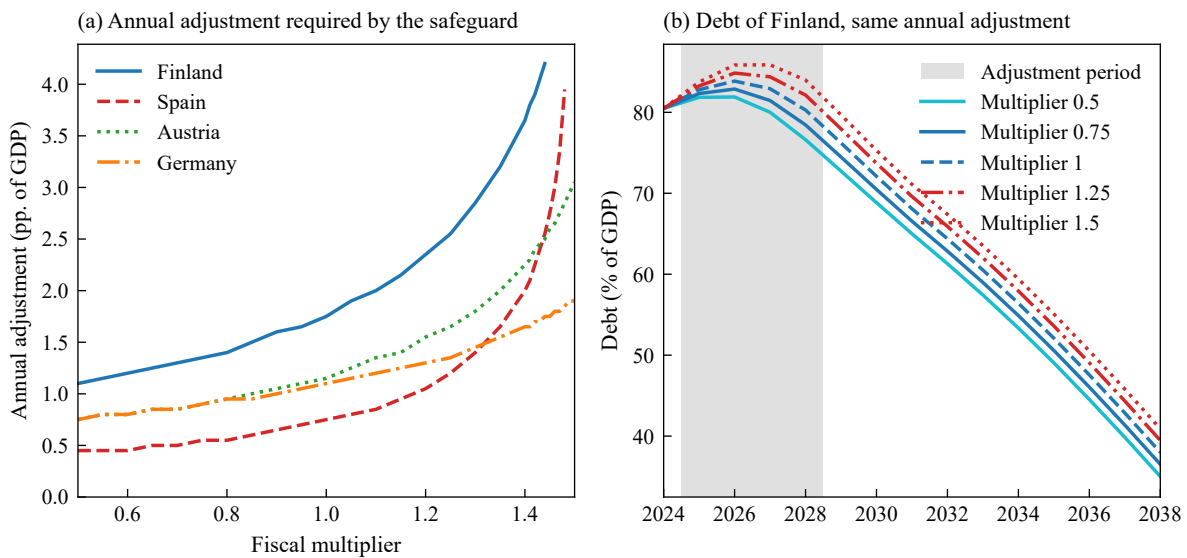


Figure 2: Debt sustainability safeguard and fiscal multiplier, four-year adjustment

Source: Author's calculations. Note: (a) Smallest constant annual adjustment, in steps of 0.05 percentage points, for which the debt sustainability safeguard is met, including the minimum adjustment of the EDP and the deficit resilience safeguard, with the persistent multiplier of the baseline, for multipliers from 0.5 to 1.5, in steps of 0.05 and of 0.01 above 1.4. Lines end where no annual adjustment of up to 20 percentage points meets the safeguard. The baseline multiplier is 0.75. (b) Debt of Finland for a constant annual adjustment of 1.34 percentage points, the adjustment of its baseline binding target. The safeguard is met with multipliers of 0.5 and 0.75 and not met with multipliers of 1.0 and more. The shaded area marks the adjustment period.

The multiplier mainly changes the timing of the debt decline. Panel (b) of Figure 2 shows the debt ratio of Finland for the same annual adjustment of 1.34 percentage points, the adjustment of its baseline binding target, and for multipliers from 0.5 to 1.5. During the adjustment, a larger multiplier slows the decline. Debt in 2028 ranges from 76.6 percent of GDP with a multiplier of 0.5 to 84.0 percent with a multiplier of 1.5, against 80.5 percent in 2024, and the safeguard

is not met with multipliers of 1.0 or more. After the adjustment, the output effect fades, and debt falls at a similar pace in all cases, by about 4 points a year. Debt nevertheless stays higher with a larger multiplier. In 2038, it is 40.9 percent of GDP with a multiplier of 1.5, against 35.0 percent with a multiplier of 0.5, because the debt accumulated during the adjustment is not reversed. The safeguard tests the change in debt during the adjustment, which the multiplier affects strongly, whereas the decline after the adjustment hardly depends on it.

The long-run effect of the multiplier on debt is therefore small, but in a crisis with large adjustment needs its short-run effect can matter for fiscal policy. With a multiplier of 1.25 or more, the debt ratio of Finland rises from 80.5 to about 85 percent of GDP in the first two years of the adjustment and is still higher in 2028 than in 2024. A consolidation can then add to the pressure on public finances in the short run, because the debt ratio rises despite the adjustment. Boussard et al. (2012) and Eyraud and Weber (2013) show when consolidations raise the debt ratio in the short run, and Heimberger et al. (2024) discuss the consequences for the EU rules. The evidence on the European consolidations after 2010 suggests that multipliers of this size arise when interest rates are at their lower bound and many countries consolidate at the same time (Blanchard and Leigh, 2013; House et al., 2020). Consolidations also have larger output costs in downturns (Jordà and Taylor, 2016) and can lower output for a long time (Fatás and Summers, 2018; Gechert et al., 2019), while other studies find smaller costs, in particular for consolidations based on spending cuts (Guajardo et al., 2014; Alesina et al., 2019). Within the range of multipliers for normal times used in the joint draws, the safeguard can be met in all draws, so that this case is limited to crisis conditions.

For Finland, the safeguard binds partly because the Commission projects stock-flow adjustments that reflect surpluses of pension funds. These surpluses lower the deficit but not gross debt (Boivin and Darvas, 2025), so that gross debt falls more slowly than the deficit suggests. I keep these projections, like all other country-specific inputs of the Commission, in all analyses.

Table A6 in the Annex repeats the multiplier checks with the Commission's rule for closing the output gap. All effects have the same sign as with the persistent multiplier and are larger. With a multiplier of 1.5, Austria also cannot meet the safeguard, and the binding target of Germany rises by 7.00 instead of 4.08 percentage points. The safeguard results therefore do not depend on the specification of the multiplier used in the baseline.

3.4 Joint variation of forecasts and model parameters

Individual checks miss interactions between inputs. A large multiplier matters more when its effect is persistent, for example, and adverse forecasts add up once several criteria bind. I therefore draw the forecasts and the model parameters jointly in 500 draws, using Latin hypercube sampling to spread the draws evenly over their distributions. The forecast errors are drawn from their empirical distribution. Errors from the same source are drawn together: the short- and long-term rate errors of the same year, and the growth and inflation errors of the same country

and vintage. Errors from different sources are drawn independently, since the sources cover different samples and horizons. Over the years 2000 to 2015, in which the samples overlap, growth and rate errors are positively correlated, so that independent draws somewhat overstate the dispersion of $r - g$. The multiplier is drawn from a uniform distribution between 0.5 and 1.0, the semi-elasticity from a uniform distribution over its range, and the persistence of the multiplier takes each value from two to five years with equal probability. The settings of the third and fourth blocks stay at their baseline values. Each draw is a full model run for the four-year adjustment period, including the stochastic criterion.

The draws give the distribution of targets implied by past forecast errors, with the model parameters drawn over the range of published estimates. I report the median and the 25th and 75th percentiles of the change in the target across draws, and refer to the 25th and 75th percentiles as the favourable and the adverse combination of assumptions. These percentiles cover the middle half of the outcomes. They keep the results from being driven by the tails of the error distributions, such as the growth errors of the boom-bust years 2006 to 2008 in Ireland, the Baltic countries and Greece.

Figure 3 and Table 4 show the results by country, and Figure A1 in the Annex shows the distribution of debt across the draws when the SPB follows the path of the baseline binding target. The binding target requires a positive adjustment in 21 countries, six of which receive only technical information. I refer to these 21 countries as the countries with adjustment requirements. Their average required adjustment is 2.6 percentage points over four years. For these countries, the favourable combination lowers the DSA target by 0.36 points on average, the median draw raises it by 0.09 points and the adverse combination raises it by 0.65 points. For the binding target, the favourable combination lowers it by 0.26 points, the median draw raises it by 0.10 points and the adverse combination raises it by 0.63 points. Per year of the adjustment, the changes in the DSA target amount to about 0.09 and 0.16 points. The rules tolerate deviations in the control account of up to 0.3 percentage points of GDP in a year and 0.6 points cumulatively. Above these thresholds, the Commission prepares a report under Article 126(3) of the Treaty for countries with debt above 60 percent of GDP (Council of the European Union, 2024). The adverse change in the target over four years is thus about as large as the cumulative deviation that the rules tolerate. The comparison is approximate, since the control account measures deviations of net expenditure, which follow from the SPB path but are not identical to it. The adverse side is larger because the target rises without limit under adverse inputs, whereas favourable inputs soon make another criterion, and for the binding target the adjustment floor, bind. The error distributions do not explain this asymmetry at the 25th and 75th percentiles. Between these percentiles, the rate and growth errors are, if anything, larger on the favourable side (Table A1). Large adverse rate errors appear only in the upper tail, at the 90th percentile.

The DSA target moves most for Italy, from 0.36 points below to 1.53 points above the baseline, and for Greece, Spain, Austria, Portugal and Belgium, whose ranges span between 1.4

and 1.9 points. The effects are most asymmetric where the deficit criterion sets the target or lies close to it, as in France, Poland and Romania. In these countries, a larger multiplier raises the SPB that the deficit criterion requires, and favourable forecasts soon make another criterion bind. For France, even the favourable combination raises the DSA target, by 0.06 points, and the adverse combination raises it by 1.33 points. In the other countries, the results mainly reflect the forecasts, since a multiplier of 1.0 moves the DSA target by more than 0.1 points in only four countries.

For the binding target, the debt sustainability safeguard adds to the effects of the adverse combination. It raises the binding target of Finland by 1.21 percentage points, against 0.56 points for its DSA target, that of Austria by 0.96 points and that of Germany by 0.64 points. The safeguard can be met in all draws. In 11 percent of all country-draws, the binding target requires a total adjustment of more than 5 percentage points over four years. Adjustments of this size have been rare. Across 25 EU countries and 11 other advanced economies, improvements in the primary balance of more than 5 percentage points of GDP occurred in fewer than 10 percent of periods of up to seven years between 1970 and 2022 (Darvas et al., 2025a). The share of draws is 66 percent for Finland, 59 percent for Slovakia, 43 percent for Italy, 37 percent for Romania and 26 percent for France. For Finland and Slovakia, the baseline target already requires an adjustment of more than 5 points.

4 Stochastic analysis, stress tests and risk tolerance

4.1 Specification of the stochastic analysis

The stochastic criterion depends on choices about how the DSA estimates risk. These are modelling choices that should be made on statistical grounds. I vary six of these choices one at a time. First, the simulated shocks start in the first year of the adjustment period instead of the year after it, with shocks to the primary balance set to zero during the adjustment period. The criterion itself is unchanged: debt five years after the adjustment period must be below debt at the end of the adjustment period, so that the shocks of the adjustment years add to the uncertainty. Second, the horizon of the stochastic projection is ten instead of five years after the adjustment period. Third, the shock sample starts in 1990 or 2010 instead of 2000. Fourth, shocks are annual instead of quarterly. Fifth, shocks are drawn by bootstrap from a vector autoregression (VAR), as in Darvas et al. (2025a), instead of from a normal distribution. Sixth, the historical shocks are winsorised at the 1st and 99th percentiles instead of the 5th and 95th percentiles, or not at all. The Commission plans to refine its simulations by allowing for persistent shocks and by replacing the normal distribution of shocks with a bootstrap (Bec et al., 2025). The VAR bootstrap addresses the same two points, whereas the start and the horizon of the stochastic projection are not part of these planned refinements.

These choices move the SPB that the stochastic criterion requires. With winsorisation at the

Table 4: SPB targets by country: baseline and joint draws of forecasts and model parameters, four-year adjustment (percent of GDP and percentage points)

	Debt (1)	Required (2)	Own	DSA target					Binding target				
			Band (3)	Base (4)	P25 (5)	Median (6)	P75 (7)	Band (8)	Base (9)	P25 (10)	Median (11)	P75 (12)	Band (13)
Greece	153.9	0.85	2.48	2.31	-0.69	+0.14	+1.19	1.88	2.58	-0.45	+0.12	+0.95	1.40
Italy	138.6	4.36	2.79	3.29	-0.36	+0.33	+1.53	1.89	3.31	-0.36	+0.34	+1.52	1.88
France	112.4	3.72	1.89	0.75	+0.06	+0.59	+1.33	1.27	0.75	+0.08	+0.60	+1.36	1.28
Spain	105.5	3.44	1.93	2.56	-0.71	+0.02	+0.87	1.58	2.59	-0.64	+0.10	+0.88	1.52
Belgium	103.4	3.24	2.08	1.18	-0.47	+0.14	+0.95	1.43	1.21	-0.48	+0.12	+0.93	1.41
Portugal	95.6	0.32	1.54	2.49	-0.73	-0.05	+0.70	1.43	2.52	-0.32	-0.06	+0.68	1.00
Finland	80.5	5.36	1.05	1.79	-0.50	-0.03	+0.56	1.07	4.83	-0.56	+0.10	+1.21	1.77
Austria	79.5	3.56	1.67	0.81	-0.68	+0.02	+0.82	1.49	2.22	-0.36	+0.16	+0.96	1.32
Hungary	74.3	2.64	1.32	2.64	-0.60	-0.07	+0.46	1.06	2.67	-0.60	-0.08	+0.44	1.04
Cyprus	70.6	0.00	0.95	0.35	-0.22	+0.15	+0.56	0.78	3.48	0.00	0.00	0.00	0.00
Slovenia	68.1	1.76	0.88	0.48	-0.23	+0.12	+0.53	0.76	0.52	-0.18	+0.12	+0.52	0.70
Germany	62.5	3.48	1.02	1.00	-0.52	-0.03	+0.50	1.02	2.46	-0.28	+0.12	+0.64	0.92
Croatia	59.5	1.60	0.97	-0.46	-0.39	+0.05	+0.51	0.90	-0.36	0.00	0.00	+0.44	0.44
Slovakia	58.5	5.08	0.89	0.81	-0.33	+0.06	+0.46	0.79	0.82	-0.32	+0.08	+0.48	0.80
Poland	53.7	3.20	0.96	0.58	-0.04	+0.20	+0.51	0.54	0.59	-0.04	+0.20	+0.52	0.56
Malta	52.0	2.03	0.93	-1.23	-0.05	+0.12	+0.30	0.35	-0.87	-0.03	0.00	+0.04	0.07
Romania	50.9	4.68	0.91	0.26	-0.03	+0.22	+0.48	0.52	0.27	0.00	+0.24	+0.48	0.48
Netherlands	47.1	0.72	0.90	0.06	-0.34	+0.01	+0.41	0.75	0.08	-0.33	0.00	+0.40	0.73
Czechia	45.2	0.48	0.83	0.37	-0.32	-0.03	+0.33	0.64	0.39	-0.14	0.00	+0.32	0.46
Latvia	44.5	1.23	0.89	-1.28	-0.18	+0.12	+0.53	0.70	-0.13	-0.05	+0.03	+0.13	0.18
Ireland	42.5	-3.16	0.87	-0.66	-0.31	-0.04	+0.28	0.59	-0.63	-0.32	-0.04	+0.28	0.60
Lithuania	38.3	0.64	0.81	0.24	-0.31	-0.02	+0.33	0.64	0.27	-0.28	-0.04	+0.32	0.60
Sweden	32.0	-1.43	0.85	-1.78	-0.27	-0.03	+0.32	0.59	-0.74	-0.36	-0.17	+0.03	0.39
Luxembourg	27.1	-0.32	0.80	-0.25	-0.26	-0.03	+0.24	0.50	-0.22	-0.28	-0.04	+0.24	0.52
Denmark	26.5	-4.00	0.87	-1.41	-0.34	-0.05	+0.27	0.61	-1.09	0.00	0.00	0.00	0.00
Bulgaria	24.5	1.21	0.74	-2.07	-0.24	-0.03	+0.27	0.50	-0.88	-0.06	-0.01	+0.07	0.13
Estonia	21.4	0.00	0.76	-1.91	-0.24	-0.01	+0.26	0.50	-0.29	0.00	0.00	0.00	0.00
Mean (adjusting)	73.7	2.55	1.31	0.79	-0.36	+0.09	+0.65	1.01	1.23	-0.26	+0.10	+0.63	0.89

Source: Author's calculations. Note: Column (1) is debt in 2024. Column (2) is the adjustment that the baseline binding target requires, relative to the SPB in 2024. Column (3) is the band of the SPB required by the own criterion: the debt criterion of the baseline scenario. Base is the baseline target. P25, Median and P75 are the 25th, 50th and 75th percentiles of the change of the target across 500 joint draws, relative to the baseline. Band is the difference between P75 and P25. The last row gives the mean across the 21 countries whose binding target requires a positive adjustment.

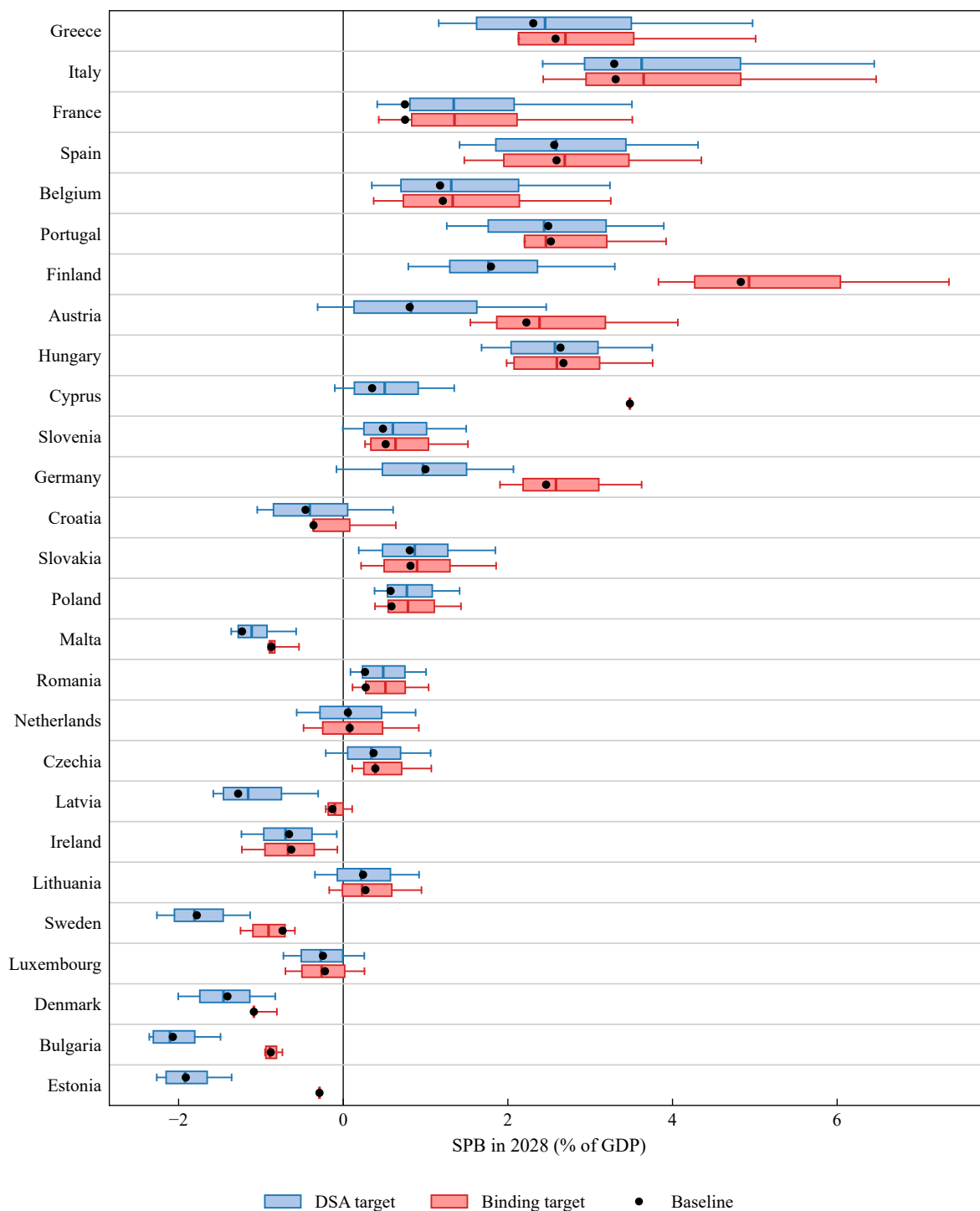


Figure 3: SPB targets by country: baseline and joint draws, four-year adjustment (percent of GDP)

Source: Author's calculations. Note: SPB at the end of the adjustment period. For each country, boxes show the 25th to 75th percentiles of the DSA target (blue) and of the binding target (red) across 500 joint draws of forecasts and model parameters, lines in the boxes the median and whiskers the 10th to 90th percentiles. Dots show the baseline targets. Countries are ordered by debt in 2024.

1st and 99th percentiles, it rises by 0.52 percentage points on average, without winsorisation by 0.83 points and with an early start by 0.20 points, and with annual shocks it falls by 0.14 points. Most of these changes do not pass through to the target, however, because in the baseline the stochastic criterion sets the DSA target only for Finland and lies below other criteria for all other countries.

The winsorisation has the largest effect on the targets. Clipping the shocks at the 1st and 99th percentiles raises the DSA target of France by 0.36 percentage points and those of Finland and Austria by 0.27 and 0.24 points. Without winsorisation, the targets of France and Austria rise by 0.63 points, that of Finland by 0.38 points and that of Italy by 0.17 points. The VAR bootstrap raises the target of Finland by 0.46 points. The other choices change no target by more than 0.11 points.

The early start adds the shocks of the adjustment years to the uncertainty, but the criterion still compares debt after the adjustment period with debt at its end. The SPB that the criterion requires therefore rises by only 0.20 points on average, and no target changes by more than 0.1 points. Combined with a ten-year horizon, the early start raises the target of Greece by 0.54 points. These results indicate what is at stake in the proposals of Wieland (2024) and Erce (2025) to include uncertainty during the adjustment period. On their own, the shocks of the adjustment years change the targets little. The start and the horizon matter more in combination with the probability threshold, as Section 4.2 shows.

4.2 Calibration of risk tolerance

The probability threshold, the size of the stress tests and the ageing cost period implicitly calibrate the degree of uncertainty considered acceptable under the rules. Since these settings have no true value that data could reveal, I do not assign them a range. Blanchard et al. (2021) make a similar point in their proposal to base the EU fiscal rules on a stochastic DSA. Instead, I report how the SPB changes relative to the baseline under alternative settings. Table 3b reports these changes at the three levels. The stochastic criterion appears as a grid of threshold, start and horizon, while the stress tests and the ageing cost period vary one at a time. Two scenarios set all settings at the lenient or the strict end of the alternatives considered.

The probability threshold has a large effect on the stochastic criterion itself. A threshold of 80 percent raises the SPB that this criterion requires by 0.58 percentage points on average and by more than 0.1 points in all 15 countries with a reference trajectory and adjustment requirements. A threshold of 60 percent lowers it by 0.49 points. Neither choice passes through to the targets, however. With a threshold of 80 percent, the DSA targets rise by 0.03 points on average, and only those of Finland and Austria rise by more than 0.1 points. The threshold has a larger effect in combination with an early start. With an early start and a five-year horizon, a threshold of 80 percent raises the DSA target by 0.15 points on average, that of Greece by 1.48 points and that of Finland by 0.60 points. With a ten-year horizon, it raises the target of Greece by 2.0 points.

Among the stress tests, the size of the adverse $r - g$ test matters the most. In this test, interest rates rise and growth falls by 0.5 percentage points each. Shocks of 0.75 points raise the SPB that the test requires by 0.28 points on average, the DSA target by 0.16 points and the binding target by 0.12 points, with the largest effect for Italy (0.49). Shocks of 0.25 points lower the DSA target by 0.06 points on average. A lower-SPB shock of 0.75 points raises the DSA target by 0.06 points, whereas the size of the financial stress test changes no target.

Although the size of the stress tests has no true value, past forecast errors can help to gauge the implicit degree of uncertainty considered acceptable. The adverse $r - g$ test raises $r - g$ by 1 percentage point. Among the errors of Section 3, the error in the long-term rate minus the error in growth exceeded 1 point in 30 percent of cases, both when the two errors are combined independently and when they are paired by year for 2000 to 2015. The test therefore covers past errors in $r - g$ up to about their 70th percentile. This percentile is comparable to the probability threshold of 70 percent in the stochastic criterion, although the two refer to different quantities and different sources of risk. The percentile refers to an error in an input, and the threshold to a probability about the debt outcome. The two sources of risk are errors in the central projection for the stress test and future shocks around it for the stochastic criterion. The alternative sizes of the test correspond to higher percentiles. Shocks of 0.75 points, a shift in $r - g$ of 1.5 points, cover errors up to the 75th percentile and raise the DSA target by 0.16 points on average. The comparison is approximate, since the growth errors are averages over five years and the rate errors refer to rates ten years ahead.

After the adjustment period, the DSA keeps the SPB before ageing costs at its target. Ageing costs are public spending on pensions, health care and long-term care. Any increase in these costs relative to the last adjustment year then lowers the SPB one for one, and any decrease raises it (Darvas et al., 2025b). The ageing cost period is the number of years over which these changes enter. The baseline period of ten years covers the whole DSA horizon. It assumes that governments adjust no other part of the budget to offset changes in ageing costs. For countries whose ageing costs rise, the rules thus accept no risk that such an offset fails. For countries whose ageing costs fall, the ten-year period instead credits them with the full decline. With a period of five years, the DSA counts only the changes in ageing costs up to the fifth year.

The ageing cost period changes the targets of most countries. A period of five instead of ten years lowers the DSA target by 0.24 percentage points on average and that of Spain by 0.89 points. It raises the targets of Bulgaria, Latvia, Estonia, Croatia and Sweden, whose ageing costs fall. For these countries, the shorter period is the stricter setting. The lenient scenario lowers the DSA target by 0.40 points on average, mostly through the ageing cost period, while the strict scenario raises it by 0.18 points. The two scenarios are asymmetric because the ageing cost period cannot be longer than the DSA horizon. Table A3 in the Annex reports the effects by country.

Table 5 compares the effects of the risk standard with those of the forecasts and model parameters. For the countries with adjustment requirements, the lenient risk standard lowers

the DSA target by 0.40 points on average, about as much as the favourable combination of the joint draws. Adverse interest-growth shocks of 0.75 instead of 0.5 percentage points raise it by 0.16 points, a quarter of the adverse combination. The comparison holds mainly on the lenient side. The strict risk standard raises the DSA target by only 0.18 points, far less than the adverse combination. The lenient result comes mostly from the shorter ageing cost period, which cannot be longer than the DSA horizon. The two kinds of range also differ in nature. The range of the forecasts comes from data, whereas the alternative settings of the risk standard are values that I chose. The specification of the stochastic analysis matters much less. The VAR bootstrap raises the DSA target by only 0.02 points. The current values of the risk standard imply that the rules protect against errors in $r - g$ up to about their 70th percentile. They also imply that governments offset none of the change in ageing costs over the DSA horizon. These levels are set by convention. Whether they are appropriate is a question for policymakers.

Table 5: Uncertainty about the economy and tolerance for risk: mean change of the targets, four-year adjustment (percentage points of GDP)

Setting	DSA target	Binding target
<i>Forecasts and model parameters</i>		
Joint draws, 25th percentile (favourable)	-0.36	-0.26
Joint draws, 75th percentile (adverse)	+0.65	+0.63
Potential growth $T + 10$, -1 pp.	+0.42	+0.35
Real long-term rate $T + 10$, +1 pp.	+0.23	+0.17
Fiscal multiplier 1.0	+0.06	+0.22
<i>Specification of the stochastic analysis</i>		
VAR bootstrap	+0.02	0.00
No winsorisation	+0.09	+0.04
Start in first adjustment year	0.00	0.00
<i>Risk standard</i>		
Probability threshold 60%	-0.01	0.00
Probability threshold 80%	+0.03	+0.01
Threshold 80%, start in first adjustment year	+0.15	+0.09
Adverse $r - g$ shocks 0.25 pp.	-0.06	-0.05
Adverse $r - g$ shocks 0.75 pp.	+0.16	+0.12
Lower-SPB shock 0.25 pp.	0.00	-0.01
Lower-SPB shock 0.75 pp.	+0.06	+0.04
Ageing cost period 5 years	-0.24	-0.20
Lenient scenario	-0.40	-0.27
Strict scenario	+0.18	+0.13

Source: Author's calculations. Note: Mean change of the target relative to the baseline across the 21 countries with adjustment requirements. Divide by four for the change in the annual adjustment. Joint draws: 25th and 75th percentiles of the change across 500 draws of forecasts and model parameters. The other rows are individual checks and alternative settings from Tables 3a and 3b. Runs in which the debt sustainability safeguard cannot be met are left out of the binding target.

5 Debt repayment profile and data vintage

The repayment profile of debt matters mostly for Greece and Finland. In the baseline, the share of long-term debt that matures each year follows the Commission's inputs, which converge to a historical average. The alternative repays the debt outstanding in 2024 according to Eurostat data on debt by residual maturity, which are not available for Hungary, Luxembourg and the Netherlands. Maturing debt is refinanced at market rates, which in both countries exceed the average interest rate on the existing debt, so that the repayment profile determines how fast the average interest rate rises.

For Greece, the Commission's inputs let the share of long-term debt that matures each year rise from about 4 percent in 2026 to between 9 and 11 percent after 2033. In the Eurostat data, this share stays between 2 and 4 percent, because much of Greek debt consists of official loans with long maturities. Less debt is refinanced at market rates, so that for the same SPB path the average interest rate in 2038 is 3.0 instead of 3.5 percent and debt is 3 percentage points of GDP lower. The SPB that the adverse $r - g$ stress test requires falls accordingly, which lowers the DSA target of Greece by 0.57 points and its binding target by 0.42 points. For Finland, the effect goes in the opposite direction. The Eurostat data show about 14 percent of long-term debt maturing each year until 2028, against 3 to 4 percent in the Commission's inputs. More debt is refinanced at market rates, the average interest rate in 2038 is 2.7 instead of 2.2 percent and debt is 3 points higher. This raises the SPB that the stochastic criterion requires, and with it the DSA target, by 0.26 points, and the binding target, which the debt sustainability safeguard sets, by 0.32 points. The targets of the other countries change by less than 0.15 points.

The sensitivity analysis so far has used the 2024 data of the Commission's prior guidance, whereas later applications of the rules will use newer data. I therefore rerun the individual checks and the alternative settings of the risk standard with the data from September 2026 and a four-year adjustment period from 2027 to 2030. The targets themselves differ from those with the 2024 data, as Table A5 in the Annex shows, but the effects of the inputs hardly change. Table A4 in the Annex compares the mean effect of each check across the two vintages. The correlation is 0.99 for the DSA target and 0.98 for the binding target, and the mean effects differ by about 0.02 percentage points on average. The largest differences concern potential growth and the crisis multiplier. Potential growth 1 point higher lowers the DSA target by 0.29 and 0.35 points. A multiplier of 1.5 raises the binding target by 0.95 and 0.82 points. The sensitivities reported in this paper are therefore not specific to the conditions of 2024.

The average effects hide changes for individual countries, because the criterion that sets the target changes with the data. With the 2026 data, a different DSA criterion sets the target for four countries and a different constraint sets the binding target for eight (Tables 1 and A5). The debt sustainability safeguard no longer binds for Austria, whose binding target falls from 2.22 to 1.16 percent of GDP. Finland's binding target rises from 4.83 to 8.49 percent of GDP, which requires an annual adjustment of 2.45 percentage points. Which inputs matter for a country

therefore changes when its binding criterion changes.

6 Conclusions

How much an input of the DSA changes the SPB targets of the reformed EU fiscal rules depends on which criterion is binding and thus determines the target. Because forecasts and model parameters relating to main debt drivers shift all deterministic criteria, they matter for most countries. I draw forecasts and model parameters jointly from past forecast errors and published estimates. At the 25th percentile of these draws, the DSA target of the countries with adjustment requirements falls by 0.36 percentage points on average. At the 75th percentile, it rises by 0.65 points. These changes compare with an average required adjustment of 2.6 points over four years. The adverse change is about as large as the cumulative deviation that the control account tolerates. Because the errors are demeaned, the draws measure the size of forecast errors but not their bias. Growth forecasts, for instance, have been optimistic on average in the past (Frankel and Schreger, 2013).

Within the alternatives considered, the calibration of assumptions in the rules that define acceptable degrees of risk can move the targets by similar magnitudes. This holds mainly on the lenient side, and these alternatives are chosen values rather than ranges estimated from data. A lenient risk standard lowers the DSA target by 0.40 points. Stress-test shocks of 0.75 instead of 0.5 percentage points raise it by 0.16 points. The specification of the stochastic analysis matters much less, because the stochastic criterion sets the target only for Finland. The refinements that the Commission plans would therefore change few targets (Bec et al., 2025). The rules protect against errors in the central projection mainly through the deterministic stress tests. The adverse $r - g$ test, for example, is larger than about 70 percent of past forecast errors, implying an acceptable degree of uncertainty about the central projection similar to the probability threshold of the stochastic DSA.

These results suggest three priorities for the review of the DSA. First, the size of the stress tests and the ageing cost period deserve as much attention as the stochastic simulations. The stochastic approach is more coherent in theory, but it currently sets the target for only one country. Second, the debt sustainability safeguard can interact with the fiscal multiplier and become self-defeating, because a larger adjustment slows the decline in debt that it tests. Measuring the decline of debt over a longer window would reduce this effect, and dropping the safeguard would remove it. Third, the level of risk that the rules implicitly accept via stress tests and probability thresholds should be justified explicitly. This choice belongs to policymakers.

In addition, future reviews should consider how policies that raise potential growth could in theory ease the targets. Potential output is determined by the EU's commonly agreed methodology, which does not respond to policy. In Gottschalk et al. (2025), we let selected measures of the medium-term fiscal plans raise potential growth in the DSA. Germany's infrastructure package, for example, lowers its SPB target from 0.99 to 0.84 percent of GDP. Scaled from the

individual checks, a reform that raises potential growth by 0.1 percentage points around $T + 10$ lowers the SPB required by the debt criterion by about 0.05 points. The DSA also leaves out the reverse channel, through which consolidations can lower potential output for a long time (Fatás and Summers, 2018; Gechert et al., 2019).

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Annex

Table A1: Distribution of past forecast errors

Assumption	Source of errors	Sample	N	Mean error	P10	P25	P75	P90
Real short-term rate, $T + 10$	Bundesbank: 1-year rate in ten years minus forward rate	Germany, year ends 1986-2015	30	-4.13	-1.61	-1.22	+0.40	+3.11
Real long-term rate, $T + 10$	Bundesbank: 10-year rate in ten years minus 10Y10Y forward rate	Germany, year ends 1986-2015	30	-2.98	-1.53	-1.24	+0.89	+2.36
Inflation, $T + 10$	IMF WEO: CPI inflation, average error over five years	EU27, autumn vintages 2000-2018	513	+0.14	-1.33	-0.74	+0.64	+1.35
Potential growth, $T + 10$	IMF WEO: real GDP growth, average error over five years	EU27, autumn vintages 2000-2018	513	-0.70	-2.53	-0.84	+1.08	+2.31
Change in ageing costs, 2024–2038	Ageing Report 2024: scenarios except pension policy, change in ageing costs 2024-2038	EU27, 8 scenarios	216	–	-0.38	-0.24	+0.14	+0.62

Source: Author’s calculations based on Ech-charfi (2024), the Deutsche Bundesbank term structure of interest rates and European Commission (2024a). Note: Errors are realised minus forecast values, in percentage points. WEO errors are averages over the five forecast years of each autumn vintage, demeaned by country. Forward-rate errors compare the forward rate at each year end with the rate realised ten years later, demeaned. Ageing costs: deviation of each scenario from the baseline change in the total cost of ageing between 2024 and 2038, in percentage points of GDP, for all countries and all scenarios except the pension policy scenarios. Mean error: average error before demeaning. P10 to P90: percentiles of the demeaned errors. The individual checks shift each forecast by a round amount close to half the distance between the 25th and the 75th percentile; the joint draws use the full distribution.

Table A2a: Change of the SPB relative to the baseline: forecasts and model parameters, seven-year adjustment (percentage points of GDP)

Input	Value	Own criterion		DSA target		Binding target	
		Mean	Largest	Mean	Largest	Mean	Largest
1. Forecasts							
Real short-term rate, $T + 10$	−1 pp.	−0.04	−0.15 ITA	−0.04	−0.15 ITA	−0.03	−0.18 ITA
	+1 pp.	+0.04	+0.17 ITA	+0.04	+0.15 ITA	+0.04	+0.15 ITA
Real long-term rate, $T + 10$	−1 pp.	−0.30	−0.65 GRC	−0.27	−0.47 ITA	−0.17	−0.42 ESP
	+1 pp.	+0.30	+0.60 GRC	+0.30	+0.57 ITA	+0.21	+0.48 GRC
Inflation, $T + 10$	−0.75 pp.	+0.15	+0.50 ITA	+0.10	+0.47 GRC	+0.06	+0.42 GRC
	+0.75 pp.	−0.13	−0.41 ITA	+0.01	+0.30 ITA	+0.01	−0.28 FIN
Potential growth, $T + 10$	−1 pp.	+0.54	+1.34 ITA	+0.47	+1.10 ITA	+0.36	+0.86 ITA
	+1 pp.	−0.51	−1.16 ITA	−0.29	−0.60 FIN	−0.16	−0.49 FIN
Ageing costs	−0.2 pp.	−0.07	−0.15 AUT	−0.08	−0.14 AUT	−0.05	−0.14 CZE
	+0.2 pp.	+0.08	+0.15 AUT	+0.09	+0.14 AUT	+0.06	+0.14 CZE
Real short-term rate, $T + 30$	−0.5 pp.	0.00	−0.02 PRT	0.00	−0.02 PRT	0.00	0.00
	+0.5 pp.	0.00	+0.02 PRT	0.00	+0.02 PRT	0.00	0.00
Real long-term rate, $T + 30$	−0.5 pp.	−0.02	−0.07 GRC	−0.02	−0.05 AUT	0.00	−0.04 ITA
	+0.5 pp.	+0.02	+0.07 GRC	+0.02	+0.06 GRC	+0.01	+0.07 ESP
Inflation, $T + 30$	−0.25 pp.	+0.02	+0.06 GRC	+0.01	+0.05 GRC	+0.01	+0.07 PRT
	+0.25 pp.	−0.02	−0.06 GRC	−0.01	−0.05 BEL	0.00	−0.02 BEL
2. Model parameters							
Fiscal multiplier	0.5	−0.01	−0.07 SVK	−0.02	−0.06 SVK	−0.07	−0.42 FIN
	1	+0.01	+0.07 SVK	+0.03	+0.23 FRA	+0.08	+0.56 FIN
	1.5	+0.04	+0.21 SVK	+0.13	+0.79 FRA	+0.31	+2.10 FIN
Multiplier persistence	2 years	0.00	+0.13 ITA	−0.01	−0.05 FIN	−0.05	−0.28 FIN
	4 years	+0.02	+0.05 SVK	+0.03	+0.16 FRA	+0.05	+0.35 FIN
	5 years	+0.03	+0.11 FRA	+0.05	+0.33 FRA	+0.10	+0.63 FIN
Budget semi-elasticity	×0.9	−0.01	−0.02 ROU	−0.01	−0.04 FRA	−0.03	−0.14 FIN
	×1.1	+0.01	+0.02 ROU	+0.01	+0.06 FRA	+0.02	+0.21 FIN

Source: Author's calculations. Note: See Table 3a. With a seven-year adjustment, the debt sustainability safeguard can be met in all runs.

Table A2b: Change of the SPB relative to the baseline: estimation of risk, risk standard and data, seven-year adjustment (percentage points of GDP)

Input	Value	Own criterion		DSA target		Binding target	
		Mean	Largest	Mean	Largest	Mean	Largest
3. Estimation of risk							
Start of stochastic projection	first adjustment year	+0.48	+1.98 GRC	+0.14	+1.96 GRC	+0.10	+1.82 GRC
Horizon of stochastic projection	10 years	0.00	−0.80 FIN	0.00	+0.09 GRC	0.00	+0.06 GRC
Start of shock sample	1990	−0.02	−0.08 GRC	0.00	0.00	0.00	0.00
	2010	+0.01	+0.34 SVN	0.00	0.00	0.00	0.00
Shock frequency	annual	−0.14	−0.56 MLT	0.00	0.00	0.00	0.00
Shock distribution	VAR bootstrap	+0.06	−0.70 ROU	+0.06	+0.60 GRC	+0.03	+0.54 GRC
Winsorised shocks	P1 and P99	+0.52	+1.08 ESP	+0.10	+0.53 FRA	+0.04	+0.25 ITA
	off	+0.82	+1.64 ESP	+0.21	+0.99 GRC	+0.11	+0.84 GRC
4. Risk standard							
Threshold, start, horizon	60%, after adj., 5 years	−0.50	−0.90 GRC	0.00	0.00	0.00	0.00
	80%, after adj., 5 years	+0.58	+1.03 GRC	+0.11	+1.00 GRC	+0.06	+0.84 GRC
	60%, after adj., 10 years	−0.40	−1.09 FIN	0.00	0.00	0.00	0.00
	80%, after adj., 10 years	+0.45	+0.98 GRC	+0.07	+0.96 GRC	+0.05	+0.84 GRC
	60%, first adj. year, 5 years	−0.30	−0.71 MLT	0.00	0.00	0.00	0.00
	80%, first adj. year, 5 years	+1.37	+4.26 GRC	+0.42	+4.05 GRC	+0.30	+3.92 GRC
	60%, first adj. year, 10 years	−0.24	−1.04 FIN	0.00	0.00	0.00	0.00
	70%, first adj. year, 10 years	+0.33	+1.45 GRC	+0.07	+1.42 GRC	+0.06	+1.26 GRC
Adverse $r - g$ shock	80%, first adj. year, 10 years	+0.99	+3.18 GRC	+0.26	+3.16 GRC	+0.20	+3.01 GRC
	0.25 pp.	−0.27	−0.49 ITA	−0.04	−0.21 BEL	−0.01	−0.14 ESP
Lower-SPB shock	0.75 pp.	+0.26	+0.48 ITA	+0.16	+0.44 GRC	+0.09	+0.36 GRC
	0.25 pp.	−0.20	−0.28 ITA	0.00	−0.06 DEU	0.00	0.00
Financial stress shock	0.75 pp.	+0.21	+0.28 ITA	+0.06	+0.23 PRT	+0.04	+0.21 PRT
	0.5 pp.	−0.03	−0.13 ITA	0.00	0.00	0.00	0.00
Ageing cost period	1.5 pp.	+0.03	+0.13 ITA	0.00	0.00	0.00	0.00
	5 years	−0.17	−0.87 ESP	−0.19	−0.85 CZE	−0.12	−0.77 ESP
All settings	lenient	−0.17	−0.87 ESP	−0.36	−1.15 ESP	−0.16	−1.12 ESP
	strict	0.00	0.00	+0.21	+1.00 GRC	+0.12	+0.84 GRC
Data							
Repayment profile	Eurostat profile	−0.01	−0.48 GRC	−0.01	−0.36 GRC	+0.02	+0.42 FIN

Source: Author's calculations. Note: See Table 3b. With a seven-year adjustment, the debt sustainability safeguard can be met in all runs.

Table A3: Effect of selected settings of the risk standard by country, DSA target, four-year adjustment (percentage points of GDP)

	Thr. 80%	Early start	Early, 80%	$r - g$ 0.75 pp.	Low SPB 0.75 pp.	Ageing 5 yrs	Lenient	Strict
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Greece	+0.02	0.00	+1.48	+0.44	0.00	-0.41	-0.62	+0.44
Italy	0.00	0.00	+0.14	+0.49	0.00	0.00	-0.38	+0.49
France	+0.04	0.00	+0.35	+0.40	+0.02	0.00	-0.08	+0.40
Spain	0.00	0.00	0.00	+0.33	+0.05	-0.89	-1.25	+0.33
Belgium	0.00	0.00	0.00	+0.36	0.00	-0.49	-0.70	+0.36
Portugal	+0.01	0.00	+0.23	+0.27	+0.19	-0.77	-1.06	+0.27
Finland	+0.46	+0.09	+0.60	+0.10	+0.18	0.00	-0.38	+0.46
Austria	+0.11	0.00	+0.32	+0.31	+0.11	-0.22	-0.55	+0.31
Hungary	+0.01	0.00	+0.01	+0.19	+0.18	-0.50	-1.07	+0.19
Cyprus	0.00	0.00	0.00	+0.13	+0.17	-0.23	-0.42	+0.17
Slovenia	0.00	0.00	0.00	+0.12	+0.19	-0.20	-0.39	+0.19
Germany	0.00	0.00	0.00	+0.19	+0.17	-0.06	-0.26	+0.19
Croatia	0.00	0.00	0.00	0.00	0.00	+0.05	+0.05	0.00
Slovakia	0.00	0.00	0.00	+0.11	+0.19	-0.15	-0.34	+0.19
Poland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Malta	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Romania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Netherlands	0.00	0.00	0.00	0.00	0.00	-0.65	-0.65	0.00
Czechia	0.00	0.00	0.00	0.00	0.00	-0.66	-0.66	0.00
Latvia	0.00	0.00	0.00	0.00	0.00	+0.20	+0.20	0.00
Ireland	0.00	0.00	0.00	0.00	0.00	-0.46	-0.46	0.00
Lithuania	0.00	0.00	0.00	0.00	0.00	-0.54	-0.54	0.00
Sweden	0.00	0.00	0.00	0.00	0.00	+0.05	+0.05	0.00
Luxembourg	0.00	0.00	0.00	0.00	0.00	-0.70	-0.70	0.00
Denmark	0.00	0.00	0.00	0.00	0.00	-0.16	-0.16	0.00
Bulgaria	0.00	0.00	0.00	0.00	0.00	+0.26	+0.26	0.00
Estonia	0.00	0.00	0.00	0.00	0.00	+0.09	+0.09	0.00
Mean	+0.03	0.00	+0.15	+0.16	+0.06	-0.24	-0.40	+0.18

Source: Author's calculations. Note: Change of the DSA target relative to the baseline. (1) Probability threshold of 80 percent. (2) Stochastic projection starting in the first adjustment year. (3) Both. (4) Adverse $r - g$ shocks of 0.75 percentage points. (5) Lower-SPB shock of 0.75 percentage points. (6) Ageing cost period of five years. (7) and (8) Lenient and strict scenarios, see Table 3b. Mean: mean across the 21 countries with adjustment requirements. Countries are ordered by debt in 2024.

Table A4: Mean change of the SPB by individual check with the 2024 and the September 2026 data, four-year adjustment (percentage points of GDP)

Setting	Alternative	Own criterion		DSA target		Binding target	
		2024	2026	2024	2026	2024	2026
1. Forecasts							
Real short-term rate, $T + 10$	−1 pp.	−0.04	−0.04	−0.04	−0.04	−0.03	−0.03
	+1 pp.	+0.04	+0.04	+0.04	+0.04	+0.03	+0.04
Real long-term rate, $T + 10$	−1 pp.	−0.26	−0.26	−0.23	−0.26	−0.17	−0.20
	+1 pp.	+0.25	+0.26	+0.23	+0.25	+0.17	+0.19
Inflation, $T + 10$	−0.75 pp.	+0.18	+0.20	+0.11	+0.14	+0.10	+0.12
	+0.75 pp.	−0.16	−0.16	−0.04	−0.07	−0.03	−0.09
Potential growth, $T + 10$	−1 pp.	+0.54	+0.56	+0.42	+0.48	+0.35	+0.39
	+1 pp.	−0.51	−0.54	−0.29	−0.35	−0.20	−0.29
Ageing costs	−0.2 pp.	−0.09	−0.09	−0.08	−0.09	−0.06	−0.07
	+0.2 pp.	+0.09	+0.09	+0.08	+0.10	+0.06	+0.04
Real short-term rate, $T + 30$	−0.5 pp.	0.00	0.00	0.00	0.00	0.00	0.00
	+0.5 pp.	0.00	0.00	0.00	0.00	0.00	0.00
Real long-term rate, $T + 30$	−0.5 pp.	−0.01	−0.01	−0.01	−0.01	−0.01	0.00
	+0.5 pp.	+0.01	+0.01	+0.01	+0.01	0.00	+0.01
Inflation, $T + 30$	−0.25 pp.	+0.01	+0.01	+0.01	+0.01	0.00	+0.01
	+0.25 pp.	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01
2. Model parameters							
Fiscal multiplier	0.5	−0.01	−0.01	−0.04	−0.02	−0.13	−0.16
	1	+0.01	+0.01	+0.06	+0.03	+0.22	+0.26
	1.5	+0.04	+0.04	+0.28	+0.24	+0.95	+0.82
Multiplier persistence	2 years	−0.01	−0.01	−0.03	−0.02	−0.08	−0.10
	4 years	+0.01	+0.01	+0.04	+0.02	+0.10	+0.12
	5 years	+0.03	+0.03	+0.08	+0.06	+0.18	+0.23
Budget semi-elasticity	×0.9	−0.01	−0.01	−0.01	−0.01	−0.05	−0.05
	×1.1	+0.01	+0.01	+0.01	+0.01	+0.06	+0.06
3. Estimation of risk							
Start of stochastic projection	first adjustment year	+0.20	+0.23	0.00	+0.01	0.00	0.00
Horizon of stochastic projection	10 years	+0.14	+0.14	−0.01	−0.01	0.00	0.00
Start of shock sample	1990	−0.02	−0.01	0.00	0.00	0.00	0.00
	2010	+0.01	+0.01	0.00	0.00	0.00	0.00
Shock frequency	annual	−0.14	−0.17	0.00	0.00	0.00	0.00
Shock distribution	VAR bootstrap	+0.06	+0.02	+0.02	+0.03	0.00	0.00
Winsorised shocks	P1 and P99	+0.52	+0.51	+0.04	+0.02	+0.02	+0.01
	off	+0.83	+0.81	+0.09	+0.11	+0.04	+0.06
4. Risk standard							
Probability threshold	60%	−0.49	−0.54	−0.01	−0.01	0.00	0.00
	80%	+0.58	+0.62	+0.03	+0.07	+0.01	+0.02
Adverse $r - g$ shock	0.25 pp.	−0.28	−0.27	−0.06	−0.06	−0.05	−0.05
	0.75 pp.	+0.28	+0.27	+0.16	+0.18	+0.12	+0.14
Financial stress shock	0.5 pp.	−0.02	−0.02	0.00	0.00	0.00	0.00
	1.5 pp.	+0.02	+0.02	0.00	0.00	0.00	0.00
Lower-SPB shock	0.25 pp.	−0.23	−0.23	0.00	−0.01	−0.01	−0.01
	0.75 pp.	+0.23	+0.23	+0.06	+0.10	+0.04	+0.07
Ageing cost period	5 years	−0.22	−0.20	−0.24	−0.23	−0.20	−0.18
Scenario	lenient	−0.22	−0.20	−0.40	−0.43	−0.27	−0.32
	strict	0.00	0.00	+0.18	+0.23	+0.13	+0.16
Data							
Repayment profile	Eurostat profile	−0.01	+0.04	−0.01	+0.04	0.00	+0.04

Source: Author's calculations. Note: Mean change across the 21 countries with adjustment requirements in the 2024 data, relative to the baseline of each data vintage. 2024: Commission prior guidance data, adjustment from 2025 to 2028. 2026: September 2026 data, adjustment from 2027 to 2030.

Table A5: SPB targets with the September 2026 data (percent of GDP)

	2026		Four-year adjustment, 2027–2030					Change vs. 2024 data			Seven-year
	Debt (1)	SPB (2)	DSA target (3)	DSA criterion (4)	Binding target (5)	Binding constraint (6)	Annual adj. (7)	DSA target (8)	Binding target (9)	Annual adj. (10)	Binding target (11)
Greece	140.7	2.54	2.05	Adverse $r - g$ test: debt declines	2.54	Adjustment floor	0.00	−0.26	−0.04	−0.21	2.54
Italy	138.5	0.97	3.18	Adverse $r - g$ test: debt declines	3.21	DSA criteria	0.56	−0.11	−0.10	−0.53	3.00
France	118.1	−1.97	1.77	Adverse $r - g$ test: debt declines	1.79	DSA criteria	0.94	+1.03	+1.04	+0.01	2.49
Belgium	110.5	−1.96	1.87	Adverse $r - g$ test: debt declines	1.88	DSA criteria	0.96	+0.70	+0.67	+0.15	2.32
Spain	99.6	−0.40	2.82	Adverse $r - g$ test: debt declines	2.84	DSA criteria	0.81	+0.25	+0.25	−0.05	2.96
Finland	91.2	−1.31	1.83	Stochastic	8.49	Debt safeguard	2.45	+0.04	+3.66	+1.11	10.87
Portugal	87.6	2.20	2.59	Adverse $r - g$ test: debt declines	2.60	DSA criteria	0.10	+0.10	+0.08	+0.02	2.34
Austria	83.4	−1.72	1.13	Adverse $r - g$ test: debt declines	1.16	DSA criteria	0.72	+0.32	−1.06	−0.17	1.66
Hungary	75.1	−2.01	3.21	Adverse $r - g$ test: debt declines	3.23	DSA criteria	1.31	+0.57	+0.56	+0.65	3.66
Germany	65.8	−1.77	1.10	Adverse $r - g$ test: debt declines	2.75	Debt safeguard	1.13	+0.11	+0.29	+0.26	2.29
Slovenia	64.9	−2.40	1.00	Lower-SPB test: debt below 60% at end	1.04	DSA criteria	0.86	+0.52	+0.52	+0.42	1.17
Poland	64.5	−3.77	1.75	Adverse $r - g$ test: debt declines	1.79	DSA criteria	1.39	+1.18	+1.21	+0.59	2.32
Slovakia	63.7	−2.63	1.67	Lower-SPB test: debt below 60% at end	1.69	DSA criteria	1.08	+0.86	+0.87	−0.19	1.85
Romania	61.6	−2.39	1.46	Lower-SPB test: debt below 60% at end	1.49	DSA criteria	0.97	+1.20	+1.22	−0.20	2.23
Croatia	55.9	−1.74	−0.95	Baseline: debt below 60% at end	−0.14	Deficit resilience	0.40	−0.49	+0.22	0.00	0.01
Cyprus	50.4	2.52	0.10	Deficit below 3%	0.12	DSA criteria	−0.60	−0.25	−3.36	−0.60	−0.35
Latvia	48.8	−2.08	0.01	Lower-SPB test: debt below 60% at end	0.04	DSA criteria	0.53	+1.29	+0.18	+0.22	0.30
Netherlands	46.9	−0.45	−0.01	Deficit below 3%	−0.01	DSA criteria	0.11	−0.06	−0.08	−0.07	−0.31
Malta	46.2	−0.29	−0.94	Deficit below 3%	0.19	Deficit resilience	0.12	+0.29	+1.06	−0.39	0.06
Czechia	45.8	−1.33	0.98	Deficit below 3%	0.99	DSA criteria	0.58	+0.61	+0.60	+0.46	1.40
Lithuania	44.6	−1.05	0.47	Deficit below 3%	0.54	Deficit resilience	0.40	+0.23	+0.27	+0.24	0.55
Sweden	36.6	−1.35	−1.55	Deficit below 3%	−0.65	Deficit resilience	0.17	+0.23	+0.09	+0.53	−0.47
Ireland	32.4	2.09	−0.46	Deficit below 3%	−0.43	DSA criteria	−0.63	+0.20	+0.20	+0.16	−0.36
Bulgaria	32.3	−2.93	−1.18	Deficit below 3%	−1.17	DSA criteria	0.44	+0.89	−0.29	+0.14	−0.76
Luxembourg	29.2	0.75	0.18	Deficit below 3%	0.19	DSA criteria	−0.14	+0.42	+0.41	−0.06	0.05
Denmark	27.0	2.75	−1.29	Deficit below 3%	−1.25	Adjustment floor	−1.00	+0.12	−0.17	0.00	−0.84
Estonia	26.9	−3.20	−1.28	Deficit below 3%	−1.28	DSA criteria	0.48	+0.63	−0.99	+0.48	−0.89

Source: Author's calculations based on the September 2026 input data. Note: Columns (1) and (2) are debt and the SPB in 2026, the reference year of this data vintage. Columns (3) to (7) refer to a four-year adjustment period ending in 2030: the DSA target and the DSA criterion that sets it, the binding target and the constraint that sets it, and the annual adjustment required by the binding target. Columns (8) to (10) are the changes of the targets and of the annual adjustment relative to the baseline with the 2024 data, whose targets refer to 2028. Column (11) is the binding target at the end of a seven-year adjustment period (2033). Countries are ordered by debt in 2026.

Table A6: Fiscal multiplier checks with the persistent multiplier and the Commission's output gap rule, binding target, four-year adjustment (percent of GDP and percentage points)

	Austria		Finland		Germany	
	Persistent	Commission	Persistent	Commission	Persistent	Commission
Baseline target	2.22	2.58	4.83	5.99	2.46	2.78
Fiscal multiplier: 0.5	−0.64	−0.80	−1.00	−1.44	−0.52	−0.64
Fiscal multiplier: 1	+1.04	+1.52	+1.64	+2.60	+0.76	+1.00
Fiscal multiplier: 1.5	+8.56	inf.	inf.	inf.	+4.08	+7.00
Multiplier persistence: 2 years	−0.40	−0.64	−0.64	−1.36	−0.32	−0.56
Multiplier persistence: 4 years	+0.44	+0.48	+0.68	+1.04	+0.32	+0.40
Multiplier persistence: 5 years	+0.76	+0.88	+1.20	+1.88	+0.56	+0.68

Source: Author's calculations. Note: The first row is the binding target of the baseline. The other rows are the change of the binding target relative to the baseline. inf.: the debt sustainability safeguard cannot be met with an annual adjustment of up to 5 percentage points. Persistent: multiplier effect on the output gap fading over the persistence period, as in the rest of this paper. Commission: output gap closure rule of the Commission's prior guidance calculation sheets. The debt sustainability safeguard sets the binding target of the three countries in the baseline.

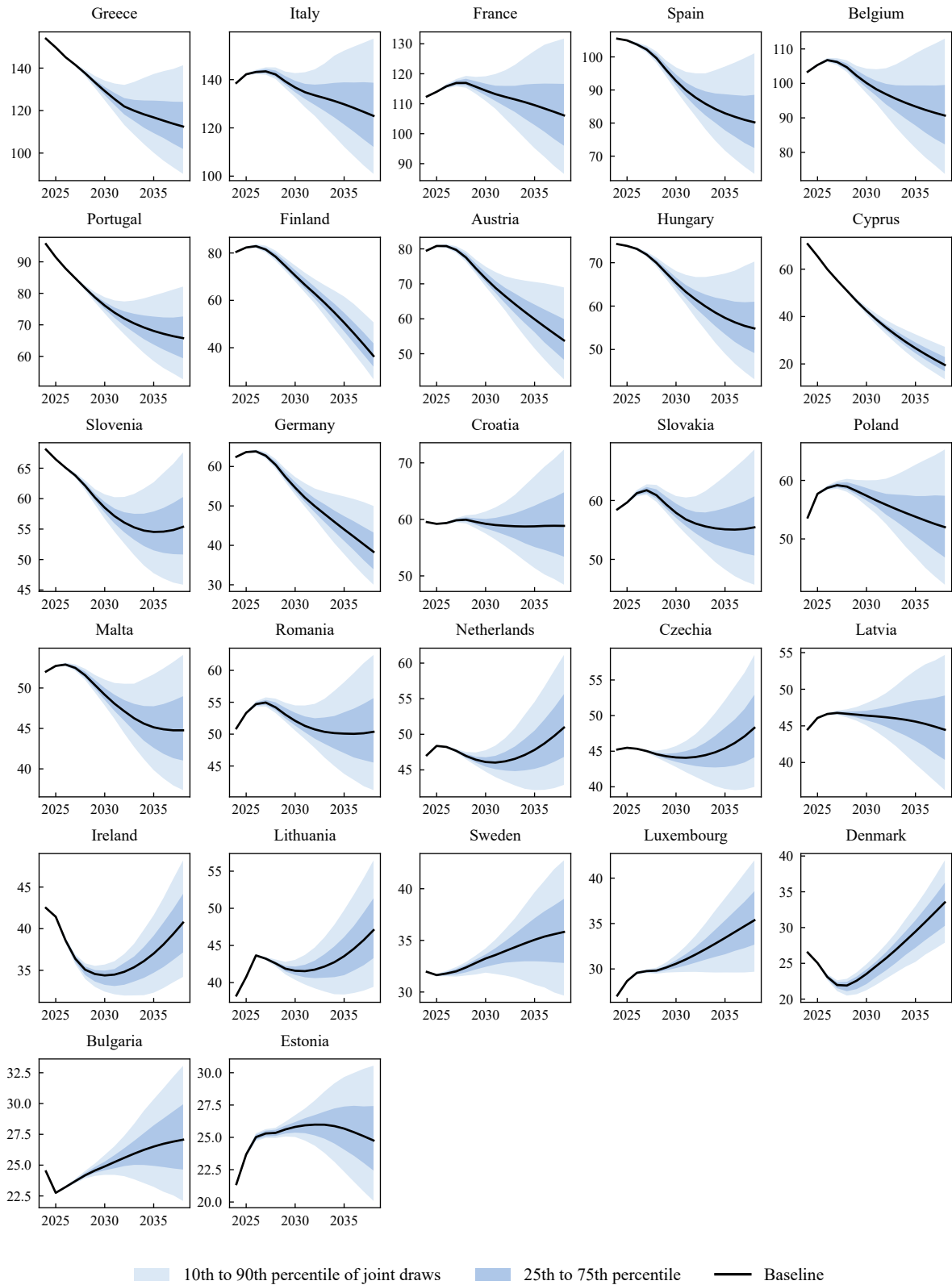


Figure A1: Debt under the baseline SPB path in the joint draws, four-year adjustment (percent of GDP)

Source: Author's calculations. Note: Debt when the SPB follows the path of the baseline binding target in all draws, with the adjustment from 2025 to 2028 including the minimum adjustment of the EDP and the deficit resilience safeguard. Only the forecasts and the model parameters differ across draws. The black line shows the baseline. The shaded areas show the range between the 10th and the 90th percentile (light) and between the 25th and the 75th percentile (dark) of debt in each year across the 500 joint draws of forecasts and model parameters. Countries are ordered by debt in 2024.