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PIANO NAZIONALE
DI RIPRESA E RESILIENZA



DELIVERABLE D4.1

**Real time monitoring and forecasting of
key macroeconomic and financial
indicators, including probabilistic
vulnerability indicators**



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Executive Summary

This report provides up-to-date projections and risk assessments of short- to medium-term macroeconomic and fiscal indicators of the Italian economy. We consider not only point and density forecasts but also assess tail risks to macroeconomic and fiscal variables. In this report, we focus on nowcasts and forecasts up to three years ahead for real GDP growth, the debt-to-GDP ratio, the deficit-to-GDP ratio, the unemployment rate, and inflation.

1. Introduction

This report provides up-to-date projections and risk assessments of short- to medium-term macroeconomic and fiscal indicators of the Italian economy. We consider not only point and density forecasts but also assess tail risks to macroeconomic and fiscal variables. In this report, we focus on nowcasts and forecasts up to three years ahead for real GDP growth, the debt-to-GDP ratio, the deficit-to-GDP ratio, the unemployment rate, and inflation.

The results are based on a Bayesian vector autoregressive model with stochastic volatility (BVAR-SV). The choice of this model is due to its consistent performance in a comprehensive model evaluation exercise featuring a large set of competing specifications. This evaluation is documented in ([boeck2024forecasting?](#)). An overview on the related econometric techniques can be found in ([marcellino2024chapter?](#)).

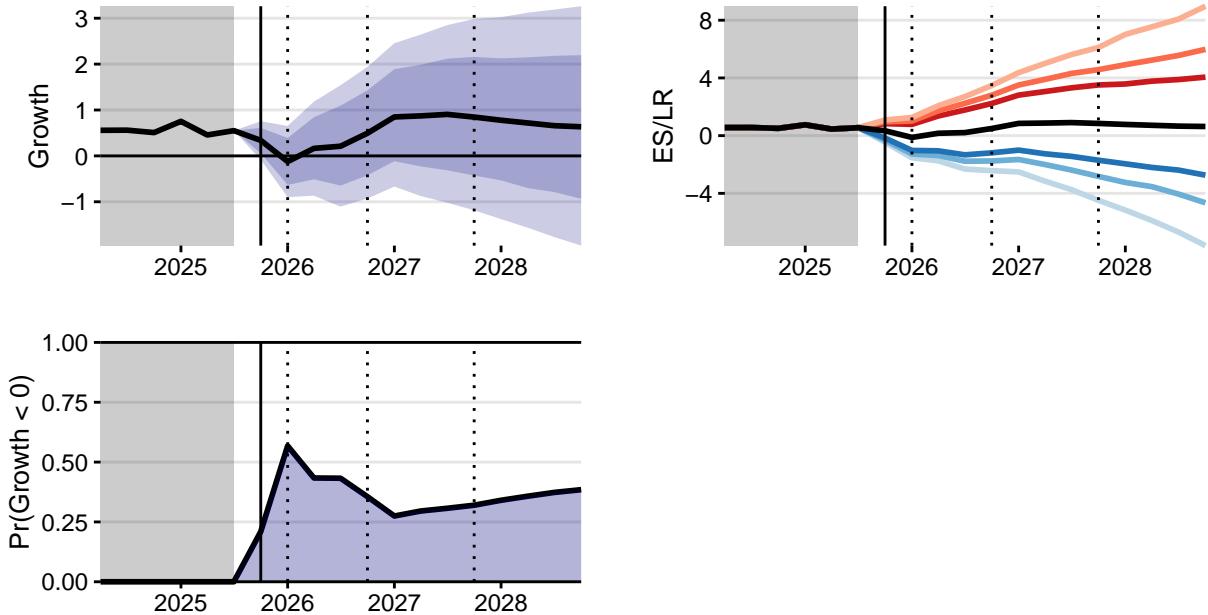
For the construction of the forecasts, we use real-time data on the Italian economy ranging from 2001 Q2 to 2025 Q3. The variables and their sources are listed in Table 1. The evaluation sample ranges from 2025 Q4 to 2028 Q3. For each target variable, we report three charts. The first one (upper-left) shows the point and density forecasts, in which we indicate the nowcast, one-, four-, and eight-step ahead forecasts distinctively. The predictive distribution is given in form of the 16/84 and 25/75 quantiles (i.e., 68% and 50% credible sets) alongside the median. To assess tail performance, the second figure (upper-right) reports the expected shortfall (ES for 10/16/25 percent in shades of blue) and longrise (LR for 75/84/90 percent in shades of) of the respective variable. Additionally, the third figure (bottom) provides the probabilities of interesting scenarios: that real GDP growth turns negative, the change in the debt-to-GDP ratio is positive, the deficit/surplus-to-GDP ratio is below -3%, the change in the unemployment rate is positive, and that inflation is above 2%. The grey shaded area is the backcast period (in case publication lags are longer than the current quarter with analogous credible sets, otherwise, realized values), the solid black vertical line marks the nowcast, and the dotted lines are the one-quarter, one-year and two-year ahead forecast horizons.

Note that the forecasts shown in this report are purely statistical in nature. That is, we do not consider any planned changes in fiscal or monetary policy, and we solely rely on quarterly time series.

2. Forecasting Results

2.1 Economic Growth (real GDP)

Figure 1: Forecasting Results for Real GDP Growth.



Notes: Upper-left panel: predictive density given by the median alongside 68% and 50% credible sets. Upper-right: expected shortfall (ES) for 10/16/25 percent and longrise (LR) for 75/84/90 percent. Bottom: probability for the scenario that real GDP growth is negative.

	Forecast	50%	68%	ES 10%	LR 90%	Pr(Growth < 0)
2025 Q4	0.34	[0.06, 0.61]	[-0.08, 0.76]	-0.46	1.08	21
2026 Q1	-0.12	[-0.63, 0.39]	[-0.9, 0.65]	-1.53	1.26	57
2026	0.49	[-0.42, 1.43]	[-0.93, 1.94]	-2	2.38	45
2027	0.85	[-0.43, 2.16]	[-1.19, 2.98]	-3.47	5.28	30
2028	0.63	[-0.93, 2.19]	[-1.96, 3.26]	-6.34	7.9	36

Table 1: Forecasting Results for Real GDP Growth.

The nowcast of real output growth (year-over-year) for the current quarter 2025 Q4 is 0.34 percent with the 50% probability interval [0.06,0.61] and the 68% interval at [-0.08,0.76]. The one-step ahead forecast for 2026 Q1 is -0.12 percent with 50% intervals at [-0.63,0.39] and 68% at [-0.9,0.65]. We estimate the annual growth rate for the current year 2026 to be 0.49 percent, with 50 and 68% intervals at [-0.42,1.43] and [-0.93,1.94].

The estimate for annual growth rates in 2027 is 0.85 with 50% interval [-0.43,2.16]; for 2028 we predict a growth rate of 0.63 in an interval of [-0.93,2.19] with a probability of 50%.

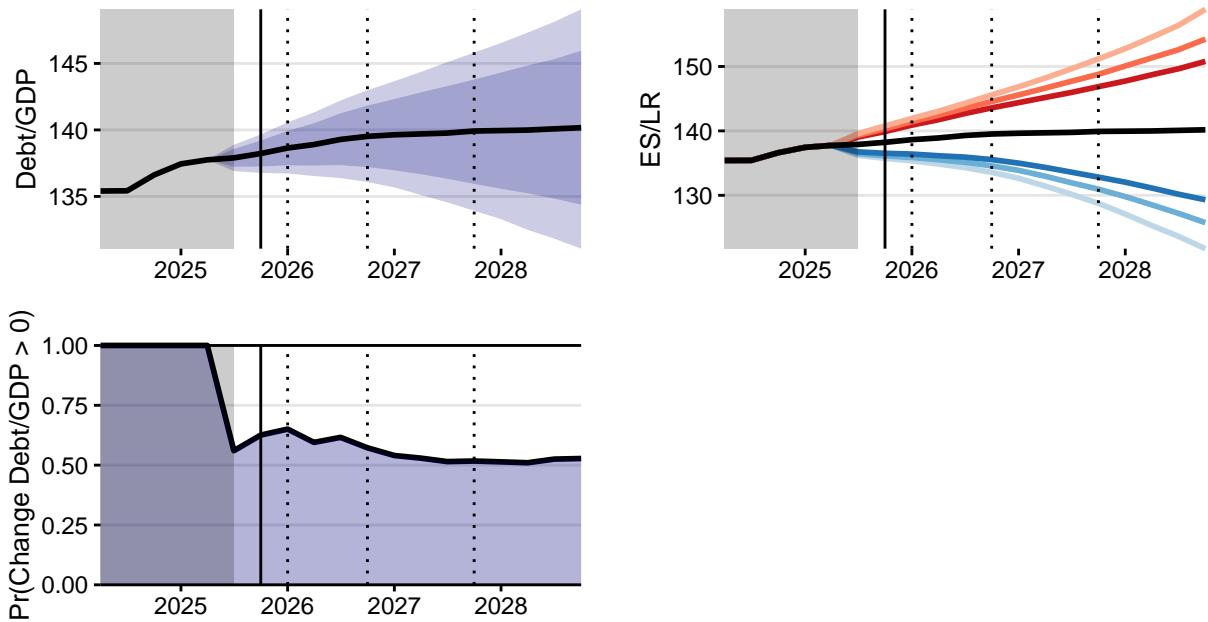
The estimate for the expected shortfall (ES) at 10% is -0.46 and the longrise (LR) at 90% is 1.08 for the nowcast, while the one-step ahead tail risks are at -1.53 (10%) and 1.26 (90%). The estimates of the tail risks in 2027 are ES/LR [-3.47,5.28]; and for 2028 they are [-6.34,7.9].

The last plot reports the probability of the scenario that real output growth is negative. In the current quarter 2025 Q4, this probability is 21 percent, while this scenario has a probability of 57 percent in the next quarter. For the year 2027 the model predicts a probability of 30 percent;

for the year 2028 of 36 percent that real GDP growth turns negative.

2.2 Debt-to-GDP Ratio

Figure 2: Forecasting Results for Government Debt to GDP Ratio.



Notes: Upper-left panel: predictive density given by the median alongside 68% and 50% credible sets. Upper-right: expected shortfall (ES) for 10/16/25 percent and longrise (LR) for 75/84/90 percent. Bottom: probability for the scenario that the change in the debt-to-GDP ratio is positive.

	Forecast	50%	68%	ES 10%	LR 90%	Pr(Ch. Debt/GDP > 0)
2025 Q4	0.32	[-0.35, 1.01]	[-0.67, 1.35]	135.74	140.77	63
2026 Q1	0.42	[-0.31, 1.17]	[-0.67, 1.54]	135.36	141.94	65
2026	139.52	[137.21, 141.83]	[136.08, 142.99]	134.52	143.71	61
2027	139.92	[135.94, 143.79]	[133.92, 145.81]	130.75	148.96	53
2028	140.17	[134.38, 145.96]	[131.07, 149.07]	124.43	155.64	52

Table 2: Forecasting Results for Debt/GDP Ratio.

We expect debt-to-GDP ratio (in percent) to increase by 0.32 percentage points in the current quarter 2025 Q4 with the 50% probability interval [-0.35,1.01] and the 68% interval at [-0.67,1.35]. Next quarter 2026 Q1, it is expected to increase by 0.42 percentage points with 50% intervals at [-0.31,1.17] and 68% at [-0.67,1.54].

The projection for the end-of-year ratio in the current year 2026 is at 139.52 percent with 50 and 68% intervals at [137.21,141.83] and [136.08,142.99]. For 2027 and 2028 we predict debt at 139.92 and 140.17 percent of GDP, respectively. The associated 50% intervals are [135.94,143.79] and [134.38,145.96].

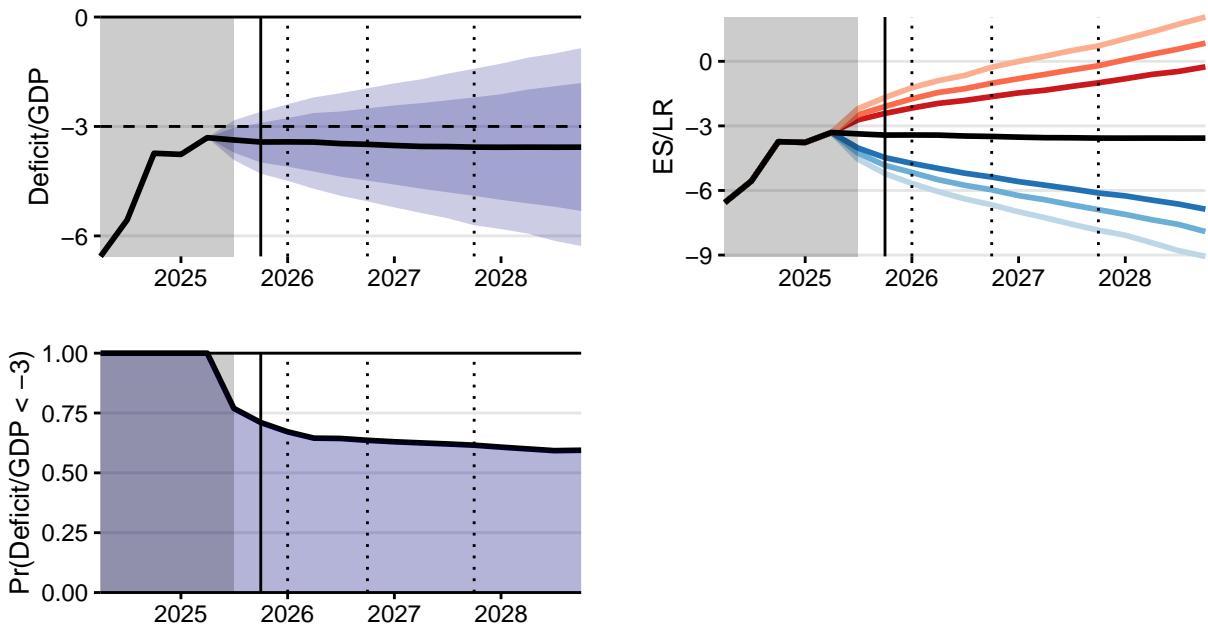
The estimate for the expected shortfall (ES) at 10% is 135.74 and the longrise (LR) at 90% is 140.77 for the nowcast, while the one-step ahead tail risks are at 135.36 (10%) and 141.94 (90%). The estimates of the tail risks in 2027 are ES/LR [130.75,148.96]; and for 2028 they are [124.43,155.64].

The last plot reports the probability of the scenario that there is an increase in the debt-to-GDP

ratio. In the current quarter 2025 Q4, this probability is 63 percent, while this scenario has a probability of 65 percent in the next quarter. For the year 2027 the model predicts a probability of 53 percent; for the year 2028 of 52 percent that the debt-to-GDP ratio increases.

2.3 Deficit-to-GDP Ratio

Figure 3: Forecasting Results for Government Deficit-to-GDP Ratio.



Notes: Upper-left panel: predictive density given by the median alongside 68% and 50% credible sets. Upper-right: expected shortfall (ES) for 10/16/25 percent and longrise (LR) for 75/84/90 percent. Bottom: probability for the scenario that deficit-to-GDP ratio is below -3%.

	Forecast	50%	68%	ES 10%	LR 90%	Pr(Deficit/GDP < -3)
2025 Q4	-0.06	[-0.4, 0.27]	[-0.62, 0.46]	-5.22	-1.68	71
2026 Q1	0.01	[-0.29, 0.3]	[-0.5, 0.5]	-5.67	-1.22	67
2026	-3.5	[-4.5, -2.5]	[-5.1, -2]	-6.2	-0.76	65
2027	-3.6	[-4.9, -2.2]	[-5.7, -1.4]	-7.42	0.36	62
2028	-3.57	[-5.32, -1.81]	[-6.28, -0.85]	-8.59	1.55	60

Table 3: Forecasting Results for Deficit/GDP Ratio.

We expect deficit-to-GDP ratio (in percent) to decrease by -0.06 percentage points in the current quarter 2025 Q4 with the 50% probability interval [-0.4,0.27] and the 68% interval at [-0.62,0.46]. Next quarter 2026 Q1, it is expected to increase by 0.01 percentage points with 50% intervals at [-0.29,0.3] and 68% at [-0.5,0.5].

The projection for the end-of-year ratio in the current year 2026 is at -3.5 percent with 50 and 68% intervals at [-4.5,-2.5] and [-5.1,-2]. For 2027 and 2028 we predict deficit/surplus at -3.6 and -3.57 percent of GDP, respectively. The associated 50% intervals are [-4.9,-2.2] and [-5.32,-1.81].

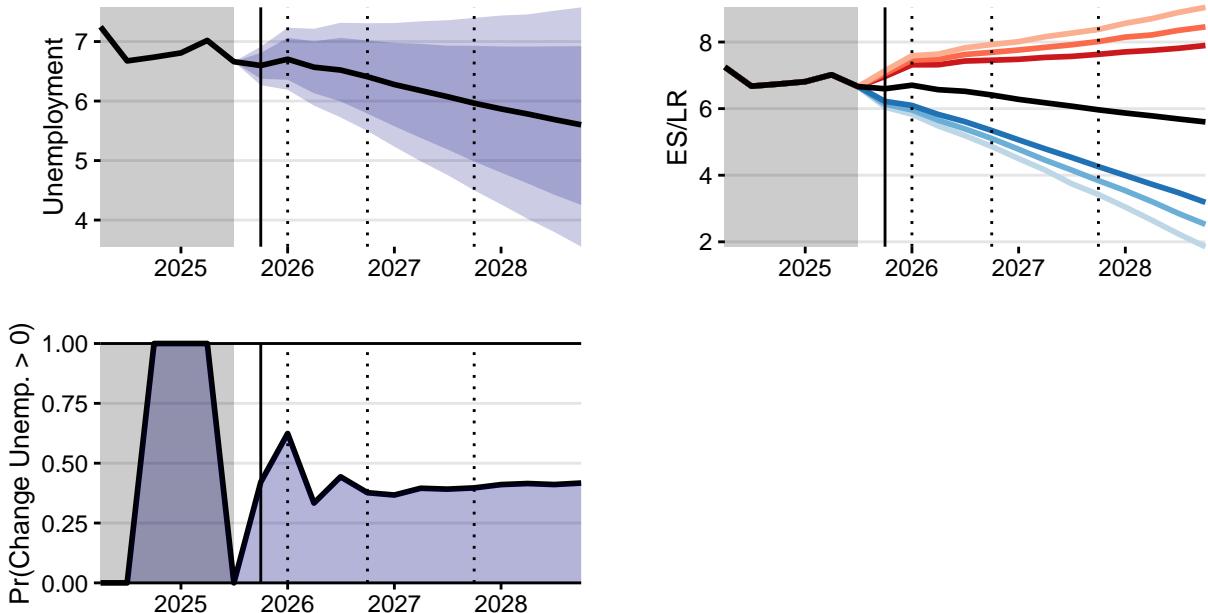
The estimate for the expected shortfall (ES) at 10% is -5.22 and the longrise (LR) at 90% is -1.68 for the nowcast, while the one-step ahead tail risks are at -5.67 (10%) and -1.22 (90%). The estimates of the tail risks in 2027 are ES/LR [-7.42,0.36]; and for 2028 they are [-8.59,1.55].

The last plot reports the probability of the scenario that the deficit/surplus-to-GDP is below

-3%. In the current quarter 2025 Q4, this probability is 71 percent, while this scenario has a probability of 67 percent in the next quarter. For the year 2027 the model predicts a probability of 62 percent; for the year 2028 of 60 percent that the deficit/surplus-to-GDP ratio is below -3%.

2.4 Unemployment Rate

Figure 4: Forecasting Results for the Unemployment Rate.



Notes: Upper-left panel: predictive density given by the median alongside 68% and 50% credible sets. Upper-right: expected shortfall (ES) for 10/16/25 percent and longrise (LR) for 75/84/90 percent. Bottom: probability for the scenario that the change in the unemployment rate is positive.

	Forecast	50%	68%	ES 10%	LR 90%	Pr(Ch. Unemp. > 0)
2025 Q4	6.6	[6.37, 6.81]	[6.27, 6.91]	6.05	7.14	42
2026 Q1	6.7	[6.36, 7.06]	[6.19, 7.23]	5.83	7.59	62
2026	6.41	[5.79, 7.02]	[5.5, 7.31]	5.34	7.74	44
2027	5.96	[4.99, 6.93]	[4.5, 7.4]	3.96	8.2	39
2028	5.6	[4.25, 6.92]	[3.55, 7.57]	2.45	8.8	41

Table 4: Forecasting Results for Unemployment.

The nowcast of the unemployment rate for the current quarter 2025 Q4 is 6.6 percent with the 50% probability interval [6.37,6.81] and the 68% interval at [6.27,6.91]. The one-step ahead forecast for 2026 Q1 is 6.7 percent with 50% intervals at [6.36,7.06] and 68% at [6.19,7.23]. We estimate the end-of-year unemployment rate for 2026 to be 6.41 percent, with 50 and 68% intervals at [5.79,7.02] and [5.5,7.31].

Unemployment in 2027 is predicted at 5.96 with 50% interval [4.99,6.93]; for 2028 we predict 5.6 in an interval of [4.25,6.92] with a probability of 50%.

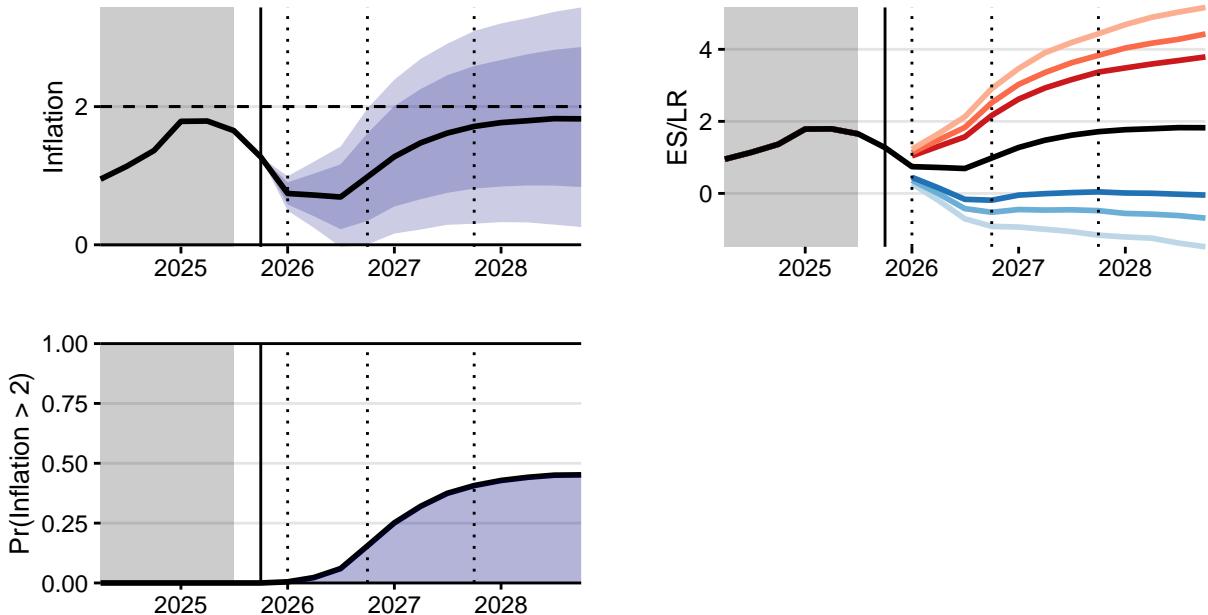
The estimate for the expected shortfall (ES) at 10% is 6.05 and the longrise (LR) at 90% is 7.14 for the nowcast, while the one-step ahead tail risks are at 5.83 (10%) and 7.59 (90%). The estimates of the tail risks in 2027 are ES/LR [3.96,8.2]; and for 2028 they are [2.45,8.8].

The last plot reports the probability of the scenario that the unemployment rate increases. In the

current quarter 2025 Q4, this probability is 42 percent, while this scenario has a probability of 62 percent in the next quarter. For the year 2027 the model predicts a probability of 39 percent; for the year 2028 of 41 percent that the unemployment increases.

2.5 Inflation (in the HICP)

Figure 5: Forecasting Results for Inflation.



Notes: Upper-left panel: predictive density given by the median alongside 68% and 50% credible sets. Upper-right: expected shortfall (ES) for 10/16/25 percent and longrise (LR) for 75/84/90 percent. Bottom: probability for the scenario that inflation is above 2%.

	Forecast	50%	68%	ES 10%	LR 90%	Pr(Inflation > 2)
2025 Q4	1.27	[1.27, 1.27]	[1.27, 1.27]			0
2026 Q1	0.74	[0.58, 0.91]	[0.49, 0.99]	0.27	1.23	0
2026	0.98	[0.34, 1.61]	[0, 1.97]	-0.39	1.98	6
2027	1.71	[0.81, 2.59]	[0.3, 3.09]	-1.04	4	34
2028	1.82	[0.84, 2.86]	[0.26, 3.44]	-1.33	4.94	44

Table 5: Forecasting Results for Inflation.

The nowcast of inflation in the HICP (year-over-year) for the current quarter 2025 Q4 is 1.27 percent with the 50% probability interval [1.27,1.27] and the 68% interval at [1.27,1.27]. The one-step ahead forecast for 2026 Q1 is 0.74 percent with 50% intervals at [0.58,0.91] and 68% at [0.49,0.99]. We estimate annual inflation for the current year 2026 to be 0.98 percent, with 50 and 68% intervals at [0.34,1.61] and [0,1.97].

The estimate for annual inflation in 2027 is 1.71 with 50% interval [0.81,2.59] and for 2028 we predict 1.82 inflation with a probability of 50% in an interval between [0.84,2.86].

The estimate for the expected shortfall (ES) at 10% is NA and the longrise (LR) at 90% is NA for the nowcast, while the one-step ahead tail risks are at 0.27 (10%) and 1.23 (90%). The estimates of the tail risks in 2027 are ES/LR [-1.04,4]; and for 2028 they are [-1.33,4.94].

The last plot reports the probability of the scenario that inflation is above 2%. In the current

quarter 2025 Q4, this probability is 0 percent, while this scenario has a probability of 0 percent in the next quarter. For the year 2027 the model predicts a probability of 34 percent; for the year 2028 of 44 percent that inflation is above 2%.

Data Appendix

All series were gathered from the sources listed below, including the Federal Reserve Economic Database (FRED) compiled by the St. Louis Federal Reserve, Refinitiv, Eurostat, the Istituto Nazionale di Statistica (Istat), and the Statistical Data Warehouse (SDW) of the European Central Bank (ECB). If necessary, series are seasonally adjusted with the X-13ARIMA-SEATS model. All series are transformed to approximate stationarity.

Table 6: Quarterly target variables.

Variable	Details	Source	Transformation
<code>gov_debt_ratio_t</code>	government debt (consolidated, as % of GDP)	SDW ECB	2
<code>gov_deficit_ratio_t</code>	government primary deficit/surplus (as % of GDP)	SDW ECB	2
<code>rgdp_t</code>	real gross domestic product	SDW ECB	4
<code>hicp_t</code>	harmonized consumer price index, overall index	SDW ECB	4
<code>unrate_t</code>	unemployment rate	SDW ECB	0
<code>ltir_t</code>	long-term interest rate for convergence purposes, 10 years maturity	SDW ECB	0
<code>sovciss_t</code>	composite indicator of systematic stress	SDW ECB	0
<code>baltic_t</code>	Baltic Dry Index	Refinitiv	0
<code>ip_constr_t</code>	index of production construction	Istat	1
<code>prodnxt3m_t</code>	production, next 3 months, balance	Istat	0
<code>oilprice_t</code>	crude oil prices, Brent, Europe	FRED	0

Notes: Transformation codes: 0 = level, 1 = log-differences, 2 = differences, 3 = log-level, 4 = annualized differences.

References