DOI: https://doi.org/10.37075/EA.2025.4.03 Economic Alternatives, 2025, Issue 4, pp. 1026-1059

The Bulgarian Economy – Trends and Signals in the Context of Global Challenges

Received: 02.05.2025
Available online: 30.12.2025

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Abstract

This article examines the key macroeconomic trends and early warning signals for the Bulgarian economy in 2023–2024, in the context of an unstable external environment. The study aims to identify the main drivers of growth, assess inflationary dynamics, and evaluate the applicability of an early warning indicator. The analysis is quantitative and empirical, combining descriptive and comparative examination of official data with econometric modeling using a Markov-switching dynamic factor model.

The findings show that GDP growth slowed from 4.0% in 2022 to 1.9% in 2023, before rebounding to 2.8% in 2024, driven primarily by domestic demand, while external demand weakened. Inflation declined from 13.0% in 2022 to 3.1% by the end of 2024; however, price pressures in the services sector remained elevated due to rising wages and labor costs.

The proposed early warning indicator, constructed from five high-frequency variables, successfully signaled a 70% probability of low growth in mid-2023, which decreased to 55% by the end of 2024. These results highlight the value of high-frequency data and advanced modeling techniques for timely forecasting of cyclical fluctuations.

Keywords: Bulgarian Economy, Early warning Indicators

JEL: E31, E32, C38

1. Introduction

In recent years, financial and economic crises have been observed, which are a consequence of various global problems and phenomena. Despite the experience of 2008, it seems that the enterprises did not learn enough of their lessons and failed to foresee the difficulties for their business and finances. There are not many examples in history that have seen phenomena of superimposing economic and financial crises (Nozharov and Hristozov, 2023). The analysis in the present study of the Bulgarian economy covers the period from the beginning of 2023 to the first half of 2024. During this period, five main trends emerged that shaped global economic developments.

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First, major central banks continued to tighten financial conditions by raising nominal interest rates and reducing the size of their asset holdings in order to curb demand and bring inflation back to target levels.

Second, governments continued to withdraw the COVID-19 pandemic support measures. States were further compelled to limit discretionary fiscal policies due to higher public debt servicing costs, resulting in tighter fiscal conditions in the euro area, as reflected by the structural budget balance, and a contraction in economic activity in Bulgaria's main trading partner.

Third, the effects of economic shocks from previous years began to subside, which, combined with weaker demand, contributed to a sustained decline in inflation. Energy prices, particularly in Europe, which had risen sharply due to the military conflict in Ukraine, decreased, while COVID-19-related disruptions in global supply chains continued to ease.

Fourth, labor markets remained relatively stable in advanced economies despite slower economic growth. Rising employment supported continued growth in private consumption, which helped generate secondary effects from the high inflation observed in 2022 and the first half of 2023. The tight labor market led to significant wage increases and higher labor costs, resulting in persistently high inflation in the services sector.

Fifth, global geopolitical tensions continued to escalate, accompanied by an increase in protectionist measures to shield national economies. High inflation, rising labor costs, and the stabilization of energy prices in Europe at historically elevated levels contributed to a substantial loss of price competitiveness for the euro area relative to its main trading partners, especially China. This threatens the export-oriented growth model of the euro area and may lead to persistently lower export growth for Bulgarian firms integrated into European production and supply chains in the coming quarters.

The main objective of this study is to identify trends and early warning signals for the Bulgarian economy in the context of global challenges, as well as to apply an early warning indicator. The research focuses on key economic indicators, with the analysis and assessment aimed at evaluating the overall economic condition of Bulgaria. Authors' scientific hypothesizes are as follows:

H1: In 2023–2024, the Bulgarian economy sustained positive, albeit moderate, underlying GDP growth, driven primarily by domestic demand despite an adverse external environment.

H2: During the period under review, inflation in Bulgaria slowed significantly due to external factors (declining international energy and food commodity prices). However, underlying inflation pressures remained strong, supported by robust domestic consumption and rising labor costs.

H3: The early warning indicator, based on a Markov-switching dynamic factor model, allows for timely identification of "high" and "low" growth phases and provides more accurate information than traditional macroeconomic forecasts.

H4: Differences between institutional forecasts for the Bulgarian economy stem mainly from variations in methodological approaches, input data, and assumptions regarding the external environment.

2. Bulgarian economy through the lens of institutional forecasts

The cyclic pattern of economic development is based on theoretically sound logic, which, under certain conditions, can be empirically confirmed or rejected. Adjustments of economic cycles can be expected and predictable, but they may be due to unexpected global force majeure circumstances. Such a circumstance was the COVID-19 pandemic, which occurred after a ten-year period of steady economic growth (Zaharieva, G., Tarakchiyan, O., & Zahariev, A., 2022).

This part of the paper aims to review some of the existing analyses of Bulgarian economy which provide macroeconomic forecasts, and which are prepared by a high-profile institutions and research papers. The result should indicate what the variety of methodology used in the analyses and results they achieve is. Analyses of the Bulgarian economy and macroeconomic projections are performed by Bulgarian institutions and researchers as well as by international ones such as the European Commission, IMF etc.

A comparison of short-term macroeconomic forecasts for Bulgaria provided by national and international institutions, focusing on methodological differences, forecast outputs, and policy implications is important to understand the different results from the variety of analyses. A summary of key findings on Bulgaria's economic outlook based on reports from the Institute for Economic Research (IER) at the Bulgarian Academy of Sciences (BAS), as well as European and international institutions is given hereafter.

The macroeconomic forecasts produced by institutions such as the IMF, the European Commission, and the OECD are primarily utilized by national governments, international organizations, investors, and credit rating agencies to assess economic stability, fiscal performance, and the need for structural reforms. In contrast, the projections of BAS are mainly referenced within academic circles and domestic policy debates, offering detailed analyses of internal economic dynamics, sectoral imbalances, and regional development trends. These differences in users reflect distinct institutional objectives: while the IMF and the European Commission emphasize fiscal surveillance and macro-financial sustainability, the BAS provides expert-driven, granular insights tailored for national use.

This issue is important to discuss because there are some assumptions that Bulgaria's current revenue forecasting framework relies on outdated and rigid models that struggle to respond effectively during periods of economic volatility (Ashtar and Telarico, 2023). In their research paper about government budget revenue modelling Astar and Telarico (2023) propose a Bayesian mixed-frequency model that integrates high-frequency fiscal and macroeconomic indicators, which significantly improves predictive accuracy—especially during fiscal shocks such as the COVID-19 crisis. Their simulations show a substantial reduction in forecasting errors compared to traditional approaches used by Bulgarian institutions. As a result, they advocate for a data-driven, modular forecasting architecture tailored to small open economies like Bulgaria (Ashtar and Telarico, 2023).

The following section includes projections for the real GDP growth projections, inflation trends, labor market developments, fiscal policy conditions, and external risks.

The problems facing economic development due to the COVID-19 crisis are also related to changes in the behavioural

pattern of consumption, which will be reflected in a decrease in demand and will slow down the recovery (Hristozov, Y., Chobanov, P., 2020). IER performs annual report for Bulgarian economy focusing on a forecast for GDP growth, inflation, labor market, fiscal policy, etc. According to IER-BAS, real GDP growth in Bulgaria is estimated at 1.8% in 2023, 2.2% in 2024, 3% in 2025 and 3,4% for 2026, driven mainly by domestic demand, especially private consumption and public investment (IER-BAS, 2024, p. 97).

On the other hand, there is a slowdown in inflation from 14.3% in 2022 to 8.6% in 2023, with a forecast of 3.9% in 2024, 3.2% in 2025 and 2.9% in 2026. (IER-BAS, 2024, p. 97). Employment is increasing moderately, with an unemployment rate of 4.4% in 2023 and expected around 4% in 2025 and a decrease to 3.7% in 2025 and 2026, almost reaching a full employment (IER-BAS, 2024, p. 98). The budget deficit is estimated at 3.1% of GDP in 2023, with a slight deterioration in 2024 at 2.3% before stabilizing at 2% in 2025 and 1.9% in 2026 (III-BAS, 2024, p. 97). The main risks for Bulgaria's economy, according to the institute, are related to an unstable external environment (EU and Ukraine), the capacity to absorb European funds and demographic pressure on the labor market (IER-BAS, 2024, p. 98).

Debt accumulation is largely driven by easy access to borrowed capital and coincides with a strong drive for new investment, which, however, has not led to sustainable growth in the region's economies (Hristozov, Y., 2020). According to the EC, GDP growth is expected to increase from 2.1% in 2024 to 2.7% in 2025 and 3.0% in 2026, driven by private consumption and public investment, while inflation (HICP) is expected to decline from 3.2% in 2024 to 2.5% in 2025, and further to 2.1% in 2026 as energy and services prices stabilize (European Commission, 2025, p. 3,4). The unemployment rate is projected to decrease from 4.3% in 2024 to 4.1% in 2025 and 4.0% in 2026, with employment growth mainly in services and the fiscal deficit is forecasted at 2.8% of GDP in 2024, narrowing to 2.5% in 2025 and 2.2% in 2026. Public debt to decline from 23.8% to 22.1% of GDP by 2026 (European Commission, 2025, p. 6). Downside risks include delays in EU-funded projects, geopolitical instability, and export dependency. An upside risk is faster absorption of EU recovery funds.

A comparative analysis of data forecasts from different sources is presented in the following table.

Table 1. Comparative Forecast Table

Indicator/Institution	IER-BAS	BNB	MF	EC	OECD	IMF
Real GDP growth (2025)	2.2%	2.9%	3%	2.0%	2.6%	2.9%
Real GDP growth (2026)	3%	2.7%	2.5%	2.10%	2.3%	2.9%
Real GDP growth (2027)	3.4%	2.7%	2.4%			2.9%
Inflation (HICP, 2025)	3.9%	3.6%	3.6%	3.60%	3.50%	2.7%
Inflation (HICP, 2026)	3.2%	3.7%	2.2%	1.8%	2.8%	2.1%
Inflation (HICP, 2027)	2.9%	3.3%	2.0%	-	-	2.0%
Unemployment rate (2025)	4%	3.6%	4.1%	4 %	4.10%	4.2%

Indicator/Institution	IER-BAS	BNB	MF	EC	OECD	IMF
Unemployment rate (2026)	3.7%	<3.6%	4.0%	3.8%	4.00%	4.2%
Unemployment rate (2027)	3.7%	3.3%	4.0%	-	-	4.2%
Budget deficit (% of GDP, 2025)	3.0%			2.80%	2.90%	~3.0%
Budget deficit (% of GDP, 2026)	<3.0%			2.80%	2.90%	~3.0%
Public debt (% of GDP, 2026)				25.9%	<27.1%	27%

Source: BAS, EC, OECD, IMF, BNB, MF.

The forecasts mainly differ due to the difference in models and metrics used. The differences can be summarized as follows:

- Model scope and input frequency: OECD uses high-frequency now-casting and peer inputs, while IMF uses conservative staff-based country models. BAS relies on traditional national models.
- Assumption differences: EC forecasts embed technical assumptions about EU funds, trade tariffs, and external scenario paths.
- Expert judgment vs. Pure model output: IMF places emphasis on fiscal sustainability and structural risks. OECD supplements models with expert adjustments and peer review.
- Treatment of fiscal and external variables: IMF includes debt sustainability and current account models explicitly, influencing output. EC and OECD model fiscal outcomes but within broader EU frameworks.
- Reform and policy uncertainty: IMF tends to be more cautious under risk scenarios, whereas EC and OECD optimistically assume structural reforms and fund absorption will materialize.

None of the reviewed forecast give a developed mathematical model to enable a methodological comparison of forecast calculation techniques. When comparing macroeconomic forecasts there are differences of when these forecasts are prepared and when published as they may consider different data and different economic news and developments. Macroeconomic forecast also depends on the frequency of unexpected international and domestic events, which may significantly change the observed indicators. For instance, ministry of finance (MF) of Bulgaria projected 2,6% inflation for 2022 but instead the real value reached 12% due to the unexpected rise of raw materials' prices (MF, 2021).

Another key observation from the forecasts presented above is that some institutions project a turning point in GDP growth. Motivated by this, the paper introduces an early warning indicator for the Bulgarian economy. The methodology underlying this indicator, together with a related literature review, is presented in the following section, while the results are discussed in Section 4.

3. Methodological Framework for the Analysis of the Bulgarian Economy

The study covers the period from the beginning of 2023 to the first half of 2024, using official statistical data from the National Statistical Institute (NSI), the Bulgarian National Bank (BNB), the Employment Agency, the European Commission (EC), and international institutions such as the IMF and the OECD. The data includes both low-frequency (quarterly) macroeconomic indicators and

high-frequency (monthly) indicators, allowing for a more detailed monitoring of economic activity dynamics.

The analysis incorporates data on real GDP and its expenditure components, gross value added by economic sector, indices of industrial, construction, and trade production, foreign trade indicators, inflation (HICP and deflators), labor market dynamics, budget balance and public finance structure, as well as balance of payments and external debt indicators.

The indicators used in the paper are organized into three main groups:

- **Macroeconomic indicators** – real GDP growth, components of final consumption, gross fixed capital formation, net exports, gross value added by sector, labor productivity, and unit labor costs.
- **Price dynamics indicators** – harmonized consumer price index (HICP), deflators of final demand, producer price index for the domestic market, and international prices of commodities and energy products.
- **High-frequency early warning indicators** – five monthly indicators employed in a Markov-switching dynamic factor model:
  - Industrial production index (NSI)
  - Construction production index (NSI)
  - Services sector production index (NSI)
  - Economic sentiment indicator (EC)
  - Unemployment rate (Employment Agency)
  - Eurozone PMI index (S&P Global)

The high-frequency indicators are seasonally adjusted and transformed into monthly percentage changes, allowing the capture of short-term fluctuations and transitions between growth and slowdown phases.

The methodological framework consists of three stages:

1. Descriptive and comparative analysis of key macroeconomic indicators and the international context, including a comparison of forecasts from various institutions.
2. Graphical and statistical analysis to identify trends, cyclical phases, and potential risk factors, using annual and monthly change dynamics as well as decomposition by individual components.
3. Construction of an early warning indicator using a Markov-switching dynamic factor model, adapted from Eo and Kim (2016) and Leiva et al. (2019) to the Bulgarian economic context. The model:
   - Estimates a latent factor for real GDP growth based on the selected five high-frequency indicators.
   - Allows for the endogenous determination of transition probabilities between “high” and “low” growth phases, as well as negative growth (recession).
   - Utilizes a Markov-switching Kalman filter with missing data to synchronize monthly and quarterly series.
   - Applies Bayesian estimation with Gibbs sampling for parameters and latent states.

This combined approach enables simultaneous assessment of the current macroeconomic position and real-time forecasting of potential turning points in the economic cycle.

3.1. Early warning indicator – literature review and methodology

The identification of turning points in real time is critical for macroeconomic surveillance and policymaking. This section introduces the methodology behind an early warning

indicator designed to estimate the likelihood that the Bulgarian economy will transition between "high growth" and "low growth" regimes. The indicator is constructed using a Markov-switching dynamic factor model, which allows for real-time assessments of economic conditions using high-frequency data.

The Markov-switching approach, introduced by Hamilton (1989), has become a cornerstone in the empirical analysis of business cycles. In this framework, the underlying data-generating process of GDP growth can be modelled as switching between discrete unobserved regimes, typically interpreted as expansions and recessions. Unlike traditional threshold or probit models (Estrella & Mishkin, 1998; Battistini & De Santis, 2019), the Markov-switching framework allows the transition probabilities between regimes to be estimated endogenously, without requiring an external recession dating criterion.

Despite its effectiveness in historical analysis, the standard Hamilton model has limited utility for real-time monitoring due to its reliance on lagged quarterly GDP. To overcome this, subsequent research has focused on incorporating timely monthly data. Chauvet and Piger (2008), Camacho and Perez-Quiros (2010), and Camacho et al. (2018) develop dynamic factor models that combine multiple high-frequency indicators to infer the latent state of the economy. These models have been widely applied to estimate real-time recession probabilities for the U.S. and euro area.

This paper adopts a time-varying Markov-switching dynamic factor model inspired by Eo and Kim (2016) and extended by Leiva et al. (2019) to multivariate settings. The model modifies the standard Markov-switching process to allow for changing means across regimes, enabling it to reflect the evolving structure of the economy, particularly post-2008 and post-COVID. The latent GDP growth factor is modeled as a function of regime-specific means and shocks, with an additional regime-dependent adjustment term that captures the varying intensity of recessions.

The measurement system links observed indicators to the unobserved GDP factor, and quarterly GDP is expressed as a moving average of latent monthly growth rates, following Mariano and Murasawa (2003). This enables estimation via a Markov-switching Kalman filter with missing observations, as shown in Camacho et al. (2018). Bayesian estimation using Gibbs sampling is applied to infer the latent states, model parameters, and regime probabilities.

Despite the growing international literature on early warning indicators and regime-switching models, there is a notable absence of studies applying such approaches specifically to the Bulgarian economy. Existing analyses by national institutions and international organizations focus primarily on descriptive forecasts and traditional econometric models, without incorporating high-frequency data or regime-switching techniques. **This gap highlights the novelty and contribution of the present study,** which introduces a Markov-switching dynamic factor model as a timely early warning tool for Bulgaria.

Model Specification of the early warning indicator for Bulgaria

The main equations describing the Markov-switching dynamic factor model are as follows:

$$\begin{pmatrix} y_t \\ z_{1,t} \\ z_{2,t} \\ z_{3,t} \\ z_{4,t} \\ z_{5,t} \end{pmatrix} = \begin{pmatrix} \gamma_t \\ \gamma_{1,t} \\ \gamma_{2,t} \\ \gamma_{3,t} \\ \gamma_{4,t} \\ \gamma_{5,t} \end{pmatrix} f_t + \begin{pmatrix} u_t \\ u_{1,t} \\ u_{2,t} \\ u_{3,t} \\ u_{4,t} \\ u_{5,t} \end{pmatrix} \quad (1)$$

$$u_{i,t} = \psi_{i,1} u_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

$$\begin{aligned} f_t &= \mu_0(1 - S_t) + \mu_1 S_t + S_t x_t + e_t \\ e_t &\sim N(0, \sigma_e^2) \\ \epsilon_{i,t} &\sim N(0, \sigma_{\varepsilon,i}^2) \end{aligned} \quad (3)$$

$$\begin{aligned} x_t &= S_t x_{t-1} + (1 - S_t) u_t \\ u_t &\sim N(0, \sigma_u^2) \end{aligned} \quad (4)$$

$$Prob(S_{t=i} / S_{t-1=j}, \Omega_{t-1}) = p_{i,j} \quad (5)$$

Here, y_t denotes the latent monthly GDP growth rate, while z_t represents the set of observable monthly indicators. The latent factor f_t summarizes the common dynamics of the system and follows a non-linear process driven by the regime variable S_t.

Although y_t is unobserved, it can be linked to observed quarterly GDP, Y_t, via a distributed lag structure as proposed by Mariano and Murasawa (2003):

$$\begin{aligned} Y_t = &\frac{1}{3} y_t + \frac{2}{3} y_{t-1} + y_{t-2} \\ &+ \frac{2}{3} y_{t-3} + \frac{1}{3} y_{t-4} \end{aligned} \quad (6)$$

By substituting equation (1) into equation (6), one obtains an expression for the observed variables as functions of the latent (unobserved) components, which can be estimated using a Markov-switching Kalman filter with missing data. This methodology is extended to non-linear cases in Camacho et al. (2018).

Accordingly, the measurement equation becomes:

$$\begin{aligned} Y_t = &\frac{1}{3} f_t + \frac{2}{3} f_{t-1} + f_{t-2} + \frac{2}{3} f_{t-3} + \\ &+ \frac{1}{3} f_{t-4} + \frac{1}{3} u_t + \frac{2}{3} u_{t-1} + u_{t-2} + \\ &+ \frac{2}{3} u_{t-3} + \frac{1}{3} u_{t-4} \end{aligned} \quad (7)$$

As shown in equation (3), during normal times (when $S_t = 0$), the expected growth rate of the economy measured by the factor is μ_0. In recessionary periods (when $S_t = 1$), the expected growth rate is $\mu_1 + x_t$, where x_t captures the depth of each recession. The probability of recession is thus defined as Pr($S_t = 1$).

Estimation follows Leiva et al. (2019), who adapt the approach to a multivariate framework for developing economies. Let:

$Y = \begin{pmatrix} Y_t \\ z_{1,t} \\ z_{2,t} \\ z_{3,t} \\ z_{4,t} \\ z_{5,t} \end{pmatrix} \forall t = 1 \dots T$, be the observable vector,

$Z = \begin{pmatrix} f_t \\ u_{1,t} \\ u_{2,t} \\ u_{3,t} \\ u_{4,t} \\ u_{5,t} \end{pmatrix} \forall t = 1 \dots T$, the latent factor and idiosyncratic components,

$S = (S_t) \forall t = 1 \dots T$, the regime indicator,

$X = (x_t) \forall t = 1 \dots T$, the adjustment of the mean during recessions, and

θ the set of model parameters.

Given observed data Y and initial values (S_0,X_0,θ_0), the Gibbs sampling algorithm proceeds iteratively:

1) Given $(Y, S_{i-1}, X_{i-1}, \theta_{i-1})$ generate Z_i from P(Z/Y,S,X,θ) using Carter and Kohn (1994)
2) Given $(Z_i, S_{i-1}, \theta_{i-1})$ generate X_i from P(X/Z,S,θ) using Durbin and Koopman (2002)

3) Given $(Z_i, X_{i-1}, \theta_{i-1})$ generate S_i from P(S/Z,X,θ) using Carter and Kohn (1994)
4) Given ($Y, S_i, Z_i X$) simulate θ_i using Gibbs Sampling.

The model constructed for the Bulgarian economy employs a parsimonious and timely set of five high-frequency indicators, selected to capture real-time fluctuations in economic activity. This selection strategy follows the rationale of Stock and Watson (1989), who emphasized the effectiveness of carefully chosen coincident indicators in tracking the business cycle. The chosen variables—covering both supply-side and demand-side dynamics—enable the model to detect non-linear patterns and turning points in a timely manner, without the need for a large dataset. This approach aligns with empirical strategies found in the work of Chauvet and Piger (2008), who developed the Recession Probability Index for the Federal Reserve Bank of St. Louis using a small number of coincident indicators that reflect the components used in GDP estimation. Such models balance tractability with predictive performance, and their structure is well-suited for real-time applications in policy environments where data availability and timeliness are critical. In the context of Bulgaria, the selected indicators—augmented with a Markov-switching framework—serve as an efficient early warning tool for shifts in economic regimes.

The model for Bulgaria relies on five seasonally adjusted indicators that are transformed into month-on-month percent changes. These include the industrial production index, the construction production index and the production index in services published by the NSI; the economic sentiment indicator compiled by the European Commission; the unemployment rate based on data from the Employment Agency; and the PMI index for the euro area published by S&P Global. These indicators are used to explain and forecast changes in the quarter-on-quarter growth rate of real GDP.

The inclusion of the three production indices in the zt set is motivated by their ability to capture the supply side of the economy. This choice aligns with the fact that the production approach remains the most reliable method employed by statistical institutes for estimating GDP. Accordingly, Markov-switching dynamic factor models frequently incorporate data from short-term business statistics, particularly production-related variables. The unemployment rate and the economic sentiment indicator are included to account for demand-side dynamics within the domestic economy. Simultaneously, the PMI index for the euro area—Bulgaria's largest trading partner—is considered the most informative high-frequency indicator for capturing the external environment, particularly the external demand for Bulgarian goods and services.

4. Empirical Results

4.1. External Demand, Financial Flows, and Balance of Payments

In 2023, Bulgaria's current account recorded a surplus of €839 million (0.9% of GDP), a significant improvement compared to a deficit of €2,232 million (-2.6% of GDP) in 2022. This positive shift was primarily driven by a reduction in the trade deficit and an increase in the surplus from services trade.

Preliminary data for the first half of 2024 indicate that the improvement in the current account observed in 2023 was temporary. From January to June 2024, the current account turned negative, reaching a deficit of €352 million (-0.8% of GDP).

Table 2. Balance of payments (mil. euro)

Balance of payments (mln euro)	2017	2018	2019	2020	2021	2022	2023	2024
Current account	1657	368	1019	274	-768	-2299	-846	-1898
Goods, net	-773	-2706	-2909	-1941	-2887	-5084	-3931	-5365
Services, net	3067	4202	4953	3504	4660	6042	7851	7766
Primary income, net	-2381	-2957	-2954	-2301	-3452	-4805	-6269	-5292
Secondary income, net	1745	1829	1929	1013	910	1548	1503	993
Capital account	530	602	892	889	491	793	1475	1811
Financial account	1947	1715	2760	-3178	-833	-1626	-2327	233
Direct investment, net	-1313	-757	-1238	-2555	-1112	-3572	-3987	-2264
Portfolio investment, net	2833	1548	1607	764	2309	1061	1248	2373
Financial derivatives (other than reserves), net	-25	44	-31	-46	79	4	12	-37
Other investment, net	452	879	2422	-1341	-2108	882	399	161
Net errors and Omissions	-340	2106	290	1452	3051	3872	324	-584
Overall balance	99	-1362	559	-5794	-3606	-3992	-3280	904
Reserves and related items	-99	1362	-559	5794	3606	3992	3280	-904

Source: BNB

Table. 3 Balance of payments (% of GDP)

Balance of payments (% of GDP)	2017	2018	2019	2020	2021	2022	2023	2024
Current account	3.2	0.7	1.7	0.4	-1.1	-2.7	-0.9	-1.8
Goods, net	-1.5	-4.8	-4.7	-3.1	-4.0	-5.9	-4.2	-5.2
Services, net	5.8	7.5	8.1	5.7	6.5	7.0	8.3	7.5
Primary income, net	-4.5	-5.3	-4.8	-3.7	-4.8	-5.6	-6.6	-5.1
Secondary income, net	3.3	3.3	3.1	1.6	1.3	1.8	1.6	1.0
Capital account	1.0	1.1	1.5	1.4	0.7	0.9	1.6	1.7
Financial account	3.7	3.1	4.5	-5.1	-1.2	-1.9	-2.5	0.2
Direct investment, net	-2.5	-1.3	-2.0	-4.1	-1.6	-4.1	-4.2	-2.2
Portfolio investment, net	5.4	2.8	2.6	1.2	3.2	1.2	1.3	2.3
Financial derivatives (other than reserves), net	0.0	0.1	-0.1	-0.1	0.1	0.0	0.0	0.0
Other investment, net	0.9	1.6	3.9	-2.2	-3.0	1.0	0.4	0.2
Net errors and Omissions	-0.6	3.8	0.5	2.3	4.3	4.5	0.3	-0.6
Overall balance	0.2	-2.4	0.9	-9.4	-5.1	-4.6	-3.5	0.9
Reserves and related items	-0.2	2.4	-0.9	9.4	5.1	4.6	3.5	-0.9

Source: BNB

In 2023, the trade balance deficit narrowed due to a larger decline in goods imports in real terms (-7.1%) compared to exports (-4.1%). At the same time, the deterioration of terms of trade in 2023 negatively affected the country's trade balance. According to foreign trade data, exports of all major groups, except machinery, food, and some finished products, declined in nominal terms, with the largest negative contributions coming from mineral products and fuels, followed by metals and chemical products. The downward trend in goods exports in 2023 was consistent with weakening external demand for Bulgarian products, as reflected by the indicator of industrial production coverage with foreign orders (mainly from the EU).

The decline in goods imports in nominal terms was primarily due to mineral products and fuels, chemical products, and metals.

A contributing factor to the reduction in imports was companies' policy of reducing accumulated inventories in the economy.

In the first half of 2024, the trade balance deficit widened compared to the same period in the previous year, reaching €2,386 million (5.1% of GDP). This was due to a combination of a decline in goods exports in real terms (-1.6%) and growth in the physical volume of goods imports (1.0%), as well as the persistence of unfavorable terms of trade. Exports continued to be constrained by subdued economic activity in Bulgaria's main trading partners, such as Germany.

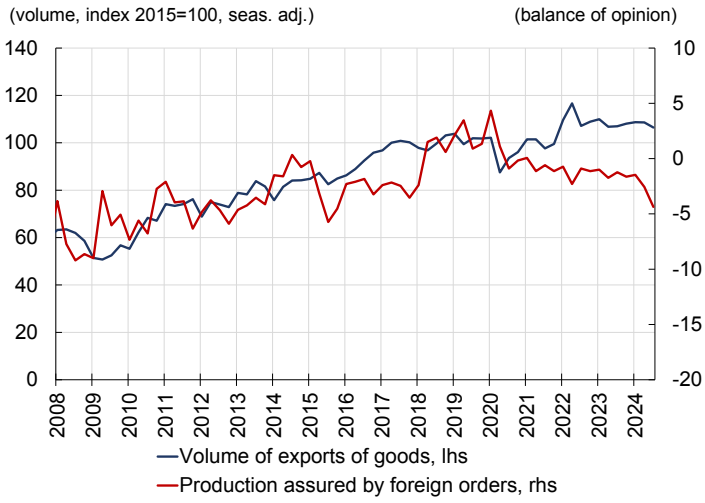

Figure 1. External demand and volume of exports
Note: Data for volume of exports is seasonally adjusted
Source: NSI

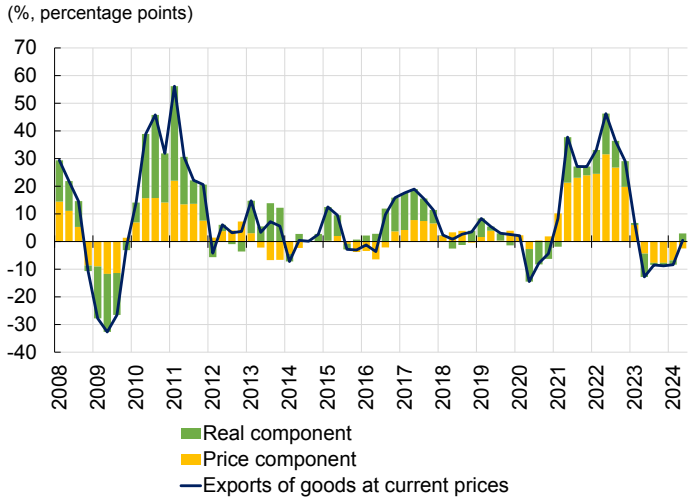

Figure 2. Contributions of price and volume components to the nominal growth rate of exports
Source: Eurostat

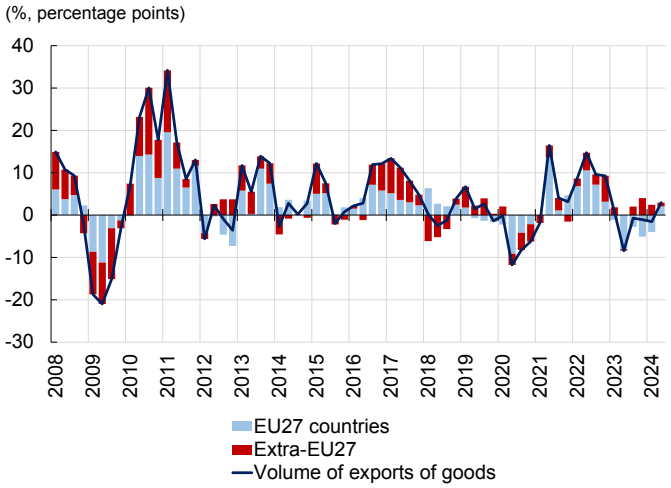

Figure 3. Geographical breakdown of real exports of goods
Source: Eurostat

Regarding the "primary income, net"[1] item of the balance of payments, which traditionally records a negative balance for Bulgaria, the deficit remained broadly stable in 2023 compared to the previous year. At the same time, in the first half of 2024, the deficit slightly decreased on an annual basis, mainly driven by the dynamics of outgoing flows under the "income from equity" sub-item, which captures reinvested earnings from foreign-owned companies.

Concerning the "secondary income, net" sub-item, a positive net inflow of funds to the country was recorded both in 2023 and in the period from January to June 2024. This was primarily supported by transfers received from non-residents.

According to balance of payments statistics, the services trade balance, which is traditionally positive for the country, continued its upward trend, reaching EUR 7,812 million in 2023 (8.3% of GDP) compared to EUR 6,043 million (7.0%) in 2022. In nominal terms, services exports increased by 15.1%, with the largest positive contributions coming from travel-related services, telecommunications, computer and information services, as well as consulting services. Services imports in nominal terms rose by 3.0% in 2023, largely due to higher expenditures by Bulgarian residents on travel abroad and spending on telecommunications, computer, information, and other business services. At the same time, imports of transport services declined compared to 2022. The net surplus in the "services" category for January–June 2024 amounted to EUR 3,241 million (7.0% of GDP).

In 2023, the capital account, which records revenues from the sale of greenhouse gas emission allowances and EU transfers related to the implementation of projects under structural and cohesion funds, saw an

[1] Primary income reflects the compensation that residents of the country pay to non-residents for the use of foreign production factors. The balance under this sub-item is traditionally negative for Bulgaria and primarily reflects the investment income paid to non-residents, in line with the substantial amount of foreign capital attracted to the country.

increase in the surplus to EUR 1,473 million (1.6% of GDP). This trend continued in the first half of 2024, when the capital account surplus improved by EUR 236 million year-on-year, reaching EUR 957 million (2.1% of GDP). Net inflows into the country were mainly due to received capital transfers from the "general government" sector. The balance of the current and capital accounts determines Bulgaria's economic exposure to the rest of the world. As a result of the dynamics of the components described above, both in 2023 and in the first half of 2024, the overall balance of the current and capital accounts remained in surplus.

Regarding the financial account, in 2023 there was a larger increase in foreign liabilities of Bulgarian residents compared to their foreign assets, resulting in a net inflow of funds into the country. These developments made Bulgaria a net recipient of funds from the rest of the world—a trend observed in the years following the pandemic (2020–2023). By institutional sector, the decline in net foreign assets was mainly attributable to the public sector and banks. For banks, the formation of negative net foreign assets (inflow of funds into the country) was due to an increase in their foreign liabilities as a result of reinvested profits from previous years. Data for the "general government" sector can be primarily explained by government debt issuances on international capital markets.

In the first six months of 2024, the financial account of the balance of payments was positive, interpreted as a net outflow of funds, i.e., the country was a net creditor to the rest of the world. All institutional sectors contributed to these developments.

As a result of the described dynamics of flows in the current, capital, and financial accounts, Bulgaria's international reserves at the Bulgarian National Bank increased by EUR 3.3 billion in 2023, or 3.5% of GDP (excluding changes due to exchange rate differences and price revaluations). At the same time, international reserves decreased by EUR 4.6 billion in the first half of 2024 (-9.9% of GDP).

Table 4. Breakdown of the Financial account by institutional sectors

Breakdown of Financial account by sectors (mln euro)	2017	2018	2019	2020	2021	2022	2023	2024
Financial account	1947	1715	2760	-3178	-833	-1626	-2327	233
Central bank	61	-37	23	33	-65	-69	-30	161
Other monetary financial institutions (MFIs)	1106	-41	1372	-1892	-1146	895	-1650	-769
General government	1001	157	1153	-1967	-329	-1180	-938	-1296
Other sectors	-221	1636	212	648	707	-1272	290	2137

Note: Category 'other sectors' includes: „other investment, net" and financial derivatives (other than reserves), net'.
Source: BNB

Table 5. International investment position

Internation investment position (IIP), (% of GDP)	2019	2020	2021	2022	2023	2024
IIP, net	-30.8	-23.4	-15.6	-8.7	-6.3	-3.7
Assets	91.4	100.2	98.7	92.4	92.6	92.7
Reserve assets	0.0	0.0	0.0	0.0	0.0	0.0
Liabilitites	0.0	0.0	0.0	0.0	0.0	0.0

Source: BNB

According to the international investment position, by June 2024, international reserves reached EUR 37.7 billion (39.0% of GDP), providing strong coverage of Bulgaria's short-term external debt and imports of goods and services. Coverage of the average nominal imports of goods and services by international reserves over the last 12 months as of June 2024 was 8.4 months, while international reserves exceeded the country's short-term external debt by 4.5 times.

Bulgaria's gross external debt fell to 45.4% of GDP by June 2024, compared to 50.8% of GDP at the end of 2022, reflecting both a significant increase in nominal GDP and a reduction in incentives for external financing due to active credit activity of Bulgarian banks and more favorable domestic financial conditions compared to the euro area. In absolute terms, gross external debt amounted to EUR 44.4 billion, an increase of EUR 0.8 billion compared to the end of 2022. The majority of the debt (68.8%) was held by the private sector, mainly in the form of intragroup loans. At the same time, a substantial portion of the debt is long-term (75.7% of total gross external debt) and denominated in euros (79.4% of total gross external debt), which limits the vulnerability of the Bulgarian economy to potential volatility in international capital flows amid the normalization of monetary policy by major central banks. Public debt financing is a policy tool that solves current fiscal imbalances but creates medium-term (and often long-term) macroeconomic problems (Zarkova, Kostov, Angelov, Pavlov and Zahariev, 2023).

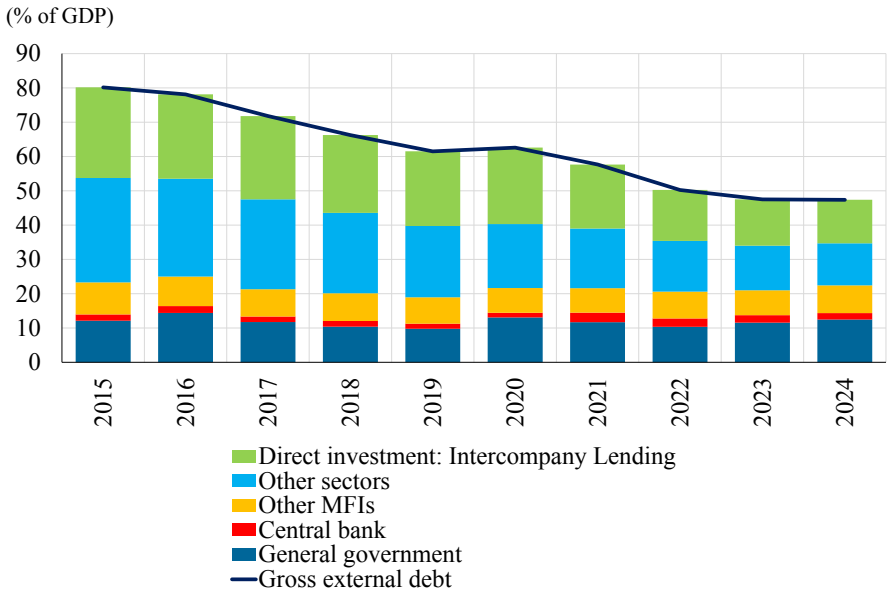

Figure 4. Breakdown of gross external debt by institutional sectors
Source: NSI, authors' calculations

4.2. Cyclical Position of the Economy

After a growth of 4.0% in 2022, Bulgaria's annual real GDP growth slowed to 1.9% in 2023, before accelerating again to 2.8% in 2024. From the perspective of GDP measured by the expenditure approach, this growth profile was largely determined by changes in inventories. Disruptions in global supply chains and high global inflation led firms to deliberately accumulate raw materials and finished goods in 2021–2022, after which inventory levels decreased significantly in 2023, contributing negatively to real GDP growth.

Domestic demand continued to increase at a sustainably high pace in 2023 and 2024. This was primarily supported by favorable developments in the labor market, including rising employment and real labor income, which boosted disposable income and household consumption. The government's fiscal policy exhibited a pronounced procyclical character and was also aimed at stimulating domestic demand. On the one hand, higher government spending on wages and healthcare contributed to the growth of the government consumption component of GDP, while on the other hand, increases in social transfers supported the growth of final household consumption, particularly for low-income households.

By economic sector, the improvement in national activity, as measured by value added, was primarily driven by the services sector. Although the industrial sector also recorded growth in value added, the industrial production index indicated a deterioration in sectoral activity in 2023 and 2024. These developments were accompanied by a decline in employment in the industrial sector on an annual basis, with decreases of -1.1% in 2023 and -1.7% in 2024, while overall employment in the economy grew by 1.1% in both years.

Within domestic demand, private consumption made the largest positive contribution to GDP changes throughout the period under review. In 2023, households' final consumption expenditures increased by 1.4% in real terms, while in 2024, growth reached 4.2%. This private consumption dynamics was consistent with rising real wages, employment growth, higher net fiscal transfers to households, an annual increase in consumer credit, and improved consumer sentiment. By composition, the growth in final consumption expenditures was mainly driven by spending on services, non-durable, and semi-durable goods, whereas durable goods had a neutral contribution.

Government consumption continued to grow nominally at relatively high rates (10.9% in 2023 and 17.0% year-on-year in 2024). This was primarily due to increased compensation expenditures for public sector employees and higher healthcare spending. In real terms, government consumption increased by 1.1% in 2023 and by 4.6% year-on-year in 2024.

Gross fixed capital formation increased by 10.2% in real terms in 2023, driven entirely by public investments. By asset type, the growth was mainly supported by investments in machinery and equipment. Investments by the "general government" sector rose for the first time since 2019. Public investments recorded a 63% real-term increase, supported both by capital expenditures from the national budget and by funds financed through European resources. Factors potentially limiting corporate investment activity included the deterioration of external demand prospects and the availability of idle production capacity in industry.

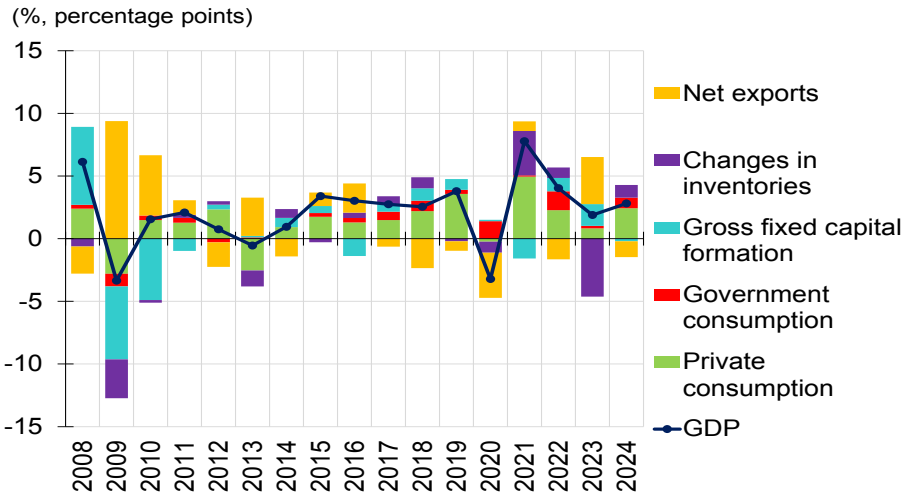

Figure 5. GDP growth rate breakdown by expenditure approach
Source: NSI, authors' calculations

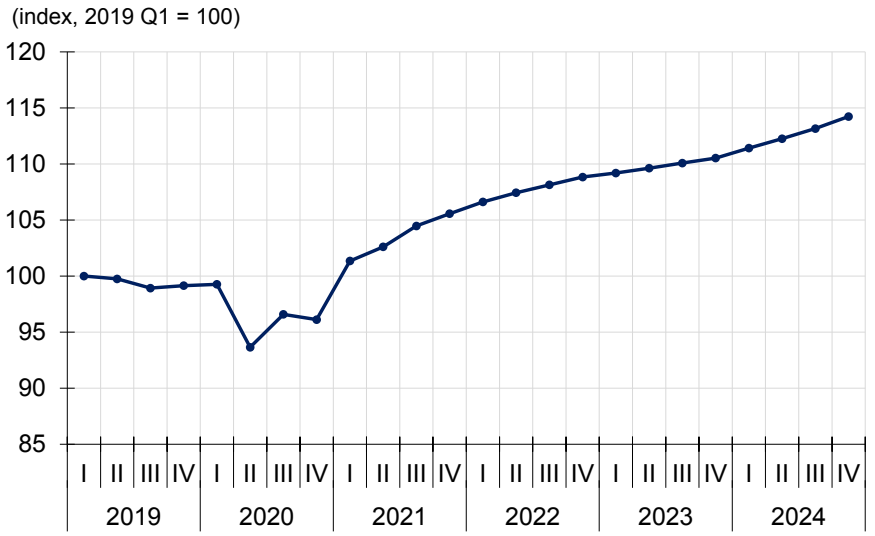

Figure 6. Real GDP level, seasonally adjusted data
Source: NSI, authors' calculation

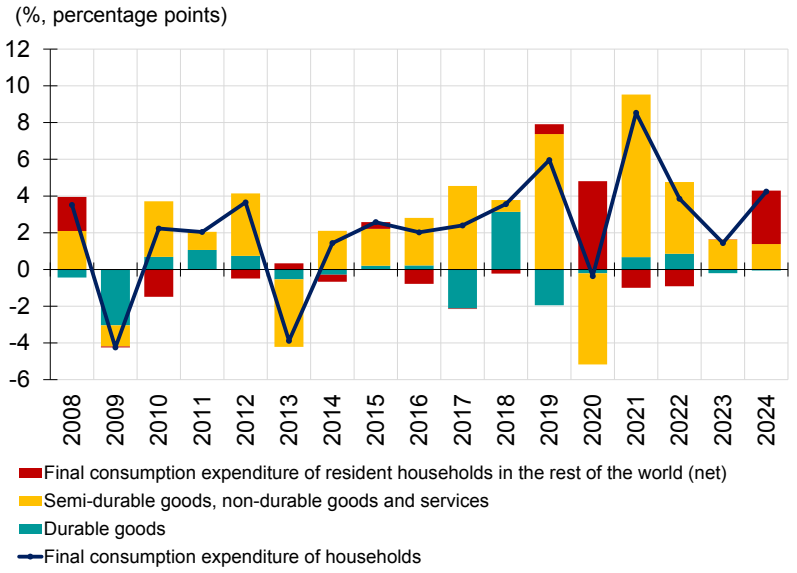

Figure 7. Growth rate of real final consumption expenditure of households

Note: Category 'final consumption expenditure of resident households in the rest of the world (net)' is the difference between expenditure of residents abroad and expenditures of non-resident in Bulgaria
Source: Eurostat, authors' calculations

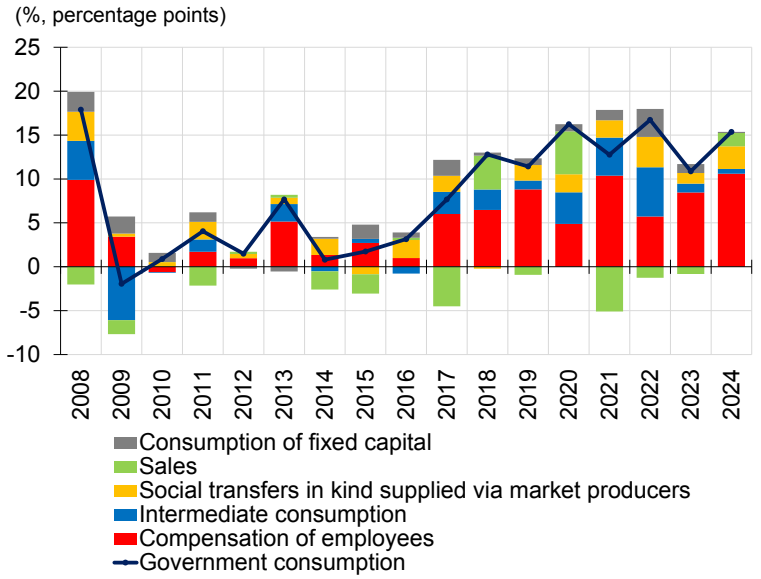

Figure 8. Growth rate of nominal government consumption

Source: NSI, authors' calculations

In 2024, gross fixed capital formation declined by 1.1% year-on-year. By asset type, the main negative contribution to the decrease came from construction-related investments.

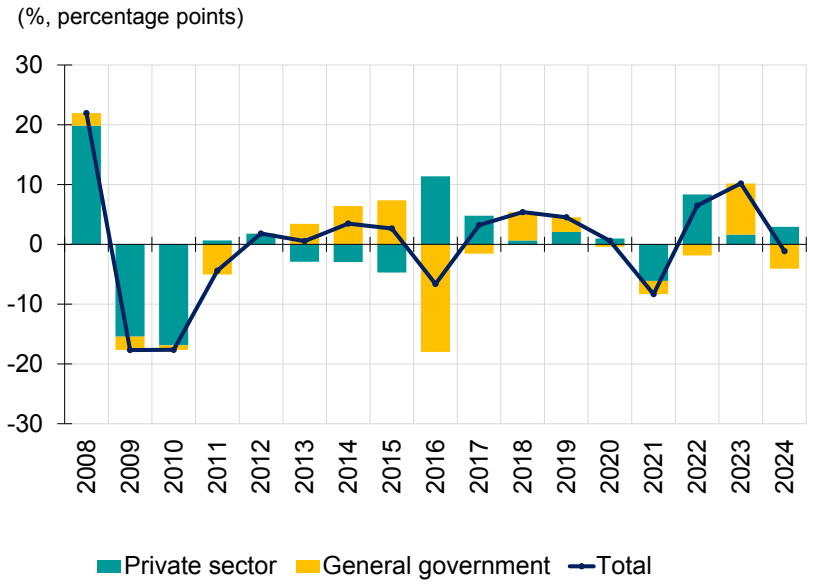

Figure 9. Breakdown of investment in fixed assets by institutional sectors
Source: NSI, authors' calculations

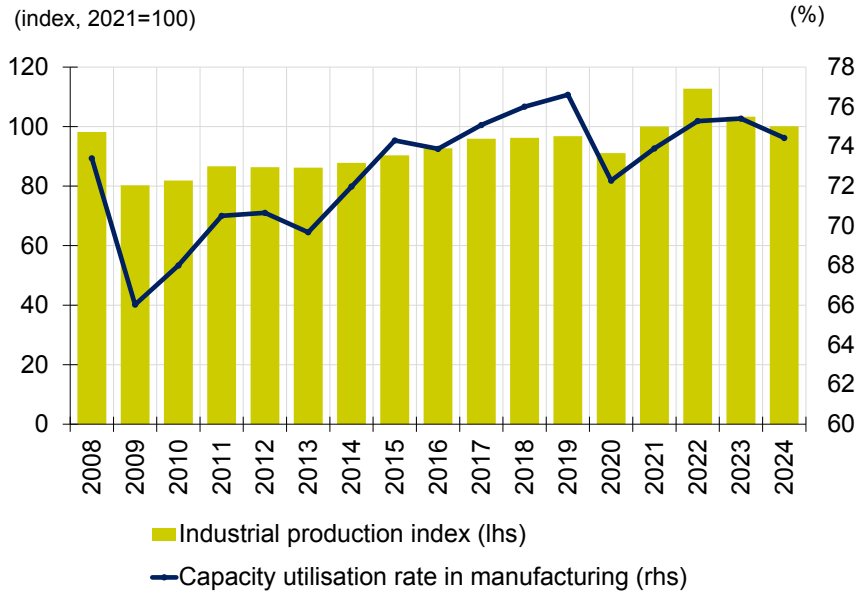

Figure 10. Industrial production and capacity utilization rate in manufacturing
Source: NSI, authors' calculations

4.3. Exports and Imports

In 2023, exports of goods and services remained unchanged compared to the previous year, but declined by 0.8% year-on-year in 2024. These developments were mainly driven by goods trade and reflected weaker economic activity among Bulgaria's main trading partners. Services exports contributed positively to total exports in 2023 and slightly negatively in 2024.

Imports of goods and services fell significantly by 5.5% in real terms in 2023, reflecting reduced inventory accumulation and stagnant exports. In 2024, imports grew modestly by 1.3% year-on-year, in line with strong domestic demand. As a result, the net export contribution to real GDP growth was positive in 2023 but turned negative in 2024.

In 2023, the economy-wide gross value added (GVA) increased by 1.3% in real terms (compared with 5.5% in 2022), mainly driven by the services sector (+3.1 percentage points). In 2024, annual GVA growth accelerated to 2.5%, with positive contributions from most major sectors: industry (+0.3 pp), construction (+0.2 pp), and services (+0.2 pp), while agriculture contributed negatively (-0.2 pp).

The growth in services GVA in 2023–2024 reflected strong domestic demand. However, the increase in industrial GVA in 2024 should not be interpreted as a signal of improved sectoral activity. Alternative indicators, such as industrial production and turnover indices, NSI business climate surveys, goods exports, and employment changes, indicate a deterioration in industrial sector activity during 2024.

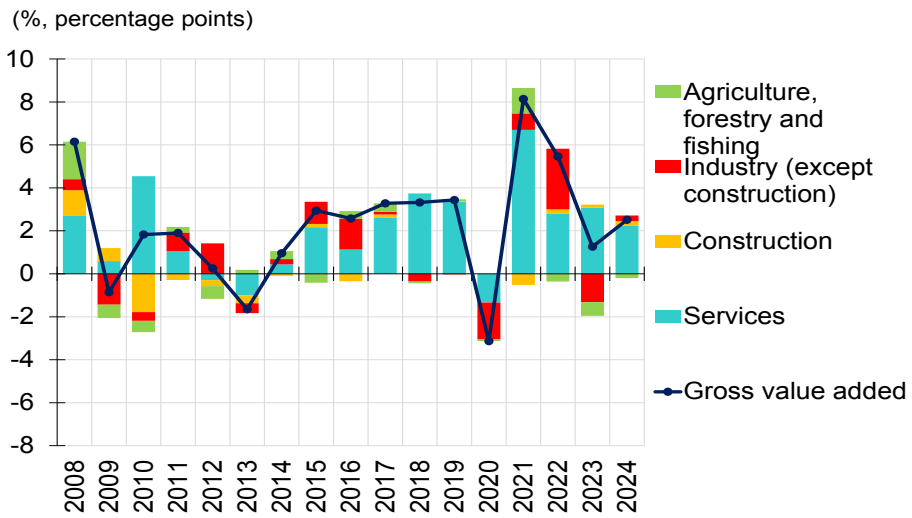

Figure 11. Breakdown of GVA growth rate by economic sectors

Source: NSI, authors' calculations

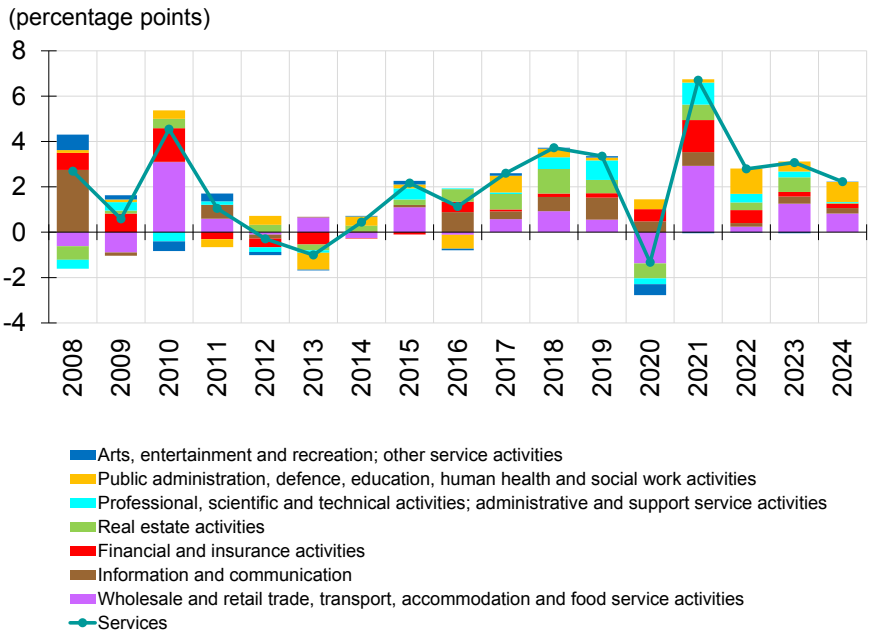

Figure 12. Contributions of services subsectors to the growth rate real GVA

Source: NSI, authors' calculations

4.4. Labor Productivity

Overall labor productivity in the economy increased by 0.2% in 2023 (compared with 4.4% in 2022), driven by stronger growth in gross value added relative to employment. In 2024, labor productivity continued to rise, reaching 1.4%, although developments varied by sector: productivity improved in industry (due to declining employment) but declined in agriculture and services.

The deepening labor shortage, along with increases in the minimum wage and public sector salaries, contributed to a rise in nominal compensation per employee by 13.4% in 2023 and 10.4% in 2024. Faster growth in compensation relative to productivity led to higher unit labor costs, increasing by 13.2% in 2023 and 8.8% in 2024.

Here we should mention that there is a huge gap between the needs of employers and the direction of the educational services provided by the institution. Significant changes in the social, economic and technological areas of life urge to transform the traditional educational practices (Bezgin, Zahariev, Shaulska, Doronina, Tsiklashvili and Wasilewska, 2022).

4.5. Labor Market

Economic activity growth in 2023–2024 supported the labor market: the economic activity rate rose, total employment increased, and unemployment remained low.

- Employment grew by 1.1% in both 2023 and 2024, mainly driven by the services sector and, to a lesser extent, construction. Employment in industry and agriculture declined.
- Within services, job gains were concentrated in "trade; transport; hotels and restaurants" and "public administration; education; human health and social work."
- The decline in industrial employment reflected lower industrial activity, adverse demographic trends, labor shortages (particularly skilled labor), and employment reductions aimed at improving productivity and offsetting rising wages.
- Unemployment:
- According to the NSI Labor Force Survey, seasonally adjusted unemployment fell to 4.0% in Q4 2024 (from 4.4% at end-2023).
- Registered unemployment (Employment Agency data) slightly increased to 5.3% in Q4 2024 (from 5.6% at end-2023), reflecting higher inflows of new unemployed in industry.
- Compensation per Employee
- Compensation per employee increased cumulatively by 25.5% over 2023–2024, reflecting labor shortages, indexing to inflation, public sector wage increases, and rises in the minimum wage.

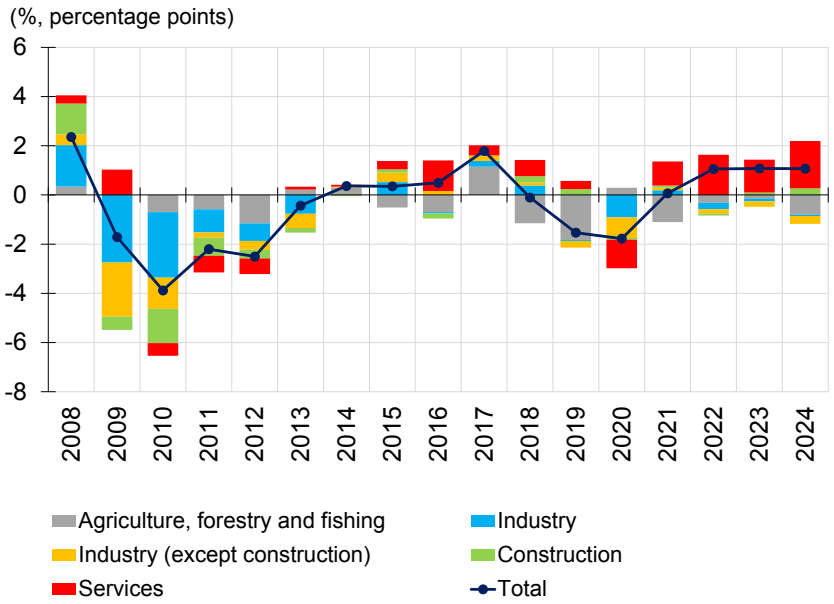

Figure 13. Breakdown of employment growth by economic sectors

Source: NSI, authors' calculations

4.6. Fiscal Policy

The consolidated fiscal program (CFP) recorded a budget deficit of BGN 5,619 million at the end of 2023, equivalent to -3.0% of GDP, representing a deterioration of BGN 4,272 million compared with 2022. The negative balance was driven by expenditure exceeding revenues across the central budget, municipal

budgets, and EU funds. On an accrual basis, the 2023 deficit was of a similar magnitude, also amounting to -3.0% of GDP.

In 2024, the CFP budget deficit amounted to BGN 6,138 million, representing a further deterioration of BGN 519 million compared with 2023. This was due to total budget expenditures rising more than total revenues.

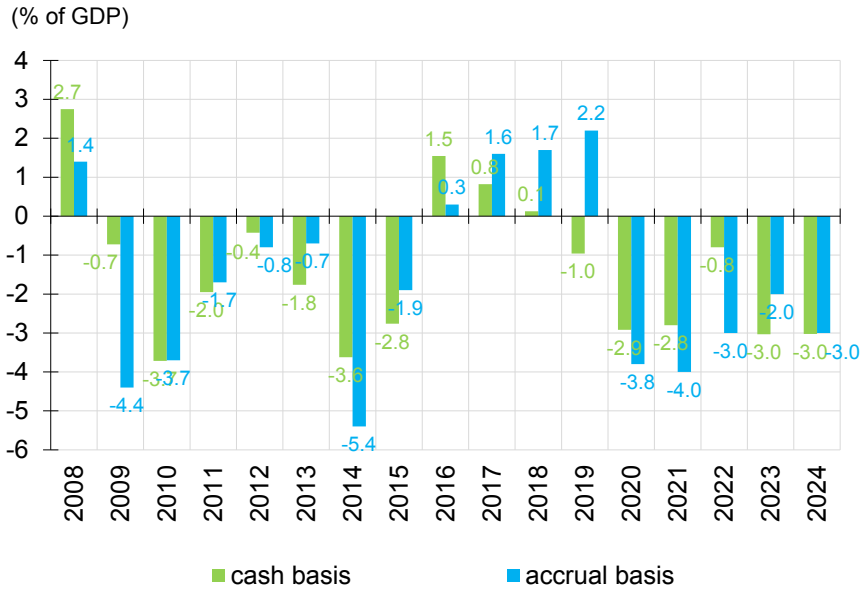

Figure 14. Budget balance
Source: NSI, authors' calculations

4.7. Budget Revenues

- 2023: Total revenues and aid under the Consolidated Fiscal Program (CFP) increased by 3.5%, significantly slower than the 23.7% growth recorded in 2022, mainly due to slowing inflation.
  - The growth was entirely driven by tax revenues, with the largest contributions from social and health insurance and other taxes.
  - Non-tax revenues and aid revenues declined.
- 2024: Total revenues and aid increased by 7.4%, again mainly driven by tax revenues.

- Budget Expenditures
- 2023: Total expenditures under the CFP rose by 9.9%, mainly due to:
  - Social expenditures – increase in pension payments.
  - Personnel expenditures – growth of 17.7% due to rising public sector wages.
  - Capital expenditures – increase due to the completion of projects under the 2014–2020 EU program, as well as funding for the Municipal Investment Program.
- 2024: Total expenditures rose by 7.5%, with the main contributions coming from social expenditures and personnel expenditures.

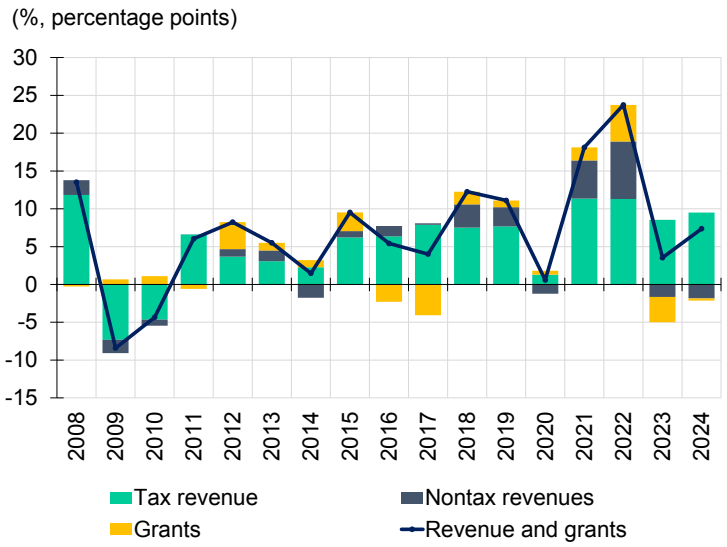

Figure 15. Government revenue growth rate, cash basis
Source: NSI, authors' calculations

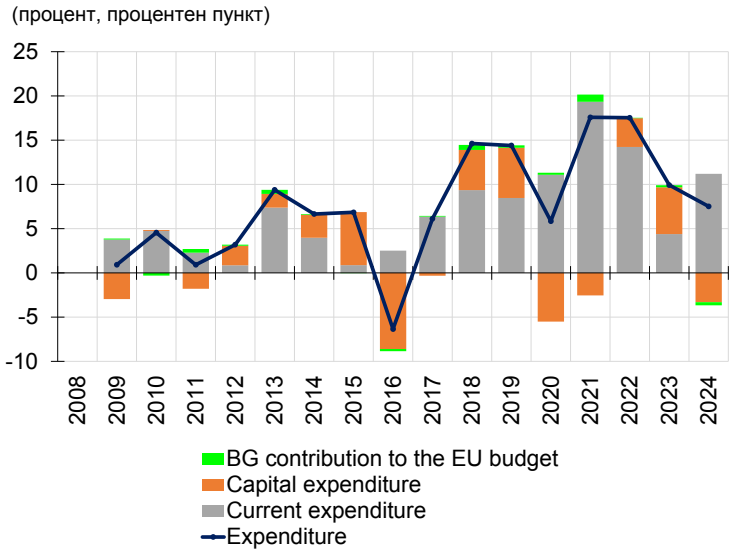

Figure 16. Government expenditures growth rate, cash basis
Source: NSI, authors' calculations

The increase in total government expenditures was reflected in a rise in government consumption, through which fiscal policy had a positive impact on real GDP in 2023 and 2024. The contribution of government consumption to economic growth during the period under review was determined by the simultaneous increase in both individual and collective consumption.

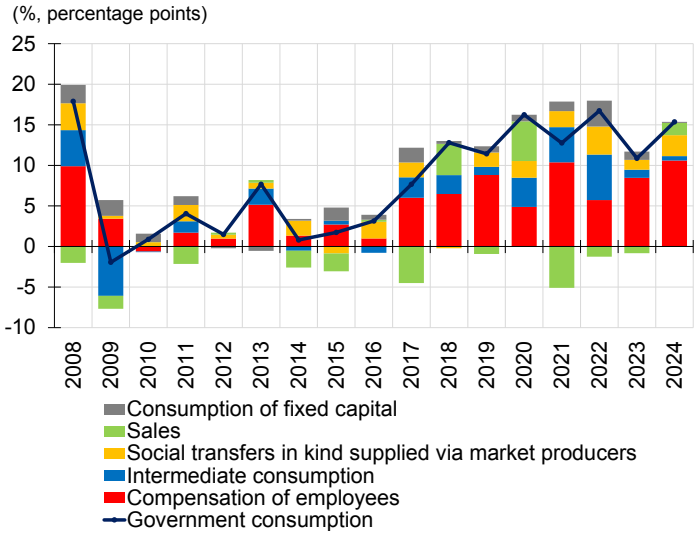

Figure 17. Breakdown of nominal government consumption growth rate
Source: NSI, authors' calculations

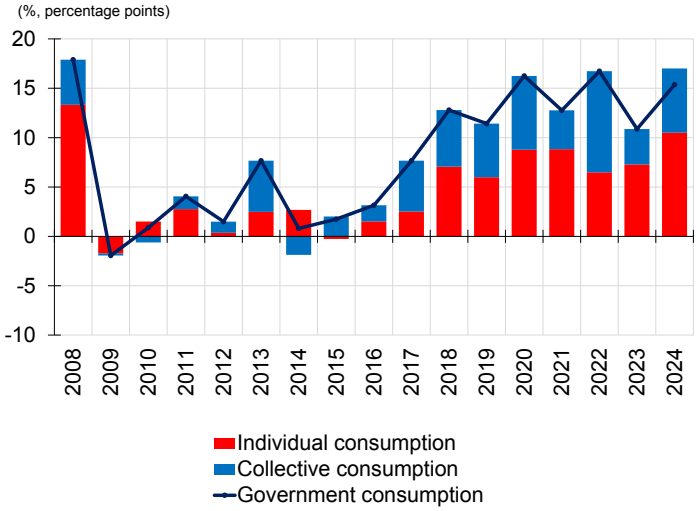

Figure 18. Breakdown of nominal government consumption growth rate into individual and collective consumption
Source: NSI, authors' calculations

The negative budget balance in 2023 and 2024 was financed mainly through bond issuances, both on international capital markets and on Bulgaria's domestic government securities market. Funds from the fiscal reserve were also used for financing. Deposits in the fiscal reserve amounted to BGN 8,525 million (4.2% of GDP) at the end of 2024, compared to BGN 9,013 million at the end of 2022.

4.8. Inflation

The trend of slowing inflation in Bulgaria, which began in the last quarter of 2022, continued throughout 2023 and 2024. Inflation according to the HICP decreased from 14.3% year-on-year in December 2022 to 2.1% at the end of 2024. The average annual inflation was 2.6% in 2024, compared to 8.6% in 2023 and 13.0% in 2022. The main factors behind the downward inflationary trend were the base effect from the high HICP growth in 2022, as well as the decline in international energy and food prices. A similar disinflationary process was observed in other European countries, contributing to lower inflation for manufactured goods.

Regarding the domestic macroeconomic environment, pro-inflationary pressures continued to arise from the strong growth in labor costs per unit of output, driven by wage-indexation pressures amid a significant labor shortage. Fiscal policy also had a pro-inflationary effect, as increased net fiscal transfers to households and higher public sector wages supported private consumption growth. This contributed to sustained high inflation in services, which are typically more demand-sensitive, and simultaneously enabled firms to pass higher production costs onto sales prices. These developments, together with corporate strategies to maintain profit margins, limited the extent to which falling international prices of key raw materials were reflected in final consumer prices.

The impact of external and domestic factors on inflation in Bulgaria in 2023–2024 can be analyzed using the deflator of final consumption. Based on this indicator, the annual growth of prices for domestically produced goods and services for final consumption was 4.0% in 2023 and 4.2% in 2024, compared to 18.1% in 2022. The main driver of the deflator increase in 2023–2024 was the rise in nominal labor costs per unit of output, only partially offset by declining prices of imported goods and services and the appreciation of the nominal effective exchange rate of the lev[2] against the currencies of Bulgaria's main trading partners in 2023.

[2] The nominal effective exchange rate (NEER) of the lev is calculated against 42 trading partners.

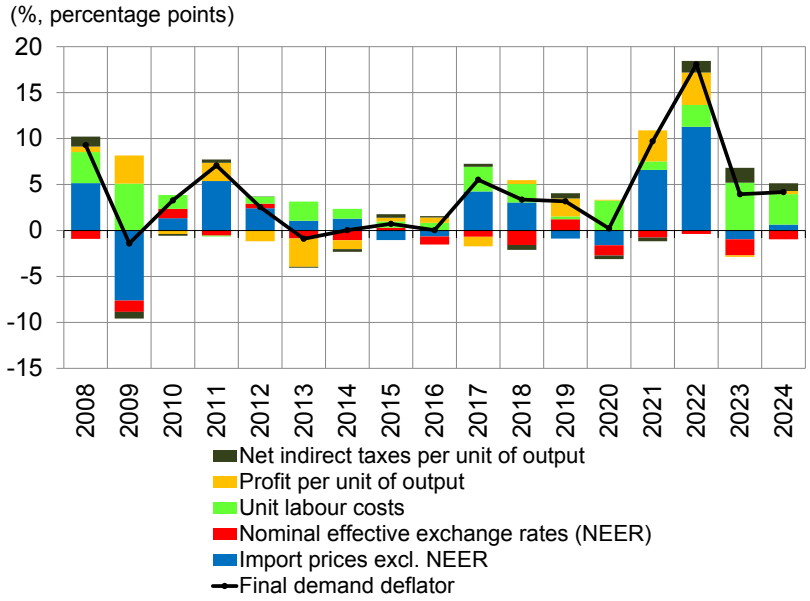

Figure 19. Final demand deflator growth rate
Source: NSI, authors' calculations

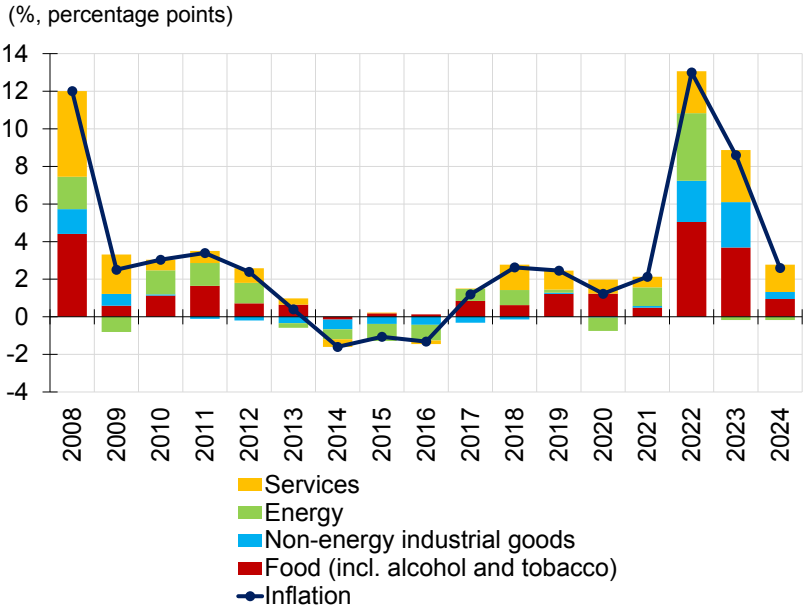

Figure 20. HICP inflation, annual average
Source: NSI, authors' calculations

The limited pass-through of falling international prices of key raw materials along the supply chain can be illustrated by examining the dynamics of producer prices. The domestic producer price index decreased by -12.5% in 2023 and by -7.6% year-on-year in January–August 2024. This was mainly due to the significant decline in energy product prices, particularly the production of electricity and heat, gaseous fuels, and refined petroleum products. Other product groups intended for intermediate consumption also recorded year-on-year decreases, namely -0.7% in 2023 and -2.5% in January–August 2024.

Although these products make up a significant portion of firms' production costs, producer prices of consumer and investment goods continued to show an increasing trend during the period, albeit at a slower pace. For example, producer prices of non-durable consumer goods, which include processed food products, increased by 13.3% in 2024 and by 2.7% in January–August 2024.

In 2024, the annual rate of change of consumer prices, measured by the HICP, was 2.6%. The largest positive contribution to inflation in August came from services (1.45 percentage points), followed by food (including tobacco) (0.95 percentage points) and non-food goods (0.37 percentage points). At the same time, the energy products group contributed negatively to the annual rate of change of the HICP (-0.17 percentage points).

4.9. Results from the early warning indicator

The model integrates five seasonally adjusted, high-frequency indicators: the month-on-month growth rates of the production indices in industry, construction, and services; the economic sentiment indicator compiled by the European Commission; the unemployment rate based on Employment Agency data; and the PMI index for the euro area, Bulgaria's main trading partner. These indicators jointly capture both domestic and external dynamics and are used to estimate the quarter-on-quarter growth rate of real GDP through a non-linear regime-switching framework.

By the end of 2023, the model estimated a close to 70% probability of transitioning into a low-growth regime, consistent with weakening industrial activity and deteriorating external demand conditions. Throughout 2024, this probability declined to approximately 60%, in line with stabilizing indicators.

Following the methodology outlined in the previous sections, Fig. 32 presents the estimated probability of a slowdown or recession in Bulgaria, as derived from Equations (1) and (2). The probability exceeds 50% during periods of sharply decelerating or negative GDP growth. The model successfully identifies key downturns such as the Great Recession of 2008–2009, the subsequent period of subdued "jobless" growth around the euro area sovereign debt crisis, and the economic contraction during the COVID-19 pandemic. In mid-2023, the low-growth probability peaked at approximately 70%, consistent with weakening economic activity in the euro area and a decline in the industrial production in Bulgaria. By late 2024, the probability moderated to around 60%.

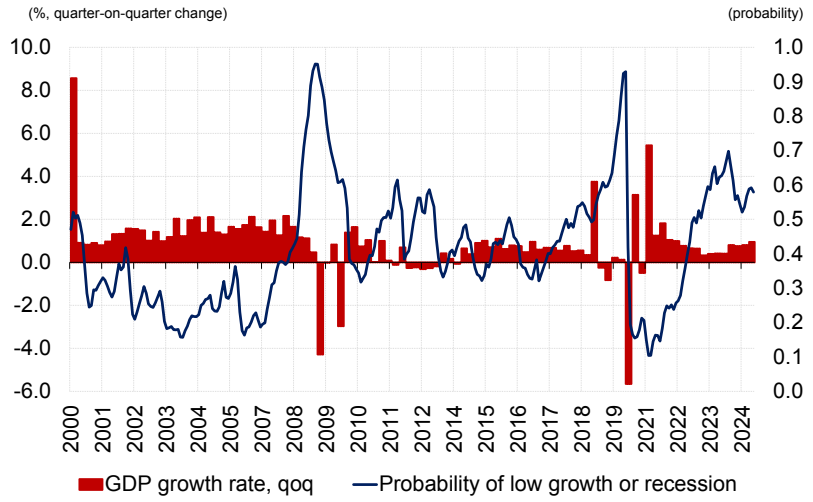

Figure 21. Probability of low growth
Source: own calculations

In addition to estimating the probability of a low-growth regime, the model also allows for the calculation of the probability of a negative change in real GDP—a standard indicator of recession. These probabilities, representing the likelihood of a contraction in economic activity in Bulgaria, are shown in Fig. 33. As expected, they are somewhat more volatile than the probabilities associated with the low-growth regime, which includes recessions as a special case. According to the model's estimates, the probability of a recession in Bulgaria rose above 60% in March 2024 but subsequently declined, reaching approximately 20% by the end of 2024.

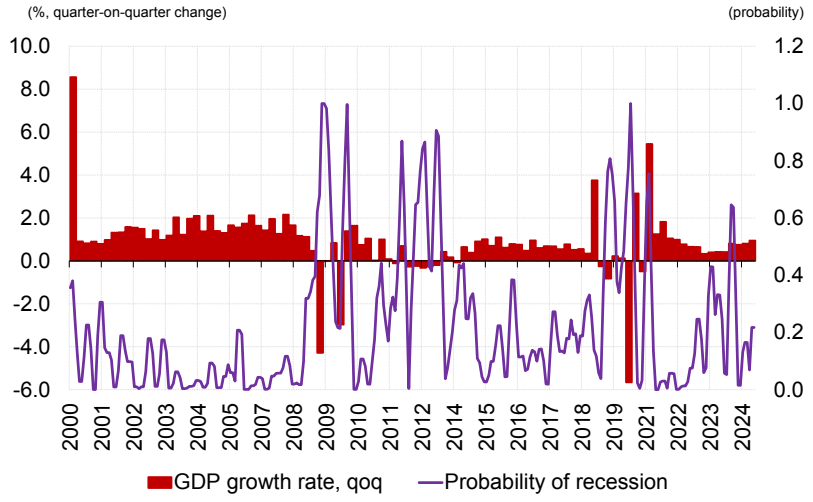

Figure 22. Probability of recession
Source: own calculations

5. Discussion

The results of the conducted study confirm that Bulgaria's economic development during the 2023–2024 period was shaped by the interaction of domestic stimulating factors and external limiting influences. Although GDP growth slowed significantly in 2023 compared to the previous year, it remained positive and accelerated in 2024, indicating a certain resilience of the Bulgarian economy in an unstable global environment. The main contributors to this resilience were private and government consumption, as well as public investment, while industrial production and exports were negatively affected by weakened external demand, particularly from eurozone countries.

The inflationary dynamics showed a clear distinction between external and domestic factors. The decline in energy and food prices on international markets had a strong disinflationary effect, but the sustained rise in labor costs and strong domestic demand kept inflation high in the services sector. This underscores the need for more balanced policies that simultaneously support economic activity while containing domestic price pressures.

A comparison of macroeconomic forecasts from different institutions revealed significant methodological differences, related to the models used, the frequency of input data, and assumptions about the external environment. This raises the question of developing more flexible and adaptive forecasting tools, especially under conditions of high uncertainty.

In this context, the proposed early warning indicator, based on a **Markov-switching dynamic factor model**, stands out as an effective tool for timely identification of transitions between "high" and "low" growth phases. The model successfully captured the rising risk of growth slowdown in mid-2023 and its subsequent decline in 2024, providing a faster and more flexible assessment compared to traditional forecasts. This confirms its applicability as a complement to official macroeconomic tools and highlights its practical significance for economic policy.

The Early Warning Mechanism in the European Union, part of the Stability and Growth Pact, focuses on the fiscal discipline of member states. It is based on criteria such as a budget deficit not exceeding 3% of GDP and public debt not exceeding 60% of GDP or moving steadily towards that threshold. The mechanism relies on preventive instruments, which include monitoring and recommendations to avoid violations, as well as corrective instruments, such as the Excessive Deficit Procedure, which can lead to sanctions. Its horizon is both medium-term and long-term, with the ultimate goal of ensuring the sustainability of public finances.

The early warning mechanism described in the article, however, focuses on the macroeconomic dynamics of Bulgaria and, by analogy, other small open economies. It applies a dynamic factor model with Markov-switching, which combines multiple high-frequency indicators such as GDP, inflation, foreign trade, and the labour market. Its main tool is a statistical model that identifies the probability of the economy entering a slowdown or a crisis regime. The horizon is short-term and medium-term, with the purpose of signalling potential economic shocks before they appear in official statistics.

The main difference between the two mechanisms lies in their nature and objectives. The EU mechanism is normative and sanctioning, as it monitors compliance with fiscal rules, whereas the mechanism

in the article is econometric and predictive, aiming to forecast cyclical changes and crises through data and modelling. In other words, the EU mechanism looks backwards to determine whether rules have been broken, while the model from the article looks forward to assessing whether there is a risk of an upcoming crisis.

6. Conclusion

During the period 2023–2024, Bulgaria's economy demonstrated moderate resilience amid a weakening external environment. Real GDP growth slowed to 1.9% in 2023—down from 4.0% in the previous year—before recovering to 2.8% in 2024. The deceleration in 2023 was largely driven by a pronounced reduction in inventories, following stock accumulation during prior global supply chain disruptions. Despite this drag, domestic demand remained robust throughout the period, supported by rising employment, strong real wage growth, and expansionary fiscal policy, including increased public sector wages and social transfers.

The main sources of growth were private consumption, government consumption and public investment in 2023. On the supply side, the services sector was the largest contributor to output and employment growth, while industrial production declined over both years, reflecting weak external demand. Inflation, which had reached 13.0% in 2022, moderated significantly to 8.6% in 2023 and further to 3.1% by the end of 2024, largely due to declining international energy and food prices. Nonetheless, core inflation—particularly in services—remained elevated, driven by strong domestic demand and rising unit labor costs.

Foreign developments—particularly in the euro area, Bulgaria's main trading partner—played a critical role in shaping the external environment. Economic growth in the euro area remained subdued (0.6% in 2023 and 0.9% in early 2024), due to tighter monetary and fiscal conditions, persistent energy cost pressures, and geopolitical uncertainty. This contributed to weak foreign demand for Bulgarian exports, especially in industry, and had a negative impact on overall net exports in 2024. Simultaneously, the deterioration in the Eurozone's Purchasing Managers' Index (PMI) further signaled sluggish external conditions.

High-frequency indicators proved to be valuable tools for real-time monitoring of economic developments. Production indices for industry, construction, and services offered timely signals of sectoral activity, while labor market indicators confirmed continued tightness in employment conditions. Confidence indicators compiled by the European Commission, as well as the Eurozone PMI, were effective in gauging both domestic sentiment and external demand. Together, these short-term indicators enabled a timely and more nuanced assessment of the macroeconomic stance and emerging risks.

To enhance the early detection of cyclical turning points, a Markov-switching early warning indicator was constructed. This model incorporates five high-frequency, seasonally adjusted variables: production indices in industry, construction, and services; the unemployment rate; the economic sentiment indicator; and the Eurozone PMI. The model endogenously estimates the probability of transitions between high-growth and low-growth phases, as well as the likelihood of negative GDP growth. As of mid-2023, the probability of entering a low-growth regime increased to above 0.6 but since then has receded to around

55%, reflecting improvements in short-term indicators and easing downside risks. This indicator provides a valuable supplement to traditional macroeconomic tools by allowing for timely, data-driven assessments of shifts in the economic regime before official national accounts data become available.

Domestic demand continued to grow at a persistently high pace in 2023 and the first half of 2024. This was mainly supported by favorable developments in the labor market, including employment growth and real wage increases, which bolstered disposable income and household consumption. The government's fiscal policy exhibited a pronounced procyclical stance, also aimed at stimulating domestic demand. Higher government spending on wages and healthcare contributed to growth in the government consumption component of GDP, while increased social transfers supported the growth of final consumption, particularly among low-income households.

By economic sectors, the improvement in domestic activity, measured by value added, was primarily driven by the services sector. Although the industrial sector also recorded value-added growth, the industrial production index indicated a deterioration of activity in 2023 and the first half of 2024. These developments were accompanied by a decline in industrial employment on an annual basis, by -1.2% in 2023 and -1.7% in the first half of 2024, while overall employment in the economy increased by 1.0% and 1.2%, respectively.

Annual average inflation slowed gradually to 8.6% in 2023 and to 3.4% by September 2024 (from 13.0% in 2022). These developments were mainly driven by easing price pressures in energy products, industrial goods, and food, consistent with the dynamics of commodity and international market prices. The services sector contributed most positively to inflation in mid-2024, reflecting developments in the domestic macroeconomic environment. Throughout the period, unit labor costs rose strongly, exerting upward pressure on CPI components with a high labor cost share. The pass-through of higher production costs to final consumer prices was facilitated by sustained growth in consumer demand.

The constructed early warning indicator shows that at the end of 2024 the economy remained in a "high growth" phase. In the medium term, GDP growth is expected to remain in the range of 2.2–2.6%, supported mainly by domestic demand. Factors expected to limit real GDP growth include slower growth of external demand compared to historical trends, limited fiscal space for the government, and delayed implementation of infrastructure projects, including those under the Recovery and Resilience Plan.

The existing institutional forecasts, while differing in assumptions and methods, provide complementary insights that are critical for shaping Bulgaria's short- and medium-term economic policy mix. The analyzed data indicate the necessity of developing further models for better forecasting Bulgaria's macroeconomic indicators.

The analysis confirmed that despite the slowdown in external demand, domestic factors—private consumption, government expenditure, and public investment—were the main drivers of GDP growth in 2023–2024, confirming **H1**.

Empirical data showed a clear slowdown in inflation driven by external price factors, alongside persistent price pressures in services due to domestic pro-inflationary factors, confirming **H2**.

The applied early warning indicator successfully captured the increased risk of transition to low growth in mid-2023 and its subsequent decline in 2024, validating its effectiveness and confirming **H3**.

Comparison of forecasts from different institutions revealed significant methodological differences and dependency on assumptions regarding the external environment, confirming **H4**.

7. Limitations and Future Research

This study has several limitations that should be acknowledged. First, the analysis is restricted to the period 2023–2024, which may limit the generalizability of the results to longer-term structural developments. Second, the early warning indicator relies on a relatively small set of high-frequency indicators, and while this ensures parsimony and timeliness, it may overlook additional channels of transmission, particularly financial variables such as credit spreads, housing market dynamics, or capital flows. Third, the Markov-switching dynamic factor model, although powerful in capturing regime changes, is sensitive to model specification and prior assumptions, which may affect real-time forecasting accuracy.

Future research could extend the analysis by incorporating a broader range of financial and international indicators to enhance the predictive power of the early warning tool. A comparative study with other small open economies in Central and Eastern Europe could also provide useful benchmarks for assessing Bulgaria's cyclical position. Finally, integrating the indicator into policy simulation frameworks would allow researchers and policymakers to evaluate potential fiscal and monetary policy responses to emerging risks in real time.

Acknowledgements

The publication contains the results of a study funded by a targeted subsidy of the University of National and World Economy, Contract No: NID NI-9-2025.

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