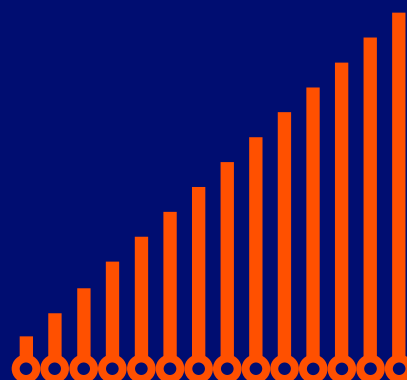
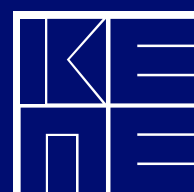


GREEK ECONOMIC OUTLOOK



- Recent (macro-)economic developments
- Fiscal developments
- Human resources and social policies
- Reforms-Economic development
- Special topics



Publisher:

CENTRE OF PLANNING AND
ECONOMIC RESEARCH

Editor:

Panagiotis G. Liargovas

Managing editor:

Nikolaos Rodousakis

Editorial Board:

Fotini Economou
Konstantinos Loizos
Vlassis Missos

Editing:

Helen Soultanakis

Publications Department

Information:

Eva Toulitsi
Tel.: 210 3676347

Printed by:

[βιβλιοτεχνία]
Pappas Ektipotiki PC

Copyright 2025
CENTRE OF PLANNING
AND ECONOMIC RESEARCH
11, Amerikis str., 106 72 Athens, Greece
Tel.: +30-210-3676.300, 210-3676.350
Fax: +30-210-3630.122, 210-3611.136
Website: www.kepe.gr

Opinions or value judgments expressed in this journal are the authors' own and do not necessarily reflect those of the Centre of Planning and Economic Research.



Executive Summary	3
1. Recent (macro-)economic developments	6
1.1. The main demand components in the first six months of 2025, <i>Yannis Panagopoulos, Konstantinos Loizos</i>	6
1.2. Developments in inflation in Greece and the Eurozone, <i>Emilia G. Marsellou</i>	16
1.3. Factor model forecasts for the short-term prospects in GDP, <i>Macroeconomics Forecasting Unit</i> <i>Ersi Athanassiou, Aristotelis Koutroulis, Emilia Marsellou,</i> <i>Theodore Tsekeris</i>	21
1.4. The Greek stock market is entering a new era, <i>Fotini Economou</i>	23
1.5. Recent developments and prospects of global economic activity: Moderate economic growth amidst great uncertainty and rising trade protectionism, <i>Aristotelis Koutroulis</i>	28
2. Fiscal developments	31
State Budget, public debt and prospects of fiscal aggregates, <i>Yiorgos Ioannidis, Elisavet I. Nitsi</i>	31
3. Human resources and social policies	38
3.1. Recent developments in key labour market variables, <i>Ioannis Cholezas</i>	38
3.2. Significant wage inequality between European regions, <i>Vlassis Missos</i>	46

3.3. Health, subjective well-being, and healthcare access in the wake of COVID-19: Evidence from Greece, <i>Athina Raftopoulou</i>	50
4. Reforms-Economic development	55
4.1. Military expenditure in the EU27, <i>Georgios Bertsatos, Christos Chrysanthakopoulos</i>	55
4.2. Digital reforms and tax evasion in Greece, <i>Artemis Stratopoulou</i>	60
Special topics	68
Revisiting Greece's participation in Global Value Chains: New evidence at the sector level, <i>Petros Dimas, Alexandra Kontolaimou, Aimilia Protogerou</i>	68
The impact of risk-based tax audits on the efficiency of Tax Administration, <i>Charalampos Kalligosfyris, Eleni Kalamara, Zacharias Dermatis, Athanasios Anastasiou</i>	86

Executive Summary

The Greek economy continues to grow steadily despite mild deceleration

The Greek economy remains on a growth trajectory, despite a slight slowdown in the pace of expansion observed during the second quarter of 2025. According to preliminary *National Accounts* data, real GDP increased by 1.7% year-on-year, compared to 2.2% in the first quarter, indicating a limited but not alarming deceleration. **This development does not signify a substantial shift in the economy's underlying momentum**, as it mainly reflects short-term and partly offsetting fluctuations. A sharp decline in goods imports, mainly fuel, contributed positively to growth, while the reversal of the previous inventory build-up had a mildly negative impact. In this context, KEPE's updated projections for 2025 foresee an **average annual real GDP growth rate of 2.1%**, slightly lower than the previous estimate of 2.2% (see section 1.3). This small downward revision mirrors the second-quarter moderation without altering the broader picture of an economy expanding at a steady pace, supported by resilient domestic demand and the normalization of inflationary pressures.

The labour market continues to strengthen

The labour market also shows signs of stabilization and improvement (see section 3.1). Employment has risen, including among wage earners, while unemployment has declined. Particularly noteworthy is the drop in unemployment among foreign workers—an indication of better integration into the productive economy. By sector, the primary sector records some losses, while employment continues to grow in the secondary and tertiary sectors, albeit unevenly across subsectors. Changes in occupations follow similar patterns, without significant shifts in the overall skill mix, as most new jobs are still filled by secondary-education graduates. Working hours remain high by Greek standards and are converging towards the EU average, while the reduction in job vacancies suggests a gradual easing of labour market mismatches—even in sectors that traditionally face staff shortages. For instance, in tourism, both a decline in vacancies and a slight reduction in employment have been observed, reflecting a natural market adjustment rather than structural weakness. At

the institutional level, the new labour law under public consultation has sparked broad social dialogue—an essential process to ensure fairness and balance in the labour market.

The Greek capital market enters a new growth phase

At the same time, the Greek capital market appears to be entering a new growth phase (see section 1.4). During the first eight months of 2025, the Athens Stock Exchange recorded a **strong upward trend**, with a marked increase in both capitalization and trading volumes. Large-cap indices outperformed the general index, while mid- and small-cap indices also rose, though at a milder pace. Banking and financial stocks were at the forefront of this rally, reflecting improved investor confidence and upgraded prospects for the financial sector. The continued **easing of interest rates by the European Central Bank**, most recently in June 2025, has further supported liquidity and investment sentiment. Simultaneously, the Greek government bond market has shown positive developments, with successful issues and a decline in the average cost of borrowing. The outlook for the coming months remains highly positive, as the forthcoming acquisition of the Athens Stock Exchange by Euronext and its expected reclassification among developed markets open up new growth opportunities and broader access to capital for Greek enterprises.

Fiscal performance continues to improve impressively

Within this macroeconomic environment, Greece's fiscal performance has continued to improve markedly. The general government's primary surplus reached 4.8% of GDP in 2024, far exceeding expectations, while public debt declined to 153.6% of GDP, the sharpest drop among EU countries. Tax revenues rose to 49.3% of GDP, mainly due to the surge in electronic transactions and digital reforms implemented by the Independent Authority for Public Revenue (AADE). The interconnection between cash registers and POS terminals, combined with the widespread use of electronic payments, has substantially reduced tax evasion and improved transaction traceability, allowing for a more

accurate alignment between declared income and real economic activity. These reforms have enhanced tax compliance, broadened the tax base, and strengthened the credibility of fiscal data. While the European fiscal framework calls for tighter spending control and greater medium-term prudence, Greece must strike a delicate balance: reinforcing economic resilience without undermining fiscal stability, and using new financial instruments to bolster its productive capacity without jeopardizing growth or social cohesion.

The 2026 draft state budget was submitted in early October

The draft budget projects a 2.4% growth rate for 2026, compared with just 1% in the Eurozone. The primary surplus is expected at 2.8% of GDP, confirming ongoing fiscal discipline and **Greece's steady path toward sustainable public finances**. Public debt is projected to decline further to 137.6% of GDP—its lowest level since 2010. However, this positive picture is accompanied by a gradual slowing of growth momentum and increasing external risks—geopolitical, inflationary, and fiscal—that could hinder target achievement. The global environment remains fraught with challenges: protectionism in the US, geopolitical tensions in Ukraine and the Middle East, and uncertainty in global energy markets all create instability that inevitably affects Greece. Even if the country remains a “island of stability” within Europe, its growth remains closely tied to external trade and investment flows. The next period calls for **greater resilience and diversification of growth drivers**. The government highlights the “demographic tax reform” as a key lever to support the middle class and families with children. Lower personal income tax rates and the gradual abolition of the property tax (ENFIA) in small settlements bring a sense of relief. However, the overall tax take is still expected to rise by €2.6 billion, meaning that much of this relief is offset by indirect taxation (VAT), imputed income taxation, and the lack of inflation indexation in tax brackets. **Tax fairness remains an unresolved issue**. The ratio of indirect to direct taxation continues to weigh disproportionately on lower-income households. Investment growth, projected at 10.2%, is the highest in the EU for 2026. The Public Investment Programme amounts to €16.7 billion, compared to €14.6 billion in 2025. If fully implemented, it could act as a strong driver of productivity and growth. Yet, much of this investment momentum depends on EU funding—particularly the Recovery and Resilience Facility, whose disbursements will end in 2026. With EU inflows set to decline gradually, the key question is whether Greece can bridge the forthcoming funding

gap through national or private resources. In the social sphere, the government's measures—such as the €250 allowance for pensioners and pension increases based on GDP and inflation—are welcome steps to support vulnerable groups. However, their impact remains limited unless accompanied by real income growth. Inflation, though easing to 2.2%, continues to erode purchasing power, and income inequality is widening. Unemployment stands at 8.6%, the lowest since 2008, but the quality of employment—marked by part-time work, seasonality, and low wages—remains a concern.

Geopolitical tensions highlight the priority of defense readiness

The Latin phrase *Si vis pacem, para bellum*—“If you want peace, prepare for war”—seems more relevant than ever, encapsulating the European Union and NATO's renewed emphasis on defense readiness amid escalating geopolitical tensions (see section 4.1). European leaders now prioritize mobilizing both public and private capital to strengthen defense capabilities. The recent EU program offering low-interest loans for defense procurement creates a new framework from which Greece is expected to benefit. Meanwhile, discussions within NATO about stricter spending targets—including clear distinctions between “core defense” and “critical infrastructure” and annual progress reporting—are reshaping the medium-term fiscal outlook. Any potential increase in the minimum defense spending target could strain national budgets, especially following the 2024 revision of EU fiscal rules, which impose stricter net-expenditure paths and corrective mechanisms for deviations.

For Greece, this shift has a dual significance:

- On one hand, it opens a window for industrial policy focused on defense technologies, dual-use innovations, and critical infrastructure—stimulating investment, value chains, and export capacity.
- On the other, it demands careful coordination between development priorities and fiscal discipline to preserve macroeconomic stability.

Inflation is easing but not gone

Inflationary pressures are gradually subsiding, though not yet eliminated (see section 1.2). In August 2025, annual inflation stood at 2.9%, while core inflation—excluding energy and food—was 4.2%, reflecting persistent increases in service and housing costs. Preliminary September estimates show further declines to

1.8% for headline inflation and 2.6% for core inflation. The highest price increases are recorded in clothing and footwear, hotels and restaurants, and housing, while goods inflation remains subdued compared with services. This persistent gap suggests that domestic inflationary pressures stem more from production costs and local demand conditions than from global commodity prices.

Wage disparities between Greece and the EU average are widening

This issue takes on added importance when considering the growing wage inequality between Greece and the EU average (see section 3.2). In 2022, the wage situation across Greek regions worsened markedly, with a clear divergence from the European mean. Attica still records higher wages than the rest of the country but continues to lag behind major Western European metropolitan areas. Overall, Greece's relative position has shifted closer to that of Eastern European countries, many of which have now overtaken it in wage levels thanks to stronger investment inflows and productivity gains. **Among the EU's 237 regions, Greek regions now rank at the very bottom in terms of average wages. In 2009, the North Aegean ranked 202nd; by 2022, it had fallen to 237th – last place.** Epirus follows immediately behind at 236th. On average, between

2009 and 2022, Greek regions fell by about forty places in the EU wage ranking. These data confirm Greece's chronically low purchasing power and highlight the worsening socio-economic situation of workers whose income primarily depends on private-sector wages.

The path ahead

In conclusion, all evidence confirms the macroeconomic stability of the Greek economy but also underscores its persistent structural weaknesses: **low productivity and quality of governance; weak institutions; dependence on EU funds, consumption and imports; widening social inequalities; slow transition to the green and digital economy; and the demographic challenge**—all of which gradually erode future growth potential. Achieving primary surpluses should not become an end in itself. The goal is not to secure fiscal balance through over-taxation, which drains liquidity from the real economy and discourages investment. Greece needs a balanced strategy—less focus on accounting performance and more on qualitative, inclusive growth. Stability is a prerequisite for development—not a substitute for it.

*Professor PANAGIOTIS LIARGOVAS
Chairman of the Board and Scientific Director,
Centre of Planning and Economic Research (KEPE)*

1. Recent (macro-)economic developments

KEPE, *Greek Economic Outlook*, issue 58, 2025, pp. 6-15

1.1. The main demand components in the first six months of 2025

1.1.1. Introduction - Domestic & external demand

Yannis Panagopoulos

In this section, utilizing the recorded macroeconomic data, we proceed with the analysis of the current developments of the first six months of 2025. Specifically, based on the results of Table 1.1.1, we observe the existence of positive rates of change in individual aggregate macroeconomic factors excluding imports of goods. However, there is a slight decline in the growth of the economy compared to the corresponding half of 2024 (1.96% and 2.39%, respectively).

More specifically, for the 1st half of 2025, it should be noted that from the specific macroeconomic factors, the largest positive rate of change was displayed by exports of goods and services (2.23%), followed by gross fixed capital formation (2.13%), private consumption (1.46%) and public consumption (0.7%). As expected, imports of goods and services had a negative rate of change (Table 1.1.1.).

For the 2nd quarter of 2025, we have a slightly different ranking regarding the importance of the individual factors for the recorded GDP growth. Specifically, gross fixed capital formation had the largest percentage rate (6.5%), followed by exports of goods and services (1.9%), private consumption (1.1%) and public consumption (0.7%). It is also noticeable that for the same quarter and in contrast to all quarters of 2024 as well as the 1st quarter of 2025, public consumption recorded a positive rate (0.7%) in its economic growth contribution. On the other hand, as expected, imports of goods and services had a negative rate (-3.2%).

Furthermore, aggregate demand continues to show positive but gradually declining growth (Figure 1.1.2). In an analytical form, for Q2 2025, based on its existing sub-components of aggregate demand (using seasonally adjusted data), fixed capital investment has

the largest contribution (1.04), followed by private consumption (0.78) and public consumption (0.14).

As regards the share of the domestic and external sectors of demand (i.e., the balance of goods and services) in GDP, for the 2nd quarter of 2025, we have a relatively positive recorded balance, mainly due to the significant positive contribution of both the change in inventories (4.62) and domestic demand (4.56) (Figure 1.1.3). Thus, the negative contribution of the balance of goods and services (-0.69) was adequately encountered by the positive contribution of the other two sub-components.

Regarding now the Economic Climate Index (ECI), as the future “proxy” of demand, Figure 1.1.4 records the expectations of households and businesses for the period 5/2024-8/2025. This Index continues to demonstrate a moderate volatility that started from 110.2 points in May 2024 and a “return” to 110.3 points in August 2025 (Figure 1.1.4). Overall, the expectations of households and businesses, for 2025, were volatile but generally restrained.

Below, a more detailed discussion on the contribution of the country's balance of goods and services to GDP is presented.

Balance of goods and services

The contribution of the external sector (percentage change in exports minus imports) for the first half of 2025, as already presented in Figure 1.1.3, is generally positive (1.04). Below, we refer separately to the rate of change for goods and for services. Starting with exports, we should underline that services, which are also the smallest part of exports, showed a six-month increase of 2.24%, while goods, which were the largest part of exports, showed a small increase of 0.57%. On the other hand, for the same six-month period, imported services had a sizeable increase of 2.61%, while imported goods experienced a decrease of 1.68% (Table 1.1.1).

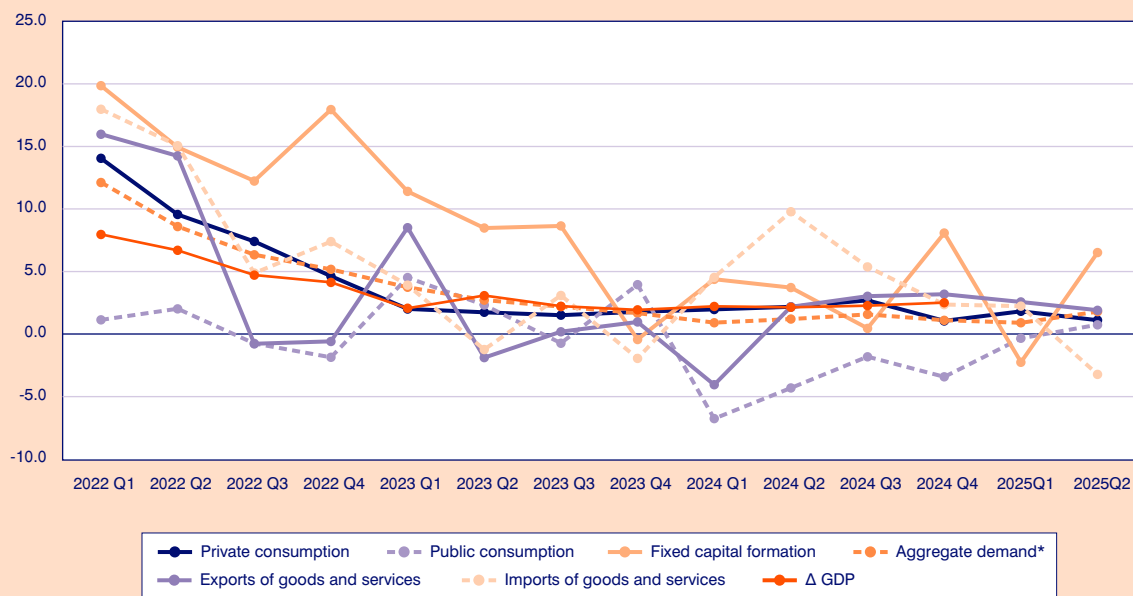
As far as the contribution of the balance of goods and services to the GDP growth rate for the 2nd quarter of 2025, it stood at 2.16 points in contrast to -3.39 points, for the corresponding 2nd quarter of 2024

TABLE 1.1.1 Basic macroeconomic variables
(% rates of change with seasonally adjusted data, at constant prices)

	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2	2024 (Q1+Q2)	2025 (Q1+Q2)
Private consumption	14.1	9.6	7.4	4.6	2.0	1.7	1.5	1.8	2.0	2.2	2.7	1.1	1.8	1.1	1.87	1.46
Public consumption	1.1	2.0	-0.7	-1.9	4.5	2.3	-0.7	3.9	-6.8	-4.3	-1.8	-3.4	-0.3	0.7	-2.62	0.20
Fixed capital formation	19.9	14.9	12.2	18.0	11.4	8.5	8.6	-0.4	4.4	3.7	0.5	8.1	-2.3	6.5	4.27	2.13
Aggregate demand*	12.1	8.6	6.3	5.2	3.7	2.7	2.2	1.7	0.9	1.2	1.6	1.1	0.9	1.8	1.34	1.35
Exports of goods and services	16.0	14.2	-0.8	-0.6	8.5	-1.9	0.2	1.0	-4.1	2.2	3.0	3.2	2.6	1.9	2.80	2.23
Exports of goods	6.9	5.6	3.8	2.0	8.9	-3.0	-2.9	-4.2	-9.7	0.6	0.7	1.4	2.2	-1.1	1.06	0.57
Exports of services	21.6	27.6	-1.7	-3.5	6.9	0.0	3.7	5.1	3.4	2.6	4.3	4.9	0.6	3.9	4.58	2.24
Imports of goods and services	18.0	15.1	4.9	7.4	3.9	-1.2	3.1	-1.9	4.5	9.8	5.4	2.4	2.2	-3.2	3.86	-0.50
Imports of goods	19.4	18.7	9.7	6.3	2.0	-3.9	2.7	-1.7	4.0	11.1	3.5	2.0	1.4	-4.8	2.71	-1.68
Imports of services	13.6	4.6	-7.7	9.9	13.2	8.2	2.5	-2.8	4.4	5.2	12.7	4.8	3.7	1.5	8.76	2.61
Δ GDP	8.0	6.7	4.7	4.1	2.1	3.1	2.2	1.9	2.2	2.1	2.3	2.5	2.2	1.7	2.39	1.96

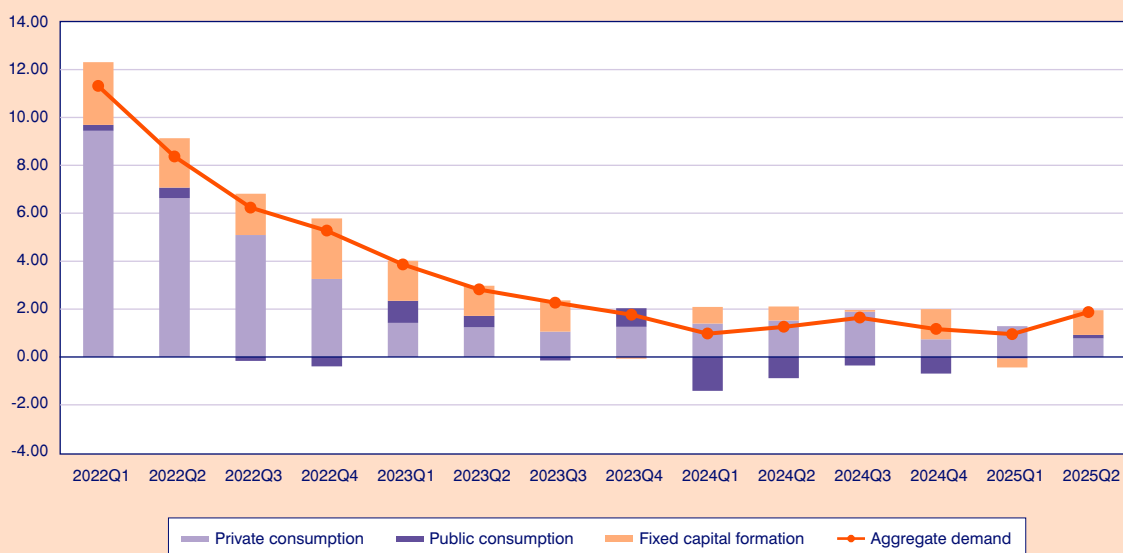
Source: National Accounts, ELSTAT.

* Without change of Inventories.

FIGURE 1.1.1**Basic macroeconomic variables***(% rates of change with seasonally adjusted data, at constant prices)*

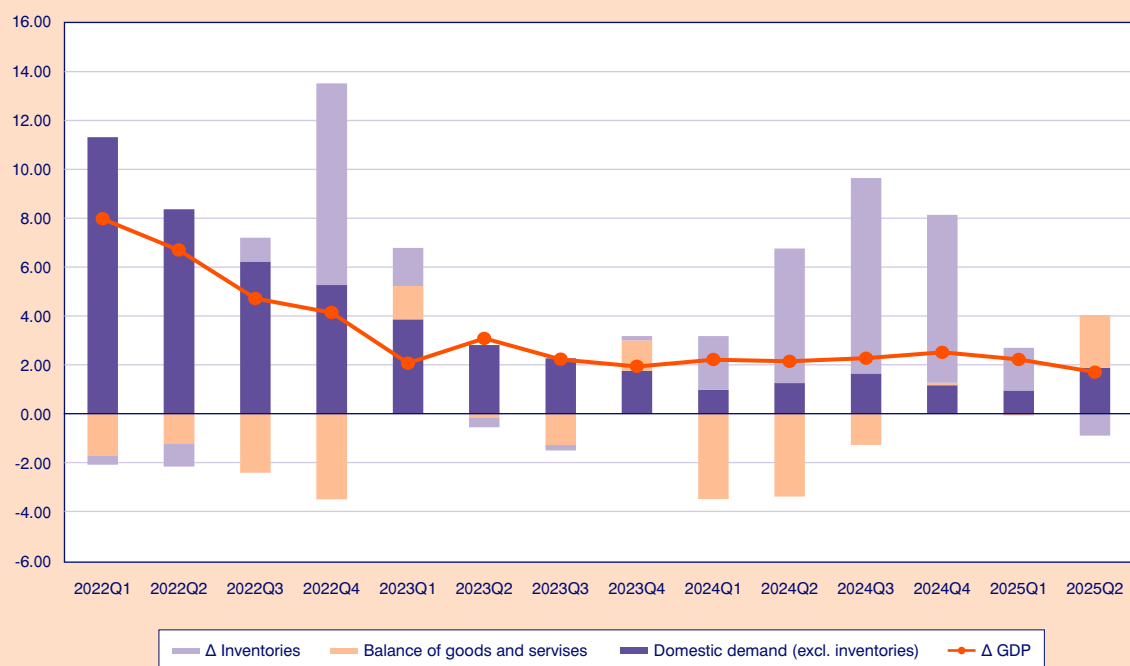
Source: National Accounts, ELSTAT, data processing by the author.

* Without change of inventories.

FIGURE 1.1.2**Sub-components of domestic demand**

Source: National Accounts, ELSTAT, data processing by the author.

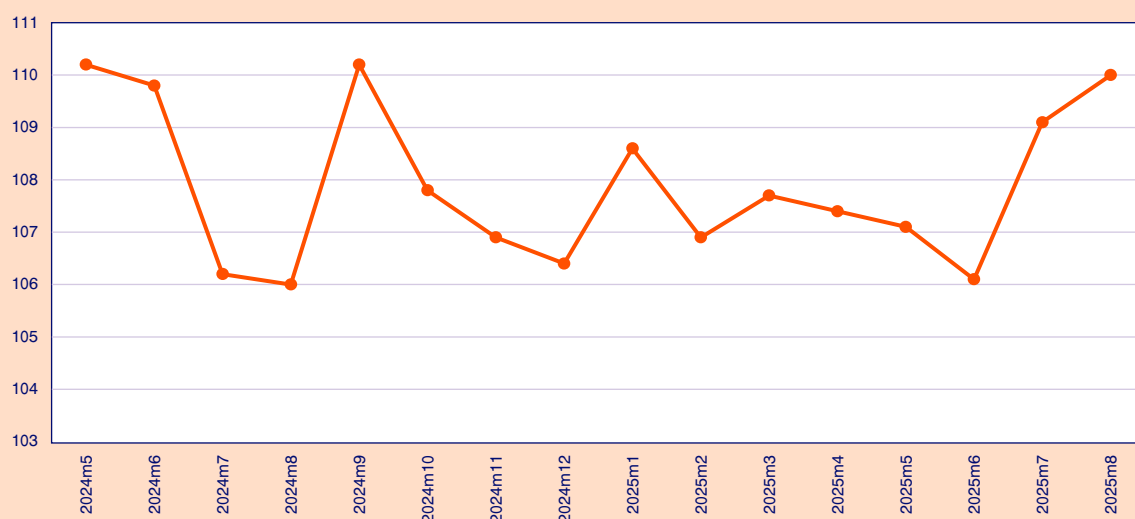
FIGURE 1.1.3
Domestic and net external demand*



Source: National Accounts, ELSTAT, data processing by the author.

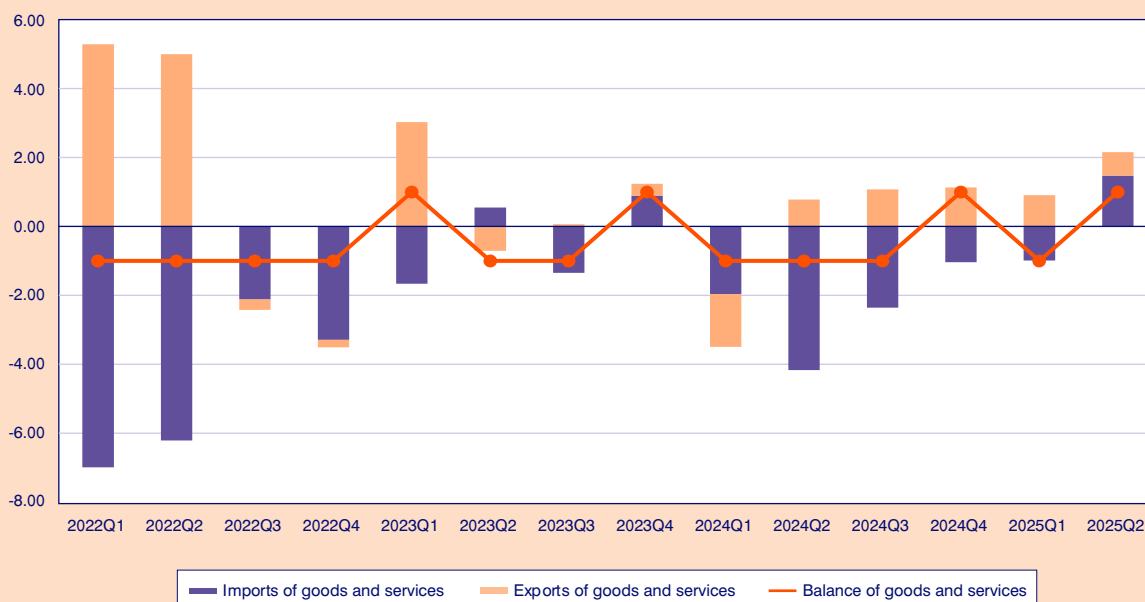
* The change of inventories for 2024Q1 and Q2 is author's estimate.

FIGURE 1.1.4
Economic Sentiment Index – ESI (5/2024-8/2025)



Source: Eurostat.

FIGURE 1.1.5
Sub-components of external demand



Source: National Accounts, ELSTAT, data processing by the author.

(Figure 1.1.5). More specifically, we measure a positive contribution of total exports to GDP, estimated at 0.68 points, but more notable was the unexpected positive contribution of total imports to GDP, which was at 1.48 points. A general longstanding picture, with the corresponding histograms of exports and imports, is presented in detail in Figure 1.1.5.

1.1.2. Private consumption and investment

Konstantinos Loizos

1.1.2.1. Private consumption

Fluctuations in private consumption expenditure in the first six months of 2025

According to the quarterly seasonally adjusted *National Accounts*,¹ private consumption of households and NPISH² rose from 41,579 million euros in current prices in the last quarter of 2024 to 42,586 million eu-

ros in the first quarter and 42,902 million euros in the second quarter of 2025. However, in terms of chain-linked volumes in constant 2020 prices, while private consumption rose initially from 35,366 million euros in the fourth quarter of 2024 to 35,807 million euros in the first quarter of 2025, it subsequently decreased to 35,740 million euros in the second quarter of the same year. The same fluctuation is observed in terms of percentage changes³ with respect to the previous quarter, based on seasonally adjusted chain-linked volumes, where private consumption showed a negative rate of change of -0.2% in the last quarter of 2024, a positive change of 1.2% in the first quarter of 2025 and again a negative change of -0.2% in the second quarter of the same year. With respect to the corresponding quarter of the previous year, the rates of change were correspondingly 1.1%, 1.8% and 1.1%, showing the same pattern of fluctuations, though, in this case, they were all positive.

Private consumption, as a percentage of GDP, was 69.10% on average during the year 2024, but it in-

1. Quarterly National Accounts, Press release, ELSTAT, September 5, 2025.

2. Non-profit institutions serving households.

3. Percentage changes are calculated using the formula $\frac{X_t - X_{t-1}}{X_{t-1}}$.

creased slightly to 69.41% on average in the first six months of 2025. On the contrary, public consumption as a percentage of GDP decreased, on average, from 18.37% in 2024 to 18.09% of total expenditure in 2025. A similar fall is observed in gross capital formation (fixed capital and change in inventories) where, on average, it was 17.73% of GDP in 2024, while in the first six months of 2025, it was 17.18% of GDP. However, the above is reflected in the reduction of the external trade deficit as a percentage of GDP, which fell, on average, from -5.20% of GDP in 2024 to -4.68% in the first six months of 2025 (See Figure 1.1.6). In conclusion, while private consumption in the first half of 2025 increased in nominal prices, it also showed fluctuations in real and percentage rate of change terms, while it gained ground in terms of its percentage share in total expenditure.

Positive developments in retail trade in the first half of 2025, except in automotive fuel

The evolution in retail trade in terms of percentage changes of the overall volume index was, on average, positive in the first six months of 2025 (1.93%), as

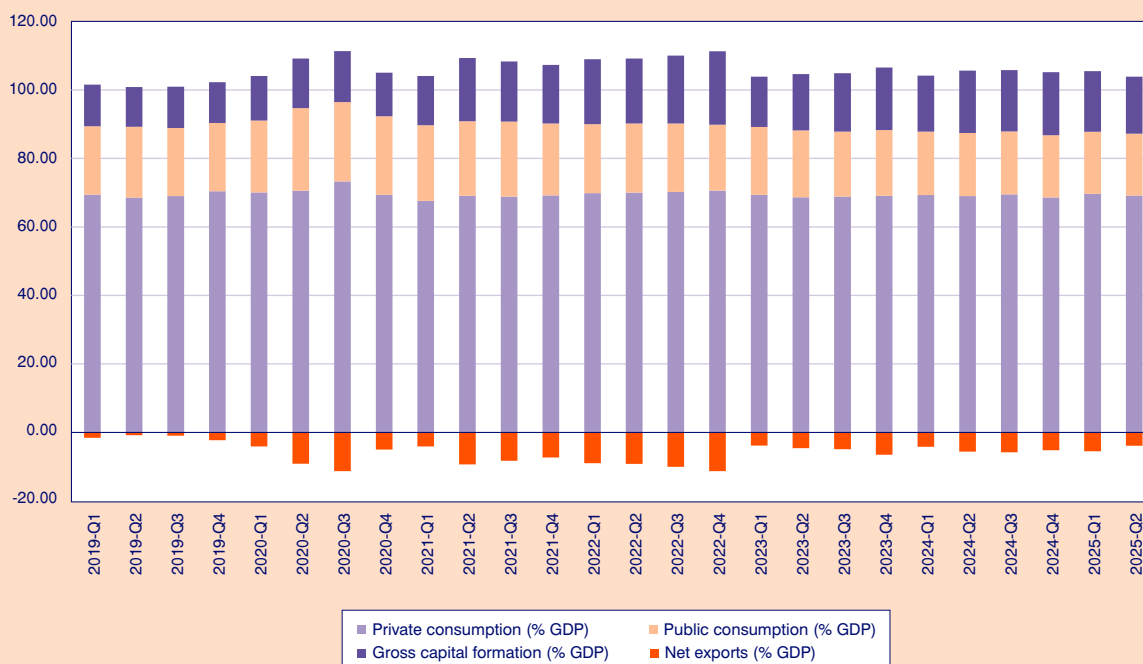
opposed to the average negative percentage rate of change of the previous year (-1.47%), based on ELSTAT monthly data (Figure 1.1.7). We also observe positive developments in food items since the small positive average percentage change in 2024 (0.90%) became a significant positive average percentage change in the first half of 2025 (4.12%). The same happened in other items except automotive fuel, where the negative average percentage change of -5.78% in 2024 became a positive change of 3.41% in the first six months of 2025. The only exception is automotive fuel, where a small positive average percentage change in 2024 (0.42%) turned into a negative one, equal to -1.53% in the first half of 2025. In total, it seems that our observation in the previous issue of the *Greek Economic Outlook* has been confirmed concerning the positive developments in retail trade in the current year, at least for the overall volume index and most of its components.

Uncertainty in retail trade expectations continues

Despite the above-described positive developments and given the confidence indicators published by

FIGURE 1.1.6

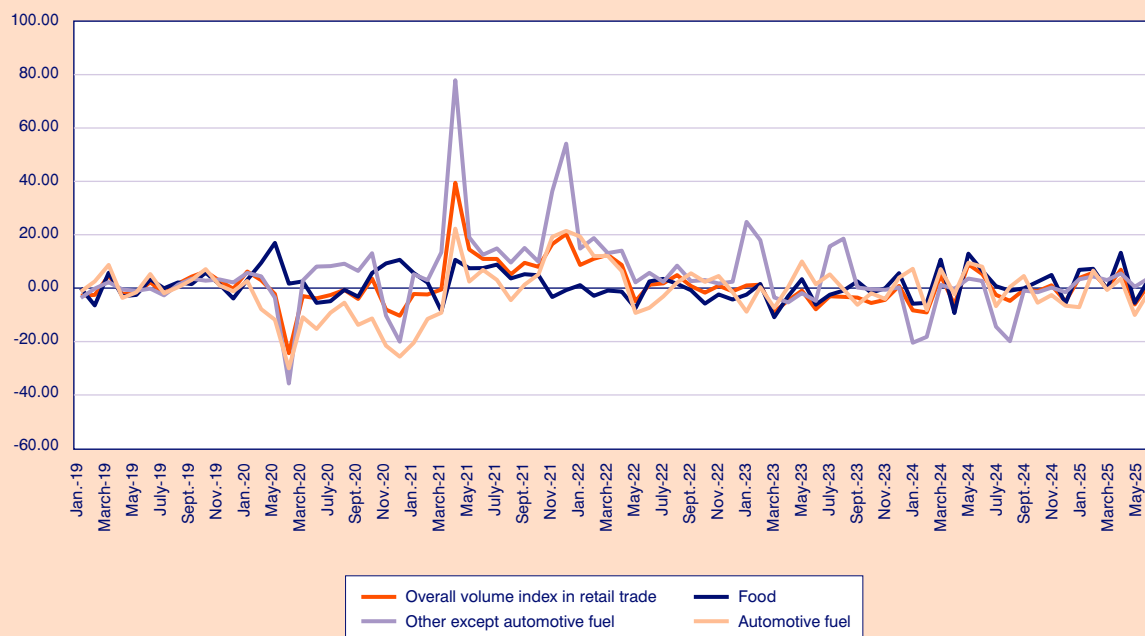
Evolution of private consumption and other components of demand as a percentage of GDP
(expenditure approach) (seasonally adjusted data in current prices)



Source: ELSTAT, data processing by the author.

FIGURE 1.1.7

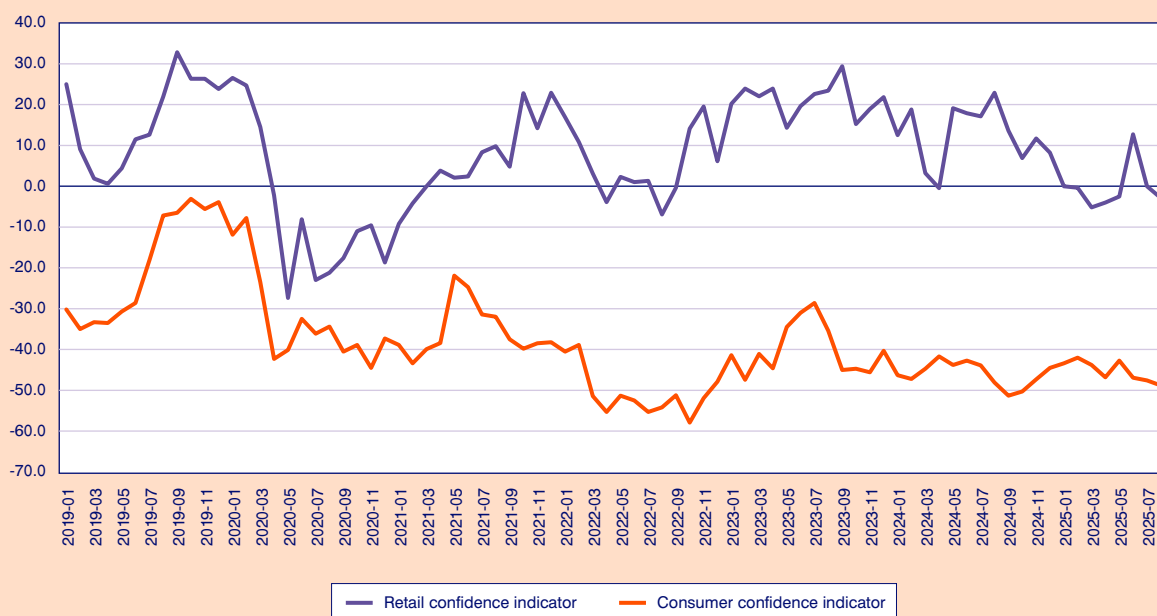
Percentage changes in the seasonally adjusted overall volume index and the main sector indices in retail trade



Source: ELSTAT, data processing by the author.

FIGURE 1.1.8

Confidence indicators in retail trade



Source: Eurostat, data processing by the author.

Eurostat (Figure 1.1.8), we observe that the uncertainty in retail trade expectations is maintained. Specifically, both indicators fluctuate in the first half of 2025, although the retail confidence indicator shows a wider range of fluctuations, and it is maintained at much higher levels, as opposed to the consumer confidence indicator. In addition, in terms of average values, we observe a relative stability in the consumer confidence indicator but significant deterioration in the retail confidence indicator. More specifically, the consumer confidence indicator increased from -45.98 in 2024 to -45.30 in the first six months of 2025, while the corresponding values for the retail confidence indicator were 12.62 in 2024 and -0.3 in the first half of 2025.

1.1.2.2. Investment

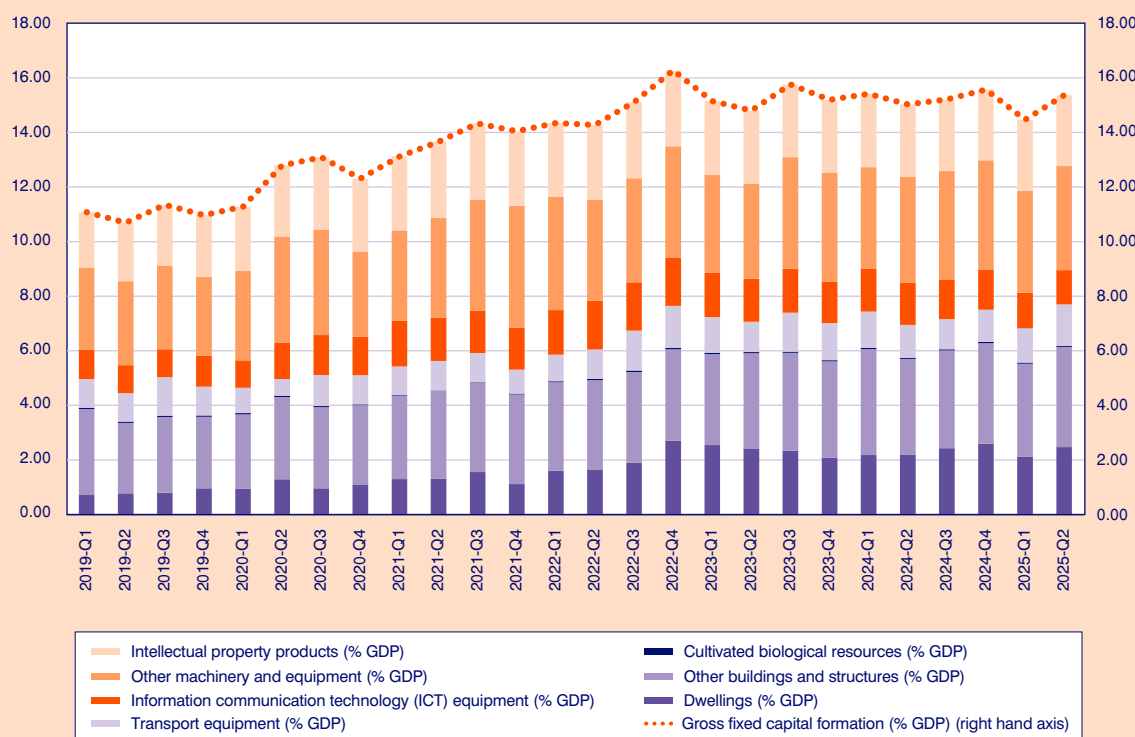
Fluctuations in gross investment during the first six months of 2025

Gross fixed capital formation, which initially decreased from 9,440 million euros in the last quarter of 2024 to

8,843 million euros in the first quarter of 2025 in current prices, increased thereafter to 9,528 million euros in the second quarter of the same year. Similarly, in terms of chain-linked volumes in constant 2020 prices, gross fixed capital formation initially decreased from 8,330 million euros in the fourth quarter of 2024 to 7,918 million euros in the first quarter of 2025 before increasing to 8,501 million euros in the second quarter of 2025. The same fluctuations are observed in terms of percentage rates of change with respect to the corresponding quarter of the preceding year, with rates of change in gross investment of 8.1% in the last quarter of 2024, -2.3% in the first quarter of 2025 and 6.5% in the second quarter of that year. A similar situation is observed in rates of change with respect to the previous quarter, with values of 5.0% for the last quarter of 2024, -5.0% for the first quarter of 2025 and 7.4% for the second quarter of the current year, according to the seasonally adjusted chain-linked volumes.

In terms of current prices as a percentage of GDP (Figure 1.1.9), the average rate of change of gross fixed capital formation with respect to the previous quarter

FIGURE 1.1.9
Gross fixed capital formation as a percentage of GDP
(overall and by asset) (seasonally adjusted data in current prices)



Source: ELSTAT, data processing by the author.

was positive and equal to 0.63% in 2024 but became negative in the first half of 2025 and equal to -0.44%. In reality, we observe a fluctuation between positive and negative rates of change between the two quarters (-7.11% in the first quarter and 6.22% in the second quarter). The same pattern holds for the main components of gross investment. Concerning machinery and transport equipment as a percentage of GDP, the negative average yearly percentage change of -0.82% in 2024 became -0.43% in the first half of 2025. However, the latter is decomposed to -5.32% in the first quarter and 4.46% in the second quarter of that year. On the contrary, concerning buildings (dwellings and other buildings and structures) as a percentage of GDP, the positive average percentage change of 2.99% in 2024 evolved into a negative average percentage rate of change of -0.42% in the first half of 2025 or, more analytically, -11.99% in the first quarter and 11.16% in the second quarter of 2025. The above indicates a significant fluctuation and instability in investment expenditure, though it is true that developments in the second quarter of 2025 were positive both in terms of magnitudes and in terms of rates of change.

Fluctuation of the share of buildings in gross investment compared to machinery and transport equipment

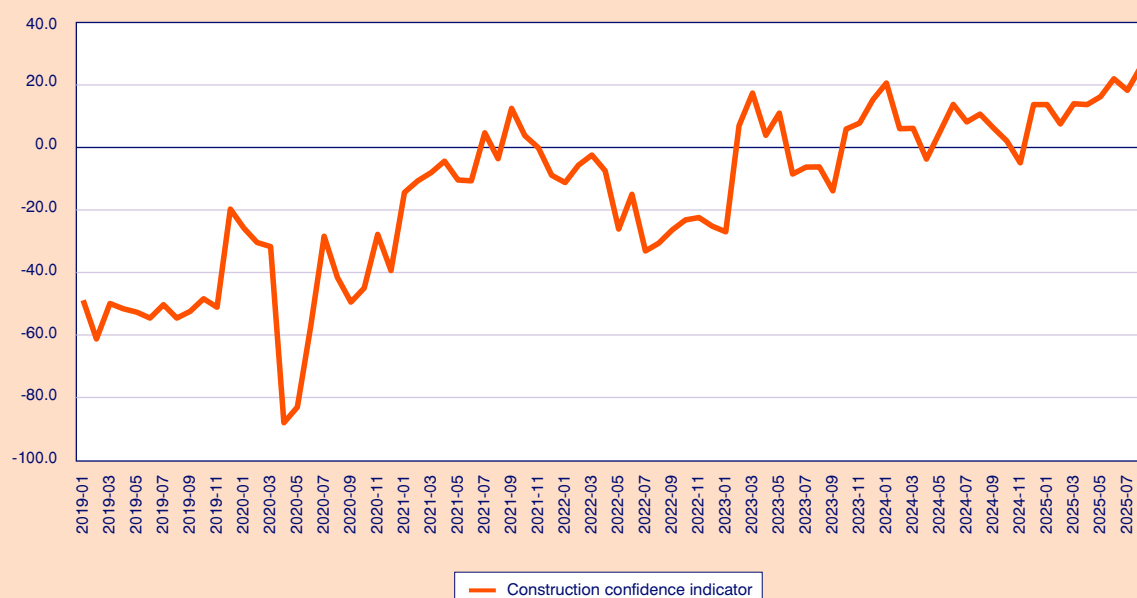
Figure 1.1.10 indicates that the share of buildings in total gross fixed capital formation rose from 42.72% in the last quarter of 2024 to 43.55% in the first quarter of 2025 but fell again to 42.83% in the second quarter of 2025. The opposite trend is observed in buildings, with the relevant share falling from 40.34% in the last quarter of 2024 to 38.22% in the first quarter of 2025 before rising to 39.99% of the gross fixed capital formation. However, on average, the share of machinery and transport equipment in gross investment increased from 43.17% in 2024 to 43.19% in the first half of 2025, while that of buildings decreased from 39.29% in 2024 to 39.10% in the first two quarters of 2025. Notably, over time, the share of buildings has converged closely to the percentage values of machinery and transport equipment in total gross investment, as depicted in Figure 1.1.10. This reflects Greek economy's traditional emphasis on investment in buildings and structures.

FIGURE 1.1.10

Machinery, transport equipment and buildings as a percentage of gross fixed capital formation



FIGURE 1.1.11
Construction confidence indicator



Source: Eurostat, data processing by the author.

Expectations in the construction sector are further improving

The picture that we get from Figure 1.1.11 is that, despite fluctuations, business expectations in the construction sector follow a clear rising trend. In terms of average values, the relevant indicator shows constant improvement since the average value of 6.98 for the year 2024 follows an average value of 16.40 for the first eight months of 2025. This persistent optimism in the buildings sector probably feeds back on the positive developments in the relevant investment expenditures, and it is also affected by the latter.

1.1.2.3. Conclusions

The above analysis indicates the possible uncertainty concerning the evolution of consumption and invest-

ment expenditure despite the positive developments in retail trade and buildings. What seems to be problematic is the continuous uncertainty in retail trade and especially the composition of gross investment, where buildings have gained significant ground at the expense of machinery and transport equipment. On the one hand, the uncertainty in retail trade, which does not seem to improve, indicates that the Greek economy remains sensitive and vulnerable to potential future disruptions, especially given that this economy is characterized by a sizeable share of consumption in GDP. On the other hand, the rise in the participation of buildings in total gross investment does not inspire optimism about the transition to a more resilient and productive development model for the Greek economy. Maintaining a high trade deficit as a percentage of GDP increases these concerns.

1.2. Developments in inflation in Greece and the Eurozone

Emilia G. Marsellou

Introduction

According to the latest available data, inflation in Greece stood at 2.9% in August 2025, while core inflation – that is, the index excluding volatile components such as energy and food – reached 4.2%, reflecting persistent inflationary pressures in the domestic price segment. Furthermore, according to flash estimates by Eurostat, in September 2025, inflation measured by the Harmonized Index of Consumer Prices is expected to decline significantly to 1.8%, with the corresponding core index at 2.6%.

At the level of the individual categories of the Consumer Price Index (CPI), the largest annual increases were observed in Clothing and Footwear (+7.7%), Hotels, Cafés, and Restaurants (+6.2%), and Housing (+3.7%), while no category recorded a decline.

The gap between inflation in goods and services remains wide, with service inflation continuing to register significantly higher levels. In particular, service prices exhibited strong upward momentum, reaching 5.6% in August 2025, slightly below the 5.7% recorded in July. In contrast, goods prices followed a noticeably milder trajectory, increasing by 0.7% in August, compared with 1.0% in July.

According to the flash estimates by Eurostat, inflation in the Eurozone is expected to reach 2.2% in September 2025, up from 2.0% in August, while core inflation is projected to remain stable at 2.3%. The highest inflation rates within the Eurozone are observed in Services (3.2%) and Food, Alcohol, and Tobacco (3.0%). Prices of Non-Energy Industrial Goods increased more moderately (0.8%), whereas Energy is expected to record a negative rate (-0.4%). Among member states, the highest inflation rates are recorded in Estonia (5.2%), Croatia (4.6%), and Slovakia (4.6%), while the lowest are observed in Cyprus (0.0%), France (1.1%), and Italy and Greece (1.8%).

1.2.1. Greece

Based on monthly data, the national Consumer Price Index (CPI) recorded an annual growth rate of 2.9% in August 2025, lower than the 3.1% increase observed in the previous month (Table 1.2.1). In contrast, the growth rate of core CPI rose to a higher level of 4.2%, compared with 3.9% in July 2025.

The sub-indices of goods and services recording the largest annual increases in August 2025 (Table 1.2.2) were Clothing and Footwear (+7.7%), Hotels, Cafés, and Restaurants (+6.2%), and Housing (+3.7%), with no category showing a decline.

The largest contributions to overall inflation in August 2025 came from the Hotels, Cafés, and Restaurants category (0.73 percentage points), Clothing and Footwear (0.53 percentage points), Housing (0.52 percentage points), and Food (0.46 percentage points), whereas the smallest contribution was recorded by Other Goods and Services (0.01 percentage points).

Inflation based on the National General CPI in August 2025 (2.9%) represents a combined effect of the changes in the sub-indices of the following groups of goods and services. Specifically, the following increases were recorded:

- +2.2% in Food and Non-Alcoholic Beverages. This increase, driven primarily by price increases in bread (2.1%), other bakery products (3.2%), pizzas and quiche (5.1%), meat (7.5%), fresh fish (4.9%), milk-cheese and eggs (2.5%), fruits (11.6%), frozen vegetables (4.8%), chocolates and chocolate products (23.2%), confectionery products (6.5%), and coffee (18.5%), was partly offset by decreases in pasta products and couscous (-4.2%), olive oil (-33.2%), fresh vegetables (-4.0%), potatoes (-3.2%), and sauces and condiments (-6.8%).
- +1.2% in Alcoholic Beverages and Tobacco. This increase is mainly due to higher prices for not served alcoholic beverages (1.0%) and cigarettes (1.7%).
- +7.7% in Clothing and Footwear. This increase is mainly driven by price increases in clothing and footwear items (7.7%).
- +3.7% in Housing. This rise, which is primarily attributable to higher prices for rentals for dwellings (10.9%), services for the repair and maintenance

TABLE 1.2.1 Inflation in Greece (%)

	National CPI	CPI (m-o-m, %)	Headline inflation CPI (y-o-y, %)	Core inflation (y-o-y, %)	Harmonized inflation (y-o-y, %)	Core HICP (y-o-y, %)
2024M08	117.7	0.3	3.0	3.5	3.2	3.7
2024M09	119.8	1.8	2.9	3.7	3.1	3.6
2024M10	119.8	0.0	2.4	3.7	3.1	4.3
2024M11	119.3	-0.4	2.4	4.0	3.0	4.5
2024M12	119.5	0.1	2.6	4.1	2.9	4.4
2025M01	118.7	-0.7	2.7	3.8	3.1	4.4
2025M02	118.6	-0.1	2.5	3.6	3.0	4.2
2025M03	120.2	1.4	2.4	3.2	3.1	3.8
2025M04	120.3	0.0	2.0	3.5	2.6	3.8
2025M05	120.6	0.2	2.5	3.6	3.3	4.0
2025M06	121.5	0.8	2.8	3.5	3.6	4.2
2025M07	121.0	-0.4	3.1	3.9	3.7	4.3
2025M08	121.1	0.1	2.9	4.2	3.1	3.9
2025M09					1.8*	2.6*

Source: ELSTAT, Eurostat.

* Preliminary estimations, Eurostat.

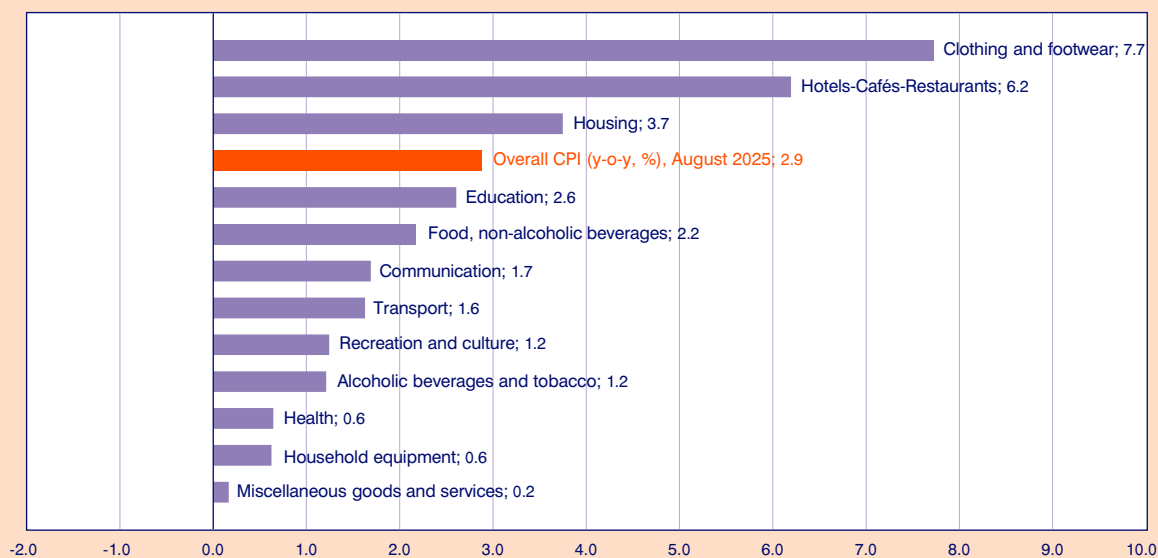
of the dwelling (5.9%), miscellaneous services relating to the dwelling (2.7%), and electricity (7.7%), was partially offset by decreases in natural gas (-2.0%), heating oil (-12.9%) and solid fuels (-3.1%).

- +0.6% in Household equipment. This increase is mainly due to higher prices for domestic services (5.2%).
- +0.6% in Health. The increase, which is largely due to price increases in medical products (2.0%), medical, dental, and paramedical services (2.5%), and hospital care (0.5%), was partly offset by lower prices for pharmaceutical products (-1.4%).
- +1.6% in Transport. This rise, which is mainly driven by new car prices (2.7%), spare parts and accessories for motorcars (3.9%), maintenance and repair of motorcars-motorcycles (6.2%), other services for motorcars-motorcycles (3.7%), and tickets for passenger transport by air (18.1%), was partially offset

by lower prices for secondhand cars (-4.9%) and fuels and lubricants (-4.6%).

- +1.7% in Communication. This rise, which is mainly driven by higher prices for telephone services (2.0%), was partially offset by lower prices for mobile phone equipment (-8.3%).
- +1.2% in Recreation and Cultural Activities. This increase, which is mainly due to higher prices for small recreational items, flowers, and pets (1.9%), recreational services (4.8%), and holiday packages (6.4%), was partially offset by lower prices for audiovisual and information processing equipment (-3.8%).
- +2.6% in Education. This increase is mainly due to higher prices in fees of pre-primary and primary education (2.1%) and fees of secondary education (3.1%).
- +6.2% in Hotels, Cafés, and Restaurants. This increase is driven primarily by price increases in restaurants-confectioneries-café-buffets (6.6%).

FIGURE 1.2.1
Annual % changes in National CPI sub-categories (August 2025)



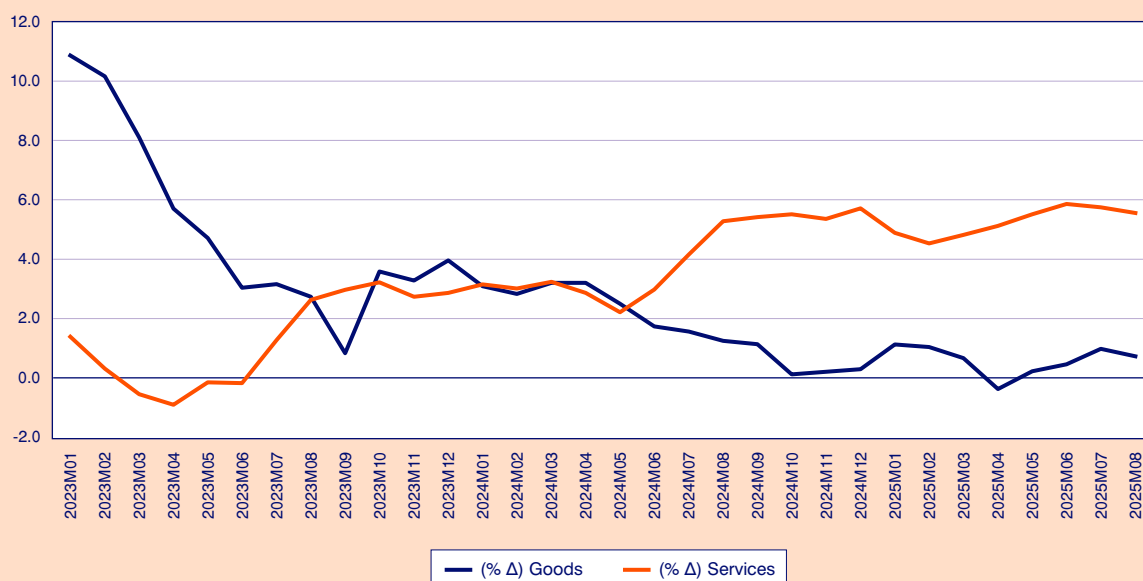
Source: ELSTAT.

TABLE 1.2.2 Annual % changes in National CPI sub-categories, January 2025 - August 2025

Groups of goods and services	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
1 Food and non-alcoholic beverages	0.1	0.2	2.2	2.0	2.6	2.3	2.8	2.2
2 Alcoholic goods and tobacco	0.8	2.0	1.2	0.0	1.7	1.4	1.8	1.2
3 Clothing and footwear	5.4	6.4	3.6	4.6	6.6	4.9	8.4	7.7
4 Housing	4.6	5.1	5.9	3.4	6.0	7.2	6.6	3.7
5 Household equipment	-0.2	-0.7	0.2	-0.6	0.1	0.5	0.0	0.6
6 Health	3.5	3.4	1.6	1.7	1.8	2.0	2.0	0.6
7 Transport	3.3	0.3	-1.6	-0.8	-2.8	-1.4	-1.1	1.6
8 Communication	1.2	1.7	2.1	1.6	2.0	2.2	2.1	1.7
9 Recreation and culture	1.3	0.9	0.9	0.8	1.2	1.2	0.8	1.2
10 Education	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
11 Hotel-Cafés-Restaurants	5.1	5.5	6.0	6.4	6.8	7.1	6.2	6.2
12 Miscellaneous goods and services	2.3	2.3	2.2	-0.4	0.9	1.0	0.6	0.2
General Index	2.7	2.5	2.4	2.0	2.5	2.8	3.1	2.9

Source: ELSTAT.

FIGURE 1.2.2
Goods and Services price indices, monthly data, annual % change



Source: ELSTAT.

- +0.2% in Miscellaneous goods and services. This rise, which is mainly due to higher prices in hair-dressing salons and personal grooming establishments (3.3%), social protection services (6.1%), and private insurance connected with health (7.0%), was partially offset by decreases in other appliances and articles for personal care (-3.2%) and motor vehicle insurance (-1.0%).

1.2.2. The euro area

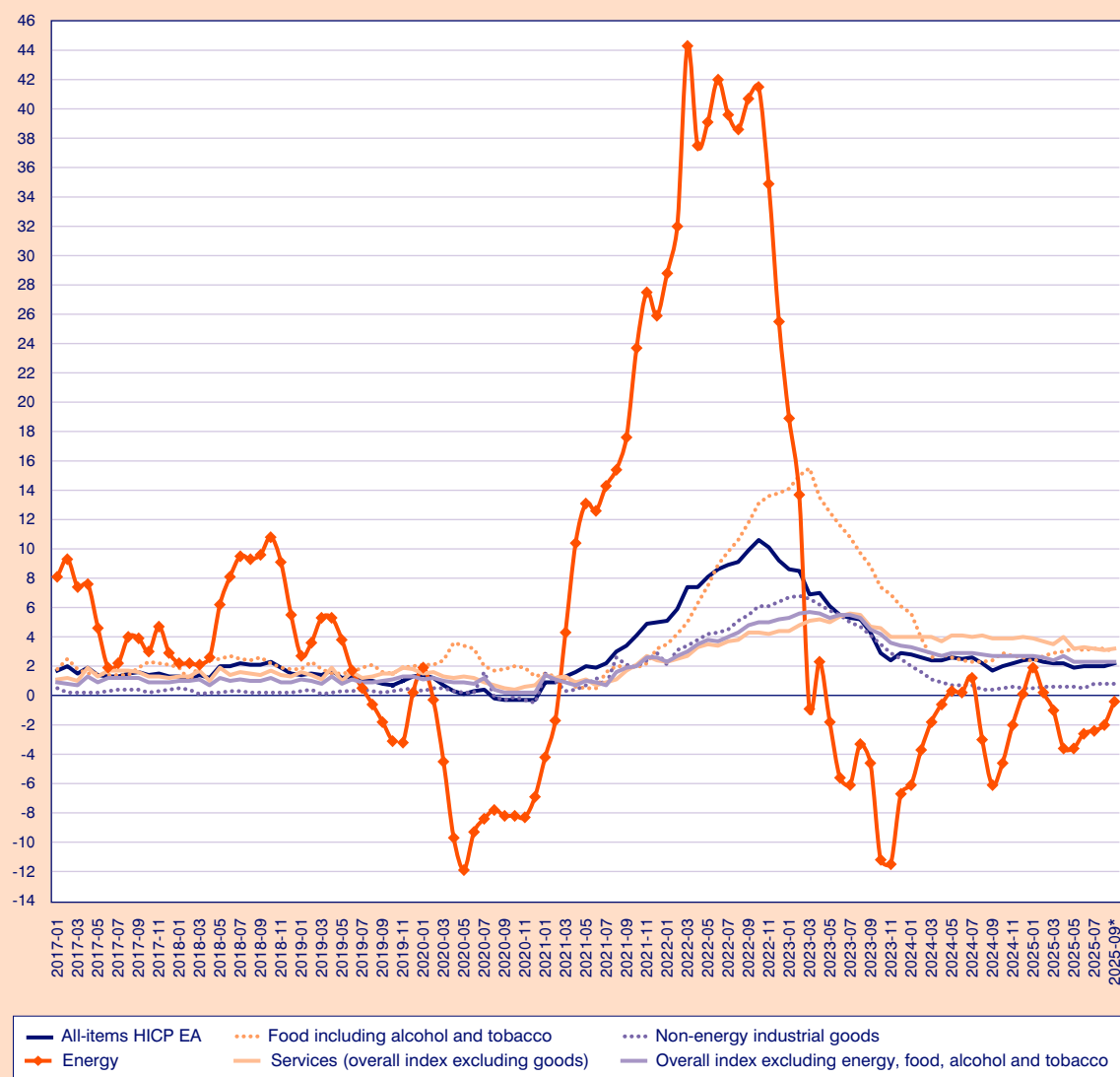
According to the flash estimates by Eurostat, inflation in the Eurozone is expected to reach 2.2% in September 2025, showing a slight increase compared with the corresponding rate in August (2.0%). Core inflation,

which excludes the volatile categories of energy and food prices, is projected to remain unchanged at 2.3%.

Regarding the individual components of the Eurozone inflation rate for September 2025, the highest rate is expected in Services (3.2%), followed by Food, Alcohol, and Tobacco (3.0%), while Non-Energy Industrial Goods are expected to reach a lower rate (0.8%). In contrast, the Energy category is expected to record a negative rate (-0.4%).

At the country level, the highest inflation rates for September 2025 are expected in Estonia (5.2%), Croatia (4.6%), and Slovakia (4.6%), whereas the lowest rates are expected in Cyprus (0.0%), France (1.1%), and both Italy and Greece (1.8%).

FIGURE 1.2.3
HICP in the euro area, monthly data, annual % change



Source: Eurostat.

* Flash estimates.

1.3. Factor model forecasts for the short-term prospects in GDP

Macroeconomics Forecasting Unit
Ersi Athanassiou, Aristotelis Koutroulis,
Emilia Marsellou, Theodore Tsekeris

The current section presents KEPE's updated forecasts concerning the evolution of the rate of change of real GDP in Greece in year 2025.¹ The forecast is conducted using KEPE's dynamic structural factor model.² The underlying time series database used to estimate the model and produce the forecasts includes 125 variables,³ covering the main aspects of economic activity in the country on a quarterly basis and spanning the period from the first quarter of 2000 onwards.

The additional information incorporated in the present forecast, as compared to the immediately previous KEPE estimate published in June 2025, concerns the published data for the second quarter of 2025. According to these data, and specifically based on the provisional quarterly data of the *National Accounts*, the Greek economy remained on a steady upward trajectory, with real GDP growth decelerating slightly in the second quarter of 2025 to 1.7% year-on-year, from 2.2% in the first quarter. This moderate slowdown in growth does not appear to indicate any systematic change in the dynamics of the Greek economy, as it is mainly due to individual, short-term changes, the effects of which offset each other to a certain extent. For example, a sharp decline in imports of goods, particularly fuel imports, in the second quarter, had a significant positive impact on the growth rate. At the same time, the sharp reversal in the trend of inventories, whose prolonged rapid accumulation had boosted GDP growth in previous quarters, contributed to the slowdown in growth during the same period.

In the above context, Table 1.3.1 presents the updated econometric estimates of KEPE for the rate of change of Greece's real GDP in 2025.⁴ According to the estimates, the average annual growth rate of the Greek economy for 2025 is expected to reach 2.1%, a forecast that represents a small downward revision of KEPE's previous estimate (2.2%). This outlook reflects the aforementioned moderate slowdown in the growth rate of the Greek economy in the second quarter of 2025, alongside the favorable evolution of the majority of the variables incorporated in the forecast.

More specifically, for the second quarter of 2025, the quarterly data of the *National Accounts* at constant prices compared to the corresponding quarter of 2024 show a significant further increase in private consumption and a moderate recovery in general government expenditure. In addition, fixed capital investment returned to an upward path, driven mainly by the revival of investment expenditure in the categories of construction and transport equipment. In the external sector, positive developments in the tourism sector led to a significant increase in exports of services, while the rate of change in exports of goods was negative, a development due to a decline in fuel trade.

Regarding the course of indicators reflecting the activity of key sectors of the economy, developments in the second quarter of 2025, as compared to the corresponding quarter of the previous year, were in most cases positive. Starting from developments in the tourism and construction sectors, travel receipts and the production index in construction registered significant increases, pointing to enhanced momentum and positive prospects for the rest of the year. In the industry sector, although the development of general indices relating to industrial production and turnover in industry was negatively affected by the significant decline observed in the energy sector, sales in the other main categories of industrial goods increased. In the trade sector, the volume index in retail trade increased overall and in five of the eight relevant subcategories, with

1. The date of the forecast is September 22, 2025.

2. A detailed description of the model can be found in Issue 15 (June 2011, pp. 19-20) of KEPE's scientific journal entitled *Greek Economic Outlook*. See https://www.kepe.gr/images/oikonomikes_ekselikseis/issue_15enb.pdf.

3. The database incorporates both real economy and nominal variables, as well as a considerable number of variables reflecting expectations and assessments of economic agents, as reported in earlier issues of the *Greek Economic Outlook*. The seasonal adjustment of the time series is carried out by use of the Demetra+ software, using the TRAMO/SEATS filter.

4. According to the most recent ELSTAT *Quarterly National Accounts* publication, dated September 5, 2025.

TABLE 1.3.1 Estimated real GDP rate of change in 2024 (% , y-o-y)

Quarters	2025	
	3 rd quarter	4 th quarter
Quarterly rate of change	2.02 [1.91 , 2.14]	2.34 [2.11 , 2.57]
Mean annual rate of change, 2 nd half	2.18 [2.01 , 2.36]	
Mean annual rate of change*	2.07 [1.98 , 2.16]	

Note: Values in brackets indicate the lower and upper boundaries of the 95% confidence interval of the forecasts.

*The mean annual rate of change incorporates the officially available (provisional) data for the first two quarters of 2025, on a seasonally adjusted basis.

the exceptions being *department stores*, *automotive fuel* and *clothing and footwear*. Concerning the course of the domestic labor market, in the second quarter of 2025, a further improvement in conditions was observed, as the number of persons employed increased by 1.4% compared to the second quarter of the previous year and the number of unemployed persons decreased by 12.0%, respectively.

With respect to price data for the second quarter of 2025, developments point to a decline in energy costs and fluctuations in average inflation, with significant inflationary pressures persisting in key categories of goods and services, such as housing; clothing and footwear; and hotels, cafés, and restaurants. In terms of the yield of Greece's ten-year government bond, which is linked to the levels of uncertainty in the economy, there was a marginal decline compared to the first quarter of 2025, and a respective small decline in the relevant spread against the corresponding German bond. With regard to indicators reflecting the expectations and assessments of economic activity participants on the course of the economy, developments

in the second quarter of 2025, compared to the first quarter of the year, showed a strengthening of business expectations in Greece in the industrial and construction sectors.

The consistently positive growth outlook for the Greek economy, based on the picture emerging from data for the second quarter of 2025, is reinforced by signs of increased momentum in the tourism and construction sectors, the imminent implementation of policy measures that will help to boost household disposable income, expectations of an acceleration in the implementation of the public investment program, including the part financed by the Recovery Fund, as well as improved economic conditions in the EU and the more stable climate created by the EU-US agreement on tariffs. On the other hand, the risks and uncertainties stemming from the external environment and geopolitical developments remain serious, highlighting the need to strengthen the resilience of the Greek economy through reforms and investments to strengthen its productive base.

1.4. The Greek stock market is entering a new era

Fotini Economou

1.4.1. Introduction

The first eight months of 2025 concluded with impressively high returns for the Greek stock market, along with increased market capitalization and transactions value. The de-escalation of interest rates by the European Central Bank (ECB) continued, with the most recent reduction recorded in June 2025 and rates remaining unchanged in the subsequent ECB meetings. The course of the Greek government bond market was also positive, featuring successful issues and a reduced weighted new funding cost.

The course of the stock market is directly linked to the recent significant positive developments for the Greek capital market. Initially, according to the announcement of the Board of Directors of Hellenic Exchanges-Athens Stock Exchange S.A. (ATHEX)¹, on 1 July 2025, the Board received a non-binding conditional share exchange offer from Euronext² relating to a possible tender offer. Following discussions and the ongoing negotiation of a cooperation agreement between Euronext and ATHEX, Euronext submitted a revised non-binding and conditional proposal. Following the signing of the Cooperation Agreement on 30 July 2025, Euronext submitted a voluntary tender offer to the Board for the acquisition of all ATHEX's common registered shares on such improved terms. This development is expected to make the Greek stock market a member of a pan-European ecosystem with international visibility, while simultaneously contributing to the convergence and integration of European capital markets. Under these circumstances, a new developmental environment will be shaped for Greek

businesses with increased transparency, liquidity, investor interest, and financing opportunities.

Furthermore, note that in July 2025, the rating agency S&P Dow Jones Indices (S&P DJI) proposed the reclassification of the Greek capital market to a “Developed Market” from an “Emerging Market” within the framework of the September 2026 index rebalancing.³ This development was a positive message for the markets. Next, on 7 October, 2025, the global index provider FTSE Russell decided to upgrade the Greek capital market from the status of “Advanced Emerging Market” to “Developed Market,” with the status change coming into effect from Monday, 21 September, 2026.⁴ This decision constitutes a milestone for the ATHEX, by achieving a return to developed markets, as the upgrade of the Greek stock market is expected to increase investment interest and attract new investors coming from a wider range of institutional investors who focus their investment choices exclusively on developed markets. This development is expected to significantly boost the dynamic of the ATHEX and contribute to the further growth of the Greek capital market.

At the same time, examining the evolution of Greece's credit rating, in early September 2025, the Canadian rating agency DBRS Morningstar kept Greece's credit rating unchanged at BBB with a stable outlook (Table 1.4.1), following the agency's previous upgrade of Greece (to investment grade) last March. Similarly, two weeks later, on 19/9/2025, Moody's kept Greece's credit rating unchanged at Baa3 with a stable outlook (Table 1.4.1), following the recovery of investment grade status by the same agency in March 2025.

In this context, the present article provides a brief overview of the Greek stock market's performance during the first eight months of 2025, focusing on key stock market indices and data. Additionally, the performance of the bond market for the same period is presented. The final section of the article summarizes and concludes.

1. See ATHEX Press Release of 31/7/2025.

2. This is the largest stock exchange group in Europe. For more information see <https://www.euronext.com/en>.

3. See ATHEX Press Release of 25/7/2025.

4. See ATHEX Press Release of 7/10/2025.

TABLE 1.4.1 Greece's credit rating

Rating Agency	Rating	Outlook	Date of last review
Standard & Poor's	BBB	Stable	18/4/2025
Moody's	Baa3	Stable	19/9/2025
Fitch	BBB-	Positive	16/5/2025
DBRS Morningstar	BBB	Stable	5/9/2025
Rating and Investment (R&I)	BBB-	Stable	9/9/2024
Scope Ratings GmbH	BBB	Stable	30/5/2025

Source: Public Debt Management Agency (PDMA)-September 2025.

1.4.2. The course of the stock market for the first eight months of 2025

The first eight months of 2025 ended with impressively high positive returns for the Greek stock market. More specifically, according to ATHEX data (Table 1.4.2), the Athex Composite Share Price Index recorded a positive return of 37.56%, reaching 2,021.69 points on 29/8/2025, from 1,469.67 points on 31/12/2024. Moreover, the FTSE/Athex Large Cap Index and the Athex ESG Index recorded returns of 42.19% and 41.62%, respectively, outperforming the Athex Composite Share Price Index. Lower returns were recorded by mid- and small-cap indices, with the FTSE/Athex Mid Cap Index recording a return of 27.39% and the Hellenic Mid & Small Cap Index a return of 26.97%.

Exceptionally high returns were also recorded in the sectoral indices of the ATHEX, with all sectoral indices recording positive returns. Among these, the FTSE/Athex Banks and FTSE/ATHEX FINANCIAL SERVICES indices stand out, with returns that even exceeded 67% (returns of 67.40% and 67.08%, respectively), as well as the FTSE/ATHEX ENERGY & UTILITIES and FTSE/ATHEX CONSUMER STAPLES indices, with returns exceeding 30% (returns of 35.06% and 31.89%, respectively). Note that the banking sector continues to outperform the Athex Composite Share Price Index in terms of returns.

According to ATHEX (2025) data, the market capitalization of the ATHEX⁵ reached €118.11 billion at the end of August 2025, significantly increased by 26.70% compared to the end of December 2024 (€93.22 billion). The participation of foreign investors remained high, reaching 68.83% at the end of August 2025, recording outflows of €68.60 million, and 65.42% of total transactions' value in August 2025. The cash value of settled transactions of August 2025 reached €5,052.58 million, recording a decrease of -2.82% compared to the previous month, which was at €5,199.02 million, and an impressive increase of 119.64% compared to August 2024, which was at €2,300.41 million. Moreover, the cash value of settled transactions of equities was significantly increased in August 2025, at €4,999.04 million, compared to August 2024, which was at €2,273.34 million, recording an impressive increase of 119.90%. Similarly, the cash value of settled transactions of equities increased by 58.07% for the first eight months of 2025, reaching €33,738.94 million, from €21,344.38 million for the first eight months of 2024.

Examining the uncertainty about the short-term course of the market with the help of the KEPE GRIV Implied Volatility Index, the so-called "fear" index, at the end of August 2025 there was a notable decrease in uncertainty compared to April 2025. The KEPE GRIV index reflects the uncertainty of the derivatives market

5. According to ATHEX (2025), "the capitalization of METLEN S.A. (which will be deleted on September 2025) has not been included, as its entire capitalization is held by the foreign legal entity METLEN PLC, resulting in the reported share of foreign investors appeared technically increased."

TABLE 1.4.2 Prices and returns for selected indices of the ATHEX (29/8/2025)

	29/8/2025	Year min	Year max	Year change (%)
FTSE/Athex Large Cap	5,076.77	3,550.72	5,382.99	42.19%
Athex ESG Index	2,376.53	1,676.07	2,516.67	41.62%
Athex Composite Share Price Index	2,021.69	1,455.08	2,135.29	37.56%
Athex All Share Index	455.20	340.27	474.06	34.10%
FTSE/Athex Mid Cap Index	2,973.28	2,262.76	3,029.36	27.39%
Hellenic Mid & Small Cap Index	2,687.79	2,005.36	2,736.27	26.97%
FTSE/Athex Banks	2,152.81	1,278.63	2,364.56	67.40%
FTSE/ATHEX FINANCIAL SERVICES	10,082.78	6,002.57	11,062.09	67.08%
FTSE/ATHEX ENERGY & UTILITIES	6,724.61	4,945.68	6,917.59	35.06%
FTSE/ATHEX CONSUMER STAPLES	8,822.01	6,653.46	9,184.21	31.89%
FTSE/ATHEX BASIC MATERIALS	6,459.17	4,549.74	6,696.99	28.74%
FTSE/ATHEX CONSUMER DISCRETIONARY	6,150.60	4,770.42	6,429.79	22.15%
FTSE/ATHEX INDUSTRIALS	8,289.30	6,534.30	8,557.74	15.81%
FTSE/ATHEX TECHNOLOGY & TELECOMMUNICATIONS	6,483.63	5,244.36	6,689.27	14.36%
FTSE/ATHEX REAL ESTATE	5,533.11	4,359.91	5,560.52	13.40%

Source: Daily official list of trading activity of the ATHEX 29/8/2025.

participants about the expected short-term course of the Greek market and is calculated on the basis of the FTSE/Athex Large Cap options prices. The KEPE GRIV index decreased in August 2025, reaching 23.50% on 29/8/2025, from 24.07% on 31/7/2025 and 33.65% on 30/4/2025. Moreover, the average daily value of the index decreased compared to the previous month, reaching 23.98% in August 2025 from 26.61% in July 2025. The index remained below its historical average level (since January 2004) for the Greek market, which stands at 31.90%. The evolution of the index indicates a decrease in uncertainty for the expected short-term course of the Greek market compared to the end of the previous month, with fluctuations within the eight-month period.

1.4.3. Greek Government T-bills, Greek Government bonds, and corporate bonds for the first eight months of 2025

The interest rate de-escalation by the ECB continued during the first half of 2025, with the most recent reduction recorded in June 2025. More specifically, the ECB's Governing Council proceeded with a reduction in the three key ECB interest rates by 25 basis points at its June 2025 meeting, based on the inflation outlook, the dynamics of underlying inflation, and the strength of monetary policy transmission.⁶

At the June 2025 ECB meeting, the interest rates on the deposit facility, the main refinancing operations and the marginal lending facility were reduced to 2.00%, 2.15%, and 2.40%, respectively, with the ECB Governing Coun-

6. See ECB Press Release of 5/6/2025.

**TABLE 1.4.3 Greek Government T-bills yields
(issues from the end of 2024 up to August 2025)**

Auction date	13 weeks	Auction date	26 weeks	Auction date	52 weeks
30/7/2025	1.76%	20/8/2025	1.74%	4/6/2025	1.84%
2/7/2025	1.70%	23/7/2025	1.71%	5/3/2025	2.15%
29/4/2025	1.85%	25/6/2025	1.75%	4/12/2024	2.27%
2/4/2025	2.03%	28/5/2025	1.74%		
29/1/2025	2.37%	23/4/2025	1.90%		
31/12/2024	2.82%	26/3/2025	2.10%		
		19/2/2025	2.19%		
		22/1/2025	2.45%		
		23/12/2024	2.61%		

Source: Ministry of Economy and Finance.

oil being “determined to ensure that inflation stabilises sustainably at its 2% medium-term target”. Note that this is the eighth consecutive reduction in the key interest rates by the ECB since June 2024, when the gradual de-escalation of interest rates began.⁷ Subsequently, interest rates remained unchanged during the meetings of July⁸ and September 2025, with this decision based on the level of inflation, which is around the medium-term target of 2%, and the assessment of the inflation outlook which remains broadly unchanged.⁹

The successful issues by the Greek Government continued, recording a reduced weighted average new funding cost by the end of June 2025 compared to the end of March 2025 and the end of 2024 as well.¹⁰ The yields of 13-, 26- and 52-week T-bill issues of the first eight months of 2025 were lower compared to the respective ones at the end of 2024, for the whole period under examination (Table 1.4.3). More specifically, the yields of 13-, 26- and 52-week T-bill issues were significantly lower compared to the respective ones at the end of 2024, with the largest decrease recorded for the

13-week T-bills. A small increase compared to the previous issue was recorded for the most recent 13- and 26-week T-bill issues (in July and August, respectively). Moreover, looking at the interest rates of the Greek Government benchmark bonds, according to Bank of Greece data for the first eight months of 2025 (Figure 1.4.1), the average monthly return of Greek Government bonds in August 2025 was higher compared to December 2024 for all maturities. However it recorded a decrease compared to March 2025, when the highest returns for all maturities were recorded (3, 5, 7, 10, 15, 20, and 30 years), with the largest decrease observed for the 5-year bonds.

In addition, following the successful issues of the first four months of 2025, a reopening of the 10-year bond with a 3.625% coupon and a yield of 3.26%, for the amount of €250 million, took place on September 17, 2025, with total bids reaching €941 million.¹¹

Finally, the performance of the ATHEX corporate bond indices is also positive. According to ATHEX data, the Hellenic Corporate Bond Price Index¹² recorded a re-

7. See Information about the ECB interest rates, Bank of Greece.

8. See ECB Press Release of 24/7/2025.

9. See ECB Press Release of 11/9/2025.

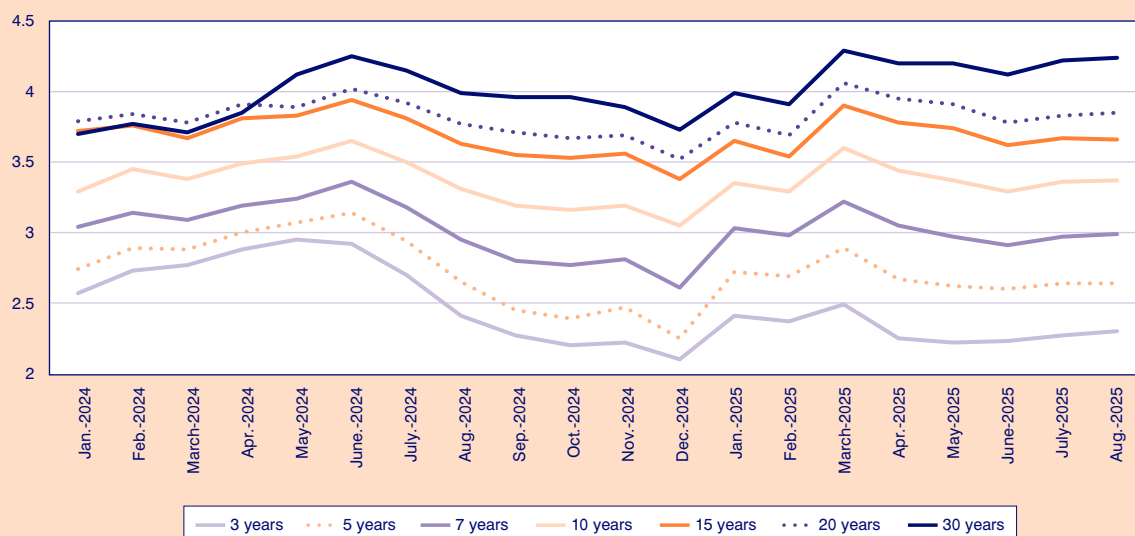
10. See the latest available at the time of writing the article Public Debt Management Agency Quarterly Bulletins No116, No117, and No118.

11. See Public Debt Management Agency announcement of 17/9/2025.

12. Based on the net price of each bond.

FIGURE 1.4.1

Monthly average yield (%) of Greek Government benchmark bonds (Jan. 2024 – Aug. 2025) for maturities of 3, 5, 7, 10, 15, 20, and 30 years



Source: Bank of Greece.

turn of 0.62% and the Hellenic Corporate Bond Index¹³ recorded a return of 3.11% for the first eight months of 2025.¹⁴ Moreover, the cash value of settled transactions of corporate bonds increased in August 2025 compared to August 2024, reaching €21.13 million from €16.33 million, respectively, with a remarkable increase of 29.39%. Furthermore, there is an increase of 21.90% for the first eight months of 2025 compared to the first eight months of 2024, reaching €256.14 million from €210.13 million, respectively.

1.4.4. Conclusions

The first eight months of 2025 concluded with significant positive developments for the ATHEX, creating new growth opportunities for the Greek capital market. Under these circumstances, the Greek stock market recorded impressively high returns, increased capitalization and transactions value. The large-cap index achieved a higher return compared to the Athex Composite Share Price Index, while the mid- and small-cap indices recorded

positive, but smaller, returns. The sectoral indices followed a similar upward course, with banks and financial services sectors recording impressive year-to-date returns. The de-escalation of interest rates by the ECB continued, with the most recent reduction recorded in June 2025, while rates remained unchanged in the subsequent ECB meetings. The course of the Greek government bond market was also positive, featuring successful issues and a reduced weighted new funding cost. The coming months are of particular interest, as the impending acquisition of the ATHEX by the Euronext and the return of the ATHEX to developed market status are expected to lead to a new era of growth for Greek businesses and the capital market.

References

- Athens Exchange Group, Monthly Statistics Bulletin *AxiaNumbers*, Securities Market, August 2025.
- Athens Exchange Group, Monthly Statistics Bulletin *AxiaNumbers*, Securities Market, August 2024.

13. Based on the net price, accrued interest, and the value of the payments of each bond.

14. Returns on 27/8/2025 according to the daily official list of trading activity of the ATHEX of 29/8/2025.

1.5. Recent developments and prospects of global economic activity: Moderate economic growth amidst great uncertainty and rising trade protectionism

Aristotelis Koutroulis

The global economy proved to be extremely resilient in the first half of this year. However, the gradual adjustment of investors, producers, and consumers to the new tariff policy of the major economies is expected to keep the global economy on a path of modest growth.

Despite the considerable uncertainty surrounding international economic diplomacy, the global economy proved to be extremely resilient in the first half of this year. This development mainly reflects the front-loaded increase in global manufacturing and international trade activity in response to the announced changes in US tariff policy. Other factors that boosted economic activity were (a) the improvement in international financial conditions, (b) the growth-friendly economic policies implemented in major economies around the world (e.g., fiscal expansion in the US and China), and (c) the restraint of tariff increases to levels lower than those announced by the US political leadership last April (ECB, 2025; IMF, 2025; OECD, 2025; UN, 2025).

Over the next few months, the global economy is expected to slow down marginally, as the benefits of increased industrial activity in the first half of the year begin to fade. At the same time, the imminent full implementation of the new tariff rates is expected to lead to an adjustment in the behavior of investors, producers, and consumers, negatively affecting investment flows, production, and consumption in several economies (OECD, 2025 and UN, 2025). Under these circumstances, the annual growth rate of global GDP in 2025 is expected to slow marginally compared to 2024, by 0.1 to 0.2 percentage points (see Table 1.5.1).

In general, the global economy is going through a period of prolonged economic and geopolitical uncertainty, with the balance of risks clearly standing on the negative side. In particular, the risks threatening the smooth functioning of the global economy relate to the follow-

ing scenarios: (a) an escalation of the armed conflict in Eastern Europe, (b) further increases in tariff rates, (c) a resurgence of inflation, (d) a downward revaluation of stocks and bonds internationally, and (e) the creation of strong fiscal pressures in countries with high public debt (OECD, 2025).

In the advanced world, GDP growth appears to be slowing down and is expected to range between 1.3% and 1.5% in 2025 (see Table 1.5.1). This decline essentially reflects the one percentage point slowdown in US economic growth, as the economies of the euro area and Japan are expected to improve their performance, albeit marginally. According to analysts at international organizations, the slowdown in US GDP growth is linked to increased tariff protection and insufficient renewal of the domestic labor reserve due to restrictions on migration flows to the US (OECD, 2025). Undoubtedly, increased tariff protection will also have a negative impact on other developed economies, especially in the export sectors of the automobile and steel industries. However, there are significant differences between countries. For example, in the Eurozone, consumption (favoured by real wage growth, lower interest rates, and positive labor market conditions) as well as increased public spending on infrastructure and defense equipment are expected to boost economic growth. In the United Kingdom, on the other hand, tighter fiscal policy will act as a drag on economic expansion (UN, 2025). As for Japan, the economy appears to be fuelled by strong investment growth in high-tech sectors (OECD, 2025).

In emerging and developing economies, GDP growth, although marginally lower than in 2024, is expected to exceed initial expectations (see Table 1.5.1). The emerging economies of Asia, particularly China and India, appear to be making a significant contribution to this development. The maintenance of relatively high rates of economic activity in China is linked to the rise in public spending on infrastructure projects, the strengthening of consumption (due to a favorable mix of economic policies), and the surge in exports in the first half of the year. In India, the main drivers of economic activity include improved performance in the services sector and a rise in agricultural production. In contrast to these two Asian countries, economic growth in Russia and Brazil will slow significantly. In the former, the economy appears to be adversely affected by high borrowing costs, lower prices for Russian oil, and labor shortages. In the latter, the slowdown in

TABLE 1.5.1 Real Gross Domestic Product
(annual percentage changes)

	2024*			2025**			2026**		
	IMF	OECD	UN	IMF	OECD	UN	IMF	OECD	UN
World economy	3.3	3.3	2.8	3	3.2	2.5	3.1	2.9	2.5
Advanced economies	1.8	:	1.7	1.5	:	1.3	1.6	:	1.4
USA	2.8	2.8	2.8	1.9	4.8	1.6	2	1.5	1.5
Euro area	0.9	0.8	1	1	1.2	1.2	1.2	1	1.4
Japan	0.2	0.1	0.1	0.7	1.1	0.5	0.5	0.5	0.9
United Kingdom	1.1	1.1	1.1	1.2	1.4	1.3	1.4	1	1
Developing economies	4.3	:	4.2	4.1	:	4.1	4	:	4.1
Brazil	3.4	3.4	3.4	2.3	2.3	2.2	2.1	1.7	1.9
Russia	4.3	4.3	4.3	0.9	1	1.1	1	0.7	1
India	6.5	6.5	7.1	6.4	6.7	6.3	6.4	6.2	6.4
China	5	5	5	4.8	4.9	4.9	4.2	4.4	4.4

Source: IMF (2025); OECD (2025) and UN (2025).

* Estimations, ** Projections.

economic activity is related to weakening consumption and falling investment (UN, 2025).

Regarding price developments, it appears that global inflation will continue to decline as it did last year. However, many economies are showing significant deviations from the global trend. For example, in 2025, average annual inflation will rise in the US (due to higher tariffs and persistent service price inflation), the United Kingdom, and Japan (due to increases in food prices) (see Table 1.5.2). In contrast, a favorable combination of factors in the euro area economy (falling energy prices, slowing nominal wage growth, and euro appreciation) is expected to keep inflation on a downward path. Similar variations can be observed in the developing world, with inflationary pressures falling rapidly in some economies (e.g., China and India) and rising in others (e.g., Brazil) (OECD, 2025 and UN, 2025).

According to the OECD, unemployment rates in most advanced economies remain low. Nevertheless, labor market conditions have started to ease. Signs of weakening labor demand include (a) a decline in the ratio of job vacancies to total unemployment in the United States, Germany, and the United Kingdom, (b) a drop in the average number of hours worked per employee in Japan and the United Kingdom, and (c) an upward trend in the unemployment rate in the United States, Germany, and France (OECD, 2025).

Finally, with regard to international trade, the volume of international trade in goods rose sharply in the first half of this year. The main driver of this increase was the front-loaded surge in inventories by US retailers due to the change in US tariff policy. However, with US tariff rates currently at their highest levels in 90 years, the medium-term outlook for international trade in goods does not look positive. This assessment is also reflected in high-frequency international trade indicators, which show a clear decline in container shipping,

TABLE 1.5.2 Inflation
(annual percentage changes)

	2024*	2025**	2026**
USA	2.5	2.7	3
Euro area	2.4	2.1	1.9
Japan	2.7	3.1	2.1
United Kingdom	2.5	3.5	2.7
Brazil	4.4	5.2	4.4
Russia	8.5	8.5	4.9
India	4.6	2.9	3.9
China	0.2	-0.2	-0.1

Source: OECD (2025).

* Estimations, ** Projections.

air transport of goods and passengers, and orders for exportable products (OECD, 2025).

References

ECB (2025), *ECB staff macroeconomic projections for the euro area*, September 2025.

International Monetary Fund (2025), *World Economic Outlook (Update): Global Economy: Tenuous Resilience amid Persistent Uncertainty*, IMF, Washington, DC.

OECD (2025), *OECD Economic Outlook, Interim Report September 2025: Finding the Right Balance in Uncertain Times*, OECD Publishing, Paris.

United Nations (2025), *World Economic Situation and Prospects, September 2025*, New York: United Nations.

2. Fiscal developments

KEPE, *Greek Economic Outlook*, issue 58, 2025, pp. 31-37

State Budget, public debt and prospects of fiscal aggregates

Yiorgos Ioannidis, Elisavet I. Nitsi

2.1. Execution of the 2025 State Budget and the Draft State Budget for 2026

The Draft State Budget for 2026 was recently submitted to the Hellenic Parliament. In addition to the budgetary framework for 2026, the Draft also includes information regarding the evolution of macroeconomic indicators and the execution of the 2025 Budget. Table 2.1.1 presents the relevant data for the 2025 and 2026 Budgets.

Execution of the 2025 State Budget

The principal feature of the updated forecast on fiscal outcomes for 2025 is the positive deviation from the initial forecasts of the 2025 State Budget. Net revenues for 2025 are now estimated to be higher by €2.3 billion (+6.3%) compared with the 2025 State Budget's initial forecast. This overperformance stems from increased revenues from taxation and transfers (which include receipts from the Public Investment Programme and the RRF). Revenues from indirect taxes are estimated to rise by approximately €1 billion, income tax revenues by €757 million, and transfer revenues by €451 million. According to the Ministry of Finance, these increases are attributed to tax evasion containment, to the increased compensation of wage earners, and to the improved tourism receipts. The only revenue category expected to record a decline relative to the initial forecasts is corporate income tax revenues, estimated at €7.8 billion compared with the €7.97 billion target of the 2025 Budget.

Similarly, overall fiscal outcomes in 2025 are expected to be significantly improved compared with 2024. Total net revenues are projected to increase by 6.3%, compared with the initial target of 3.0%, meaning that

net revenues in 2025 will exceed those of 2024 by €4.6 billion compared with the initial target increase of €2.3 billion. The improved performance relative to 2024 stems from the overperformance of indirect taxes, personal income tax, and transfer receipts, while revenues from corporate income tax are expected to be lower by €184 million compared with 2024.

Regarding the expenditure according to the updated forecast, total expenditures in 2025 are expected to be higher by €955 million, mainly due to measures not initially budgeted, such as the rent rebate and the increased cost of interest payments. The Public Investment Programme (including the RRF) shows reduced expenditures totalling €862 million compared with the initial plan. Consequently, total public investment spending is higher than in 2024 but falls short of the initial target.

As a result, the primary balance is now expected to reach 2.1% of GDP, compared with the original target of 1.4% of GDP.

Draft State Budget for 2026

Regarding the revenues, the Draft State Budget for 2026 projects a further increase of approximately €3.1 billion (or 4.1%) compared with the updated projection for 2025. The most significant sources of this revenue growth are indirect taxes, which are expected to rise by 4.5% compared with 2025; transfer revenues related to receipts from the Public Investment Programme and the RRF (up by €1.7 billion, or 18.3%); and corporate income tax revenues, which are projected to reach €8.7 billion in 2026, compared with €7.8 billion in 2025. Conversely, personal income tax revenues are expected to decline marginally, reflecting the impact of the updated taxation scale announced by the government last September.

Similarly, expenditures are projected to increase by approximately €5.1 billion (+6.2%) compared with 2025. This rise is almost entirely attributed to higher investment expenditure, reflecting efforts to accelerate the implementation of projects financed through the RRF.

TABLE 2.1.1 State Budget figures according to the European System of Accounts (ESA) methodology, € million

	2024	2025		2026
	Execution	Forecast	Updated estimation	Forecast
I. Net State Budget Revenues according to ESA (a + b + c + d + e + f – g)	72,256	74,575	76,826	79,947
a. Taxes (1 + 2 + 3 + 4 + 5 + 6 + 7)	68,297	69,205	70,878	73,526
1. Taxes on goods and services of which:	36,907	38,019	39,071	40,818
<i>Value Added Tax (VAT)</i>	25,683	26,673	27,530	29,129
<i>Excise duties</i>	7,258	7,276	7,394	7,447
2. Taxes and duties on imports	366	362	400	427
3. Property taxes	2,430	2,394	2,411	2,328
4. Other taxes on production	643	460	495	659
5. Income tax, of which:	24,723	25,212	25,969	26,710
<i>Income tax payable by individuals</i>	14,563	15,244	15,878	15,785
<i>Income tax payable by corporations</i>	7,984	7,972	7,800	8,659
6. Capital taxes	239	235	250	250
7. Other current taxes	2,989	2,523	2,282	2,334
b. Social contributions	61	60	61	61
c. Transfers	7,420	8,794	9,245	10,941
d. Sales of goods and services	844	965	1,213	1,097
e. Other current revenues	3,793	3,043	2,991	2,222
f. Sales of fixed assets	29	37	32	55
g. Revenue refunds	8,188	7,529	7,594	7,955
<i>Informative items:</i>				
<i>Public Investment Budget¹</i>	3,685	4,300	4,300	4,350
<i>RRF²</i>	3,145	4,237	4,293	5,950
II. State Budget Expenditure according to ESA³ (a + b + c + d + e + f + g + h + i + j)	74,929	80,503	81,458	86,529
a. Compensation of employees	14,869	14,790	15,285	15,253
b. Social benefits	340	425	566	642
c. Transfers	32,319	34,436	34,664	35,086
d. Purchases of goods and services	2,192	1,910	2,281	2,022
e. Subsidies	73	81	78	80
f. Interest payments	10,203	9,400	9,841	9,746
g. Other expenditure	117	102	121	101
h. Appropriations under allocation	13,437	17,602	16,740	21,201
i. Purchases of fixed assets	1,379	1,757	1,882	2,397

TABLE 2.1.1 (continued)

	2024	2025		2026
	Execution	Forecast	Updated estimation	Forecast
Informative items:				
Public Investment Budget ¹	9,913	9,200	9,700	9,500
RRF ²	3,401	4,900	4,900	7,192
III. State Budget Balance according to ESA ⁴ (I – II)	-2,673	-5,928	-4,632	-6,582
% of GDP	-1.1%	-2.4%	-1.9%	-2.5%
IV. Primary Balance of the State Budget (according to ESA) ⁴ (III + II.f – I.e1)	7,483	3,470	5,119	3,164
% GDP	3.1%	1.4%	2.1%	1.2%
GDP	237,573	247,514	249,576	260,959

Source: Draft State Budget 2026, Ministry of Finance.

Notes:

1. Revenues of the Public Investment Programme (PIP) are included under transfers and other current revenues, while PIP expenditure is included under appropriations under allocation.
2. Revenues of the RRF are included under transfers, while the corresponding expenditure is included under appropriations under allocation.
3. Expenditures of the Central Administration are classified according to the major expenditure categories defined by Presidential Decree 54/2018 (Government Gazette A' 103).
4. Deficit (–) / Surplus (+).

Other expenditure categories are expected to show only minor fluctuations relative to the current year.

Based on the above, the general balance of the State Budget is projected to stand at -2.5% of GDP, while the primary balance is expected to reach approximately 1.2% of GDP.

2.2. Evolution of public debt in 2Q2025

According to the most recent data published by the Public Debt Management Agency (ΟΔΔΧ),¹ as of 30 June 2025, the General Government debt amounted to €368.3 billion, marking an increase of €2 billion (0.6%) compared with the previous quarter and €3.5 billion (0.9%) relative to the end of 2024. The entire debt portfolio carries a fixed interest rate, with an average weighted maturity of 18.7 years. The average re-pricing maturity stands at 18.09 years, while the cash-based servicing cost, including swaps, is 1.33%. The

net debt of the General Government, after deducting cash reserves (€41.9 billion), stood at €326.4 billion during the reference period. This represents a reduction of €2.2 billion (0.7%) compared with the end of 2024, but an increase of €247 million (0.01%) compared with the previous quarter.

Regarding the Central Government, total debt amounted to €403.2 billion, recording an increase of €1.1 billion (0.3%) compared with the previous quarter, a decrease of €0.7 billion (0.2%) from the end of 2024, and a reduction of €3.9 billion (1%) compared with the corresponding quarter of 2024. Furthermore, the cash reserves declined by €947.9 million (-5.4%) relative to the previous quarter, by €1.6 billion (-8.9%) compared with the end of 2024, and by €2.7 billion (-14%) relative to the same quarter of 2024.

The composition of Central Government debt during the second quarter of 2025 is presented in Table 2.2.1. The total debt of the Central Government remained de-

1. *Public Debt Bulletin*, March 2024.

TABLE 2.2.1 Central Government debt data¹ (amounts in € million)*

	2024Q2	2024Q4	2025Q1	2025Q2
Central Government Debt	407,059.67	403,860.68	402,106.09	403,204.53
Distribution of debt by type of interest rate				
Fixed	407,059.67	403,860.68	402,106.09	403,204.53
Variable ^{2,3}	0.00	0.00	0.00	0.00
Distribution of debt by negotiability				
Negotiable	105,835.51	105,003.78	108,568.64	108,865.22
Non-negotiable	301,224.16	298,856.90	293,537.45	294,339.31
Distribution of debt by currency				
In euro, €	407,059.67	403,860.68	402,106.09	403,204.53
In other currency	0.00	0.00	0.00	0.00
Cash Reserves⁴	19,176.5	18,120.80	17,449.80	16,501.90
Guarantees	28,258.33	28,130.64	27,731.04	28,388.20

Source: General Accounting Office, Ministry of Finance.

Notes:

1. Central Government debt differs from General Government debt (Maastricht debt) by the amount of intragovernmental debt and other items provided for under ESA '95.

2. The ratio of fixed to variable interest rates is calculated taking into account: (a) interest rate swap transactions, (b) the use of financing instruments from the European Stability Mechanism (ESM) in relation to loans granted to the Hellenic Republic, and (c) the incorporation of the risk parameters of the EFSF liability portfolio into the portfolio of the Greek public debt.

3. Inflation-linked bonds are included under variable-rate bonds.

4. Includes the revenue reserve account from capital market operations, with a balance of €15,697.3 million as of 31 March 2023 and 30 June 2023.

* Provisional data.

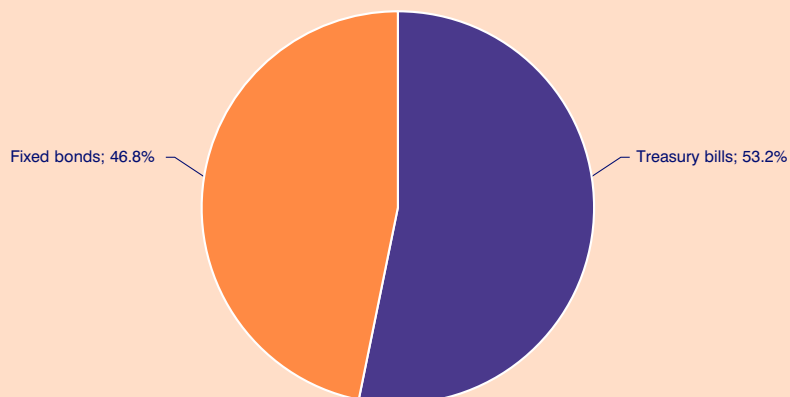
TABLE 2.2.2 Central Government debt by residual maturity* (amounts in € million)

	2024Q2	2024Q4	2025Q1	2025Q2
Total amount	407,059.67	403,860.68	402,106.09	403,204.53
Short-term (up to 1 year)	67,783.96	68,491.64	66,374.25	66,310.05
Medium-term (1 to 5 years)	49,429.50	46,187.77	33,717.90	40,920.23
Long-term (over 5 years)	289,846.21	289,181.27	302,013.94	295,974.25

Source: General Accounting Office, Ministry of Finance.

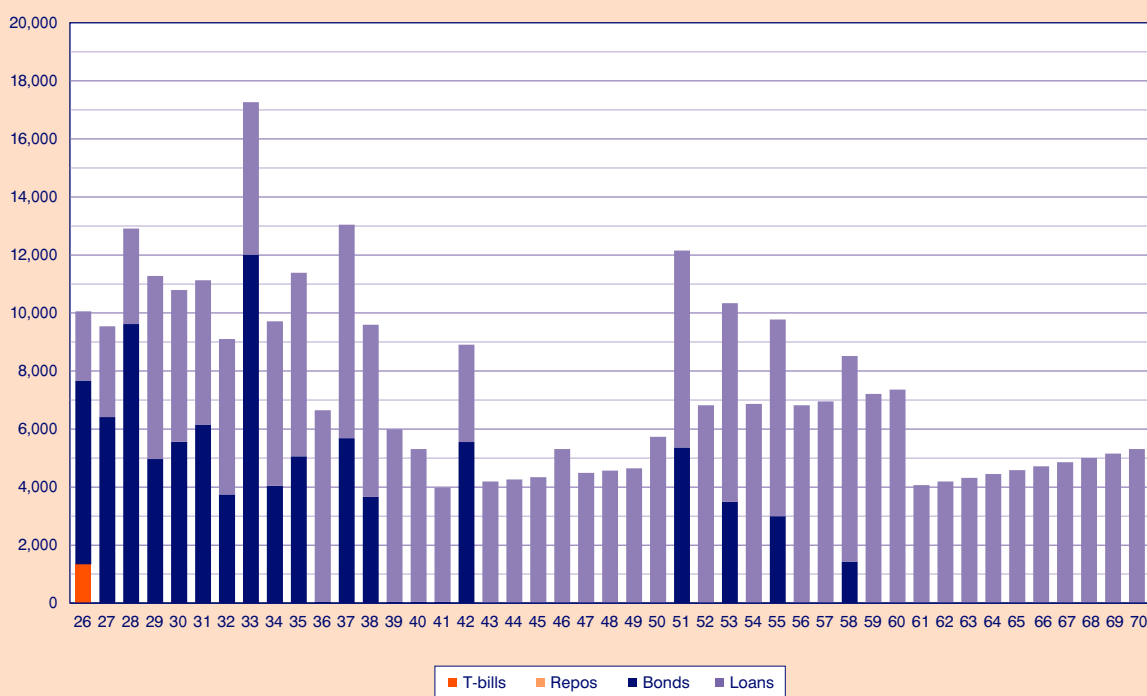
* Refers to the volume of bonds, Treasury bills and short-term securities, and not to the total amount of Central Government debt.

GRAPH 2.2.1
Distribution of new borrowing, first half of 2025



Source: General Accounting Office, Ministry of Finance.

GRAPH 2.2.2
Maturity schedule of Central Government debt as of 30 June 2025 (amounts in € million)



Source: General Accounting Office, Ministry of Finance.

The maturities of securities are smoothed through debt buybacks and liability management operations.
Includes the extension of EFSF loans as agreed at the Eurogroup meeting of 22 June 2018.

nominated entirely in euro and at a fixed interest rate. A shift is observed in the composition of debt in favour of negotiable debt instruments compared with non-negotiable debt, both relative to the previous quarter (€3 billion or 2.9%), the end of 2024 (€3.9 billion or 3.7%), and the corresponding quarter of 2024 (€0.3 billion or 0.3%). Finally, state guarantees increased by €130 million (0.5%) compared with the previous quarter and by €657 million (2.4%) compared with the same quarter of 2024.

The distribution of Central Government debt by residual maturity for the first half of 2025 is presented in Table 2.2.2 above. Short-term securities (with a maturity of less than one year) represent 16.4% of the total, compared with 10.1% for medium-term securities (with a maturity between one and five years) and 73.4% for long-term securities (with a maturity exceeding five years). These proportions compare with 16.5%, 8.4%, and 75.1%, respectively, recorded in the previous quarter of 2025. Relative to the corresponding quarter of 2024, a shift is observed towards a higher share of long-term debt instruments, accompanied by a corresponding decline in the shares of both short-term and medium-term instruments.

The average residual maturity of the total Central Government debt amounted to 16.55 years, slightly lower than the 16.82 years recorded in the corresponding quarter of 2024. It should be noted that the average residual maturity of total Central Government debt has more than doubled since Greece entered the support mechanism, when it stood at 7.65 years in the second quarter of 2010. Furthermore, regarding the new borrowing during the reference period, the average weighted maturity reached 14.79 years, reflecting a decline from the 16.54 years recorded in 2024. New borrowing for the first half of 2025 was distributed as follows: 53.2% through treasury bills and 46.8% through fixed-rate bonds (see Chart 2.2.1 above).

Chart 2.2.2 above presents the maturity schedule of Central Government debt, based on the most recently published data, indicating that the distribution of the debt redemption burden has now become more evenly spread, remaining – with few exceptions – at levels below €12 billion per year up to 2070.

2.3. Fiscal prospects

The Ministry of National Economy and Finance explicitly acknowledges that the Draft State Budget for 2026 was submitted during a period of geopolitical and fis-

cal uncertainty. Geopolitical tensions in Ukraine and the Middle East, the rise of protectionism and the imposition of tariffs, as well as the fiscal and macroeconomic challenges faced by major European economies, increase uncertainty regarding the growth prospects of the European economy, with repercussions for Greece as well. Nevertheless, the Greek economy continues to exhibit higher growth rates than the euro area average, a trend expected to persist through 2026. From a fiscal standpoint, the Greek economy does not currently face substantial risks; however, key challenges remain, particularly concerning the enhancement of household disposable income, the stimulation of private investment, and the need to alter its composition.

With respect to the Draft Budget for 2026, the achievement of fiscal targets is closely linked to the underlying assumptions embedded within it. For instance, the Draft Budget projects a slowdown in private consumption growth (1.7% in 2026 compared with 1.9% in 2025 and 2.1% in 2024), a deceleration of inflation (2.2% in 2026 compared with 2.6% in 2025 and 2.7% in 2024), a marginal increase in employment (0.4%), and a slight decline in the unemployment rate (-0.5%). At the same time, VAT revenues are expected to rise significantly (+5.8% compared with 2025 or +13.4% relative to 2024). Confirmation of these projections presupposes substantial progress in combating tax evasion and/or changes in the composition of private consumption, namely a shift towards goods and services subject to higher VAT rates. Equally important will be the further strengthening of tourism revenues, which are, in turn, highly sensitive to international developments. Moreover, the Draft Budget adopts optimistic projections regarding the implementation of the Public Investment Programme and the RRF. According to the Draft, gross fixed capital formation in 2026 is projected to increase by 10.2% (compared with 5.7% in 2025 and 4.5% in 2024). If realised, this would provide a significant boost to the economy, with long-term positive effects. Given that the RRF is approaching completion, the projection of increased investment expenditure appears reasonable. Nevertheless, the extent to which this projection is confirmed will be a decisive factor for achieving the 2026 budgetary targets.

Regarding public debt, an increase was recorded in the second quarter of 2025, both for the Central Government and the General Government. However, when expressed as a percentage of GDP, both the European Commission's forecast for 2025 (146.8% of GDP) and the 2025 Draft Budget projection (estimated at €362.8 billion or 145.4% of GDP by end-2025)

indicate a declining trajectory. For 2026, the debt-to-GDP ratio is expected to fall below 140%, with the projection standing at 137.6%, demonstrating confidence in the growth potential of the Greek economy. Finally, the borrowing strategy for the coming year is expected to remain restrained, as the cash reserves

of the Hellenic Republic are projected to remain high in 2026, while financing needs will be relatively limited due to the early repayment of public debt. At the same time, benchmark bond issuances with adequate liquidity will be employed to cover maturity gaps along the yield curve.

3. Human resources and social policies

KEPE, *Greek Economic Outlook*, issue 58, 2025, pp. 38-45

3.1. Recent developments in key labour market variables

Ioannis Cholezas

3.1.1. Introduction

The labour market continues its upward course in the first half of 2025. This is confirmed by the increase in the number of the employed, including paid employees, and the simultaneous decrease in the number of the unemployed. The decrease in the unemployment rate of foreign men is particularly impressive but is probably explained by strong outflows. The sectoral composition of employment shows losses in the primary sector and gains in the other two sectors, but without a homogeneous picture at the one-digit level. Developments in occupations are in line with developments in sectors. On the other hand, the level of skills does not seem to be changing as quickly as a change in the production model would justify, since secondary education graduates occupied most of the new employment positions. In addition, working hours are high in the Greek labour market, without any deviation from the trend, while it seems that paid employees, in the classical sense of the term, do not deviate significantly from the European average of working hours. Job vacancies seem to be declining, so the picture of worker shortages appears to be normalizing, even in sectors with more severe problems. In tourism, in particular, the reduction in the number of vacancies is accompanied by a small decrease in the number of employees in the past year. Note that these conclusions are based on official Eurostat data. Finally, institutional interventions and the new labour bill, which has just completed the public consultation stage, constitute a continuous field of confrontation. It would be wise to continue the consultation with social actors before any final provisions are put to a vote.

3.1.2. Labour Force Survey

Employment

In the second quarter of 2025, the number of employed people over 15 years of age exceeded 4.386 million people (4.250 million people aged 15-64), recording an increase on both a quarterly (170 thousand or 4%) and an annual basis (59 thousand or 1.4%). The largest annual increases were recorded in the age groups 20-24 (9.4%), 15-19 (6.8%) and 65+ (5.6%). Indicatively, it is reported that people in the 20-24 age group occupied 18.2 thousand new jobs in the last year. In contrast, a significant contraction was recorded in the 25-29 group; approximately 20 thousand jobs were lost (-5%). The annual increase in female employment was proportionally higher (2.4%) than male employment (0.3%), while it appears that men are predominantly responsible for the losses in the 25-29 group (-8.5%). Men remained the largest group of employed persons (around 2.5 million compared to 1.9 million females working).

The changes in the number of the employed drove the employment rate to 48.7% in the second quarter of 2025, the second biggest since 2007. The corresponding rate in the 15-64 age group was 65.3%, the biggest ever. Indicatively, it is reported that the EU27 average stood at 54.9% for people 15+ (71.2% for the 15-64 age group), while there were also countries with significantly higher employment rates, such as Cyprus and Estonia. Hence, despite the improvement in the employment rate, there is still room for further increase. Significant differences within the country are still observed between genders. The employment rate of men reached 56.7% (73.2% for men aged 15-64), but is still below its maximum, while that of women, despite being employed less often than men, has reached unprecedented levels: 41.3% for those over 15 and 57.4% in the 15-64 age group. Even if we use the expanded definition for young people, including people aged 25-29 in the group, their employment rate (37.1%) was significantly lower than that of people

aged 30+ (51.3%). The most obvious explanation is that, at least up to the age of 24, youth almost exclusively attend school, while men must postpone their activities for at least another year due to the compulsory military service. The same holds true with respect to the extremely low share of young people aged 15-24 who are employed, at approximately one in five.

Finally, the employment rate of foreigners is traditionally much higher than that of natives, and in 2025, it reached 67.7% vs. 48.3% for natives. This difference is mainly due to men (foreigners: 85.9%, natives: 56%), and less so to women (foreigners: 51.3%, natives: 41%). It is noted that the employment rate of foreigners increased amid a significant decrease in both the number of foreign workers (7.4%) and, especially, the size of their population, with a drop of over 25% on an annual basis. Possibly, foreigners who do not find a satisfactory job in the country find it easier to migrate to other countries, reducing unemployment and the population and increasing the employment rate.

Employment: sector of economic activity

The composition of employment is important because it shows which sectors create new jobs, but also which ones may need to be supported with targeted interventions. The evolution of the number of the employed in the past year reveals that the primary sector has suffered significant losses (approximately 65 thousand lost jobs). Although the reduction in a sector's employment may be associated with increased labour productivity when the product is stable, this does not seem to be the case because the gross value added of the primary sector did not exceed 4% of GDP over time, which means it has been approximately constant. In contrast, the developments in the other two sectors are positive, but with a significant deviation. In particular, the tertiary sector created three times more jobs than the secondary sector on an annual basis (approximately 90 thousand compared to 30 thousand). However, because the tertiary sector is many times larger than the secondary sector (4.5 times) and the largest employer in the Greek economy, the percentage increase is higher in the secondary sector (4.5% compared to 2.9%).

The secondary sector consists of five sub-sectors. Of these, three sectors recorded a decrease in employ-

ment in the last year. These are the sectors *Mining and quarrying*; *Electricity, gas, steam and air conditioning supply*; and *Water supply, sewage treatment, waste management and remediation activities* with losses of 2.3 thousand, 6.5 thousand and 7.3 thousand jobs, respectively. Proportionally, the losses approached 24.7% in the first sector, 13.5% in the second and 17.5% in the third sector, respectively. In contrast, increases were recorded in the *Manufacturing* and *Construction* sectors, which created 21.6 thousand and 25 thousand new jobs, respectively. Moreover, the largest increase in employment in the secondary sector was recorded in the *Construction* sector, as it exceeded 14% (compared to approximately 5% in *Manufacturing*). In terms of employment, the increase in these two sectors more than covered the losses in the other three, so that, in the last year, the overall balance of the secondary sector was positive.

Correspondingly, the tertiary sector consists of fifteen sectors of economic activity. Ten of them had more employees in 2025 compared to 2024 and five sectors had fewer employees. Among the first group is the *Wholesale and retail trade, repair of motor vehicles and motorcycles* sector, the largest employer in the Greek economy for many years, which has strengthened even further in the past year by creating the most new jobs, almost 54 thousand. As a result, its specific weight increased further; in the second quarter of 2025, it employed 17.3% of all employed people compared to 16.3% in the corresponding period in 2024. Almost 23 thousand new jobs were offered by the *Professional, scientific and technical activities* sector, another 20 thousand new employees were recorded in the *Education* sector, approximately the same number in the *Arts, entertainment and recreation* sector, while another 16 thousand came from the *Administrative and support activities* sector.

In contrast, the second largest employer in the tertiary sector, i.e., *Accommodation and food service activities* (tourism), showed a decrease in the number of employed individuals on an annual basis by 1.1% or 4.8 thousand people. However, the biggest losses on an annual basis are attributed to the *Human health and social work activities* and *Public administration and defence, compulsory social security* sectors; losses approached 28 thousand and 15 thousand jobs, respectively. Note that the latter sectors generally operate within the public sector. Two sectors¹ reported

1. The increase in the sector of *Activities of extraterritorial organizations and bodies* reached 170%; however, this is the smallest sector in terms of employment, accounting for only 0.1% of total employment. Therefore, caution is needed when interpreting this result, as these data are derived from a sample survey.

surprisingly big increases: the *Arts, entertainment and recreation* sector, which expanded its workers by 39%, and *Administrative and support activities* with an increase close to 17%.

Employment: single-digit occupation

The occupational composition of employment by single-digit occupation is equally as interesting as the composition by sector, because it gives a more detailed picture of labour demand.² It provides information on the type of professionals the market requires, and therefore the type of jobs that are created, and potentially influences (re)education and training decisions. As we saw above, over the past year, 59 thousand new jobs were created. Most of them, almost 49 thousand, concerned *Elementary occupations*, while significant demand (almost 30 thousand) was also recorded for *Clerical support workers*. The third largest increase was in *Plant and machine operators and assemblers* (approximately 21 thousand). The conclusion that can be drawn from the above is that the new jobs created in the last year are predominantly low-skilled. The approximately 20 thousand new jobs for *Professionals* can possibly be characterized as highly skilled. In contrast, a large decrease was noted in the number of *Skilled agricultural, forestry and fishery workers* (approximately 64 thousand), which is in line with the decrease recorded in employment in the primary sector. However, again, the fact that these are specialized workers is problematic, due to the general contraction recorded in the sector.

Employment: education

The composition of the employed population and its changes over time, in terms of sector and profession, inevitably create different levels of demand for people with different formal qualifications, such as educational attainment. Over time, most employed persons are graduates of upper secondary education, i.e., Lyceum, followed by graduates of higher education institutions, i.e., universities. This did not change in 2025. On an annual basis, the number of employed people with a higher technical vocational education degree dropped by almost 5%, which corresponds to approximately 43 thousand lost jobs. These are the so-called middle managers in public discourse. The group of individuals

with primary school education or less also exhibited a decrease of approximately 2.2 thousand jobs, which corresponds to a decrease of 0.7%. In contrast, most new jobs were filled by high school graduates (almost 73 thousand), while a significant increase, at least proportionally (5.4%), was also reported in the number of employed high school graduates (18.1 thousand). The relative stagnation of the number of employed university graduates (0.3%) is equivalent to a small increase of 2.4 thousand newly employed. In contrast, the number of the most educated group, i.e., holders of a doctoral and/or master's degree, increased by almost 11 thousand on an annual basis (or 3.1%), allowing for some optimism.

Employment: hours of employment

When hours of employment increase by less than the increase in the number of the employed, then the newly added workers must work fewer hours than those already employed, e.g., in part-time jobs. Eurostat distinguishes between usual and actual hours worked per week. Often, actual hours are fewer than usual hours, although the difference is not constant, as it depends, among other things, on the quarter in which the data is recorded due to seasonal fluctuations in economic activity. Therefore, when economic activity increases, actual weekly hours of work are expected to exceed usual hours.

If we examine the evolution of weekly working hours in Greece, they appear to be relatively stable, apart from the seasonal fluctuation that is detected. Usual working hours have been practically stable over the last two years, and in the second quarter of 2025, they amounted to 41 hours per week for all employed persons and 39 hours for employees. Actual hours worked show a marginal deviation of 0.2 (i.e., 12 minutes per week), with a temporary increase in 2024. Thus, in the second quarter of 2025, actual hours worked were almost 40 for all employed persons and approximately 38 per week for salaried persons.

Looking at overtime work using data from Eurostat (up to 2024), it appears that in Greece those who work more than 49 hours per week are mainly entrepreneurs, i.e., self-employed with employees, at 43.9%. Overtime is also common amongst the self-employed without employees (33.5%), while for employees it is a less frequent phenomenon, since only 3.2% appear

2. It should be noted that demand does not necessarily correspond to employment when there are many vacant positions. As we saw above, this is not the case for the Greek economy, but in certain sectors, the mismatch between demand and employment can be significant.

TABLE 3.1.1 Differences in weekly working hours between Greece and the EU27

	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2
<i>Usual weekly working hours</i>										
Employed	3.5	3.9	4.0	3.6	3.6	4.0	4.2	4.0	3.7	4.0
Employees	2.3	2.6	2.9	2.6	2.2	2.7	2.9	2.7	2.5	2.8
<i>Actual weekly working hours</i>										
Employed	3.0	4.2	4.2	4.0	3.0	4.5	4.9	3.8	2.5	4.7
Employees	2.1	3.2	3.3	3.2	1.8	3.5	3.7	2.7	1.3	3.7

Source: Eurostat.

to work overtime. The largest deviation compared to the EU27 average is found among the self-employed without employees, which is close to 12 percentage points. Even if we go further back, that is, either before or during the crisis, it turns out that the self-employed are much more likely to work overtime. The turning point seems to be year 2016, when the share of those working more than 49 hours per week exceeded 19%, and has been decreasing ever since.

Table 3.1.1 presents the differences between Greece and the EU27 average for usual and actual weekly working hours for all employed persons and for only salaried workers, i.e., employees, in the period 2023-2025. The positive sign means that the working hours are more in Greece. Table 3.1.1 shows that from the first quarter of 2023 to the second quarter of 2025, Greeks work more than the European average worker. The differences are smaller for employees in both usual and actual working hours. This means that the difference is larger between other categories of employed workers, such as entrepreneurs or the self-employed. Note, however, that it is common in Greece to work as quasi-self-employed. Therefore, excess working hours to some extent also concern this intermediate category of workers.

In summary, it could be argued that Greeks work more than the average European, but this is not new, and it mainly concerns the self-employed. This becomes even clearer when we examine the percentage of those who

work more than 49 hours per week. In this context, the increase in declared overtime in sectors that already apply the digital card comes as no surprise. Indicatively, in the first seven months of 2025, 3.5 million overtime hours were declared, i.e., 1.5 million more compared to 2024.³ Tourism is the leading sector (728%), followed by restaurants (301%), while the increase in retail trade is also significant (105%), as is in manufacturing (65%). These large increases reveal either the extent of underemployment in previous years or a rapid increase in the demand for work. The latter is perhaps more difficult to justify, as sample surveys are anonymous and, therefore, the incentive for untruthful responses is limited. However, a clear answer will be available once Eurostat data on overtime employment in 2025 are published.

Unemployment

The unemployment rate decreased for another quarter and stood at 8.6% (8.7%) for people over 15 years of age (15-64). On an annual basis, the decrease reached 1.2 percentage points, while on a quarterly basis, with a strong seasonal effect, the decrease reached 1.8 percentage points. The changes are similar for people aged 15+ and the 15-64 group. The unemployment rate, however, continues to be 1.3 percentage points higher than in the second quarter of 2008. The number of the unemployed also decreased on an annual and quarterly basis, reaching 411.7 thousand in total

3. See <https://ypergasias.gov.gr/ergani-pano-apo-35-ekatommyria-katagegrammenes-yperrories-sto-7mino-tou-2025/>.

(15+). Nevertheless, the number of the unemployed continues to be higher than in the second quarter of 2008 by approximately 45 thousand people. Most unemployed people are women, so it is not surprising that the unemployment rate for women continues to be higher than men (10.3% compared to 7.2% for people aged 15+).

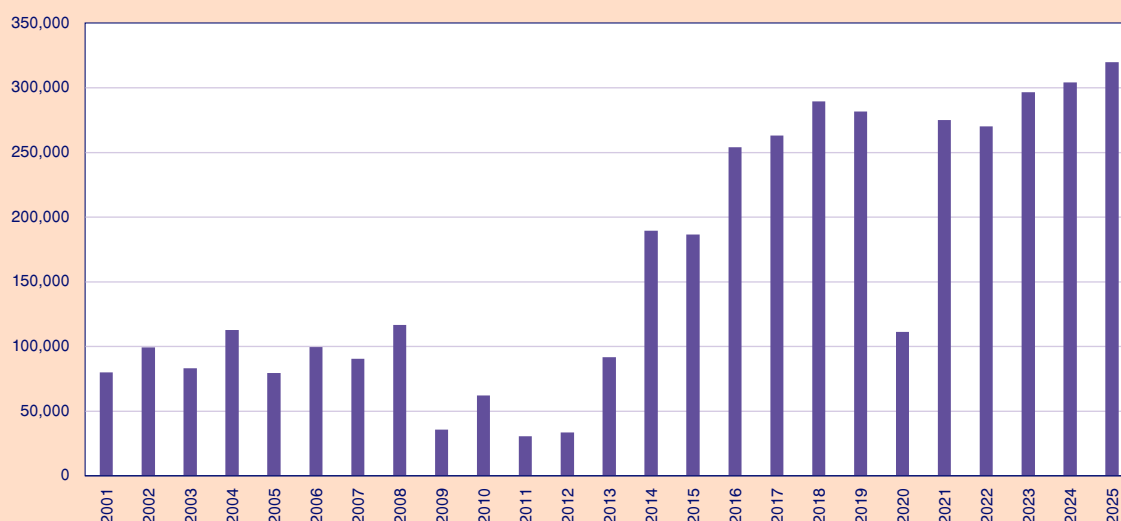
Correspondingly, young people aged 15-24 (and 15-29) have worse employment prospects than older people, but the differences are narrowing as we move away from the crisis years, which is a good thing. Thus, in the second quarter of 2025, the unemployment rate was 18.2% (15.3%) for young people aged 15-24 (15-29) compared to 8% (7.4%) for people aged 25+ (30+). Another interesting finding is that foreigners no longer have a higher unemployment rate than natives (7.2% versus 8.6%), since their employment prospects have improved massively, especially in the case of foreign men. The improvement is so great that it led to an unemployment rate lower than natives in 2025. In fact, in the second quarter of 2025, the unemployment rate of foreign men reached 2.8%. The convergence of the unemployment rate among women is also impressive, with foreign women facing approximately 3 percentage points higher unemployment than natives (13.2% versus 10.2%).

3.1.3. Wage employment

According to the ERGANI information system, 319,593 net new wage employment positions were created in the first seven months of the year, as hires exceeded exits in most months (positive monthly balances). Comparatively, this performance is the best since 2001 (see Graph 3.1.1), while from 2014 onwards there was a strong upward trend except for the coronavirus period in 2020. The study of the evolution of monthly paid employment flows shows that the benefits came from the smaller losses of paid employment jobs in the months that typically experience such losses, namely January and July. In 2025, the market managed to have a smaller negative balance in these months, compensating for the lag in the positive balances recorded in the remaining months.

More than 56% of the hires involved full-time positions. Overall, the number of hires exceeded two million in the first seven months of the year, of which 1.16 million were full-time. Compared to the corresponding period in 2024, total hires increased by 2% (+39.8 thousand), while full-time hires increased by 5.2% (+57.3 thousand). A small increase of approximately 2.5 thousand was also recorded in work-in-shift employment contracts. In contrast, part-time hires decreased by 20 thousand compared to 2024 and reached 726.5 thou-

GRAPH 3.1.1
Balance of hires-exits (in thousand), January-July



Source: ERGANI Reports, Ministry of Labour and Social Security.

sand in total. Based on the total hires and their composition, paid employment continued its upward trend in the first seven months of the year.

Conversions of full-time job contracts to flexible employment contracts were higher this year compared to 2024, reaching 27 thousand compared to 24.6 thousand last year over the same period. However, as a percentage of the total, the differences are limited. Almost three-quarters of the conversions concerned the conversion of full-time job contracts to part-time job contracts in the last two years. The rest were mainly conversions to work-in-shift employment contracts with the consent of the employees, and only a small part (1.4% in 2025) concerned conversions to work-in-shift employment without the consent of the employees. The contraction of this category is positive. However, it is disrupted by the increase in the number of conversions, especially if we consider that after the decrease in 2023 (compared to 2022) by approximately 3.7 thousand, two consecutive and accelerating increases in conversions were recorded on an annual basis: +6.4% (over the period 2023-2024) and +9.8% (over the period 2024-2025).

The gender composition of new paid jobs is quite stable. Most recruitments concern men: the share of women ranges between 38% and 40% from 2021 onward. This means that six out of ten new paid jobs are occupied by men. The same is true for age composition. Young people aged 15-24 filled many new jobs, approximately nine out of twenty, while a little more than one in four were filled by people in the 45-64 age group. The stability of the shares over time must mean that market preferences also remain relatively stable. For the group over 64, which theoretically consists of many retirees, it seems that the 2024 increase was temporary, since in the first seven months of 2025, the share of new paid jobs filled by this group decreased to 1.4%, corresponding to 4.5 thousand jobs (from 2% or 6 thousand in 2024). However, it remains more than double that of 2023 (0.6% or 1.7 thousand).

3.1.4. Job vacancies

The shortage of personnel in various sectors of the labour market is intensifying as unemployment decreases and the number of job candidates is limited. As has been reported in previous issues of the *Greek*

Economic Outlook, the Greek labour market has not had a problem with job vacancies over time. The problem began to become acute, at least based on official ELSTAT data,⁴ in 2023, when job vacancies more than doubled on an annual basis. Specifically, in the first quarter of 2022 there were approximately 16.6 thousand vacancies, in the first quarter of 2023 this number exceeded 32.8 thousand, while in the corresponding quarter of 2024 the vacancies were more than 70.8 thousand. This picture, however, seems to be reversed in 2025, as vacancies in the first quarter decreased to approximately 52 thousand, a decrease of 26.5%. Even in the second quarter of 2025, when seasonal demand from the tourism sector increases labor needs, vacancies reached 38.8 thousand, approximately 20 thousand fewer compared to 2024. Therefore, despite the intense debate, at least in the economy, vacancies seem to be de-escalating after the significant increase recorded in 2024. Similar conclusions emerge if we compare the vacancy rate in Greece with that in the EU27 and the Eurozone. Except for the first two quarters of 2024, the vacancy rate is systematically lower in our country compared to both the EU27 and the eurozone averages.

With the help of Eurostat data on vacancies, we can identify the sectors with the greatest problems. In our country, the following sectors stand out in the last five years: *Accommodation and food service activities* (tourism) with 4% vacancies, compared to 3.5% of the EU27 average and 1.5% of the national average; *Water supply, sewerage, waste management and remediation activities* with 3.6%, compared to 1.6% of the EU27 average; *Construction* with 3.5%, at the same level as the EU27; and *Arts, entertainment and recreation* with 3.4%. Therefore, there continues to be an issue in specific sectors of the Greek economy, which, in fact, employ people with low and medium levels of skills. Even these sectors, however, show a de-escalation of the phenomenon in the past year, at least until the first quarter of 2025, when data is available. For example, the vacancy rate in tourism in the first quarter of 2025 is estimated at 9%, high for the country and over three times bigger than the EU27 average but reduced by over 50% compared to the first quarter of 2024.

Considering the above findings, there is no room for complacency. There are initiatives to fill vacancies and limit the phenomenon, such as the DYPA JOBmatch platform⁵ or the Labor Market Needs Diagnosis Mech-

4. See <https://www.statistics.gr/el/statistics/-/publication/SJO41/2025-Q2>.

5. Details available at: <https://jobmatch.dypa.gov.gr/>.

anism,⁶ but also initiatives such as SEV's Skills4Jobs⁷ or the GSEE training programs.⁸ In addition, there is the possibility of calling in workers from abroad for seasonal work, e.g., in tourism, the agricultural sector and construction, if the domestic population is insufficient, does not have the required skills or does not wish to be employed in specific jobs. The state must ensure that the employment of foreigners is carried out in compliance with the rules of labour legislation, as is the case for local workers. However, especially in some sectors, it seems that the problem remains more severe than desired. Therefore, in addition to initiatives aimed at stimulating labour supply, it would perhaps be appropriate to examine issues on the labour demand side, such as, among others, the level of wages, working conditions, terms of employment and professional development prospects, elements that are not disconnected from the general economic course and investments.

3.1.5. Institutional interventions

Since the end of June 2025, the pilot implementation of the digital employment card has begun in wholesale trade, energy, financial and insurance activities as well as in the administrative and support activities of tourism. It is expected to become mandatory in November, at which time these sectors will be added to the retail trade and manufacturing sectors, banks, DEKOs, tourism and catering businesses, which already apply the digital employment card on a mandatory basis. As already mentioned before, the implementation of the digital employment card resulted in a sharp increase in declared overtime work, leading to large increases in social security contributions.

Possibly the most prominent news about the labour market during this period is the labour bill, which was open for public consultation until September 19. According to the Ministry of Labour and Social Security,⁹ the bill supports employees in their daily lives and facilitates businesses. The favourable regulations for employees include the freezing of the solidarity contribution rate for pensioners, when they are entitled to an increase in their pension from their work, the pregnancy and childbirth allowance, which requires

200 stamps regardless of the number of social security funds the employee has been insured with and the employers she has been employed by. In addition, the parental leave allowance is established as tax-free, non-transferable, and immune from seizure, while the granting of the postnatal part of maternity leave is extended to foster mothers as well.

At the same time, businesses are facilitated by various regulations included in the bill. Some of these regulations, for example, provide that recruitment, voluntary departures and contract terminations can now be carried out electronically, even via a mobile application (a new special application for employers), without physical presence or the submission of documents. A new category is added to recruitment, that of contracts with a duration of up to 2 calendar days, to cover urgent work needs of businesses in a legitimate manner, increasing the flexibility of businesses. In addition, existing procedures are simplified, as various forms are abolished or merged (forms E3, E4, E11) and the recording of data is to be done directly on the myErgani platform. This implies a reduction in bureaucracy and its cost in terms of time and money. Another provision that is expected to relieve businesses is the proposed exemption from increases in social security contributions for extra hours, overtime, night work and holidays.

However, there are specific regulations that have provoked employees' reactions.¹⁰ One of these is the institutionalization of employment up to 13 hours per day for the same employer (with an obligation to pay overtime), while until now the legislation allowed this for more than one employer, without abolishing the mandatory 11-hour rest and with a 40% increase in pay. This regulation is limited by a maximum of 150 hours of annual overtime employment (or 37.5 days per year). A second regulation provides that each employee will henceforth be able to work on a 4-day basis throughout the year (10 hours per day for 4 days per week), after consultation with the employer, while until now this possibility was available for up to 6 months per year. Changes are also foreseen regarding annual leave, which will now be allowed to be taken in instalments over four separate periods within the

6. Details available at: <https://www.sev.org.gr/protovoulies-kampanies/skills4jobs/>.

7. Details available at: <https://www.inegsee.gr/tag/katartisi-kinoniki-drasi/>.

8. See <https://ypergasias.gov.gr/ergasiakes-scheseis/atomikes-ergasiakes-sxeseis/ergasia-politon-triton-choron-stin-ellada/>.

9. See <https://ypergasias.gov.gr/i-aktinografia-tou-neou-ergasiakou-nomoschediou-tou-ypeka-se-16-1-erotapantiseis/>.

10. See <https://www.kepea.gr/24ori-apergia-tis-gsee-tetarti-1-oktovrioy-2025#>

same year, whereas previously at least two consecutive weeks of leave were required

Dialogue is always the best solution in times of tension, and the new labour bill is no exception to the rule. Bridging differences is the only way to maintain social peace. In this context, strengthening the operational capabilities of the Hellenic Labour Inspectorate, a field addressed by the new labour bill, intensifying inspections and political support for their results, and

accelerating the procedures for resolving disputes between employees and employers could potentially mitigate any negative effects of these regulations on employees. In any case, there should be no questionable practices allowed in the labour market. Those employees who wish to do so should have the right to work overtime in compliance with labour laws, but those who do not wish to do so should be protected against abusive practices.

3.2. Significant wage inequality between European regions

Vlassis Missos

The mapping of wage inequality across the administrative regions of the European Union (EU27), expressed in terms of purchasing power parity (PPP)¹ and deviations from the European average (100), reflects some important aspects of the European structure of regional development. In general, the results show a clear pattern of “center-periphery” divisions, i.e., administrative areas that are ahead and others that are lagging behind, in terms of both productive capacity and social welfare. In particular, economic activity in Western and Central Europe commands the highest wages, while in Eastern and Southern Europe wages remain significantly below average and do not reflect the rising cost of living. The chronic persistence of these disparities over time demonstrates the consolidation of inequalities and the creation of conditions of impoverishment for a large share of European regions.

With regard to the interpretation of Figures 3.2.1 and 3.2.2, the wage data presented relate to the *business sector* (Stansbury & Summers, 2017), i.e., it considers all sectors excluding *agricultural production* and *public administration*.² All data are based on national accounts published by Eurostat. The average wage is calculated as total gross earnings³ over the number of salaried employees, expressed in PPP. At the same time, for the comparison between the regions of all countries belonging to the EU27 in PPP, for Bulgaria, Denmark, Hungary, Poland, Romania, Sweden, and the Czech Republic, the average exchange rate⁴ has also been used to convert their national currencies into euros.

In Figures 3.2.1 and 3.2.2, the analysis of average wages in the EU27 business sector for 2009 and 2022 in PPP shows deep-rooted regional inequalities as well as some significant changes that have occurred over time.

For 2009, the map (Figure 3.2.1) presents a clear spatial differentiation between the “center” of Western and Central Europe and the “periphery” in Southern and Eastern Europe. Significantly higher wages were recorded in regions such as Luxembourg, Île-de-France (Paris), Brussels, the Netherlands, and the Southwestern regions of Germany, which ranged from 180 to 210 of the European average (100). In contrast, a large part of Eastern Europe (Romania, Bulgaria, the Baltic countries) were below 60–90, while Southern Europe (Spain, Portugal, Southern Italy, and Greece) was, in most of its regions, less than the average, with a few exceptions in metropolitan centers. For 2022, the spatial pattern of wage inequality remains, but with some notable changes. Western Europe continues to lead the way, with Luxembourg, Brussels, Paris, and Southern Germany recording wages above 160, while regions such as Bavaria and Baden-Württemberg maintain their leading positions. At the same time, Scandinavia is seeing further growth, with Stockholm and the Southwestern regions of Sweden joining the highest categories.

On the other hand, significant changes are detected in regions of Eastern Europe. While in 2009 regions, such as Warsaw, Prague, Bratislava, and Budapest recorded salaries of 60–90, in 2022 they moved into the 100–130 categories, following the growth trajectory of their economies. The Czech Republic and Slovakia show a clear rise due to their industrial integration into the international value chains of Eastern Europe, while Poland and Romania show some improvement, especially in their capitals and large urban centers. In Southern Europe, the picture remains relatively static. Italy continues to show a marked internal North-South divide. Lombardy, Emilia-Romagna, and Veneto are close to 120–130, while the Southern regions are below 100. Spain, Madrid, and the Basque Country are improving, but Andalusia and other Southern regions continue to lag behind. Portugal also remains relatively low, with Lisbon standing out slightly from the national average. Overall, the period 2009–2022 is characterized by a mild convergence of Eastern Europe towards the European average, while the South of the EU27 remains stagnant.

1. For an interpretation of PPP, see Missos (2024).

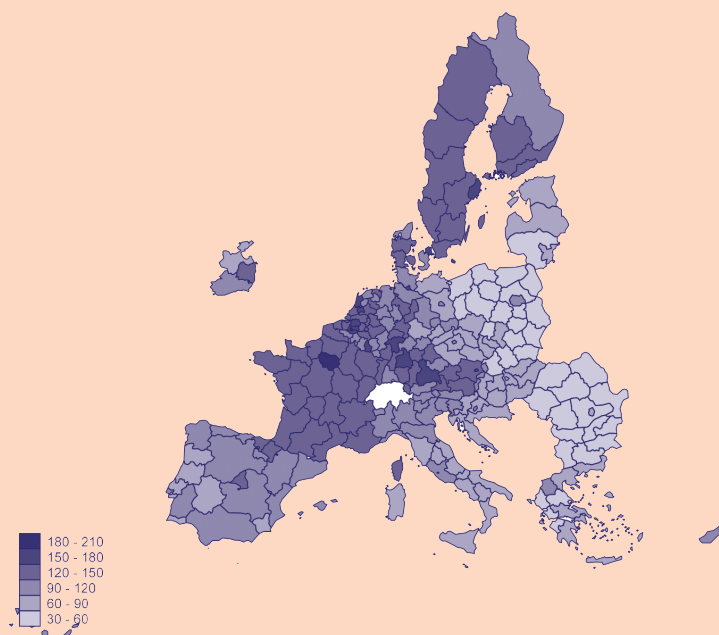
2. Agriculture, forestry and fishing [A] and Public administration, defence, education, human health and social work activities [O-Q] are excluded.

3. Compensation of employees by NUTS 2 region.

4. See Eurostat: Euro/ECU exchange rates - annual data [ert_bil_eur_a].

FIGURE 3.2.1

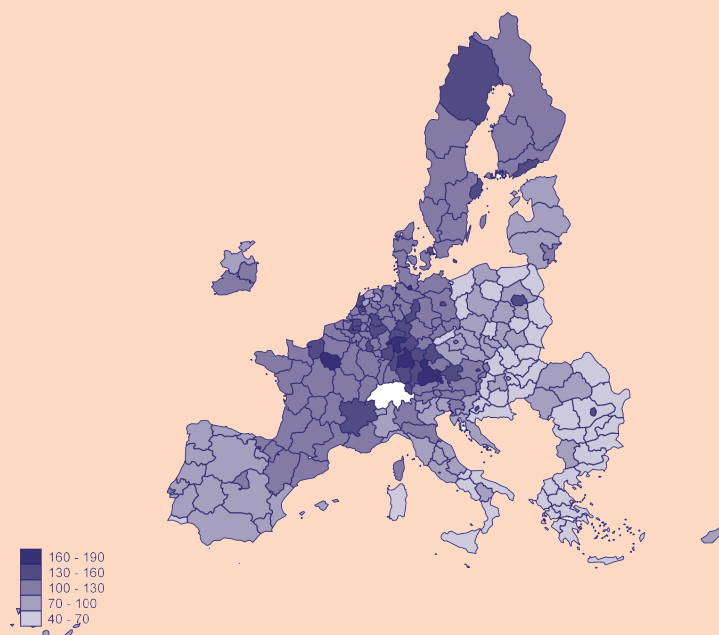
Average compensation of salaried employees in terms of purchasing power parity (PPP), as a deviation from the European average (100) per administrative region, 2009, EU27



Source: Eurostat, own calculations.

FIGURE 3.2.2

Average compensation of salaried employees in terms of purchasing power parity (PPP), as a deviation from the European average (100) per administrative region, 2022, EU27



Source: Eurostat, own calculations.

All of the above reflect broader structural changes in productivity levels, the sectoral composition of economies, the creation of new knowledge-intensive professions, and the skills employed by the workforce, particularly those related to technology. Regions with a high concentration of industrial activity, technology, research, and highly specialized services have significantly higher average wages. In contrast, areas dependent on tourism or low-skilled services tend to have lower wage levels. At the same time, urban concentration and the presence of central scientific research infrastructure, universities, and business centers reinforce regional disparities. Wage inequalities also have significant social and economic consequences. Significant differences in the compensation of employees fuel internal migration from poorer to richer regions, create pressure on urban areas, and exacerbate the depopulation of poorer regions (or even countries). At the same time, the development challenges of the administrative regions of Southern and Eastern Europe, which are struggling to converge with the European average, are intensifying. These findings underscore the need for effective cohesion policies, with an emphasis on investment in human capital, infrastructure, innova-

tion, and, most importantly, changing the production model in order to reduce the gap and strengthen long-term convergence.

In this light, the case of Greece is highly illustrative, yet deeply discouraging. According to the data, in 2009 the region of Attica stood marginally above the national average, while the country as a whole was positioned within the 60–90 band relative to the European mean, showing signs of upward convergence. Since then, however, the trajectory of wage convergence has been decisively reversed. By 2022, the wage situation across Greek regions had deteriorated significantly, with a growing divergence from the European average. Although Attica continues to record higher wages compared to the rest of the country, it fails to approach the levels of the major metropolitan centers of Western Europe. Instead, Greece now aligns more closely with Eastern European countries – most of which, by 2022, had significantly improved and surpassed it. This reversal reflects the profound impact of the prolonged economic crisis in Greece, the sustained wage restraint imposed under economic adjustment programs, and the persistently weak investment

TABLE 3.2.1 Position in the overall ranking of the administrative regions of Greece among the 237 regions of the EU27, based on average compensation of salaried employees in PPP

	2009	2022	Number of positions change between 2009 and 2022
Attica	159	208	-49
Central Greece	166	214	-48
Peloponnese	172	220	-48
Western Macedonia	143	221	-78
South Aegean	169	224	-55
Eastern Macedonia and Thrace	190	229	-39
Crete	201	231	-30
Ionian Islands	186	232	-46
Central Macedonia	203	233	-30
Western Greece	206	234	-28
Thessaly	204	235	-31
Epirus	215	236	-21
North Aegean	202	237	-35

Source: Eurostat and own calculations.

activity that could have facilitated a transition toward high-productivity sectors. In contrast, the regions of Eastern Europe appear to have integrated more successfully into international markets, benefiting from industrial restructuring, foreign direct investment, and stronger participation in global value chains. The outcome underscores both the structural weaknesses of the Greek economy and the long-term social costs of wage stagnation.

Among the 237 regions in the EU27 sample, Greek regions occupy the lowest positions in terms of average wages. In 2009, the North Aegean ranked 202nd, while by 2022, it had fallen to 237th, the very last place. Similarly, the Epirus region ranked second-to-last (236th). On average, between 2009 and 2022, all regions declined by approximately 40 positions. These findings are consistent with previous studies highlighting the

low purchasing power of wages in Greece (see Missos, 2024; Missos & Rodousakis, 2025). They also illustrate the long-term stagnation of wages in the country and the worsening socioeconomic conditions faced by a population heavily reliant on private-sector employment.

References

Missos, V. (2024). Comparing the average hourly wage between Greece and the EU27, *Greek Economic Outlook*, issue 54 (June), 50-53.

Missos, V. & Rodousakis, N. (2025). *Working harder, paying less: Wage suppression in Greece*, Policy Note 5/2025, Levy Economics Institute of Bard College.

Stansbury, A. & Summers, L.H. (2017). *Productivity and pay: Is the link broken?* National Bureau of Economic Research Working Paper No. w24165. DOI: 10.3386/w24165.

3.3. Health, subjective well-being, and healthcare access in the wake of COVID-19: Evidence from Greece

Athina Raftopoulou

3.3.1. Introduction

Building on earlier work that presented key findings on the impact of the COVID-19 pandemic on self-perceived health in Greece (Raftopoulou, 2025), this section updates the evidence and examines how different dimensions of health, well-being, and access to care have evolved over time, including during the pandemic. Prior research on crises demonstrates divergent patterns between physical and mental health, underscoring the need to track multiple dimensions. Moreover, due to the fact that COVID-19 was a distinct shock, it is not yet clear if established recession patterns apply. Assessing whether the pandemic followed or deviated from these patterns offers key insights into its long-term health consequences. Statistics are based on EU-SILC data from eight consecutive waves (2017–2024) of the Greek version of the Income and Living Conditions (EU-SILC) survey, on a sample of individuals aged 16 and over, observed across four consecutive years, with information on the relevant variables. This section presents within-person changes (differentiating by gender) in self-assessed health (SAH) and mental health, as well as trends in chronic conditions and limitations in daily activities. Additionally, unmet medical and dental needs over time and trajectories of life satisfaction are shown. Baseline data show that different health dimensions follow distinct paths. SAH shows only modest year-to-year variation, with small declines around 2020–21 followed by recovery, suggesting no major deterioration in the underlying health stock. By contrast, mental health experiences the sharpest negative shock in 2020 (reference year), with only partial recovery by 2022. In terms of physical health, the prevalence of chronic conditions shows a modest but steady rise since 2020, particularly among women, while functional limitations show only a slight upward drift. Indicators of access to care point to ongoing challenges: unmet medical and dental needs spiked in 2022 and remained elevated through 2024, with women consistently reporting higher levels. Life satisfaction dipped modestly in 2024, more visibly among women. Taken

together, the baseline data indicates a heterogeneous and incomplete recovery. The pandemic's most pronounced and enduring impacts are evident in mental health, whereas the steady rise of chronic conditions, as well as the continued barriers to medical and dental care, point to longer-term structural challenges.

3.3.2. Diverse health outcomes

Research on macroeconomic cycles reveals a contradictory pattern: physical health indicators often improve during recessions, while mental health consistently deteriorates. For instance, mortality rates tend to decline during economic contractions, with reductions observed in traffic accidents, occupational injuries, and other external causes of death (Ruhm, 2012; 2016). These countercyclical gains are linked to changes in health behaviors and lifestyles during downturns, with evidence suggesting that mortality improvements in deep recessions are roughly twice as large as those predicted by unemployment alone (Ruhm, 2016). In contrast, mental health worsens under economic stress. Job loss, financial hardship, and uncertainty are associated with heightened anxiety, depression, and increased use of psychotropic medications (Bradford & Lastrapes, 2014). Although less visible, these declines in psychological well-being carry significant social and economic consequences. In short, physical health indicators often remain relatively stable, while psychological measures are more sensitive to crises and capture their indirect human costs more sharply. The COVID-19 pandemic, however, represented a distinct type of shock. It combined a severe economic recession with a global health emergency. Pandemic-related restrictions imposed strict limits on mobility, closed schools and workplaces, and disrupted routine healthcare services. While essential for infection control, these measures simultaneously reshaped economic activity and altered the trajectories of both physical and mental health. In this context, examining a broad set of health outcomes becomes especially important.

3.3.3. Health indicators

3.3.3.1. SAH vs mental health: Modest but persistent declines vs the sharpest pandemic shock

SAH is the most frequently used health measure in economics research, valued for its generic nature and

FIGURE 3.3.1
Within-person changes in SAH and mental health over time and by gender



Source: Income and Living Conditions Survey (SILC), ELSTAT, edit: Author, Data: weighted; Y-axes are on different scales.

brevity in surveys (Au & Johnston, 2014). SAH is based on responses to the general health survey question: “How is your health in general?”, originally coded on a 5-point scale (1 = very good, 5 = very bad) and later rescaled to ensure higher values correspond to better health (1 = very bad, 5 = very good). To capture within-person changes over time, we constructed a first-difference measure of SAH, namely, ΔSAH . By construction, ΔSAH takes values from -4 to +4, with negative values indicating deterioration, positive values indicating improvements in health and 0 denoting stability. For ease of interpretation, we further collapsed these into three categories: -1 (deterioration), 0 (no change), and 1 (improvement). For mental health, change (ΔMH),¹ we use a COVID-specific question to measure the change in individual mental health due to COVID-19. Responses include -1 (worsened), 0 (same), 1 (improved). While subjective, it directly captures the perceived impact of the pandemic. Both indicators are weighed using survey weights, ensuring population representativeness.

Based on Figure 3.3.1, ΔSAH exhibits modest declines around 2020–21, with mean values falling to approximately -0.045 for men and -0.035 for women in 2020, before rebounding toward pre-pandemic levels by 2023–24. This pattern aligns with prior literature suggesting limited deterioration in physical health during recessions. By contrast, mental health displays a pronounced and persistent shock: mean scores drop sharply in 2021 (-0.726 for men, -0.759 for women), with only partial recovery by 2022 (-0.478 for men, -0.514 for women), highlighting the severe psychological impact of the pandemic.

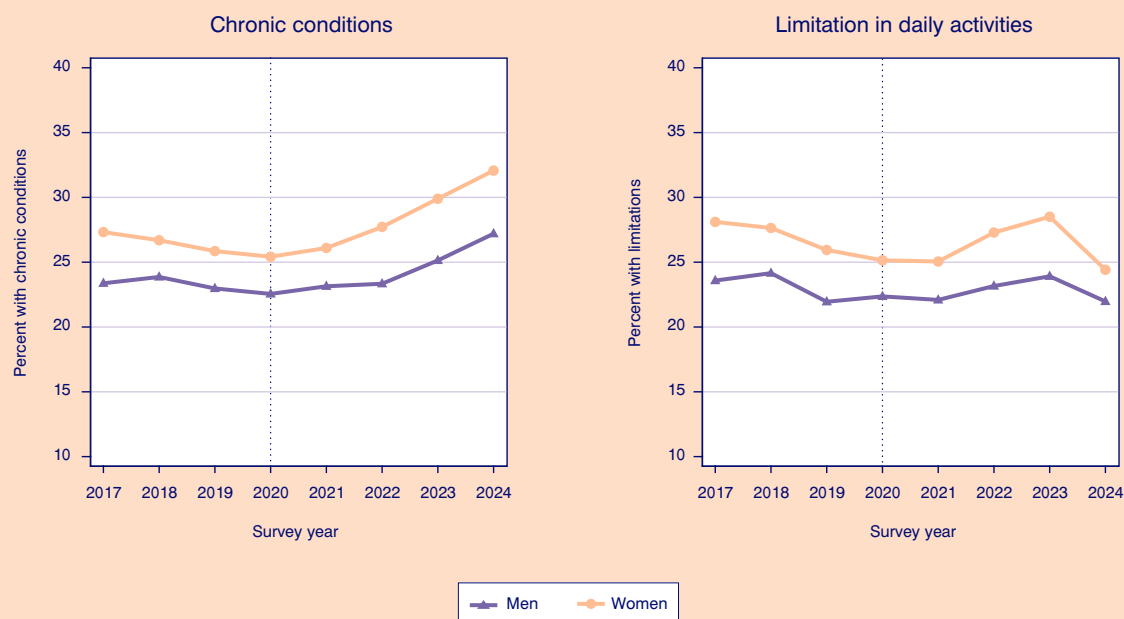
3.3.3.2. Chronic conditions and limitations

Figure 3.3.2 illustrates the evolution of chronic illness and limitations in daily activities in Greece (2017–2024). Until 2020, the prevalence of chronic conditions was broadly stable. Starting in 2021, however, a steady upward drift appears, especially among women, consist-

1. Data for ΔMH are available only for waves 2021 to 2023.

FIGURE 3.3.2

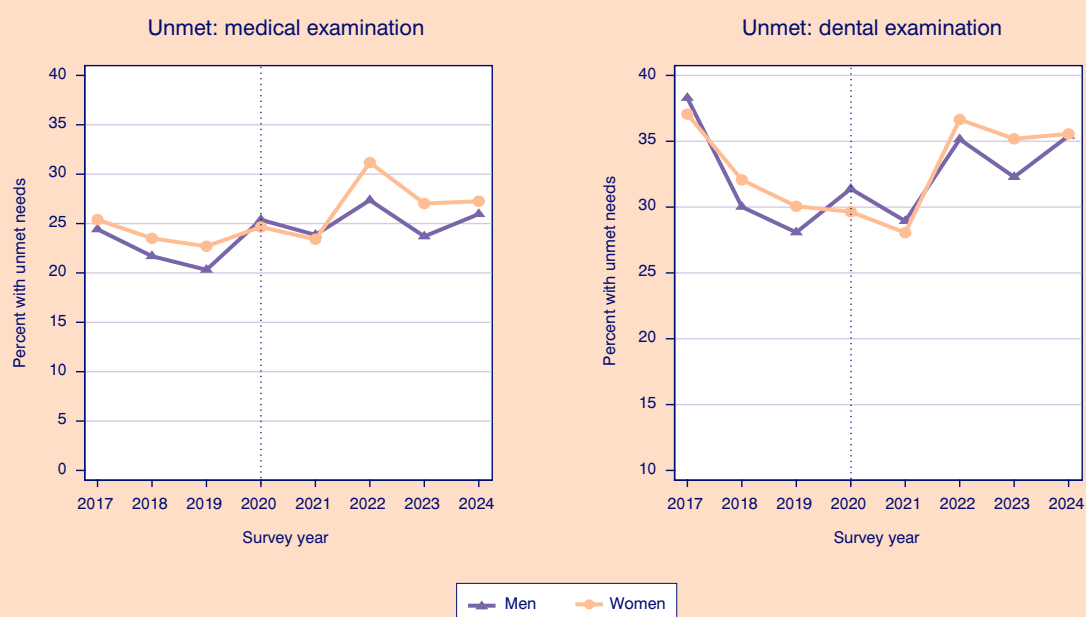
Evolution of chronic illness and limitation in activities over time and by gender



Source: Income and Living Conditions Survey (SILC), ELSTAT, edit: Author, Data: weighted.

FIGURE 3.3.3

Evolution of unmet medical needs & unmet dental needs over time and by gender



Source: Income and Living Conditions Survey (SILC), ELSTAT, edit: Author, Data: weighted.

ent with prior findings that women are more likely to report chronic health problems and that gender gaps in morbidity widened during the pandemic (Connor et al., 2020; Bambra et al., 2021). The rise is gradual rather than immediate, suggesting that it reflects cumulative deterioration in untreated conditions rather than acute COVID-related illness alone. Limitations in daily activities show a modest increase around 2020–22, but levels decline again by 2024, returning close to pre-pandemic baselines. This may suggest that some functional problems were temporary, caused by short-term illness, mobility restrictions, or interrupted rehabilitation, rather than long-term disability.

3.3.3.3. Healthcare access: Unmet needs as pandemic scars

Access to healthcare shows significant shifts (Figure 3.3.3 above). Unmet medical needs spiked in 2022, and remained elevated through 2024. Unmet dental needs increased even more sharply, reaching a prevalence of approximately 35% in 2022 and remaining high thereafter. Women consistently report higher levels of unmet needs than men across both indicators. These patterns reflect both the direct disruption of healthcare services during the pandemic and more enduring structural constraints. The persistence of high levels in

2022–24 indicates incomplete catch-up in preventive and routine care. This is particularly salient for dental care, where delays are less easily compensated for and where telehealth substitutes are unavailable. Evidence from U.S. Medicaid claims shows that only a fraction of missed dental visits during the early pandemic were ever rescheduled (Danagouliau & Wilk, 2022). The Greek case fits this pattern: shocks to preventive and diagnostic care during COVID-19 produced long-term scarring, especially in dental health.

3.3.3.4. Life satisfaction as a measure of well-being

Figure 3.3.4 (2018–2024) shows mean life satisfaction rising above the 2018 benchmark during 2021–23, with a modest decline by 2024. The decline is larger for women, though mean scores for both sexes remain above 2018 levels. The gendered pattern is consistent with pandemic literature from Germany that highlights greater well-being reductions among women, attributed to caregiving roles and societal concerns (Zoch et al., 2021). By that logic, the 2024 dip, which is larger among women, could reflect the accumulation of stressors (e.g., caregiving burdens, persistent unmet needs). Taken cautiously, the evidence points to the importance of mental-health and social supports for

FIGURE 3.3.4
Evolution of overall life satisfaction over time and by gender



Source: Income and Living Conditions Survey, ELSTAT, edit: Author, Data: weighted; 2018 values from earlier waves (shown as reference only).

sustaining wellbeing gains, especially for women, but further analysis is needed.

3.3.4. Conclusion

From a health-capital perspective (Grossman, 1972), COVID-19 shifted the balance between health loss and investment: limited resources and disrupted services reduced preventive care and mental-health support, while some healthier behaviors emerged (e.g., less risky behaviors). The baseline data presented here highlight the substantial impact of the pandemic on multiple health outcomes, healthcare access, and well-being in Greece: chronic morbidity remained stable or increased, mental health deteriorated sharply, and access to medical and dental care worsened. These baseline statistics demonstrate the magnitude of these effects, but further and more detailed analyses are needed to explore the heterogeneous impacts and the specific channels through which they operate.

Overall, health and well-being did not simply rebound once restrictions were lifted. Self-assessed health improved only modestly, chronic conditions and functional limitations evolved gradually, while mental health worsened considerably. Unmet medical and dental needs surged in 2022 and remained high through 2024, revealing persistent deficiencies in access to care. Across all dimensions, women experienced worse outcomes, including higher chronic morbidity, greater unmet needs, and sharper declines in life satisfaction—reflecting both structural inequalities in healthcare access and the unequal distribution of caregiving and household responsibilities during the crisis.

These patterns suggest that crises alter health trajectories rather than producing short-lived shocks. Economic recovery alone is insufficient. These findings underscore the need for targeted investments in mental

health, preventive and primary care, and gender-sensitive health policies. Policies that rebuild resilience, sustain well-being, and prevent temporary crises from deepening inequalities.

References

- Au, N., & Johnston, D. W. (2014). Self-assessed health: What does it mean and what does it hide? *Social Science & Medicine*, 121, 21–28.
- Bambra, C., Albani, V., & Franklin, P. (2021). COVID-19 and the gender health paradox. *Scandinavian Journal of Public Health*, 49(1), 17–26.
- Bradford, W. D., & Lastrapes, W. D. (2014). A prescription for unemployment? Recessions and the demand for mental health drugs. *Health Economics*, 23(11).
- Connor, J., Madhavan, S., Mokashi, M., Amanuel, H., Johnson, N. R., Pace, L. E., Bartz, D., & Sander, L. P. (2020). Health risks and outcomes that disproportionately affect women during the COVID-19 pandemic: A review. *Social Science & Medicine*, 266, 113364.
- Danagoulou, S., & Wilk, A. S. (2022). Long-term effects of the COVID-19 pandemic on dental care utilization in the United States. *Health Economics*, 31(S2), 86–104.
- Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy*, 80(2), 223–255.
- Raftopoulou, A. (2025). The impact of the COVID-19 pandemic on self-perceived health in Greece. *Greek Economic Outlook*, 52.
- Ruhm, C. J. (2012). Understanding the relationship between macroeconomic conditions and health. In M. Grossman & N. H. Mocan (Eds.), *Economics of health and longevity* (pp. 5–32). University of Chicago Press.
- Ruhm, C. J. (2016). Health effects of economic crises. *Health Economics*, 25(S2), 6–24.
- Zoch, G., Bächmann, A.-C., & Vicari, B. (2021). Who cares when care closes? Care-arrangements and parental working conditions during the COVID-19 pandemic in Germany. *European Societies*, 23(S1), S576–S588.

4. Reforms-Economic development

KEPE, *Greek Economic Outlook*, issue 58, 2025, pp. 55-59

4.1. Military expenditure in the EU27

Georgios Bertsatos,
Christos Chrysanthakopoulos

4.1.1. Introduction

Si vis pacem, para bellum – “If you want peace, prepare for war”. This maxim appears to express, more than ever, the stance of the European Union and the North Atlantic Treaty Organization (NATO), given the rising geopolitical tensions worldwide.

On 6 March 2025, the European Council concluded that Europe must be better prepared, in terms of defense, to address future threats and challenges, emphasizing the mobilization of both public and private capital.¹ Almost three months later, on 27 May 2025, the European Council announced the SAFE financial instrument, amounting to up to €150 billion, through which the EU will provide low-interest loans to interested member states, upon request and on the basis of their national defense plans.² Greece is expected to receive nearly €787 million from the SAFE program.³

However, NATO’s core target of allocating 2% of GDP to military expenditure is not being met by most European NATO members. Following the NATO members’ meeting in The Hague on 25 June 2025, it was decid-

ed to raise the minimum threshold for defense spending to 5% of GDP by 2035, of which 3.5% is to be devoted exclusively to “core defense” and 1.5% to critical infrastructure, with member states required to submit annual progress reports.⁴ The adoption of this higher target may generate greater fiscal pressure since, after the revision of the Stability and Growth Pact in 2024,⁵ the new fiscal rules pose strict medium-term planning of net expenditure, leaving no room for deviation and triggering automatic cuts or other corrective mechanisms in the event of overruns.

4.1.2. Military spending as a % of GDP

According to the Stockholm International Peace Research Institute (SIPRI), military expenditure includes all types of spending on the armed forces and military activities.⁶ Figure 4.1.1 presents military expenditure as a percentage of GDP for the 27 EU member states (EU27), along with their average (EU27), over the past two decades (2005-2024), based on the available data.

Greece has consistently recorded the highest average (2.85%), followed by Poland (2.13%) and Estonia (1.99%). At the opposite end of the spectrum are Ireland (0.40%), Luxembourg (0.50%), Malta (0.54%), Austria (0.81%), and Belgium (1.05%). It is worth noting that Ireland, Malta, Austria, and Cyprus (1.72%) are the four EU27 member states that are not part of NATO.⁷ The European average (EU27) stands at

1. <https://www.consilium.europa.eu/en/press/press-releases/2025/03/06/remarks-by-president-antonio-costa-at-the-press-conference-following-the-special-european-council-meeting-of-6-march-2025/>

2. <https://www.consilium.europa.eu/en/press/press-releases/2025/05/27/safe-council-adopts-150-billion-boost-for-joint-procurement-on-european-security-and-defence>

3. https://defence-industry-space.ec.europa.eu/eu-defence-industry/safe-security-action-europe_en#:~:text=Expression%20of%20interest%20to%20access%20loans%20through%20SAFE%3A

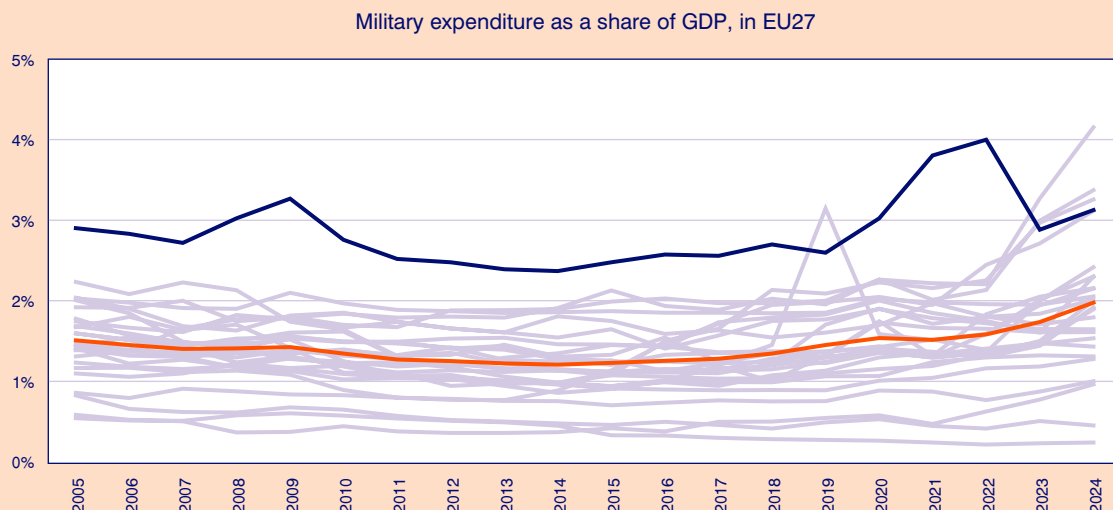
4. https://www.nato.int/cps/en/natohq/news_236516.htm & https://www.nato.int/cps/en/natohq/topics_49198.htm

5. European Commission, 2024, Commission welcomes political agreement on a new economic governance framework fit for the future.

6. Further details on the definition of military expenditure, as provided by SIPRI, can be found on the Institute’s website <https://www.sipri.org/databases/milex/frequently-asked-questions>. It should also be noted that SIPRI’s data on military spending may differ from the corresponding figures reported by NATO <https://www.sipri.org/commentary/essay/2025/natos-new-spending-target-challenges-and-risks-associated-political-signal>.

7. https://www.nato.int/cps/en/natohq/topics_52044.htm

FIGURE 4.1.1
Military spending as a % of GDP in the EU27



Source: Stockholm International Peace Research Institute (SIPRI) – Authors' calculations. The blue line represents Greece, the gray lines represent the other EU27 countries, and the orange line represents the EU27 average.

1.42%, with the lowest value recorded in 2014 (1.21%) and the highest in 2024 (1.98%). It is notable that the corresponding US average is 3.87%, while in 2024, US military expenditure amounted to 3.42%. In 2024, military spending in Greece rose to 3.13%, from 2.88% in 2023.

The only years in which Greece lost its leading position in military expenditure as a percentage of GDP within the sample under review were 2019, 2023, and 2024. More specifically, Bulgaria recorded 3.14% in 2019, ranking first. Poland recorded the highest levels in 2023 (3.27%) and 2024 (4.15%), followed by Estonia (2023: 3.00% and 2024: 3.37%) in second place and Latvia in third place (2023: 2.97% and 2024: 3.26%).

The highest military spending as a % of GDP for Greece during the period under review was recorded in 2022 (4.00%), 2021 (3.80%), and 2009 (3.27%). In contrast, the lowest values occurred between 2012 and 2015, falling below 2.5%, with a four-year average of 2.43% and a minimum of 2.37% in 2014. In terms of current prices, Greece spent \$8.022 billion in 2024, representing a 14.4% increase compared with 2023 but remaining considerably below (nearly -24.6%) the historical peak – from 1949, the earliest year for which data are available – of \$10.641 billion in 2009.

4.1.3. On the path to the 5% of GDP target

According to SIPRI, NATO members spent, on average, 2.2% of GDP in 2024, which is equal to approximately \$1.5 trillion.⁸ As noted earlier, NATO members have committed to raising the threshold for military spending from 2% to 5% of GDP, with full implementation scheduled for 2035. Based on the latest available SIPRI data for 2024, Table 4.1.1 presents each EU27 member state's deviation from the widely discussed 5% target.

It is observed that only Poland falls less than 1% short of achieving the new target. Following this, there are four countries that lag by nearly 1.8% from the updated target, among which is Greece (1.87%). Luxembourg is the only European NATO country with a deviation exceeding 4%, followed by Belgium and Slovenia at 3.72% and 3.69%, respectively. Finally, the four European countries that are not NATO members, and therefore are not bound by the revised 5% target, are Cyprus (with a potential deviation of 3.35% from the 5% target), Austria (4.00%), Malta (4.55%), and Ireland (4.76%).

8. <https://www.sipri.org/commentary/essay/2025/natos-new-spending-target-challenges-and-risks-associated-political-signal>

TABLE 4.1.1 Deviation from the 5% of GDP target for the EU27 in 2024

Deviation from 5% target	Countries	Deviation from 5% target	Countries
0.85%	Poland	3.08%	Netherlands
1.63%	Estonia	3.11%	Germany
1.74%	Latvia	3.21%	Croatia
1.87%	Greece	3.35%	Cyprus*
1.88%	Lithuania	3.39%	Italy
2.58%	Denmark	3.47%	Portugal
2.70%	Finland	3.57%	Spain
2.70%	Romania	3.69%	Slovenia
2.84%	Hungary	3.72%	Belgium
2.85%	Bulgaria	4.00%	Austria*
2.95%	France	4.04%	Luxembourg
2.99%	Slovakia	4.55%	Malta*
3.00%	Sweden	4.76%	Ireland*
3.08%	Czechia		

Source: Stockholm International Peace Research Institute (SIPRI) – Authors' calculations. Countries marked with * are not European NATO members (Cyprus, Austria, Malta, Ireland).

4.1.4. Military spending as a % of total spending

Figure 4.1.2 reports military expenditure as a share of total general government spending over the past two decades (2005-2024). At first glance, the pattern resembles that shown in Figure 4.1.1, which illustrates defense spending as a percentage of GDP.

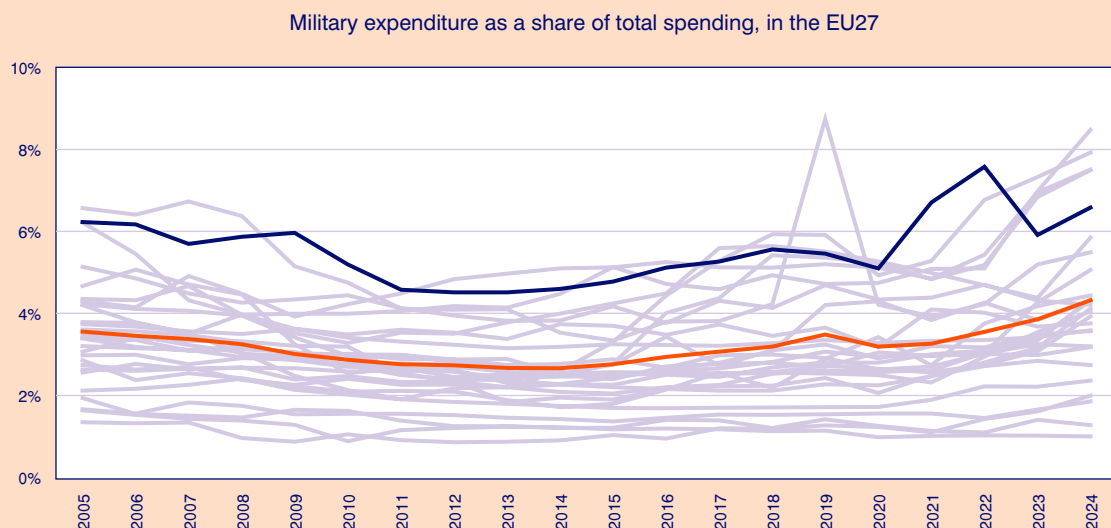
In 2024, Greece recorded military expenditure equal to 6.58% of total government spending, behind Latvia (7.49%), Estonia (7.51%), Lithuania (7.92%), and Poland (8.47%). In contrast, Ireland (1.00%), Malta (1.28%), Luxembourg (1.99%), Austria (1.85%), and Belgium (2.36%) had the lowest shares. Cyprus, which, together with Ireland, Malta, and Austria, are the EU27 member states outside NATO, recorded 4.21% in 2024. Moreover, the European average was 4.32% in 2024 and 3.20% over the 2005-2024 period. Finally, Greece's average over 2005-2024 stands at 5.57%, which is the highest among the 27 EU countries, followed by Estonia at 5.05%. It is noteworthy that the

corresponding average for the USA is 10.46%, and in 2024, the US spending stood at 9.11%.

4.1.5. Military personnel as a % of total population

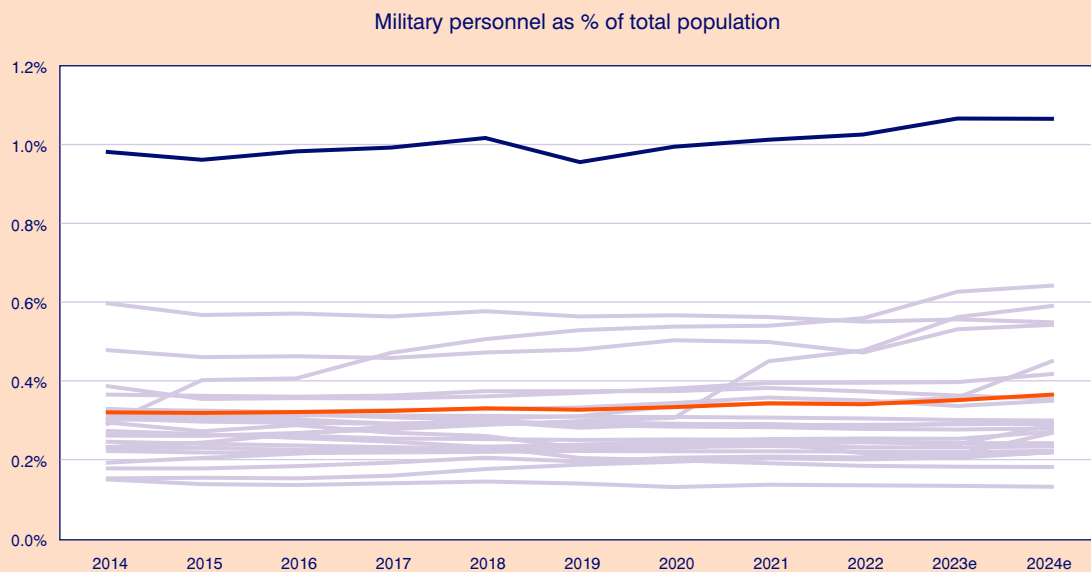
Figure 4.1.3 presents the evolution of military personnel as a percentage of total population for the 23 European countries that are NATO members. Even though, in absolute numbers, Greece ranks 6th in 2024 in terms of military personnel (approximately 111,000) –behind Poland (approximately 216,000), France (approximately 205,000), Germany (approximately 186,000), Italy (approximately 171,000), and Spain (approximately 117,000)– it consistently maintains the highest proportion relative to population (around 1% compared with the NATO European average of 0.33%) during the period 2014-2024. Furthermore, Greece stood at 1.07% compared to 0.38% for the US in 2024. Such a pattern highlights the consistently prominent role of military

FIGURE 4.1.2
Military spending, as a % of total spending in the EU27



Source: Stockholm International Peace Research Institute (SIPRI) – Authors' calculations. The blue line represents Greece, the gray lines represent the other EU27 countries, and the orange line represents the EU27 average.

FIGURE 4.1.3
Military personnel as a % of total population



Source: North Atlantic Treaty Organization (NATO), Eurostat – Authors' calculations. The blue line represents Greece, the gray lines represent the other 22 European NATO members countries, and the orange line represents the average of the 23 European NATO countries. Figures for 2023 and 2024 are estimates.

staffing in Greece, in contrast to the majority of allies, where percentages remain significantly lower. This systematic investment in the human resources of the Greek Armed Forces is linked not only to operational readiness but also to the country's geostrategic position, as Greece lies at the southeastern edge of the European Union and repeatedly faces challenges on its eastern borders.

4.1.6. Conclusions

Overall, Greece has consistently recorded the highest military expenditure among European NATO member states, primarily due to its geostrategic position and the specific challenges it faces. In this context, the new target to increase military spending to 5% of GDP is

expected to place a significant burden on the public finances of EU27 countries participating in the North Atlantic Alliance. However, Greece appears to be in a relatively favorable position compared with other member states, as its already elevated long-term military expenditure brings it closer to achieving the new target. At the same time, the approval of the military spending escape clause on 8 July 2025 is expected to create additional fiscal space for the 2025-2028 period.⁹ This development is expected to ease pressures on the national budget and strengthen fiscal stability, in line with the revised European fiscal framework resulting from the recent reform of the Stability and Growth Pact within the EU27. Despite the expected increase in military spending, Greece appears to have the necessary flexibility to adequately meet the new obligations arising from its NATO membership.

9. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52025DC0605> & <https://www.consilium.europa.eu/en/press/press-releases/2025/07/08/council-activates-flexibility-in-eu-fiscal-rules-for-15-member-states-to-increase-defence-spending/>

4.2. Digital reforms and tax evasion in Greece

Artemis Stratopoulou

4.2.1. Introduction

In recent years, tax revenue in Greece has contributed considerably to an overperformance of the general government public finances, remarking a positive outlook for Greece's fiscal sustainability. More precisely, according to the latest data published by the Hellenic Statistical Authority (ELSTAT), the Greek primary balance recorded a surplus of 4.8% of GDP in 2024, surpassing past estimations (e.g., 2.9% by the European Commission Economic Forecast, Autumn 2024 and 2.4% forecast in the Greek draft budgetary plan 2025). Government revenue stood at 49.3% of GDP in 2024 compared to 48.2% in 2023, while government expenditure was 1.5% lower in 2024 (48.0%) compared to 2023 (49.5%). Furthermore, the Greek public debt recorded the greatest fall among EU countries, standing at 153.6% of GDP in 2024 and recording a 10.3% percentage point decrease compared to the previous year.

Total tax revenue in 2024 represented 49.3% of GDP, 1.1 % higher compared to 2023. In nominal terms, total tax revenue stood at €117.2 billion, compared to €108.5 billion in 2023. Tax revenue from direct and indirect taxation in 2023 stood at €61.7 billion, representing 27.4% of GDP. In 2024, tax revenue reached €66.4 billion, 4.7 billion higher than the 2023 figure, representing 28% of GDP. This tax revenue overperformance is mainly attributed to the effective crack-down on tax evasion and the increase of electronic transactions (Bank of Greece Monetary Policy Report, June 2025). Digital reforms like the development of various digital services and applications by the Independent Authority of Public Revenue (IAPR), together with the interconnection of cash registers with POS systems, have significantly improved the recording and monitoring of financial transactions. This is extremely

important, as the reliability of official economic data can be affected by the existence of the shadow economy and tax evasion, affecting other socio-economic indicators that rely on those data (Schneider and Asllani, 2022). Furthermore, the significant increase in electronic payments in recent years has also facilitated the detection and reduction of undeclared income, particularly in sectors where cash transactions were traditionally dominant. As a result, tax authorities are now better equipped to monitor and map income declarations with actual financial transactions, leading to improved tax compliance and a significant increase in tax revenue.

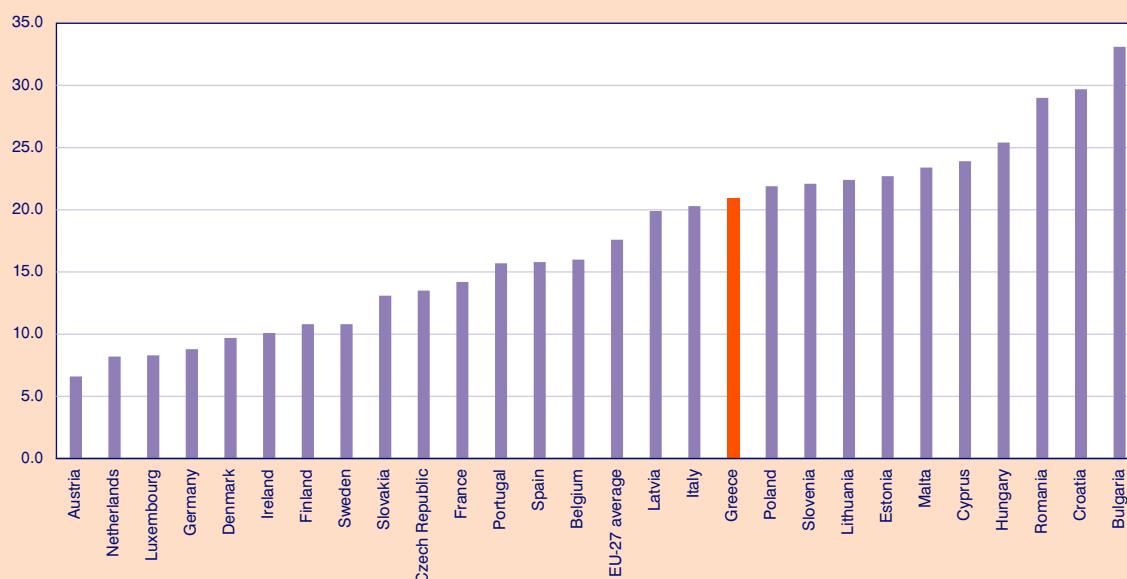
4.2.2. Tax evasion and the shadow economy

Tax evasion has long been a systemic issue in Greece, and its implications for fiscal consolidation are clear cut. However, there exist other economic consequences and social repercussions that are less evident (Vasardani, 2011). In general, tax evasion distorts the allocation and redistribution of resources both in the short and in the long run. More precisely, tax evasion can affect households' disposable income, influencing, over time, decisions about labor supply and demand, allocation decisions about consumption and saving, and also impacting prices, economic growth, etc. Furthermore, tax evasion undermines the distributive function of progressive taxation, putting a heavier burden on compliant taxpayers. In addition, it deprives governments of revenue that could support public spending.

Tax evasion is part of the shadow economy. However, the definition and measurement of the shadow economy remain a subject of debate. The shadow economy is also referred to as the "hidden" economy, "grey" economy, "black" or "lack" economy, "cash" or "informal" economy. According to Schneider and Asllani (2022), the shadow economy is defined as all economic activities that are hidden from official authorities for monetary, regulatory and institutional reasons.¹

According to data provided by Schneider and Asllani (2022), the level of informal economic activity in Greece remains at higher levels compared to other EU countries, and especially compared to Central and North-

1. Monetary reasons might involve evading tax obligations and social security payments; regulatory reasons could relate to bypassing government bureaucracy or avoiding the constraints of regulatory systems; and institutional reasons include corruption, weak rule of law, weak tax morale and ineffective political institutions.

FIGURE 4.2.1**Size of the shadow economy in EU countries (in % of official GDP), 2022**

Source: Schneider, F. and Asllani, A. (2022): "Taxation of the Informal Economy in the EU".

ern European countries. More precisely, in 2022, the level of informal economic activity in Greece stood at 20.9% of GDP, 3.3 percentage points higher than the EU-27 average (Figure 4.2.1).² Between 2003-2022, the average level of informal economic activity recorded in Greece was at 23.7 (% of GDP) compared to 12% and 12.3% in Ireland and Germany, respectively. Even when compared to countries with similar economic conditions, such as Portugal, Spain, and Italy, informal activity in Greece is still higher. The size of the shadow economy in Italy, Portugal, and Spain was respectively 21.5%, 18.5%, and 18.7% on average during 2003-2022. It should be noted, though, that the size of the shadow economy in Greece recorded a remarkable drop of 7.3% between 2003 and 2022.

The main drivers contributing to one of the highest degrees of informality among EU countries include the high level of self-employment, followed by indirect taxation, the rate of unemployment, tax morale, personal income tax, and regulatory burden, as measured by the Business Freedom Index (Table 4.2.1). As Table 4.2.1 indicates, in all countries presented, the most significant driver of the size of the shadow economy

is the level of self-employment. In Greece, the level of self-employment stands at 37.6%, compared to 31% in Italy, 31.1% in Portugal, and 23.8% in Spain. Dell'Anno et al. (2007) and Schneider and Buehn (2018) find that if the level of self-employment is high, then the participation rate in the shadow economy is high too. As data from the World Bank indicates, the average level of self-employment as a percentage of total employment between 2003-2023 was 34.6% in Greece, 24.3% in Italy, 20.6% in Portugal, and 17% in Spain, pointing to a considerably high share of self-employed individuals in Greece compared to peers.

Indirect taxes play a prominent role in shaping the size of the shadow economy. High indirect tax rates and regular cash payments in businesses could lead to large-scale evasion, especially in economies like Greece, where VAT tax rates were high and electronic transactions were limited until recently. Although unemployment has a significant contribution in the shadow economy for Greece (18%), the unemployment rate has considerably declined, by 17.6 percentage points, between 2013 (peak at 27.7%) and 2024 (10.1%).

2. See also Eurobank's research report for an indirect estimation of the size of the shadow economy in Greece.

TABLE 4.2.1 Average relative impact (in %) of the shadow economy determinants

Country	The average size of the shadow economy	Personal income tax	Indirect taxes	Tax morale	Unemployment	Self-employment	GDP growth	Business freedom
Greece	27.0	5.8	21.8	10.4	18.0	37.6	0.7	5.7
Italy	26.9	15.6	18.9	9.0	18.6	31.0	0.1	6.8
Portugal	21.2	8.1	29.9	8.7	14.6	31.1	0.4	7.2
Spain	21.8	10.6	17.9	10.4	29.2	23.8	0.6	7.5

Source: Schneider, F. and Asllani A. (2022): "Taxation of the Informal Economy in the EU".

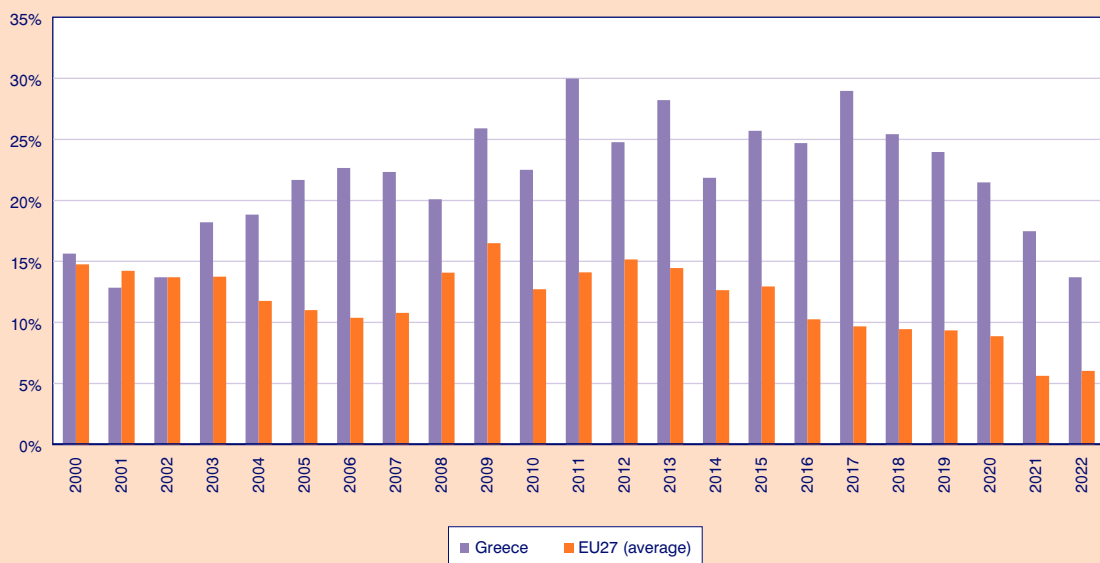
Note: Average relative impact (in %) of the shadow economy determinants in Greece, Italy, Portugal, and Spain, time period 1999-2017.

Tax morale also plays a catalytic role, participating with 10.4% in the size of the shadow economy. As related literature suggests (Devine, 2021; Torgler and Schneider, 2009; Aruoba, 2010), weak institutional quality, ineffective government institutions, complex and burdensome tax and regulatory systems, a lack of a strong legal system, and pervasive corruption are the main determinants of economic informality in most countries. Institutional quality in Greece has been historically considered weak and below the euro area (EA-19) average in particular core institutions, like the rule of law, regulatory quality, control of corruption, voice and accountability, and political stability (Bardaka and Rentifi, 2021). It is also worth mentioning that the “government effectiveness” indicator score has been systematically low for Greece (Philippopoulos, 2024). This indicator captures the quality of public and civil services and is closely related to the efficiency of

public administration, ranging from -2.5 (worst) to 2.5 (best). Greece had an average score of 0.43 between 2003-2023. However, according to the Chandler Good Government Index (CGGI) 2025, Greece has made important improvements and has emerged as the region’s top improver in Attractive Marketplace (2025 CGGI Report).³

It is also worth noting that the VAT compliance gap in Greece is higher than the EU-27 average between 2000-2022; however, it experiences a declining trend, meaning that VAT tax compliance has improved significantly, especially since 2018.⁴ The VAT gap indicator acts as a proxy for VAT revenues lost due to VAT fraud, evasion and avoidance; non-fraudulent bankruptcies and financial insolvencies; or miscalculations (European Commission, 2024). As Figure 4.2.2 indicates, the VAT gap was estimated at 13.71% of the VAT total tax liability (VTTL) in 2022, recording

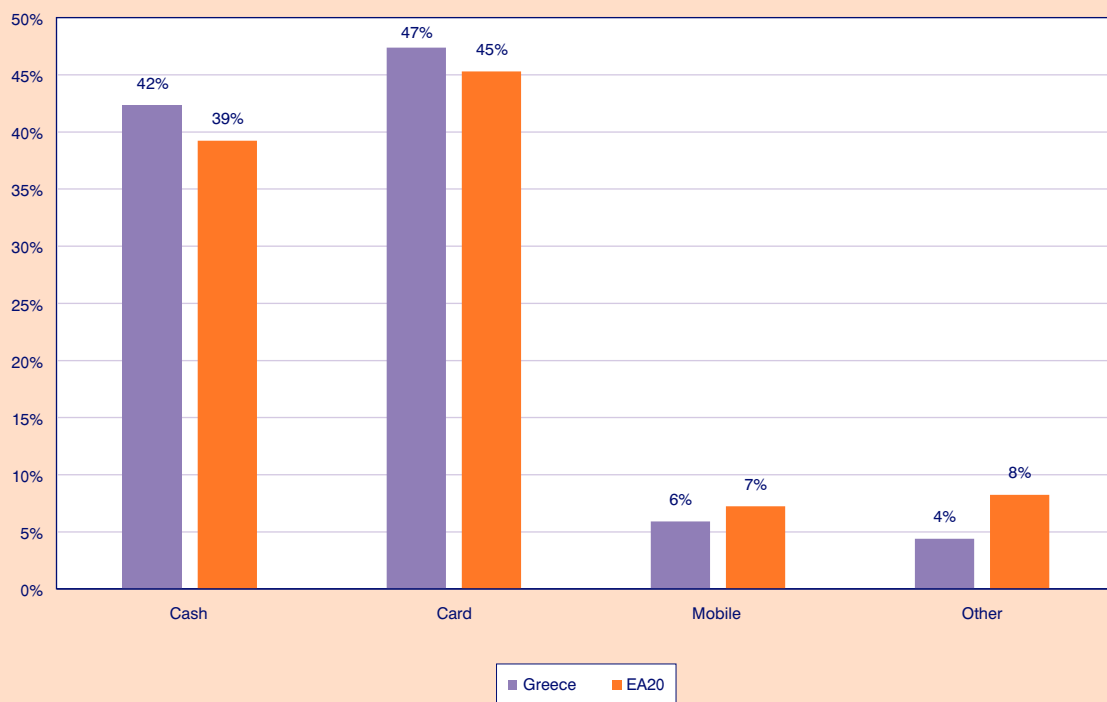
FIGURE 4.2.2
VAT compliance gap, 2000-2022



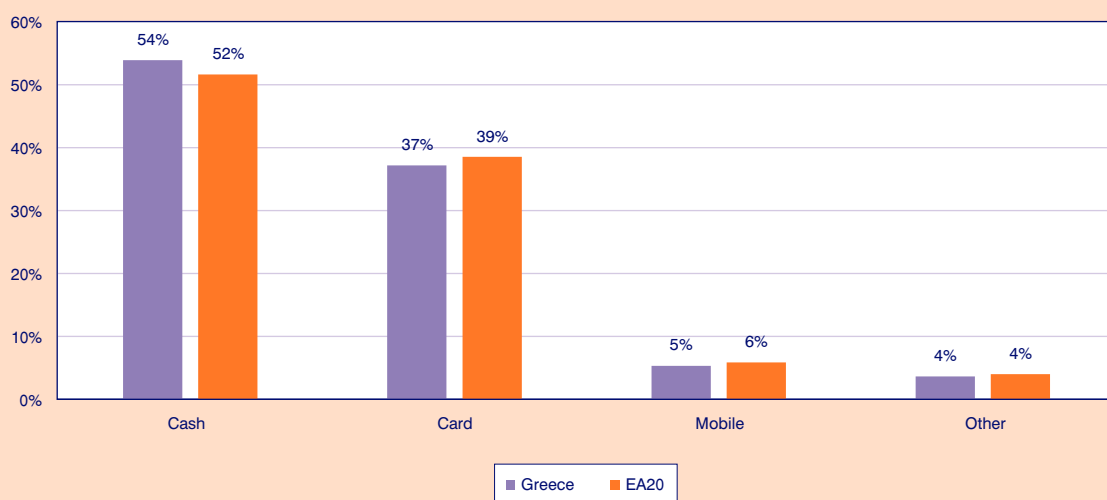
Source: EU VAT Gap Report 2024, European Commission.

3. The Chandler Good Government Index (CGGI) is a comprehensive, annual ranking of national governments based on capabilities and effectiveness. It covers about 120 countries (as of 2025), giving scores on 35 unique indicators across seven key categories: Leadership and Foresight, Robust Laws and Policies, Strong Institutions, Financial Stewardship, Attractive Marketplace, Global Influence and Reputation, and Helping People Rise.

4. The VAT compliance gap is the estimated difference between potential VAT revenue under full compliance and the actual amount collected by tax authorities (European Commission, 2024).

FIGURE 4.2.3**Share of payment instruments at Points of Sale (POS), value of transactions**

Source: ECB, 2024 Study on the payment attitudes of consumers in the euro area (SPACE).

FIGURE 4.2.4**Share of payment instruments at Points of Sale (POS), number of transactions**

Source: ECB, 2024 Study on the payment attitudes of consumers in the euro area (SPACE).

a remarkable reduction of 16.28 percentage points since 2011 (peak 30%).

In 2024, according to data published by the Hellenic Statistical Authority (ELSTAT), Greece recorded an overperformance of tax revenue, reflecting the benefits reaped by the crackdown on tax evasion, among other things. Recent reforms have helped considerably with tax compliance targets. However, for 2025, it is essential to continue and complete the 2024 interventions that led to the reduction of tax evasion. These interventions include the universal declaration of a company's income and expenses on the myData platform, the universal operation of the digital customer database, the start of the mandatory application of the digital dispatch note for transported products, new control systems for the automatic monitoring of the progress of each debtor's overdue debts, the more effective use of artificial intelligence with the aim of further reducing bureaucracy, the universal expansion of electronic invoicing, etc. (Bank of Greece, 2025).

4.2.3. The role of digital payments

The rise of digital payments and the extensive use of payment cards in Greece have played a key role not only in boosting indirect tax revenues but also in tack-

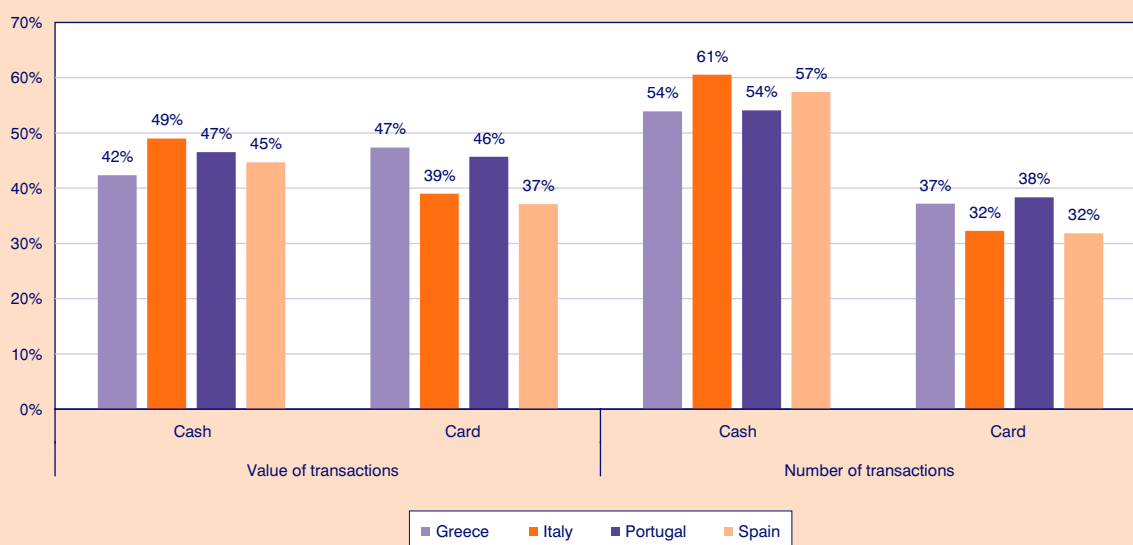
ling tax evasion. The penetration of digital payments, especially after the imposition of capital controls in 2015, has been found to have a positive impact on fiscal revenue. Hondroyiannis and Papaoikonomou (2017), using Greek data for the period 2003q4–2016q2, found that a one percentage point increase in the share of card payments in private consumption results in approximately 1% higher tax revenue through increased compliance.

The use of payment cards in Greece has followed an upward trend in recent years, especially after the imposition of capital controls in 2015. Law 4446/2016 further accelerated card usage, and this rise in digital payments has been found to have a significant positive impact on tax compliance (Danchev et al., 2020).

However, cash remains the dominant payment method in Greece, accounting for 42% of transaction values and 54% of the number of transactions, compared to the euro area (EA20) averages of 39% and 52%, respectively (ECB, 2024) (Figure 4.2.3 and 4.2.4). It is also interesting that although more than 50% of respondents across all demographic and socioeconomic categories (age, gender, and education level) declared a preference for card or other cashless payment methods, cash remains the most widely used

FIGURE 4.2.5

Share of payment instruments at Points of Sale (POS) (cash vs card) in selected countries, 2024



Source: ECB, 2024 Study on the payment attitudes of consumers in the euro area (SPACE).

payment method in many transactions. For instance, for over 60% of respondents of the 2024 SPACE survey, having the option to pay with cash is extremely important.⁵

Comparing Greece with Italy, Portugal, and Spain (Figure 4.2.5 above), it is obvious that in general, in all countries, cash dominates card usage in both value and number of transactions. Only Greece appears to have a lower percentage in cash compared to card usage in values of transactions only.

Finally, according to the 2024 SPACE survey data, six countries reported higher use of cards than cash for both the value and number of transactions.⁶

4.2.4. Conclusion

Cultural and structural change is crucial for achieving long-term compliance with tax obligations. Greece should continue implementing structural reforms to tackle tax evasion. The expansion of electronic payments and card usage has played a catalytic role with regards to this subject. These developments have been supported by the improved economic conditions and the increased business confidence of recent years.

However, significant challenges remain and should be addressed. Enforcement gaps persist, particularly in rural areas and within the informal sector. Small business owners often show resistance or confusion, especially when new compliance requirements are developed. Technical and training barriers, such as limited digital literacy, pose further barriers. Moreover, sustained progress continues to depend on broader institutional trust and the overall efficiency of the public administration system.

To overcome these limitations, it is important that the Greek government enhances the quality of its institutions and public services while strengthening the rule of law and reducing corruption, in order to create growth opportunities for the formal economy. Education and awareness-raising programs could also help improve tax morale.

References

- Aruoba, S. B. (2010). Informal sector, government policy and institutions. In 2010 meeting papers (Vol. 324). Minneapolis, MN, USA: Society for Economic Dynamics.
- Bank of Greece (2025). Monetary Policy Report 2024-2025 (in Greek). Available at: <https://www.bankofgreece.gr/ekdoseis-ereyna/ekdoseis/ekthesh-nomismatikhs-politikhs>.
- Bank of Greece (2025). Governor's Report for 2024 (in Greek). Available at: <https://www.bankofgreece.gr/ekdoseis-ereyna/ekdoseis/anazhthsh-ekdosewn?bankOfGreecePublications=751bdcf2-6284-46b9-b70d-f589fb0aeb10&categories=bankOfGreecePublications>.
- Bardaka, I., & Rentifi, A. (2021). The importance of selected structural competitiveness indicators for exports: a comparative analysis between the euro area and Greece. *Economic Bulletin* No. 54. Bank of Greece. Available at: <https://www.bankofgreece.gr/Publications/oikodelt202112.pdf>.
- Chandler Good Government Index. 2025 Report. Available at: <https://chandlergovernmentindex.com/wp-content/uploads/2025/05/2025-Chandler-Good-Government-Index-Report.pdf>.
- Danchev, S., Gatopoulos, G., & Vettas, N. (2020). Penetration of digital payments in Greece after capital controls: Determinants and impact on VAT revenues. *CESifo Economic Studies*, 66(3): 198-220.
- Dell'Anno, R., Gómez-Antonio, M., & Pardo, A. (2007). The shadow economy in three Mediterranean countries: France, Spain and Greece. A MIMIC approach. *Empirical Economics*, 33(1), 51-84.
- Devine, H. (2021). How institutions shape the informal economy. *The global informal workforce: Priorities for inclusive growth*, 223-252.
- Eurobank Research (2023). Greece Focus Notes. Estimates of the size of the shadow economy in Greece and policy proposals. Available at: <https://www.eurobank.gr/-/media/eurobank/omilos/oikonomikes-analuseis/greece-macro-monitor/summary-shadow-economy-18-07-23-en.pdf>.
- European Central Bank (2024). Study on the payment attitudes of consumers in the euro area (SPACE) – 2024. Available at: https://www.ecb.europa.eu/stats/ecb_surveys/space/shared/pdf/ecb.space202419d46f0f17.en.pdf.
- European Commission (2024). EU VAT Gap Report. Available at: https://taxation-customs.ec.europa.eu/taxation/vat/fight-against-vat-fraud/vat-gap_en.
- European Commission (2024). Autumn 2024 Economic Forecast. Available at: https://economy-finance.ec.europa.eu/document/download/7173e7c9-3841-4660-8d6a-a80712932f81_en?file-name=ip296_en.pdf.

5. The study on the payment attitudes of consumers in the euro area (SPACE) was first conducted in 2019 and has since been carried out on a regular basis to continue research on payment trends. SPACE looks at the payment habits of consumers in euro area countries.

6. These countries are: Belgium (35% cash vs 53% card in value of transactions and 39% cash vs 53% card in number of transactions), Estonia (39% cash vs 46% card in value of transactions and 39% cash vs 49% card in number of transactions), France (34% cash vs 52% card in value of transactions and 43% cash vs 48% card in number of transactions), Luxembourg (29% cash vs 57% card in value of transactions and 37% cash vs 49% card in number of transactions), Netherlands (17% cash vs 63% card in value of transactions and 22% cash vs 56% card in number of transactions), and Finland (28% cash vs 55% card in value of transactions and 27% cash vs 57% card in number of transactions).

- Hellenic Republic, Ministry of Economy and Finance (2025). Introductory Report on the Government Budget 2025 (in Greek). Available at: https://minfin.gov.gr/kratikos-proypologismos-2025/#pll_switcher.
- Hellenic Republic, Ministry of Economy and Finance (2024). Greece Draft Budgetary Plan 2025. Available at: https://minfin.gov.gr/wp-content/uploads/2024/10/Greece_DBP_2025_final-1.pdf.
- Hellenic Statistical Authority (2025). The Greek Economy. Available at: https://www.statistics.gr/documents/20181/18508449/greek_economy_22-08-2025.pdf/c6cb8b62-42fc-ab54-fe65-8c7ef79c699f.
- Hondroyannis, G. & D. Papaoikonomou (2017). The Effect of Card Payments on VAT Revenue: New Evidence from Greece. *Economics Letters* 157, 17–20.
- Philippopoulos, A. (2024). *The Greek macroeconomy: A note on the current situation and future outlook*. Athens University of Economics and Business Working Paper No. 10-2024. Available at: https://www.dept.aueb.gr/sites/default/files/WP_10_2024_Philippopoulos_0.pdf.
- Schneider, F., & Asllani, A. (2022). Taxation of the Informal Economy in the EU. European Parliament, Subcommittee on tax matters (FISC).
- Schneider, F., & Buehn, A. (2018). Shadow economy: Estimation methods, problems, results and open questions. *Open Economics*, 1(1), 1-29.
- Torgler, B., & Schneider, F. (2009). The impact of tax morale and institutional quality on the shadow economy. *Journal of Economic Psychology*, 30(2), 228-245.
- Vasardani, M. (2011). Tax evasion in Greece: An overview. *Economic Bulletin* No. 35. Bank of Greece. Available at: <https://www.bankofgreece.gr/Publications/econbull201106.pdf>.

KEPE, *Greek Economic Outlook*, issue 58, 2025, pp. 68-85

Revisiting Greece's participation in Global Value Chains: New evidence at the sector level

Petros Dimas*,
Alexandra Kontolaimou**,
Aimilia Protopogerou***

Abstract

This article examines Greece's participation in Global Value Chains (GVCs), focusing on sector-level patterns. Drawing on recent advances in measuring GVC participation, we utilize data from the GRinGVCs database, a newly developed database of GVC participation indicators, for a sample of Greek sectors and sector groupings over the period 1995–2020. These indicators capture both the type of participation (forward and backward) and its mode, distinguishing between activities that involve a single cross-border transfer of value added (simple) and those that involve multiple cross-border transfers (complex). By comparing manufacturing and mining with extended services sector groups, we find that the former exhibit stronger and increasing GVC integration with a pronounced backward orientation, while the latter show more balanced forward and backward participation, alongside a clear upward trend in forward participation. Moreover, high-tech sectors display limited forward participation with strong backward linkages, reflecting specialization in

low value-added activities. Importantly, although participation in simple activities dominates both forward and backward participation across most examined sectors, integration in complex activities has increased more rapidly between 1995 and 2020. Finally, our results reveal sector-specific patterns, highlighting the need for disaggregated analysis to support targeted policies that enhance Greece's integration into global production networks.

Keywords: Global Value Chains (GVCs), forward and backward participation, simple and complex activities, Greece, sector-level analysis.

JEL Classification: F14, L16, O52, C67.

Acknowledgments: This research was conducted in the context of the “GRinGVCs–Leveraging Global Value Chains for Innovation and Competitiveness: The Case of Greece” research project funded by the Hellenic Foundation for Research & Innovation (HFRI/ΕΛΙΔΕΚ) (Project ID: 016667), which investigates Greece's participation in GVCs at different levels (country, sector, firm).

1. Introduction

The emergence of Global Value Chains (GVCs) as a dominant production paradigm has ushered in a new era of firm-to-firm relationships and the exchange of intermediate products, capital, and labor that transcend traditional national borders (Antràs, 2020). While some countries have successfully leveraged their participation in GVCs to achieve gains in productivity growth, technological upgrading, and enhanced competitiveness (World Bank, 2020), others remain unable to in-

* Postdoctoral Researcher, Laboratory of Industrial and Energy Economics, National Technical University of Athens. Email: petrdimas@chemeng.ntua.gr

** Senior Research Fellow, Centre of Planning and Economic Research (KEPE); Visiting Research Fellow, Laboratory of Industrial and Energy Economics, National Technical University of Athens. Email: alexandra.kontolaimou@kepe.gr

*** Assistant Professor, Laboratory of Industrial and Energy Economics, National Technical University of Athens Email: protoger@chemeng.ntua.gr

– Opinions or value judgments expressed in this article are the authors' own and do not necessarily reflect those of the Centre of Planning and Economic Research.

tegrate effectively and are left behind (Fernandes et al., 2022).

At the center of this contrasting landscape lies a fundamental question: *what are the patterns of GVC participation across countries and sectors?* This question is particularly relevant for Greece, i.e., a small, SME-dominated and service-oriented economy, with significant external dependence on imported goods, persistent trade deficits, and a production model that remains less knowledge- and technology-intensive, resulting in relatively low productivity and modest innovation performance (Barkas and Pisu, 2018; OECD, 2024). Given these structural characteristics, understanding and strengthening Greece's integration into global production networks is emerging as a high priority for the national industrial policy agenda (Tsakanikas and Dimas, 2024).

Greece's profile within GVCs attracted preliminary interest in the aftermath of the 2008 economic crisis. Several reports pointed to a deepening of the country's GVC integration during the period 2000–2014, often described as “the great era of GVCs” (World Bank, 2020). However, this integration was generally considered limited in scope and impact, falling short of unlocking the full benefits of global market participation, particularly in terms of productivity and growth (Tsekeris and Skintzi, 2017; Barkas and Pisu, 2018; ECB, 2019; Gibson et al., 2019). More recent studies have revisited the topic in the context of monitoring the country's economic and export performance (see, for example, Greek National Productivity Board, 2024; Stratopoulou, 2024), with a predominant focus on country-level comparisons with EU peers.

Against this backdrop, the present article investigates Greece's participation in GVCs by providing new evidence at the sector level. Drawing on the GRinGVCs database,¹ the study examines a comprehensive set of GVC participation indicators for 31 Greek sectors and sector groupings over the period 1995–2020. These indicators are derived using the factor decomposition framework proposed by Wang et al. (2022), applied to the latest edition of the OECD's Inter-Country Input-Output Tables (ICIOTs) (OECD, 2023). The selected metrics capture both the direction or *type* (*forward* and *backward*) and the *mode* of participation, distinguishing between *simple* GVC activities, involving a single cross-border transfer of value added (VA), and *complex* activities, which involve multiple cross-border

transfers. The latter are typically associated with longer value chains, multiple international partners, and more specialized products with higher knowledge and technology content (Sturgeon et al., 2008; Mudambi, 2008). In doing so, this study contributes to the existing body of GVC-oriented studies on Greece by offering novel sector-level insights into multiple, yet largely underexplored, dimensions of the country's integration into global production networks.

The remainder of the article is structured as follows. Section 2 outlines Greece's profile in international trade and GVC participation at the country level. Section 3 describes the methodological approach used to measure different types and modes of GVC participation. Section 4 presents a descriptive analysis of the sectoral patterns of the country's GVC participation. Finally, Section 5 concludes and provides key policy implications.

2. Greece's profile in international trade and GVCs

Greece has traditionally faced a persistent current account deficit, which has widened in recent years, primarily driven by a trade deficit in goods (Konstantakopoulou, 2024) that reflects structural limitations in the competitiveness and export capacity of the domestic economy (e.g., Barkas and Pisu, 2018; Konstantakopoulou et al., 2019). According to the most recent available data from the Bank of Greece, the country closed 2024 with a total of €48.6 billion (in current prices) in exports of goods, down approximately 2.8% from 2023 and 9.6% from 2022, which was a record-breaking year for the country's export activities. Despite this recent contraction, Greece's export performance in the last decade presents a strong and resilient upward trend, with a compound annual growth rate (CAGR) of approximately 7.0% over the period 2015–2024. This trajectory reflects a steady rebound from the prolonged effects of the severe economic crisis the country faced. It should be noted that this upward trend has been mainly driven by the exports of intermediate goods² (€33.3 billion in 2024).

On the import side, Greece concluded 2024 with goods imports of €84.3 billion, resulting in a substantial trade deficit of €35.67 billion. This deficit has proven persistent and has widened in recent years, following a surge in imports in 2022 to approximately €93.3 billion. As a result, the trade deficit in goods rose sharply to €39.7

1. The GRinGVCs database is available at <http://liee.chemeng.ntua.gr/en/project/gringvcs/>.

2. Goods exported for production purposes, excluding fuels and sales (exports) of ships.

billion in 2022, compared to an average of €20.7 billion over the 2012–2021 period, and has since remained at elevated levels. This solidified pattern signals the country's significant external dependence on imported goods, primarily intermediate inputs, which accounted for €60.1 billion of total imports in 2024 when fuels (€20.4 billion) are excluded. Notably, the trade deficit in intermediate goods alone reached €28 billion, recording a CAGR of 2.4% between 2022 and 2024.

Regarding trade in services, data from the Bank of Greece indicate that service exports (credits) reached approximately €51.5 billion in 2024, continuing a steady upward trend observed over the past decade, with a CAGR of around 5% during 2015–2024. On the import side, service debits rose to €28.8 billion in 2024, up from €27.7 billion in 2023, following a similar decade-long upward trend, with a corresponding CAGR of approximately 6.7%. These dynamics resulted in a €22.6 billion surplus in the trade balance of services for 2024, which concludes a decade of surplus growth with a CAGR of approximately 3.2%.

This contrasting pattern between the trade balances in goods and services highlights the pivotal role of services in the Greek economy. While Greece is predominantly a service-based economy, the substantial volume of service exports does not necessarily translate into high levels of GVC participation, as we will discuss in Section 4. This discrepancy arises from the conceptual and empirical distinction between traditional trade and GVC-oriented trade, with the latter focusing on intermediate goods and services and the VA embedded in exports, rather than on gross trade flows in final products (Antràs, 2020). As a result, assessing GVC participation requires tailored metrics and methodologies, typically derived from the application of decomposition frameworks in ICIOTs. Given these considerations, the current study moves beyond traditional trade statistics based on product-level export and import data and instead adopts an input-output approach at the sector level. Specifically, we retrieve data from the GRinGVCs database to provide a comprehensive analysis of Greece's participation in GVCs, with a particular emphasis on sector-specific patterns.

As a starting point, we present country-level data to position Greece within the broader European context, focusing on two key dimensions, i.e., *types* of GVC participation: (i) *forward participation*, referring to domestic VA (DVA) embodied in intermediate exports which

cross borders for production purposes, measured as a share of this DVA to the country's aggregate VA, and (ii) *backward participation*, referring to foreign VA (FVA) embodied in imported intermediates which are used to produce final products, measured as a share of this FVA to the country's aggregate final demand.³

Figure 1 presents the evolution of forward participation for Greece and the EU28⁴ over the 1995–2020 period. It is evident that Greece's forward participation mirrors the corresponding EU28 average in terms of time trend, but at a constantly lower level, ranging from 4% to 11% for Greece compared to 14% to 20% for the EU28. This reflects a persistent average gap of approximately 10 percentage points. Both Greece and the EU28 experience a slight increase in forward participation during the 1998–2000 period, which may be linked to then-imminent accession of China to the World Trade Organization in 2001, a milestone often identified as marking the official beginning of the great era of GVCs (World Bank, 2020). A brief decline followed in the 2001–2003 period, after which participation resumed its upward trajectory during the mid-2000s, only to be interrupted by the global financial crisis in 2009. In the post-crisis years, both Greece and the EU28 showed signs of recovery, with forward participation stabilizing around 2015 and remaining relatively steady thereafter.

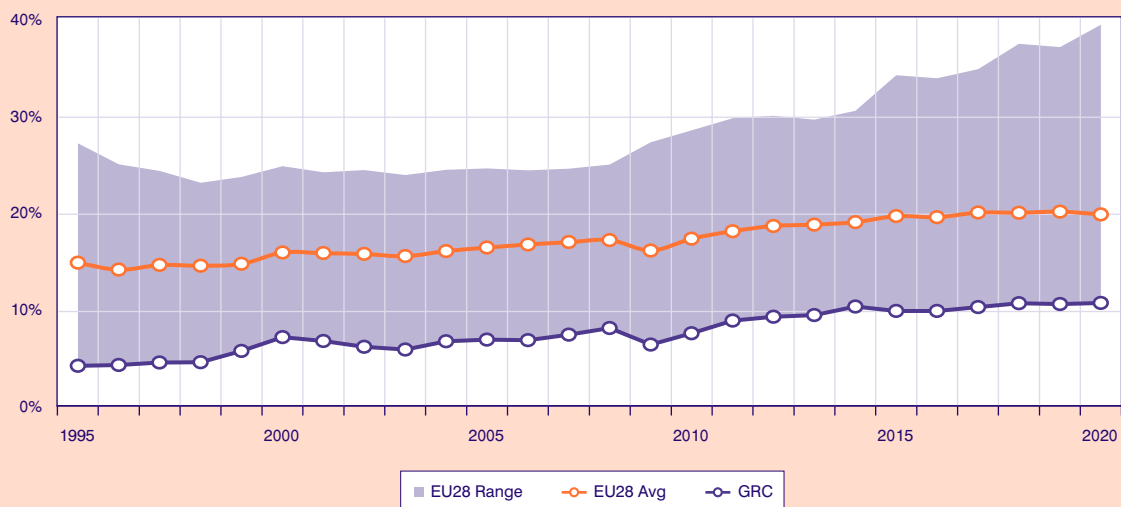
What is particularly noteworthy in Figure 1 is the pattern captured by the shaded area, which represents the range of forward participation shares across EU member states over the examined period. The upper bound corresponds to the EU economy with the highest share of forward participation, while the lower bound corresponds to the economy with the lowest. This range highlights the substantial heterogeneity in GVC integration across the EU, with top-performing countries placed well above the EU28 average. In contrast, Greece appears to rank systematically at the bottom throughout the entire period. This persistent lag in forward integration highlights the limited competitiveness of the Greek economy in global markets. As forward participation serves as a key export-oriented metric, Greece's performance raises important questions about the depth and quality of its export growth. Specifically, it challenges the optimistic narrative implied by aggregate export growth figures, revealing that the actual domestic content of Greek exports, i.e., the value Greece contributes to globally traded products, is significantly lower than that of most EU peers.

3. The two types of GVC participation are described in more detail in Section 3.

4. The EU group comprises the United Kingdom (hence, EU28) given that during the examined period, the UK was an official EU member.

FIGURE 1

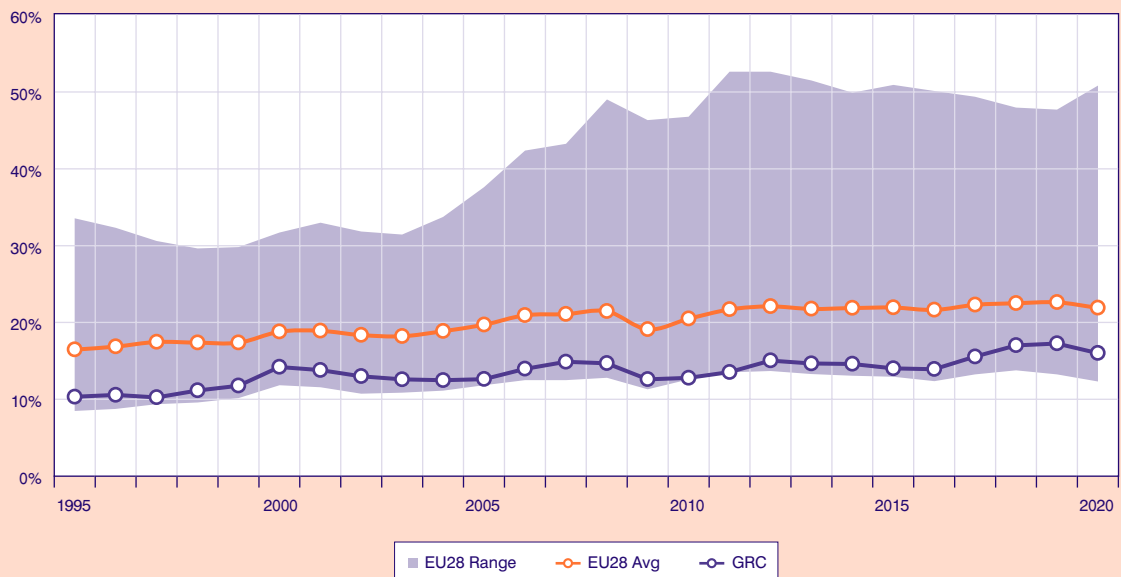
Greece's forward participation in GVCs compared to the EU28 average and the range of values of EU28 participation, 1995-2020



Source: Authors' elaboration on GRinGVCs database.

FIGURE 2

Greece's backward participation in GVCs, compared to the EU average and the range of values of EU28 participation, 1995-2020



Source: Authors' elaboration on GRinGVCs database.

Figure 2 above illustrates the evolution of backward participation for Greece and the EU28 during the 1995–2020 period, revealing some patterns that parallel those observed for forward participation. Once again, Greece’s backward participation follows the general trend of the EU average, although at consistently lower levels. However, the gap between the two is comparatively narrower, with backward participation ranging from 16% to 23% for the EU and from 10% to 17% for Greece, indicating an average difference of about 6 percentage points between Greece and the EU over the entire period under examination. In both cases, backward participation exceeds forward participation, highlighting a persistent backward orientation of the Greek and EU economies. This implies greater reliance on imported intermediate goods than on the export of domestically produced intermediates. Such a pattern has remained consistent throughout the examined period and aligns with earlier findings based on different data sources and shorter timeframes (ECB, 2019; Gibson et al., 2019; World Bank, 2020).

Regarding evolution over time, some divergences from the forward participation pattern presented in Figure 1 can be observed in Figure 2. Notably, Greece’s slowdown from the 2008 economic crisis lasted slightly longer, as the country did not bounce back until 2012, while the EU recovered as early as 2010. In addition, Greece experienced a modest growth in its backward participation in 2018, which closed the gap with the EU average, only to fall slightly sharper in 2020, likely due to the COVID-19 pandemic. Importantly, while Greece does not rank at the very bottom of EU member states in terms of backward participation — as the lower bound of the shaded area in Figure 2 lies below Greece’s values — it remains near the bottom throughout the entire period. This reinforces the conclusion that, despite its relatively more pronounced backward orientation, Greece’s overall GVC integration remains significantly lower than that of most other EU countries. The persistent integration lags outlined above have also been documented by Barkas and Pisu (2018) and are further corroborated by recent analyses from the Greek National Productivity Board (2024) and Stratopoulou (2024).

3. Measuring GVC participation

As stated above, the key contribution of this article refers to the utilization of GVC participation indicators

that move beyond the traditional differentiation between *forward* and *backward* participation to account for the complexity of GVC activities through the introduction of *simple* and *complex* participation modes. These indicators are derived from the application of the Wang et al. (2022) production-based decomposition framework on the latest ICIOTs available from the OECD and are retrieved by the GRinGVCs database.⁵

In detail, the application of the Wang et al. (2022) framework on ICIOTs enables us to identify and measure the following dimensions of GVC participation, expressed in terms of DVA and FVA embedded in intermediates:

1. DVA embedded in exports of intermediate goods and services that are used directly by the importing partner to produce final products that satisfy its domestic final demand.
2. DVA embedded in exports of intermediate goods and services that are used directly by the importing partner to produce new intermediate and final goods and services, which are further exported by the partner country to other countries.
3. FVA embedded in imports of intermediate goods and services used to produce exports (intermediate and final).
4. FVA embedded in imports of intermediate goods and services used to produce final products that satisfy domestic final demand.

Out of the four (4) dimensions outlined above, traditional measurement frameworks of GVC participation based on gross exports decomposition (e.g., Koopman et al., 2014; Los et al., 2016; Borin and Mancini, 2023) can only capture dimensions (2) and (3). In addition, even more recent approaches that account for bilateral GVC transactions (e.g., Borin et al., 2021) fail to capture the number of times that VA crosses borders during production.

Thus, based on Wang et al. (2022), we compute six different indicators of GVC participation that comprise different combinations of types and modes:

- **Forward simple GVC participation** = (DVA exported via intermediates and consumed within one production stage) / Total value added.
- **Forward complex GVC participation** = (DVA exported via intermediates and consumed in multiple succeeding production stages) / Total value added.

5. For a comprehensive and detailed technical analysis of the decomposition methodology and the matrix algebra underlying the indicators, see GRinGVCs Deliverable 2.1 (<http://lee.chemeng.ntua.gr/en/project/gringvcs/>).

- **Forward GVC participation** = Forward simple GVC participation + Forward complex GVC participation.
- **Backward simple GVC participation** = (FVA imported via intermediates from a single preceding stage and embodied in domestic final consumption) / Domestic final consumption.
- **Backward complex GVC participation** = (FVA imported via intermediates from multiple preceding stages) / Domestic final consumption.
- **Backward GVC participation** = Backward simple GVC participation + Backward complex GVC participation.

A notable difference between the above indicators and standard GVC participation measures is that they are not expressed as shares of gross exports. Following Wang et al. (2022), backward participation is mainly concerned with FVA embodied in domestic final products and is therefore computed as a share of domestic final consumption at both the sector and country level, while forward participation refers to DVA exported for production abroad and is expressed as a share of total value added at the sector and country level. The indicators, along with the specific dimensions of GVC participation they capture, are summarized in Figure 3.

Moreover, going beyond participation *type* (forward or backward), our analytical framework enables us to account for the *mode* of participation (simple or complex), which reflects the degree of complexity in the GVC activities based on the times that VA crosses national borders for production purposes. Evidently, the mode of participation is closely linked to the propagation length within GVCs, as complex activities reflect embodied VA in intermediates (either exported or imported) that pass through multiple production stages before reaching their final destination. As such, they are typically associated with greater complexity, as well as higher knowledge intensity and technological sophistication.

The above indicators are computed for 31 NACE Rev.2 sectors and sector groupings, in line with the OECD ICIOTs sectoral classification, and are organized into two relatively balanced sector groups to facilitate comparative analysis: (i) manufacturing and mining, comprising 14 sectors and sector groupings, and (ii) extended services, comprising 17 sectors and groupings, encompassing all business-economy service sectors along with selected additional sectors, thereby capturing the full scope of the country's business economy. The sectors covered in these two broad groups are listed in Table 1.

FIGURE 3

Breakdown of GVC participation components based on the Wang et al. (2022) framework

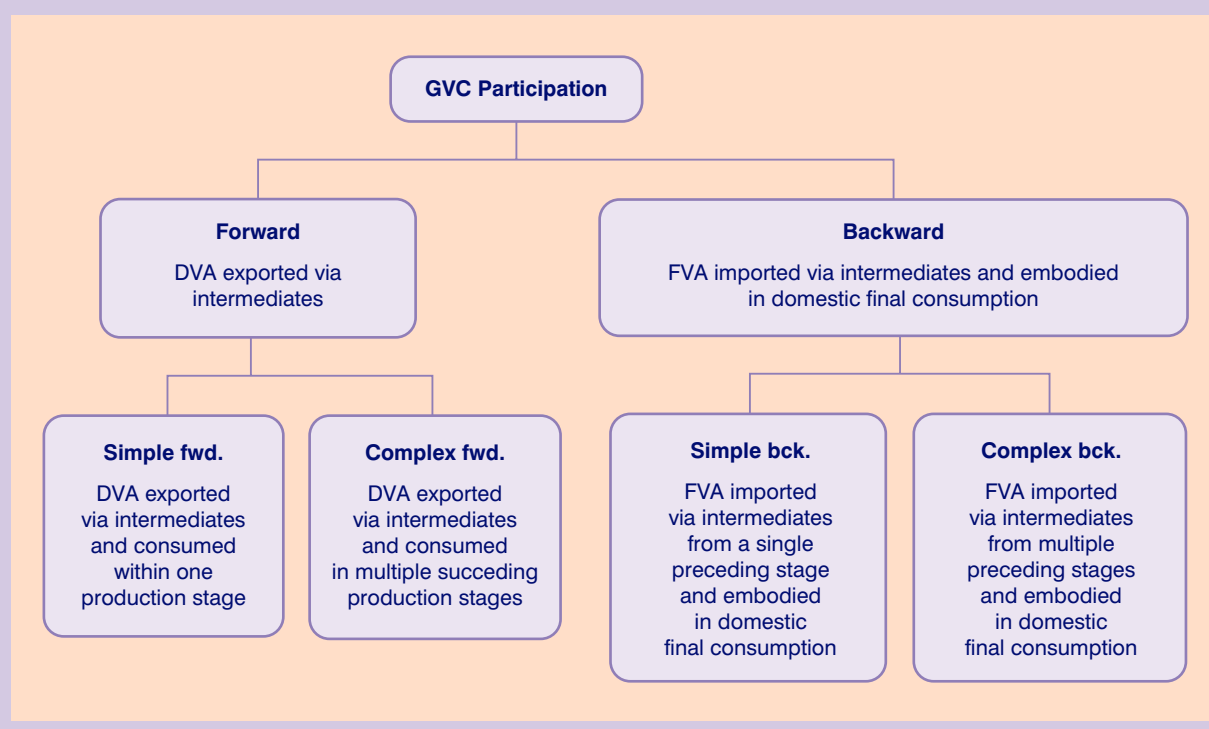


TABLE 1 Sector coverage (NACE Rev.2 correspondence)

Sector groups	Code (NACE Rev.2)	Description
Manufacturing and Mining	B	Mining and quarrying
	C10-C12	Manufacture of food products, beverages and tobacco products
	C13-C15	Manufacture of textiles, wearing apparel, leather and related products
	C16-C18	Manufacture of wood and products of wood and cork, manufacture of articles of straw and plaiting materials, manufacture of paper and paper products, printing and reproduction of recorded media
	C19	Manufacture of coke and refined petroleum products
	C20	Manufacture of chemicals and chemical products
	C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	C22-C23	Manufacture of rubber and plastic products, manufacture of other non-metallic mineral products
	C24-C25	Manufacture of basic metals and fabricated metal products
	C26	Manufacture of computer, electronic and optical products
	C27	Manufacture of electrical equipment
	C28	Manufacture of machinery and equipment n.e.c.
	C29-C30	Manufacture of motor vehicles, trailers and semi-trailers, and other transport equipment
	C31-C33	Manufacture of furniture, other manufacturing, repair and installation of machinery and equipment
Extended Services	D	Electricity, gas, steam and air conditioning supply
	E	Water supply; sewerage; waste management and remediation activities
	F	Construction
	G	Wholesale and retail trade
	H49	Land transport and transport via pipelines
	H50	Water transport
	H51	Air transport
	H52	Warehousing and support activities for transportation
	H53	Postal and courier activities
	I	Accommodation and food service activities
	J58-J60	Publishing activities, motion picture, video and television programme production, sound recording and music publishing activities, programming and broadcasting activities
	J61	Telecommunications
	J62-J63	Computer programming, consultancy and related activities
	K	Financial and insurance activities
	L	Real estate activities
	M	Professional, scientific and technical activities
	N	Administrative and support service activities

4. Sectoral patterns of Greece's GVC participation

4.1. Forward and backward participation

Figure 4 illustrates the evolution of forward GVC participation from 1995 to 2020 across the two broad sector groups examined, namely, manufacturing and mining, and extended services. Over the entire period, forward participation is consistently higher for manufacturing and mining (ranging from 10% to 20%) compared to extended services (ranging from 4% to 13%). Both sector groups broadly follow the national pattern, showing a sharp increase in 1999–2000, followed by a slowdown between 2001 and 2003, which was more evident in manufacturing and mining. This sector group also appears to have been more severely affected by the global financial crisis, with forward participation continuing to decline in 2009 and 2010. In contrast, extended services experienced a quicker recovery, with participation beginning to rebound as early as 2010. From that point onward, forward GVC participation in manufacturing and mining has exhibited a steadily increasing trend, outpacing that of extended services.

Several more pronounced differences emerge when comparing the two sector groups in terms of backward GVC participation (Figure 5), relative to their forward participation pattern (Figure 4). First, manufacturing and mining exhibit significantly higher backward participation (ranging from 17% to 40%) than extended services (9% to 15%). This is expected, given the inherently input-intensive nature of their activities and their greater reliance on imported intermediate goods due to higher resource and material requirements. Second, the backward participation of manufacturing and mining is notably more volatile than that of extended services, showing sharper fluctuations over the examined period. Indicatively, the group's recovery from the economic crisis in the 2011–2013 period was significantly sharper than that of extended services; the same applies for the corresponding trend from 2016 to 2018. These upward trends are likely attributable to two factors: (i) a sharp increase in the use of imported intermediates as a substitution mechanism for constrained domestic supply due to financial pressures, and/or (ii) a steep decline in both domestic and foreign final demand driven by volatile market conditions.

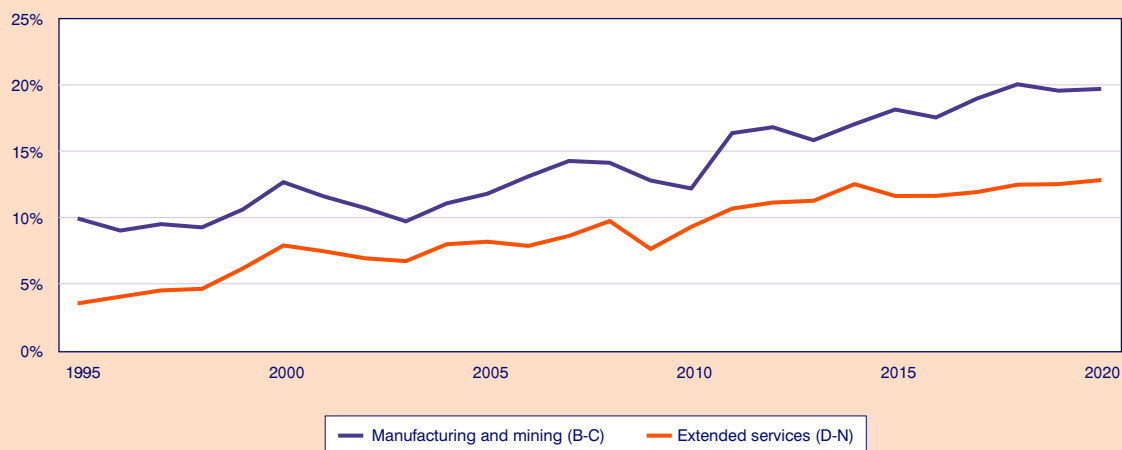
In summary, Figures 4 and 5 reveal a clear divergence in GVC integration patterns between the two sectoral groups. The manufacturing and mining sectors are significantly more integrated into GVCs, exhibiting a clear backward orientation alongside a common deepening trend in both forward and backward participation. In contrast, extended services display more limited but stable patterns of GVC integration over time, with a notable upward trend in forward participation. It is also worth noting that, for the extended services group, forward and backward participation shares are approximately at the same level, with forward participation being slightly lower but gradually closing the gap.

At a more disaggregated level, Figure 6 illustrates forward GVC participation across individual NACE Rev. 2 sectors and groupings within the manufacturing and mining sector category (as defined in Table 1), focusing on three reference years: 1995, 2008, and 2020. In 2020, the most forward-intensive sectors include mining and quarrying (B), basic metals and fabricated metal products (C24–C25), and coke and refined petroleum products (C19), followed by chemicals (C20) and rubber, plastics, and non-metallic mineral products (C22–C23). This ranking aligns with expectations, given the nature of intermediates supplied by these sectors (predominantly production inputs, raw materials, and resources), which places them in upstream stages of GVCs. Conversely, the least forward-intensive sectors are motor vehicles, trailers and other transport equipment (C29–C30), food, beverages and tobacco (C10–C12), textiles and wearing apparel (C13–C15), pharmaceuticals (C21) and computers and electronics (C26). The latter two sectors, despite being classified as high-tech⁶ and thus theoretically holding significant potential for the country's specialization and competitiveness within GVCs (Mudambi, 2008; Bontadini, 2022), consistently exhibit low forward participation shares across all three examined years. This pattern suggests a more downstream positioning within their respective GVCs, i.e., at stages generally associated with lower VA capture according to the “smile curve paradigm” (Mudambi, 2008; OECD, 2013; Dedrick et al., 2010). Sector rankings and the overall pattern outlined above remain largely consistent across the three reference years, though at lower levels. Nonetheless, forward participation has generally followed an upward trend, with most sectors demonstrating increasing integration from 1995 to 2008, and further into 2020.

6. Pharmaceuticals (C21), and computers, electronics and optical products (C26) are classified as high-tech sectors, based on the share of research and development (R&D) expenditures relative to sectoral VA, following classifications provided by Eurostat and the OECD.

FIGURE 4

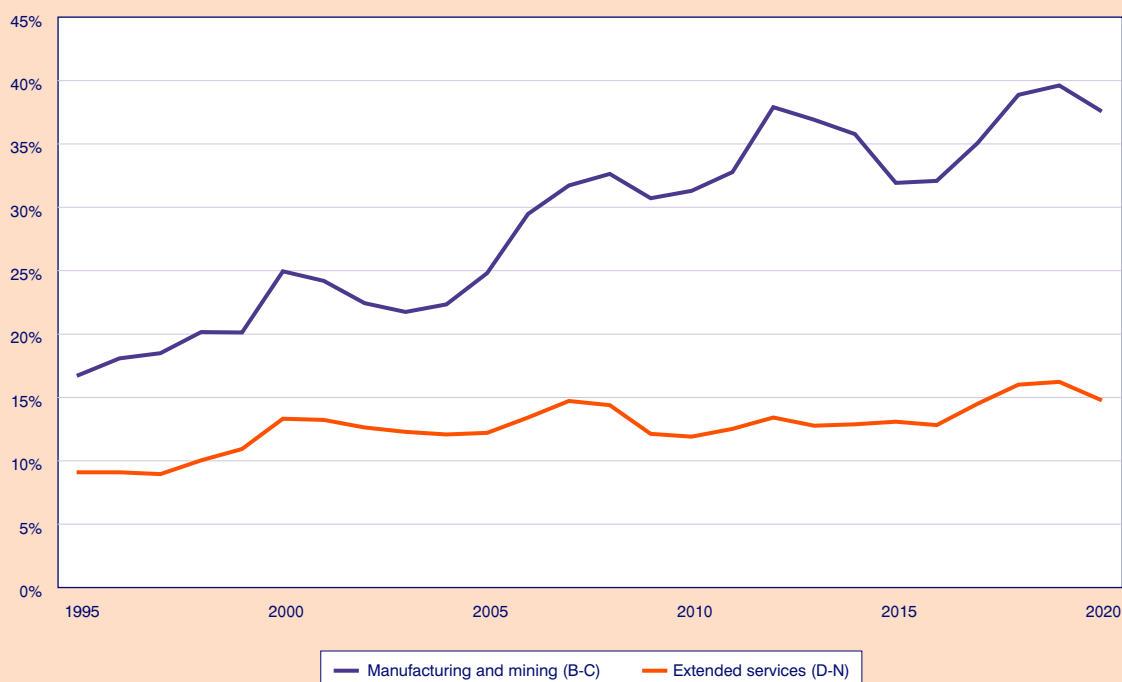
Greece's forward participation in GVCs, manufacturing and mining (B-C) vs. extended services (D-N), 1995-2020



Source: Authors' elaboration on GRinGVCs database.

FIGURE 5

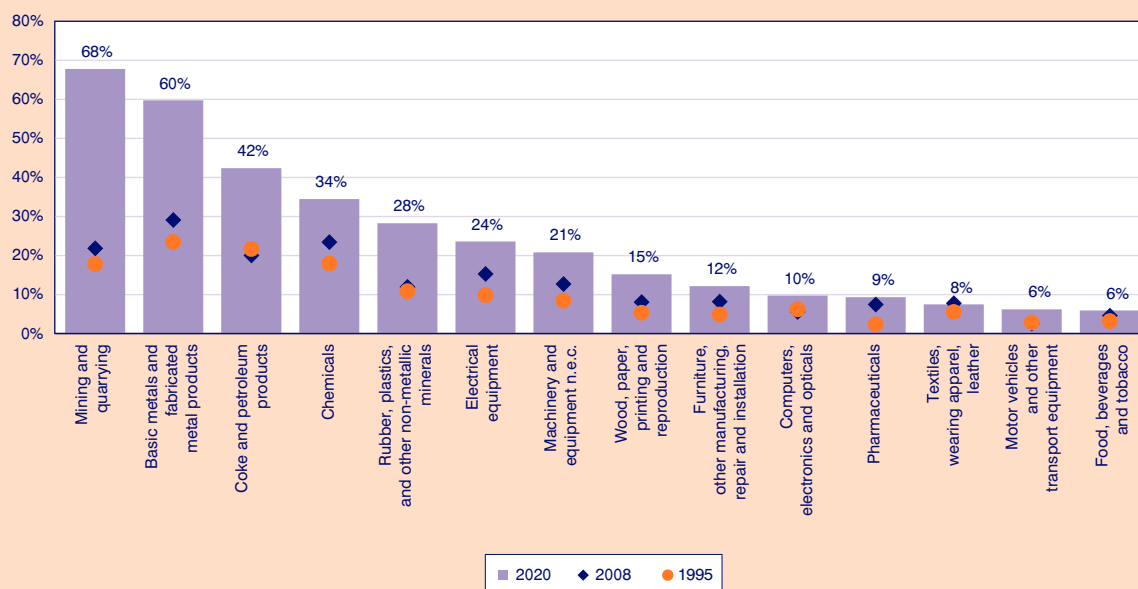
Greece's backward participation in GVCs, manufacturing and mining (B-C) vs. extended services (D-N), 1995-2020



Source: Authors' elaboration on GRinGVCs database.

FIGURE 6

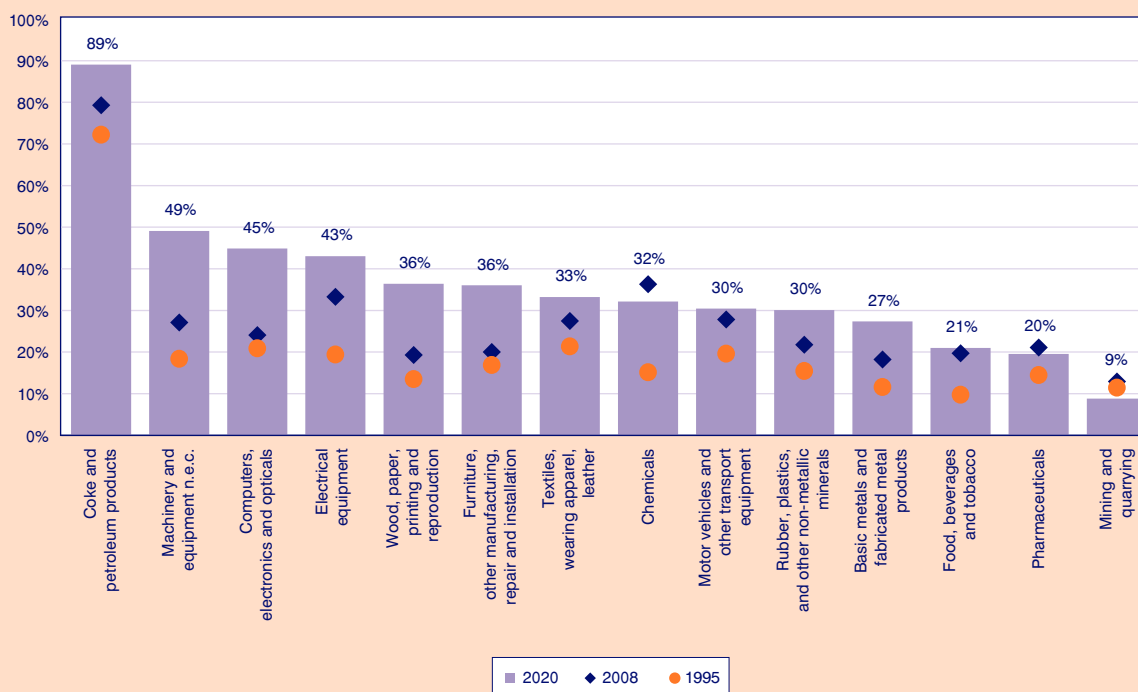
Forward participation in GVCs across manufacturing and mining sectors, years: 1995, 2008, 2020



Source: Authors' elaboration on GRinGVCs database.

FIGURE 7

Backward participation in GVCs across manufacturing and mining sectors, years: 1995, 2008, 2020



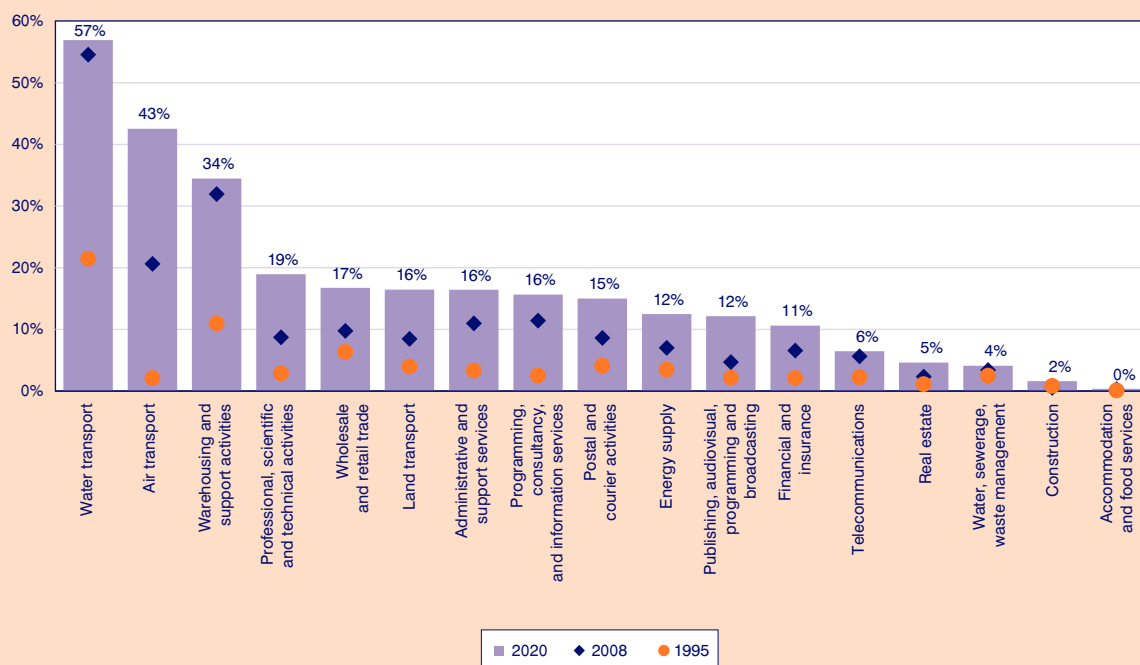
Source: Authors' elaboration on GRinGVCs database.

Turning to backward participation in the manufacturing and mining sector group, Figure 7 above shows that the most backward-intensive sectors in 2020 are coke and petroleum products (C19), machinery and equipment (C28), computers and electronics (C26), electrical equipment (C27), and wood and paper products (C16-C18). Notably, coke and petroleum (C19) was also among the most forward-intensive sectors, highlighting its significant overall integration into GVCs. Interestingly, with the exception of mining and quarrying (B) – which involves the extraction of primary raw materials – all other manufacturing sectors exhibited backward participation shares of at least 20% in 2020. This finding corroborates the aggregate backward orientation of the manufacturing and mining sector group identified earlier in Figure 5. The computers and electronics (C26) sector displays particularly high backward intensity, reinforcing our earlier observation regarding its positioning in downstream segments of the value chain. Despite its high-tech nature, this sector shows limited forward participation and substantial reliance on imported intermediates, indicating a downstream specialization in its corresponding GVC. Similar to the case of forward participation, most sectors

appear to have increased their backward participation over the examined years, with a particularly marked increase observed in 2020 compared to 2008. Two notable exceptions are chemicals (C20) and pharmaceuticals (C21), both of which exhibited higher backward participation shares in 2008 compared to 2020.

Accordingly, Figures 8 and 9 illustrate the forward and backward participation trends, respectively, across the individual subsectors within the extended services group. As shown in Figure 8, the most forward-intensive sectors in 2020 include water transport (H50), air transport (H51), warehousing and support activities for transportation (H52), professional, scientific and technical services (M), and commercial trade (G) sectors. These findings are largely expected, given the inherently global and interlinked nature of transport and logistics sectors. A particularly noteworthy observation concerns the high forward participation shares of professional, scientific and technical services (M), commonly referred to as knowledge-intensive business services. This category encompasses activities such as engineering design, management consulting, marketing, and R&D, which are closely associated

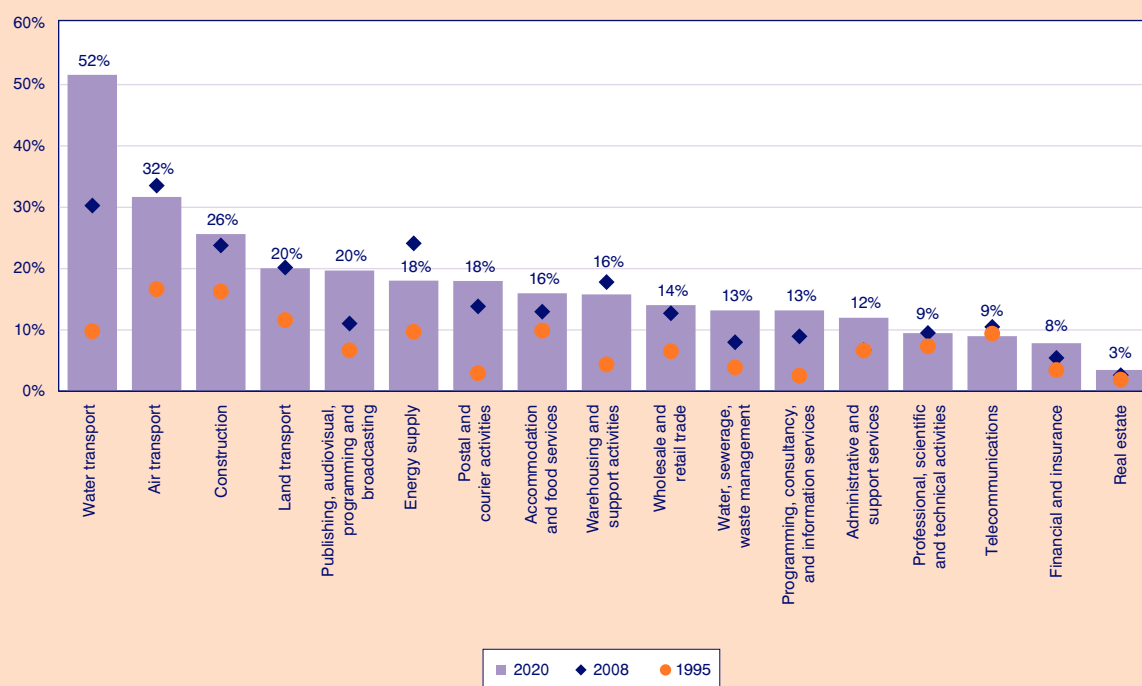
FIGURE 8
Forward participation in GVCs across extended services sectors, years: 1995, 2008, 2020



Source: Authors' elaboration on GRinGVCs database.

FIGURE 9

Backward participation in GVCs across extended services sectors, years: 1995, 2008, 2020



Source: Authors' elaboration on GRinGVCs database.

with the creation of intangible assets (OECD/Eurostat, 2018; Dimas et al., 2024; 2025). These services are also linked to GVC-related competitiveness advantages derived from specialization in knowledge-intensive, upstream production stages (Mudambi, 2008; Durand & Milberg, 2020; Tsakanikas et al., 2022). Notably, this sector's forward participation has risen markedly over time, particularly between 2008 and 2020, indicating growing integration in global production networks. Conversely, the least forward-intensive sectors within the extended services group include accommodation and food service activities (I), construction (F), water supply, sewerage, and waste management (E), real estate (L), and telecommunications (J61). These are largely infrastructural or domestically oriented services that primarily address local market needs and are less engaged in export-oriented GVC activities. Overall, while forward participation of the extended services subsectors generally exhibits an upward trend across the three reference years, variations in sectoral rankings are observed over time.

Similarly, Figure 9 depicts the patterns of backward GVC participation across the extended services sec-

tors. In 2020, the most backward-intensive sectors include water transport (H50), air transport (H51), warehousing and support activities for transportation (H52), construction (F), publishing, motion picture and broadcasting activities (J58T60), and land transport (H49). These sectors are typically dependent on imported intermediate goods or services, which explains their higher levels of backward integration into GVCs. In contrast, the least backward-intensive sectors in 2020 are real estate (L), financial and insurance activities (K), professional, scientific and technical services (M), telecommunications (J61), and administrative and support service activities (N). These sectors, generally, rely more on domestic inputs or operate in segments of the economy less embedded in international production networks, resulting in relatively limited backward GVC integration. Overall, an upward backward participation trend emerges from 1995 to 2020, which appears to be relatively uniform across sectors, with the exceptions of air transport (H51), warehousing and support activities for transportation (H52), energy supply (D), professional, scientific and technical services (M), and telecommunications (J61), whose backward participation dropped from 2008 to 2020.

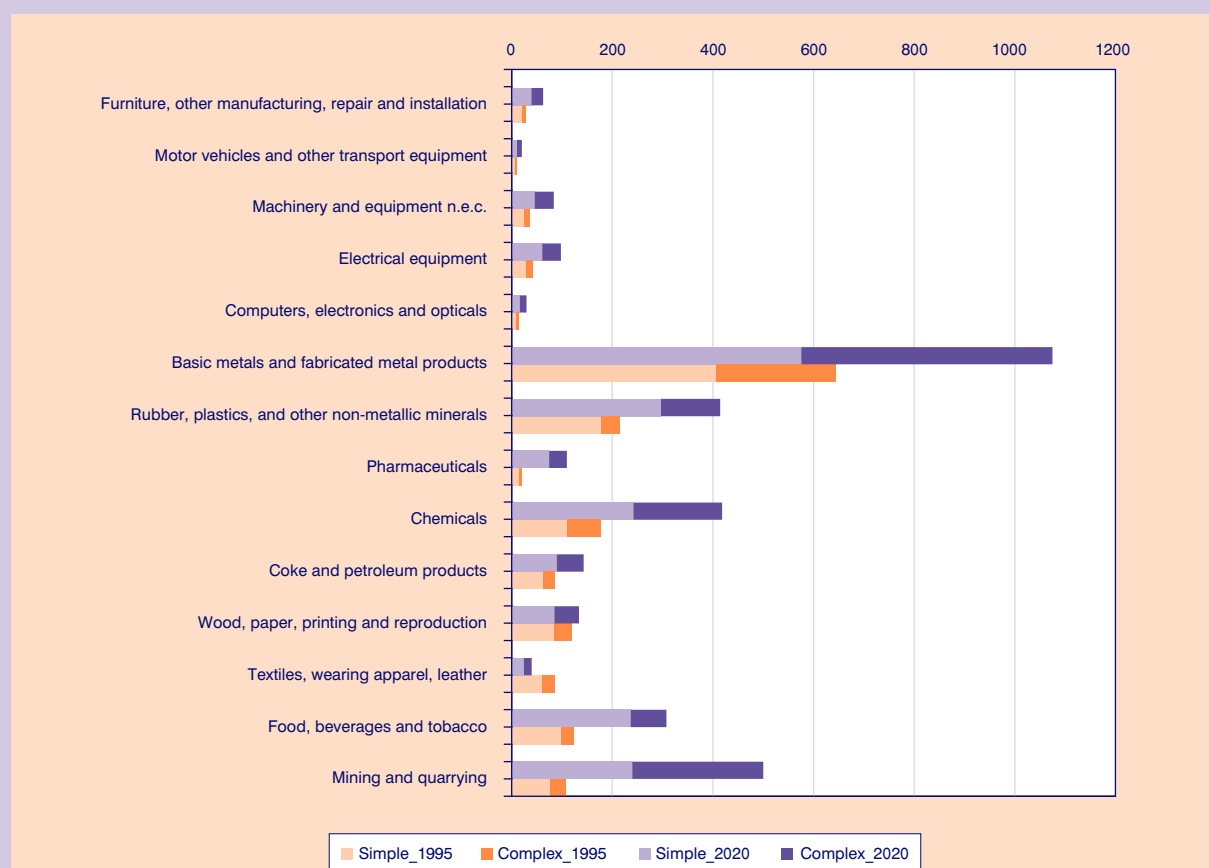
4.2. Simple and complex participation

Figures 10–13 provide additional insights gained from distinguishing between simple and complex activities at the sector level for two reference years: 1995, the starting point of our analysis and a year when the great era of GVCs was not yet at full strength, and 2020, our latest data point, a year when the globalized production system had already undergone some transformations and was beginning to experience the first effects of the COVID-19 crisis. It should be noted that all figures in this section refer to the domestic (forward) and foreign (backward) VA components of simple and complex GVC activities – expressed in USD current values – that correspond to the numerators of the respective GVC participation ratios presented in Section 3. This approach serves two purposes: (i) to highlight changes in the composition of forward and backward

participation from 1995 to 2020 in terms of its complexity, and (ii) to better visualize these changes graphically, by avoiding the joint presentation of individual sector cases with extremely low vs. extremely high participation ratios that would significantly undermine the overall interpretative quality of the figures.

Starting with the manufacturing and mining sector group, Figures 10 and 11 illustrate the two modes of forward and backward GVC participation, respectively. In Figure 10, a horizontal pattern that can be observed across all sectors is that the simple mode accounted for the largest share of forward participation in 1995, with a limited number of sectors, such as basic metals and fabricated metal products (C24-C25) and chemicals (C20), presenting relatively high shares of complex forward participation. Interestingly, the picture in 2020 is quite different, as complex forward participa-

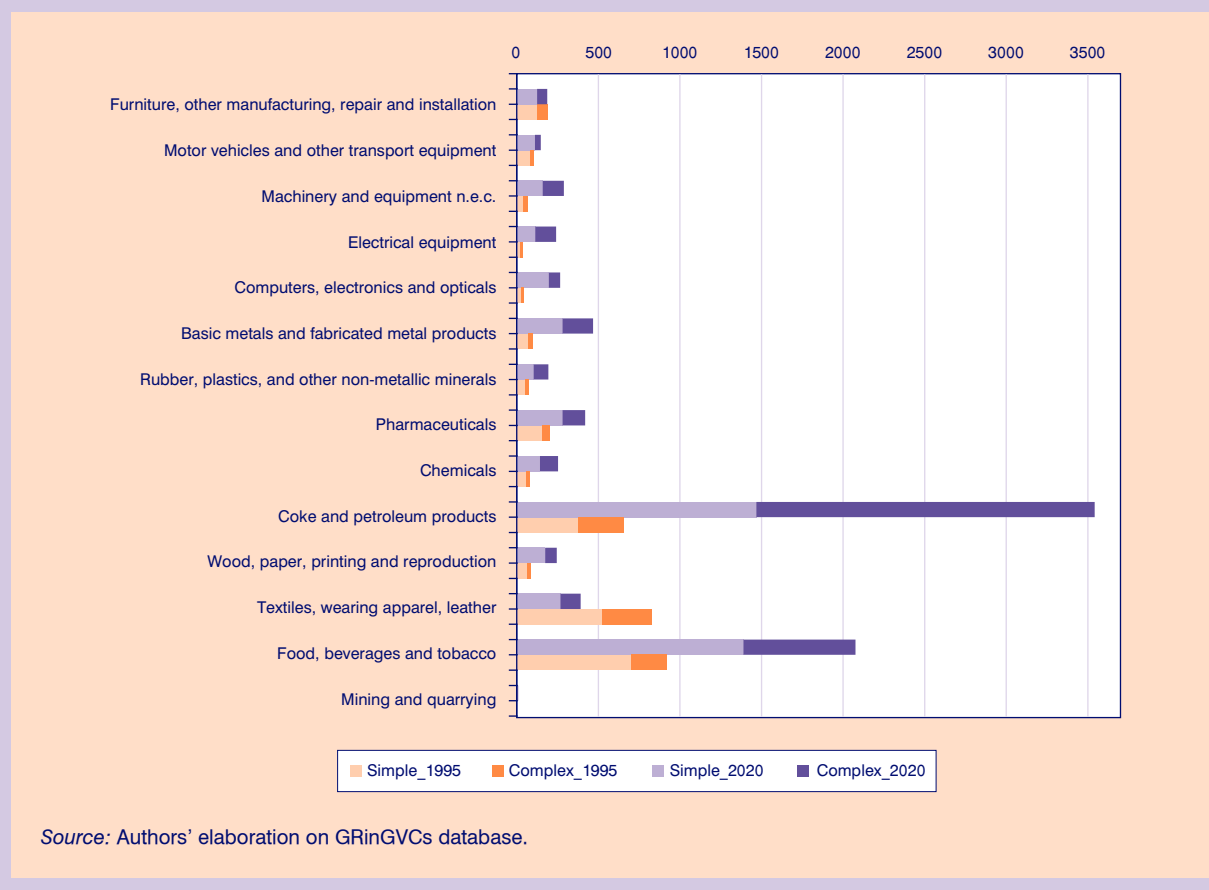
FIGURE 10
Domestic value added exported in forward simple and complex GVC activities across manufacturing and mining sectors, years: 1995 and 2020 (values in mil. USD)



Source: Authors' elaboration on GRinGVCs database.

FIGURE 11

Foreign value added imported in backward simple and complex GVC activities across manufacturing and mining sectors, years: 1995 and 2020 (values in mil. USD)



tion shares soared across many sectors, with leading forward-oriented sectors such as basic metals and fabricated metal products (C24-C25), mining (B), and chemicals (C20) presenting a balanced pattern of both simple and complex forward participation.⁷ However, this is not a pattern that concerns only the most forward-oriented sectors, as sectors at the lower ranks have also demonstrated increases in the contribution of complex activities in their forward participation.

Similar observations emerge from Figure 11, which focuses on backward participation and its sub-components. In 1995, leading backward-oriented sectors such as coke and petroleum products (C19) and food, beverages and tobacco (C10-C12) primarily relied on simple activities for their backward integration. By contrast, in 2020, these sectors exhibited significantly

higher shares of complex activities. Moreover, the expansion of complex backward participation from 1995 to 2020 is evident across nearly all sectors within the manufacturing and mining group. Taken together, the findings from both figures support a broader conclusion regarding the manufacturing-mining sector as a whole: the share of complex GVC activities has increased markedly over the examined period, indicating that the aggregate deepening of GVC integration reflects not only higher levels of participation but also greater complexity and length of value chain involvement.

Similarly, Figures 12 and 13 illustrate the simple and complex components of forward and backward participation, respectively, for the extended services sectors. The aggregate patterns identified in the manufacturing and mining sector group are also evident in this case.

7. Differences in sector rankings between Figures 10–13 and Figures 6–9 arise from the distinct measurement approaches used to compute GVC participation by type and mode across sectors, as previously explained.

FIGURE 12

Domestic value added exported in forward simple and complex GVC activities across extended services sectors, years: 1995 and 2020 (values in mil. USD)



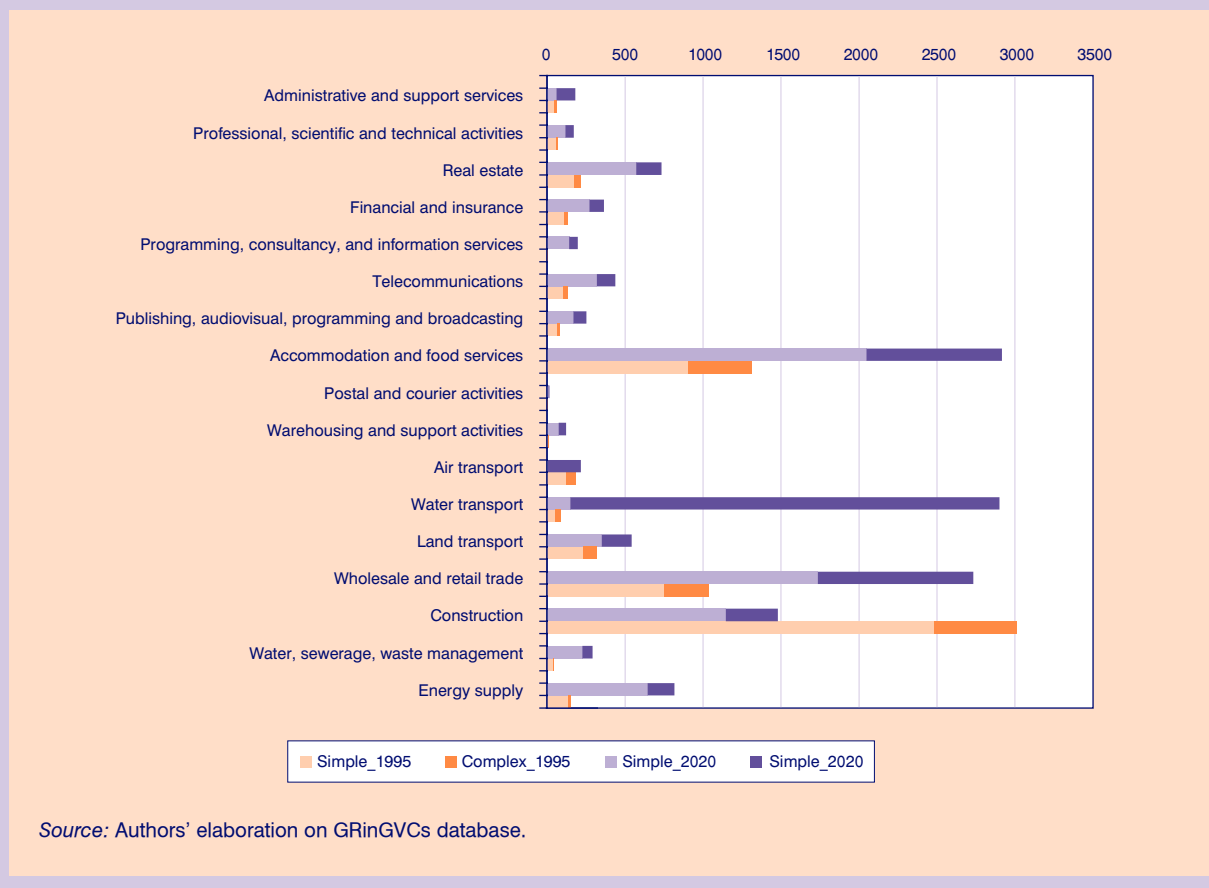
Source: Authors' elaboration on GRinGVCs database.

In detail, simple activities dominated both forward and backward participation in 1995. However, by 2020, the share of complex activities increased substantially in both forward and backward dimensions. This shift is particularly evident for water transport (H50), a sector that experienced significant growth in both forward and backward participation from 1995 to 2020, driven primarily by the expansion of its complex component. In the backward dimension, complex activities, while representing a negligible share in 1995 when overall participation was very low, experienced a pronounced increase by 2020, driving the sector's backward participation to significantly higher levels. The finding is illustrative of Greece's import dependence on the maritime industry – one of the country's flagship sectors – in terms of inputs and resources predominantly related to parts, components and shipping goods (including shipbuilding and purchases of ships) that are produced elsewhere and embody VA that has

crossed multiple international production stages. At the same time, it is worth noting that the sector is characterized by significant competitive dynamics, with complex activities accounting for a substantial share of the increase in forward participation in 2020 (Figure 12). Another interesting case is construction (F), a sector with limited forward participation (Figure 12), primarily due to its focus on serving domestic demand, yet marked by extensive utilization of imported inputs (Figure 13). However, the latter significantly dropped between 1995 and 2020, largely reflecting the shift in Greece's construction landscape following the 2008 financial crisis. A consistent pattern across both years is that a substantial share of the sector's backward participation is accounted for by complex GVC activities, highlighting the sector's integration in multi-stage international supply chains despite its domestic orientation.

FIGURE 13

Foreign value added imported in backward simple and complex GVC activities across extended services sectors, years: 1995 and 2020 (values in mil. USD)



5. Conclusions and policy implications

Effective participation in GVCs has become increasingly critical for countries aiming to boost productivity, foster technological upgrading, and capture greater value added. This is particularly relevant for Greece, a country facing persistent structural limitations, where deeper GVC integration could create opportunities for export diversification, innovation diffusion, and stronger links between domestic firms and more sophisticated stages of global production. Despite the growing recognition of these benefits, existing research consistently highlights Greece's relatively weak overall participation in GVCs. However, the lack of sector-level evidence remains a critical gap in the literature. Without disaggregated insights, our understanding of which sectors are driving or lagging behind in GVC integration remains limited. This constraint, in turn, undermines the design of targeted and evidence-based policy interventions that could more effectively support GVC upgrading and integration where it is most needed.

The current study addresses the existing research gap by providing sector-level evidence on Greece's participation in GVCs across a broad range of sectors over the period 1995–2020. Drawing on recent methodological advances, we construct GVC participation indicators that capture not only the direction of integration (forward and backward) but also the mode of participation. The latter distinguishes between simple activities, which involve a single cross-border transfer of value added, and complex activities, characterized by multiple cross-border transfers. This dual perspective allows for a more nuanced understanding of how different Greek sectors are positioned within global production networks, both in terms of their roles and the sophistication of their international linkages.

Our analysis reveals that the manufacturing and mining sectors are significantly more integrated into GVCs than extended services, characterized by a strong backward orientation and a clear deepening trend in both forward and backward participation. In contrast, extended services exhibit more balanced participation

and a substantial upward trend in forward linkages. This finding is particularly noteworthy, as it highlights the growing importance of services for Greece's international competitiveness. When accounting for the mode of GVC participation, we find that while simple activities continue to dominate across sectors, the share of complex activities has risen significantly over time, indicating a gradual shift toward more sophisticated and potentially higher value-added roles within global production networks. Focusing on sector-specific patterns, the results show that high-tech sectors tend to display limited forward participation alongside strong backward linkages, reflecting specialization in lower value-added segments of their respective value chains. On the other hand, knowledge-intensive business services display an upward forward participation trend accompanied by limited backward integration, which highlights their potential of being competitiveness drivers in international markets. Overall, these findings highlight the heterogeneous nature of GVC integration across sectors, i.e., patterns that remain largely hidden in aggregate-level analyses, stressing the importance of more granular, sector-focused research on GVCs.

In this direction, research on GVCs offers fertile ground for policy discussions about the future of Greece's competitiveness. The current study contributes to that effort by providing sector-level evidence that has been absent from the current policy dialogue regarding the transformation of the country's productive model. Despite reforms and regulation adjustments over the last decade, aimed at rejuvenating the country's business environment, attracting foreign direct investments, and upgrading exporting dynamics, Greece's performance remains sluggish compared to its EU peers. While several sector-specific initiatives have been introduced in the context of the country's various strategic frameworks (e.g., Industrial Strategy and Action Plan, Smart Specialization Strategy 2021-2027), they remain largely agnostic to the underlying implications of sector-specific GVC integration patterns and offer little insight into the external dependencies, position in value chains, and export potential of specific sectors in relation to trade in intermediates. These gaps underline the need for a deeper investigation of sectoral GVC profiles to inform more targeted and effective policies, especially in sectors with potential for technological upgrading and value capture. Policymakers are therefore encouraged to integrate GVC-based insights into the design of industrial and trade strategies, ensuring that sectoral policies are aligned with the evolving dynamics of global production.

References

- Antràs, P. (2020). Conceptual Aspects of Global Value Chains. *World Bank Economic Review*, 34(3), 551–574.
- Barkas, P., & Pisu, M. (2018). *Boosting investment in Greece*. OECD Economics Department Working Papers, No. 1506, OECD Publishing, Paris.
- Bontadini, F. (2022). Trade specialization and performance in global value chains. *Industrial and Corporate Change*, 30(6), 1557–1590.
- Borin, A., & Mancini, M. (2023). Measuring what matters in value-added trade. *Economic Systems Research*, 35(4), 586–613.
- Borin, A., Mancini, M., & Taglioni, D. (2021). *Economic Consequences of Trade and Global Value Chain Integration: A Measurement Perspective*. Policy Research Working Paper Series 9785, The World Bank.
- Dedrick, J., Kraemer, K. L., & Linden, G. (2010). Who profits from innovation in global value chains?: a study of the iPod and notebook PCs. *Industrial and Corporate Change*, 19(1), 81–116.
- Dimas, P., Caloghirou, Y., Tsakanikas, A., & Vonortas, N. S. (2025). Putting intangible inputs and global value chains into work: New sources of manufacturing comparative advantage in global markets. *Industrial and Corporate Change*, dtaf021 (published online).
- Dimas, P., Stamopoulos, D., & Tsakanikas, A. (2024). Mapping the flow of intangibles in domestic and global value chains. In C. Bloch, A. Protogerou, & N. S. Vonortas (Eds.), *Intangible Assets, Productivity and Economic Growth: Micro, Meso and Macro Perspectives* (1st ed.). Routledge.
- Durand, C., & Milberg, W. (2020). Intellectual monopoly in global value chains. *Review of International Political Economy*, 27(2), 404–429.
- ECB (2019). The impact of global value chains on the euro area economy. *ECB Working Group on Global Value Chains Occasional Papers*, No. 221.
- Fernandes, A. M., Kee, H. L., & Winkler, D. (2022). Determinants of Global Value Chain Participation: Cross-Country Evidence. *The World Bank Economic Review*, 36(2), 329–360.
- Gibson, H., Pavlou, G., Tsochatzi, C., & Vasardani, M. (2019). Greece's Integration into Global Value Chains, *Economic Bulletin*. Bank of Greece Publications, 2019/50, 8-44.
- Greek National Productivity Board (2024). *Greek National Productivity Board Annual Report 2024*. KEPE Publishing, Athens, Greece.
- Konstantakopoulou, I. (2024). Current Account Deficit: a persistent problem of the Greek economy. *Current Issues Bulletin*, KEPE Publications, 6/2024. [in Greek]
- Konstantakopoulou, I., Magdalinos, T., & Skintzi, G. (2019). *Investigation of external trade and export competitiveness of Eurozone countries*. Studies, No 80, KEPE, Athens, Greece. [in Greek]
- Koopman, R., Wang, Z., & Wei, S.-J. (2014). Tracing Value-Added and Double Counting in Gross Exports. *American Economic Review*, 104(2), 459–494.
- Los, B., Timmer, M. P., & De Vries, G. J. (2016). Tracing value-added and double counting in gross exports: Comment. *American Economic Review*, 106(7), 1958–1966.

- Mudambi, R. (2008). Location, control and innovation in knowledge-intensive industries. *Journal of Economic Geography*, 8(5), 699–725.
- OECD (2024). *OECD Economic Surveys: Greece 2024* (Vol. 2024). OECD Publishing, Paris.
- OECD (2023). OECD Inter-Country Input-Output Database (<http://oe.cd/icio>).
- OECD/Eurostat (2018). *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition*, The Measurement of Scientific, Technological and Innovation Activities. OECD Publishing, Paris.
- OECD (2013). *Interconnected Economies: Benefiting from Global Value Chains*. OECD Publishing, Paris.
- Stratopoulou, A. (2024). De-globalization and trade fragmentation: The position of Greece in the new landscape. *Greek Economic Outlook*, KEPE Publications, 55/2024, 49-69.
- Sturgeon, T., Van Biesebroeck, J., & Gereffi, G. (2008). Value chains, networks and clusters: Reframing the global automotive industry. *Journal of Economic Geography*, 8(3), 297-321.
- Tsakanikas, A., and Dimas, P. (2024). Leveraging the EU's Industrial Policy to Reshape Greece's Productive Model. *European Economy Policy Brief Series*, Greek & European Economy Observatory, Hellenic Foundation for European & Foreign Policy (ELIAMEP/EΛΙΑΜΕΠ). (https://www.eliamep.gr/wp-content/uploads/2024/04/Policy-briefs-special-edition-Leventis_final-EN.pdf)
- Tsakanikas, A., Caloghirou, Y., Dimas, P., & Stamopoulos, D. (2022). Intangibles, innovation, and sector specialization in global value chains: A case study on the EU's and the UK's manufacturing industries. *Technological Forecasting and Social Change*, 177, 121488.
- Tsekeris, T., & Skintzi, G. (2017). Participation and possibilities of Greece in global value chains. *Greek Economic Outlook*, KEPE Publications, 2017/32, 68-76.
- Wang, Z., Wei, S.-J., Yu, X., & Zhu, K. (2022). Global value chains over business cycles. *Journal of International Money and Finance*, 126, 102643.
- World Bank (2020). *World Development Report 2020: Trading for Development in the Age of Global Value Chains*. Washington, DC: World Bank Group.

The impact of risk-based tax audits on the efficiency of Tax Administration

Charalampos Kalligosfyris*,
Eleni Kalamara**,
Zacharias Dermatis***,
Athanasios Anastasiou****

Abstract

The purpose of this paper is to investigate the relationship between the implementation of risk-based tax audit strategies and the effectiveness of tax administration, based on data from 21 countries of the European Union for the period 2016-2019. This research aims to investigate how the methods of selecting cases to be audited using risk analysis criteria affect the hit rate of tax audits and to study how tax audits are interconnected with specific characteristics of the tax administration, the economy and the level of governance of a country, with the aim of revealing the determinants of the degree of their effectiveness. In addition, it analyses the relationship between tax audits using risk analysis criteria, operating costs and the effectiveness of tax administrations, examining also the degree of heterogeneity of the results according to the level of economic development, governance and trust in institutions.

The results of the analysis suggest that the application of risk-based tax audit case selection techniques is positively related to the effectiveness of tax administration audits. Moreover, country-level heterogeneity tests show that the effect of risk-based tax audits is greater in high-growth economies and in countries with a lower level of governance. Also, the results of the study showed that the implementation of risk-based tax audit

strategies is associated with lower operating costs of tax administration and higher tax effort of the country, achieving a greater utilization of its tax capacity.

Keywords: Taxation, tax audits, risk management, efficiency, tax administration.

JEL classification: H2, H21, H26, M42.

1. Introduction

The implementation of tax audits based on risk analysis criteria and the proper use of their results can contribute to improving the efficiency of tax services and constitute a valuable tool for adapting to the continuous changes in the tax environment and the emerging risks that tax administrations are called upon to manage (Anastasiou et al., 2024). On the other hand, the tax audit strategy developed by tax administrations has a significant influence on the management of tax compliance risk and the results of tax services, significantly shaping the tax behavior of businesses. With these data, the investigation of the relationship between tax audit strategies using risk analysis criteria and the efficiency of tax administration becomes of particular interest in the scientific study of the efficiency of tax services (Yusof et al., 2014; Chalu & Mzee, 2018).

Procedures for randomly selecting tax cases for audit, which have been extensively applied in the past by tax administrations, have proven ineffective, as a study of the relevant literature shows that compliance behaviour varies significantly between taxpayers (Jackson & Milliron, 1986; Jimenez & Iyer, 2016; Slemrod, 2019) and therefore requires the development of a targeted audit strategy. In addition, the limited resources of the tax administration require human resources to audit tax cases with a high compliance risk and increased audit results in terms of the disclosure of concealed tax assets and the collection of additional taxes, in order to achieve an improvement in the relationship

* PhD, Department of Management Science & Technology, University of Peloponnese, Independent Public Revenue Authority of the Hellenic Republic. Email: chkallig_82@yahoo.gr

** PhD, Department of Economics, University of Peloponnese, Independent Authority for Public Revenue of the Hellenic Republic. Email: kalamel10@yahoo.gr

*** Assistant Professor, Department of Management Science & Technology, University of Peloponnese. Email: zderm@uop.gr

**** Professor, Department of Management Science & Technology, University of Peloponnese. Email: athanastas@uop.gr

– Opinions or value judgments expressed in this article are the authors' own and do not necessarily reflect those of the Centre of Planning and Economic Research.

between the cost and the effectiveness of audits (Law & Mills, 2017). Based on these findings, the application of tax audit methods with risk analysis criteria seems to be a promising strategic option with the aim of strengthening the system of case selection for audit and assessment of tax compliance risk. However, previous research experience cannot answer with certainty whether the application of risk-analysis-based tax audit strategies contributes to the reduction of non-compliance behaviours.

The development of operational tax audit plans based on risk analysis criteria includes the application of advanced analytical techniques on a comprehensive set of data, recording and utilizing characteristics of natural and legal persons that constitute the set of taxpayers, such as information obtained through the processing of tax returns, results of previous audits, third party information and data, etc. Subsequently, the selection of cases for tax audit is carried out through appropriate automated techniques of statistical analysis and machine learning that enable the assessment of tax compliance risk (Bal, 2019).

The aim of this paper is to study the relationship between the implementation of risk-based tax audit strategies and the effectiveness of tax administration, based on data from 21 countries of the European Union in the period 2016-2019. This study is part of the general framework of risk management in tax administration, focusing specifically on addressing tax compliance risk, which is considered the most important type of risk in terms of frequency and severity, as it has a significant impact on the results and objectives of tax authorities. Through this research, we seek to assess the impact of tax audits using risk analysis criteria, as a measure to mitigate tax compliance risk, on the hit rate of tax audits, namely, the number of tax audits that result in concealed taxable material in relation to the total number of audits conducted. The analysis focuses on legal entities, in contrast to previous studies involving individuals (Hashimzade & Myles, 2017; Loyland et al., 2019; Beer et al., 2020). It has been found that businesses show a different response to tax audits compared to individuals due to different patterns of risk-taking behaviour, tax compliance costs and social attitudes and norms (Hasan et al., 2017; Armstrong et al., 2019; Jacob et al., 2021). In addition, the contribution of this study is related to investigating how tax audits are interconnected with specific characteristics of the country's tax administration, the economy and the level of governance, with the aim of revealing determinants of the degree of effectiveness of risk-based tax audits. Furthermore, the relationship between risk-based tax audits and operating costs and the effective-

ness of tax administration is analysed, additionally examining the degree of heterogeneity of the results according to the level of economic development, governance and trust in institutions. In this way, an evaluation of the effectiveness of individual tax administration interventions is achieved (Keen & Slemrod, 2017). As a result, through the aforementioned analysis, this study seeks to evaluate the method of tax audits based on risk analysis criteria in addressing or mitigating the impact of tax compliance risk on the results of tax administration.

2. Selection of tax audit cases using risk analysis criteria

The effectiveness of the tax audit strategy depends on a number of factors, such as the expertise and integrity of tax administration auditors, the adequacy and clarity of tax legislation and the efficiency of the information technologies available to tax authorities (Anastasiou et al., 2021). In addition, taxpayer compliance behaviour is considered a critical aspect of the efficiency of tax audits (OECD, 2004b). Consequently, a compliance strategy requires a tailored response by tax authorities to each level of risk, through a well-structured process of scaling compliance tools, ranging from tailored non-compliance notifications and limited scale audits to thorough and extensive [full] tax audits in cases of a high risk of non-compliance.

The selection of tax cases based on risk analysis criteria has proven to be an effective control strategy implemented by most tax administrations. According to the literature, the most commonly used risk prediction models to classify cases for audit are linear models, decision trees, neural networks and combinatorial models (Bal, 2019). These methods are used to identify tax cases for audit that present a high risk of non-compliance and, at the same time, an increased probability of determining additional taxes and imposing penalties due to the concealed taxable material. The risk-based case selection technique creates a “profile” for each taxpayer and assigns a certain score using specific characteristics and information available to the tax administration based on the findings of previous audits of all taxpayers. This method combines the benefits of previous tax case selection techniques by overcoming any issues of reduced audit efficiency. However, its implementation requires significant data acquisition costs through the management of internal tax data, access to third party data, the development of information technology to process the data and the use of artificial intelligence methods to rank and assess the compliance risk of each tax entity.

The operational result of the development and implementation of the methods of selecting tax cases with risk analysis criteria is the calculation of the score and classification of tax cases based on the predefined set of explanatory factors – risk criteria included in the automated model of objective evaluation of audit cases (Siddiqi, 2006). In most tax administrations, the risk analysis criteria are confidential in order to prevent strategic behaviours of taxpayers that aim to improve tax evasion methods by using the risk criteria. This is more easily achieved in the case where the number of risk criteria is small. For this reason, tax administration bodies are strongly advised to keep the individual risk analysis criteria confidential. Indeed, international experience has shown that the announcement by the tax administration of the application of a general risk-based approach may be a compliance factor. Thus, the announcement that tax return data is being cross-referenced with data from banking, financial, insurance and other unspecified sources may improve the level of compliance (Khawaja et al., 2011).

The calculation of the score of tax cases in the case of a linear regression model is achieved by estimating an equation of the following form (1):

$$Score_i = c + bX_i \quad (1)$$

where b is the parameter vector of the risk criteria X and $Score$ is the score assigned to tax entity (or case) i .

The choice between risk analysis methods is possible by calculating the following statistical measures (Khawaja et al., 2011):

- Percentage of tax cases correctly predicted for audit based on the proposed compliance risk model.
- Percentage of correct predictions of non-compliant audit cases based on the proposed compliance risk model.
- Percentage of non-compliant audit cases identified following a review of all tax cases resulting from the application of the proposed compliance risk model.

3. Literature review

Previous research in the field of tax audits has focused on conducting random audits (Advani et al., 2019; DeBacker et al., 2018), but the practice of tax administrations indicates that tax authorities increasingly rely on systems for selecting tax cases for audit based on risk analysis criteria, which aim to identify cases of non-compliant behaviour with a high probability of non-tax compliance. On the other hand, businesses assess the relationship between the marginal benefit of

carrying out non-tax compliance operations and the expected cost, in case of detection. In this analysis, they estimate the probability of being audited based on information and data they collect, including information on conducting tax audits using risk analysis criteria (Eberhartinger et al., 2021). This is achieved through: a) communications and data provided by the tax administration regarding the strategy followed in selecting tax cases for audit, b) information provided by tax professionals (accounting firms, consulting firms, etc.) on the parameters for assessing tax compliance risk and how these are utilized by the tax administration and c) during the conduct of tax audits, when the audited enterprise receives additional information regarding the risk analysis criteria that led to its selection for audit and the method of processing the data available to it by the tax administration (Battaglini et al., 2019). With this data, companies are expected to adopt a less aggressive stance towards the tax authorities and to implement better internal tax control systems in order to increase the level of tax compliance and limit the adverse consequences of conducting a tax audit (Kominos et al., 2020).

However, this assumption may not apply to all businesses in terms of their responsiveness and sensitivity to risk-based tax audits. This exception mainly concerns very small businesses that do not have the infrastructure and knowledge to assess the tax audit strategies implemented by the tax administration and to draw useful conclusions regarding the degree of tax audit risk. To a lesser extent, it also applies to very large businesses that are audited on a permanent basis and therefore consider that a risk-based tax case selection approach will not affect their tax behavior, as complex and intractable tax audit issues have already been successfully addressed in the tax audit that has already taken place (Eberhartinger et al., 2021). In these cases, risk-based tax audits may be of limited effectiveness.

It is generally accepted that tax audits significantly affect the tax behavior of businesses and the effectiveness of tax administration (De Simone et al., 2020; Liargovas et al., 2020). Research studies in the field of tax compliance argue that conducting tax audits increases the compliance of businesses with previous tax non-compliant behaviour, in contrast to those businesses that were fully compliant with tax legislation, which show a decrease in tax compliance after the audit (Gemmell & Ratto, 2012; Beer et al., 2020; Anastasiou et al., 2023), while the effectiveness of audits is a determining factor in the deterrent nature of audits (Kasper & Alm, 2020). A review of the relevant literature reveals limited research on the subject of tax audit strategies with risk

analysis criteria. Alm and McKee (2004) argue that the combination of random and risk-based audits increases the effectiveness of the deterrent effect of audits on tax evasion and constitutes a viable mechanism for enforcing tax legislation. Hsu et al. (2015) investigated the impact of tax audits with risk analysis criteria on the tax compliance of businesses in Minnesota and found that the application of risk analysis methods, such as data mining, contributes to improving the efficiency of the tax case selection process. Also, Hashimzade et al. (2016) argue that conducting audits with risk analysis criteria, such as predictive analytics, increases tax revenues to a greater extent than random audits. In addition, Loyland et al. (2019) presented empirical results of an analysis of the behavioural responses of a dataset of high-risk employees in Norway to tax audits. The results of the analysis support that the degree of compliance in cases of tax audits conducted based on risk and the corresponding score formed according to the risk criteria increases significantly as the risk score increases. Furthermore, Beer et al. (2020), using data on self-employed individuals in the USA, concluded that conducting targeted audits increases tax compliance. Similarly, Eberhartinger et al. (2021) studied the relationship between risk-based audits and the tax evasion of businesses in 54 OECD countries during the period 2014-2017. The results of the analysis showed that tax audits based on risk analysis criteria are associated with a lower level of tax avoidance by businesses, the effectiveness of which increases in the cases of countries with high GDP and low levels of governance and trust in the government. In addition, the study argues that risk-based audit strategies are associated with lower tax administration costs and increased efficiency of tax services. Overall, the analysis of the research results indicates an incremental effect of risk-based tax audits in limiting tax avoidance and enhancing tax revenues. Finally, Dellaportas et al. (2021) provide a statistical methodological approach to estimate an optimal random sample of tax cases for audit, aiming to maximize expected tax revenues, using data from the United Kingdom Revenue Authority.

Given these data, the study of the impact of risk-based tax audits on the effectiveness of tax administration remains almost unexplored, as the empirical evidence of previous research studies is limited to the examination of the degree of impact on the level of tax avoidance of individuals and to the formulation of general conclusions on the degree of impact on tax compliance, without demonstrating in a scientifically documented manner the contribution of risk-based tax audits to the effectiveness of tax administration.

4. Data and research methodology

Tax administrations disclose general information regarding the risk-based tax audit strategy, as the details regarding the risk criteria and the selection of cases for tax audit are confidential in order to prevent any strategic moves by taxpayers to avoid selection for tax audit (Khawaja et al., 2011).

In order to identify tax administrations implementing risk-based tax audit strategies, we use information and data published in the annual report “Tax Administration Comparative Information Series”, published by the Organisation for Economic Co-operation and Development (OECD), for the period 2016-2019, for 21 countries of the European Union. The binary variable referring to risk-based tax audits takes the value 1 when the tax administration uses risk analysis criteria for the selection of audit cases and the value 0 otherwise. Although it is not possible to link risk-based audit methods to specific taxes, they are considered to be partially used in corporate income taxation. Figure 1 presents the map of tax administrations included in the analysis, with a clear distinction as to whether or not they apply risk-based tax audit methods.

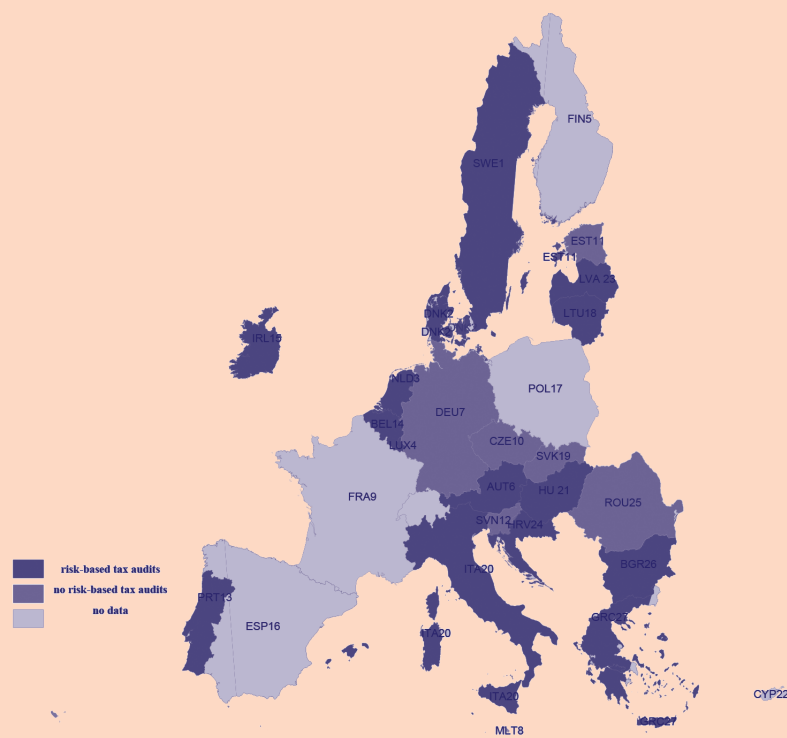
To investigate the relationship between the selection of risk-based tax audit strategies and the effectiveness of tax audits, i.e., the number of audits from which concealed taxable matter was detected to the total number of audits carried out by the tax administration during a certain period, the model of the form (2) is estimated:

$$HRA_{j,t} = \beta_0 + \beta_1 RBA_{j,t} + \beta_2 ENF_{j,t} + \beta_3 X_{j,t} + e_{j,t} \quad (2)$$

where the dependent variable *HRA* (Hit Rate of Tax Audits) represents the success rate of tax audits, i.e., the number of audits carried out from which concealed taxable matter was found in relation to the total number of tax audits carried out during the period *t*, by the tax administration of country *j*. The above indicator is widely used by tax administrations in order to evaluate the results of the audit activity of tax services and is proposed by the Intra-European Organisation of Tax Administrations (IOTA). And while the effectiveness of audits is influenced by endogenous and exogenous factors and while there are additional inherent limitations, as cases of tax evasion may not be revealed or tax evasion may be incorrectly identified when it does not exist, there is no official data on the percentage of additional taxes that were contested before administrative or judicial authorities and those that were ultimately validated by the decisions issued. This limitation should be taken into account in relevant research referring to the effectiveness of controls.

FIGURE 1

Map of European Union tax administrations



Source: OECD, authors' calculations.

In addition, the dummy variable *RBA* (Risk-Based Tax Audits) refers to the application of risk-based tax audit methods and takes the value 1 when the respective tax administration uses case selection strategies for tax audits based on risk analysis criteria and the value 0 otherwise. According to the above, a positive relationship is expected between risk-based tax audits and the success of tax authorities. The above-formulated relationship also takes into account the degree of enforcement of the tax administration towards businesses, defining as a measure of enforcement the number of tax officials employed in tax audits as a percentage of the total employees of the tax administration. In this way, the impact of risk-based tax audits on the effectiveness of audits is investigated, given the degree of enforcement (*ENF*) of the tax administration. In addition, the proposed model includes a set of country-level variables $X_{j,it}$ to capture the impact of economic, institutional and political factors related to the size of the economy, the level of governance and the institutional shielding of the economy. These factors include the annual growth rate (in real terms), the per capita GDP (in real

terms), the average corporate tax rate, the corruption perception index, the rule of law index, the quality of institutions, the independence of the tax administration, government effectiveness and the political stability of the country.

Regarding the proposed factors, the analysis includes variables such as the growth rate, GDP per capita and the level of tax rates, which represent the economic dimension of audit success and relate to both the level of economic activity and the size of the tax burden, taking into account the results of previous studies that support the existence of such an interaction (Baralexis, 2004; Drogalas et al., 2015). In addition, the research is strengthened by incorporating variables related to the quality of economic institutions, the level of corruption and adherence to the rule of law, in order to take into account parameters related to the integrity of auditors, the quality of tax procedures and the perceptions of taxpayers according to the literature (Adane, 2020; Ayalew, 2014; Van Gansberghe, 2005). Regarding the indicators referring to government effectiveness and

TABLE 1 Variables of the model

AA	Variables	Symbol	Source
1	Hit Rate of tax audits	HRA	IOTA
2	Risk-Based tax audits	RBA	OECD
3	Enforcement	ENF	IOTA
	<i>Economic</i>		
4	GDP growth (annual %)	GDP	USAID
5	GDP per capita	GDPCA	USAID
6	Corporate tax rate (% of profit)	CTR	USAID
	<i>Institutional</i>		
7	Perception Corruption Index	COR	USAID
8	Rule of law	RL	USAID
9	Regulatory quality	RQ	USAID
10	Autonomy of tax administration	AUT	IOTA
	<i>Political</i>		
11	Government effectiveness	GE	USAID
12	Political stability	PS	USAID

political stability, their selection was made with the aim of taking into account elements that reflect the political will to implement clear and effective tax legislation and the adequacy of tax services, as these factors have been highlighted in the literature as critical parameters for the effectiveness of controls (Artavanis et al., 2012; Van Gansberghe, 2005).

To estimate the proposed model, data from 21 European Union countries were used, based on the availability of data. Specifically, the sample includes the economies of Austria, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Portugal, Romania, the Slovak Republic, the Republic of Slovenia and Sweden. The selection of the 21 countries was made based on the main criterion of their accession to the European Union and the development of a common fiscal policy and strategy in the field of combating tax evasion. The remaining European Union countries are not included in the research due to lack of data. The research data were collected from official public sources (United States Agency for International Development [USAID] [<https://data.usaid.gov>], Organi-

zation for Economic Co-operation and Development [OECD] and Intra-European Organization of Tax Administrations [IOTA] [<https://data.rafit.org>]) and cover the period 2016-2019, that is, before the recent Covid-19 health crisis, which brought about a clear alteration in the comparability of the data due to the different extraordinary tax measures taken by the governments of the European countries under consideration to address the crisis (Anastasiou et al., 2021). It is noted that there is no data available before 2016 for some of the variables under investigation (HRA, ENF, AUT), and therefore, the examined study period was limited to the period 2016 – 2019.

The basic model for the analysis of panel data is formulated in the following form (3):

$$Y_{it} = a_i + a_t + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + u_{it} \quad (3)$$

where Y_{it} is the dependent variable, $X_{1it}, X_{2it}, \dots, X_{kit}$ the explanatory variables, with $i = 1, \dots, N$ and $t = 1, \dots, T$. In addition, a_i represents the constant term of the cross-sectional units of the model, a_t the time fixed effects, $\beta_1, \beta_2, \dots, \beta_k$ denotes the corresponding regression coefficients, and u_{it} represents the error term

(Hsiao, 2003). The estimation of the above basic panel model requires determining the nature of the constant term α_i . For this reason, when estimating panel models, assumptions regarding the constant term, the slope coefficients and the error term are taken into account. In this context, the common constant model was applied, in which the constant term and the slope coefficients are common for all cross-sectional units (i) and across all time periods (t). Therefore, the individual effects are assumed to be the same across units (i.e., tax administrations), implying, at the same time, that the cross-sectional units included in the sample are homogeneous. The proposed panel model can be reliably estimated using the pooled OLS method, under the condition of strict exogeneity, i.e., that the independent variable x_{it} is not correlated with the random term.

5. Descriptive data of the variables

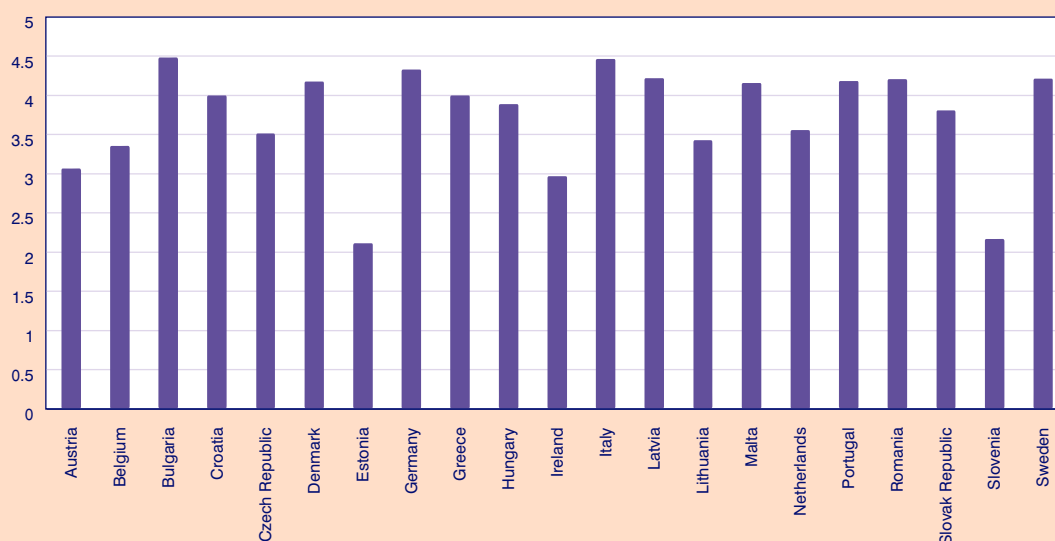
Chart 1 below shows the average hit rate of the tax audits carried out by the tax administrations under review in the period 2016-2019.

The tax administrations of Bulgaria and Italy show the highest success rate of tax audits, in contrast to those of Slovenia and Estonia, which record the lowest levels of efficiency.

Table 2 presents summary, descriptive statistics of the variables of the model. The average hit rate of tax audits is determined at 3.72%, indicating a low level of efficiency of tax administrations in the field of tax audits. The tax authorities show an average enforcement level of 0.32, which means that only 32% of tax administration employees are employed in tax audits. Also, 75% of the tax administrations in the sample apply risk-based tax audit strategies, and 52% of them operate under the status of independent or semi-autonomous administrative authority.

Table 3 shows the degree of correlation [according to Pearson] of the variables of the model. A positive correlation is observed between the implementation of risk-based tax case selection strategies for audit and audit efficiency [correlation coefficient 0.415], which is in agreement with previous research studies and the hypotheses formulated during the development of the proposed model, leading to an early conclusion about the existence of a positive relationship between HRA and RBA. Also, a small but statistically significant positive relationship is found between the autonomy of the tax administration and the effectiveness of audits. A positive correlation is also observed between the enforcement measures of the tax administration and the hits of audits, indicating that the effectiveness of audits is associated with increased effort and the employment of a significant number of tax officials specializing in tax audits.

CHART 1
Average Hit Rate of Tax Audits



Source: OECD, authors' calculations.

TABLE 2 Descriptive Statistics

	HRA	RBA	ENF	GROWTH	GDPCA	COR	GOV	PS	RL	RQ	AUT	CTR
Mean	3.723635	0.750000	0.321429	1.018361	10.10306	-0.615444	-0.218067	-0.489508	-0.244347	-0.012446	0.523810	3.683197
Median	4.011242	1.000000	0.310000	1.033607	9.940170	-0.339913	0.063382	-0.256215	0.046017	0.136911	1.000000	3.766916
Maximum	4.504244	1.000000	0.570000	2.391084	11.22843	0.808937	0.643356	0.249964	0.684582	0.715619	1.000000	4.127134
Minimum	0.788457	0.000000	0.190000	-0.727328	8.901237	-3.486139	-3.213121	-3.060062	-4.268153	-1.935216	0.000000	2.995732
Std. Dev.	0.761929	0.435613	0.096719	0.567045	0.596837	1.178039	0.827593	0.685611	0.923955	0.551227	0.502432	0.294919
Skewness	-1.722166	-1.154701	0.461562	-0.417312	0.047248	-0.536251	-1.547034	-2.056695	-1.712686	-0.995825	-0.095346	-0.880727
Kurtosis	6.520468	2.333333	2.401916	4.119838	2.021069	2.090656	5.098120	7.170100	6.518895	3.851944	1.009091	2.688562
Jarque-Bera	84.89994	20.22222	4.234511	6.827220	3.385326	6.920081	48.91376	120.0840	84.40531	16.42368	14.00029	11.19899
Probability	0.000000	0.000041	0.120362	0.032922	0.184029	0.031428	0.000000	0.000000	0.000000	0.000271	0.000912	0.003700
Sum	312.7853	63.00000	27.00000	85.54231	848.6567	-51.69732	-18.31762	-41.11867	-20.52511	-1.045422	44.00000	309.3886
Sum Sq. Dev.	48.18445	15.75000	0.776429	26.68784	29.56579	115.1853	56.84754	39.01517	70.85648	25.21963	20.95238	7.219095
Observations	84	84	84	84	84	84	84	84	84	84	84	84

TABLE 3 Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12
Hit Rate of Audits	1.000000											
Risk-Based Audits	0.415147	1.000000										
Enforcement (ENF)	0.274640	0.128683	1.000000									
GDP growth	-0.216878	-0.132157	0.006179	1.000000								
GDP per capita	-0.143766	0.066664	0.126891	-0.232506	1.000000							
Corruption Index	-0.298856	-0.049031	0.236948	-0.021493	0.740931	1.000000						
Government Effectiveness	-0.297343	0.010828	0.046136	-0.041023	0.746226	0.776952	1.000000					
Political Stability	-0.245927	-0.066122	0.008047	0.224318	0.419551	0.502376	0.722210	1.000000				
Rule of Law	-0.330126	-0.114693	0.057739	0.111555	0.688608	0.807323	0.812843	0.590822	1.000000			
Regulatory Quality	-0.203754	0.022048	0.236827	0.053446	0.684249	0.840596	0.766943	0.561052	0.778799	1.000000		
Autonomy of TA	0.064432	-0.110096	-0.144509	0.232010	-0.218194	-0.227512	-0.273647	-0.144498	-0.216645	-0.161007	1.000000	
CTR	-0.049687	0.057456	0.185807	-0.376322	0.162797	0.077652	0.138038	-0.125294	0.147176	0.204601	-0.304032	1.000000

6. Results of the survey

This section presents the estimation results of the proposed model (2) with regard to the effectiveness of tax audits, operating costs and individual efficiency parameters of tax administration.

6.1. Effectiveness of tax audits

The purpose of this section is to investigate the relationship between the implementation of risk-based tax audit strategies and audit effectiveness. Table 4 pre-

sents the estimation results of the proposed model formulated in equation (2) above. Column (1) shows the estimation results of the proposed model in its basic form, using the pooled OLS method.

The data in the scoreboard show a positive and statistically significant effect of the application of risk-based tax audit methods on the effectiveness of audits, suggesting that the development of a strategic selection of tax cases for audit using risk analysis criteria is associated with higher hit rates of tax audits. The coefficient value of the Risk-Based Audits variable indicates that tax administrations that apply risk-based tax audit

TABLE 4 Risk-Based Tax Audits and Audit Effectiveness

Variables	Hit Rate of Audits (1)	Hit Rate of Audits (2)
Risk-Based Audits	0.7703 (0.000)*	0.7124 (0.000)*
Enforcement	0.87 (0.0015)*	0.906 (0.0008)*
GDP growth	-0.26669 (0.03981)*	-0.2776 (0.0759)**
GDP per capita	-0.23023 (0.0616)**	0.1382 (0.4951)
Corruption Index		-0.1053 (0.4532)
Government Effectiveness		-0.4487 (0.0320)*
Political Stability		0.0584 (0.7228)
Rule of Law		-0.0962 (0.5509)
Regulatory Quality		0.5447 (0.0475)*
Autonomy		0.5502 (0.0998)**
CTR		-0.2229 (0.4533)
Constant	6.5216 (0.000)*	3.6245 (0.1408)
Observations	84	84
R-squared	0.336241	0.886527
Country FE	Yes	Yes
Year FE	Yes	Yes

*, ** indicates statistical significance at 5% & 10% significance level, respectively.

techniques achieve an increase in the effectiveness of tax audits by 0.7703%. Furthermore, the analysis of the results shows that the success of tax audits is greater when the enforcement of the tax administration is stronger. This conclusion is in line with the results of previous research studies which argue that the strength of tax administration enforcement measures contributes to limiting tax evasion phenomena (Hoopes et al., 2012; Eberhartinger et al., 2021). Regarding the remaining variables of the model that refer to the size of the economy, the estimation results of the proposed model support the existence of a negative and statistically significant effect of the growth rate of the economy and GDP per capita on the effectiveness of audits. This result suggests that the tax administrations of economies that record high growth rates show lower tax audit hit rates.

Column (2) of Table 4 presents the estimation results of the proposed model after introducing additional variables concerning the level of governance and institutional shielding of the country. These variables reflect the society's overall perceptions of the quality of institutions, the possibility of political instability, the effectiveness of the government, the level of adherence to the rule of law and the level of corruption. The degree of autonomy of the tax administration is also introduced as a factor of the efficiency of tax audits. The results support the existence of a positive and statistically significant effect of the application of risk-based tax audit methods on the success of tax administration audits. Furthermore, the estimation results of the expanded model confirm again the effect of the enforcement power of the tax administration and the growth rate of the economy on the level of efficiency of tax audits. The above findings strengthen the robustness of the research results, as they largely confirm the conclusions drawn from the estimation of the basic model (column 1). With these data, it is found that tax administrations that apply risk-based tax audit techniques achieve an increase in the effectiveness of tax audits by 0.71 to 0.77 percentage points, on average (see Table 4), which corresponds to almost one standard deviation of the dependent variable HRA (see Table 2). In addition, a positive and statistically significant effect of the degree of autonomy of the tax administration on the success of tax audits is observed, which indicates that an independent or semi-autonomous tax administration achieves better tax audit results. Moreover, from the estimation of the proposed augmented model (column 2), it can be argued that government effectiveness and the quality of institutions significantly affect the success of audits.

6.2. Heterogeneity test results

The different characteristics of tax administrations and the economies in which they operate may significantly affect the results of tax audits. For this reason, it is considered important to conduct additional checks regarding the degree of heterogeneity of the economies included in the research sample, with the aim of revealing any different results between tax administrations.

The degree of impact of risk-based tax audits on the efficiency of tax administration audits may vary depending on the level of economic development of countries. Economies with a high growth rate are likely to have developed advanced risk-based tax audit methods and more effective audit procedures. In addition, these economies may not face additional fiscal constraints due to the high level of economic development, and consequently, the pressure on tax authorities to strengthen public revenues may be lower (Eberhartinger et al., 2021).

Table 5 presents the estimation results of the proposed model (2) in two groups of countries, namely those with a growth rate greater than unity and those [countries] less than unity. It is noted that the above models include the control variables X_{it} , as in equation (2). The results suggest that the impact of implementing risk-based tax audit strategies on audit efficiency is greater in economies with a higher growth rate.

Additionally, the level of governance of the country may affect the efficiency of tax audits differently, in the sense that countries with a high quality of governance may be more effective in implementing policies and developing socio-economic institutions and processes, so that the implementation of risk-based tax audit strategies to limit tax evasion is not required. On the other hand, countries with lower governance quality may exhibit reduced effectiveness in implementing compliance policies and audit procedures while, at the same time, suffering from the inadequacy of the socio-economic system and public structures and services due to widespread corruption and the lack of credibility and trust in the tax administration, resulting in a negative impact on the level of tax compliance (Anastasiou et al., 2018). Therefore, the application of risk-based tax audit methods becomes a necessary condition for limiting tax evasion (Eberhartinger et al., 2021).

Table 5 presents the estimation results of the proposed model (2) for the effectiveness of tax audits depending on the level of governance of the country, which is defined as the average score of the individual effectiveness and transparency criteria defined when formulating the augmented model (Mendoza et al.,

TABLE 5 Risk-Based Tax Audits and Country Characteristics

Variables	Low GDP Growth	High GDP Growth	Low Governance	High Governance
Risk-Based Audits	0.4644 (0.0035)*	1.1182 (0.000)*	0.84725 (0.000)*	0.7416 (0.000)*
Enforcement	0.0465 (0.017)*	0.0533 (0.012)*	0.0082 (0.000)*	0.0351 (0.009)*
Constant	5.5104 (0.000)*	3.6647 (0.000)*	3.5772 (0.000)*	4.3764 (0.000)*
Observations	32	52	48	36
R-squared	0.461187	0.419775	0.3369	0.2934
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

* indicates statistical significance at 5% significance level.

2017). The evidence suggests that the impact of risk-based tax audits on the efficiency of tax administration audits is greater in countries with a lower level of governance.

6.3. The impact of risk-based tax audits on the cost of tax administration

The analysis then focuses on the relationship between risk-based tax audits and the operating costs of the tax administration, with the aim of investigating any effects of implementing a risk-based tax audit strategy on the cost of tax services, which is given by the ratio of the operating costs of the tax administration to the amount of tax revenue collected. The investigation of this relationship is of particular interest as the implementation of risk-based tax audit methods increases the effectiveness of tax authorities that focus on tax audit cases with a high compliance risk; however, the use of such methods may cause increased costs of data collection and the acquisition of IT systems, which exceed the reduction in enforcement costs achieved as a compensation for the implementation of risk-based tax audit methods. Consequently, the study of the relationship between these two quantities is of particular importance for the efficiency of the tax administration. To investigate this relationship, the following model is proposed (4):

$$CTA_{j,t} = \beta_0 + \beta_1 RBA_{j,t} + \beta_2 ENF_{j,t} + \beta_3 X_{j,t} + u_{j,t} \quad (4)$$

where the variable *CTA* represents the cost of tax administration as the ratio of operating costs to total tax revenues collected. The data for this variable come from the Intra-European Organization of Tax Administrations (IOTA) [<https://data.rafit.org>] and cover the period 2016–2019. It is assumed that the lower the cost of tax administration, the greater the efficiency of the tax system for tax collection. Table 6 presents, among others, the estimation results of the proposed model (4) using the pooled OLS method.

The results presented in column (1) suggest that the application of tax audit techniques with risk analysis criteria [Risk-based audits] is associated with lower operating costs of the tax administration (coefficient -0.1733). On the contrary, the extensive use of enforcement measures in the form of an increased number of auditors as a percentage of the total number of tax administration employees increases the operating costs of the tax administration, as shown by the positive value of the relevant impact coefficient (coefficient 0.6216). This finding is consistent with the stated position of the OECD (OECD, 2019) that risk management based on advanced analytical data contributes to reducing the cost of tax audits.

6.4. Risk-based tax audits and the effectiveness of tax administration

Following the effort to investigate the relationship between the application of risk-based tax audit methods

TABLE 6 Risk-Based Tax Audits and Tax Administration Effectiveness

Variables	Cost (1)	Tax Effort (2)	Tax Buoyancy(3)
Risk-Based Audits	-0.1733 (0.0257)*	0.15756 (0.0024)*	-0.25328 (0.3444)
Enforcement	0.6216 (0.0933)**	0.0109 (0.9634)	-1.243236 (0.3341)
GDP growth	-0.1467 (0.0430)*	-0.21924 (0.000)*	-0.411446 (0.1031)**
GDP per capita	-0.1766 (0.0619)**	0.13474 (0.0314)*	0.255520 (0.4356)
Corruption Index	-0.0367 (0.5707)	-0.02935 (0.4923)	-0.266668 (0.2415)
Government Effectiveness	-0.0213 (0.8227)	0.07123 (0.2580)	0.267141 (0.4233)
Political Stability	0.0372 (0.6251)	-0.01887 (0.7069)	-0.59996 (0.0269)*
Rule of Law	0.0147 (0.8434)	0.02179 (0.6572)	-0.61014 (0.0215)*
Regulatory Quality	0.1613 (0.2003)	-0.1114 (0.1798)	1.08231 (0.0155)*
Autonomy	0.0405 (0.5645)	0.01432 (0.7573)	-0.28225 (0.2535)
CTR	0.1418 (0.3028)	-0.17117 (0.0612)**	-0.426029 (0.3757)
Constant	2.5141 (0.0298)*	-1.25656 (0.0969)**	-1.657556 (0.6773)
Observations	84	84	84
R-squared	0.895889	0.510973	0.795855
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

*, ** indicates statistical significance at 5% & 10% significance levels respectively.

and the effectiveness of the tax administration, the research extends to the country's tax effort, i.e., the tax revenues that the tax administration could collect, taking into account a set of macroeconomic, institutional and demographic characteristics of the economy. For example, a value of the tax effort index equal to one indicates that the economy collects exactly the projected tax revenues that correspond to its tax-paying capacity. Correspondingly, a value of the tax effort index less than one indicates that the tax revenues collected fall short of the potential revenues that the economy can generate. It is estimated that the application

of risk-based tax audit techniques would improve the country's tax effort by increasing the level of tax revenue collection to its maximum potential. To investigate this relationship, the following model is proposed (5):

$$TE_{i,t} = \beta_0 + \beta_1 RBA_{i,t} + \beta_2 ENF_{i,t} + \beta_3 X_{i,t} + u_{i,t} \quad (5)$$

where the variable TE represents the country's tax effort, as the ratio of actual tax revenues (as a percentage of GDP) to the estimated tax capacity of the economy. The data come from the USAID database and concern the period 2016-2019. The estimation results

of the above proposed model (5), using the pooled OLS method, are presented in Table 6 above (column 2). The analysis of these data shows that the implementation of tax case selection strategies for audit with risk analysis criteria has a positive and statistically significant effect on the country's tax effort, contributing to the collection of more tax revenues in a way that more fully utilizes the tax capacity of the economy.

Furthermore, the analysis showed that the size of the economy affects the country's tax effort. Specifically, the estimation results of model (5) [column 2] support that the growth rate of the economy and GDP per capita have a negative and statistically significant effect on the tax effort, suggesting that economies with a high growth rate are unable to collect the tax revenues that correspond to their tax capacity. Similarly, the level of corporate tax rates adversely affects the collection of the country's potential tax revenues according to its characteristics.

Furthermore, the analysis focuses on the study of the relationship between risk-based tax audits and the country's tax buoyancy, i.e., the degree of responsiveness of tax revenues collected in response to changes in the tax base. It is estimated that the implementation of risk-based tax audit methods will contribute to the increase in tax revenues in proportion to the increase in the tax base, which is measured by the GDP index. The following model is proposed to investigate this relationship (6):

$$TB_{j,t} = \beta_0 + \beta_1 RBA_{j,t} + \beta_2 ENF_{j,t} + \beta_3 X_{j,t} + u_{j,t} \quad (6)$$

where the variable TB represents the country's tax buoyancy, as the ratio of the percentage change in tax revenues (by type of tax) to the percentage change in the tax base (or GDP). The data come from the USAID database and concern the period 2016-2019. The estimation results of the proposed model (6) are presented in Table 6 (column 3) and show that the use of tax audit techniques with risk analysis criteria does not have an effect on the country's tax buoyancy, given that the coefficient of the RBA variable is not statistically significant. On the contrary, factors related to the rate of economic growth, political stability and the quality of institutions are related to the possibility of increasing tax revenues to a greater extent than the increase in the tax base.

7. Conclusions

The purpose of this article is to investigate the relationship between the implementation of tax case selection

strategies for audit based on risk analysis criteria and the effectiveness of tax audits, the operating costs of the tax administration and tax characteristics of the economy, using annual observations from 21 European Union countries during the period 2016-2019.

The results of the analysis conducted suggest that the application of tax audit case selection techniques based on risk analysis criteria is positively related to the effectiveness of tax administration tax audits. In addition, heterogeneity tests at the country level showed that the impact of tax audits based on risk criteria is greater in economies with a higher growth rate and in countries with a lower quality of governance. The results of the study also showed that the application of risk-based tax audit strategies is associated with lower operating costs of the tax administration and higher tax effort of the country, achieving a fuller utilization of its tax capacity. The above findings are in partial agreement with the conclusions of the study by Eberhartinger et al. (2021), whose results showed that tax audits using risk analysis criteria are associated with a lower level of tax avoidance by businesses and with lower tax administration costs, indicating an incremental effect on reducing tax evasion and enhancing tax revenues. In addition, the conclusion that the selection of tax cases to be audited using risk criteria increases the efficiency of tax audits could be linked to the results of the study by Hsu et al. (2015), who found that the application of risk analysis methods contributes to improving the efficiency of the tax case selection process for audit. Furthermore, it could be considered that the above conclusions agree, at least partially, with the results of the analysis by Van Gansberghe (2005) on the relationship between a country's level of governance, the quality of tax legislation, and the efficiency of tax audits.

In view of this, the findings of the preceding analysis highlight the value of developing and implementing tax audit methods based on risk analysis criteria, providing measurable and objective evidence that scientifically substantiates the superiority of risk-based tax audit methods on the effectiveness of audits carried out by the tax authorities of Greece and the European Union and the operating costs of the tax administration. Therefore, the implementation of tax audit methods based on risk analysis criteria proves to be an important measure to address tax compliance risk and a useful tool for the tax administration in its effort to limit tax evasion. With these data, it is recommended to extend the application of risk analysis methods to individual areas of tax audit and to develop modern risk management procedures across all tax administration functions.

References

- Adane, A. B. (2020). Determinants of Tax Audit Effectiveness: In Case of Gondar Zone Revenue Offices. *Research Journal of Finance and Accounting*, Vol. 11, No. 23.
- Advani, A., Elming, W., & Shaw, J. (2019). "The dynamic effects of tax audits" (Warwick Economics Research Papers No. 1198).
- Alm, J., & McKee, M. (2004). "Tax compliance as a coordination game". *Journal of Economic Behavior and Organization*, 54(3), pp. 297–312.
- Alm, J., C. Blackwell, & McKee, M. (2004). "Audit Selection and Firm Compliance with a Broad-Based Sales Tax". *National Tax Journal* 57 (2), pp. 209–227.
- Anastasiou, A., Papageorgiou, C., Kalamara, E., Komninos, D., Dermatis, Z., & Liargovas, P. (2018). "Corruption Perception Index (CPI) as an index of economic growth for European countries". *Theoretical Economics Letters*, 2018, 8, 524–537.
- Anastasiou, A., Kalligosfyris, C. & Kalamara, E. (2021). "An Analysis of the Efficiency of Tax Administrations of 26 European Countries in 2017". *Bulletin for International Taxation*, Vol. 75, No 2, pp. 67–83.
- Anastasiou, A., Kalligosfyris, C., Kalamara, E., & Dermatis, Z. (2023). "Evaluation of the factors affecting tax audits effectiveness. Evidence from EU tax administrations." Proceedings of the International Conference on Business and Economics, Hellenic Open University, ICBE -HOU 2023, Vol. 3 No. 1.
- Anastasiou, A., Kalligosfyris, C., & Kalamara, E. (2024). Determinants of tax revenue performance in European Countries: A panel data investigation. *International Journal of Public Administration*, Vol. 47, Issue 4, pp. 227–242, <https://doi.org/10.1080/01900692.2022.2111578>
- Armstrong, C. S., Glaeser, S., Huang, S., & Taylor, D. J. (2019). "The economics of managerial taxes and corporate risk-taking". *The Accounting Review*, 94(1), pp. 1–24.
- Artavanis, N., Morse, A., Tsoutsoura, M. (2012). "Tax Evasion Across Industries: Soft Credit Evidence From Greece", Chicago Booth Research Paper: 12–25.
- Ayalew, Elias (2014). *Factors affecting tax audit effectiveness in Bahir Dar city administration*.
- Bal, A. (2019). "Ruled by algorithms: the use of "black box" models in tax law", Tax Notes International.
- Baralexis, S. (2004). "Creative accounting in small advancing countries: The Greek Case". *Managerial Auditing Journal*, 19 (3): 440–461.
- Battaglini, M., Guiso, L., Lacava, C., & Patacchini, E. (2019). "Tax professionals: tax-evasion facilitators or information hubs?" (National Bureau of Economic Research Working Paper Series No. 25745).
- Beer, S., Kasper, M., Kirchler, E., & Erard, B. (2020). "Do audits deter or provoke future tax noncompliance? Evidence on self-employed taxpayers". *CESifo Economic Studies*, 66(3), pp.248–264.
- Chalu, H., & Mzee, H., (2018). Determinants of tax audit effectiveness in Tanzania. *Managerial Auditing Journal*, <https://doi.org/10.1108/MAJ-06-2016-1390>.
- De Backer, J., Heim, B. T., Tran, A., & Yuskavage, A. (2018). "Once bitten, twice shy? The lasting impact of enforcement on tax compliance". *The Journal of Law and Economics*, 61(1), pp. 1–35.
- De Simone, L., Stomberg, B., & Brian, W. (2020). "Does tax enforcement disparately affect domestic versus multinational corporations around the world?" (Stanford University Graduate School of Business Research Paper No. 18-37).
- Dellaportas, P., Ioannidis, E., & Kotsogiannis, Ch., (2021). "Sample size determination for risk-based tax auditing". *Journal of the Royal Statistical Society Series A*, 184(2), pp.479–493.
- Drogalas, G., Sorros, I., Karagiorgou, D., & Diavastis, I. (2015). Tax audit effectiveness in Greek firms: Tax auditors perceptions. *Journal of Accounting and Taxation* 7(7) (2015): 123–130.
- Eberhartinger, E., Reyhaneh, S., Caren, S., & Yuchen, W. (2021). "Are risk-based tax audit strategies rewarded? An analysis of corporate tax avoidance", arqus Discussion Paper, No. 267, Arbeitskreis Quantitative Steuerlehre (arqus), Berlin.
- Gemmell, N., & Ratto, M. (2012). "Behavioral responses to taxpayer audits: Evidence from random taxpayer inquiries". *National Tax Journal*, 65(1), pp.33–58.
- Gupta, M., & Nagadevara, V. (2007). "Audit Selection Strategy for Improving Tax Compliance: Application of Data Mining Techniques. In Foundations of E-government", eds. A. Agarwal and V. Ramana. Proceedings of the eleventh International Conference on e-Governance, Hyderabad, India, December 28–30.
- Hasan, I., Hoi, C.K., Wu, Q., & Zhang, H. (2017). "Does social capital matter in corporate decisions? Evidence from corporate tax avoidance". *Journal of Accounting Research*, 55(3), pp.629–668.
- Hashimzade, N., & Myles, G. (2017). "Risk-based audits in a behavioral model". *Public Finance Review*, 45(1), pp.140–165.
- Hashimzade, N., Myles, G. D., & Rablen, M. D. (2016). "Predictive analytics and the targeting of audits". *Journal of Economic Behavior and Organization*, 124, pp.130–145.
- Hoopes, J., L., Devan, M., & Pittman, J. A. (2012). "Do IRS audits deter corporate tax avoidance?" *The Accounting Review*, 87(5), pp.1603–1639.
- Hsiao, C. (2003). *Analysis of Panel Data* (2nd ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9780511754203>
- Hsu, K.-W., Pathak, N., Srivastava, J., Tschida, G., & Bjorklund, E. (2015). "Data mining based tax audit selection: A case study of a pilot project at the Minnesota department of revenue BT - real world data mining applications" (M. Abou-Nasr, S. Lessmann, R. Stahlbock, & G. M. Weiss (eds.), pp. 221–245). Springer International Publishing.
- Jackson, B. R., & Milliron, V. C. (1986). "Tax compliance research: findings, problems, and prospects". *Journal of Accounting Literature*, 5(1), pp.125–165.
- Jacob, M., Rohlfing-Bastian, A., & Sandner, K. (2021). "Why do not all firms engage in tax avoidance?" *Review of Managerial Science*, 15(2), pp.459–495.
- Jimenez, P., & Iyer, G. S. (2016). "Tax compliance in a social setting: The influence of social norms, trust in government, and perceived fairness on taxpayer compliance". *Advances in Accounting*, 34, pp.17–26.
- Kasper, M., & Alm, J. (2020). "Audits, audit effectiveness, and post-audit tax compliance" (WU International Taxation Research Paper Series No. 2020-12).

- Keen, M., & Slemrod, J. (2017). "Optimal tax administration". *Journal of Public Economics*, 152, pp.133–142.
- Khwaja, M. S., Awasthi, R., & Loeprick, J. (2011). *Risk-based tax audits: Approaches and country experiences*. The International Bank for Reconstruction and Development / The World Bank, Washington.
- Komninos D., Dermatis, Z., Anastasiou, A., & Liargovas, P. (2020). "The effect of over-taxation and corruption at commercial enterprises in Greece: Evidence from a survey experiment". *Journal of Statistical and Econometric Methods*, Vol. 9, No. 4, 2020, 153–170.
- Law, K. K. F., & Mills, L. F. (2017). "Military experience and corporate tax avoidance". *Review of Accounting Studies*, 22(1), pp.141–184.
- Liargovas, P., Anastasiou, A., Komninos, D., & Dermatis, Z. (2020). "Mapping the Socio Economic Indicators of Greece from the Implementation of the Monetary Policy and the Tax Administration". *Applied Economics and Finance*, 7: 42–52.
- Loyland, K., Raaum, O., Torsvik, G., & Ovrum, A. (2019). "Compliance effects of risk- based tax audits" (CESifo Working Papers No. 7616).
- Mendoza, J. P., Wielhouwer, J. L., & Kirchler, E. (2017). "The backfiring effect of auditing on tax compliance". *Journal of Economic Psychology*, 62, pp.284–294.
- OECD (Organisation for Economic Co-operation and Development). (2004a). "Compliance Risk Management: Audit Case Selection Systems". OECD, Centre for Tax Policy and Administration, Paris.
- OECD (Organisation for Economic Co-operation and Development) (2004b). "Compliance Risk Management: Managing and Improving Tax Compliance". OECD, Centre for Tax Policy and Administration, Paris.
- OECD (Organisation for Economic Co-operation and Development) (2004c). "Compliance Risk Management: Use of Random Audit Programs". OECD, Centre for Tax Policy and Administration, Paris.
- OECD (Organisation for Economic Co-operation and Development) (2017). "Tax administration 2017: comparative information on OECD and other advanced and emerging economies". Electronic copy available at: <https://ssrn.com/abstract=3911228> 34. OECD Publishing.
- OECD (Organisation for Economic Co-operation and Development) (2019). "Tax administration 2019: comparative information on OECD and other advanced and emerging economies". OECD Publishing.
- Siddiqi, N. (2006). *Credit Risk Scorecard*. Hoboken, NJ: Wiley.
- Slemrod, J. (2019). "Tax compliance and enforcement". *Journal of Economic Literature*, 57(4), pp. 904–954.
- Van Gansberghe, and Cecilia Nordin (2005). "Internal auditing in the public sector: a consultative forum in Nairobi, Kenya, shores up best practices for government audit professionals in developing nations". *Internal Auditor*, vol. 62, no. 4, pp. 69+
- Yusof, A.M.N., Ling M., & Wah, B. (2014). "Tax non-compliance among SMCs in Malaysia: Tax audit evidence". *Journal of Applied Accounting Research*, 15(2), 215–234.

Recent Studies and Reports published by KEPE

STUDIES

87. E. Tsouma, F. Economou, A. Kontolaimou and G. Skintzi. *Value Added Tax Revenue Buoyancy and Elasticity in Greece*. Athens, 2025.
86. Em.G. Marsellou. *Income Distribution and Aggregate Demand: A Theoretical and Empirical Investigation Using Data from the Greek Economy, 1960-2017*. Athens, 2025 (in Greek).
85. C. Passas. *Productivity issues in the Greek economy: Social determinants*. Athens, 2024 (in Greek).
84. K. Loizos. *The Dimensions of the Problem of Non-performing Loans and the Greek Case During the Period 2002Q4-2019Q1*. Athens, 2022 (in Greek).
83. E. Athanassiou, A. Kotsi and E.I. Nitsi. *Export Diversification, Specialisation and Performance: The Case of Greece*. Athens, 2022 (in Greek).
82. T. Tsekeris and S. Papaioannou. *Agglomeration Economies and Productivity in the EU Regions*. Athens, 2021.
81. E. Tsouma, F. Economou, I. Kontouri, Y. Panagopoulos and G. Skinzi. *Excise Taxes on Tobacco Products and Alcoholic Beverages in Greece: Revenues and Elasticities*. Athens, 2020 (in Greek).
80. I. Konstantakopoulou, T. Magdalinos and G. Skintzi. *Investigation of External Trade and Export Competitiveness*. Athens, 2019 (in Greek).
79. F. Economou and Ch.Triantopoulos, *Economic Crisis and Deposits: Greece and Southern Europe*. Athens, 2018.
78. S. Papaioannou. Th. Tsekeris and Ch. Tassis, *Regional and Sectoral Efficiency of the Greek Economy: Measurement and Determinants*. Athens, 2017.
77. I. N. Reziti, *Non-Linear Adjustment in the Greek Milk Market*. Athens, 2016.
76. I. Konstantakopoulou. *Analysis of Greek External Trade: Sectoral Analysis, Comparative Advantages, Exports and Economic Growth, 2000-2014*. Athens, 2015 (in Greek).
75. J. Cavounidis and I. Cholezas. *Educational and Labour Market Trajectories of Youth of Migrant Origin*. Athens, 2013 (in Greek).
74. S. Papaioannou. *Economic Growth in Greece: Trends and Future Prospects*. Athens, 2013 (in Greek).
73. E. A. Kaditi. *Analysis of the Greek Food Supply Chain*. Athens, 2012.
72. Th. Lianos and J. Cavounidis. *Migration Flows from and to Greece in the 20th Century*. Athens, 2012 (in Greek).
71. A. Koutroulis. *Finance and Economic Growth: The Case of Greece 1960-2005*. Athens, 2011.
70. T. Tsekeris. *Travel Consumption and Market Competition in Greece*. Athens, 2010.
69. I. Reziti. *The Price Transmission Mechanism in the Greek Agri-Food Sector*. Athens, 2010 (in Greek).
68. K. Athanassouli. *The Professional Transition of Graduates from Schools of Philosophy*. Athens, 2009 (in Greek).
67. Kl. Efstratoglou. *Assessment of the Professional Training of the Unemployed in Greece*. Athens, 2009 (in Greek).
66. P.-I. K. Prodromidis. *The Spatial Distribution of Male and Female Employment and Unemployment in Greece*. Athens, 2008.
65. Y. Panagopoulos and Y. Peletides. *Basel II: Description and Consequences for the Banking System*. Athens, 2008 (in Greek).

64. M. G. Arghyrou. *The Effects of the Accession of Greece to the EMU: Initial Estimates*. Athens, 2006.
63. P.-I. K. Prodromidis. *A Regional Analysis of Declared Incomes in Greece*. Athens, 2006.
62. S.K. Spathi. *Comparing Air and Sea Passenger Transportation in Domestic Lines. Econometric Estimation of Demand*. Athens, 2005 (in Greek).
61. C.N. Kanellopoulos, in cooperation with P. Papaconstantinou. *Economic Aspects of Adult Training*. Athens, 2005 (in Greek).
60. Th. Terrovitis. *Production and Use of Information and Communication Technologies in Greece: Impact on the Greek Economy*. Athens, 2005 (in Greek).
59. A. Lampropoulou. *The Greek Agriculture in the Context of Foreign Competition*. Athens, 2005 (in Greek).
58. M.St. Panopoulou. *Technological Change and Corporate Strategy in the Greek Banking Industry*. Athens, 2005.
57. S. Chandrinou in association with K. Altinoglou and A. Pepe. *Evolution of SMEs in Greece. Estimation and Comparability of Efficiency and Flexibility of SMEs and Large Manufacturing Enterprises*. Athens, 2005 (in Greek).

REPORTS

83. *Short-Term Accommodation Rentals in Greece*, by E. Athanassiou and A. Kotsi. Athens, 2022 (in Greek).
82. *The Effects of the System of Social Protection on Poverty and Inequality in Greece and the EU*, by V. Missos. Athens, 2021 (in Greek).
81. *Information and Communication Technologies and e-Commerce*, by A. Kontolaimou, E. Korra and G. Skintzi. Athens, 2021 (in Greek).
80. *The Manufacturing Industry in Greece: Developments, Prospects and Policy Challenges*, by A. Koutroulis (coordinator), E. Athanassiou, N.C. Kanellopoulos, A. Kotsi and I. Cholezas. Athens, 2018.
79. *Developments and Prospects of the Shipbuilding Industry in Greece*, by E. Athanassiou and A. Koutroulis. Athens, 2018 (in Greek).
78. *Assessment of Selected Structural Reforms Regarding Competition and Their Economic Impact*, by R. Karagiannis, A. Kotsi (coordinators), E. Athanassiou, E.I. Nitsi and I. Cholezas. Athens, 2017 (in Greek).
77. *Cultural and Religious Tourism as Components of the National Tourist Product*, by N. Vagionis and S. Skoultos. Athens, 2016 (in Greek).
76. *The Emigration of Greeks and Diaspora Engagement Policies for Economic Development*, by J. Cavounidis. Athens, 2016.
75. *General Government Spending Review 2013-2016: An Analysis Framework for Future Spending Reviews in Greece*, by Y. Monogios, E. I. Nitsi (coordinators), J. N. Anastassakou, I. Cholezas, N. C. Kanellopoulos, R. Karagiannis, I. Konstantakopoulou, V. Lychnaras and Th. Tsekeris. Athens, 2016.
74. *Freight Transport and the Development of International Logistics Hubs in Greece*, by Th. Tsekeris. Athens, 2016 (in Greek).
73. *Impact Assessment of the Liberalization in 20 Professions*, by A. Kotsi, E. Athanassiou, N. C. Kanellopoulos, R. Karagiannis, S. Papaioannou and J. Katselidis. Athens, 2016 (in Greek).
72. *Proposals for the Development of Cultural Tourism in Greece*, by W. Kafouros. Athens, 2015 (in Greek).
71. *Liberalization of Professions: Extent and expected effects*, by A. Kotsi, E. Athanassiou, N.C. Kanellopoulos, R. Karagiannis, S. Papaioannou and J. Katselidis. Athens, 2015 (in Greek).

70. *The Economies of the Western Balkans: Transition, Growth and Prospects for EU Accession*, R. Panagiotou. Athens, 2012.
69. *The Equalisation of the Qualifying Age for Old Age Pensions for Females in Greece to the Regime in Force for Males*, by L. Athanassiou, F. Zervou and A. Kotsi. Athens, 2012 (in Greek).
68. *Air Transport and Airports in Greece: Current Developments, Economic Importance and Efficiency*, by Th. Tsekeris and K. Vogiatzoglou. Athens, 2011 (in Greek).
67. *Market Conditions and Competition in the Greek Economy*, by Study Group of KEPE, ed. K. Kanellopoulos. Athens 2011 (in Greek).
66. *Luxury Hotels in Greece: Dynamics and Development Potential*, by N. Vagionis, E. Kasimati, W. Kafouros. Athens, 2011 (in Greek).
65. *Labor Market: Developments and Policy Guidelines*, by K. Kanellopoulos, K. Athanassouli, K. Efstratoglou, G. Panagopoulos, P. Papakonstantinou and P.K. Prodromidis. Athens, 2010 (in Greek).
64. *Wages, Pensionable Time and Working Conditions in the Public and Private Sector*, by K. Kanellopoulos, F. Zervou. Athens, 2010 (in Greek).
63. *Transport and Economy: Contribution, Trends and Prospects in Greece with Emphasis on Surface Transport*, by T. Tsekeris and E. Tsouma. Athens, 2010 (in Greek).
62. *The Greek Commercial Fleet*, by S. Spathi, S. Karagiannis and N. Georgikopoulos. Athens, 2010 (in Greek).
61. *The Social Capital in Greece*, by E. Poupos. Athens, 2010 (in Greek).
60. *The Agricultural Sector in Greece*, by E. Kaditi and E. Nitsi. Athens, 2010 (in Greek).
59. *Size Profile and Labour Market Analysis of Immigration in Greece*, by K. Kanellopoulos, M. Gregou and A. Petralias. Athens, 2009.
58. *The Evolution and Viability of the Greek Pension System*, by F. Zervou. Athens, 2009 (in Greek).
57. *The Economic and Demographic Viability of the Greek Social Insurance System*, by L. Athanassiou, F. Zervou and A. Kotsi. Athens, 2009 (in Greek).
56. *Multilateral Trade Negotiations: Trade in Services*, by V. Notis. Athens, 2008 (in Greek).
55. *FYROM's transition: From Yugoslavia to the European Union?*, by R. Panagiotou, Athens, 2008.
54. *The Development Process and Long Term Trends in Economic Behaviour and Economic Conditions in Greece*, by L. Athanassiou, Athens, 2007 (in Greek).
53. *Tourist Development in Greece and the Mediterranean: A Comparative Analysis*, by N. Vagionis and W. Kafouros. Athens, 2007 (in Greek).
52. *Financing & Insurance of Export Credits*, by Cl. B. Efstratoglou. Athens, 2007 (in Greek).
51. *The Greek Energy Sector: Tendencies and Ascertainment*, by N. Manolas. Athens, 2007 (in Greek).
50. *Minimum Guaranteed Income in EE15 Countries and Possibilities in its Implementation to Greece*, by A. Balfoussias and K. Kotsis. Athens, 2007 (in Greek).
49. *Agricultural Trade between Greece and Selected Balkan Countries: Comparative Advantage and Competitiveness*, by P. Paraskevaides. Athens, 2006 (in Greek).
48. *Vocational Education in Greece: Developments, Problems and Prospects*, by C. A. Karmas. Athens, 2006 (in Greek).
47. *Restructuring and Privatization of the Greek Railways and Ports* by D.Th. Athanassakopoulos. Athens, 2006 (in Greek).
46. *Greek Agriculture on the Eve of the New Conditions and Policy Framework*, by C. Carabatsou-Pachaki in cooperation with P. Tonikidou. Athens, 2006 (in Greek).

45. *Europe and the International Economic Environment in 2005: Recent Developments and Outlook*, by St. Savva-Balfoussias, E. Athanassiou, St. Karagiannis and K. Tsouma. Athens, 2007.
44. *The Systemic Transformation of the Balkan States and the Developments of the Economic Relations with Greece*, by N. Vagionis, W. Kafouros and R. Panagiotou. Athens, 2005 (in Greek).
43. *Recent Developments in the Greek Housing Market*, by St. Himoniti-Terroviti. Athens, 2005 (in Greek).

Greek Economic Outlook

