GREEK NATIONAL PRODUCTIVITY BOARD

Annual Report 2021

Growth

Productivity and Competitiveness Developments: Towards a Resilient and Sustainable Growth

Greek National Productivity Board Annual Report 2021

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Contributions

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Foreword

Panagiotis Liargovas

The Centre of Planning and Economic Research (KEPE) assumed the function of the Greek National Productivity Board in April 2019.[1] Even though this is a new role for KEPE, the Centre has a long history of research in matters concerning the Greek economy and its productivity. Indeed, since its establishment in 1959, headed by Andreas G. Papandreou, who would later become the Prime Minister of Greece, KEPE has kept a close eye on the Greek economy, producing studies and reports that have helped economic policy makers in their decisions and have contributed to the scientific study of the Greek economy. Today, with 30 researchers on staff, KEPE remains the largest research institute on economic matters in Greece. KEPE is mostly financed by the Greek Government but retains its independence. Researchers are hired with open calls for specific positions and their recruitment and promotion is decided by independent committees. We have researchers specialising in different fields of research and sectors of the Greek economy. This expertise has been used in producing the third productivity and competitiveness report at hand.

Apart from producing the annual report on productivity, KEPE has already produced several studies and reports that deal directly with issues pertaining to productivity. As a National Productivity Board, KEPE is in the process of producing a number of more specialised studies that will help us understand the productivity and competitiveness problems of the Greek economy. Indeed, the Global Economic Crisis followed by the coronavirus pandemic have been particularly harsh on Greece, with a drop in its output that has been one of the largest for a developed country in living memory.

Despite the severe economic contraction during the pandemic, mainly caused by reduced private consumption and the direct hit on the tourism industry, the Greek economy now stands on uniquely favourable conditions for expansion. This fact is clearly indicated by an exceptional growth in GDP by 16.2% during the second quarter of 2021. Moreover, it is of critical note that the rebound in economic activity is fueled not only by private consumption, but also, and more importantly, by an increase in private investment across a broad range of asset categories.

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1. Law 4605/2019, Art. 37, Gov. Gaz. A΄ 52/1.4.2019.

This underlying recovery process underway is expected to be further enhanced by the Greek National Recovery and Resilience Plan, Greece 2.0, mobilising a total amount of 59.8 billion euro, or 36.1% of GDP. The main aim of this programme is to fully reverse the adverse effects of the COVID-19 crisis and simultaneously to close the output gap formed because of the economic crisis during the last decade.

All the pillars of the recovery programme, namely, green transformation, digitalisation, enhancing labour force skills, and supporting private investment, have a direct link to productivity growth, either by upgrading and updating capital, or by upskilling (or reskilling) labour force. They correspond to the pillars set out in Article 3 of the Recovery and Resilience Facility politically agreed between the European Parliament and the Council in December 2020 (2020/0104 (COD)). Therefore, our estimate is that both short- and medium-term prospects of productivity growth are favourable.

Nonetheless, a few underlying issues of critical importance affecting the long-term stability of the economy remain, such as unfavourable demographic developments and a fragile banking system.

We hope that this report, which takes a long view of examining the performance of our economy, will provide a useful overview of the current situation and will indicate the necessary reforms to accompany the Recovery Plan of the Greek economy —a plan that will liberate the productive and innovative forces of the economy and allow Greece to transform its growth model.

Professor Panagiotis Liargovas
Scientific Director, National Productivity Board
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Preface

Theodore Tsekeris

The Greek economy is currently experiencing the process of recovery from the highly adverse impact of the pandemic, although some consequences may be long lasting. At the same time, the country is attempting to structurally address several challenges to ensure a resilient and sustainable growth. On the one hand, investments and structural reforms mainly aiming at upgrading human resources, entrepreneurship, environmentally friendly infrastructure and digitisation need to be efficiently planned and implemented to reinforce the preparedness, responsiveness and resilience of the economy to future (health, environmental, economic, social, technological) crises. On the other hand, it should be cautioned that the prompt clean energy transition should not incur additional costs, as it would harm cost competitiveness and would entail further social inequalities. Moreover, investment in green, digital and other types of infrastructure, should entail balanced and adequate economic and social returns to circumvent severe core-periphery disparities, fiscal imbalances and trade deficits in the long term.

For this reason, the components of the new investment package and structural reforms should be timely and effectively coordinated with each other to set forth a new production model, which would combine efficiency, innovation and extroversion, with a robust, inclusive and sustainable growth. In this respect, the country should harness the reorganisation/regionalisation of global value chains to attract activities in more productive and dynamic sectors of the economy and gradually reduce its dependency on imports. Long-standing inequalities in regional performance should also be properly addressed, as they hinder national competitiveness, but without compromising the development of the capital region of Attiki, which is the workhorse of the Greek economy. This annual report highlights the favourable developments in the country's economic prospects as well as the uncertainties and risks associated with both the dynamics and the quality of growth, emphasising the efficiency, fairness, robustness and competitiveness of the health care services and of the energy markets and the green transition process.

Theodore Tsekeris
Head of the Steering Committee
National Productivity Board of Greece

Executive Summary

This annual report underscores the crucial role of productivity and efficiency in the formulation of comprehensive EU and national policies and the resilient and sustainable growth of the Greek economy. Several current issues regarding the recovery rate, investments from the Recovery and Resilience Facility (RRF) of the Next Generation EU (NGEU), the implementation of structural reforms, productivity developments and competitiveness indicators are analysed, together with potential risks and long-term challenges, which should be tackled within a comprehensive strategic development framework. It is argued that the country must reverse the divergence of its economy from the corresponding EU average, through promoting its efficiency and digitisation, attracting investments, and increasing its integration in global value chains and regional output/ employment multiplier effects against import dependence.

The growth projections, which are made on the basis of alternative economic scenarios, underline the considerable expansion opportunities as well as sources of uncertainty that may hinder growth dynamics. The Greek National Recovery and Resilience Plan (Greece 2.0) provides both short- and medium-term prospects for productivity growth through supporting private investment, green transformation, digitisation and skills development. Yet critical issues such as those related to macroeconomic stability, high reliance on services receipts from tourism and transport, core–periphery disparities and adverse demographic trends should be appropriately addressed.

Despite the positive impact of the pandemic on the acceleration of digitisation and the attraction of investment resources, other issues were further aggravated, such as social and spatial inequalities, the current account deficit, the debt-to-GDP ratio, fiscal imbalances and cost/price competitiveness. Although there are signs of strong digital competitiveness at the business level, there are still considerable gaps and weaknesses at the individual/household and employee levels as well as at the state and infrastructure levels.

This annual report gives special emphasis to two major challenges for the sustainable and resilient future of both the EU and Greek economy. The first challenge refers to the provision, efficiency and competitiveness of health services, in order to support productivity and strengthen the ability to tackle new health crises. Our analysis shows that Greece has diminished the inefficient usage of health resources in recent years, while the Greece 2.0 plan can further enhance resilience and efficient resource allocation in the health system. Nonetheless, Greece is ranked low in the competitiveness index related to health, having weaknesses in public spending on health, health infrastructure, and universal health care coverage, due to the high rate of out-of-pocket payments of households, who pay 35.2% of the total current health expenditure.

The second challenge concerns the productivity and competitiveness of the energy sector and the ability to ensure a smooth transition to decarbonatisation and affordable energy. During the last years, Greece has implemented several reforms to accomplish harmonisation with environmental targets, achieving to reduce the greenhouse gas (GHG) emissions per capita and the intensity of GHG emissions of energy consumption, which is below the EU average. It has also expanded

competition in the energy market and set the goal of withdrawing all lignite plants by 2028, developing a Just Transition Development Plan for lignite areas.

Nevertheless, electricity and gas prices for households in Greece, expressed in purchasing power standard (PPS), are among the highest in the EU, and the share of energy poverty remains much higher than the EU average, which makes the national economy more exposed to the recent increase of energy products' prices. At the same time, Greece's economy shows increased dependency on energy imports and much lower energy productivity than the EU average. Thus, the considerable budget of the Recovery and Resilience Plan (about 6 billion euro) allocated to energy and green transition projects should be fully exploited to expedite the supply of decarbonised and affordable energy and achieve an energy-competitive, inclusive and carbon-neutral growth, with the least possible negative effects on the economy and the society.

1. Introduction

1.1. The role of productivity in the EU and national policies

The role that the COVID-19 pandemic has hitherto played in the economic activity around the world greatly varies and is constantly changing from place to place. Several composite metrics, such as the Oxford COVID-19 Government Response Tracker (OxCGRT) "stringency index", Bloomberg's COVID Resilience Ranking and the OECD Regional Recovery Indicators, suggest that these variations can be due to several reasons, such as the responsiveness of governments to implement a wide range of counter-measures and the effectiveness of policy responses to handle the pandemic with the least social and economic upheaval. The economic and social effects of the pandemic can be regarded as having possibly amplified competitiveness gaps and inequalities between the richer, more efficient places and the poorer, less efficient places, both across countries and regions within them, due to the increased capacity of the former to adequately respond to and more quickly recover from the pandemic crisis.

In this respect, the turbulence caused by the pandemic in the European and global economies has set forth the need for reorienting the objectives of the national and EU policies in relation to productivity and competitiveness issues. The allocation of a significant proportion of funds originating from the Recovery and Resilience Facility (RRF) of the Next Generation EU (NGEU) to relatively high productivity (Information and Communication or ICT-intensive) activities, in conjunction with the accelerated digitisation of public services during the pandemic, are expected to reinforce productivity.

Therefore, the effectiveness of governments to design and implement policy measures to protect public health as well as to efficiently absorb investment resources and deploy structural reforms to efficiently diffuse benefits across sectors and regions will determine the direction and speed at which places will shift to a more resilient and sustainable future. Furthermore, under the assumption of a full absorption rate, the annual public investment in several, mostly smaller, EU economies, including Greece, should more than double over the next four years (Alcidi et al., 2020). However, depending on the productivity growth scenario, the role of fiscal spillover effects —across countries, regions and sectors— on smaller economies located in southern Europe, such as Greece, are expected to be small or modest, as a portion of the GDP impact, because their trade partners receive smaller allocations and their economies tend to be less integrated in production chains (Pfeiffer et al., 2021).

By and large, in most of the EU countries, productivity is anticipated to follow the GDP growth dynamics of the whole economy. However, labour productivity in Greece is predicted to remain substantially unchanged during the time horizon 2021–2022, in relation to the immediate pre-pandemic period, compared to the upsurge noticed in the average EU27 and EA19 labour productivity (Figure 1.1). These trends suggest the continuing divergence of the labour productivity of the Greek economy with the economy of the EA19 and the whole EU. On the contrary, total

Figure 1.1 Labour productivity in Greece, the EA19 and the EU27 during 2010–2020 and 2021–2022 forecasts (at 2015 reference level)
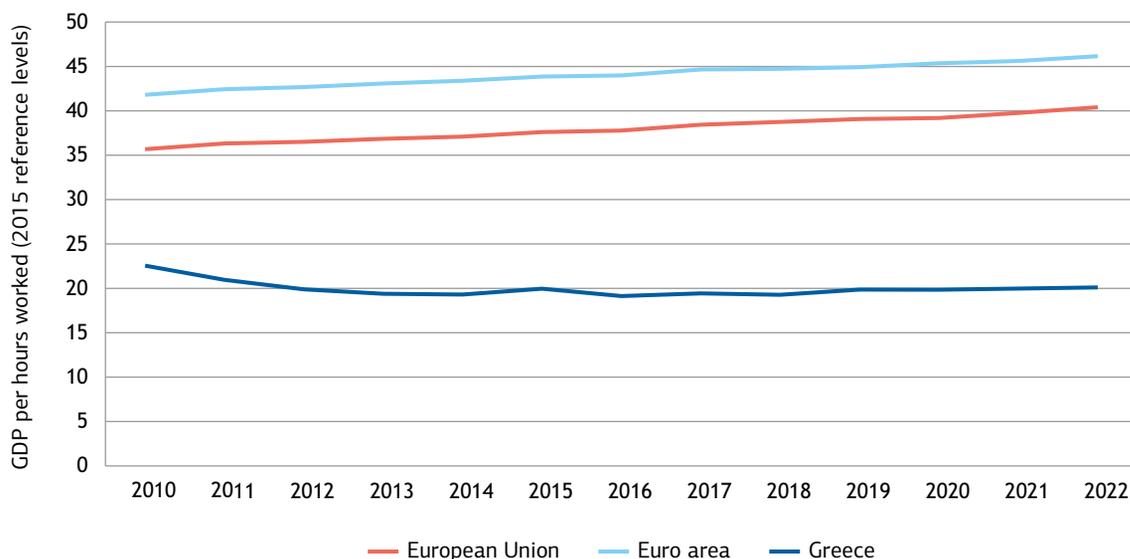
Source: AMECO.

factor productivity (TFP) of the Greek economy is predicted to have a faster recovery than the EA19 average, with both climbing at higher levels than those in 2019 (Figure 1.2).

The aforementioned developments should properly recognise the considerable heterogeneity that underlines productivity among regions and sectors of the Greek economy (Papaioannou et al., 2017; Greek NPB, 2019, 2020). In particular, sectors highly dependent on the external market and having an increased contribution to the country's GDP and employment, such as tourism, are among those most affected by the pandemic, despite the strong rebound of tourist arrivals and receipts in 2021. The disruption of value chains has posed increased threats to less advantaged (laggard) regions and to sectors mostly dependent on imports, such as manufacturing, which is typically among the most productive activities (Greek NPB, 2020).

The Greek regions did not succeed in recovering from the economic crisis, which was deep and persistent in Greece during the 2010s. Specifically, the recovery rate for all regions of Greece remained well below the EU average (EU27=100), while the capital region of Attiki[1] has basically retained its superior economic performance compared to the rest of the regions (Figure 1.3).

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1. The names of Greek regions follow the second-level classification of the Nomenclature of Territorial Units for Statistics (NUTS) for the sub-national division of EU regions and are translated to English as follows: Attica (Attiki), Central Greece (Sterea Ellada), Central Macedonia (Kentriki Makedonia), Crete (Kriti), Eastern Macedonia and Thrace (Anatoliki Makedonia-Thraki), Epirus (Ipeiros), Ionian Islands (Ionia Nisia), North Aegean (Voreio Aigaio), Peloponnese (Peloponnisos), South Aegean (Notio Aigaio), Thessaly (Thessalia), Western Greece (Dytiki Ellada), Western Macedonia (Dytiki Makedonia) (Accessed online at: <https://publications.europa.eu/code/en/en-5001000.htm>).

Figure 1.2 **TFP evolution in Greece and the EA19 during 2010–2020, and 2021–2022 forecasts (2015=100)**
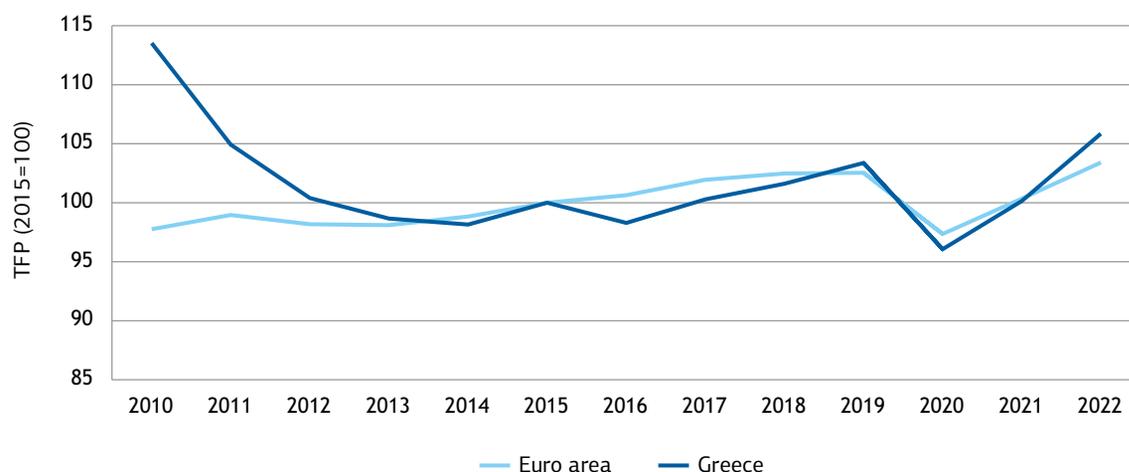
Source: AMECO.

Figure 1.3 **Gross domestic product (GDP) per capita (euro per inhabitant in current prices) of the Greek NUTS-2 regions as a percentage of the EU27 average (EU27=100), 2010–2019**
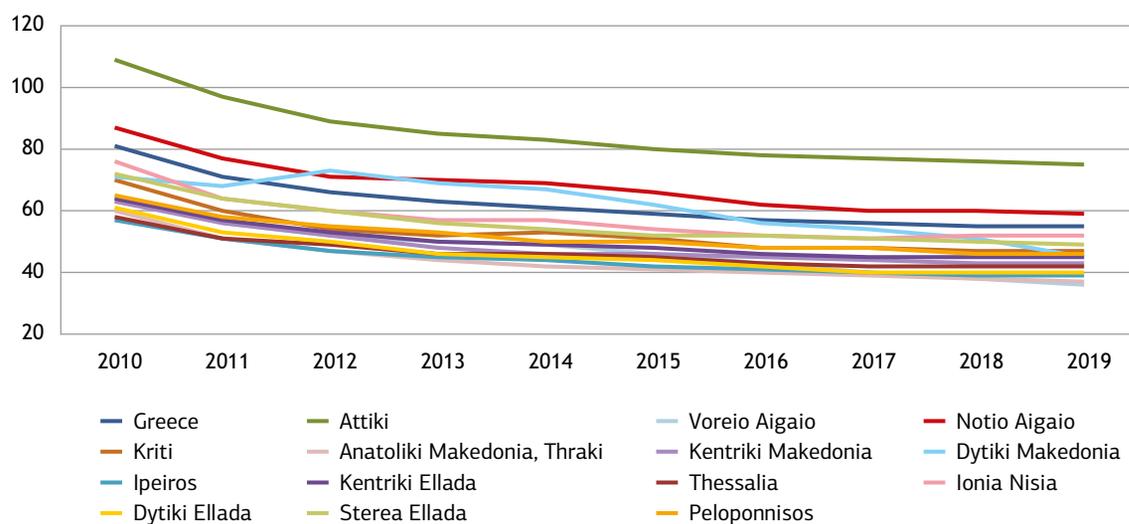
Source: Eurostat.

These outcomes verify the divergence of the Greek economy from the EU27 average and the persistence of the intense core-periphery disparities in the country.

These findings also suggest the weak state of the Greek economy within the EU before the onset of the pandemic crisis and its relatively limited capacity to withstand sudden disturbances, adequately respond to shocks and adjust to changes. Nonetheless, the Greek economy presented

a significant year-on-year growth rate of 7% in the first half of 2021 (specifically, 16.2% in the second quarter of 2021). This outcome signifies the increased robustness of the country to the pandemic conditions, in spite of the negative developments in the fiscal imbalance, the debt-to-GDP ratio and the trade deficit.

It should be stressed here that the economic development of the capital region of Attiki is key to fostering the national growth. As estimated in the recent study of the OECD (2020), the recovery period (to return to the pre-crisis level of GDP) would be 15 years, given a national growth rate of around 2%, while it would be reduced to half (around 8 years), if growth were restored in Attiki to 3%. However, according to Eurostat, during the period 2016–2018, the region of Attiki was the only EU27 region —together with that of Valencia— to have a GDP per capita between 75% and 100% of the EU27 average and, at the same time, an unemployment rate double the EU27 average. In the same period, Greece had the highest underemployment rate (67%), defined as involuntary part-time employment as a percentage of the total part-time employment, among the EU27 countries, whose corresponding average rate amounts to 26%. During 2010–2018, the level of employment in Greece fell on average by -11.2%, compared to the average employment growth in the EU27 by 5.8%. Attiki was one of the regions in Greece which mostly underperformed in employment growth, as employment reduced by -14.2%. Therefore, although core-periphery disparities should be drastically dealt with, in parallel, revamping the productivity of Attiki could have a very strong impact on the aggregate national growth figures and would be of vital importance to be part of our nationwide regional development strategy. Details about the regional-level performance of the country, in terms of output and employment multipliers and productivity, as well as several pillars of competitiveness, are provided in sections 2.5 and 3.5, respectively.

1.2. Future challenges and scope of the annual report

This annual report will provide an update and further in-depth examination of crucial factors affecting the productivity and competitiveness of the Greek economy. Before proceeding to the analysis of these issues, it is important to mention several key challenges faced by the EU member states and, particularly, the Greek economy. According to the recent foresights report of the European Commission (EC, 2021a) and the Greek government's foresights, two of the top challenges which should be addressed refer to (a) providing sustainable and resilient health systems, in order to strengthen the EU and Greece's ability to tackle new health crises, and (b) ensuring a smooth transition to decarbonatisation and affordable energy. Appropriate investment and reforms to safeguard the supply of decarbonised and affordable energy are crucial for achieving carbon-neutral growth and tackling climate change. For this purpose, the health system and the energy sector are examined as the two thematic productivity and competitiveness challenges of this annual report.

Digitisation is another major challenge that can support the development of knowledge and technological innovations in all sectors and facilitate the energy transition and productivity convergence among regions. The digitisation of the Greek economy has been dramatically

accelerated during the pandemic period. There are signs of strong digital competitiveness at the business level, but considerable gaps and weaknesses at the individual/household and employee levels as well as at the state and infrastructure levels. The issues of the digital adoption and competitiveness of the Greek economy are discussed in this annual report (section 3.4), while a more detailed analysis for businesses was made in our previous annual report (Greek NPB, 2020).

The modernisation of the educational system and a skills revolution can also be considered as a productivity and competitiveness challenge in the long run, in order to successfully address adverse demographic trends, diminish existing skills gaps, sustainably transform labour markets, and create more and new types of well-paid jobs. Human capital-intensive investment plans and strategic innovations could help to maintain and attract talent in the country, taking advantage of the high proportion of STEM graduates. Such policies could help the country produce higher value-added and more knowledge-intensive goods and services at a competitive cost. The theme of education and skills development, as well as of the development and competitiveness of the manufacturing industry in Greece were also analysed in detail in our pervious annual report (Greek NPB, 2020).

Additionally, proper attention should be given to other challenges and types of risks, such as those related to population aging, cybersecurity and the trustworthiness of data and artificial intelligence, the sustainability of the social security/pension system, the fragility of the banking system, food security and the sustainable development of the agricultural sector, the security and diversification of the supply of raw materials, the efficient allocation and management of land uses, and the alleviation of intense core-periphery disparities.

Particularly with regard to the supply chain system, Greece should harness the opportunities from the regionalisation of global value chains and the nearshoring/reshoring of economic activities in Europe. Among others, the country might seek to attract more activities to produce energy equipment and tangible assets, exploiting its competitive advantage of geographical position and the availability of key ports/gateways and other transport infrastructure assets, which shorten the travel distance and reduce the transit time between Europe and Asia.

The adequate treatment of the aforementioned challenges would facilitate the reorientation of the country's production structure towards more productive and dynamic sectors of the economy, such as pharma and health services, food industries and metal (and other construction materials), some of which have improved their export performance during the pandemic period, absorbing and optimally utilising ICTs in the domestic firms. At the same time, the enhancement of the institutional framework and deployment of structural policies and firm organisational strategies would facilitate these favourable changes, reinforce scale economies, enhance the non-cost competitiveness of the country, and reduce productivity/efficiency gaps vis à vis the rest of the EA.

As far as the organisation of the rest of the annual report is concerned, Chapter 2 describes the macroeconomic environment, forecasts based on different economic scenarios, and main developments in the aggregate productivity and their drivers, including some critical issues concerning the impact of the pandemic, as well as measurement of the productivity in sectors and regions of the country. Chapter 3 provides an analysis of developments in the competitiveness

of the Greek economy, considering the aspects of public finance, current accounts, and net international investment position. It also presents the evolution of cost/price competitiveness indices and of international competitiveness indicators for Greece, in relation to other countries, putting an emphasis on the digital performance and competitiveness. A special reference is made on indicators/sub-indices of regional competitiveness to underline inequalities in regional performance. Chapter 4 examines the two major challenges mentioned before, namely, the provision, regulation, competitiveness and efficiency of health services, and the productivity and competitiveness of the Greek energy sector, encompassing insights in the process of green energy transition. Chapter 5 summarises and concludes with relevant policy suggestions.

2. Macro Developments and the Aggregate, Sectoral and Regional Productivity

2.1. Macroeconomic environment

In addition to the tragic social and human cost of the global COVID-19 pandemic, its impact on the global economy during 2020 was also severe and unprecedented. A contraction of output by 3.1% globally and 6.3% in the euro area makes this recession significantly deeper than any other in living memory. The immediate economic impact of the pandemic was partially offset by significant and coordinated fiscal and monetary policy responses at the national and international levels. Moreover, as vaccine coverage increases and economic sentiment normalises, a strong recovery becomes increasingly possible. However, a number of factors such as the prospect of more infectious virus mutations, the possibility of the virus becoming endemic, or, alternatively, sudden shifts in economic policy or long-lasting changes in consumer and firm behaviour, result in increased uncertainty over future prospects.

During 2020, Greece was hit by two successive waves of the ongoing COVID-19 pandemic. The first wave, culminating through March and April, was successfully arrested and subsequently contained by the implementation of proactive and strict social distancing measures. Restrictions on movement and economic activity were subsequently lifted, beginning from early May 2020, as a result of the progressive normalisation of conditions. However, beginning from October 2020, confirmed cases began to rise exponentially, indicating the outbreak of a second wave of the pandemic. As a result, new restrictions on movement and economic activity were implemented in November that succeeded in arresting the spread of the pandemic. Lasting in various forms and levels of severity, the containment measures remained in force until May 2021.

As a result of the curtailment in economic activity due to social distancing measures, business closures, a disruption of global trade, and changes in household spending and firm investment behaviour, real GDP in Greece declined by 8.2%. This result not only brought to a halt the partial recovery that followed the great economic crisis of 2008 – 2016, but also erased all of the gains of the mild economic expansion of the second half of the 2010s. In particular, in 2020, GDP (in chain linked 2015 volumes) stood at 168.5 billion euro, down 29.5% from its 2008 levels. Therefore, gearing the economy towards strong recovery and sustainable growth should be considered as a top policy priority in order to minimise persistent damage and scarring. Several projections of GDP growth for 2021 indicate a strong recovery, including those of the Bank of Greece (BoG, 2021) at 4.2%, the IMF (IMF, 2021) at 6.5%, and the European Commission (EC, 2021b) at 4.3%. Furthermore, the latest projection of the Greek government, which is included in the draft budget, increases the expected GDP growth rate at 6.1% (and 4.5% for 2022). Our own projections for years 2021 and 2022 are presented in section 2.2 below.

This projected recovery process is expected to be the result of a strong rebound in consumer spending due to pent up domestic demand, a strong rebound of external demand mainly from the tourism industry, and of a return to more favourable conditions for investment. Moreover, fiscal

and monetary policy measures in support of firms and employment are expected to continue until recovery is firmly underway —a condition necessary if premature fiscal tightening and sudden stops in funding are to be avoided. Finally, a significant source of medium-term growth potential is the recovery fund amounting to 31.2 billion euro originating from the NGEU, which is allocated to the Greek economy towards a greener, more digital and more resilient economy. Such a delicate recovery process rests critically on a comprehensive policy of fiscal sustainability and macroeconomic stability, underpinned by decreasing inequality and increasing social cohesion.

Turning to the evolution of the main components of aggregate demand during 2020, we identify the following contributions to year-on-year growth rates of real GDP (Figures 2.1.1 to 2.1.4). During the first quarter, when the pandemic was in its initial stages and no lockdown was in place until mid-March, GDP fell by 1.2%. This decline can be attributed to a fall in private consumption by 0.8%, near zero investment, a decline in inventories by 0.7%, an increase in government expenditure by 0.9% and a decline in the external balance by 0.5%.

During the second quarter, when the first wave of the pandemic was in full force and containment measures were implemented from March until early May 2020, GDP fell by 15.8%. This decline came mainly as a result of a reduction in private consumption, contributing 9.4%, and, secondarily, of unfavourable changes in the external balance, contributing 6.6%. Investment remained subdued, while inventories picked up, contributing to an increase of 0.8%, while government expenditure actually reduced, contributing to a reduction of 0.5% in GDP.

During the summer months of the third quarter, containment measures were lifted and the domestic economy operated normally. A strong rebound in economic activity was indicated by private consumption contributing towards an increase in GDP by 1.1%; investment to a further 2.1%; inventories picking up, contributing to a 4.3% increase; and government spending towards a further 0.4%. In effect, domestic factors alone would have resulted in a significant increase of GDP by 6%. However, because of reduced mobility on a global scale, the tourism industry was heavily hit, resulting in a decrease in the balance of trade of 15.4%, therefore erasing all gains from the domestic market and resulting in a GDP decline of 9.5% (Figure 2.1.1).

During the fourth quarter, an exponential increase in cases and fatalities led to a second round of containment measures beginning from November and extending into December 2020, although these were partially relaxed during the winter holidays and thus were less economically disruptive. Not surprisingly, reduced private consumption contributed to a decline in GDP by 5.2%, investment to a further decline by 0.3%, inventories also reduced, contributing a further 2.1%, while, on the other hand, increased government spending increased GDP by 1.4% and a more favourable external balance by a further 0.6%. In other words, by the fourth quarter, it appears that the economy had partially adapted to the new pandemic conditions with a combination of e-commerce and smart measures resulting in a reduction of consumption only half of the level experienced during the first lockdown (during the second quarter, private consumption reduced by 13.1% year-on-year, whereas in the fourth quarter, it reduced by 6.9% year-on-year).

Indications that the economy was adapting to the pandemic conditions were further corroborated by the data for the first quarter of 2021. In particular, the rate of decline of the GDP fell to 1.7%, the lowest since the beginning of the pandemic, despite the fact that significant containment

measures were in place. The main factors contributing to this decline were the decline in private consumption by 4.8% and reductions in inventories by 2%. On the contrary, government consumption contributed to a 2% increase of GDP, in tandem with a favourable external balance of trade by 1.4% and a further increase in investment activity by 1.6%.

Finally, during the second quarter of 2021, with the vaccination program in full swing, the economy grew at an unprecedented rate of 16.2%. Private consumption accounted for 10.6% of the increase in GDP, followed by increases in inventories accounting for a further 4.4%, a significant increase in investment at 2.1% and, finally, government consumption contributing a further 1.5%; the external balance of goods and services contributed a negative 2%. Therefore, it appears safe to conclude that a strong recovery is currently underway.

Comparing those results with the euro area, it is possible to arrive at a number of conclusions. First, GDP growth in Greece declined less than that of the EA during the first quarter, but more than the EA in the other three quarters of 2020. The major differentiating point was the evolution of the external balance of goods and services, mainly influenced by Greek reliance on tourism as a major export component. This fact on its own explains why Greece underperformed the EA during the second and especially during the third quarter of 2020. Second, during the final quarter of 2020, a significant decrease in inventories in Greece, together with a slightly deeper reduction in private consumption, led to GDP in Greece falling more than in the EA. Therefore, it is important to note that the Greek economy experienced not only a symmetric shock with the rest of the EA, namely reduced demand due to lockdowns and changes in consumer and firm behaviour in pandemic conditions, but also an asymmetric shock in lost revenue in its main export commodity, tourism.

Turning to the medium-term growth prospects of the Greek economy, the Greek National Recovery and Resilience Plan, Greece 2.0, is understood as the key instrument for the restructuring of the Greek economy towards increased productivity, employment, and economic and social resilience. The plan is based on the recommendations of the committee headed by Professor Pissarides and is in full alignment with the Country Specific Recommendations of the European Commission. It aims at mobilising 18.4 billion euro in RRF grants, together with 12.7 billion euro in loans and a further 28.6 billion in private sector contributions, summing to a grand total of 59.8 billion euro, or 36.1% of GDP in 2020. It aims at an extroverted, competitive, green and digital growth model leading to a fundamental economic and social transformation that combines economic efficiency with social cohesion and justice.

Greece 2.0 consists of four pillars: (a) green transition, (b) digital transformation, (c) employment, skills, and social cohesion, (d) private investment and transformation of the economy. Its primary aim is to bridge the endemic output gap that has been formed during the last decade in the Greek economy because of the great economic crisis.

The first pillar, green transition, accounts for 41% of the total budget and consists of an array of measures towards a greener and more energy efficient future. It includes actions aiming to increase energy efficiency and helping to fully abolish the use of brown coal as energy fuel by 2028 in favour of renewable energy sources. Moreover, it includes actions aiming to upgrade the energy efficiency of existing buildings and strategic urban regeneration. It also includes actions

Figure 2.1.1 Contributions to GDP growth

Legend:
- External balance of goods and services
- Final consumption expenditure of the general government
- Changes in inventories and acquisitions less disposals of valuables
- Household and NPISH final consumption expenditure
- Gross fixed capital formation
- Gross domestic product at market prices
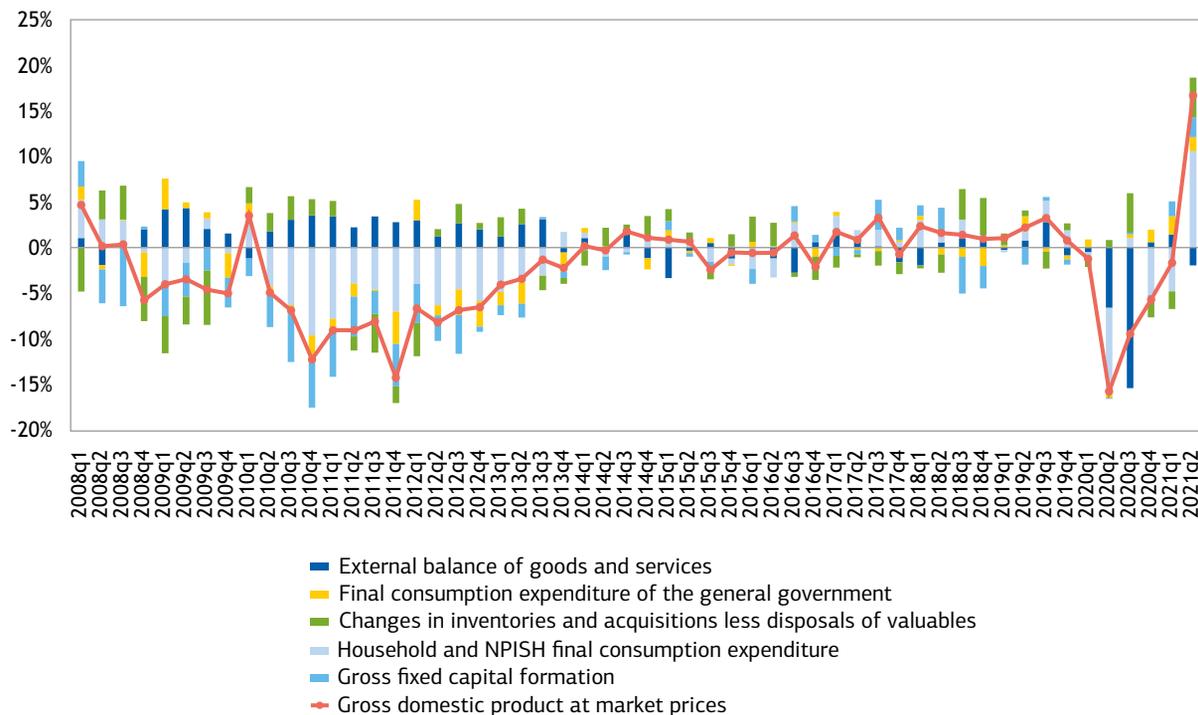
Source: Eurostat, author's own calculations.

Figure 2.1.2 Contributions to gross fixed capital formation growth

Legend:
- Dwellings
- Transport equipment
- Other machinery and equipment and weapons systems
- Intellectual property products
- Other buildings and structures
- ICT equipment
- Cultivated biological resources
- Total fixed assets
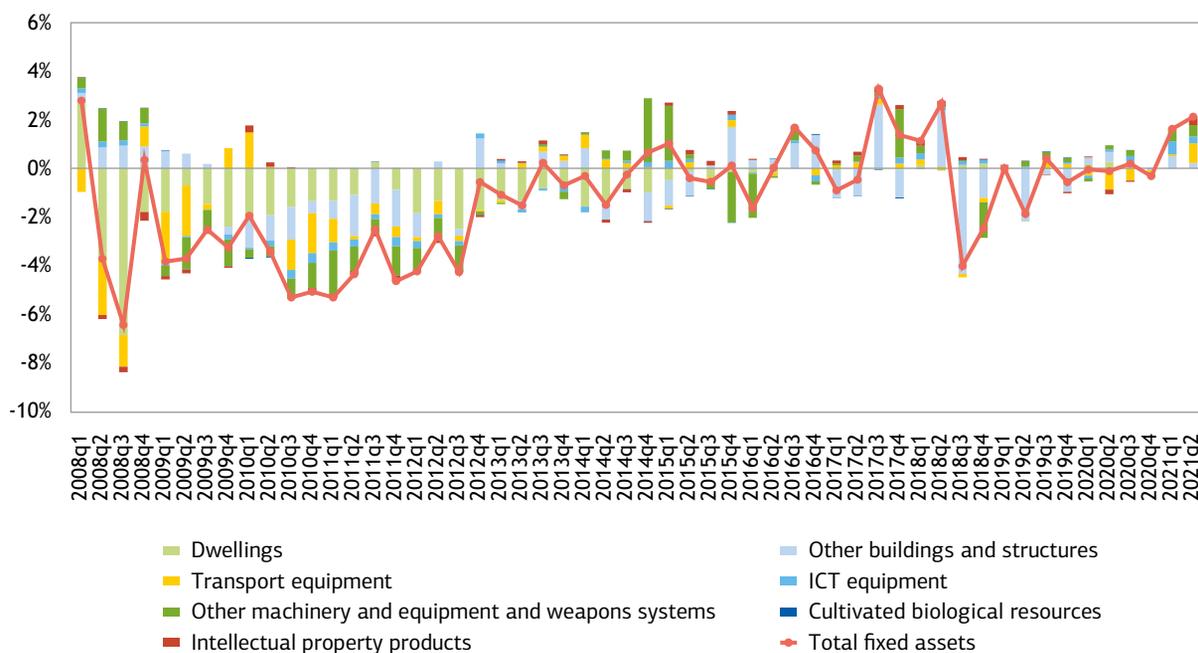
Source: Eurostat, author's own calculations.

Figure 2.1.3 Imports and exports of goods and services

- Exports of goods and services to the European Union
- Imports of goods and services from the European Union
- Exports of goods and services to third countries and international organisations
- Imports of goods and services from third countries and international organisations
- External balance of goods and services
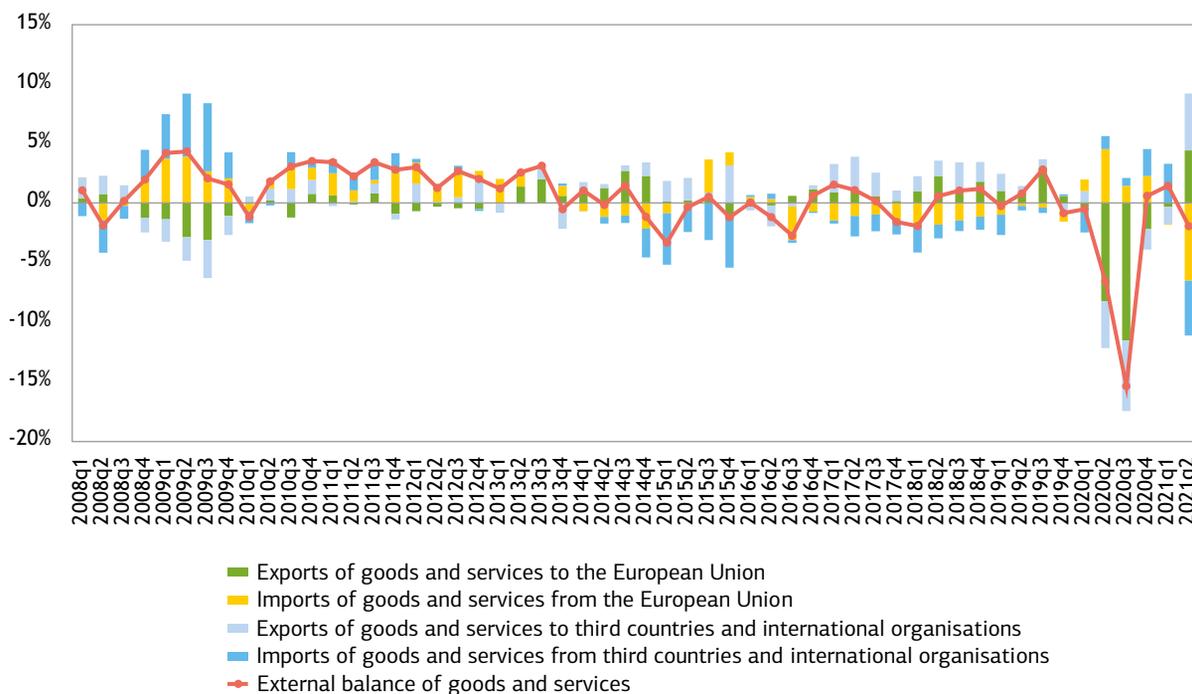
Source: Eurostat, author's own calculations.

Figure 2.1.4 General government revenue, expenditure and balance

- Net borrowing
- Total general government expenditure
- Total general government revenue
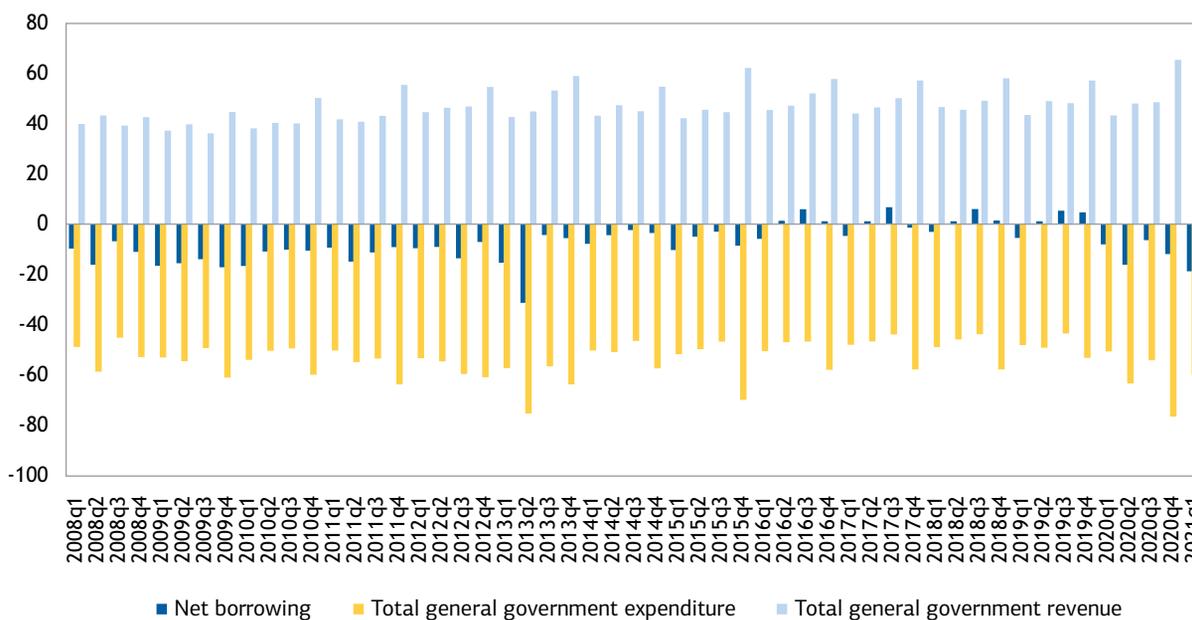
Source: Eurostat, author's own calculations.

towards a greener transportation system, including the formation of a network of charging stations for electric vehicles. Finally, it includes actions helping to protect the natural environment and increase biodiversity.

The second pillar, digital transformation, accounts for 8% of the total budget and consists of actions towards a digital future. It includes actions towards increased connectivity between citizens, businesses, and the state, such as facilitating the installation of fast broadband networks. It also includes actions towards the digital transformation of the state in terms of connectivity as well as computing and data management. Finally, it includes actions geared towards reducing the digital gap between Greek SMEs and their European peers.

The third pillar, employment, skills, and social cohesion, accounts for 19% of the total budget and consists of an array of measures towards boosting job creation, education, health services and social policies. It includes provisions for Active Labour Market Policies, enhancing the digitisation of education, structural reforms on the national health system, and promoting equal opportunities for all.

The fourth pillar, private investment and transformation of the economy, accounts for 31% of the total budget and consists of actions that aim at boosting investment and competitiveness. It includes actions towards upgrading the tax administration and public financial management using the tools available through the digital transformation of public administration. It also includes actions aiming to increase the ease of doing business, increase the resilience of money and capital markets, and enhance the capabilities of the Capital Market Commission. Finally, it includes actions towards boosting Research and Development and increasing the resilience and competitiveness of business.

Greece 2.0 is therefore a vital link in the transition of the Greek economy out of the effects of past and present recessions and into a more resilient and productive future. Greece 2.0 is thus of particular importance to future productivity growth trends, as the public and private investment that it aims to mobilise is expected to have a key contribution to that effect.

2.2. Own Projections for 2021–2022

In order to project the key variables of the macroeconomic model over the 2021–22 period, we assume that the international travel receipts will increase by about 150% in 2021 relative to 2020, which implies an increase of about 7 billion euro[2]. The increase in the number of travel receipts cannot be considered as optimistic, and it will bring them back to 60% of the levels of 2019. We expect that tourism will almost recover in 2022.

We assume that the government will continue supporting the economy in 2021 through additional expenditure, while government expenditure is expected to return to pre-COVID-19 levels in 2022.

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2. This model is a dynamic extension of Kurz's (1985) matrix multiplier framework in the cases of open economy (Metcalfe and Steedman, 1981) and pure joint production (Mariolis, 2008).

We also include our evaluation of the National Recovery and Resilience Plan (RRP) impact in our baseline projections. Appendix A.1 presents the main reforms per pillar included in the RRP. We assume that the Greek government will receive less than 1.0 billion euro in 2021, and 5.3 billion euro in 2022, which will be spent entirely on investments.

Based on these assumptions, the model forecasts an increase in real GDP of 6.1% in 2021 and 5.4% in 2022, while employment and imports are expected to increase accordingly to GDP levels (baseline scenario).[3] This means that the Greek economy will return to its pre-pandemic GDP trend. By adopting the optimistic scenario of an increase in travel receipts of 70% of the 2019 level, real GDP will increase (year-on-year) by 7.1% in 2021 and by 4.8% in 2022 (optimistic scenario).

However, there are two main drawbacks that may disrupt the recovery trajectory of the GDP beyond 2021. In particular, the most recent COVID-19 case numbers show a strong possibility for a fourth wave of the pandemic. Despite the large number of arrivals in 2021, this deterioration may stop the recovery of Greek tourism, i.e., the arrivals would stagnate at the levels of 2021. Therefore, *ceteris paribus,* we assume that the exports of services will increase less than 1.0 billion euro in 2022. In comparison to the baseline scenario, our projection shows a less sustained recovery in 2022, i.e., an increase in real GDP of 2.7% (pessimistic scenario 1). The other possible

Table 2.2.1 GDP, employment and imports estimates

	2021	2022
Baseline scenario		
GDP	6.1%	5.4%
Employment	7.1%	7.0%
Imports	5.6%	4.0%
Optimistic scenario		
GDP	7.1%	4.8%
Employment	8.2%	6.3%
Imports	6.4%	3.5%
Pessimistic scenario 1		
GDP	6.1%	2.7%
Employment	7.1%	3.9%
Imports	5.6%	1.9%
Pessimistic scenario 2		
GDP	5.7%	3.0%
Employment	6.5%	3.7%
Imports	5.2%	1.7%

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3. Due to the extraordinary measures taken by the government to support the workers who were out of work because of the pandemic, the exact size of unemployment is not feasibly reflected in elements of ELSTAT (for this issue, see Papadimitriou et al., 2020).

risk comes from the limited capacity of the Greek authorities to implement the RRP in time; thus, we estimate a one-year delay in the RRP time schedule. In other words, we assume that the Greek government will not receive any money in 2021, and it will receive less than 1.0 billion euro in 2022, which will be spent entirely on investments. This scenario corresponds to an increase in real GDP of 5.7% in 2021 and of 3.0% in 2022 (pessimistic scenario 2).

In summary, the GDP growth for 2021 is expected to range between 6–7%, while the exact amount of growth will depend on travel receipts. For 2022, it is expected to range between 5–5.5%, depending on both the full recovery of travel receipts and the implementation of the RRP. Therefore, on this basis, the successful efforts of the government to attract more tourists and to accelerate the absorption of EU funds must be continued. The latter effort may even lead to new reforms in order to remove administrative bottlenecks.

2.3. Aggregate productivity growth

Estimates of productivity growth rest critically on the particular measure of productivity used. This statement, being generally true, acquires particular significance in the current conditions. During 2020, real output declined by 8.2%, hours worked by 11.2%, and employment by 1.3%. Therefore, labour productivity measured as real output per hours worked increased during 2020 by 3.3%. On the contrary, the alternative measure for labour productivity, real output per person employed, declined by 7.3%. Moreover, it is also important to note that our variable of choice for real output, Gross Domestic Product in chain linked volumes, is only one of the available alternatives. Another alternative would have been real output proper, including intermediate consumption. In that case, the decline in output during 2020 is estimated at 9.4%.

Measurement issues are also, if not more, critical for the estimation of total factor productivity (TFP) growth (Figure 2.3.1). In addition to the issues of measuring output and labour for the estimation of TFP, estimates of the capital stock and of the labour share in total output are necessary. Constraining our selection of capital stock variables to that of net capital stock, due to data availability, and using the adjusted wage share specific to 2020, then, TFP declined by 3.7%, when hours worked is selected as the preferred variable for labour input, and by 9.1%, when we select persons employed. The use of the average adjusted wage over the period after 1995 results in a decline in TFP by 1.9% and 7.3%, respectively.

Setting aside measurement issues by selecting hours worked as our variable of choice for labour input, net capital stock for capital and using the period average adjusted wage, then we can gain significant information by decomposing aggregate output per capita into changes in labour productivity and changes in labour utilisation (Box 2.3.1). In particular, the fall in per capita output by 8.5% can be analysed into a fall of 11.8% in labour utilisation, i.e., hours worked by total employment to population ratio, and an increase in labour productivity by 3.3%, measured as real output per hours worked (Figure 2.3.2).

Turning to a further decomposition of labour productivity growth into its contributing parts, we find that TFP declined by 1.9%, whereas capital intensity grew by 5.2% (Figure 2.3.3). The significant increase in capital intensity is the result of total hours worked declining faster than

Figure 2.3.1 Labour productivity and total factor productivity y-o-y rate of change, 1996-2020
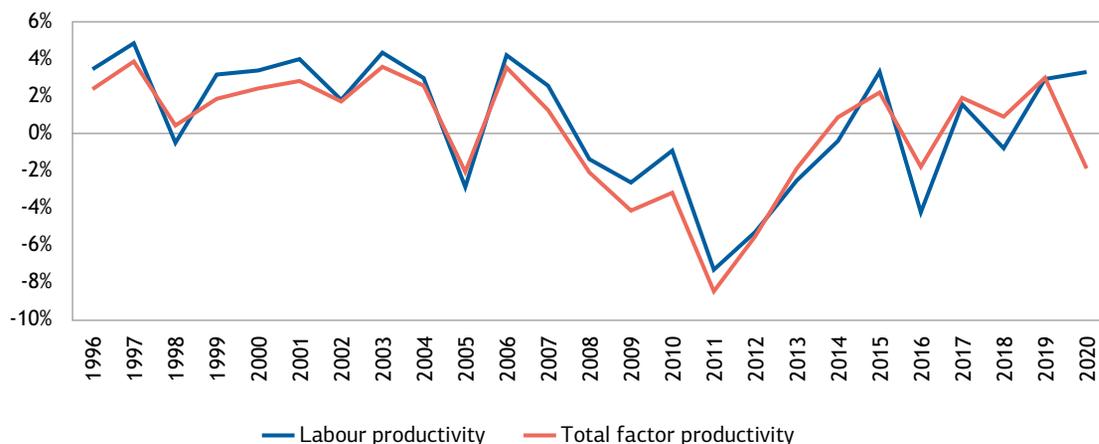
Source: Eurostat, author's own calculations.

Figure 2.3.2 Output per capita decomposition, 1996-2020
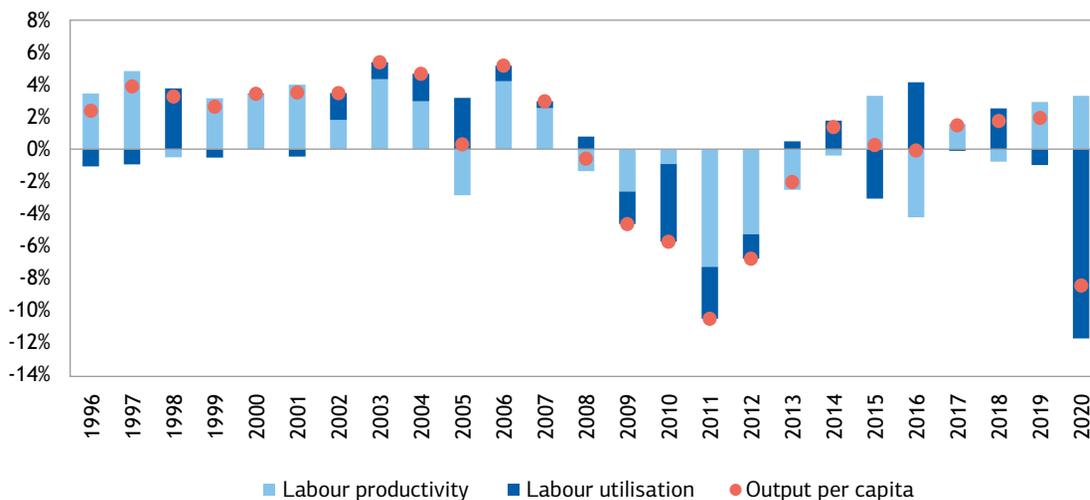
Source: Eurostat, author's own calculations.

the decrease in the capital stock, with hours worked declining by 11%, while the capital stock declined by 1.2% year-on-year. It is important to remember that this marks the eleventh year of constant and steady reductions in the capital stock, averaging 1.3% per year, due to insufficient investment to match the consumption of fixed capital. The steady decline in the capital stock being the foremost indicator of the continuing malaise of the Greek economy.

Similarly, the decline in labour utilisation can be mainly attributed to the decline of average hours worked by 10.45%, while other factors had only a limited impact (Figure 2.3.4). In particular, the decline in the participation rate reduced labour utilisation by 1.2%, while the effect of population

Figure 2.3.3 Labour productivity decomposition, 1996-2020
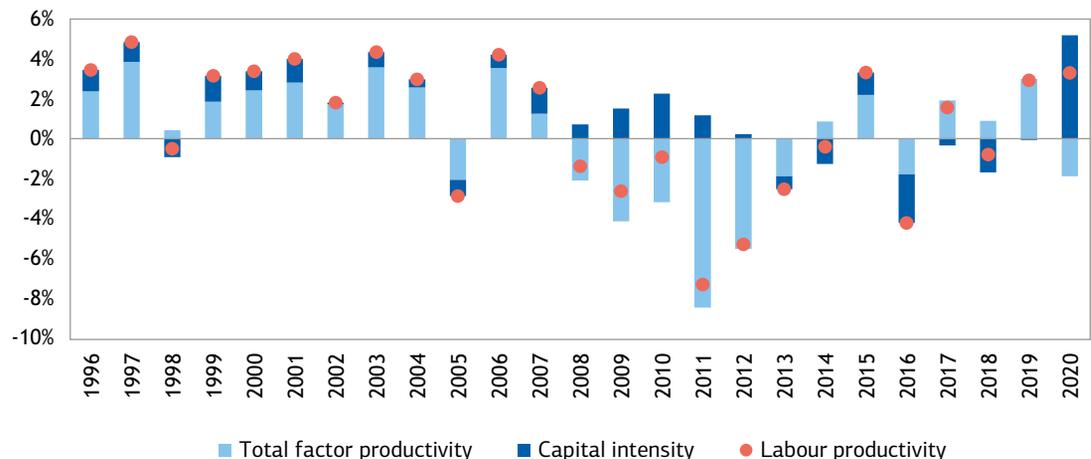
Source: Eurostat, author's own calculations.

Figure 2.3.4 Labour utilisation decomposition, 1996-2020
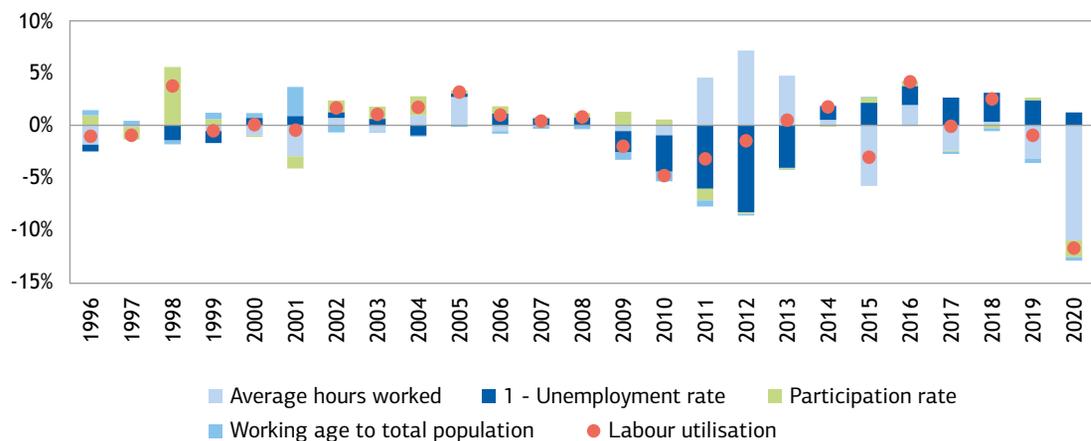
Source: Eurostat, author's own calculations.

aging also redused labour utilisation by a further 0.4%. On the contrary, the steady decrease in the unemployment rate, critically not reversed during the pandemic crisis due to government response, helped increase labour utilisation by 1.2%.

Therefore, it is possible to assume that a normalisation of conditions, resulting in increased labour utilisation, would translate into a significant increase in output. In other words, by removing the main effect of the current crisis, the significant decrease in hours worked and, hence, to labour utilisation, the immediate effect of the normalisation of conditions would be an immediate, significant increase in output. However, a continuation of the crisis for a longer period of time could possibly result in more permanent damage to the economy.

Box 2.3.1 Output decomposition

Given that labour productivity can be decomposed into total factor productivity and capital intensity (see, e.g., Gomez-Salvador et al., 2006):

$$\frac{Y}{L} = TFP \times \left(\frac{K}{L_h}\right)^{1-a}$$

and that labour utilisation can be decomposed into effects for average hours worked, the unemployment rate, the employment rate, and aging:

$$\frac{L_h}{N} = \left(\frac{L_h}{EMP}\right) \times \left(1 - \frac{U}{LF}\right) \times \left(\frac{LF}{POP}\right) \times \left(\frac{POP}{N}\right)$$

then, output per capita can be decomposed into the effects of labour productivity and labour utilisation:

$$\frac{Y}{N} = \frac{Y}{L} \times \frac{L}{N}$$

where Y is the output, L_h are the hours worked, K is the capital, a is the labour share of income, TFP is total factor productivity, N is the total population, EMP is the employment, U is the unemployment, LF is the labour force, and POP is the population of working age.

Moreover, a number of chronic problems still weigh on the Greek economy. First, demographic issues are expected to have a significant impact in the following years. In that regard, the baseline projections anticipate a decline of 24% until the end of the current century. Alternative scenarios indicate a level of decline reaching 46% assuming no migration, or conversely, a decline of 17% assuming higher migration. Therefore, it is obvious that simply in order to sustain current levels of economic output, huge increases in labour productivity should take place. Moreover, taking into account the effects of the population aging, the increases in productivity that are necessary to sustain current output levels are even greater as the proportion of population aged 15 to 64 is expected to fall from 63% today to 54% at the end of the century in the baseline projection and to 50% under the no migration assumption. Therefore, demographic issues are expected to play a key negative role in the evolution of macroeconomic stability in the medium to long term and will necessarily have to be offset by increases in physical and human capital as well as in technology and management.

Second, the financing of investment, despite being strengthened by the Basel reforms, is hampered by a financial system that is still feeling the effects of the preceding great economic crisis and has not yet felt the full force of the effects of the current pandemic-induced crisis. In particular, the stock of non-performing loans accounts for 30.3% of total loans, a figure that, despite recent

reductions, still remains high, especially when compared to the stock of non-performing loans in the euro area at 2.8%. However, all four Greek systemic banks have completed or initiated actions to join the Hercules program, moving non-performing loans off their balance sheets and resulting in a 33% reduction of non-performing loans held by the systemic banks. Therefore, the success of the Hercules program frees up bank balance sheets from the legacy of the great crisis and makes financing future investment projects possible. Moreover, in order to avoid the immediate stress of the pandemic crisis metastasising into an increase in non-performing loans, the Greek state has provided contributions up to 90% of monthly loan instalments to distressed loans for households and businesses. Thus, given the legacy of non-performing loans of the great crisis, the current pandemic-induced crisis is generating an additional stressor to a system that still remains under a significant level of stress.

2.4. Sectoral productivity growth

While, as already mentioned, real GDP declined overall by 8.2% in 2020, the effects of the pandemic on output where not uniformly distributed across economic sectors. A closer look at the relevant data reveals that we can broadly identify three groups of industries relative to their performance under pandemic conditions (Table 2.4.1). The first group of industries can be identified with the services sectors that took a direct and heavy hit by the containment measures and the general reduction in economic activity. Those industries include "arts, entertainment, recreation, etc." (-25.4%), "trade, transport, accommodation, etc." (-22.8%), "professional, scientific, technical, administrative and support activities" (-10.7%) and also "financial and insurance activities" (-7.6%).

The second group of industries can be identified with those production sectors that faced relatively minimal loses in economic activity. In the second group, we include "mining and industry" (-3.9%) and "agriculture, forestry and fishing" (-0.3%). Although not related to production, "real estate activities" also faced minimal loses (-0.6%). Finally, a third group of industries actually increased output during the pandemic. Those industries include "information and communication" (0.1%) and "public administration, education, and health services" (2.5%). However, the star performer is the construction industry, having found its economic activity increase significantly during the pandemic (10.4%), possibly as a result of its extremely supressed state in the last decade due to the great economic crisis and in anticipation of increased government spending on infrastructure projects described in the previous section.

Similarly, although overall employment decreased by 1.3% and hours worked by 11.2%, the sectoral effects were significant and distinct. In particular, hours worked decreased the most in "arts, entertainment, recreation, etc." (-21.8%), followed by "real estate" (-17.2%), "trade, transport, accommodation, etc." (-16.7%), and "professional, scientific, technical, administrative and support activities" (-10.2). Substantial decreases in hours worked can be found also in the sectors of "construction" (-9.6%), "agriculture, forestry and fishing" (-9.1%), "mining and industry" (-6.5%), "information and communication" (-5.3%), "financial and insurance activities" (-4.9%) and "public administration, education, and health services" (-3.5%).

Table 2.4.1 Contributions to labour productivity growth per sector, 2020

Sector	Labour productivity	Output	Hours worked
Agriculture, forestry and fishing	9.6%	-0.3%	-9.1%
Industry	2.8%	-3.9%	-6.5%
Construction	22.1%	10.4%	-9.6%
Wholesale and retail trade, transport, accommodation and food service activities	-7.3%	-22.8%	-16.7%
Information and communication	5.6%	0.1%	-5.3%
Financial and insurance activities	-2.9%	-7.6%	-4.9%
Real estate activities	20.1%	-0.6%	-17.2%
Professional, scientific and technical activities; administrative and support service activities	-0.5%	-10.7%	-10.2%
Public administration, defense, education, human health and social work activities	6.1%	2.5%	-3.5%
Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	-4.6%	-25.4%	-21.8%
Total	3%	-8%	-11%

Source: Eurostat, author's own calculations.

Therefore, labour productivity change, measured as real output per hour worked, can be found to have significant variations across economic sectors. Construction and real estate activities had the fastest growth in labour productivity (22.1% and 20.1%, respectively), followed by "agriculture, forestry and fishing" (9.6%), "public administration, education, and health services" (6.1%), "information and communication" (5.6%) and "mining and industry" (2.8%). On the contrary, the greatest reductions in labour productivity where to be found in "trade, transport, accommodation, etc." (-7.3%), followed by "arts, entertainment, recreation, etc." (-4.6%), "financial and insurance activities" (-2.9%) and "professional, scientific, technical, administrative and support activities" (-0.5%).

Given the significant sectoral variations just described, in order to have a more in-depth look of the effects of the changing sectoral structure of the Greek economy to labour productivity growth, we employ a shift-share analysis (Box 2.4.1). Such an analysis indicates that the increase of labour productivity by 3.3% can be attributed by 97.5% to changes of productivity within economic sectors, by 0.5% to changes in productivity arising from changes in the allocation of employment between economic sectors, and, finally, by 2% from a combination of the two factors. Therefore, we conclude that changes in the allocation of labour between economic sectors did not play a significant role in changes in labour productivity, indicating that the structure of the Greek economy has remained unchanged during the current pandemic-induced crisis.

Box 2.4.1 Shift-Share analysis

Shift-share analysis is a technique that allows for a decomposition of aggregate productivity growth into three distinct components: (a) a within-effect, (b) a between-effect, and (c) a cross-effect (see, e.g., Timmer and Szirmai, 2000). The within-effect accounts for changes in aggregate productivity growth caused by changes in productivity within economic sectors. The between-effect accounts for the impact of changes in the allocation of employment between sectors of economic activity. Finally, the cross-effect accounts for changes in aggregate productivity brought about as a result of the flow of employment into sectors with growing productivity. The sum of the three effects equals the change in total productivity.

Within Effect $\quad : \quad \sum_{i=1}^{n}\left[\dfrac{P_{it}-P_{it-1}}{P_{t-1}}\times\dfrac{H_{it-1}}{H_{t-1}}\right]$

Between Effect $\quad : \quad \sum_{i=1}^{n}\left[\dfrac{P_{it-1}}{P_{t-1}}\times\left(\dfrac{H_{it}}{H_{t}}-\dfrac{H_{it-1}}{H_{t-1}}\right)\right]$

Cross Effect $\quad : \quad \sum_{i=1}^{n}\left[\dfrac{P_{it}-P_{it-1}}{P_{t-1}}\times\left(\dfrac{H_{it}}{H_{t}}-\dfrac{H_{it-1}}{H_{t-1}}\right)\right]$

with P_t labour productivity (real output per hour worked) at time t and industry i ; $H_t=\sum_{i=1}^{n}H_{it}$ total hours worked at time t and industry i.

2.5. Regional multiplier effects of the Greek economy

Greece faces increased regional inequalities, with long and persistent core-periphery disparities in wealth and productivity measures, which are among the largest across the EU countries (see, e.g., Papaioannou et al., 2017; Greek NPB, 2019; Tsekeris and Papaioannou, 2021). For this purpose, regional development and territorial cohesion should constitute principal objectives of the Greek national growth policies.

In this context, the so-called multiplier effects can be regarded as a crucial measure of the performance of a region, in terms of output and employment. In other words, the regional analysis of multiplier effects should be considered as an integral part of a national growth plan to address the needs and harness the comparative advantages of each region. For instance, such an analysis can promote the return of investment in specific sectors of some regions and can help to diminish spatial disparities in growth, beyond the limited scope of the project selection and evaluation processes for monitoring purposes.

The benefits of utilising regional multipliers have long been acknowledged in the existing scholarly literature for a range of applications (see, e.g., Oosterhaven, 2019). Particularly in the current

context, such applications may involve the planning and prioritisation of investment projects for the Greek Recovery and Resilience Plan, in order to increase the effect of the programme on the national economy and across the Greek regions.

In what follows, we refer to the mapping of the regional multiplier effects of the Greek economy.[4] For this purpose, we employ a Post Keynesian–Sraffian multiplier framework[5] using data obtained from the regionalisation of the existing (most recently available) national input-output table of the Greek economy for the year 2015 (Rodousakis et al., 2021). Map 2.5.1 reports the arithmetic means of output multipliers for all NUTS-2 regions of the country.

According to our estimates, we can distinguish four groups of regions that are characterised by similar output multipliers, in terms of order of magnitude, as follows:

- The first group consists of Notio Aigaio, Voreio Aigaio, and Ionia Nisia, with output multipliers in the range of 1.077 to 1.139.

- The second group consists of Dytiki Ellada, Attiki, Peloponnisos, and Kriti, with output multipliers in the range of 1.060 to 1.070.

- The third group consists of Anatoliki Makedonia and Thraki, Kentriki Makedonia, Dytiki Makedonia, and Ipeiros, with output multipliers in the range of 1.045 to 1.056.

- The last group consists of Thessalia and Sterea Ellada, with output multipliers in the range of 1.019 to 1.024.

Thus, we observe that the regions with the highest output multipliers are the island complexes of the Notio Aigaio and Voreio Aigaio as well as the Ionia Nisia, i.e., those regions with relatively low participation of the primary and industrial sectors in their total economy. On the contrary, the areas with the lowest output multipliers are Thessalia and Sterea Ellada, i.e., regions with relatively high participation of the primary and industrial sectors in their total economy. These sectors, as we have shown in our previous Greek NPB (2020)'s Annual Report, are characterised by high dependence on imports. This feature becomes even clearer if we estimate the average import multipliers. Map 2.5.2 reports the arithmetic means of import multipliers for all regions of the country.

Therefore, it becomes evident that the regions with high output multipliers are those having low import multipliers, and vice versa. However, there are some slight differences in the classification of regions according to these two types of multipliers. This fact also holds in the case where we classify the regions in terms of employment multipliers. Map 2.5.3 reports the arithmetic means of employment multipliers for all regions of the Greek economy.

Given the employment multipliers, then, we can focus on the labour productivity indices of the different regions of the country (see Map 2.5.4). A long-term structural policy to enhance the

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4. The analysis of the sectoral multipliers of the Greek regions does not fall within the scope of this report (for details, see Rodousakis et al. (2022)).

5. For the estimation of multiplier effects, see Greek NPB (2020: Box 2.4.1). The corresponding estimation of regional multipliers has been made here in terms of the 13 regions of the country.

Map 2.5.1 Output multipliers of the Greek regions
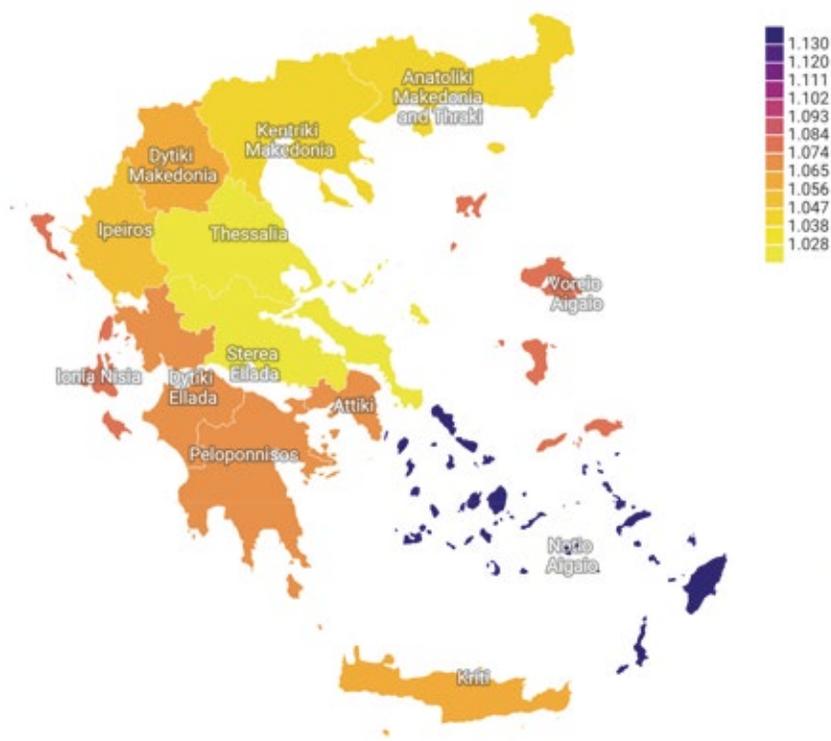
Map 2.5.2 Import multipliers of the Greek regions
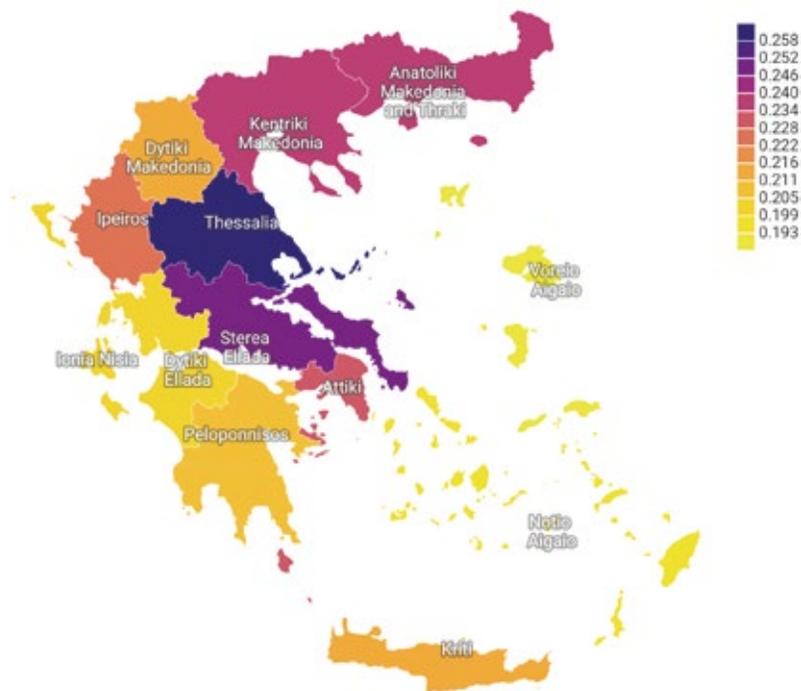
Map 2.5.3 Employment multipliers of the Greek regions
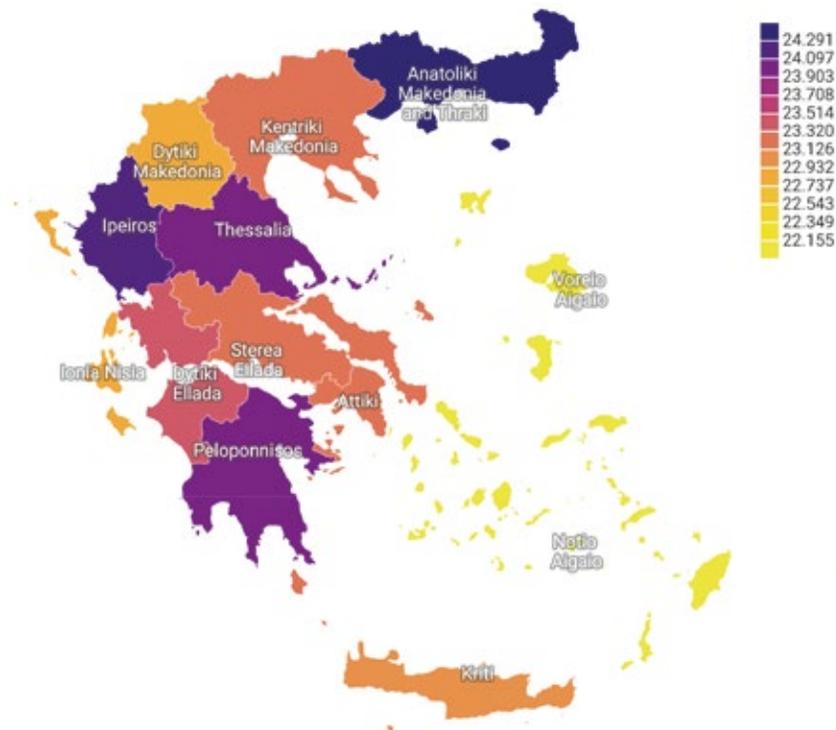
Map 2.5.4 Productivity indices of the Greek regions
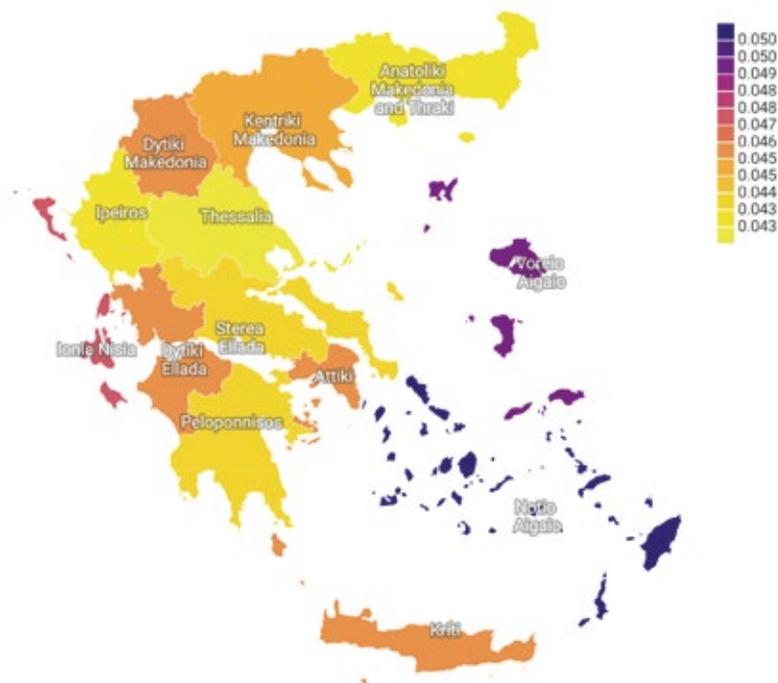
overall productivity of the Greek economy should be directed towards the regions (and the sectors) that are characterised by high productivity indices.

From the comparison between the Maps 2.5.1 and 2.5.4, we observe that the classification of the regions according to productivity indices differs from their classification on the basis of output multiplier effects. This outcome suggests that an effective demand management policy relying on the regions with the highest output multipliers can only have a temporary (short-term) positive impact on the growth potential of the economy.

3. Developments in Competitiveness

3.1. Public finance

3.1.1. Introduction

The key role of sustainable public finances remains indisputable for the effective allocation and distribution of public resources and the enhancement of the country's financial position, competitiveness and overall viable growth process. Long-lasting deficits and imbalances limit the government's reaction space and aggravate the country's fiscal position, in particular when experiencing sudden and deep shocks. The outbreak of the COVID-19 pandemic in early 2020 underpinned the importance of consolidated medium- and long-term fiscal policies to —among all other things— shield the economy and counterbalance the adverse implications caused by exceptional intermediate disturbances.

Under the extraordinary circumstances of the COVID-19 pandemic, emergency fiscal measures became essential to support businesses and households. Given the generalised nature of the crisis and the need for a coordinated and orderly temporary deviation from the normal requirements, the so-called General Escape Clause was activated in March 2020 and remains in force.[6] Within the preventive and corrective procedures of the Stability and Growth Pact, the clause provides the necessary flexibility by allowing Member States to undertake exceptional budgetary measures to adequately deal with the evolving health crisis and the ensuing economic downturn. As the procedures of the Pact are not suspended by the clause, fiscal monitoring is still in effect, and Greece, once again, falls under the regime of enhanced surveillance, since significant vulnerabilities and legacy issues persist.[7]

3.1.2. Recent developments in public finance

The COVID-19 pandemic outbreak and the associated implementation of expansionary fiscal measures in Greece led to the interruption and reversal of the adjustment course of the more

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6. See the related Communications from the Commission to the Council, COM (2020) 123 final and COM(2021) 105 final at <https://ec.europa.eu/info/sites/default/files/economy-finance/2_en_act_part1_v3-adopted_text.pdf> and <https://ec.europa.eu/info/sites/default/files/economy-finance/1_en_act_part1_v9.pdf>.

7. According to the Commission Implementing Decision (EU) 2021/271, as of February 2021, the period of enhanced surveillance for Greece, under Article 2(1) of Regulation (EU) No 472/2013 <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:140:0001:0010:En:PDF> activated by Implementing Decision (EU) 2018/1192, has been prolonged for an additional period of six months, commencing on 21 February 2021. See <http://data.europa.eu/eli/dec_impl/2021/271/oj>. Note that the latest Alert Mechanism Report (AMR), prepared under the COVID-19 crisis circumstances and adopted by the Commission on 18 November 2020, identified Greece as one of the Member States for which an in-depth review (IDR) should be prepared in 2021 to evaluate whether the country is affected by imbalances in need of policy action. See EC (2020b).

recent past. The latest developments indicate a substantial deterioration of public finances in Greece, with the General Government (GG) budget balance and the primary balance recording extensive deficits in 2020 (Figure 3.1.1[8]). The headline balance deficit reached -9.7% (following the 1.1% surplus in 2019), being among the highest in Europe and surpassing the -7.2% and -6.9% average deficits for the EA19 and EU27, respectively. The primary balance deficit stood at -6.7% (following the 4.1% surplus in 2019), exceeding the -5.7% and -5.5% average deficits for the EA19 and EU27, respectively. At the same time, the cyclically-adjusted and the structural budget balances for 2020 were calculated at -4.1% and -4.7% of potential GDP, respectively (EC, 2021c).

The above described evolution in balances for 2020 was driven by the course of total revenue and expenditure (Figure 3.1.1). The repercussions of the pandemic were reflected in the rise of total expenditure to 60.7% of GDP in 2020 (from 47.9% in 2019), translating to a 14.7% y-o-y annual growth rate (following the 0.7% increase in 2019). Social benefits and compensation of employees remained the major categories in terms of GDP percentages (23.8% and 13.4%, respectively). At the same time, the relatively minor —in terms of GDP percentages— expenditure categories of capital transfers payable and subsidies widened and recorded remarkable increases, which corresponded to three-digit y-o-y rates of growth (291.4% and 223.3%, respectively). The notable increase in total expenditure was accompanied by a fall of -6% in total revenue, which amounted to 51% of GDP in 2020 (from 49% in 2019). Apart from capital revenue, all other revenue categories recorded negative y-o-y percentage changes. The categories of taxes and social contributions, accounting for 25.7% and 15.3% of GDP, respectively, for the major part of government revenue, recorded negative annual percentage changes of -14.4% and -4.5%, respectively.

Figure 3.1.1 General Government balance, revenue and expenditure
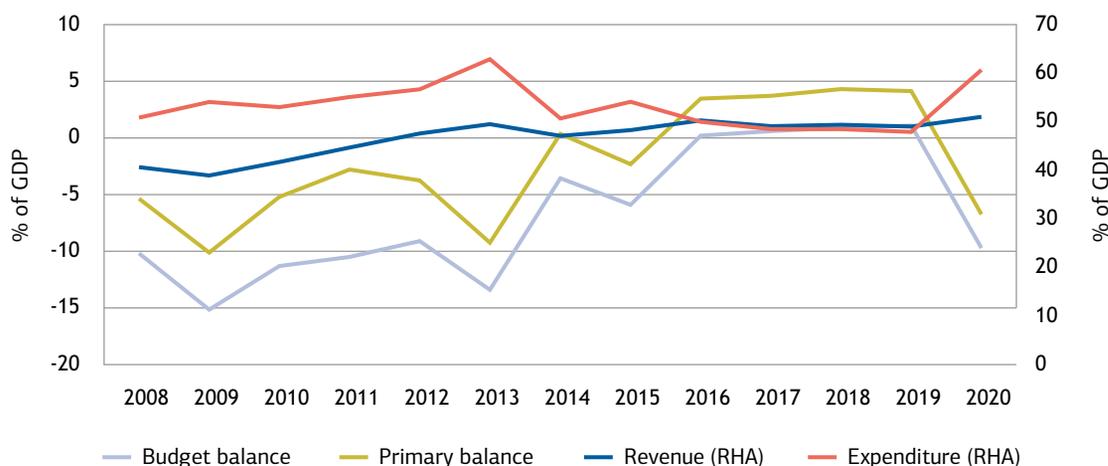
Source: Eurostat.

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8. All included data are in terms of the European System of Accounts (ESA).

Out of total expenditure, public investment accelerated to 3% of GDP in 2020, from 2.5% in 2019, close to the corresponding EA19 and EU28 averages of 3.1% and 3.3%, respectively. This rise translated to a noteworthy 7.8% annual growth rate, following the two preceding double-digit negative percentage changes of -27.5% and -20.3% recorded in 2018 and 2019, respectively. The under-spending of the Public Investment Budget (PIB) in the recent past was replaced in 2020 by a 100% execution rate of the Public Investment Programme.[9] Overall, measures taken in 2020 to tackle imbalances included the enhancement of public investment (EC, 2020b), while progress made in 2020 with reference to public financial management reforms included reform of the PIB (EC, 2021e).

Under the exceptional circumstances caused by the COVID-19 pandemic, the deterioration in flow balances in 2020 was accompanied by the amplification of the stock of public debt. The already substantially high Greek government debt widened in 2020 to 205.6% of GDP, from 180.5% in 2019 (Figure 3.1.2), far exceeding the EA19 and EU27 averages of 98% and 90.7%, respectively. The respective increase corresponded to a positive change in government debt by 6% of GDP (€ 9,950 million), following the negative change of -2% (€ -3,648 million) in 2019. The associated stock-flow adjustment, linking debt with the rising deficit, amounted to -3.7% of GDP (€ -6,180 million) in 2020, following -0.8% (€ -1,549 million) in 2019.

In 2020, the composition of the government debt continued to be characterised by the dominant share of long-term loans, amounting to 159.8% of GDP (over €265 billion), from 144.1% in 2019, supplemented by long-term securities standing at 33.8% (around €56 billion), from 25.1% in 2019. At the back of its maturity structure and composition, the related risks continued to be

Figure 3.1.2 General Government balance, deficit-debt link, debt
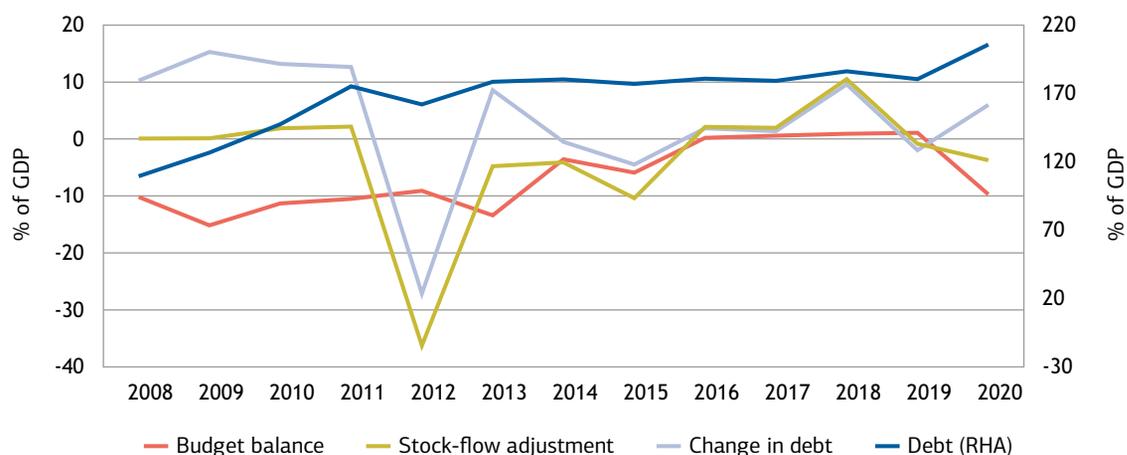
Source: Eurostat.

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9. See the respective Press Release published on 7 January 2021, by the Ministry of Development and Investments at <http://www.mindev.gov.gr/στο-62-η-απορρόφηση-του-εσπα-και-πλήρης-ε/>.

mitigated, since a large share of the debt is financed at low rates by official lenders and the average residual maturity on medium- and long-term debt stood at 21 years in 2020 (EC, 2020c).[10]

Nevertheless, the deteriorated short- to medium-term macroeconomic outlook due to the pandemic is expected to impact debt sustainability, by increasing uncertainty and the associated risks (EC, 2020c). This is the case, according to the updated debt sustainability analysis as of June 2021 (EC, 2021e), carried out on the basis of the revised methodology (EC, 2020b), for both the baseline scenario and the country-specific scenario analysis.[11] The baseline scenario expects the debt-to-GDP ratio to remain on a downward path from 2021 onwards and Greek debt to reach 169% by the end of the decade and decline below 100% of GDP by 2047. Additional financing needs, expected to arise in 2021–2022 due to the implementation of the Loan Facility according to the Recovery and Resilience Plan (RRP), will be covered by the assumed disbursement of the Recovery and Resilience Facility (RRF) loan. Until 2030, financing needs are expected to be moderate, remaining below 15% of GDP, whereas the period of higher needs in the 2030s[12] will be followed by a declining course, reaching 13% of GDP by 2060. The other two alternative scenarios entail elevated sustainability risks, leading to worsened prospects for debt and gross financing needs in the long run.

Despite the adverse economic developments triggered by the pandemic, sovereign financing conditions continued to be favourable in 2020 and were supported by liquidity measures agreed at the European level. The issuance activity of the Hellenic Republic in international capital markets has been consistent and successful (Ministry of Finance, 2021 and EC, 2021d), while Greek sovereign yield spreads declined further and exhibited subdued volatility (EC, 2021e). With the General Government's cash reserves standing around €31 billion at the end of 2020, medium- and long-term debt redemptions and interest payments would be covered for the next two years. Finally, financing conditions allowing for an early partial repayment of the International Monetary Fund (IMF) loans (due in 2021 and 2022), which were announced at the end of 2020, provided for risk reduction and positive signals to the markets.

3.1.3. Concluding remarks and outlook in public finance

The outbreak of the COVID-19 pandemic in early 2020 radically changed the public finance developments and the fiscal outlook that had prevailed until then. The adoption and implementation of a significant bulk of fiscal measures to enhance the national healthcare system and support

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10. In that way, the financing costs are effectively insulated from short-term fluctuations, while rollover risks are reduced (EC, 2020d).

11. See EC (2020c) for more details on methodological changes and the revised scenario analysis, including the two developed alternative scenarios (i.e., the higher risk premium scenario, and the lower GDP growth and higher risk premium scenario), replacing the previous single adverse scenario. The updated debt sustainability analysis follows the updated macroeconomic and fiscal outlook in the Commission 2021 Spring Forecast. Based on the Recovery and Resilience Plan (RRP), the evaluation takes into account the expected positive impact of the Recovery and Resilience Facility (RRF) on growth until 2026, but does not factor in for any potential impact beyond 2026 (EC, 2021d).

12. See the Report for details.

households and businesses, the duration of which turned out to be much longer than initially planned, led to a significant deterioration in public finances in Greece. Moreover, the renewed imposition of extensive containment and restrictive measures in November 2020 had to be accompanied by additional fiscal support. Out of the total fiscal cost of the support measures (without taking into account liquidity measures), €11.6 billion (7% of GDP) affected the 2020 fiscal balance (Ministry of Finance, 2021).

Fiscal policy in 2021 will remain accommodative, since targeted supportive actions will be maintained to limit the impact of the pandemic on households and businesses. As a result, a temporary departure from the budgetary requirements is expected also for 2021, while the General Escape Clause will remain active. This short-term deviation will concern, among other things, the fiscal targets which will, nevertheless, remain under monitoring and enhanced surveillance. In addition, and as soon as the economic environment becomes more favourable, the country is urged to pursue fiscal policies with the aim to ensure medium- and long-term term rebalancing and sustainability (EC, 2021e).

With regard to public finances in 2021:

- The anticipated effect out of the total fiscal cost of the support measures (without taking into account liquidity measures) on the 2021 fiscal balance will amount to €14.3 billion (8.3% of GDP) (Ministry of Finance, 2021);

- According to the baseline scenario of the Stability Programme 2021,[13] the headline budget balance and the primary balance are estimated at -9.9% and -7.2% of GDP, respectively, reflecting a major downward revision (as compared to the Draft Budgetary Plan) owed to the prolongation of the crisis caused by the pandemic and the related additional measures adopted. Nevertheless, a significant rebalancing is expected for the subsequent years;

- The general government debt is expected to decline only slightly to 204.8% of GDP in 2021, but dissipate thereafter.

The outlook for sovereign financing conditions in 2021 remains favourable. The moderate debt redemption and interest payments will be financed by the sufficient cash reserves, while successful fund raising took place in early 2021 through a 10-year government bond issuance (at a historical low yield for this maturity, see EC (2021e)) and private placements. The effective utilisation of available cash reserves was reflected in the early repayment of part of the outstanding debt to the IMF, which was concluded in March 2021, while Standard & Poor's upgraded Greece's sovereign credit rating by one notch in April 2021 (EC, 2021d).

Overall, prospects concerning public finances in Greece will depend on the potential prevalence of several positive factors over a number of negative factors, since

- emergency fiscal measures needed and implemented to tackle the pandemic are expected to be temporary;

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13. See Ministry of Finance (2021). The Stability Programme entails a concise list of the interventions. In addition, it presents, among other things, alternative fiscal developments resulting from three different scenarios examined in the sensitivity analysis framework.

- public financial management reforms will accelerate progress made;

- that achievement of prudent fiscal positions is expected to be promoted via supporting the economy and boosting potential growth by the huge financial assistance that will be provided by the RRF (EC, 2021e);[14]

- high uncertainty remains as to the evolution of the pandemic in 2021, where in the case of a renewed resurgence, additional restrictive and supporting measures will be necessary, increasing further the associated fiscal costs;

- additional fiscal risks[15] remain significant, while medium- and long-term debt sustainability could be further threatened (EC, 2020c).

3.2. Current account and net international investment position

3.2.1. Introduction

The consideration of Greece's external position, centered on the evaluation of the course of its current account (CA) and net international investment position (NIIP), constitutes a vital part in assessing the country's competitiveness. The existence of external imbalances, as expressed by excessive CA deficits and a highly negative NIIP, poses a threat to the country's competitive position and renders the adjustment process unavoidable.[16] This holds inasmuch as, in a dynamic environment, Greece's external position is strongly affected by interdependencies and spill-over effects operating at the international and European levels.

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14. As a significant part of the RRF expenditure will be directed to public investment (Ministry of Finance, 2021), corporate investment is expected to be promoted as well, contributing to the maximisation of complementarities between private, public and EU funded projects (EC, 2021e).

15. Additional risks are created by rulings on retroactive pensions and litigation cases against the Public Real Estate Company, see EC (2021e). For further fiscal risks remaining substantial (e.g., relating to state guarantees), see EC (2020d). Note that according to the most recent Enhanced Surveillance Report published in June 2021 (EC, 2021f), Eurostat recently clarified several statistical issues, contributing to a lower fiscal balance. The most important among the revisions was to accrue all the expected clearance costs of the backlog of state guarantees to 2020, adding 1.2% of GDP to the 2020 deficit. Furthermore, the decision to change the practice of the fiscal recording of the clawback mechanism is estimated to have had an additional impact, causing a deterioration of the balance of 0.3% of GDP. Overall, and according to the same report, the country's primary deficit, monitored under enhanced surveillance, reached 7.5% of GDP in 2020.

16. The EU, within the framework of broadening the surveillance procedure (beyond budgetary surveillance) to include (excessive) macroeconomic imbalances, regulates the monitoring of 'external imbalances, including those that can arise from the evolution of current account and net investment positions of Member States'. For a definition of 'imbalances', see Chapter I, Article 2, and for the indicators comprised in the regulated Scoreboard to identify 'external imbalances', see Chapter II, Article 4,b of Regulation (EU) No 1176/2011 of the European Parliament and of the Council, <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:306:0025:0032:en:PDF>.

The significance of the correction of long-lasting excessive imbalances[17] for Greece to be able to enhance its resilience to external risks has become even more clear against the backdrop of the outbreak of the COVID-19 pandemic. The latter hit the country at a time when Greece was already struggling with vulnerabilities relating, among other things, to the ongoing process of external rebalancing. The pandemic brought about the emergence of additional short-term imbalances associated with the sudden shock and the ensuing abnormal developments. These imbalances aggravated the CA and NIIP positions, obstructing the efforts to enhance the country's competitiveness.

3.2.2. Recent developments in current account and net international investment positions

The outbreak and evolution of the COVID-19 pandemic in 2020 had significant implications for external sector developments worldwide, through the effects on global trade, alongside changes in macroeconomic fundamentals (IMF, 2020). Globally, the initial narrowing of CA deficits and surpluses at the beginning of the COVID-19 crisis was followed by a widening, as trade and commodity prices rose (IMF, 2021). The rise in trade concerned mainly a rebound in merchandise trade, while services trade remained subdued (OECD, 2021a). The surpluses of 0.4%, 0.3% and 0.6% of GDP for the world economy, and the groups of advanced economies and emerging market and developing economies in 2020, respectively, concealed significant divergencies among individual countries.

On the European level, when the COVID crisis occurred in early 2020, single countries were already experiencing different stages of rebalancing and adjustment of external positions, mainly driven by debtor countries' corrections, but still reflecting major divergencies. Under the ensuing circumstances, the EA19 and EU27 CA surpluses remained notable in 2020 at 3% of GDP. The EU surplus reflected an increase in the merchandise trade surplus to 3.1% of GDP in 2020 (from 2.7% in 2019), accompanied by a narrowing of the services trade surplus to 0.9% of GDP (from 1.1% in 2019) (EC, 2021c).

Still, the recorded average CA surpluses for Europe continued to mask significant heterogeneity in CA developments among individual European countries. This divergence reflected, on the one hand, the persistence of a great number of unbalanced positions, such as the huge CA surpluses in some countries (e.g., the surpluses of 7.8%, 7% and 7.8% of GDP in Denmark, Germany and the Netherlands, respectively, even though narrowing down from 2019, and the surpluses of 8.3% and 7.1% of GDP in Lithuania and Slovenia, respectively, widening from 2019) and the large CA deficits in some others (e.g., the deficits of -11.9% and -5.2% of GDP in Cyprus and Romania, respectively, widening from 2019). On the other hand, the discrepancies mirrored developments related —at least to a significant degree— to the pandemic outbreak, such as the cases of

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17. According to the in-depth-review published on 2 June 2021 by the Commission, Greece is experiencing excessive macroeconomic imbalances, including incomplete external rebalancing. See <https://ec.europa. eu/info/sites/default/files/3_en_autre_document_travail_service_part1_v5.pdf>.

countries experiencing noteworthy reversals from deficit to surplus in 2020 (e.g., Ireland, to 4.6% of GDP from -11.3% in 2019) or vice versa (e.g., Malta, to -4% of GDP from 5.8% in 2019).

Greece belongs to the countries who experienced a significant widening of their CA deficits in 2020, mainly due to the impact of the COVID-19 crisis on the services sector and, in particular, on the tourism sector through the imposed travel restrictions (EC, 2021c). After the correction in 2019 (to -1.5% of GDP from -2.9% in 2018), the CA deficit closed at -6.7% of GDP in 2020, basically reflecting the deterioration of the balance of goods and services (see Figure 3.2.1). The latter stood at -6.8% of GDP (from -0.9% in 2019), mainly owed to the huge decline in the services surplus to 4.4% of GDP from 11.5% in 2019. These adverse developments could not be counterbalanced by the recorded modest improvements in the balance of goods (to -11.2% of GDP from -12.4% in 2019) and primary income account (to -0.3% of GDP from -0.9% in 2019). The decrease in the services surplus as a percentage of GDP is largely explained[18] by the massive fall in services' receipts (to 13.7% from 21.9% in 2019), relatively to the corresponding modest reduction in services' payments (to 9.3% from 10.4% in 2019). In nominal terms and following the downward course in annual growth rates already recorded in 2019, the unfavourable conditions concerning services' receipts and payments in 2020 were reflected in negative double-digit annual percentage changes of -43.5% and -19%, respectively. Similar adverse circumstances characterised annual percentage changes in goods' exports and imports (in nominal terms) in 2020, which stood at -10.9% and -14.2%, respectively, from annual growth rates slightly below 1% in 2019. In terms of GDP percentages, the marginal fall in goods' exports (to 17.4% from

Figure 3.2.1 Current account balance, components, NIIP and net external debt
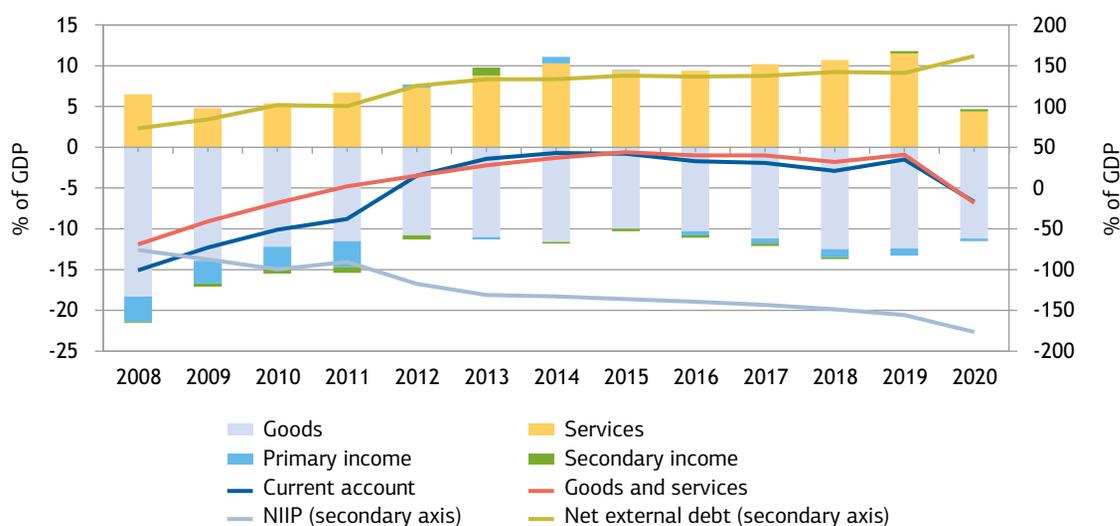
Source: Eurostat.

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18. The reference to services' receipts and payments, as well as goods' exports and imports rely on Balance of Payments data obtained from the Bank of Greece.

17.7% in 2019) alongside the decline in goods' imports (to 28.6% from 30.1% in 2019) explain the aforementioned modest narrowing of the goods' deficit in 2020.

Evidently, the country's relative export performance of goods and services was also affected by the ensuing crisis. Greece's overall (goods and services) export market share (as a percentage of world total) shrank in 2020 to 0.27%, from 0.33% in 2019, remaining below the EU27 average, where Greece was among the nine countries with the lowest shares. The associated export share for goods fell to 0.19% from 0.20% in 2019, while the export share for services decreased significantly, to 0.53% from 0.74% in 2019, with both shares remaining below the corresponding EU27 averages. Indicative of the adverse developments were the related one-year changes in export market shares, which amounted to -19.07% (from 0.72% in 2019) for the overall export market share, -1.82% (from -2.25% in 2019) for the export share for goods and -28.34% (from 0.64% in 2019) for the export share for services.

The COVID-19 pandemic and the ensuing crisis interrupted not only the process of adjustment in flow balances, but also stock positions. In 2020, highly positive NIIPs continued to persist (for example, 61.5% of GDP from 76.9% in 2019 in Denmark) or were even amplified in some cases (for example, 114.8% of GDP from 90% in 2019 in the Netherlands, 76.2% of GDP from 71.9% in 2019 in Germany, 62.4% of GDP from 53.7% in 2019 in Malta). In parallel, a number of significantly negative NIIPs remained excessive in 2020 (for example, -167.4% of GDP from -174% in Ireland) or even deteriorated (for example, -141.3% of GDP from -122.3% in 2019 in Cyprus, -105.4% from 100.5% in 2019 in Portugal and -84.3% from -73.9% in 2019 in Spain), indicating the persistence and widening of already large stocks of external liabilities. The latter was also the case for Greece, with the country's NIIP —mainly composed of debt instruments— deteriorating in 2020 to -176.4% of GDP from -155.8% in 2019 (see Figure 3.2.1) and remaining well below both NIIP norms and prudential thresholds (EC, 2020a).[19] These debt instruments basically concerned external government debt held by official creditors, partly insulating the country from external disturbances and shifts in market sentiment. Still, the large external public debt (at highly concessional terms and long maturities, according to the EC [2020a]) continued to account for the bulk of the respective position, with the net external debt remaining excessive in 2020 at 161.9% of GDP, from 141.1% in 2019.[20]

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19. According to the most recent AMR (which incorporates the updated scoreboard figures until 2019) (EC, 2020b), Greece's CA deficit is 'below the level required to ensure the convergence of the NIIP towards a prudent level'. According to the latest in-depth review for Greece, as of 2 June 2021, the CA balance in cyclically-adjusted terms was -11.8% of GDP in 2020, pointing to a structural imbalance. At the same time, the estimated CA necessary to stabilise the NIIP below the macroeconomic imbalance procedure threshold of -35% of GDP in 2030 stood at 1.5% of GDP in the medium term. For the underlying assumptions and methodologies applied to assess NIIP stabilising CA benchmarks and CA norms (to evaluate if CAs are in line with fundamentals), see Coutinho et al. (2018). For the determination of NIIPs norms and prudential thresholds, see EC (2020b) and Turrini and Zeugner (2019).

20. The persistent high external debt is among the factors identifying Greece as a country that continues to experience excessive imbalances. See EC (2020b) and <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0500&from=EN>.

3.2.3. Concluding remarks and outlook in CA and NIIP

The significant progress made until 2019 in rebalancing Greece's external position was disrupted by the outbreak of the COVID-19 pandemic, the repercussions of which further aggravated some of the already persisting excessive imbalances. In 2020, Greece was again facing:

- an excessive CA deficit and a highly negative NIIP,
- a threat to its competitive position, and
- a far more demanding adjustment process.

The resulting crisis and its significant impact on the services sector and, in particular, the tourism sector in Greece exacerbated the country's vulnerability, due to its reliance on services' receipts from tourism and transport.

The prolongation of the pandemic throughout the first half of 2021 and the uncertainty concerning its evolution up to the end of the year are expected to continue to affect external sector developments in Greece. The easing of a number of restrictions and the reopening of the tourism sector in mid-May supported services' receipts and enhanced the services' surplus. Still, overall economic conditions at the domestic and international levels are not anticipated to return to normality within 2021 and the related outlook will be still characterised by significant downside risks. As a result,

- the CA and NIIP of the country may only partly improve during 2021,
- the degree of rebalancing and adjustment reached in late 2019 and early 2020 will not yet be restored, and
- the exceptionally high external debt will continue to cause excessive imbalances and dictate regular monitoring and surveillance.

The ensuing short-term external imbalances alongside the long-term vulnerabilities create additional challenges with regard to the enhancement of the country's external position and, hence, competitiveness. The overall outlook and prospects will rely on

- risks related to possible short- to medium-term delays in the vaccination process at the domestic and international levels and to a potential deterioration of the healthcare repercussions of the pandemic, threatening the upcoming tourism season;
- the final fading out and remedy of the pandemic, allowing for the ultimate lifting of imposed measures worldwide and, in particular, of travel restrictions;
- the ability of the country to adapt to new conditions concerning world trade and transport that will prevail in domestic and international markets following the COVID-19 crisis;
- the overall capability of the country to tackle chronic structural weaknesses in order to reallocate activity towards sectors with higher productivity growth potential and enhance export performance;
- the continuation and completion of all the necessary reforms to strengthen Greece's competitiveness and resilience to external disturbances and shifting market sentiment; and

- the effective and successful implementation of investment and reforms as presented in the national RRP, along the lines of the general objectives of the RRF.[21]

3.3. Cost/price competitiveness indices

The COVID-19 pandemic and the consequent health and economic crises have caused significant disruptions in economic activity, supply chains and trade. The impact of the pandemic on competitiveness cannot be easily captured at its whole extent. The main competitiveness indicators can provide an initial insight.

One of the most commonly used cost/price competitiveness indicators is the Real Effective Exchange Rates (REERs). The main purpose of REERs is to depict a country's price/cost competitiveness relative to its principal competitors. REERs are usually calculated using either the consumer price index (CPI) or the unit labour cost (ULC). As far as Greece is concerned (Figure 3.3.1[22]), the CPI-based REER slightly decreased in 2020 compared to the previous year, whereas the ULC-based REER significantly increased. As far as the Eurozone is concerned, both indices increased, indicating that the competitiveness of the Eurozone deteriorated.

Moreover, the nominal unit labour cost (ULC) increased significantly in 2020 compared to 2019 (Figure 3.3.2). Greece experienced the largest increase of the last twenty years (2001–2020). The average ULC in the EU27 also recorded the largest increase, while the average ULC in the EA recorded the second largest increase of the past two decades. In addition, the relative unit labour cost, which measures the trading position of Greece relative to its EA partners, increased by 3.3% in 2020, compared to 2019, indicating a decline in Greece's competitive position. Greece is among the 18 EU member states that exhibited an increase in relative unit labour cost.

The COVID-19 pandemic has affected the global economy in an unprecedented way, but not all sectors have been affected in the same way. For example, cultural and creative industries and tourism suffered acutely and for extended periods due to lockdowns and containment measures introduced by governments to protect the public health. However, digital industries have not been affected significantly since they are not based on direct human interaction and contact, while they facilitated several economic activities through distant interaction (e.g., tele-working, tele-education). Therefore, sectoral competitiveness should also be taken into consideration when assessing the impact of the ongoing crisis.

Another important issue that should be addressed is the dependance of Greece and the EU on global supply chains. The pandemic brought to light the vulnerabilities and the fragility of the global supply chains. Moreover, as technological advancements and automation decrease the

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21. See the proposal for a Council implementing decision on the approval of the assessment of the recovery and resilience plan for Greece, <https://ec.europa.eu/info/system/files/com_328_1_en.pdf>, as of 17 June 2021.

22. Thirty-seven trading partners are selected, i.e., the EU27 and 10 other countries (Australia, Canada, Japan, Mexico, New Zealand, Norway, Switzerland, Turkey, the United Kingdom, the USA).

Figure 3.3.1 Real effective exchange rates (37 trading partners, 2010=100)
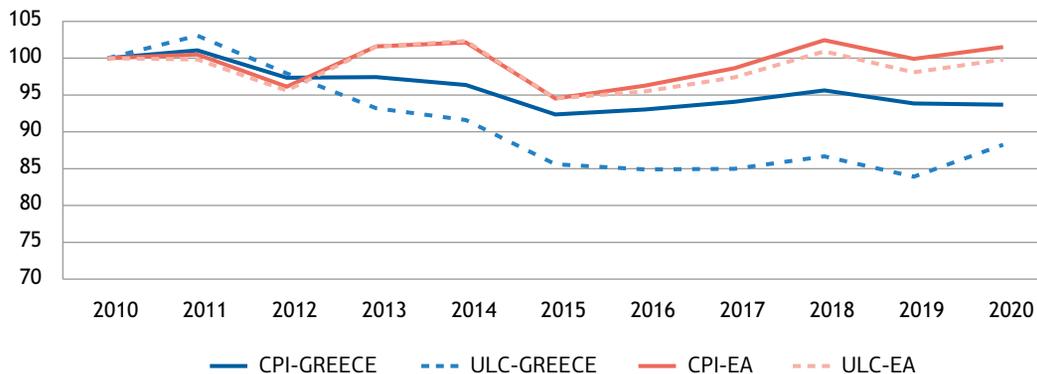

Source: Eurostat.

Figure 3.3.2 Nominal unit labour cost based on hours worked (2010=100)
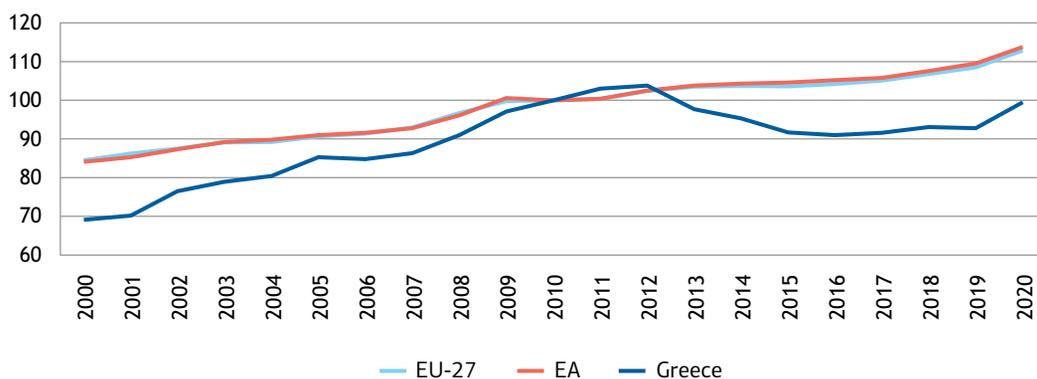
Source: Eurostat.

importance of labour cost, at least in certain industrial ecosystems, reshoring or nearshoring strategies are gaining attention. Hence, sources of competitiveness (e.g., innovation, technology readiness, R&D) other than labour cost are attracting interest.

3.4. International competitiveness indicators

Due to the COVID-19 pandemic, which caused great upheaval worldwide, neither the World Economic Forum (WEF) nor the World Bank (WB) published their usual annual reports on the Global Competitiveness Index (GCI) and the Ease of Doing Business (DB), respectively[23]. The WEF

23. After reviewing all the information available to date on Doing Business, including the findings of past reviews, audits, and the report the Bank released, World Bank Group management took the decision to discontinue the Doing Business report.

has published a special Global Competitiveness Report in which it analyses the ways to revive and transform economies and societies in the aftermath of the health and economic crises of the pandemic (WEF, 2020). In the report, the WEF emphasises the role of digitalisation in transforming many key sectors of the economy, such as improving public services delivery, accelerating energy transition, and increasing productivity and employment (WEF, 2020).

Digital transformation was already a hot topic before the pandemic. The IMD has been publishing annual reports on the World Digital Competitiveness Rankings since 2017. In a similar vein, the European Commission has been publishing the Digital Economy and Society Index (DESI) since 2014. However, the pandemic gave digital transformation and artificial intelligence (as a tool against COVID-19) a great push forward (OECD, 2020b). Moreover, the pandemic has put digital transformation at the epicentre of the socio-economic transformation which is required for economies globally to regain the lost ground due to the health, economic and social crises the coronavirus has caused. Digitalisation of the economy is one of the major priorities for the Recovery and Resilience Facility (RRF) of the European Commission (EC, 2021f). Consequently, the present section focuses on the digital competitiveness of the Greek economy.

Yet, it should be highlighted that the last IMD and DESI reports (2020) refer to data collected in 2019, that is, before the pandemic. The most recent data captured by the IMD questionnaire refer to the first wave of COVID-19 early last year. This means that both reports have not captured the full impact of the pandemic in accelerating digital transformation. This impact will be presented in the next edition of the IMD and DESI rankings. This is not to say that the IMD and DESI reports are not useful. On the contrary, they are very helpful in assessing the Greek economy's digital competitiveness in the pre-COVID-19 era. Coming editions of the digital competitiveness indices will show how the Greek and other economies have responded during and after the pandemic.

3.4.1. IMD World Digital Competitiveness Rankings

The IMD started to produce annual reports on the World Digital Competitiveness Rankings (WDCR) in 2017. Like most dynamic competitiveness indices, every year the IMD enriches its list of indicators as well as its set of economies. In the last edition, WDCR 2020, included 63 economies. Data are collected from both secondary sources, such as the OECD, and primary sources using a survey questionnaire. The questionnaires are administered by IMD partner institutes in each of the 63 countries. In the case of Greece, there are two partner institutes: the Federation of Industries of Greece (SBE) based in Thessaloniki and the Foundation for Economic and Industrial Research (IOBE) based in Athens.

Table 3.4.1 presents all 52 ranked criteria used for the construction of the WDCR for the Greek economy as well as the best performer(s) in each of them. Data for 20 out of the 52 criteria are survey data, while the remaining 32 are hard (secondary) data. Due to space constraints, a brief presentation of the criteria follows. For an in-depth presentation of the criteria, data, and the method, the reader can visit the referenced IMD edition.

The criteria are divided into three factors: Knowledge (capturing "the intangible infrastructure necessary for the learning and discovery dimensions of technology"), Technology (quantifying "the landscape of developing digital technologies"), and Future Readiness (examining "the level of

Table 3.4.1 Ranking of Greece according to the IMD World Digital Competitiveness 2020 (total number of countries: 63)

Factor ranking	Rank	Best performer(s)
Total ranking	**46**	**USA**
Knowledge	**48**	**USA**
Talent	*50*	*Singapore*
Educational assessment PISA-Math	41	China
International experience ˢ	47	Switzerland
Foreign highly skilled personnel ˢ	58	Switzerland
Management of cities ˢ	46	Singapore
Digital/Technological skills ˢ	41	Iceland
Net flow of international students	51	Australia
Training and Education	*56*	*Israel*
Employee training ˢ	56	Denmark
Total public expenditure on education	44	South Africa
Higher education achievement	31	Kazakhstan
Pupil-teacher ratio	57	Japan
Graduates in sciences	10	Malaysia
Women with degrees	36	Kazakhstan
Scientific concentration	*36*	*USA*
Total expenditure on R&D (%)	35	Israel
Total R&D personnel per capita	28	Denmark
Female researchers	28	Venezuela
R&D productivity by publication	33	China
Scientific and technical employment	25	USA
High-tech patent grants	45	Singapore
Robots in education and R&D	39	China
Technology	**43**	**Singapore**
Regulatory framework	*41*	*Singapore*
Starting a business	6	New Zealand
Enforcing contracts	59	Singapore
Immigration laws ˢ	15	UAE
Development & application of technology ˢ	47	Sweden
Scientific research legislation ˢ	40	Switzerland
Intellectual property rights ˢ	45	Denmark

Table 3.4.1 (continued)

Factor ranking	Rank	Best performer(s)
Technology (continued)		
Capital	*49*	*USA*
IT & media stock market capitalization	11	Taiwan
Funding for technological development ˢ	50	Finland
Banking and financial services ˢ	60	Finland
Country credit rating	57	Australia, Canada, Denmark, Germany, Luxembourg, Netherlands, Norway, Singapore, Sweden, Switzerland
Venture capital ˢ	57	USA
Investment in Telecommunications	11	India
Technological framework	*46*	*Singapore*
Communications technology ˢ	50	Finland
Mobile broadband subscribers	40	Australia, Japan, Singapore, Taiwan
Wireless broadband	40	UAE
Internet users	40	Singapore
Internet bandwidth speed	51	Singapore
High-tech exports (%)	32	Hong Kong
Future readiness	**46**	**Denmark**
Adaptive attitudes	*44*	*Korea*
E-Participation	41	Estonia, Korea, USA
Internet retailing	29	Korea
Tablet possession	41	USA
Smartphone possession	48	Hong Kong
Attitudes toward globalization ˢ	48	Denmark
Business agility	*55*	*Taiwan*
Opportunities and threats ˢ	47	Hong Kong
World robotics distribution	44	China
Agility of companies ˢ	57	Taiwan
Use of big data and analytics ˢ	57	Qatar
Knowledge transfer ˢ	53	Switzerland
Entrepreneurial fear of failure	26	Kazakhstan

Table 3.4.1 (continued)

Factor ranking	Rank	Best performer(s)
Future readiness (continued)		
IT integration	*45*	*Denmark*
E-Government	37	Denmark
Public-private partnerships [s]	40	UAE
Cyber security [s]	37	Qatar
Software piracy	52	USA

Source: IMD World Digital Competitiveness Ranking 2020.
Notes: [s] Survey data. Red: weak performance, Green: strong performance.

preparedness of an economy to assume its digital transformation") (IMD, 2020a). Each factor is broken down into three subfactors. Specifically, Knowledge is composed of Talent, Training and Education, and Scientific Concentration; Technology is composed of Regulatory Framework, Capital, and Technological Framework; Future Readiness is composed of Adaptive Attitudes, Business Agility, and IT Integration.

Greece ranks 46th, i.e., seven ranks up from the 53rd position held in the 2019 edition. This is the fourth best improvement after Cyprus (14 ranks), Estonia (8 ranks), and Turkey (8 ranks). The boost came from improvements such as the starting a business indicator, in which Greece went up from rank 26 to rank 6. However, there are only a few criteria where the Greek economy performs relatively well. In most of the criteria, Greece ranks relatively low.

Specifically, Knowledge is the lowest ranked factor (48th). The sub-factors of Talent (50th) and Training and Education (56th) have most of their criteria ranked relatively low. It is positive that Scientific Concentration is the best performing sub-factor (36th) thanks to R&D expenditure and employment as well as employment in scientific and technical positions. The factor of Technology gets the highest ranking among the three (43rd) thanks to the relatively well performing Regulatory Framework (41st), which has become more business friendly. However, Capital (49th) still suffers due to the financial and banking system's structural weaknesses, while Technological Framework (46th) also needs considerable advancements. Future Readiness (46th) is an important factor, with sub-factors Adaptive Attitudes (44th) and IT Integration (45th) performing relatively better than Business Agility (55th), which needs rapid improvement.

The WDCR criteria refer to individual, business and state levels of flexibility and adaptability. All factors as well as sub-factors are composed of criteria referring to all three levels. It is important to note that countries that rank high have most of their criteria at a relatively high rank. In other words, Greece needs to improve all levels of its digital economy, namely the individual/household level, the business level, and the state (regulatory, e-government) level in order to become digitally competitive.

3.4.2. The Digital Economy and Society Index (DESI)

The EC recognised the importance of digital transformation and competitiveness early on. Since 2014, it has been publishing the DESI in order to "monitor Europe's overall digital performance and track the progress of EU countries in digital competitiveness" (EC, 2020d: 10).

The DESI has a different structure than the WDCR. It includes 5 dimensions (Connectivity, Human capital, Citizen use of internet, Integration of digital technology, and Digital public services), each of which is focused on the individual/household level, the employee level, the business level and the state/infrastructure level. Connectivity captures digital infrastructure (fixed broadband take-up, coverage, mobile broadband, and broadband prices); Human capital addresses internet user skills and advanced skills; Use of internet tackles the citizen's use of internet services and online transactions; Integration of digital services measures business digitisation and e-commerce; Digital public services focuses on e-Government development.

Table 3.4.2 presents all (37) indicators/criteria that are used to compose the five dimensions. As in the case of the WDCR, the DESI is also a dynamic index that is enriched every year with new indicators, while others are taken out in a continuous effort to better measure the digital performance and competitiveness of EU countries. The DESI first edition (2014) included 25 indicators, whereas the last edition (2020) includes 37.

In the last two DESI editions (2019 and 2020), Greece remained in the 27th rank, just above Bulgaria among the 28EU member states (the 2020 edition includes the UK), gaining one rank from the DESI 2018 when Greece ranked last. Integration of digital technologies is the best performing dimension, ranking 24th, followed by Human capital and Use of internet services (both 25th rank). Digital public services (27th) and Connectivity (28th) have the weakest performance. These results suggest that digital competitiveness at the business level is the strongest in Greece. The individual/household and employee levels follow, with the state and infrastructure levels being the weakest. This is not surprising for a country where infrastructure and government efficiency are significantly lower than the other European countries.

It should be noted that the DESI 2020 does not capture the COVID-19 era, given that all data are from 2019 and before. However, as it is stated in the report published amid the pandemic crisis, Greece, along with most countries, has prioritised its digital transformation. Particularly, the digitisation of public services has been accelerated. The government portal "gov.gr" provided more than 500 e-services as of the publication date of the DESI 2020 and more than 1000 as of January 2021. This data is not included in the DESI 2020 edition.

3.4.3. Remarks on critical indicators for improvement

Responding to the COVID-19 crisis, Greece and the rest of the EU countries have launched programmes and measures to advance digitisation in many sectors of the economy, increase IT security, boost innovation and artificial intelligence within a general plan to radically transform the economy (EC, 2020d). Even though Greece has already accelerated its digitisation programme, similar programmes run in most countries, not only in the EU, but world wide. This means that if

Table 3.4.2 Greece's ranking/scoring and comparison to the EU average based on the DESI 2020*

Indicator	Rank/score	EU average
Total DESI	**27/37.3**	**52.6**
1. Connectivity	**28/33.4**	**50.1**
Overall fixed broadband take-up (% households)	76%	78%
At least 100Mbps fixed broadband take-up (% households)	1%	26%
Fast broadband (NGA) coverage (% households)	81%	86%
Fixed very high-capacity network (VHCN) (% households)	7%	44%
4G Coverage (% households)	97%	96%
Mobile broadband take-up (subscriptions per 100 people)	86	100
5G readiness (assigned spectrum as a % of total harmonised 5G spectrum)	0%	21%
2. Human capital	**25/34.8**	**49.3**
At least basic skills (% individuals)	51%	58%
Above basic digital skills (% individuals)	23%	33%
At least basic software skills (% individuals)	56%	61%
ICT specialists (% total employment) 2018	1.8%	3.9%
Female ICT specialists (% female employment) 2018	0.5%	1.4%
ICT graduates (% graduates) 2017	2.9%	3.6%
3. Use of internet services	**25/46.1**	**58.0**
People who have never used the internet (% individuals)	22%	9%
Internet users (% individuals)	74%	85%
News (% internet users)	88%	72%
Music, videos, and games (% internet users) 2018	79%	81%
Video on demand (% internet users) 2018	11%	31%
Video calls (% internet users)	67%	60%
Social networkers (% internet users)	75%	65%
Doing an online course (% internet users)	7%	11%
Banking (% internet users)	40%	66%
Shopping (% internet users)	51%	71%
Selling online (% internet users)	3%	23%
4. Integration of digital technology	**24/28.2**	**41.4**
Electronic information sharing (% enterprises)	38%	34%
Social media (% enterprises)	19%	25%
Big data (% enterprises) 2018	13%	12%

Table 3.4.2 **(continued)**

Indicator	Rank/ score	EU average
4. Integration of digital technology (continued)		
Cloud (% enterprises) 2018	7%	18%
SMEs selling online (% SMEs)	9%	18%
e-Commerce turnover (% SME turnover)	4%	11%
Selling online cross-border (% SMEs)	4%	8%
5. Digital public services	**27/51.5**	**72.0**
e-Government users (% internet users needing to submit forms)	39%	67%
Pre-filled forms (score 0-100)	25	59
Online service completion (score 0-100)	84	90
Digital public services for business (score 0-100)	63	88
Open data (% maximum score)	66%	66%

Source: The Digital Economy and Society Index 2020.
Notes: * All data refer to 2019 except otherwise noted. Green indicates performance above the EU average. Red indicates the weakest criteria.

Greece is to converge its digital performance and competitiveness with the rest of the EU member states as well as with the rest of the OECD developed countries, it has to run its digitisation programme faster and in a more effective and efficient way. Otherwise, if Greece improves its digital performance at the same pace as the rest of the EU and OECD developed countries, it will remain in the bottom ranks among its peers.

According to the WDCR, some of the criteria that need significant improvement in Greece include foreign highly skilled personnel, pupil to teacher ratio, banking and financial services, country credit rating, venture capital, agility of companies, and use of big data and analytics. It is interesting that most of the above criteria are not at the heart of digital transformation, but are rather peripheral to it. However, these criteria directly affect the process of digitisation through investment opportunities and the employment of highly digitally-skilled workers. This is not to say that the rest of the criteria do not need attention. Some that also need significant and immediate improvement are digital/technological skills, employee (digital) training, high-tech patent grants, the development & application of technology, scientific research legislation, intellectual property rights, funding for technological development, communications technology, mobile broadband subscribers, wireless broadband, internet users, internet bandwidth speed, e-participation, e-government, public-private partnerships, and software piracy.

Some of the above WDCR criteria coincide with the DESI indicators. According to the DESI, Greece needs to drastically improve criteria such as internet speed, very high-capacity networks (VHCNs), 5G readiness, above basic digital skills, ICT specialists, access to the internet, individuals selling online, advanced digital technologies for business (cloud computing, e-commerce turnover,

businesses selling online cross-border), and digital public services to both individuals and businesses.

Digitisation of the Greek economy has been dramatically accelerated by COVID-19. The next editions of the WDCR and the DESI will capture this considerable change toward digital transformation. The question for Greece to become more competitive is not whether it achieves the digital shift required for the post-COVID-19 economy, but at what pace this shift will take place.

3.5. Regional competitiveness

Regional competitiveness is defined by Annoni and Dijkstra (2019) as the "ability to offer an attractive and sustainable environment for firms and residents to live and work" in an attempt to balance entrepreneurial and social well-being, short-term success and long-term potential.

The EU Regional Competitiveness Index (RCI) incorporates 74 indicators (most of them spanning the period 2015–2017) grouped into 11 pillars, which are organised into three sub-indexes: a) basic (institutions, macroeconomic stability, infrastructure, health and basic education), b) efficiency (higher education and lifelong learning, labour market efficiency and market size) and c) innovation (technology readiness, business sophistication and innovation). As it becomes

Table 3.5.1 RCI and GDP per capita ranking of Greek regions (out of 263), 2019

Regions		Sub-indexes			RCI 2019	RCI 2016	GDP per capita
		Basic	Efficiency	Innovation			
EL30	Attiki	235	177	157	180	193	122
EL41	Voreio Aigaio	247	266	249	268	249	246
EL42	Notio Aigaio	254	255	260	259	244	185
EL43	Kriti	256	252	224	250	250	235
EL51	Anatoliki Makedonia, Thraki	261	259	251	265	261	256
EL52	Kentriki Makedonia	250	235	226	239	242	242
EL53	Dytiki Makedonia	260	260	248	263	252	225
EL54	Ipeiros	257	245	246	251	248	253
EL61	Thessalia	255	248	253	252	247	245
EL62	Ionia Nisia	249	253	256	256	256	221
EL63	Dytiki Ellada	258	261	244	262	257	248
EL64	Sterea Ellada	251	249	257	254	258	228
EL65	Peloponnisos	252	256	254	258	258	239

Source: EU Regional Competitiveness Index 2019, author's calculations.
Note: Green indicates the best performing region and red indicates the worst performing region.

evident from Table 3.5.1, Greek regions reside at the end of the scale. Five Greek regions reside at the bottom ten regions of the index. Similar to most of the other EU member states, Greece's capital region (Attiki) performs significantly better than the other regions of the country. Nevertheless, Attiki scores lower than the EU average in all three sub-indexes (Figure 3.5.1), and scores higher than the EU average in only five (out of eleven) pillars (infrastructure, health, higher education and lifelong learning, market size, business sophistication).

By comparing the RCI 2019 with the previous edition of the index, it is observed that only three regions, Attiki, Sterea Ellada and Kentriki Makedonia, improved their position compared to 2016, while Kriti, Ionia Nisia and Peloponnisos remained the same. On the other hand, the competitiveness of the remaining 7 regions seems to have deteriorated. The sharpest decline is observed in Voreio and Notio Aigaio (dropping 19 and 15 places, respectively). It should also be noted that almost all regions (Kentriki Makedonia and Ipeiros being the only exceptions) underperform their economic level as they score lower than their GDP per capita[24] would indicate. For example, Attiki is placed 122nd as far as GDP per capita is concerned, while it is placed at the 180th position in the RCI 2019. Although Annoni and Dijkstra (2019) identify a positive relationship between RCI and GDP per capita, certain regions either overperform or underperform when comparing RCI to the level of GDP per capita. Since most Greek regions underperform, more emphasis should be given to investments that increase competitiveness.

Longstanding inequalities in regional performance are an important issue that hinders national competitiveness. Moreover, the emerging trends of technological changes (digitisation and

Figure 3.5.1 **RCI scores by pillar and sub-indices for the region of Attiki and the EU average**
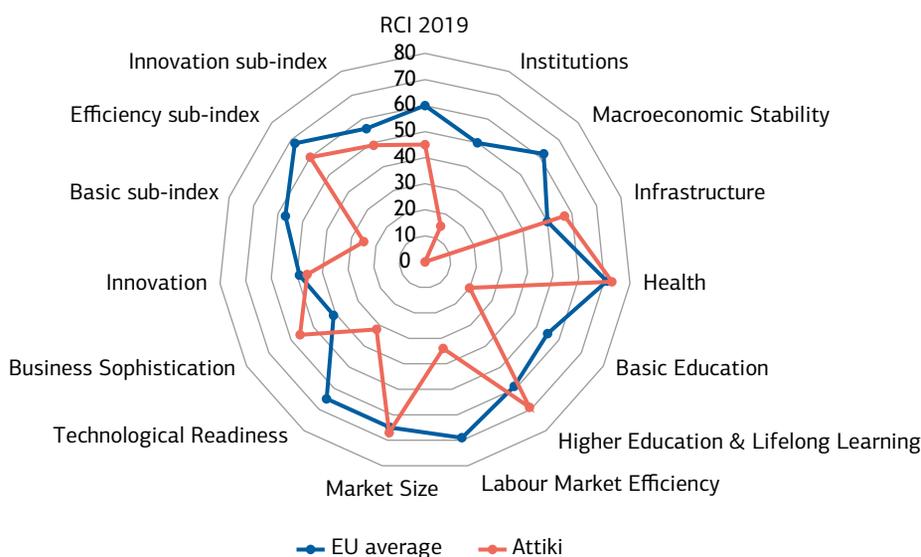
Source: EU Regional Competitiveness Index 2019.

24. Average 2015–2017 GDP per capita in purchasing power standard (PPS).

automation), demographic changes (ageing, migration, and urbanisation) and climate change might affect regions within the country in different ways (OECD, 2019). These global trends may well deepen the gap between the regions or contribute to its diminishment. Regional imbalances should be addressed by carefully designed and targeted strategies that take into account the inherent characteristics of each region and the specific impact of the emerging challenges so that no region will be left behind.

4. Thematic Productivity and Competitiveness Challenges

4.1. The health care system

4.1.1. An overview of the organisation of the health care system

Health improvements influence labour productivity and the pace of income growth through many pathways (Weil, 2014; Bloom et al., 2019). Better health directly promotes labour market participation and worker productivity (Strauss and Thomas, 1998; Bloom et al., 2019); increasing life expectancy creates incentives to invest in education, innovation, and physical capital (Bloom et al., 2019; Cervellati and Sunde, 2013); and better health, particularly that of women, improves fertility and spurs an economic transition from a state of stagnating incomes toward sustained income growth (Galor and Weil, 2000; Cervellati and Sunde, 2013; Bloom et al., 2019).

The Greek health care system comprises elements from both the public and private sector (Figure 4.1.1). In the public sector, a National Health System (ESY) coexists with a Social Health Insurance (SHI) model (Economou et al., 2017). ESY provides emergency pre-hospital, primary/ambulatory and inpatient health care services through public hospitals, health centers and rural surgeries. The Ministry of Health plays the dominant role in the regulation, planning and management of ESY, such as free and equitable access to quality health services for all citizens. The Ministry makes decisions on health policy issues, overall planning, national health strategies and the allocation of relevant resources. Also, it proposes changes in the legislative framework and undertakes the implementation of laws and reforms. The Ministry is responsible for hiring new health care personnel and for licensing health care professionals. It supervises a number of organisations and institutions (see Figure 4.1.1) that participate in the governance and regulation of the public health care system. It is also responsible for the regulation of the private health care sector and for planning and implementing pharmaceutical policy. The National Organisation for Medicines (EOF) is responsible for the pricing, evaluation and market authorisation of pharmaceuticals. It also monitors product quality, safety and efficacy and pharmaceutical production and clinical trials.

Regional Health Authorities (YPEs) were established in 2001, but the health care sector remains highly regulated by the central government. YPEs were the first step towards decentralisation in planning, management and regulation of the health care system. YPEs are responsible for the effective organisation, operation and management of all health and social units, i.e., public hospitals and health centers, within their area. Since 2014, the National Primary Healthcare Networks (PEDYs), coordinated by the YPEs, have been responsible for public primary/ambulatory care provision. YPEs have jurisdiction over all primary-care facilities, including health centers and their surgeries as well as facilities formerly belonging to the various health insurance branches that were merged into EOPYY. However, YPEs have only an advisory and supervisory role, and they do not have the authority to manage their budgets.

Figure 4.1.1 Overview of the Greek health care system
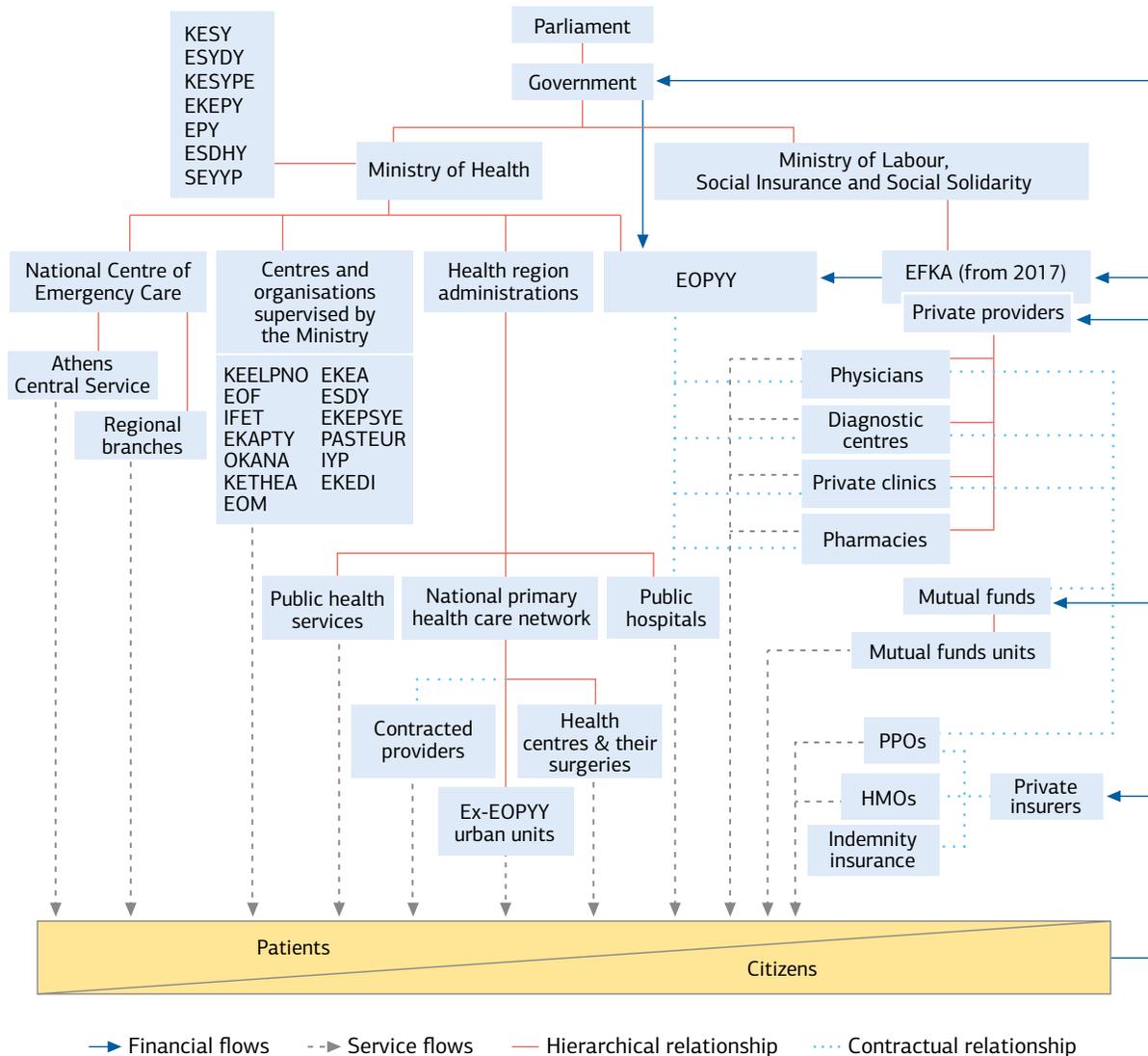
Source: Economou et al. (2017), p. 16.

Regional and local authorities have played a secondary role in the planning, organisation and provision of health care services through the lack of power and economic resources to implement health policies at the regional level. Some large municipalities, i.e., Athens, established health care centers, providing services mainly to the socially excluded, the low-income and the uninsured populations. During the economic crisis, many municipalities established municipal pharmacies to provide drugs free of charge to low-income and uninsured populations.

Apart from the Ministry of Health, the Ministry of Defense owns and is responsible for a number of military hospitals that are funded by the central government. These hospitals provide services to military personnel, although some provide services to civilians subject to certain criteria. The Ministry of Education owns and funds two teaching hospitals which provide services to the

population. These hospitals are under the authority of the National and Kapodistrian University of Athens and are not under the supervision of ESY.

SHI funds have played a very important role with regard to the coverage, financing and provision of health care services (Economou et al, 2017). In 2011, the National Organisation for the Provision of Health Services (EOPYY) was established. EOPYY is a self-governing public entity that operates under the supervision of the Ministry of Health. It acts as a monopsony, as it is the sole purchaser of health care services. EOPYY purchases services on a contractual basis, negotiating with health providers (public and private) on the volume, cost and quality of services, taking into account the demographic, epidemiological and social characteristics of the local population. Since 2017, the Unified Social Security Fund (EFKA) has been responsible for collecting all health contributions and transferring them to EOPYY.

The private sector includes profit-making hospitals (general, maternity and psychiatric), diagnostic centers, rehabilitation centers, geriatric homes for the elderly and a large number of solo practitioners, either contracted by EOPYY or paid directly by patients through out-of-pocket payments or, to a lesser extent, by private health insurance. The private sector plays an important role in the provision of health services, although it does not have any direct involvement in the planning, financing and regulation of the health care system.

The health care system is financed by a mix of public and private resources (Economou et al., 2017). ESY is financed by the state budget via direct (mainly on income and property) and indirect (VAT on goods and services) tax revenues and social insurance contributions. The state budget funds administration expenditures, the salaries of the employees of public health care providers, primary/ambulatory health care, public health and medical education.

Also, it provides subsidies to public hospitals and EOPYY and invests in capital stock. EOPYY is financed mainly by contributions from employees, employers and pensioners; rebate inflows from pharmacies and pharmaceutical companies; and a variety of minor sources of income. Household out-of-pocket payments fund health care services not covered by social health insurance, services of private providers, co-payments (mainly for pharmaceuticals and diagnostic tests), informal payments and private health insurance premiums. Voluntary health insurance funds spending in private inpatient and outpatient care units and provides packages of integrated health care services. In 2019, the central government funded 28.6% of total current health expenditures, the SHI 31.2%, voluntary private health insurance 4.9%, and household out-of-pocket payments 35.2% (ELSTAT, 2021). Financing systems for health care providers are, to a large extent, retrospective, including ESY staff salaries and fee-for-service payments for providers contracted with EOPYY. Since 2012, Diagnostic Related Groups (DRGs-KEN in Greek) are the main reimbursement mechanism of public hospitals and private hospitals that are contracted with EOPYY.

4.1.2. Health care and the competitiveness of the economy

A domestic economy is defined as competitive when it achieves economic growth and a continuous improvement in productivity and welfare (Aiginger, 2006). To evaluate the overall competitiveness of the economies, the IMD World Competitiveness Center uses (among others) appropriate indicators such as total health care spending, health infrastructure, life expectancy, infant mortality

Table 4.1.1 Performance in health indicators, by score in 2020, 33 European countries

	Total health expenditure	Total health expenditure per capita	Public expenditure on health	Health infrastructure	Universal health care coverage index	Life expectancy at birth	Healthy life expectancy	Infant mortality	Medical assistance	
	% of GDP	US$ per capita	% of total health expenditure	Does not meet (0)-meets (10) the needs of society	Index (0-100) measuring coverage of essential health services	Age (average estimates)	Age (average estimates)	Under 5 mortality rates per 1000 live births	Number of inhabitants per physician	Number of inhabitants per nurse
Greece	8.0	1520.0	60.2	5.3	75.0	82.1	72.6	4.5	157.1	312.8
Mean	8.2	3097.7	70.4	6.2	78.2	79.8	70.7	4.2	289.3	141.3
Standard deviation	2.0	2434.3	13.1	2.1	5.4	3.2	3.0	2.0	76.4	72.7
Highest score	12.3	9970.0	85.5	9.2	87.0	83.6	75.0	10.6	586.8	398.9
	Switzerland	Switzerland	Norway	Austria	Norway	Switzerland	Cyprus	Turkey	Turkey	Turkey
Lowest score	4.2	185.0	30.5	1.6	66.0	72.0	63.5	1.7	157.1	56.3
	Turkey	Ukraine	Switzerland	Ukraine	Bulgaria	Ukraine	Ukraine	Finland	Greece	Norway

Source: IMD (2020b).

and medical assistance (see Table 4.1.1 and 4.1.2) to capture the health dimension in the economy. The IMD World Competitiveness Report (2014) concluded that differences in health policies create a significant gap in competitiveness between rich and poor economies. Since 2011, most European countries (i.e., Austria, Denmark, France, Germany, the United Kingdom, Italy) have witnessed mild, if not negative, changes in total health expenditure as a percentage of GDP. These are all countries where the starting level of public expenditure is significantly higher (greater than 75% of total health expenditure). In contrast, average total health care expenditure for European countries decreased from $3,305 per capita in 2011 to $3,098 in 2020.

In 2020, the European countries that spent the most in health care were Switzerland ($9,970 per capita), Norway ($7,867 per capita), Iceland ($6,026 per capita) and Luxemburg ($5,956 per capita). It does not necessarily follow that health care is the best in these countries. Austria ranked number one in the question "Health infrastructure meets the needs of society", but it was only 25th in public health care expenditure and 11th in total health expenditure per capita. And while Sweden was the 5th country by total health expenditure, it ranked 26th in health infrastructure. The countries that spend the least in health care were Ukraine ($185 per capita), Turkey ($445 per capita), Romania ($557 per capita) and Russia ($573 per capita). The data show dramatic differences among countries in Europe. The highest spending economy in Europe (Switzerland) spends 54 times more in health care than the lowest-ranked country (Ukraine). Italy (ranked 21st) spends almost three times as much as Latvia (42nd). It is obvious that countries who spend the least in absolute terms (i.e., Turkey, Romania, Russia) also spend little relative to GDP (i.e., 4.2%, 5.2% and 5.3%, respectively) (IMD, 2020b).

Table 4.1.2 **Sub-factor ranking of the domestic economy, health indicators, 2011–2020**

	2011	2014	2019	2020
Overall	**56**	**57**	**58**	**49**
Economic performance	**58**	**60**	**60**	**55**
Health & environment	**26**	**26**	**34**	**35**
Total health expenditure as % of GDP	10	8	23	28
Total health expenditure per capita	20	22	30	31
Public expenditure on health as % of total health expenditure	38	38	42	41
Health infrastructure	35	44	48	40
Universal health care coverage index	n.a.	n.a.	44	40
Life expectancy at birth	15	23	22	15
Healthy life expectancy	18	17	16	17
Infant mortality	2	26	35	32
Medical assistance	27	36	29	29
Number of economies	**59**	**60**	**63**	**63**

Source: IMD, 2011, 2014, 2019, 2020b. n.a.=not available.

One of the main problems of the Greek economy is the lack of competitiveness. Greece is ranked low according to the 2020 IMD World Competitiveness Ranking (49th among 63 economies), being in 55th place for the macroeconomic evaluation of the domestic economy-economic performance and 35th place for the evaluation of health and environment factors (Table 4.1.2).

In terms of health indicators, the strengths of the domestic economy are life expectancy at birth (15th) and healthy life expectancy (17th), while its weaknesses are public expenditure on health (41th), health infrastructure (40th) and universal health care coverage (40th). The low ranking of our country compared to other countries is due to (a) the reduction of total health expenditure as a percentage of GDP (-18 positions since 2011) and per capita health expenditure (-11 positions), mainly due to the memorandum commitments and the implementation of cost containment policies; (b) the high rate of out-of-pocket payments (-3 positions); and (c) the perception of the population that health infrastructure does not meet the needs of society (-5 positions) since structural reforms emphasised mostly cost containment rather than improving the quality of health care services provided and reducing health inequalities.

4.1.3. Performance/final outcome of the health care system

Performance defines the extent to which the health of the total population (final outcome) has been improved. It constitutes an important measure of health system assessment. However, the most difficult part in assessing the performance of health systems is to correlate the final outcome with the operation of the health system. This becomes more complicated if we consider that there are many factors beyond the functioning of the health system that could influence the level of citizens' health. Key indicators for the empirical analysis of health systems are the life expectancy at birth and at age 65 and over, the infant mortality and the Potential Years of Life Lost (PYLL), i.e., the average years a person would have lived if they had not died prematurely, before the age of 75 years.

Life expectancy at birth of the total population increased in Greece over the past decades, but progress has slowed down in recent years. Since 1960, life expectancy at birth has increased by 9.2 years (Figure 4.1.2). The most life years (+6.6) were gained during the period 1960–2000 and only 2.8 years between 2001–2018. During the recent pandemic, 0.5 years of life were lost. The life expectancy for women increased by 9.9 years compared to 8.4 years for men.

In 2020, life expectancy at birth reached 80.4 years on average across 26 European countries, about 12 years higher than in 1960 (OECD, 2021b). Norway, Switzerland and Iceland had the highest life expectancy among European countries, with life expectancy reaching over 83 years in 2020. Life expectancy at birth exceeds 80 years in almost two-thirds of European countries, but still remains at only around 75 years in Lithuania, Latvia and Hungary. The life expectancy in Greece is 0.8 years higher than the average of the European countries. However, the growth rate is lower.

Until 2019, life expectancy rose fairly rapidly and steadily across European countries as a result of a well-organised health system, the improvement in the quality of health care services provided, the increase in disposable income, and the improvement in education, living conditions and nutrition

Figure 4.1.2 Life expectancy at birth, Greece, 1960–2020
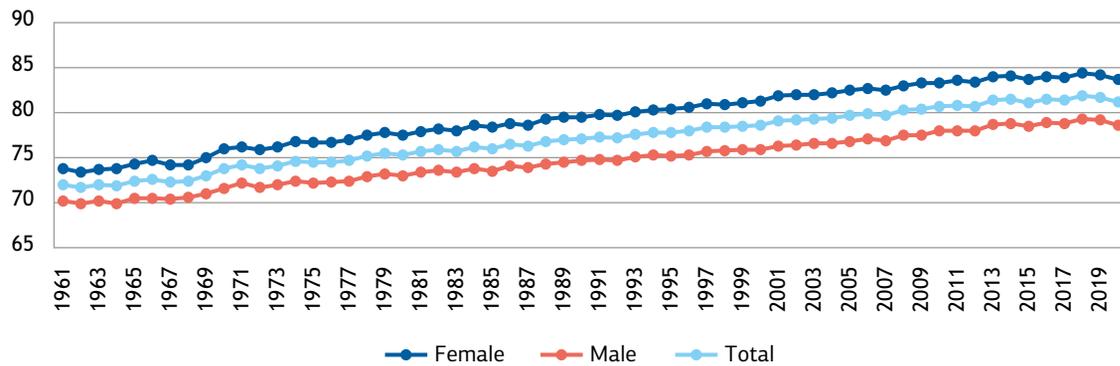
Source: OECD (2021b).

Figure 4.1.3 Infant mortality, Greece, 1960–2019
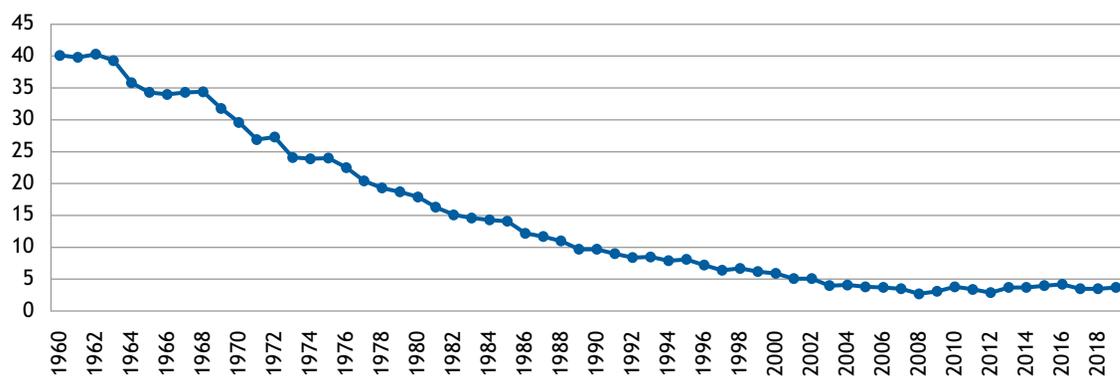
Source: OECD (2021b).

habits of the population. However, gains in life expectancy have slowed down markedly during the last decade. The COVID-19 pandemic further contributed to the reduction in life expectancy in 2020 by 0.6 years. The impact of COVID-19 on life expectancy will depend on both infection rates and fatality rates of people infected during the year. COVID-19 might lead to a reduction in life expectancy in all the countries where life expectancy was already high and where the infection rate will exceed 1% or 2% of the population (OECD/European Union, 2020).

Women continue to live longer than men in all European countries —83.1 years compared with 77.5— although this gap has narrowed by about 1 year since 2000 as men's life expectancy increased more rapidly than women's in most countries. These gender differences in life expectancy are partly due to greater exposure to risk factors among men, particularly greater tobacco consumption, excessive alcohol consumption and a less healthy diet that result in higher death rates from heart diseases, various types of cancer and other diseases. Men are more likely to die from violent deaths, such as suicide and accidents (OECD/European Union, 2020).

Infant mortality is affected by poor living conditions and other socio-economic factors. However, the quality of health care services can greatly reduce the number of infant deaths. Greece has achieved notable progress in reducing infant mortality rates over the past few decades (Figure 4.1.3 above). The infant mortality rate reduced from 40 deaths per 1,000 live births in 1960 to 9.7 deaths in 1990 and 3.7 deaths in 2020. Infant mortality rates are low in most European countries, with an average of less than 3.5 deaths per 1,000 births across European countries in 2019. However, a small group of countries —Turkey and the Slovak Republic— still have infant mortality rates of 5 deaths per 1,000 live births or more.

4.1.4. Efficiency of the health care system

One way to determine the efficiency of the health system is to use cost variables such as total health expenditure as a percentage of GDP and total health expenditure per capita. In Greece, the total health expenditure as a percent of GDP reduced by 5% annually after the implementation of structural reforms aiming to the cost containment of the health care system. Total expenditure continued its downward trend until 2019 with a diminishing growth rate. (Figure 4.1.4). The fall in total health expenditure was mainly due to the significant reduction in public expenditures (14% average annual change). Since 2015, public expenditures have increased by 1.3% on average, and out-of-pocket payments by 5.18%. This reduction was the mixed result of the implementation of structural reforms referring to cost containment in the health sector, pharmaceutical policy (the introduction of external reference pricing for brand-named drugs, the development of a positive list for reimbursement drugs, the implementation of e-prescription, rebates and clawbacks), the development of centralised e-procurement and e-tenders, the penetration of generics in hospitals, etc. In 2019, the central government spent 4.7% of GDP on health, and households 3.3% of GDP. Voluntary and out-of-pocket payments have not changed significantly over time, even during the financial crisis.

In terms of current prices, the financial crisis and the decline in disposable income have affected negatively the out-of-pocket payments (Figure 4.1.4). The fall in the retail price of drugs reduced household spending. Nevertheless, the introduction of the negative list of drugs and the increase in patients' co-payments has transferred a portion of health expenditure from the central government and social insurance funds to households. The share of the public sector in total health expenditure decreased 8 percentage units (from 68% in 2009 to 60% in 2019), while the share of private payments increased by 8 units (from 32% to 40%, respectively) (ELSTAT, 2021). The share of social insurance funds decreased 10 percentage units (31% of total health expenditure), the contribution of the central government remained stable (29%) and the out-of-pocket payments reached 35% in 2019.

In Greece, total health expenditure per capita decreased significantly (28%) during the period 2008–2014 mainly due to the structural health reforms (Figure 4.1.5). Since 2015, per capita expenditure increased by 9%, reaching €2,319. Government/compulsory spending present more sharp changes compared to voluntary/out-of-pocket payments during the period 2000–2015.

Figure 4.1.4 Total health expenditure as % of GDP, Greece, 1988–2019
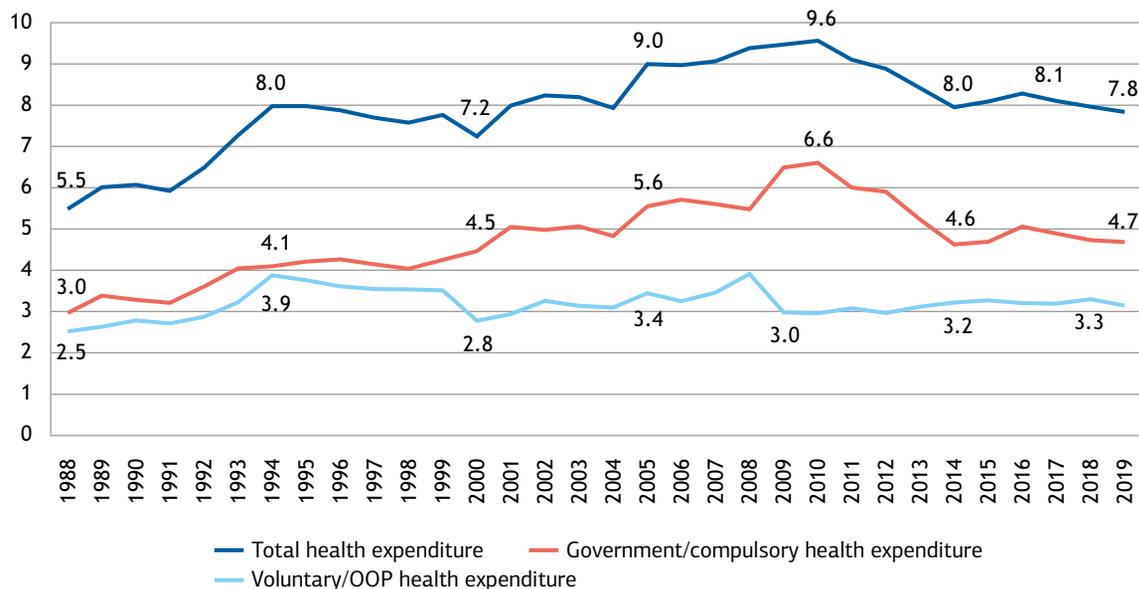
Source: OECD (2021b).

Figure 4.1.5 Total health expenditure per capita, current prices, PPPs, USD, Greece, 1988–2019
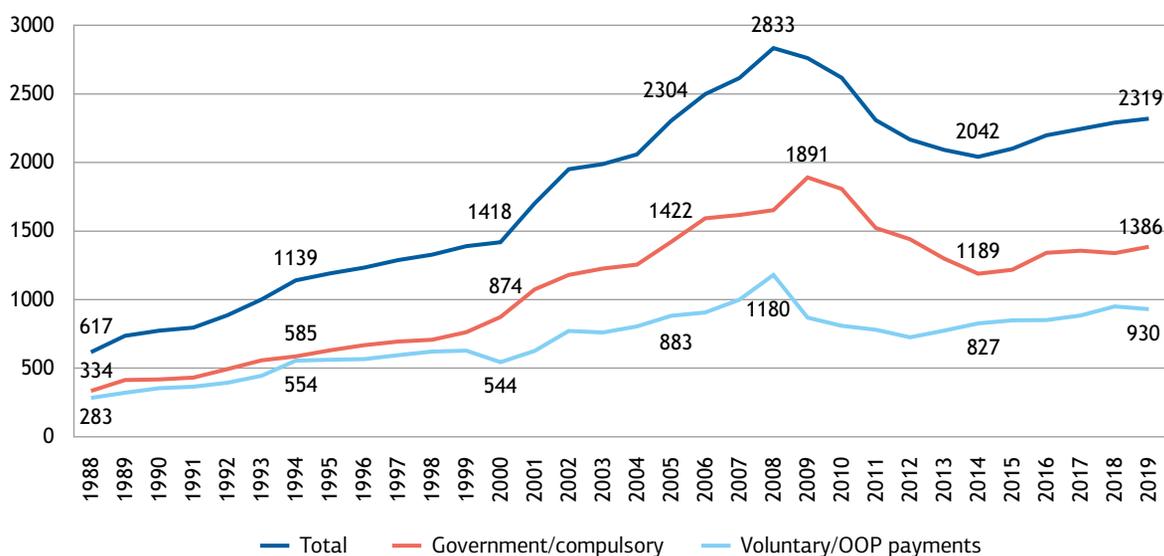
Source: OECD (2021b).

EU countries devoted, on average, 8.3% of their GDP to health care in 2019 (OECD/European Union, 2020). This measure has not changed since 2014 as growth in health spending remained in line with the overall economy. There are large variations in the level and growth of health spending across European countries. Switzerland (12.1%), Germany (11.7%) and France (11.2%) presented

Figure 4.1.6 Effect of total health expenditure as % of GDP on overall satisfaction index, European countries, 2018
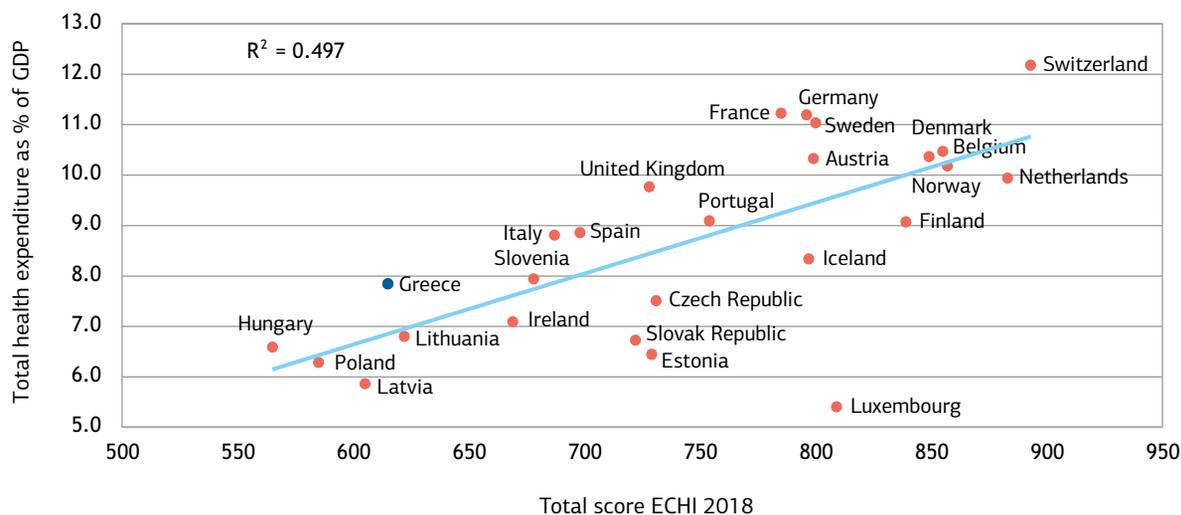
Source: Euro Health Consumer Index (ECHI), 2018, OECD (2021b).

the highest shares of GDP, while Luxemburg (5.4%) and Romania (5.7%) had the lowest. Also, Switzerland exhibited the highest per capita spending (€5,241), followed by Norway (€4,505). In 2020, health spending was significantly affected by the COVID-19 pandemic. The development of the pandemic has shown the need for the rapid deployment of resources across the health sector: (a) providing increased capacity for the treatment of patients in hospitals, (b) health providers received substantial subsidies to provide treatment capacity for COVID-patients and (c) building up testing and diagnostic capabilities.

Figure 4.1.6 presents the correlation between total health expenditure as a percentage of GDP and the citizens' overall satisfaction as defined by the Euro Health Consumer Index. The correlation is strong, indicating that if total health expenditure as a percentage of GDP increased by 1 unit, the overall satisfaction of the population would increase by 0.7 units. The variability of the overall satisfaction score is interpreted by 50% of the total expenditure. Switzerland and several Scandinavian countries are located in the upper-right side of Figure 4.1.6 (high satisfaction, high cost). On the other hand, Greece is located at the bottom, indicating low satisfaction and low cost.

4.1.5. Technical efficiency evaluation of health care systems

In this section, we evaluate the technical efficiency of health care systems in OECD countries using a non-parametric two-stage DEA approach. The aim is to assess how much outcome (life expectancy at birth) could be gained without changing the technology and the input quantities used in the health system or if the outcome could be achieved with fewer resources. The discussion focuses mainly on the position of Greece among other OECD countries.

Figure 4.1.7 shows the relative ranking of 34 OECD countries based on the degree of technical efficiency, for five years. Nine countries are located on the best practice production frontier, i.e., the degree of technical efficiency is equal to one: Sweden (for all years), Estonia, Greece, Israel, Latvia and Spain (2000 and 2005), Canada (2005), Ireland (2010) and Turkey (2010, 2015, 2019). Germany (2000) and Japan (all years except 2000) are ranked in the lower places among countries. The degree of technical efficiency reduced from 0.56 in 2000 to 0.29 in 2019, indicating that the level of life expectancy at birth in Japan could be achieved using a smaller quantity of health resources. Denmark, Finland, Iceland, Italy, Ireland, Luxemburg and the United Kingdom are among European countries that have improved their health systems' technical efficiency overtime.

As concerns Greece, the degree of technical efficiency decreased from 1.00 in 2005 to 0.66 in 2010 and increased to 0.76 in 2019. This indicates that the life expectancy at birth could be achieved using 24% fewer inputs, if the technical inefficiency of the health system could be eliminated. During the period 2000–2009, the improvement in life expectancy by 1.1 years was followed by a 55.7% increase in total health expenditure per capita, a 28.9% increase in health workforce density and a 6% decrease in the number of beds. Various structural reforms were implemented in the health sector during the period 2010–2015 (for more details, see Appendix A.2), resulting in a rapid decrease of total health expenditure per capita (30%) and in the number of beds (5.14%), while the density of the health workforce increased by 4%. Since 2015, Greece has achieved significant improvement (0.10 units) relative to other European countries, i.e., Portugal and Spain, who experienced significant cuts in health spending. Nevertheless, Greece ranked very close to the average of the OECD countries and occupied the 16th place among 34 countries in 2019, relative to 19th in 2015 (Figure 4.1.7).

On average, the degree of technical efficiency reduced from 0.81 in 2000 to 0.68 in 2010 and increased to 0.71 in 2019 in OECD countries, indicating that the final outcome has been achieved by using the available inputs more efficiently in 2019 compared with 2010. Figure 4.1.8 presents the frequency distribution of technical efficiency scores among countries. The majority of countries exhibited technical efficiency scores greater than 60%. In 2019, 64% of countries had technical efficiency scores between 0.60 and 1.00.

If a country is located away from the best practice production frontier, it is not necessarily the result of the inefficient production of health care services; it might also be due to environmental factors which are beyond the control of health systems or the central government. The two-stage analysis showed that the ageing of the population could be a significant exogenous factor that influenced negatively the efficient operation of health systems. Empirical studies supported that the alcohol consumption and the economic profile could also significantly influence the level of efficiency of health systems, but this is not verified in our results.

The degree of technical efficiency could also be determined by technical factors. Technical efficiency is a relative measure of health care system performance. Therefore, the location of Greece from the best practice frontier is influenced by the degree of technical efficiency of other countries and how quickly these countries respond to measures that could improve their

Figure 4.1.7 Technical efficiency ranking of health care systems in the OECD countries

2000

	Value
Estonia	1.00
Greece	1.00
Israel	1.00
Latvia	1.00
Spain	1.00
Sweden	1.00
United States	0.99
Portugal	0.95
Canada	0.94
Norway	0.93
Slovenia	0.90
Lithuania	0.89
Australia	0.88
Slovak Republic	0.88
United Kingdom	0.86
Czech Republic	0.82
Denmark	0.81
Italy	0.81
OECD average	0.81
Hungary	0.79
Ireland	0.74
Netherlands	0.72
Belgium	0.59
Finland	0.58
Switzerland	0.58
Japan	0.56
France	0.53
Austria	0.51
Germany	0.47

2005

	Value
Canada	1.00
Estonia	1.00
Greece	1.00
Israel	1.00
Latvia	1.00
Poland	1.00
Spain	1.00
Sweden	1.00
Slovenia	0.93
United States	0.93
Portugal	0.93
Lithuania	0.91
Slovak Republic	0.88
Italy	0.88
United Kingdom	0.86
Australia	0.83
OECD average	0.79
Czech Republic	0.78
Denmark	0.76
Hungary	0.73
Netherlands	0.70
Ireland	0.66
Norway	0.62
Belgium	0.60
Switzerland	0.59
Luxembourg	0.56
France	0.56
Austria	0.56
Finland	0.55
Germany	0.51
Japan	0.50

2010

	Value
Ireland	1.00
Sweden	1.00
Turkey	1.00
Canada	0.98
Spain	0.94
United Kingdom	0.94
Israel	0.93
United States	0.87
Portugal	0.84
Latvia	0.81
Italy	0.81
Iceland	0.79
Denmark	0.76
Australia	0.75
OECD average	0.68
Netherlands	0.67
Estonia	0.66
Greece	0.66
Norway	0.64
Slovenia	0.63
Poland	0.63
Lithuania	0.62
Switzerland	0.56
Hungary	0.54
Korea	0.53
Luxembourg	0.53
Finland	0.49
Belgium	0.47
France	0.46
Czech Republic	0.45
Slovak Republic	0.45
Austria	0.38
Germany	0.35
Japan	0.30

Figure 4.1.7 (continued)

2015

2019

Figure 4.1.8 Frequency distribution of technical efficiency scores of health care systems in the OECD countries
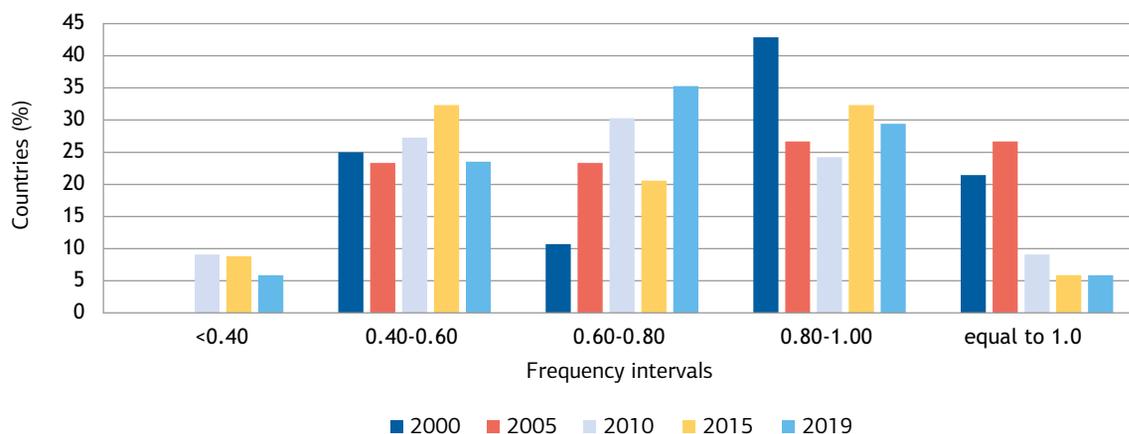
Box 4.1.1 Technical notes of the linear programming model

An input-oriented DEA model (Charnes, Cooper and Rhodes, 1978) is adopted for the measurement of technical efficiency ($TE(x_i, y_i)$) by solving a linear programming problem for each country $i = 1, \ldots I$ with $m = 1$ output (y_i) and $n = 1, \ldots N$ inputs (x_i) (Fare, Grosskopf and Lovell, 1994, p. 99):

$$TE(x_i, y_i) = \min \theta_i$$

$$\text{s.t.} \sum_{i=1}^{I} z_i y_{im} \geq y_{im} \qquad m = 1$$

$$\sum_{i=1}^{I} z_i x_{in} \leq \theta x_{in} \qquad n = 1, \ldots N$$

$$\sum_{i=1}^{I} z_i \leq 1$$

The term $\theta_i \leq 1$ refers to the degree of technical efficiency. If $\theta_i < 1$, then the health system is inefficient. If $\theta_i = 1$, the health system is fully efficient. The vector $z = (z_i, \ldots z)$ is a vector of constants that measures the weight used to compute the location of an inefficient country if it were to become efficient. The restriction $\sum_{i=1}^{I} z_i \leq 1$ introduces constant returns to scale (CRS) for the production technology.

The degree of technical efficiency is influenced by a number of environmental variables (i.e., socio-economic factors) that are beyond the control of health systems and/or governments and play an important role to determine the heterogeneity among countries, affecting the final outcome of health systems. Ray (1991) proposes a two-stage analysis for the estimation of environmental variables where the first stage DEA model is solved using the traditional inputs and outputs, and the technical efficiency scores (θ_i) from the first stage (i.e., dependent variable) are regressed on the environmental variables (w_i). A censored Tobit regression model is often considered appropriate (Jacobs et al., 2006; Tingley and Pascoe, 2005; Ray, 2004): $\hat{\theta}_i = \gamma_0 + \sum_{i=1}^{I} \gamma_i w_i + \varepsilon_i$, where γ_i is a vector of parameters to be estimated.

The empirical analysis is based on available data published by the OECD (2021b) for 34 OECD countries for years 2000, 2005, 2010, 2015 and 2019.

Output: Life expectancy at birth, total population, years
Inputs: Total health expenditure per capita, 2015 constant prices, PPPs, USD
          Total number of hospital beds per 1,000 population
          Total health and social workforce per 1,000 population, head counts

Environmental variables: Alcohol consumption, adults over 15 years old, libras per capita
                          Percentage of the total population over 65 years old
                          GDP per capita at 2015 constant prices, PPPs, USD

Six dummy variables (HS1 – HS6), accounting for the heterogeneity among countries, which classifies our sample countries in six sub-groups sharing broadly similar health system characteristics. Each dummy variable is equal to 1 if the country belongs to the specific sub-group and 0 otherwise.

health system efficiency, ranking our country in a lower position. Additionally, the Health System Accounts was implemented in Greece after 2010. The underestimation of variables such as the number of health care workforce or total health expenditure per capita could influence the degree of technical efficiency.

4.2. The energy sector and green transition

4.2.1. Introduction to the Greek energy sector

The energy sector is of great importance for the Greek economy. It represents a significant share in GDP as well as in employment and has the potential to attract new investments and create new jobs. In 2019, "Electricity, gas, steam and air conditioning supply (EGSACS)" and "Manufacture of coke and refined petroleum products (MCRPP)" economic activities represented together a 3.3% value added share of the GDP of the country. Even if the total GDP decreased during the last decade, the added value of the latter sector increased (Figure 4.2.1). To the contrary, the added value of the MCRPP sector decreased, especially during the last five years. However, for both economic activities, the final growth in added value was positive and, for this reason, the sectoral share in GDP increased from 2.1% in 2010 to 3.3% in 2019 (Figure 4.2.2).

Regarding employment, the total number of employees of the above two economic activities of the energy sector increased from 28,7 thousand people in 2010 to 33,4 thousand people in 2019 (Figure 4.2.3). More specifically, even if the number of employees in MCRPP remained

Figure 4.2.1 Gross value added of the economic activities of the energy sector (left y-axis), compared to the total added value of all NACE activities and the added value of industry (right y-axis), in current prices
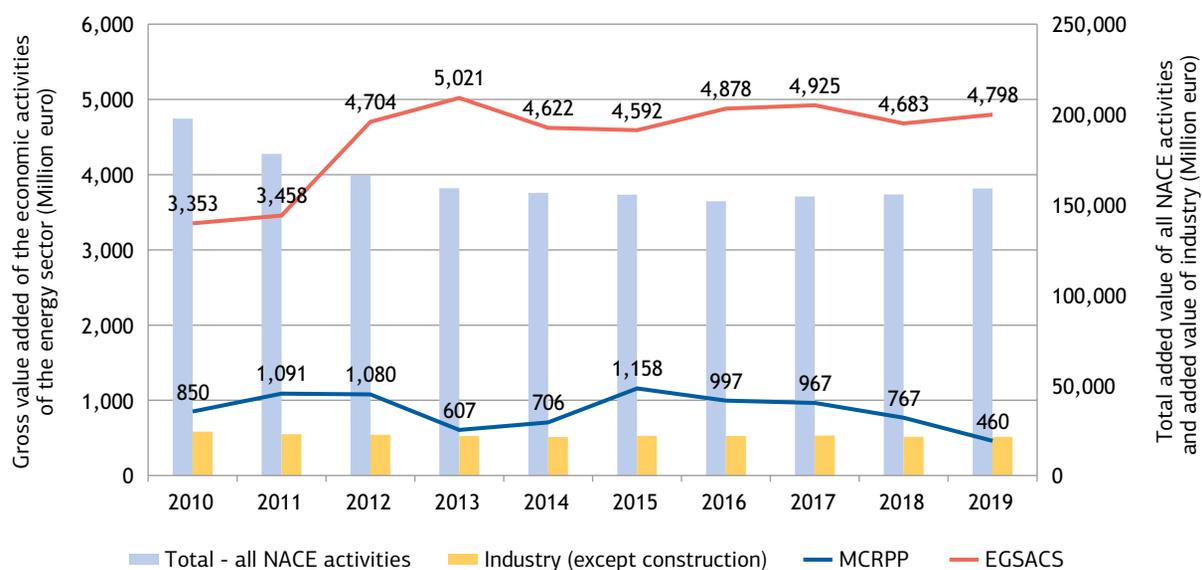
Source: Own processing of data from Eurostat.

Figure 4.2.2 Gross value added of the economic activities of the energy sector, as a share of total GDP (left y-axis) and as a share of industry's added value (right y-axis)
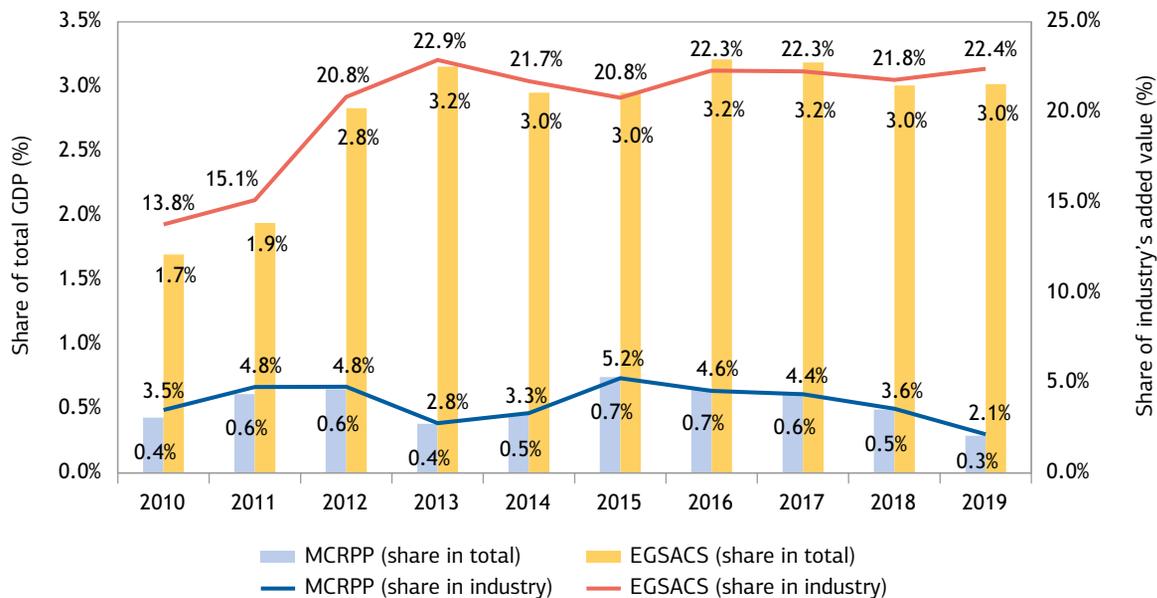
Source: Own processing of data from Eurostat.

Figure 4.2.3 Employment (left y-axis) and labour productivity (right y-axis) in the energy sector
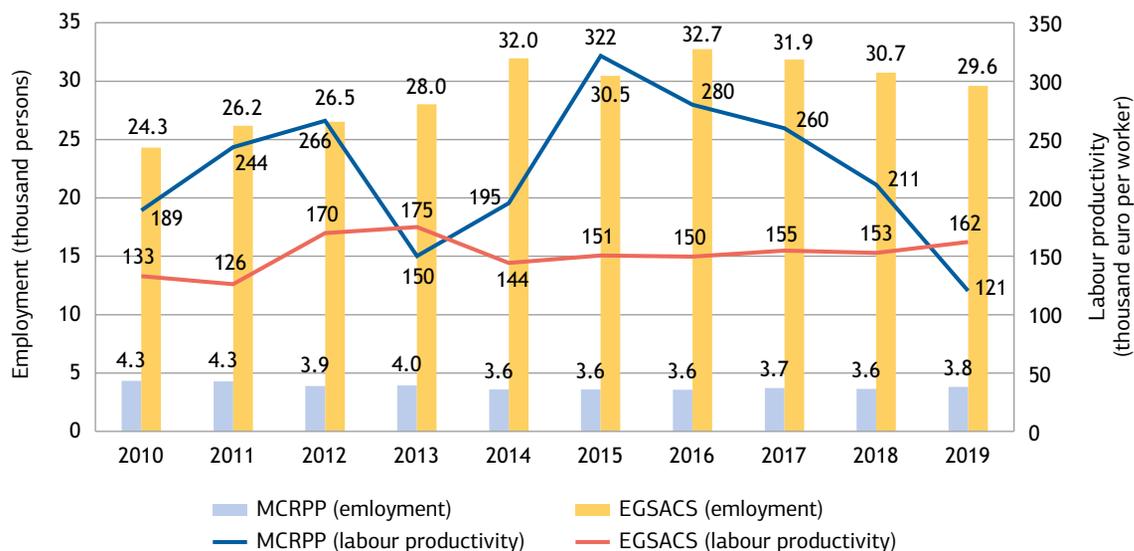
Source: Own processing of data from Eurostat.

Figure 4.2.4 Employment in the economic activities of the energy sector, as a share in total employment (left y-axis) and as a share in industry (right y-axis)
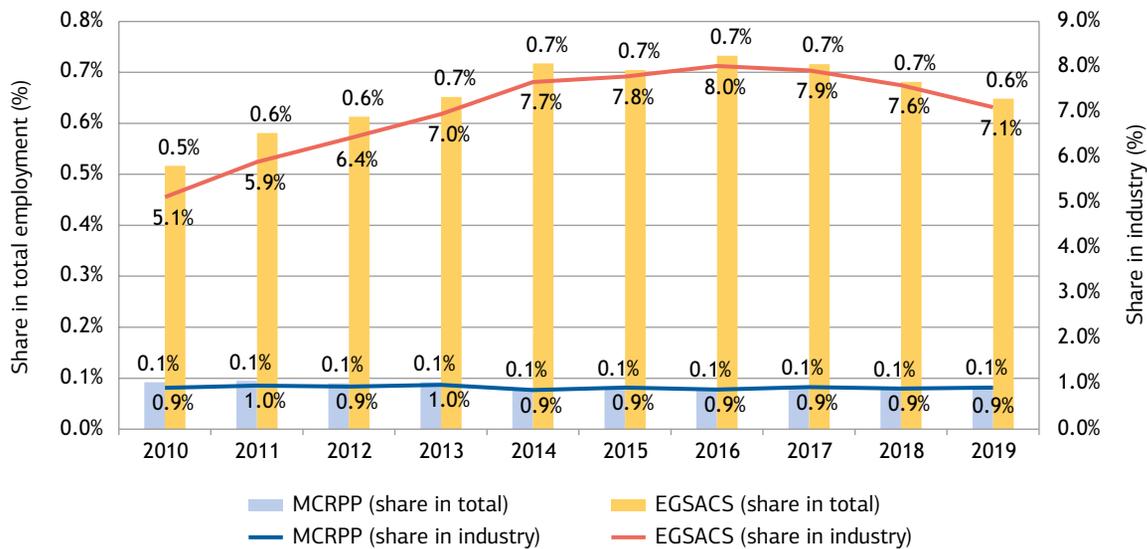
Source: Own processing of data from Eurostat.

almost stable during the last decade, the respective number in EGSACS increased. Additionally, the labour productivity of the MCRPP decreased during the last five years, due to the decrease of the added value of the economic activity. Nonetheless, the labour productivity of the EGSACS remained stable during the last decade, as both the added value and the employment in the economic activity increased (Figure 4.2.3). Regarding employment in the energy sector as a share of total employment of the country, it ranged between 0.6% and 0.8% during the last decade, while employment in the energy sector as a share of industry employment increased from 6% to 8% (Figure 4.2.4).

4.2.2. Characteristics of energy consumption in Greece

A characteristic of the evolution of the energy market during the last decade is the change of the country's energy mix during the last years. The use of Renewable Energy Sources (RES) and natural gas has increased, while the use of conventional sources such as lignite has decreased. Energy consumption in Greece decreased compared to 10 years ago (Figure 4.2.5). This is related to the fact that energy production and transmission became more efficient, but also because energy efficiency in consumption increased. Additionally, other reasons, such as the recession of the economy, led to the limitation of consumption. It is also obvious that the main energy products used in Greece are oil and petroleum products. In 2019, 53.5% of the total final energy consumption represented oil products. This is an important fact because Greece mainly depends on imports of oil products and the fact that their share in the energy mix is so high, increases the energy dependency of the country. The next most important product in the Greek energy mix is electricity, whose share reached 28% in 2019. Following that, the share of renewables (excluding the share that is already included in electricity) was 11% and the share of natural gas 5.8%.

Figure 4.2.5 Final energy consumption by product
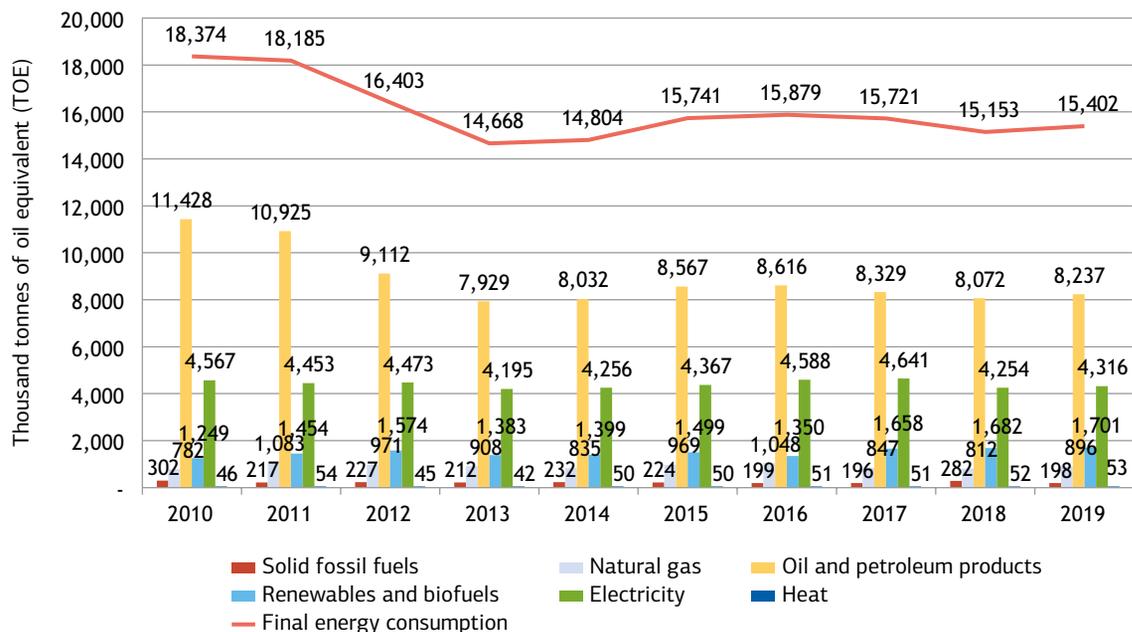
Source: Own processing of data from Eurostat.

Notes: Final energy consumption covers the energy consumption of end-users, such as industry, transport, households, services, and agriculture. It excludes consumption of the energy sector itself and losses occurring during the transformation and distribution of energy (e.g., power plants, district heating plants, oil refineries, coke ovens, blast furnaces). It also excludes all non-energy uses of energy carriers (e.g., natural gas used for producing chemicals, oil-based lubricants, bitumen used for road surface). Quantities delivered to international aviation and international marine bunkers are also excluded from the final energy consumption.

Figure 4.2.6 Final energy consumption by sector
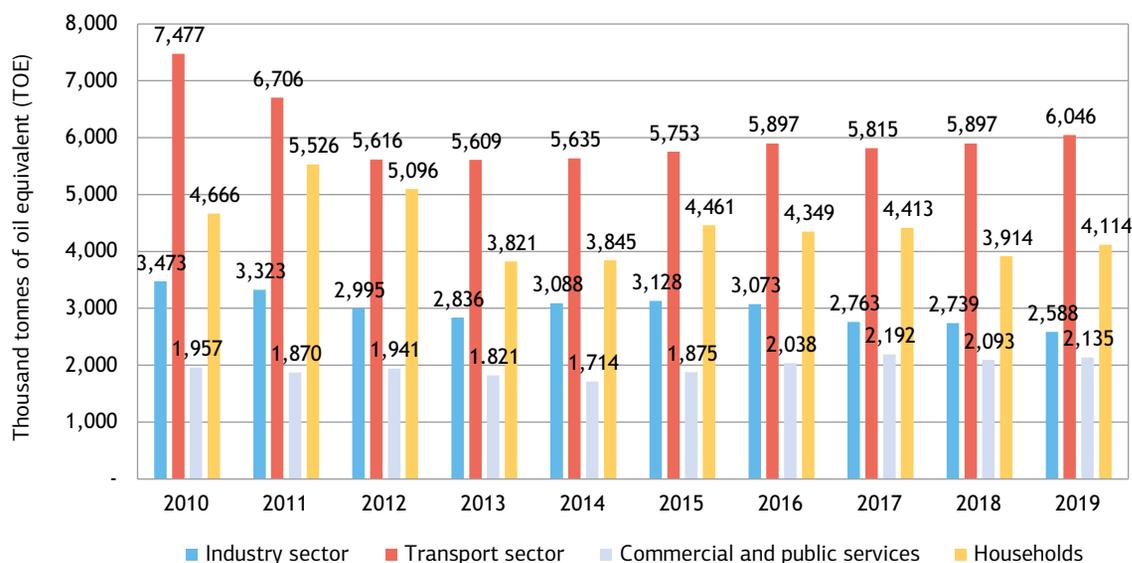
Source: Own processing of data from Eurostat.

Figure 4.2.7 **Final energy consumption in households per capita**
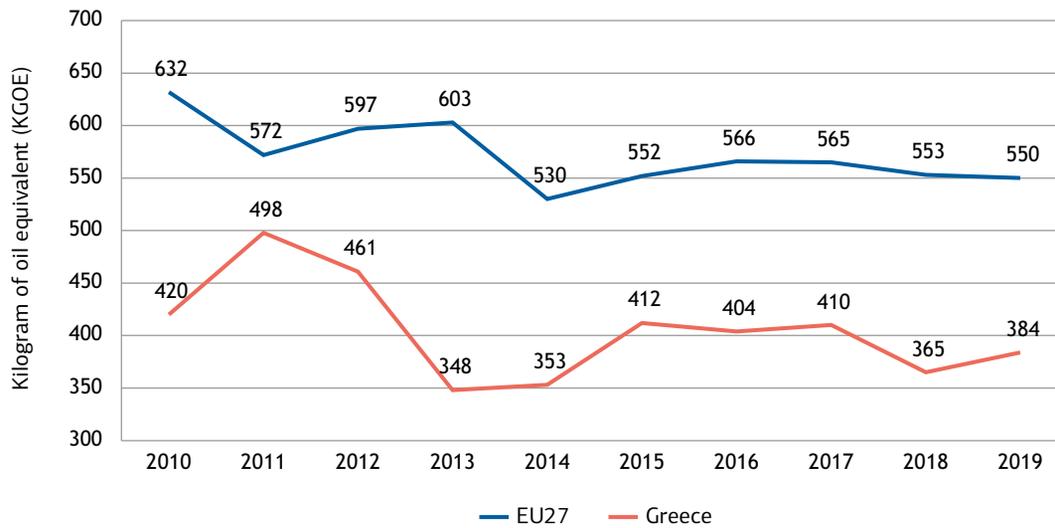
Source: Own processing of data from Eurostat.
Note: Final energy consumption refers to energy solely used by end consumers, while the related consumption of the energy sector itself is excluded.

Transport and then households are the most energy-consuming sectors (excluding the energy sector), accounting for about 2/3 of the final energy consumption (Figure 4.2.6). The great share of transport (39.3% in 2019) also explains the fact that the main product of energy consumption refers to oil products, as mentioned above. It also shows the importance of promoting the electrification of the transport sector and the use of electric vehicles. The significant share of households in energy consumption (26.7% in 2019) highlights the criticality of improving the energy efficiency of buildings. Regarding the rest of the economic sectors, in 2019, the share of industry in final energy consumption was 16.8% and that of commercial and public services was 13.9%. Also, the final energy consumption in households per capita in Greece, which shows how much electricity and heat every person consumes at home, excluding energy used for transport, is much lower than the EU average and is decreased compared to a decade ago (Figure 4.2.7).

4.2.3. Energy production and competitiveness in Greece

Energy is a key parameter for the economic development of a country, as the cost of energy and the security of supply are major elements of the economic sectors. Additionally, the energy sector itself has the potential to attract new investments and create new jobs. However, as mentioned, there are specific peculiarities and distortions in the Greek energy sector that limit its efficiency and prospects. During the latest years, several important reforms have been implemented in the Greek energy market, aiming at the harmonisation of energy production with environmental targets, as well as the liberalisation and increase of competition in the energy market. In order to analyse the efficiency of the energy sector, it is necessary to study specific parameters and characteristics of the production and supply market.

Figure 4.2.8 Market share of the largest generator in the electricity market
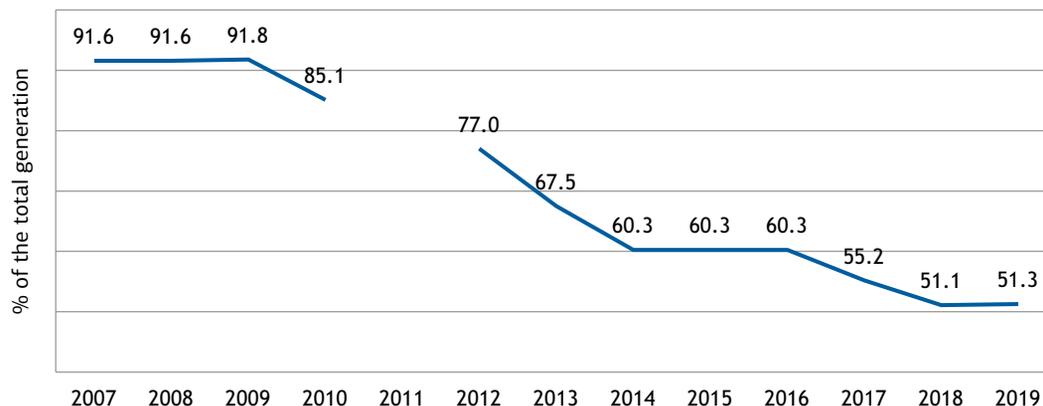
Source: Own processing of data from Eurostat.

A fact that characterised Greek energy markets was that most were traditionally controlled by state-owned enterprises. As an example, for many decades, the market for electricity supply at the wholesale level was characterised by a high degree of concentration, including only a small number of competitors. As is known, the state-owned Public Power Corporation S.A. (PPC S.A.) was and remains the main power producer, owning the total of the lignite and large hydroelectric units, whereas there were significant barriers that limited the entry of new businesses (Farantouris, 2014). Additionally, until recently, the transmission system as well as the distribution network for electricity was also controlled by the PPC. The limitations of the wholesale market also created distortions to the retail energy market, as most suppliers were obliged to draw energy exclusively from the wholesale market and mainly from the PPC. As a result, the PPC was also the main supplier as well as the main retailer of the electricity market. It bears noting that all "traditional" technologies, i.e., lignite and large hydroelectric units are operated by PPC, while private investments are mainly focused on renewables and natural gas units.

An interesting indicator that illustrates the evolution of the concentration of the electricity market is the "Market share of the largest generator in the electricity market", which shows the market share of the largest electricity generator in each country as a percentage of the total net electricity production. Figure 4.2.8 shows the change of this index since 2007. Even though data for 2011 are not available, it is clear from the figure that the share of the PPC in generation has decreased from over 90% up to 2009, to about 50% in 2018 and 2019. This is a characteristic example of the increase of competition in the electricity market.

It is also worth mentioning that a basic target of the EU is to ensure energy security, increase competition and decrease the cost and the wholesale prices of electricity. In this context, a main pillar of the European energy policy is the establishment of an integrated single, competitive, internal EU electricity market, with common rules. For this scope, the Greek electricity market has been reformed, in order to adopt a common model of operation with other EU markets (EU Target Model) and achieve the integration towards the single internal European electricity market. Apart from that, many other reforms of the energy market have been made in recent

years in order to increase competition in the market (KEPE, 2019). For example, one of the most important reforms not only in the electricity, but also in the gas market, was the unbundling of the network from supply activities. Other additional reforms were adopted to deal with the restriction of the exclusive access of the PPC to major resources of lignite mines and hydroelectric plants. Moreover, the scheduled and ongoing procedures for the privatisation of energy corporations (e.g., DEPA Commercial SA, DEPA Infrastructure SA, Hellenic Petroleum S.A.), as well as energy infrastructures (e.g., "South Kavala" underground natural gas storage, HEDNO S.A., IPTO S.A.) will contribute to the increase in competition of the energy market. Even if the analysis of the above reforms is out of the scope of this work, they are mentioned here because they strongly affect the competition of the energy markets and support the productivity and competitiveness of the energy sector.

In this context, a main indicator that measures the "Energy productivity" of the country is calculated as the ratio of GDP to gross available energy of a given calendar year. The indicator measures the amount of economic output produced per unit of gross available energy. In this manner, the indicator illustrates the productivity of energy consumption and provides a picture of the degree of the decoupling of energy use from growth in GDP. Concerning increasing energy costs and the more ambitious targets for energy efficiency, the productivity of energy must be considered as a major parameter. Figure 4.2.9 shows that the energy productivity in our country is much lower than the EU27 average and that the energy use in the economy is not very efficient. However, since 2013, this parameter has been following an upward growth, following the EU trend.

Moreover, one of the most important factors for the competitiveness of the energy market is the dependency of the country on energy imports. The indicator of "Energy import dependency" shows the share of the total energy needs of a country met by imports from other countries, as a percentage (%) of imports in total gross available energy. More particularly, it is calculated

Figure 4.2.9 Energy productivity in Greece compared to the EU average
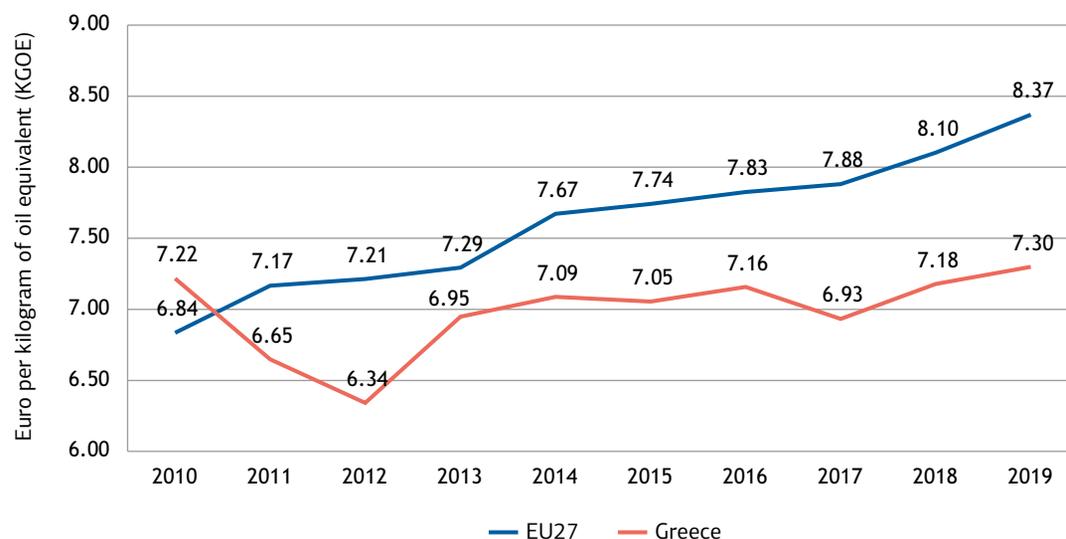
Source: Own processing of data from Eurostat

Figure 4.2.10 Energy import dependency by products

(a) All fuels
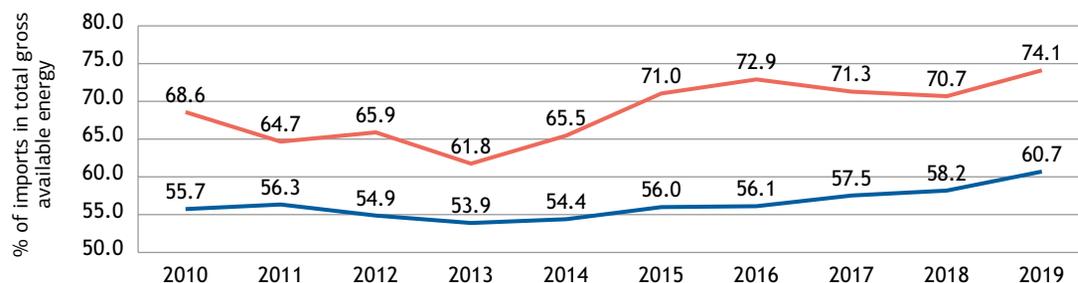
(b) Solid fossil fuels
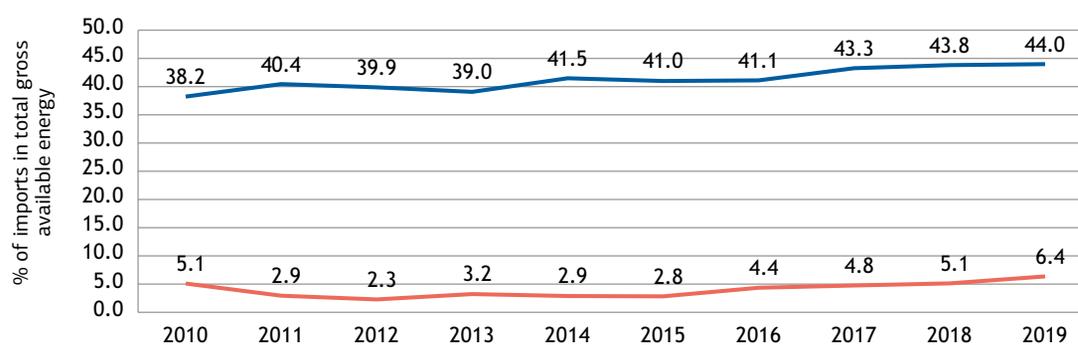
(c) Oil and petroleum products (excluding biofuel portion)
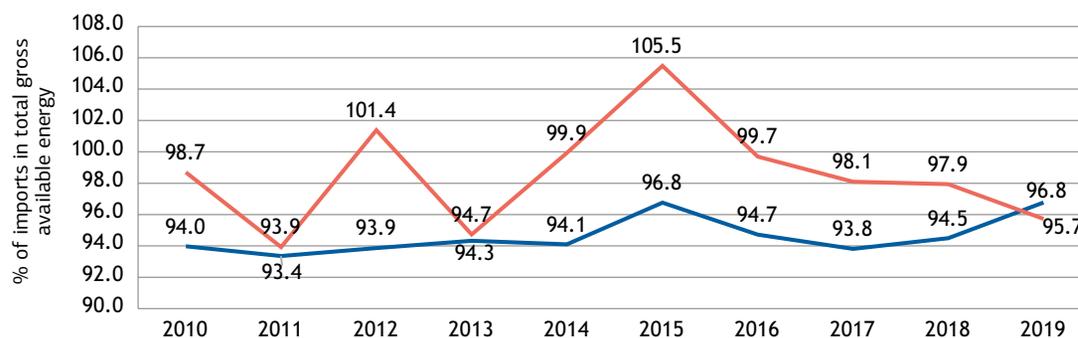
(d) Natural gas
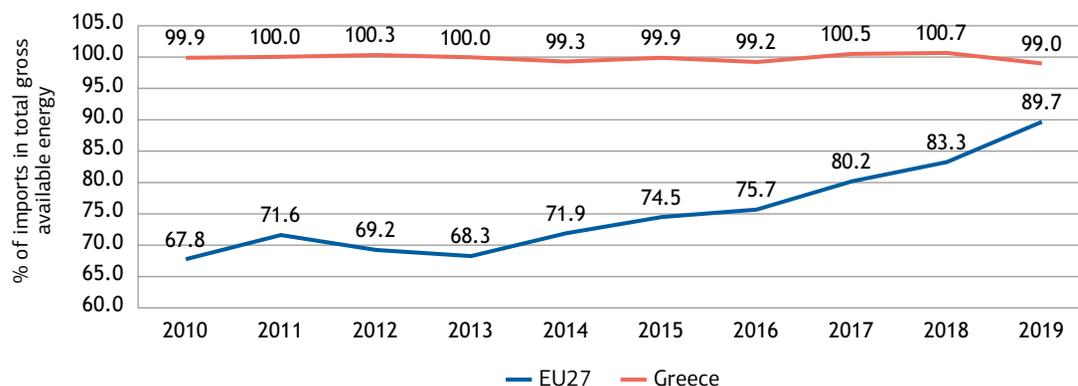
Source: Own processing of data from Eurostat

as net imports (imports – exports) divided by the gross available energy. Regarding the total energy imports dependency (Figure 4.2.10a), Greece is much more dependent on energy imports compared to the EU average. More specifically, it is about 100% dependent on imports of Natural Gas (Figure 4.2.10d) and almost totally dependent on oil imports (Figure 4.2.10c). Nevertheless, the dependence on imports of solid fuels (Figure 4.2.10b) is very low and much lower than the EU average. It is worth mentioning that oil and natural gas represent a great share of final energy consumption, while the share of solid fuels is negligible (Figure 4.2.5). This high dependency on imports affects the competitiveness of the economy, as well as the energy security of the country. For this reason, it is important to promote inland energy production (e.g., renewables, energy storage, etc.) and increase energy efficiency.

As mentioned before, a significant parameter for the competitiveness of the economy is the cost of energy. Regarding the evolution of the nominal prices of electricity (Figure 4.2.11a) and

Figure 4.2.11 Electricity prices by type of user

(a) Medium–size households
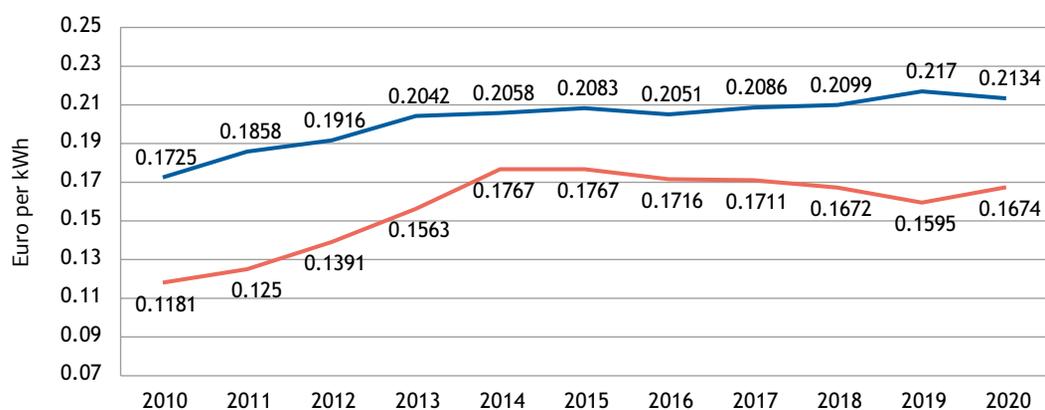
(b) Non–household, medium–size consumers
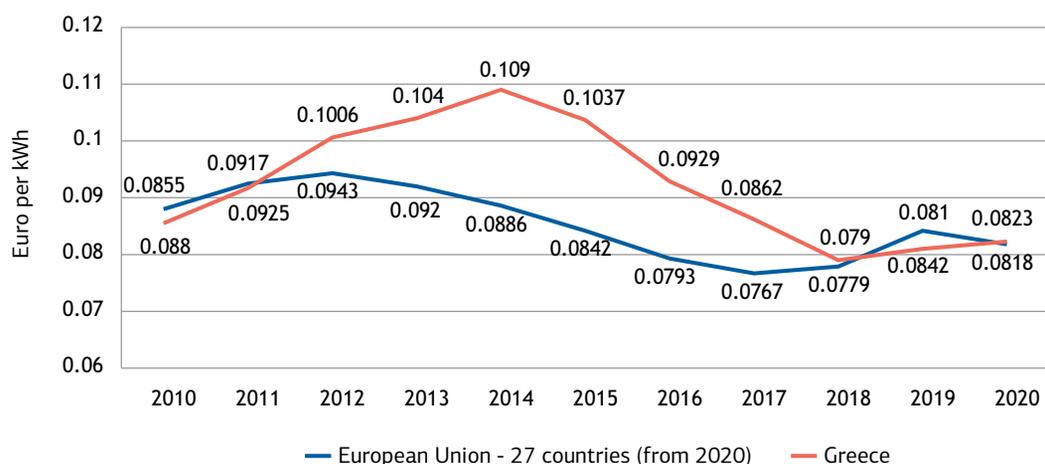
Source: Own processing of data from Eurostat

gas (Figure 4.2.12a) for medium-size households,[25] it is clear that the energy prices in Greece, both for electricity and gas, are lower than the average prices of the EU member states. More specifically, the nominal prices of electricity for medium-size households were under the EU27 average during the above-mentioned period. On the other hand, the respective nominal prices of gas were higher in Greece until 2015, but decreased below the EU average by the end of the decade. Regarding non-household medium-size consumers,[26] for a long period of time, the

Figure 4.2.12 Gas prices by type of user (euro per gigajoule)

(a) Medium–size households
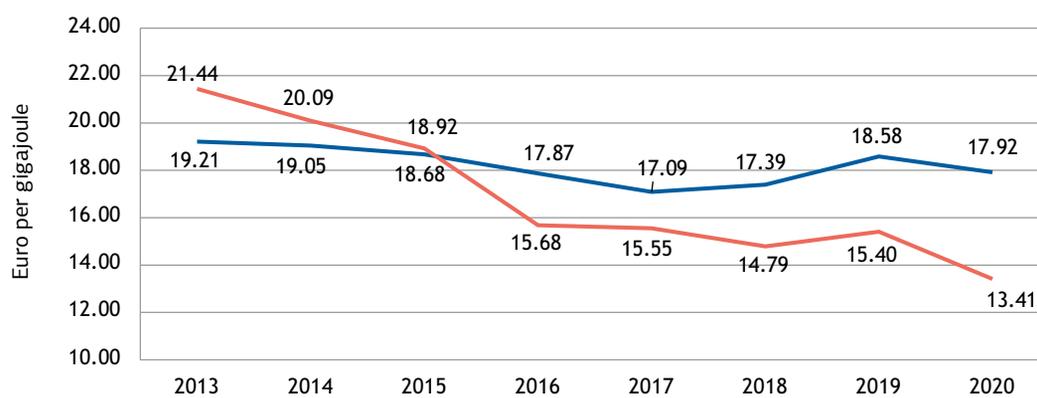
(b) Non–household, medium–size consumers
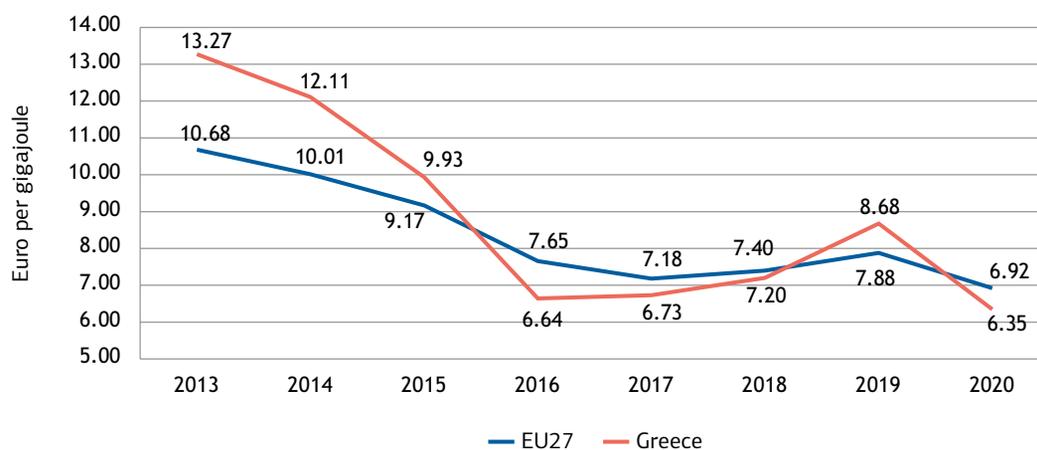
Source: Own processing of data from Eurostat

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25. Electricity prices for household consumers are defined as the average national price in euro per kWh including taxes and levies applicable for the first semester of each year for medium-size household consumers (Consumption Band Dc with annual consumption between 2500 and 5000 kWh).

26. Electricity prices for non-household consumers are defined as the average national price in euro per kWh without taxes applicable for the first semester of each year for medium-size industrial consumers (Consumption Band Ic with annual consumption between 500 and 2000 MWh).

nominal price of electricity for medium-size consumers was higher than the EU average prices. However, it reached the average EU levels during the last years (Figure 4.2.11b). Regarding nominal gas prices for non-household consumers (Figure 4.2.12b), it seems that they also reached the EU average levels during the last five-year period. Nevertheless, it should be noted that these figures are only indicative, as they present medium-size energy consumers' nominal prices and, for example, might differ a lot from large-size industrial consumers. It should also be mentioned that according to the recent study of the Commission on energy prices and cost (EC, 2020g), if the electricity and gas prices and costs are adjusted in the context of local income, i.e., expressed in purchasing power standard (PPS), the prices of electricity and gas for households in Greece are among the highest in EU.

Figure 4.2.13 shows that, on the basis of the share of the population unable to keep their home adequately warm, energy poverty in Greece was dramatically increased for the period 2010 to 2014, reaching a 32.9% share of the population. Fortunately, since 2015, the indicator followed a downward trend to 16.7% in 2020. However, it remains much higher than, the EU average, which was 6.9% in 2019. Based on Figures 4.2.11 to 4.2.13, it can be concluded that, even if nominal energy prices in Greece seem to be at lower levels compared to the EU27 average prices, the share of the population that is unable to keep their home adequately warm is high. This means that the available income of these households for energy is not enough. This matches the results from the study on EU energy prices and cost (EC, 2020g), which shows that the PPS energy prices in Greece are high.

Finally, there are two mostly indicative indices for the efficiency of the Greek electricity market that are included in the *Doing Business 2020* report of the World Bank (2019) and should be mentioned here. The first refers to "how easy it is for entrepreneurs in economies in the EU to connect a

Figure 4.2.13 Share of the population unable to keep their home adequately warm
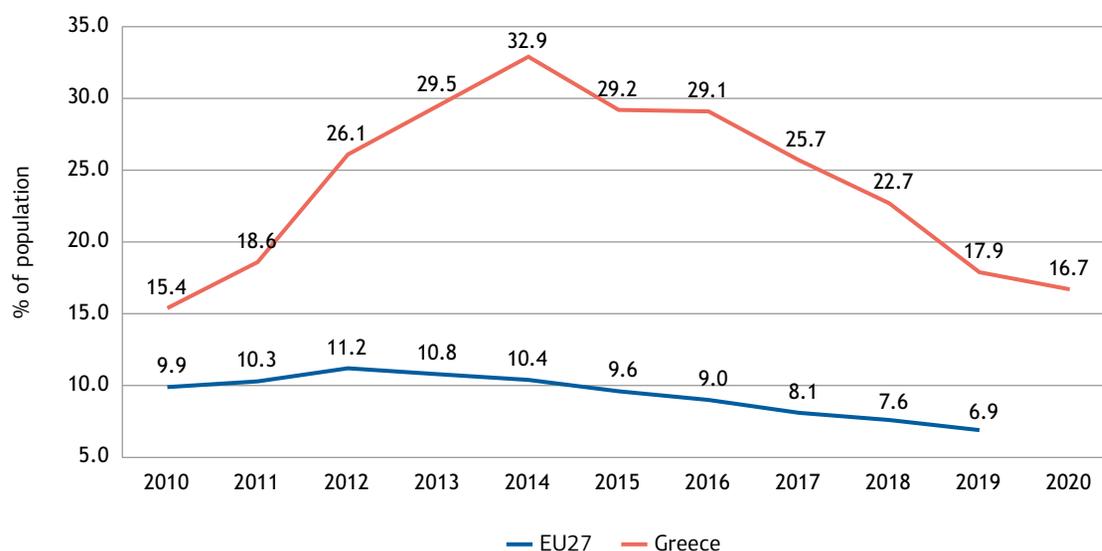
Source: Own processing of data from Eurostat.
Note: The data for 2020 are not available for all EU member countries.

warehouse to electricity?", which measures the procedures, time and cost required for a business to obtain a permanent electricity connection for a newly constructed warehouse. According to this, the rank of Greece is 84.7, and it is near the EU average rank (83.4). More specifically, for Greece, the steps of the procedures required are 5, the time needed is 51 calendar days and the cost is 68.2% of the income per capita. Additionally, the second is the "reliability index", which measures the reliability of supply, the transparency of tariffs and the price of electricity. This index for Greece is high, at 7 in a range of 0–8.

4.2.4. Energy transition

Today, Greece is at a critical point for its energy transition towards a lower-carbon economy (Lychnaras, 2020). In December 2019, the Greek government adopted the updated National Energy and Climate Plan (NECP) of the country, for the period 2020–2030 (Ministry of the Environment and Energy, 2019). The NECP is the strategic plan that records the analytical roadmap for energy and climate targets to be achieved by 2030. It sets ambitious targets for reducing Greenhouse Gas (GHG) emissions, increasing the RES share and improving energy efficiency. This transition is going to significantly restructure the energy market over the next decade, but it will also affect the whole economy of the country. Additionally, the Greek government published the 2050 Long-term Strategy for Greece that sets the roadmap of EU objectives for a successful and sustainable transition to a climate-neutral economy by the year 2050 (Ministry of the Environment and Energy, 2020a). A main target of the government's strategy for GHG emission reduction and increase of the RES share is the definite decrease of the lignite share in power generation, i.e., the so-called lignite phase-out, by 2025. In this context, this NECP sets out the time schedule for shutting down the lignite-fired power plants that are currently in operation. Moreover, the withdrawal of lignite plants becomes critical due to their increasing cost of production and the significant economic losses of their operation in recent years, with emphasis to the increasing CO_2 emission allowances prices. Nevertheless, it is known that for many decades, lignite energy production in Greece has been highly concentrated in certain regions. More specifically, lignite mining and electricity production were the main economic activities of the municipality of Megalopolis and the region of Western Macedonia (energy regions). These areas, as well as the areas geographically and economically related to them, are more likely to be exposed to the cost of the energy transition, due to the economic and social consequences of lignite phase-out, and for this reason should be supported (Lychnaras, 2020).

The achievement of the ambitious environmental and energy targets set for 2030 is a complex process affected by multiple parameters. In order to fulfill the objectives of the transition process, boost the economic growth and, at the same time, minimise the negative consequences of this transition, especially for the energy regions, there are many key parameters that need to be considered. A main element is to ensure the energy security of the electricity system after the lignite phase-out. As is known, the increase of the penetration of RES creates restrictions in the supply of energy, while the withdrawal of the use of oil for electricity production in the islands will also create energy shortages during high demand periods (e.g., tourist seasons). Additionally, the increase of the use of gas will probably boost the energy dependence of the country. Apart from that, it is known that EU climate and energy policies are putting upward

pressure on energy prices (because of further RES subsidisation, renewable-related system costs, carbon taxation, etc.) with a potential detrimental effect on the competitiveness of the European industry.

It is believed that there is a causal link between RES deployment and industries' energy costs and that RES diffusion has pushed electricity levies (Faiella and Mistretta, 2020). Increasing energy costs will have a negative impact on the main economic sectors of the country, such as manufacturing, commerce, tourism, etc., thus, affecting the country's economic development. For example, energy costs for energy-intensive industries (e.g., clay, cement, iron and steel, etc.) could range between 20% to 40%, as a share of total production cost (EC, 2020g). Moreover, household budgets will be burdened and energy poverty might grow. It should also be mentioned that the recent developments of the increase of energy costs are the result of a complex of parameters, such as the increase of the prices of natural gas and CO_2 emission rights, etc.

With regard to RES, according to the latest NECP, there is an objective to achieve a minimum share of 35% RES in gross final energy consumption by 2030. In Greece, the previously adopted support mechanism for RES was based on guaranteed prices (Feed-In Tariffs) for the producers, where RES production stations did not participate in the competitive process of the wholesale electricity market. As a result, the high prices of RES, along with other distortions of the market, increased the cost of renewable energy for the state and consumers. A new support scheme for RES and Co-generation power stations came into force in 2016. This reform aimed at restructuring the RES support legislation, in order for RES to be incorporated into the wholesale energy market with the best cost-effective manner for the market, the state and the customer. The key element was the change of the "Feed-In Tariff" to a "Sliding Feed-In Premium" mechanism, where RES producers are obliged to participate in the competitive process of the wholesale market, receiving only an additional premium. According to primary results after the implementation of the new mechanism, the cost of energy produced from RES has decreased, which is an important development for the restriction of electricity prices.

The total share of renewables in Greece has been increasing very fast during recent years, reaching the EU27 average share at 19.7% in 2019 (Figure 4.2.14a). Furthermore, the share of RES in electricity production also increased rapidly from 12.3% in 2010 to 34.1% in 2019, approaching the 34.1% average share of the EU27 (Figure 4.2.14c). For other sectors, e.g., transport (Figure 4.2.14b) and heating & cooling (Figure 4.2.14d), the share of RES also increased, but still remained lower than the EU average. Nowadays there is an ongoing procedure for the simplification of the licensing process of RES projects that will contribute to a rapid increase of the market (Ministry of the Environment and Energy, 2020b). The dynamic perspectives and investment opportunities of the Greek RES and energy storage markets are expected to support the competitiveness and productivity growth of the national economy.

As analysed above, for many decades, Greece has been strongly dependent on fossil fuels, a fact that had relevant effects on GHG emissions. Recently, the EU Commission proposed an updated 2030 Climate Target Plan to cut greenhouse gas emissions by at least 55% below 1990 levels by 2030 (EC, 2020e). This is a substantial increase compared to the previous target

Figure 4.2.14 Share of renewable energy in gross final energy consumption

(a) Total share of RES
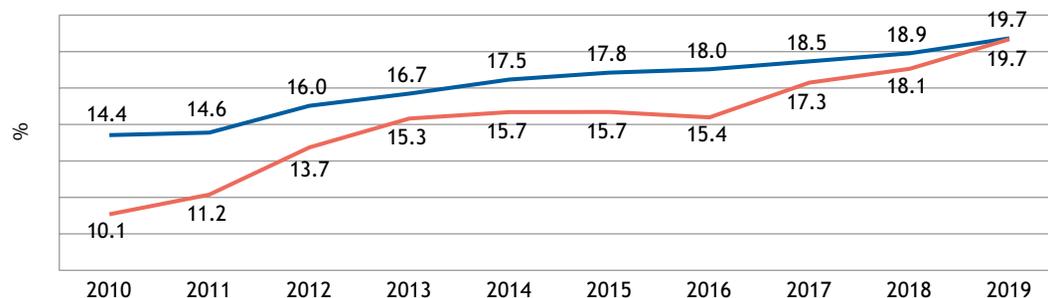
(b) Share of RES in transport
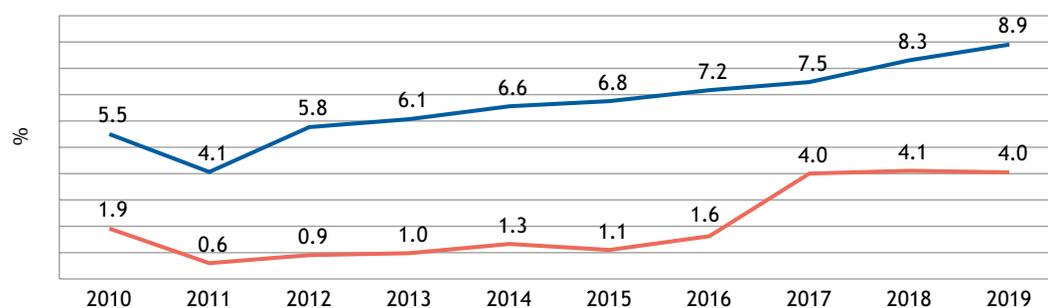
(c) Share of RES in electricity
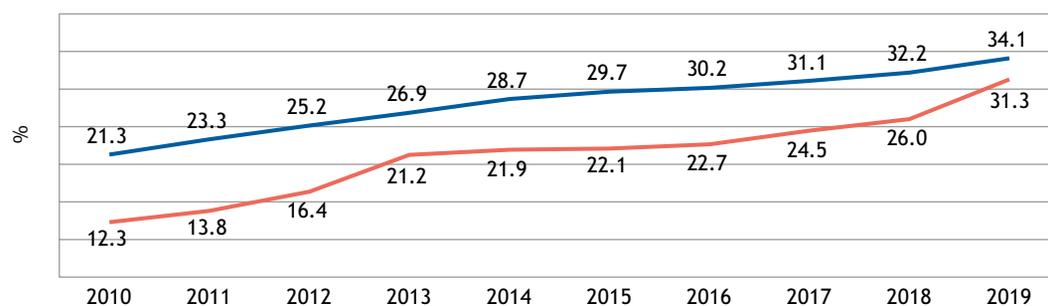
(d) Share of RES in heating & cooling
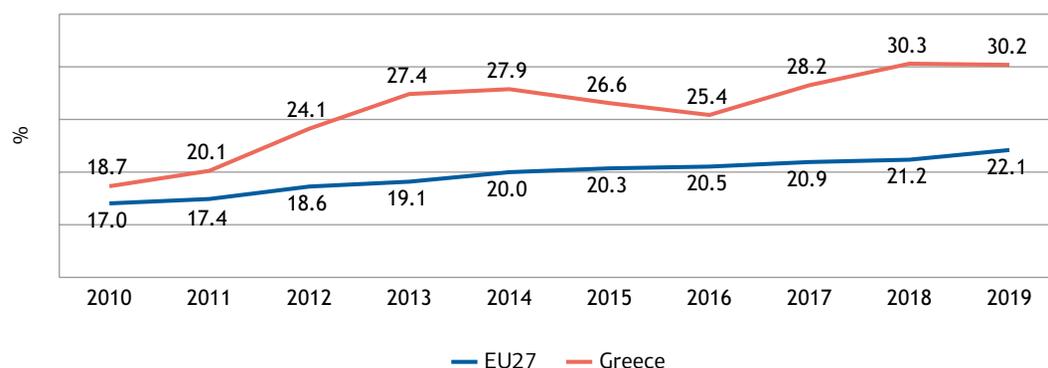
EU27 — Greece

Source: Own processing of data from Eurostat.

Notes: The gross final energy consumption is the energy used by end-consumers (final energy consumption) plus grid losses and self-consumption of power plants, according to definitions included in the Renewable Energy Directive (2009/28/EC).

of at least a 40% reduction (EC, 2020f).[27] As is known, the EU is working on the revision of its climate, energy and transport-related legislation under the so-called "Fit for 55 package" in order to align current laws with the 2030 and 2050 ambitions (EC, 2021g). This plan sets specific obligations for each member state in order to adopt more optimistic environmental targets that will probably affect the competitiveness of the economies. An indicator that measures the intensity of GHG emissions in an economy is the "Greenhouse gas emissions per capita". This indicator estimates the total national emissions of the so-called 'Kyoto basket' of greenhouse gases,[28] integrated into a single indicator expressed in units of CO_2 equivalents, divided by the average population of the reference year. It is important to notice that Greece decreased the GHG per capita during the last decade. In 2010, the country had 10.9 tonnes per capita of GHG emissions, while the EU27 average was 9.7 tonnes. Since then, there was an important decrease of energy emissions, and Greece reached the EU average of 8.4 tonnes per capita of GHG emissions in 2019 (Figure 4.2.15). The reduction of GHG emissions is a significant development for achieving the environmental targets, but also for the competitiveness of the energy market as well as for the national economy.

In addition to carbon emission levels, an important parameter that affects the competitiveness and the productivity of the economy is the cost for CO_2 rights, which is crucial for energy-intensive industries (Bruyn et al., 2020). In general, the price of carbon emission rights reflects the cost for environmental protection. The price of emission rights has increased dramatically during recent

Figure 4.2.15 Greenhouse gas emissions per capita
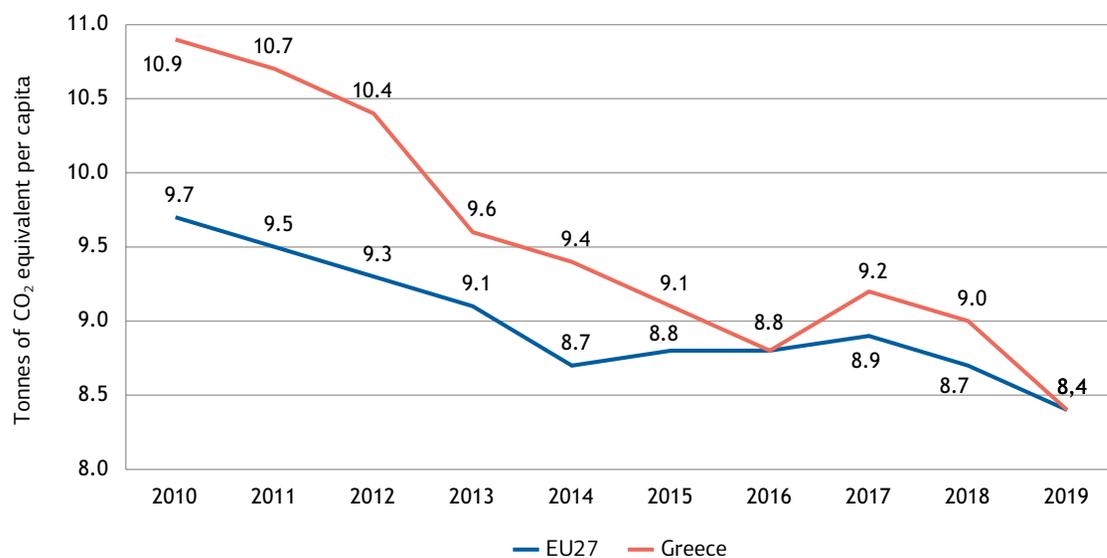
Source: Own processing of data from Eurostat.

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27. Note that the relative target set by the Greek NECP was 44%.

28. Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and the so-called F-gases (hydrofluorocarbons, perfluorocarbons, nitrogen triflouride (NF_3) and sulphur hexafluoride (SF_6))

years, climbing from €5.6/ton in January 2017 to almost €55/ton in the summer 2021 (Figure 4.2.16), while the average price for the first seven months of 2021 is over €46/ton. This boost in the cost of emission rights directly affects the cost of energy production from conventional fuels

Figure 4.2.16 Evolution of carbon emission rights prices
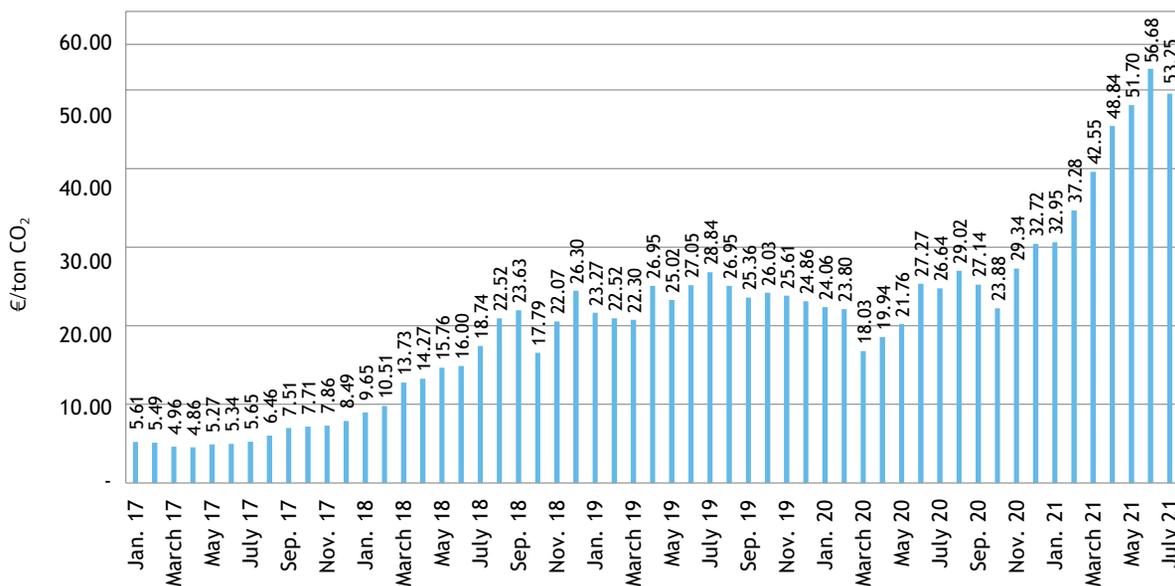
Source: Own processing of data from Investing.com <https://www.investing.com/commodities/carbon-emissions-historical-data>.

Figure 4.2.17 The intensity of greenhouse gas emissions from energy consumption
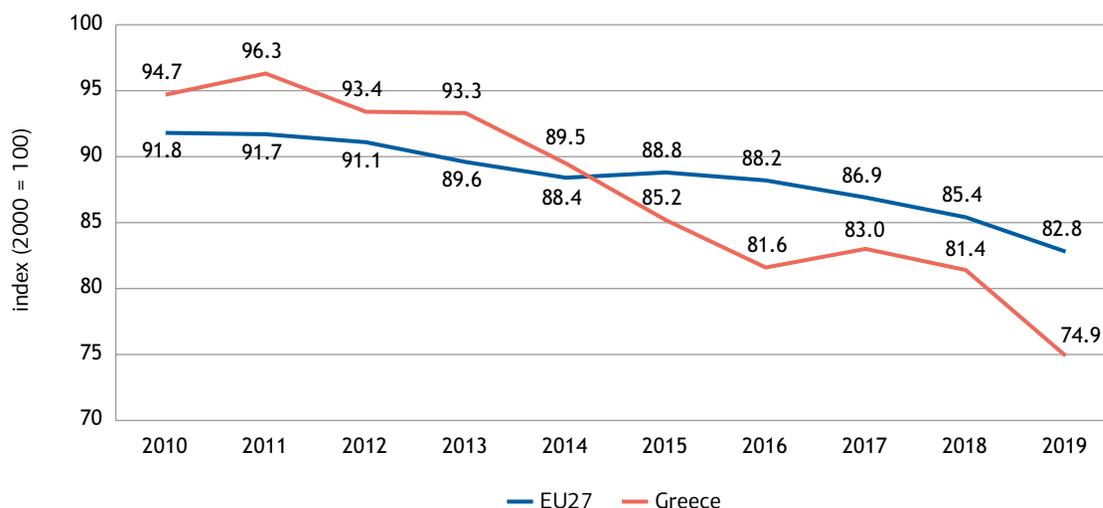
Source: Own processing of data from EEA and Eurostat.

Notes: The intensity of greenhouse gas emissions from energy consumption is defined as the ratio of energy-related GHG emissions to gross inland consumption of energy, and it expresses the quantity of energy-related GHGs emitted (in tonnes of CO_2 equivalents) in a certain economy per unit of energy consumed.

and especially from lignite, a fuel that was mainly used for energy production in Greece for a long time, but, in general, it also affects industrial production.

Furthermore, the energy sector can be affected by the need to increase RES share, which requires not only new investment in RES units, but also investment in energy infrastructures (e.g., electricity networks, energy storage units, demand management systems, etc.). Greece has already adopted an optimistic plan for the decarbonisation of the Greek energy sector and economy. The increase of CO_2 costs precipitates the need for the decarbonisation of the economy and the need for speeding up the procedure for the withdrawal of the lignite power plants.

In this context, Figure 4.2.17 above illustrates that the intensity of GHG emissions from energy consumption in Greece decreased during the last decade. The intensity of GHG emissions in Greece remains lower than the EU27 average, presenting a steep decrease during 2019, where the intensity of the GHG emissions fell from 81.4% in 2018 to 74.9% in 2019. Even though there are no data yet for 2020, it is believed that there will be a new decrease as the decarbonisation of energy production and the use of RES accelerate.

5. Conclusions and Policy Suggestions

Concerns are growing about the role of environmental, energy, public health and other (e.g., financial, demographic, migration, geopolitical, cyber-physical) risks on the well-being and inequalities of modern societies. For this reason, the productivity and competitiveness of the economies of the EU countries should be thoroughly analysed in the medium and long run, considering a wide range of aspects, diverse policy tools and multi-level interdependencies between them. This approach would arguably support the effectiveness of policies to enhance preparedness, responsiveness and the rate of recovery from future crises.

The growth path of the Greek economy is still characterised by uncertainty, given the increasing fiscal deficit, trade imbalances and inflationary pressures. However, there are strong positive prospects concerning different components of demand, such as investments, while there is substantial room for the implementation of various structural reforms and digital adoption to promote the green energy transition, the efficiency of the public sector and the competitiveness of businesses.

Quality of life, living conditions, social inclusion and territorial cohesion should also be taken into consideration, given the adverse footprint of the pandemic on these issues, as well as other deficiencies, such as those regarding energy poverty and the reduced accessibility of inhabitants and businesses of insular/island regions. The following paragraphs outline the main conclusions and policy implications that can be made on the basis of the material presented in this annual report for the productivity and competitiveness of the Greek economy.

I. Macroeconomic developments and productivity growth

Despite the severe economic contraction during the pandemic, mainly caused by reduced private consumption and the direct hit on the tourism industry, the Greek economy now stands on uniquely favourable conditions for expansion. This fact is clearly indicated by an exceptional growth in GDP, by 16.2%, during the second quarter of 2021. Moreover, it is of critical note that the rebound in economic activity is fueled not only by private consumption, but also, and more importantly, by an increase in private investment across a broad range of asset categories.

This underlying recovery process already underway is expected to be further enhanced by the Greek National Recovery and Resilience Plan, Greece 2.0, mobilising a total amount of 59.8 billion euro, or 36.1% of GDP. The main aim of this programme is to fully reverse the adverse effects of the COVID-19 crisis and simultaneously to close the output gap formed as a result of the economic crisis during the last decade.

All of the pillars of the recovery programme, namely, green transformation, digitalisation, enhancing the labour force skills, and supporting private investment, have a direct link to productivity growth, either by upgrading and updating capital, or by upskilling (or reskilling) the labour force.

Therefore, our estimate is that both short- and medium-term prospects of productivity growth are favourable. Nonetheless, a number of underlying issues of critical importance affecting the long-term stability of the economy still remain, such as unfavourable demographic developments and a fragile banking system.

II. Enhancement of national, sectoral and regional competitiveness

The impact of the COVID-19 pandemic on competitiveness cannot be easily captured at its whole extent, nor fully assessed, presently. Nevertheless, certain significant aspects have been brought to light. On the one hand, the outbreak of the pandemic radically changed the ensuing public finance developments and the fiscal outlook that prevailed until then. The adoption and implementation of a significant number of fiscal measures to support the national healthcare system, as well as households and businesses, coupled with the unpredictably long duration of the health crisis, led to a significant deterioration of public finances. On the other hand, public investment in Greece accelerated in 2020 and the RRF is expected to play a significant role in supporting investments and mitigating the economic and social impact of the pandemic.

Furthermore, the outbreak of the COVID-19 pandemic had significant implications for external sector developments worldwide. The significant progress made until 2019 in rebalancing Greece's external position was disrupted, and some of the already persisting excessive imbalances were further aggravated. In 2020, Greece was again faced with an excessive current account deficit and a highly negative NIIP. Moreover, the cost/price competitiveness indicators deteriorated in Greece and the Eurozone (on average), and the unit labour cost increased. These developments pose a threat to the country's competitive position. It should also be noted that the impact of the pandemic on the services sector and, especially, the tourism sector exacerbated the country's vulnerability, due to the reliance of its economy on services' receipts from tourism and transport. On the other hand, not all sectors have been affected in the same way. In particular, digital industries have not been disrupted significantly, while the digitisation of the Greek economy has been dramatically accelerated.

Regional competitiveness should also be taken into account when accessing the competitiveness of countries, especially those with deep and persistent regional (core-periphery) disparities, like Greece. The longstanding inequalities in regional performance may hinder the national competitiveness. The emerging trends of technological advancements, demographic shifts and climate change as well as the pandemic, are affecting regions within the country in different ways and may well deepen the gap between them.

III. Improvement of the health system

The health system is one of the most important sectors provided in most countries. Health influences economic growth and supports labour productivity by enhancing physical capacity and

mental capabilities. The need to analyse the performance of the health care system becomes more apparent due to the significant financial contribution of the central government and households. The Greek health care system is a mixed system comprising elements from both the public and the private sector. It is financed by a mix of public and private resources, in which household out-of-pocket payments funded 35.2% of total current health expenditure.

On the one hand, Greece is ranked low according to the competitiveness index related to health. Its weakness is public spending on health, health infrastructure and universal health care coverage. The low ranking is due to the high rate of out-of-pocket payments with respect to total health expenditure and the perception of the population that the health infrastructure does not meet the needs of society, since structural reforms emphasise cost containment over improving the quality of health care services and reducing health inequalities.

On the other hand, life expectancy at birth of the total population and infant mortality have achieved notable progress over the past decades. Total health expenditure and total health expenditure per capita decreased significantly after the implementation of structural reforms during the period 2010–2014, mainly due to the significant reduction in public spending in health. To the contrary, household out-of-pocket payments do not change significantly over time. The empirical results of standard first-stage DEA linear programming indicate that Greece seems to have eliminated the inefficient usage of health resources in recent years. However, there is still room for improvement in the operation of the health system and the elimination of weaknesses.

The COVID-19 pandemic seems to influence public health spending upwards. The pandemic constitutes a challenge for the health system in terms of improving resilience, efficiency and resource allocation. Also, it is an opportunity for policy makers to assess and eliminate the distortions of the health care system. Greece's Recovery and Resilience Plan and the National Strategic Policy Framework for Public Health and Prevention propose a number of interventions that focus mainly on increasing the resilience of the health care system and improving the access, efficiency and quality of health care services. The optimal planning and integrated implementation of the above interventions are necessary and important factors that could contribute to the improved efficiency of the health care system.

IV. Energy transition and environmental sustainability

Energy is a key parameter for the productivity and competitiveness of the economy, as the cost of energy and the security of supply are the main elements of sectoral growth and household income. During the last years, several reforms have been implemented in the Greek energy market, mainly aiming at harmonising with environmental targets, expanding competition, increasing the competitiveness and productivity of the energy sector, and enhancing the potential to attract new investments and create new jobs. However, a fact that should be considered is that, even if the nominal prices of electricity and gas in Greece are lower than the EU average, the respective prices for households, expressed in PPS, are among the highest in the EU and that the share of energy poverty remains much higher than the EU average. Because of this, the Greek economy

seems to be much more exposed to the recent developments related to price increases for energy products.

Moreover, the increased dependency of the country on energy imports, especially oil and natural gas, restricts its energy security as well as its competitiveness. Even if the energy productivity in Greece follows an upward trend, it remains much lower than the EU27 average, implying that energy use in the economy is not efficient. For these reasons, it is crucial to promote sustainable inland energy production (e.g., renewables, energy storage, etc.) and energy efficiency. The fact that transport followed by households cover about 2/3 of the final energy consumption highlights the importance of promoting the electrification of the transport sector, the use of alternative fuels, the management of energy demand and the energy efficiency of buildings.

Today, Greece is on the way for its energy transition towards a lower-carbon economy. Optimistic targets for GHG emission reduction and an increase of RES share have been adopted and several important consequences should be faced. The increase of RES penetration creates restrictions in the supply of energy and requires investment in infrastructure, while the increase of the use of natural gas in the energy mix escalates the energy dependence of the country. The price of CO_2 emission allowances has increased dramatically during recent years, affecting considerably energy-intensive industries and the cost of energy production from lignite. This development precipitates the need for the decarbonisation of the economy.

In this context, it is important that Greece decreased the GHG emissions per capita during the last decade, as well as the intensity of GHG emissions from energy consumption, which is below the EU average. The withdrawal of lignite plants is crucial for the reduction of GHG emissions and becomes even more critical because of the increasing CO_2 prices. However, the lignite areas, i.e., the municipality of Megalopolis and the region of Western Macedonia, as well as the areas geographically and economically related to them, are more likely to be exposed to the economic and social consequences of lignite phase-out and, hence, should be supported.

The growth and transformation of the Greek energy sector should be based on a holistic approach, fulfilling the environmental objectives and simultaneously boosting economic growth and minimising the negative consequences of the transition on the energy sector, the economy and the society. This approach should focus on sustainable investment in energy infrastructure for electricity, gas and hydrogen networks, the deployment of strategic energy storage projects, the establishment of new RES plants, offshore wind farms and natural gas plants where needed, the development of green hydrogen technologies, energy savings and smart demand management. It should be noted that about 1/3 of the RRF budget of the country (about 6 billion euro) has been allocated to energy and green transition projects, such as the establishment of new electrical interconnections across islands, electricity network improvements, investments in RES and energy saving and storage technologies.

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Appendix

A.1 Main reforms per pillar in the Greek RRP

Pillars	Reforms
1. Green transition	• Reform of the licensing procedure for renewable energy sources
	• Promotion of e-mobility through a modern institutional framework
	• Preparation of urban plans, establishment of new spatial planning for renewables, industry, tourism and aquaculture, and marine spatial planning
2. Digital transformation	• Action plan for the provision of "customer-centric" digital services by the public administration
	• 5G technology and development of innovative digital services
	• Transition to fast broadband
	• Digital transformation of SMEs
	• Reforms to promote basic and applied research
3. Employment, skills, and social cohesion	• Reform of active and passive labour market policies, including an increase in female labour force participation
	• Digitisation of education, both equipment and curricula
	• Primary health care reform and digital telemedicine service
	• Training against discrimination in the public and private sectors
4. Private investment and transformation of the economy	• Reforms to simplify the business environment and licensing, improve the ease of doing business, support investment and trade facilitation
	• Improve the efficiency of the justice system, including digitalisation and administration reform
	• Incentivising economies of scale through increasing the size of enterprises
	• Artificial intelligence and big data deployed against tax evasion
	• Modernising and upgrading Greece's upskilling and reskilling system
	• Labour law reform

A.2 Regulation of the health care system

The health care system is highly regulated by the central government. There is extensive legislation stipulating the activities of third-party payers (EOPYY, state budget, private health insurance) and providers of health care services (public and private), the procurement process, the level of prices and reimbursement of goods and services, the e-health strategy, and the training and licensing of health professionals (Economou et al., 2017). After the establishment of

EOPYY, the benefit packages of the various social health insurance funds were integrated into a single scheme of reimbursable services. The legislation and the regulation specify who is covered and how costs are reimbursed. The central government incorporates the European directives concerning professional qualifications for health personnel, medical equipment, pharmaceutical and voluntary health insurance into national legislation. Private health insurers are supervised by the Bank of Greece.

The health care system has been affected by the economic crisis and the introduction of the Economic Adjustment Programs during the period 2010–2017. Table A.2.1 presents the major reforms that have been implemented since 2010. The reforms below aimed to reduce public health care spending, achieve savings through price-volume agreements, remove barriers to access of health care services for vulnerable populations, create a more integrated primary health care system with a gatekeeping role, achieve economies of scale with central procurements, improve the cost and allocative efficiency of public hospitals, control the volume of pharmaceutical consumption, reduce the cost related to overprescribing, reduce the prices of pharmaceuticals, liberalise the pharmacy market to increase access and enhance efficiency and improve quality of care (Liaropoulos et al., 2012; Mladovsky et al., 2012; Goranitis et al., 2014; Economou et al., 2017; Kanavos and Souliotis, 2017).

The implementation of enhanced surveillance for Greece acknowledges the fact that Greece needs to continue implementing structural reforms to support and enhance the Greek health care system. As part of the Greek authorities' strategy to modernise the health care sector,[29] Greece was committed to the rollout of the primary health care system by opening at least 120 primary health care centers (TOMYs) by end-2018 and all 240 TOMYs by the end of 2020 and to achieve a share of 30% of centralised procurement in total hospital expenditure by mid-2020 and 40% by mid-2022.[30] According to the Enhanced Surveillance Report (June 2021), the Greek authorities reached the 30% target on centralised procurement of health care expenditure, while taking steps to speed up the collection of clawbacks[31] and relaunching work on the primary health care reform.

To avoid the accumulation of delays, the authorities have introduced a new collection system for providers, under which 70% of the clawback will be collected up front on a rolling basis and the remaining 30% through instalments. Also, the authorities decided to abandon the use of the clawback ceiling in fiscal recording. The clawback for 2020 was quantified at €888 million for pharmaceuticals and €280 million for providers, which compares to €869 million and €301 million in 2019, respectively. The preliminary draft of the revised primary health care law defines the new organisational set up of health centers, and set out the new contractual arrangements for family

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29. Eurogroup of 22 June 2018.

30. <https://www.consilium.europa.eu/media/35749/z-councils-council-configurations-ecofin-eurogroup-2018-180621-specific-commitments-to-ensure-the-continuity-and-completion-of-reforms-adopted-under-the-esm-programme_2.pdf>

31. When public spending on medicines and health care providers exceeds the threshold of the respective closed budgets, any surplus is "repaid" by all pharmaceutical companies and health care providers, on the basis of a specific formula.

Table A.2.1 Key reforms of the health care system since 2010

Year	Reforms
	Financing
2010	Upper limit 6% of GDP in public health expenditure, which resulted in extensive cuts in public pharmaceutical expenditure, staff salaries and wages in secondary and tertiary care
	Social Health Insurance
2011	Establishment of EOPYY as a unitary health insurance fund and a sole purchaser of health care services, standardised benefits package
	Reform of reimbursement system of physicians in primary health care
2012	Reform of reimbursement system of private hospitals and diagnostic centers
2016	Legislation to provide comprehensive health insurance coverage to the unemployed and vulnerable groups
2017	Establishment of EFKA
	Health services management
2010–2012	Introduction of Health Systems Accounts (OECD), introduction of ESY.net platform to collect quantitative data of public hospitals
	Reforms to public hospitals accounting system: introduction of a double-entry accounting system, yearly publication of balance sheets and central procurements, revised pricing and costing mechanisms
2011–2013	Administrative interconnection of public hospitals located in the same area or county
2013	Introduction of KEN-DRGs as reimbursement system of hospitals according to ICD-10 protocol
2014	Establishment of PEDYs and transfer of responsibility of primary care to YPEs
2015-on process	Establishment of TOMYs, creation of two-tiered primary care with gatekeeping function
	Pharmaceutical policy
2010	Upper limit on public pharmaceutical expenditure €2.44 billion in 2013, €2 billion in 2014, €1.94 billion in 2015-2017
2010-2012	Introduction of compulsory e-prescription for physicians, prescription by active substance, promotion of the use of generics mainly in public hospitals
	Introduction of external reference pricing system for on-patent drugs, compulsory periodic publication of Drugs Price List
	Introduction of positive and negative list of medicines
	Revised cost-sharing of patients for pharmaceuticals
2012-2014	Implementation of rebate and clawback mechanisms to pharmaceutical companies and pharmacies, reduction of pharmacists' and wholesalers' trade margins
2017	Market liberalisation of pharmacies and retail price of over-the-counter medicines (OTCs)

Source: Economic Adjustment Programs, (May 2010-July 2017).

doctors. In addition, it does not cover the implementation of gatekeeping and the registration procedure to achieve full population coverage.

As concerns the centralised procurements, an electronic platform to monitor tenders is underway, and a project to upgrade procurement of hospitals is envisaged to meet both the requirements of the National Central Authority of Health Procurements (EKAPY) and the needs of hospitals. The authorities have proposed in Greece's Recovery and Resilience Plan (GR-RRP): (a) the development of an electronic Medical Health Record to streamline and update the use of existing electronic medical record applications, (b) the extension of the application of the e-prescription project (phase II), (c) a National Strategic Policy Framework for Health Care, (d) the coverage of long-term

Box A.2.1 Centralised procurements of health care services and supplies

Figure A.2.1 presents the total value and the number of tenders for services and supplies in the health care sector. In 2020, the health sector carried out 20% and 7% of the volume and value, respectively, of the total awarded tenders. Supplies and services account for 80% and 20% of the total awarded tenders in the health sector, and 73% and 27%, respectively, of their total value. Both the number and the value of the awarded tenders for supplies and health care services increased over time, reaching 1,715 tenders with a total value of €316 million. Based on value terms, medicines, medical consumables, cleaning, security and medical waste services occupy the first places. The total savings from the awarded tenders compared to the initial budget ranged between 8-11% during the period 2016–2020.

Figure A.2.1 Tenders for health care services and supplies in value and volume, 2014–2021

Supplies Health care services
— Tenders of supplies — Tenders of health care services
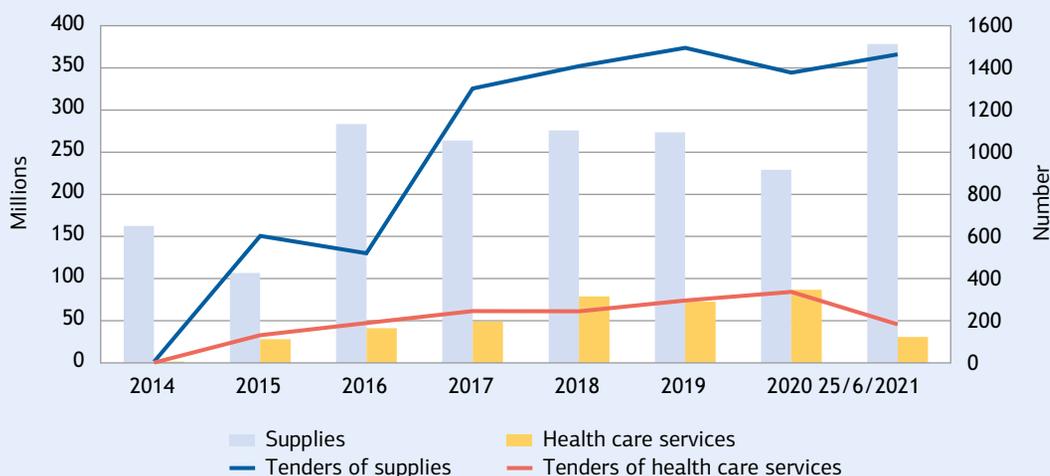
Source: promitheus.gov.gr-ESIDIS.

care needs with available human and technical resources and (e) the promotion of community-based health care services.

The GR-RRP plan focuses on increasing the resilience of the health care system through various interventions. Part of these measures focus on (a) physical and digital infrastructural and operational improvement to modernise and upgrade the hospital system and the network of health centers, (b) strengthening public health and prevention, (c) increasing the capacity of the health care system to deliver mental health and home care services, (d) strengthening the primary health care sector, (e) rationalising pharmaceutical spending and (f) supporting pharmaceutical R&D. All measures aim to improve access, promote efficiency and resilience of the health care sector, and increase the overall transparency and quality of public spending in the system.[32]

The National Strategic Policy Framework for Public Health and Prevention (May 2021) focuses on (a) the development and implementation of well-designed prevention programmes for the total population to reduce exposure to risk factors related to diseases such as smoking, nutritional habits, stress and lack of physical activity to reduce morbidity, (b) the implementation of integrated care programmes for the early diagnosis of diseases, (c) the development and provision of rehabilitation services and (d) the development of mechanisms and the provision or reforms/policies to protect the population during emergency health conditions (i.e., COVID-19).[33]

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32. <https://ec.europa.eu/info/system/files/com_328_1_annexe_en.pdf>

33. <https://www.moh.gov.gr/articles/health/domes-kai-draseis-gia-thn-ygeia/ethnika-sxedia-drashs/8776-ethniko-sxedio-drashs-gia-th-dhmosia-ygeia-2021-2025>

GREEK NATIONAL PRODUCTIVITY BOARD ANNUAL REPORT 2021

The 2021 edition of the Greek National Productivity Board Annual Report is constructed as follows. **Chapter 1** presents the role of productivity in the EU and national policies as well as the scope of the annual report. **Chapter 2** describes the macroeconomic environment, forecasts based on different economic scenarios, and main developments in the aggregate productivity and their drivers, including some critical issues concerning the impact of the pandemic, as well as measurement of the productivity in sectors and regions of the country. **Chapter 3** provides an analysis of developments in the competitiveness of the Greek economy, considering the aspects of public finance, current accounts, and net international investment position. It also presents the evolution of cost/price competitiveness indices and of international competitiveness indicators for Greece, putting an emphasis on the digital performance and regional competitiveness. **Chapter 4** examines two major challenges, namely, the provision, regulation, competitiveness and efficiency of health services, and the productivity and competitiveness of the Greek energy sector, encompassing insights in the process of green energy transition. **Chapter 5** summarises and concludes with relevant policy suggestions.