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**GREEK NATIONAL
PRODUCTIVITY BOARD
(NPB)**

KEΠE

**CENTRE OF PLANNING
AND ECONOMIC
RESEARCH (KEPE)**

Annual Report 2020

Recovery and Growth Through Enhancing
Productivity and Competitiveness

Athens
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Contributions

This report was prepared by the Centre of Planning and Economic Research, which acts as the National Productivity Board (NPB) of Greece, under the coordination and scientific editing of its Steering Committee.

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Foreword

The Centre of Planning and Economic Research (KEPE) assumed the function of the Greek National Productivity Board in April 2019.[*] 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 put to use in producing the second productivity and competitiveness report at hand.

Apart from producing the annual report on productivity, KEPE has already produced a number of 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.

One of the causes of this decline can be attributed to the productivity of the Greek economy, which shows divergence from that

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[*] Law 4605/2019, Art. 37, *Gov. Gaz.* A΄ 52/1.4.2019.

of the Eurozone countries and whose TFP remains quite low, about half of the TFP of the frontier economies in the EU and worldwide, such as of Germany and the U.S.A. Despite its slight gradual increase during the recovery period since 2016, the coronavirus pandemic is anticipated to cause a large drop of TFP in the Greek and the other European economies and the recovery during 2021 will only partially compensate the losses during 2020.

In the context of a long-term recovery plan and in conjunction with the resources to be utilised over the multiannual financial framework 2021-2027, emphasis should be given to both the quantitative (capital deepening and employment growth) and the qualitative (digital upgrading and human capital enhancement-upskilling) attributes of production inputs to boost the productivity and efficiency of the Greek economy.

The productive investments must be accompanied by a coherent framework of structural reforms to promote innovation and entrepreneurship; all levels of education and training; research and technology; the effectiveness of the public sector; the legal system; financing conditions; the sustainability and fairness of the insurance, social security and taxation systems; and the affordability of childcare, education, healthcare and other basic necessities.

The aggregate and sectoral productivity growth and the inter-sectoral analysis of the Greek economy signify the need for the deployment of a comprehensive growth strategy. Beyond the short-term actions for the recovery through stimulating effective demand, mostly in the public sector and the tourism industry, this strategy should focus on activities that can enhance productivity and competitiveness, including structural policies to strengthen exports and the value-added content of the domestic economy on global value chains and an investment programme to attract and allocate resources towards the most efficient sectors of the economy.

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
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Executive Summary

Following the first annual report of the previous year (2019), this year's (2020) report offers an up-to-date comprehensive analysis of the productivity and competitiveness developments of the Greek economy. In addition to the analysis of the patterns and drivers of productivity at the macro and sectoral level, an assessment of the impacts of the COVID-19 pandemic and of counter-measures to mitigate adverse effects is made. The effects of the macroeconomic shock of the pandemic are placed in the context of pre-existing conditions pertaining to the Greek economy, which kept its TFP far from the frontier of the European and world best-performing countries and led its labour productivity to diverge from the EA countries.

Among other factors, several of which are common and have contributed to the productivity slowdown in the advanced economies, the country's productivity has been adversely affected by the declining capital intensity, the low performance in skills development and technological adoption, and the relatively high contribution to the economy of low-productivity sectors. The pandemic further contributes to lower investment, unemployment, and the deterioration of the budget balance, public debt and global trade linkages. Nevertheless, it is argued that this urgent situation may offer opportunities for the government to redesign its growth strategy and to attract and (re)allocate resources towards higher-productivity sectors, increasing physical and human capital intensity and diversification, expediting technological adoption and increasing the resilience to such global-scale (health, financial and environmental) risks.

The improvement of the overall competitiveness of the Greek economy, which is characterised by poor performance, involves

the treatment of a wide range of critical indicators. At the national level, such indicators include the legal system, the land administration and the public sector management at both the central and local levels of government. Particularly in relation to sectoral competitiveness, it is suggested that the Greek manufacturing industry can improve its performance through reducing energy and transport costs, e.g., by adopting energy-efficient technologies and effective logistics practices, facilitating access to external finance and decreasing borrowing costs, boosting investments in human resources and (ICT and non-ICT) capital assets, and raising the R&D intensity and the share of production and exports of high-tech products.

Furthermore, two key thematic productivity challenges with considerable implications for the upgrading of the Greek economy to more efficient sectors are examined. First, the issue of the relatively low performance of the country in skills development, utilisation and matching is discussed. Holistic policy interventions and reforms are suggested with a focus on all levels of formal education and all types of learning to reinforce the link between the skills supplied by the education system and the skills required by firms. Second, the challenge of the adoption and use of new technologies by Greek firms, which lag behind the EU28 average in several ICT indicators, is discussed. Relevant public policies for the enhancement of human capital and technological infrastructure in businesses as well as flexible training, distance learning and mobility programmes to their personnel in ICT-related issues are proposed to mitigate some barriers to e-business/e-commerce and reduce digital divides.

Despite the temporary disturbances caused by the pandemic, some positive developments in structural reforms over a range of institutions and functions of the public and private sector are also discussed, such as those aiming at attracting investment and improving the business environment and employment conditions. The need for strengthening the reform efforts is stressed, particularly in relation to the liberalisation of network industries (energy, transport and communication), the protection of property rights, the establishment of the rule of law, and the closer connection between changes in wage costs and growth in productivity and competitiveness.

It can be concluded that the prospects of a fast economic recovery, as will be outlined by the country's Recovery and Resilience Plan, and of a long-term sustainable growth to be achieved during the new programming period, are closely related to a comprehensive

package of policy reforms and investments, whose interactions and timing of implementation are crucial to boost productivity and competitiveness. It is indicatively mentioned that, given the current structure of the economy, while investments in the public sector and tourism services can bring about the largest increase in GDP and employment, a long-term industrial policy programme is required to enhance productivity and competitiveness, support import substitution and enhance forward linkages in global value chains, in conjunction with the green and digital transformation process.

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1. Introduction

1.1. Productivity developments in Greece and the EU

The current year is not only signified by the disruptive impact of the coronavirus pandemic, but it also coincides with the formal end of the programming period 2014-2020 and the final preparation/completion of the national and regional plans for the new programming period (the EU's Multiannual Financial Framework 2021-2027 package). The plans corresponding to this new period should be integrated into the overall objectives and principal directions of the updated national strategic growth framework, the updated policies to respond to and recover from the effects of the coronavirus pandemic, as well as the existing and revised national reform policies, special planning frameworks and sectoral growth plans for transport, tourism, energy, digital governance and other main economic activities. From the sectoral dimension, priority should be given to the development of integrated value chains, which have possibly strong horizontal effects (extensive backward and forward linkages) across the whole economy, such as those encompassing (i) the digital transformation technologies, (ii) agri-food, tourism and transport-logistics, (iii) sustainable energy production and conservation and environmental management, and (iv) education, skills and cultural development.

In addition to the cross-sectoral dimension, the formulation and implementation of structural policies are necessary to increase the efficient use of resources and promote regional development and territorial cohesion. In particular, spatial policies should be regarded as structural ones, as they can enhance productivity and competitiveness at the (sub)regional level and reduce interregional productivity gaps and external trade impediments, such as increased transport/trade costs from insular areas. Such spatial policies may include, for instance, (i) investment and

Figure 1.1
TFP evolution in Greece and the EA19 during 2010-2019, and 2020-2021 forecasts (2015=100)
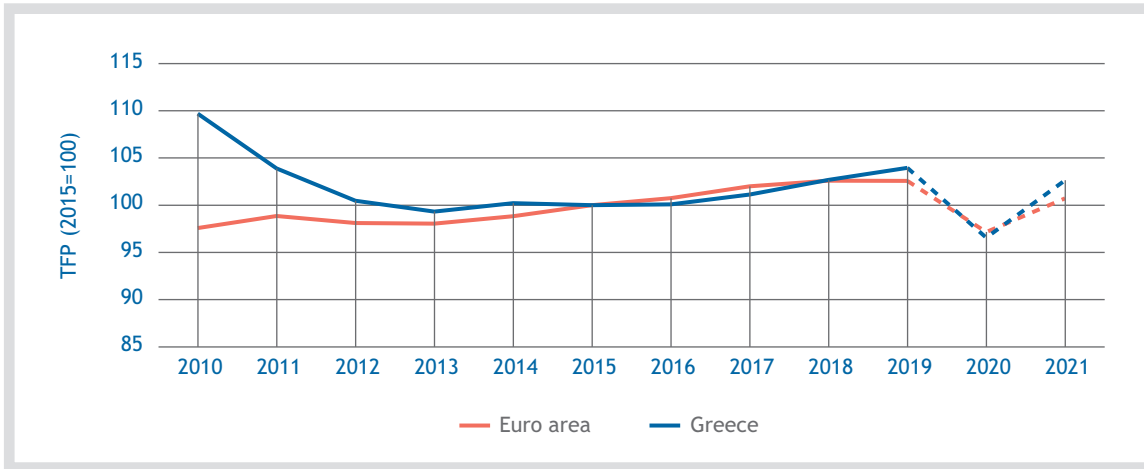
Source: AMECO.

Figure 1.2
Beta convergence of labour productivity (GDP per hour worked, in 2015 reference level) among the EA19 countries, 2010-2019
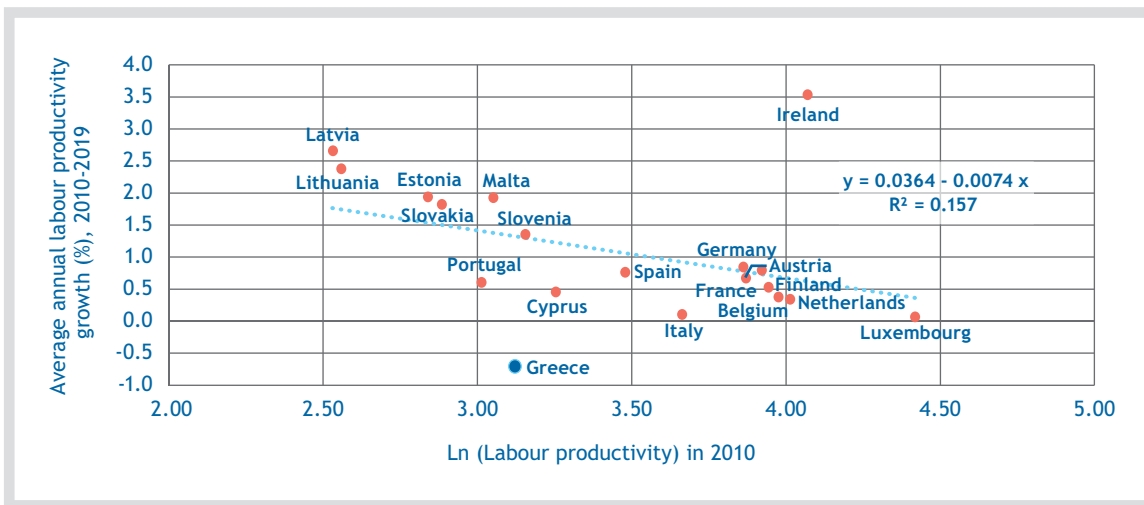
Source: AMECO and own processing of data.

subsidies to reduce disparities and promote the integration of the highly fragmented island regions (especially those of the North and South Aegean), and (ii) asymmetric regional decentralisation (at a higher level in metropolitan regions and at a lower level in semi-rural and rural regions), focused on the structural characteristics and production challenges of each area, e.g., the 'green' and fair transformation of the lignite-dependent economy in the regions of Dytiki Makedonia and Peloponnisos.

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Figure 1.1 above illustrates the substantial drop of TFP in the Greek economy after the outbreak of the economic crisis, which continued until 2013. TFP did not change considerably during 2013-2016; it then started to increase (at a rate higher than the EA average), reaching in 2019 the level of 2011. The coronavirus pandemic is expected to bring about a large drop of TFP in the economies of Greece and of the other EA countries; the recovery, which is projected during 2021, will only partially compensate the losses during 2020 (Figure 1.1). It is also stressed that the TFP of the Greek economy remains quite low compared to the frontier countries in the EA and the world. Based on the Penn World Tables 9.1 (Feenstra et al., 2015), in 2017, the TFP level at current PPPs (USA=1) was 0.54 in Greece and 0.99 in Germany (see also section A.2 of the Appendix). The beta convergence diagramme depicts the very slow convergence process among the EA countries, in terms of labour productivity (Figure 1.2 above). While several Eastern EU countries (together with Ireland and –to a lesser extent– Malta) have shown considerable productivity growth during the previous decade (2010-2019), some other countries, especially Greece, fall significantly behind the average productivity growth and diverge.

It should also be mentioned that the convergence process significantly varies not only at the country level, but also at the subnational or regional level (Tsekeris and Papaioannou, 2020). This fact signifies the need for targeting policies that can address the 'double convergence', i.e., at both the EU and the national level. In this perspective, priority should be given to catching-up processes that involve the broadening of the production base and specialisation patterns of regions, in order to increase multiplier effects and the integration into the national and European/global value chains (GVC). Priority should also be given to increase the connectivity between and within transport/supply chain networks (national, internal and external to the EU) to enhance network density, resilience and market access; reduce delays and upgrade speed with use of information and communication technologies (ICT); and promote environmentally friendly and resource-efficient mobility.

In addition to capital deepening and strengthening the quality of institutions, Greece must address various qualitative features underlying its low productivity performance, including (i) the relatively low level of skills development, skills underutilisation and the increased skills mismatch, and (ii) the relatively low adoption and use of several new technologies and e-commerce practices by firms. Furthermore, there is a need for better interaction and creation of synergies among production inputs and across sectors as well as within them, as reflects the small average size of firms. In this way, the most educated and skilled workers will be oriented toward sectors producing more value added, outward oriented, knowledge-intensive and innovative goods and services, thus increasing the domestic value-added content in gross exports and the competitiveness of the Greek economy.

1.2. The coronavirus pandemic: impacts and counter policies

The current crisis associated with the coronavirus pandemic affects both the demand (consumption, investment, exports) and the supply (lockdowns, factory closures, firm liquidity) conditions of the economy, putting pressures on the financial system and debt spending, increasing unemployment, and exacerbating social hardship and inequalities. The negative impacts concern both the micro and the macro-level of the economy and span over the short and long-term, i.e., from temporary disruptions of regional and national integration in GVC up to changes in capital accumulation/deepening and TFP, although some adjustments may positively affect productivity. The latter effects may concern increased ICT adoption and accelerated digitisation of work, education, business and public administration, which could support skills maintenance and innovation-led growth, the increase of the state budget for supporting arguably more productive activities, digital and green investments, and the funding mix of viable firms towards equity.

The expected downturn resulting from the coronavirus pandemic suggests that the analysis of traditional cost/price and non-cost indicators as well as of fiscal and current accounts-related measures of competitiveness should be complemented with human resource-oriented measures. Such measures may involve the preparedness and responsiveness of the health care system to properly address infectious diseases, through enhancing its efficiency, flexibility and scalability, and the ability to combat and increase resilience to other global-scale risks, such as climate change, digital threats and migrant crises. Importance should also be given to strengthening global governance and policy coordination among the EA (and the EU) member states and regions to effectively respond to the economic crisis and treat the resulting imbalances.

Policy initiatives are urgently required to counter the economic and social impacts of the coronavirus pandemic, through a comprehensive set of fiscal stimuli and measures encompassing the reinforcement of the health care system; loan moratoria and guarantees to SMEs and transfers to inhibit the rise of unemployment; EU (co)financing instruments, without tight conditionalities and beyond the stability and growth pact; and more flexible usage of the EU structural funds between and within programmes, regions and purposes. In this way, efforts would be properly adjusted to key regions, sectors and value chains, and appropriate types or mixtures of reforms and investments would be considered for the recovery plan of the economy and its sustainable productive transformation in the long run.

In this line, proper investments should involve high multiplier effects, increased innovation content and diffusion, and a neutral (or low) ecological footprint, e.g., through the digital transformation of the public sector and of legal and business services, the 'greening' of power generation, transport and logistics facilities, and sustainable mobility through the expansion of public transport systems, pedestrian and bicycle facilities in urban areas. Additionally, investments are required in all levels of education and training, in order to

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help the development of a combination of skills in future labour markets, and in research, science and technology, in tandem with redesigning the insurance, social security and taxation systems, to increase the affordability of childcare, education, healthcare and other basic necessities.

1.3. Scope of the Annual Report for 2020

This annual report will provide an update and further in-depth examination of crucial factors influencing the productivity and competitiveness of the Greek economy. Following the description of the macroeconomic environment and of aggregate and sectoral productivity growth patterns (sections 2.1-2.3), some critical issues concerning how the coronavirus pandemic would possibly affect macroeconomic and sectoral developments are discussed, through an intersectoral analysis of the Greek economy (section 2.4). These issues take into account the uncertainty underlying the policy responses to the pandemic as well as key sectors that are affected and on which the economy relies. Moreover, the competitiveness developments are analysed with regard to public finance, the current accounts balance, the net international investment position of the country (section 3.1), cost/price competitiveness indices (section 3.2) and international competitiveness indicators, such as those originating from the *Global Competitiveness Report* and the *Doing Business* Report (section 3.3). Special emphasis is given to the analysis of the competitiveness of the industrial sector, provided its (potential) importance for the recovery and sustainable development of the Greek economy (section 3.4).

Quality aspects of capital and labour inputs are further examined, through concentrating on two major thematic areas, i.e., education and skills development, and the role of ICT on the productivity and growth of businesses. These aspects are closely related to the (qualitative) contribution of capital and labour to output growth and the current policy efforts to enhance the availability, (re)allocation and more efficient use of resources in the post-coronavirus era. Particularly, they are associated, on the one hand, with the reduction of skills mismatch, unemployment, 'brain drain' and inequalities between households, regions and (frontier vs. laggard) firms (section 4.1). On the other hand, they focus on making firms more resilient, innovative and competitive, through increasing the rate of starting-up and scaling-up, and supporting the digitisation of their processes and the digital skills of their labour force (section 4.2).

Finally, several structural reforms closely related to the productivity and competitiveness of the Greek economy are discussed in the Appendix, such as those set up in the national reform programme (section A.1) and, more specifically, with regard to the government efficiency and liberalisation of the product markets (section A.2) and professions/economic activities of the service sector (section A.3), and the (minimum) wage-setting process (section A.4).

2. Productivity developments in Greece

2.1. Macroeconomic environment

During 2019, the Greek economy continued to recover from the effects of the economic crisis, with GDP increasing by 1.9% to 186.5 billion euros (in 2015 prices). The rate of the current expansion, which started in 2017, remains subdued with GDP currently standing 22.5% below its 2007 peak after bottoming out at 26.5% in 2013. For 2020, as a result of the global COVID-19 pandemic, all projections indicate a return to an economic recession of severe, yet not currently fully quantifiable dimensions, as a combination of both demand and supply side effects (see section 2.4).

Regarding the main components of aggregate demand growth (Table 2.1.1 and Figure 2.1.1), we find that, during 2019, growth in GDP remained unchanged compared to 2018, at 1.9%. Net exports contributed to GDP growth by 0.8%, followed, in turn, by private consumption by 0.5%, investment by 0.5%, government expenditure by 0.4% and, finally, changes in inventories, which contracted by 0.4%. In comparison, EA countries as a group experienced a deceleration of growth from 1.9% in 2018 to 1.3% in 2019, with private consumption contributing to GDP growth by 0.7%, government expenditure by 0.4%, investment by 1.2%, and with net exports and inventories contracting by 0.6% and 0.5%, respectively. Therefore, during 2019, Greece outperformed, on average, its EA partners, and this result can be mainly attributed to a superior net export performance.

By decomposing aggregate demand (Table 2.1.2), we find that, during 2019, private consumption accounted for 68% of GDP in Greece, followed by government expenditure by 19%, investment by 11%, changes in inventories by 1%, with net exports being balanced. In comparison, private consumption in EA countries as a

Table 2.1.1
Components of aggregate demand growth,
Greece and the EA19, 2019

	Gross domestic product at market prices	Final consumption expenditure of General Government	Household and NPISH final consumption expenditure	Gross fixed capital formation	Changes in inventories and acquisitions less disposals of valuables	External balance of goods and services
EA19	1.3%	0.4%	0.7%	1.2%	-0.5%	-0.6%
Greece	1.9%	0.4%	0.5%	0.5%	-0.4%	0.8%

Source: Eurostat, own calculations.

Table 2.1.2
Composition of aggregate demand,
Greece and the EA19, 2010-2019

	Final consumption expenditure of General Government	Household and NPISH final consumption expenditure	Gross fixed capital formation	Changes in inventories and acquisitions less disposals of valuables	External balance of goods and services
EA19	21%	53%	22%	0%	4%
Greece	19%	68%	11%	1%	0%

Source: Eurostat, own calculations.

group accounted for 53% of GDP, followed by government expenditure at 21%, investment at 22%, inventories at 0.3%, and net exports at 4%. Moreover, the comparison of the composition of aggregate demand of Greece with that of the EA indicates that, over the last decade, the Greek economy has remained exceptionally dependent on private consumption, while private investment performance remains significantly below average.

Turning to a longer-term view of economic growth prospects for the Greek economy, it is easy to identify as highly hindering future growth the toxic combinations of (a) demographic problems with high unemployment levels, (b) low investment with low capacity utilisation, and (c) asset price deflation with non-performing loans. Specifically, the unemployment rate, currently at 16.2% (Figure 2.1.2), and the employment rate, currently at 50.6%, indicate that significant increases in employment are physically possible in the short and medium run. However, the long-term trajectory of population growth indicates that by 2085, abstracting from the effects of immigration, the working-age population will be

Figure 2.1.1
Contributions to GDP growth, Greece, 1996-2019
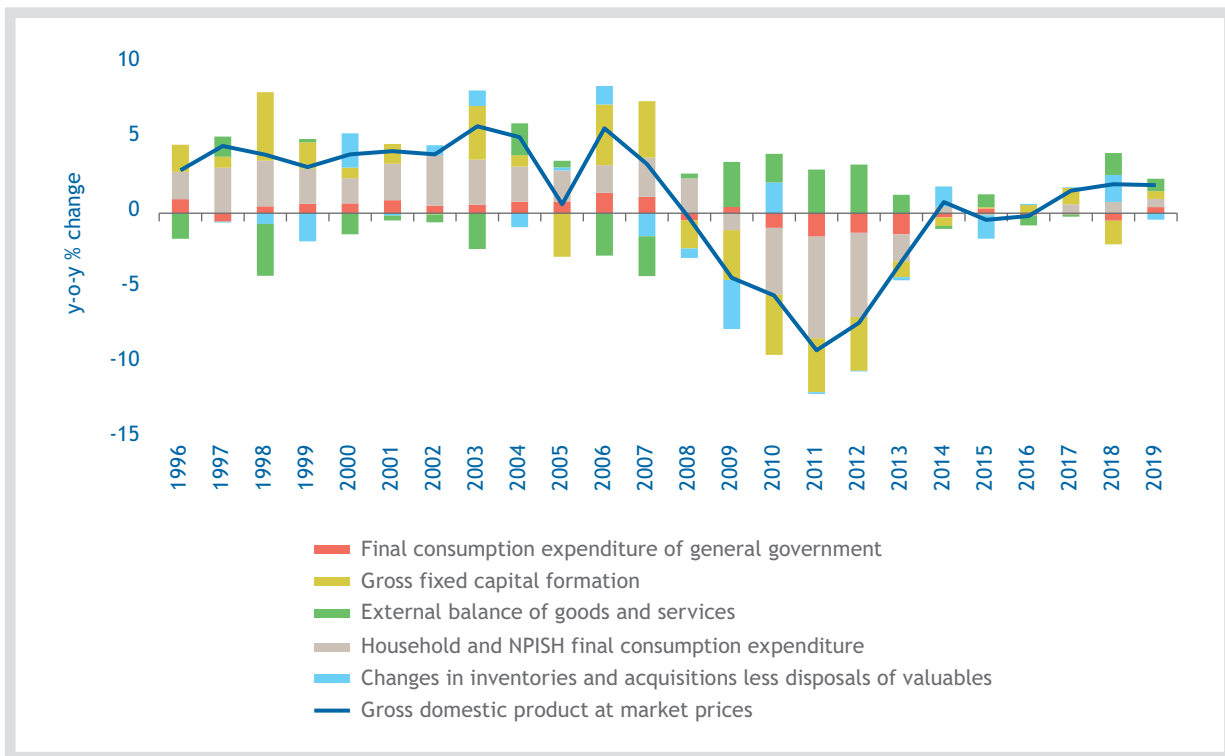
Source: Eurostat, own calculations.

Figure 2.1.2
Cumulative loss of GDP, non-performing loans, unemployment rate and output gap, Greece, 2007-2019
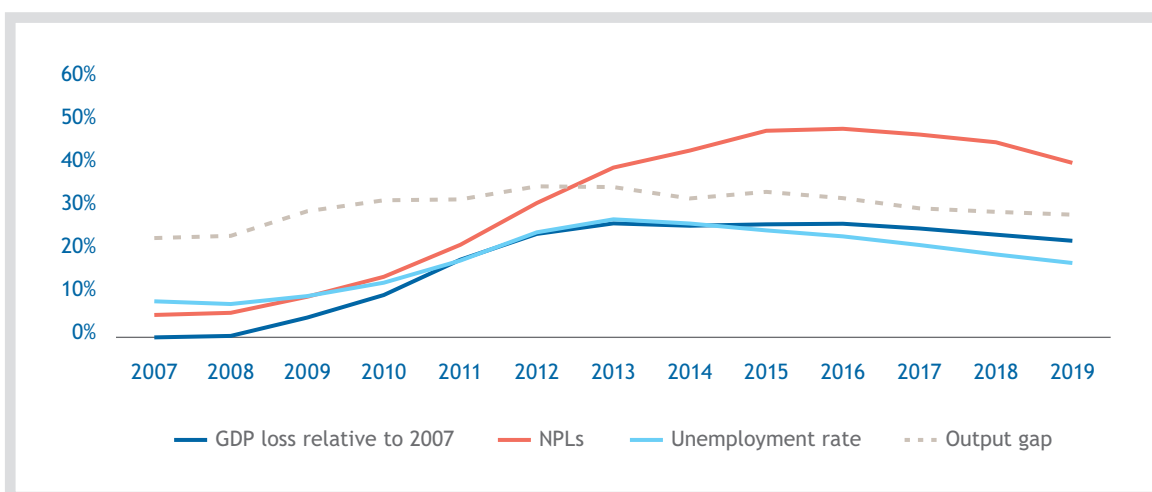
Source: Eurostat, Bank of Greece, FRED, own calculations.

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reduced to half its current size (Eurostat, 2020). Therefore, significant increases in labour productivity will be necessary in order to sustain current levels of output.

Similarly, while capacity utilisation rates indicate that, on average, a 30% increase in the utilisation of available capital is possible (OECD, 2020), at the same time, higher investment rates are more consistent with EA averages, as we have already seen. In particular, while an increase in investment might be preferable as capital of newer vintages normally embodies more recent and therefore more advanced technology, thus boosting TFP, such investments might, in the short run, be substituted by bringing back online capacity that was not utilised. Such a substitution therefore reduces investment demand and hampers potential growth.

A critical link in the investment decision is the capacity of the banking sector to finance such projects. According to the latest data from the Bank of Greece, the non-performing loan (NPL) ratio currently stands at 41% (Figure 2.1.2), while in the EA as a whole, NPLs are below 5%, indicating that significant stresses remain in the Greek banking sector. Moreover, the stock of NPLs in Greece, as in the EA, has a long average age, indicating structural problems. A significant subset of NPLs in Greece, accounting for 35% of the total, are residential loans. Given that residential asset prices deflated between 2009 and 2017 by 40%, it is obvious that a sustained rebound in asset prices is necessary in order to avoid significant write-offs. In particular, a strong recovery in residential asset prices, during 2019, gave some respite that was immediately translated in a fall of the NPL ratio. Moreover, the European Commission has approved the "Hercules" programme to reduce NPLs by almost 40% through sales to Special Purpose Vehicles (SPVs) with the state guaranteeing the senior tranches. Therefore, through a combination of increasing asset prices and targeted interventions, banks will reduce their NPL exposure, strengthening their balance sheets and therefore regaining the capacity to finance growth. However, the future success of this strategy is obviously conditional on a number of variables adversely influencing current conditions, most notably because of the global downturn of economic activity due to the COVID-19 global pandemic.

2.2. Aggregate productivity growth

Measuring changes in living standards across countries and though time is usually achieved by focusing on output per capita. The latter can, in turn, be decomposed into the growth rate of labour productivity (output per hour worked) and labour utilisation (hours worked per capita). Therefore, an increase in living standards can be attributed either to an increase in labour productivity, or to an increase in labour utilisation (Box 2.2.1). In the long run, the evolution of living standards can therefore be considered to depend on labour productivity alone, since variations in labour utilisation mainly depend on cyclical variations in the unemployment rate; however, these variations might exert significant influence in the short run.

Box 2.2.1
Output per capita decomposition

Formally, if Y is output, N is the population level, and H employment measured in hours worked, then:

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

Therefore, output per capita equals labour productivity times labour utilisation. Following Gomez-Salvador et al. (2006), we can further decompose the above expression to:

$$\frac{Y}{N} = TFP \times \left(\frac{K}{H}\right)^{1-a} \times H^{AV} \times (1-UR) \times PR \times \frac{p^{WA}}{p^{TOT}} ,$$

where TFP is total factor productivity, K is capital, H is hours worked, H^{AV} is average hours worked per person, UR is the unemployment rate, PR is the participation rate, p^{WA} is working-age population and p^{TOT} is total population.

During 2019, output per capita in Greece increased by 2.05%, with increased labour productivity contributing only 0.26% and increased labour utilisation contributing 1.79% (Figure 2.2.1). The increase in labour productivity was the net result of an increase in TFP by 5.23% and a reduction in capital intensity by 4.97%. The increase in labour utilisation was, in turn, the result of falling unemployment (2.25%) and increasing participation rates (0.63%) that covered the losses due to a fall in average hours worked (0.39%) and a fall in the working-age population relative to the total population (0.69%). In other words, the increase in output per capita came mostly from the increase in the labour utilisation rate, which, in turn, was largely the result of falling unemployment.

Moreover, it is important to note that capital intensity continues to decline, due to a decreasing capital stock, therefore creating strong headwinds for increases in output per capita —headwinds that, for the time being, are tacked by significant increases in TFP, although the latter is a volatile and pro-cyclical variable. Also, Greece outperformed the EA19 during 2019, as GDP per capita in the EA19 increased by 1%, with 0.1% due to labour productivity and 0.9% due to labour utilisation. Similarly favourable is the comparison with the EU28, since GDP per capita increased by 1.3% during 2019, with 0.4% due to labour productivity and 0.8% due to labour utilisation. It is also important to note the very low levels of labour productivity growth that our findings suggest. Such results fit a greater pattern of productivity slowdown in the advanced economies, a phenomenon that preceded the economic crisis of 2008 and intensified in its aftermath (Conference Board, 2016).

Figure 2.2.1
Output per capita decomposition, Greece, 2019
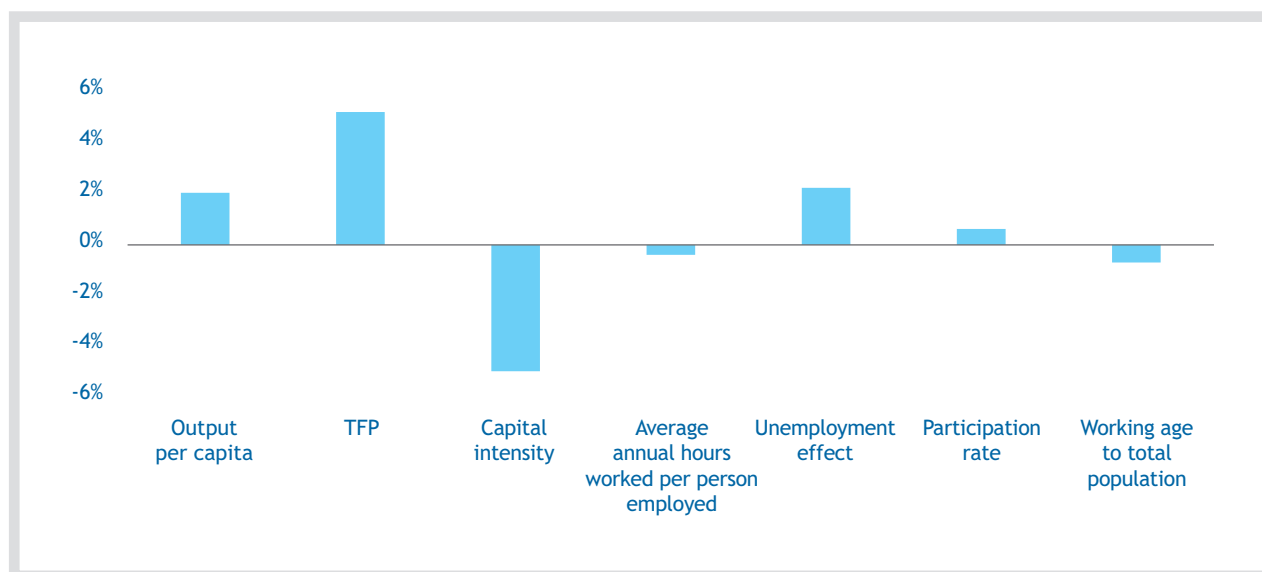
Source: Ameco, own calculations.

2.3. Sectoral productivity growth

Using data for 2019, we observe that 77% of economic activity in Greece, proxied by gross value added, came from four broad sectors: trade, transport, storage, accommodation and food services (26%), public administration, education and health (20%), real estate activities (16%) and industry including mining (15%). Smaller sectors accounted for the remaining 23%, including those of agriculture (4%), construction (3%), information and communication (4%), finance (3%), professional, scientific, administrative, etc. activities (6%) and arts and entertainment (4%). Comparing those data to the EA19 averages, we find that Greece specialises in the sectors of trade, transport, storage, accommodation and food services, i.e., in a cluster of activities directly related to tourism, and in the real estate sector; it has comparatively less professional, scientific, administrative and support activities and also industry. It is also important to note that the fastest growing sector in Greece is that of construction, which is making a rebound from the lows experienced during the crisis period proper, whereas financial activities continue to decline. Overall, comparing the current situation with the pre-crisis period, we find that the sectoral economic structure of the Greek economy remains broadly the same, with minor alterations on the relative importance of construction (downwards) and of real estate (upwards) (see also section 2.4).

Turning to employment, we observe that, again, 79% of total employment in Greece came from four broad sectors, namely trade, transport, storage, accommodation and food services (33%), public administration, education and health (24%), industry including mining (12%), and agriculture (11%). Smaller sectors providing the remaining 21% include those of construction (4%), information and communication (3%), finance (2%), professional scientific, administrative, etc. activities (8%), and arts and entertainment (4%). Therefore, the sectoral composition of employment follows a similar pattern as the sectoral composition of gross value added, with the major exception of agriculture, which still employs a disproportionately large number of persons relative to the gross value added it produces, thus indicating a sector with very low labour productivity. Comparing this employment distribution with the corresponding EA average distribution verifies evidence of tourist-industry specialisation and a disproportionately large agricultural sector. Finally, the fastest growth in employment can be found in the information and communication sector.

Aggregate labour productivity, defined as gross domestic product in constant prices to hours worked, grew by 0.3% in Greece compared with 0.2% in the EA19 during 2019. However, focusing on the evolution of labour productivity by sector reveals significant variation in labour productivity growth rates. Construction and real estate were two sectors with significant productivity growth, by 13% and 10%, respectively. Other sectors with productivity growth included arts and other services (5%), professional, scientific, administrative, etc. activities (3%), agriculture (2%), and trade, transport, storage, accommodation and food services (1%). On the contrary, finance and public administration, education and health experienced reductions in productivity by 4%, while industry, and information and communication had labour productivity reduced by 5%.

Finally, although aggregate TFP cannot be estimated at the sector level for 2019 due to data limitations, it is possible to estimate average TFP growth per sector over the period 1995 to 2017. For this purpose, we use a standard growth accounting framework (see, for example, Hulten, 2009) where output growth can be identified with the contributions of labour, capital, and TFP growth, the latter measured as residual magnitude. Assuming that capital and labour are paid their marginal products, therefore the output elasticities of capital and labour are the same as their respective income shares, then the growth accounting expression can be estimated using available National Accounts data. At the aggregate level, during 1995–2017, yearly output growth averaged at 0.8%, with TFP contributing by 0.18%, capital by 0.7%, and labour having a negative impact by 0.07% (Table 2.3.1). At the sectoral level, it is possible to identify real estate, accommodation and food services, electricity production, agriculture, and water supply as sectors with significant TFP increases; however, administrative and support activities, human health, professional activities, trade, and entertainment experienced reductions in TFP.

Table 2.3.1

Decomposition of labour productivity growth by sector, Greece, 1995-2017

Sectors	Output change (%)	TFP change (%)	Labour input change (%)	Capital input change (%)
Total - all NACE activities	0.79	0.18	-0.07	0.69
Agriculture, forestry and fishing	0.04	1.15	-1.33	0.22
Mining and quarrying	-0.65	0.20	-0.81	-0.04
Manufacturing	-0.14	-0.25	-0.94	1.05
Electricity, gas, steam and air conditioning supply	1.84	1.51	-0.67	1.00
Water supply, etc.	0.39	1.15	0.05	-0.80
Construction	0.74	0.70	-0.61	0.65
Wholesale and retail trade, etc.	-1.08	-1.74	0.22	0.45
Transportation and storage	2.99	-0.05	-0.96	3.99
Accommodation and food service activities	1.97	1.55	0.65	-0.23
Information and communication	2.56	0.95	0.90	0.72
Financial and insurance activities	0.68	-0.57	-0.30	1.54
Real estate activities	2.66	1.55	0.03	1.07
Professional, scientific and technical activities	0.22	-2.86	2.03	1.05
Administrative and support service activities	0.43	-4.78	1.59	3.62
Public administration and defence, etc.	1.15	0.14	0.47	0.54
Education	1.37	-0.31	1.32	0.37
Human health and social work activities	-0.53	-3.28	0.70	2.05
Arts, entertainment and recreation	2.00	-1.04	0.43	2.60
Other service activities	0.94	-0.74	0.75	0.93

Source: Eurostat, own calculations.

2.4. Inter-sectoral analysis of the Greek economy and the effects of COVID-19

2.4.1. Key sectors and multipliers of the Greek economy

2.4.1.1. The structural economic basis of the Greek economy

In what follows, we refer to the mapping of the structural economic basis of Greece.[1] For this purpose, we employ the Sraffian multiplier (see Box 2.4.1) framework using data from the Supply and Use Tables for the year 2015. Table 2.4.1 reports the key commodities for an effective demand management policy of the Greek economy and their correspondence to the Classification of Product by Activity (CPA).[2]

We observe that apart from forestry and construction, all the key commodities of the Greek economy belong to services. This feature becomes clearer if we estimate the average multipliers for primary products, industrial products and services. Table 2.4.2 reports the arithmetic means of GDP, import and employment multipliers for the primary sector, the industry sector, the service sector, and economy's average.

Thus, it follows that an increase of 1 unit of the autonomous demand induces, on average,

- an increase of 0.99 units in GDP,
- an increase of 0.46 units in imports,
- an increase of 26.3 units in the employment of the Greek economy.

Furthermore, only services demonstrate GDP and employment multipliers above the economy's average and, at the same time, import multipliers below the economy's average. However, it should be noted that, if we exclude minerals from primary production, then

- the GDP multiplier for primary products becomes 1.05,
- the import multiplier becomes 0.30,
- the employment multiplier becomes 47.8.

This fact indicates that there is certain room for an effective demand management policy towards primary production.

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1. For the analytical results, see Mariolis et al. (2020a).

2. A commodity is said to be a key commodity if it is characterised by an output and employment multiplier that is above the average multipliers of the economy, and, at the same time, by an import multiplier that is below the average import multiplier of the economy.

The Sraffian multiplier

The Sraffian multiplier is not a scalar but a square matrix of produced commodities (instead of industries) and includes, as special versions or limit cases, the usual Keynesian multiplier, the multipliers of the traditional input-output analysis, and their Marxian versions. This kind of multiplier effects modelling has been introduced by Metcalfe and Steedman (1981) and Kurz (1985). Further generalizations are provided by Mariolis (2008, 2018).

Consider an open, linear system producing n commodities by n industries of pure joint production. By taking into account both the price and quantity sides of the economy, we derive the following equation

$$\mathbf{y} = \mathbf{\Pi d}$$

where $\mathbf{\Pi} \equiv [\mathbf{I-C+M}]^{-1}$ denotes the $n \times n$ matrix of multipliers linking the $n \times 1$ vector of autonomous demand (government expenditures, investments, and exports), $\mathbf{d}$, to the $n \times 1$ vector of final demand, $\mathbf{y}$; $\mathbf{C}$ the $n \times n$ matrix of total consumption demand; and $\mathbf{M}$ the $n \times n$ matrix of total import demand. The matrix $\mathbf{\Pi}$ is a multiplier of commodities (instead of industries), and the multiplier effects depend, in a rather complicated way, on the (i) technical conditions of production; (ii) imports per unit of gross output; (iii) income distribution; (iv) savings ratios out of wages and profits; (v) consumption patterns; and (vi) the physical composition of autonomous demand.

On the basis of the matrix $\mathbf{\Pi}$, we derive the matrix multiplier linking autonomous demand to the levels of total employment as

$$\mathbf{L} = \mathbf{\Lambda \Pi d}$$

where $\mathbf{\Lambda \Pi}$ denotes the $n \times n$ matrix of employment multipliers linking autonomous demand to the $n \times 1$ vector of sectoral employment, $\mathbf{L}$; and $\mathbf{\Lambda}$ the $n \times n$ matrix of direct and indirect labour requirements per unit of net output for each commodity. Finally, we derive the matrix multiplier linking autonomous demand to imports as

$$\mathbf{Im} = \mathbf{M \Pi d}$$

where $\mathbf{M \Pi}$ denotes the $n \times n$ matrix of import multipliers linking autonomous demand to the $n \times 1$ vector of imports, $\mathbf{Im}$.

Table 2.4.1
Key commodities for an effective demand management policy

CPA	Nomenclature
A02	Products of forestry, logging and related services
F	Construction work
G45	Wholesale and retail trade; repair of motor vehicles
G47	Retail trade except for motor vehicles
H49	Land transport and transport via pipeline
H53	Postal and courier services
I	Accommodation and food services
K66	Services related to financial and insurance services
M69-M70	Legal and accounting services
M71	Architectural and engineering services
M74-M75	Other professional, scientific and technical services
N77	Rental and leasing services
N78	Employment services
N79	Travel agency, tour operator and other reservation services and related services
N80-N82	Security and investigation services
O84	Public administration services
P85	Education services
Q86	Human health services
Q87-Q88	Social services
R93	Sport and entertainment services
S94	Services provided by organizations
S96	Other personal services
T	Services from private households with employed persons

Table 2.4.2
Commodity multipliers of the Greek economy

	GDP multipliers	Import multipliers	Employment multipliers
Primary products	0.83	0.46	36.5
Industrial products	0.59	0.67	12.8
Services	1.28	0.32	33.7
Economy's average	0.99	0.46	26.3

However, none of the commodities of Table 2.4.1 is characterised by an incremental output-labour ratio, i.e., output multiplier relative to labour multiplier, that is above the economy's average. Since the incremental output-labour ratios can be conceived as productivity indices, it follows that none of the key commodities for an effective demand management policy of the Greek economy is characterised by a relatively high productivity index. This fact rather indicates that an effective demand management policy in the Greek economy can have a positive impact on the growth potential of the economic system only in the short term. On the other hand, a long-term structural policy to enhance the overall productivity of the Greek economy should be directed towards commodities that are characterised by high productivity indices. Table 2.4.3 reports the key commodities for structural policy for the Greek economy, i.e., the commodities that are characterised by an incremental output-labour ratio above the economy's average.

Finally, in Table 2.4.4, we report the sectoral incremental output-labour and output-import ratios of the Greek economy as derived directly from Table 2.4.1. The incremental output-import ratios can be conceived as indices of relative import dependency. From the above, it follows that the industrial sector of the Greek economy is characterised by the highest productivity and, at the same time, by the highest import dependency. Thus, a long-term structural policy to enhance productivity should be directed towards the industrial sector and, more specifically, should implement policies of import substitution.

Table 2.4.3
Key commodities for structural policy

CPA	Nomenclature
C19	Coke and refined petroleum products
C20	Chemicals
C24	Basic metals
C26	Computer, electronic and optical products
C27	Electrical equipment
C33	Repair and installation of machinery and equipment
D35	Electricity and gas
E36	Water supply services
E37-E39	Sewerage, waste and remediation services
H50	Water transport services
H52	Storage and auxiliary to transport services
J61	Telecommunications
K64	Financial services
K65	Insurance services
L68	Real estate services
M72	Scientific research and development services

Table 2.4.4
Sectoral incremental multipliers of the Greek economy

	GDP multiplier/ Employment multiplier	GDP multiplier/ Import multiplier
Primary products	0.023	1.80
Industrial products	0.046	0.88
Services	0.038	4.00
Economy's average	0.038	2.15

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2.4.1.2. Sectoral drivers of economic growth

Since an effective demand management policy can be implemented from the public sector or the private sector or the external sector of the economy, it is useful to examine

- the composition of the different components of autonomous demand,
- the corresponding multiplier effects in order determine which sectors can drive economic growth.

The available data from the Supply and Use Tables of 2015 provides information about the composition of

- the government's final consumption expenditure (Public Sector),
- gross fixed capital formation (Public and Private Sectors),
- exports (External Sector).

Given now the relative importance of tourism for the Greek economy, it is useful to examine separately the multiplier effects of international travel receipts (Tourism Sector)[3]. Table 2.4.5 gives the multiplier effects per category of autonomous demand of the Greek economy.

Table 2.4.5
Composite multipliers of the Greek economy

	GDP multipliers	Import multipliers	Employment multipliers
Government	1.49	0.36	33.5
Investment	0.68	0.61	18.9
Exports	0.78	0.51	16.6
Tourism	1.08	0.32	26.4
Economy's average	0.99	0.46	26.3

From Table 2.4.5, it may be concluded that the Public Sector and the Tourism Sector can be characterised as the key sectors for effective demand management policy of the economy. In order to get a more complete picture of the composition of these sectoral multipliers, Figure 2.4.1 gives a visual representation of the GDP, import and employment multipliers for each sector of the economy:

---

3. For more details concerning the multiplier effects of international travel receipts on the Greek economy, see Mariolis et al. (2020b).

- The rows of the graphs represent the government (1), investment (2), exports (3) and tourism (4), multiplier, respectively.
- The columns of the graphs represent the composition of these multipliers in terms of the 63 commodities described in the SUT of the Greek economy.

From these estimates, it can be concluded that favourable multiplier effects for an effective demand management policy of the Greek economy are concentrated in the service sector (mainly, in the Public and the Tourism Sectors) and, secondarily, in the primary sector, while the economy is heavily dependent on imports of industrial commodities.

Table 2.4.6
Incremental composite multipliers

	GDP multiplier/ Employment multiplier	GDP multiplier/ Import multiplier
Government	0.044	4.14
Investment	0.036	1.11
Exports	0.047	1.53
Tourism	0.041	3.38
Economy's average	0.038	2.15

By focusing again on the productivity and import dependency indices of the different sectors of the Greek economy, Table 2.4.6 presents the incremental output-labour and output-import ratios, as derived directly from the estimates in Table 2.4.5. We observe that, primarily, the public sector and, secondarily, the tourism sector are characterised by relatively high productivity indices and, at the same time, by low import dependency indices, while the external sector of the Greek economy is characterised by the highest productivity index, but also relatively high import dependency. Moreover, the composition of investments demonstrates the lowest productivity and, at the same time, the highest import dependency indices.

The above facts indicate that a short-term growth-oriented policy for the Greek economy could be basically implemented, primarily, through the public sector and, secondarily, through the tourism sector. Nonetheless, given the high public debt and the current fiscal constraints, the public sector seems unable to implement such a policy, while, as the recent COVID-19 pandemic revealed, the tourism sector is rather unstable to external shocks. The external sector of the Greek economy, which demonstrates the highest incremental productivity index, could be the basis of a long-term growth-oriented policy; however, it requires the repositioning and higher participation of the country in global

Figure 2.4.1
Composite multipliers of the Greek economy:
(a) GDP multipliers;
(b) employment multipliers; and
(c) imports multipliers
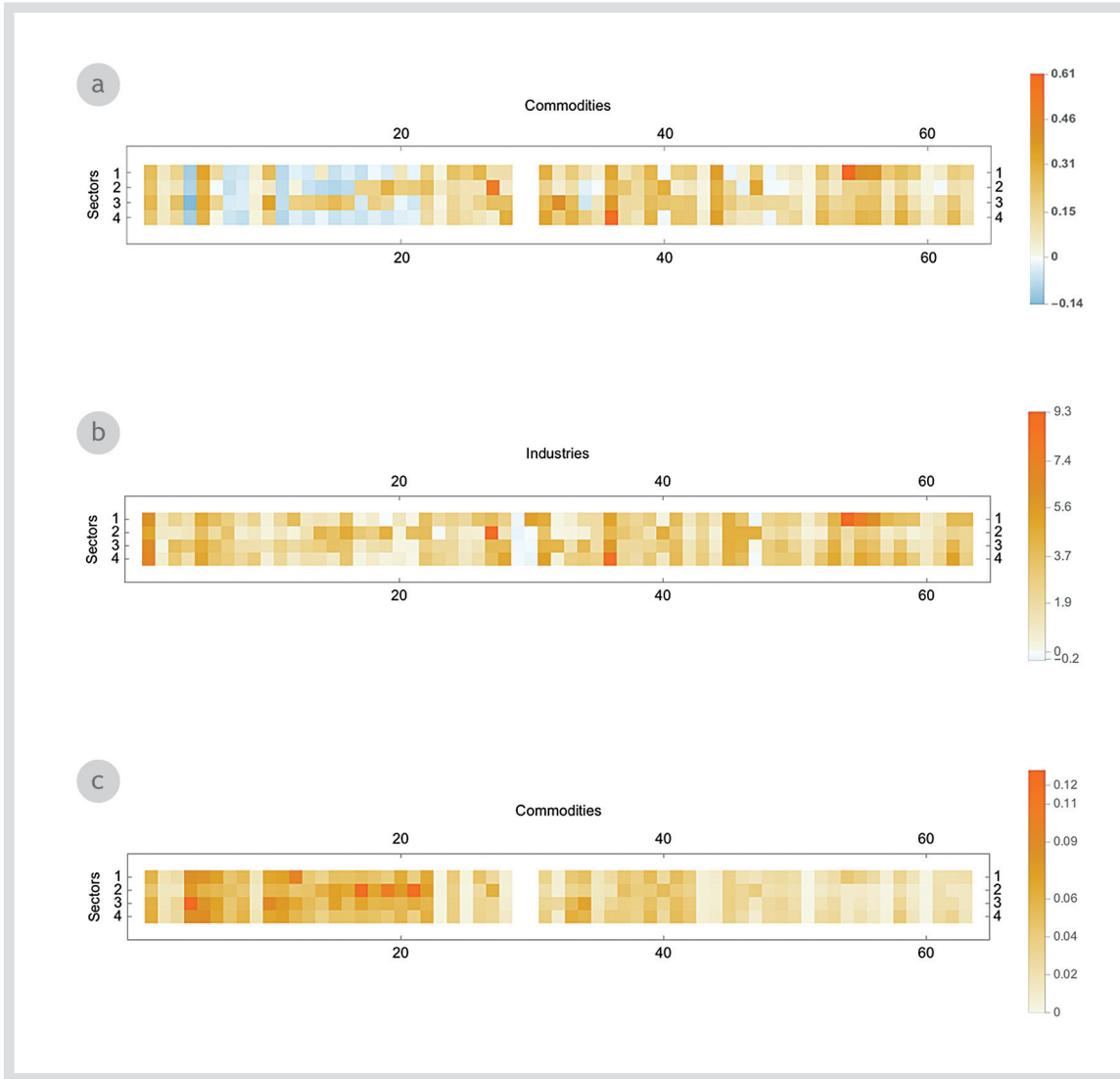
Note: Commodities 1-4 belong to primary production. Commodities 5-27 belong to industry. Commodities 28-63 belong to services. Thus, the sum of each row gives the composite multipliers presented in Table 2.4.3.

value chains, in terms of increasing the domestic value-added content in the gross exports of its trade partners. Moreover, the fact that the basic tool of implementing policies that can enhance the growth potential, i.e., investment, demonstrates the lowest productivity and, at the same time, the highest import dependency index indicates that the Greek economy is currently trapped in a "hypotension cycle" and the need for reconsidering the way investments are planned and implemented in connection with productivity and growth requirements.

The multiplier effects of investment

The empirical results suggest that a decrease in gross fixed capital formation by 1 million euro would lead to a total (direct and indirect)

- decrease in GDP of about 0.682 million euro, whose distribution per commodity is described in Figure 2.4.2.a,
- decrease in the levels of total employment of about 18,930 persons, whose sectoral distribution is described in Figure 2.4.2.b,
- decrease in the total imports of about 0.608 million euro, whose distribution per commodity is described in Figure 2.4.2.c.

Now, according to the ELSTAT provisional data, the GDP of the Greek economy for the year 2019 reached approximately 187.456 billion euro, the level of employment reached 4,301.341 thousand persons, and total imports reached approximately 69.728 billion euro. Hence, it follows that a decrease in investment by 1 billion euro would lead to a total

- decrease in GDP of about 0.36%,
- decrease in employment of about 0.44%,
- decrease in total imports of about 0.87%.

The multiplier effects of exports

The empirical results suggest that a decrease in exports by 1 million euro would lead to a total (direct and indirect)

- decrease in GDP of about 0.784 million euro, whose distribution per commodity is described in Figure 2.4.3.a,
- decrease in the levels of total employment of about 16,604 persons, whose sectoral distribution is described in Figure 2.4.3.b,
- decrease in total imports of about 0.507 million euro, whose distribution per commodity is described in Figure 2.4.3.c.

Figure 2.4.2
The multiplier effects of investment:
(a) the distribution (%) of the losses in GDP per commodity;
(b) the distribution (%) of the losses in employment per sector; and
(c) the distribution (%) of the losses in total imports per commodity

a

- Construction work
- Research and development services
- Machinery and equipment
- IT and other information services
- Other commodities
- Real estate services
- Food products

6.0%, 4.4%, 2.6%, 13.6%, 6.0%, 7.6%, 59.8%

b

- Construction work
- Architecture and engineering activities
- Manufacture of fabricated metal products
- IT and other information services
- Other sectors
- Legal and accounting activities
- Agriculture

4.8%, 6.2%, 32.4%, 4.0%, 4.0%, 4.1%, 44.5%

c

- Machinery and equipment
- Other commodities
- Motor vehicles, trailers and semi-trailers
- Mining and quarrying
- Other transport equipment
- Computer, electronic and optical products
- Furniture and other manufacturing products

13.6%, 5.5%, 19.8%, 19.8%, 5.4%, 31.2%, 4.6%

Figure 2.4.3
The multiplier effects of exports:
(a) the distribution (%) of the losses in GDP per commodity;
(b) the distribution (%) of the losses in employment per sector; and
(c) the distribution (%) of the losses in total imports per commodity

a

3.7%
12.9%
10.2%
16.7%
6.9%
20.1%
29.4%

- Water transport services
- Other commodities
- Land transport
- Accomodation and food services
- Food products
- Real estate services
- Coke and refined petroleum products

b

4.8%
24.1%
14.4%
4.6%
3.9%
4.0%
44.2%

- Manufacture of food products
- Security and investigation activities
- Hotels and restaurants
- Other sectors
- Legal and accounting activities
- Agriculture
- Architectural and engineering activities

c

7.7%
4.9%
25.2%
11.4%
6.9%
4.8%
39.1%

- Food products
- Textiles
- Coke and refined petroleum products
- Chemicals
- Basic metals
- Other commodities
- Mining and quarrying

Given the ELSTAT provisional data for GDP, employment and imports, it follows that a decrease in exports by 1 billion euro would lead to a total

- decrease in GDP of about 0.42%,
- decrease in employment of about 0.39%,
- increase in the trade balance deficit of about 0.493 billion euro,
- decrease in imports of about 0.73%.

Since the Greek economy depends heavily on tourism activities and, especially, on international travel receipts, which according to BoG data reached 18.2 billion euro (for the contribution of the tourism sector to the economy see Box 2.4.2), it is important to analyse the multiplier effects of a decline in international travel receipts separately from the rest of the exports of the Greek economy. Following the same procedure described before, we find that a decrease in international travel receipts by 1 billion euro would lead to a total (direct and indirect)

- decrease in GDP of about 0.57%,
- decrease in the levels of total employment of about 0.61%.,
- increase in the trade balance deficit of about 0.676 million euro, of which more than two-thirds are due to losses of receipts for accommodation and food services.

Box 2.4.2
The tourism ratio and the need for Tourism Satellite Accounts

The modern approach to assess the contribution of tourism to the economy is through the system of Tourism Satellite Accounts (TSA), which allow us to estimate

- the tourist gross value added,
- the tourist gross domestic product,
- the indicator of the contribution of tourism to the economy (tourism ratio).

Greece is one of the few countries in the European Union (EU) that has not yet developed a TSA system; therefore, there is no accurate estimate of the amount of the tourist gross value added and the tourist gross domestic product in the economy (the estimates about the contribution of Greek tourism to the GDP range from 10% to 30%, or even higher). Thus, there is no precise estimate of the real contribution of tourism to the Greek economy.

However, we have sufficient data on tourism expenditures and, therefore, we can have an estimate of the tourism ratio in the Greek economy (see

Rodousakis and Soklis, 2020a). Given the latest available data from ELSTAT (i.e., data for the year 2018) and the definition of tourism ratio, we may conclude that (a) the contribution of domestic tourism expenditures to the economy is about 4.6% and (b) if we assume that the other facts and figures of the unaccounted tourist consumption could reach up to 1/5 of the domestic tourist expenditure, then the tourism ratio of the Greek economy could reach up to 5.6%. This proportion may seem "small" in comparison with the usually published contribution of tourism to the Greek economy, but it is in correspondence with the relative proportion announced by other European Union (EU) countries and, especially, with the Southern European economies that are represented in the following table.

Table B.2.4.1
The tourism ratio in Greece and in the competitive countries

Country	Tourism ratio
Greece	4.6%-5.6%*
Spain	5.1%
Italy	3.9%
Malta	5.8%
Portugal	5.6%
EU	3.4%

Source: Eurostat, Tourism Satellite Accounts, 2019 Edition.
* Own estimations.

The multiplier effects of the government's final consumption expenditure

The empirical results suggest that an increase in the government's final consumption expenditure by 1 million euro would lead to a total (direct and indirect)[4]

- increase in GDP of about 1.487 million euro, whose distribution per commodity is described in Figure 2.4.4.a,
- increase in the levels of total employment of about 33.524 persons, whose sectoral distribution is described in Figure 2.4.4.b,
- increase in total imports of about 0.359 million euro, whose distribution per commodity is described in Figure 2.4.4.c.

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4. For more details, see (Rodousakis and Soklis, 2020a).

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Figure 2.4.4
The multiplier effects of the government's final consumption expenditure: (a) the distribution (%) of the losses in GDP per commodity; (b) the distribution (%) of the losses in employment per sector; and (c) the distribution (%) of the losses in total imports per commodity

a

- Public administration services — 41.1%
- Education — 14.5%
- Human health — 13.1%
- Other commodities — 10.7%
- Food products — 6.6%
- Hotel and restaurant services — 5.7%
- Real estate services — 8.3%

b

- Public administration — 27.8%
- Education — 18.4%
- Human health — 10.4%
- Other sectors — 25.3%
- Agriculture — 9.7%
- Retail trade — 4.6%
- Hotels and restaurants — 3.9%

c

- Textiles — 6.9%
- Petroleum products — 5.8%
- Chemical products — 6.9%
- Pharmaceutical products — 19.2%
- Other commodities — 37.5%
- Minerals — 13.1%
- Food products — 10.6%
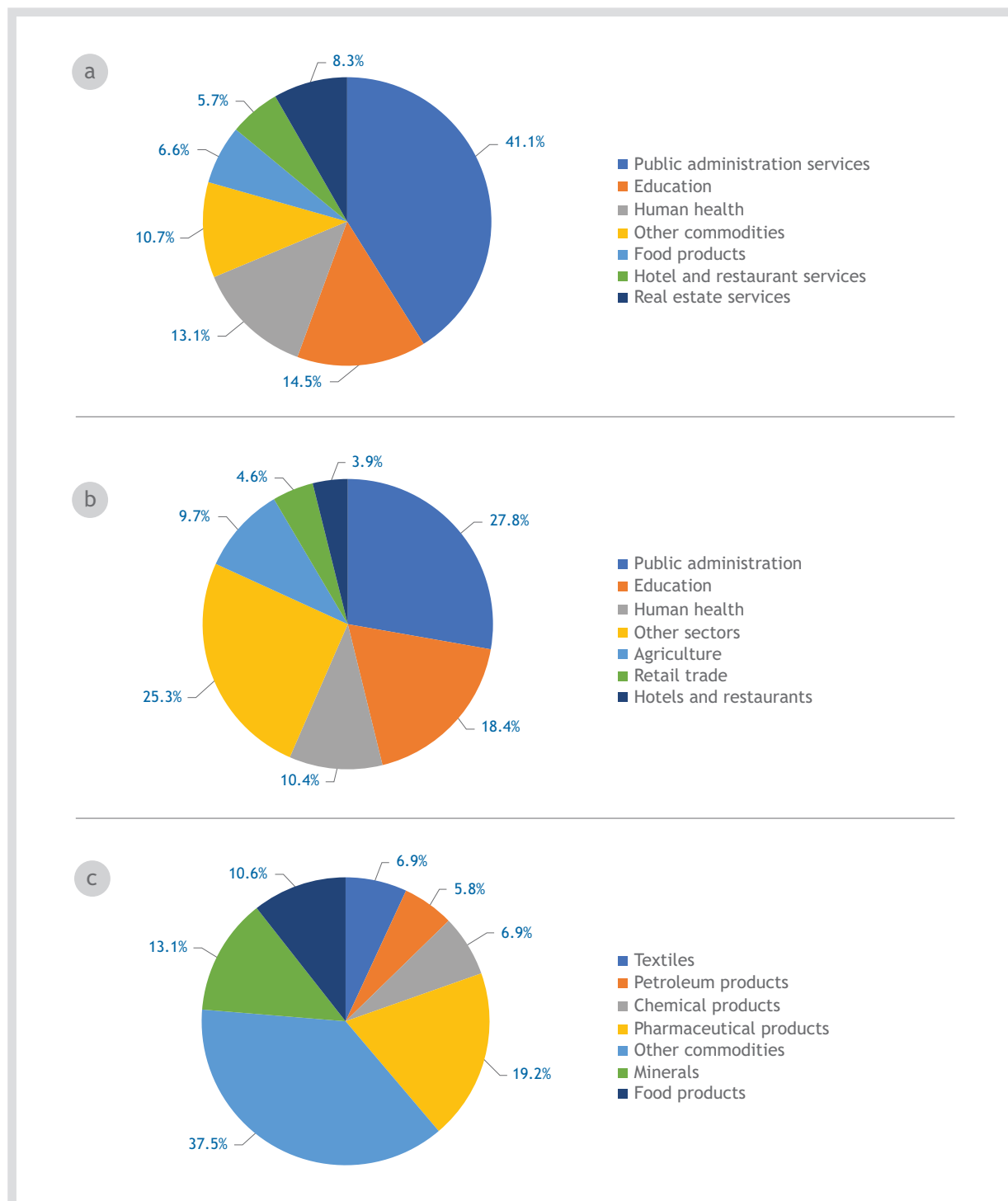
Based on the ELSTAT provisional data, it follows that an increase in the government's final consumption expenditure by 1 billion euro would lead to a total

- increase in GDP of about 0.79%,
- increase in employment of about 0.78%,
- increase in the total imports of about 0.51%.

2.4.2. The effects of COVID-19 shocks on the Greek economy

In this section, we analyse the multiplier effects of COVID-19 shocks on the Greek economy. In particular, based on the estimations of the Sraffian multiplier, we assess the impact on

- GDP,
- employment,
- total imports.

For this purpose, we use Input-Output data from the Supply and Use Table (SUT) of the Greek economy for the year 2015, provided by the Hellenic Statistical Authority (ELSTAT).

Thus, firstly, we estimate the multiplier effects of

- investment,
- exports,
- the government's final consumption expenditure,

and, then, the multiplier effects of the projected changes on autonomous demand by the

- Ministry of Finance,[5]
- European Commission.[6]

Based on these projections, we conclude with the total multiplier effects on the Greek economy.

2.4.2.1. The multiplier effects based on Ministry of Finance projections

According to Ministry of Finance (MinFin) projections for the changes in the components of autonomous demands of the Greek economy in 2020 (let's say Scenario 1), the government's final consumption expenditure is expected to increase by approximately 0.364 billion euro, gross fixed capital formation is expected to decrease by approximately 0.985 billion euro, and exports are expected to decrease by approximately 13.384 billion euro.

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5. Ministry of Finance (2020).

6. European Commission (2020a).

Figure 2.4.5
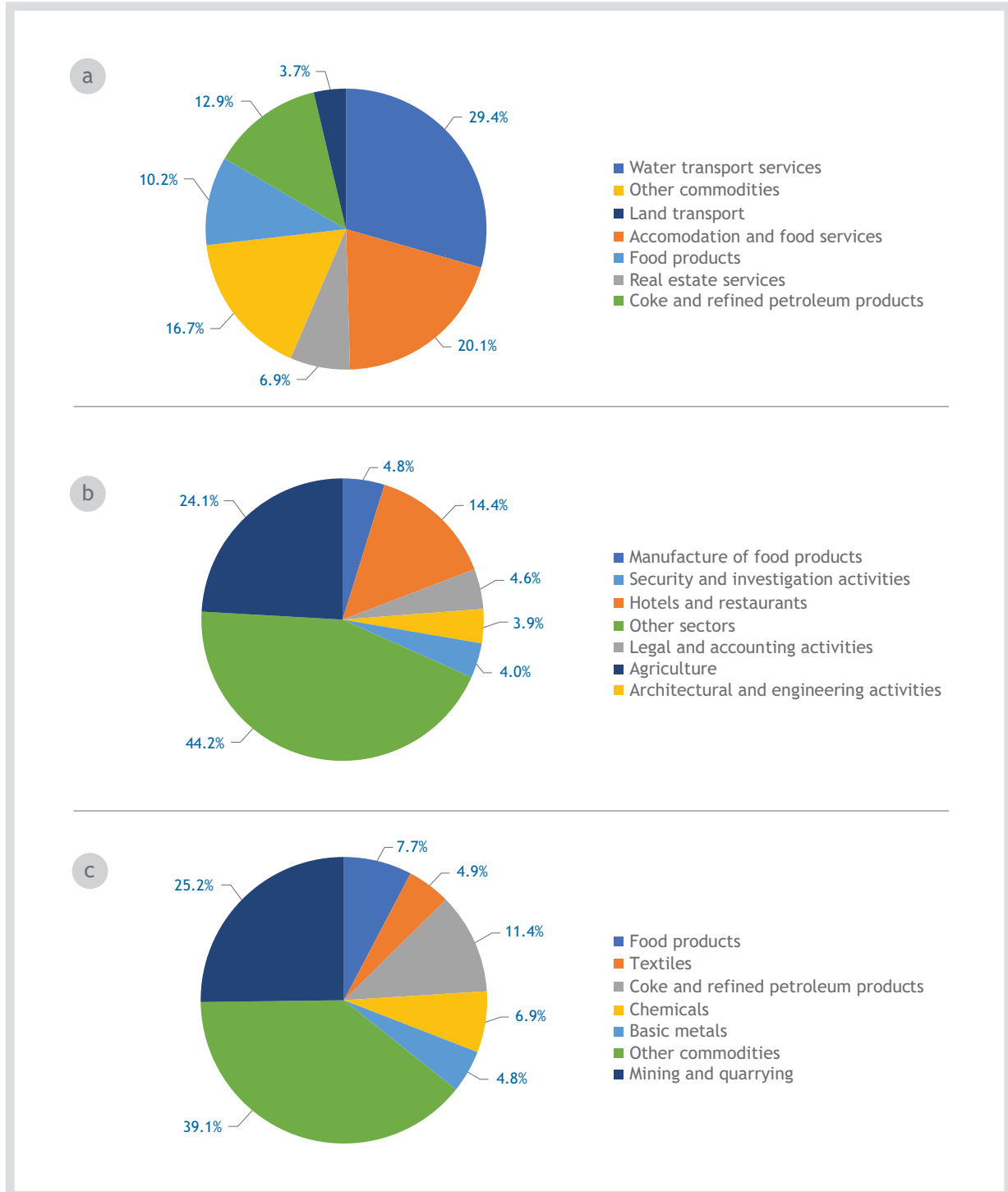**The total effects of COVID-19 Scenario 1:**
(a) the distribution (%) of the losses in GDP per commodity;
(b) the distribution (%) of the losses in employment per sector; and
(c) the distribution (%) of the losses in total imports per commodity

a

- Construction work
- Water transport services
- Accomodation and food services
- Real estate services
- Other commodities
- Food products
- Coke and refined petroleum products

5.4%
29.1%
19.8%
6.8%
16.2%
10.0%
12.7%

b

- Manufacture of food products
- Construction
- Hotels and restaurants
- Legal and accounting activities
- Architectural and engineering activities
- Other sectors
- Agriculture

4.7%
5.7%
13.9%
4.7%
4.1%
43.4%
23.4%

c

- Mining and quarrying
- Coke and refined petroleum products
- Chemicals
- Basic metals
- Computer, electronic and optical products
- Other commodities
- Food products

7.2%
23.8%
10.7%
6.5%
4.9%
5.6%
41.4%

Our estimations suggest that the MinFin projections correspond to a total (direct and indirect) [7]

- decrease in GDP of about 5.67%, whose distribution per commodity is described in Figure 2.4.5.a,
- decrease in the levels of total employment of about 5.32%, whose sectoral distribution is described in Figure 2.4.5.b,
- decrease in total imports of about 10.40%, whose distribution per commodity is described in Figure 2.4.5.c.

As it follows, the majority of output losses correspond to 'Water transport services' (29.1%), 'Accommodation and food services' (19.8%) and 'Coke and refined petroleum products' (12.7%). The most significant decreases in the levels of employment correspond to the sectors 'Agriculture' (23.4%), 'Hotels and restaurants' (13.9%) and 'Construction' (5.7%). The most significant decreases in total imports correspond to 'Mining and quarrying' (23.8%), 'Coke and refined petroleum products' (10.7%) and 'Food products' (7.2%).

2.4.2.2. The multiplier effects based on the European Commission's projections

According to the European Commission's (2020a) Spring forecast (Scenario 2) for the changes in the components of autonomous demand of the Greek economy in 2020, the government's final consumption expenditure is expected to increase by approximately 1.782 billion euro. Gross fixed capital formation is expected to decrease by approximately 6.422 billion euro, and exports are expected to decrease by approximately 14.918 billion euro. Thus, the European Commission's projections correspond to a total (direct and indirect)

- decrease in GDP of about 7.16%, whose distribution per commodity is described in Figure 2.4.6.a,
- decrease in the levels of total employment of about 7.20%, whose sectoral distribution is described in Figure 2.4.6.b,
- decrease in total imports of about 15.53%, whose distribution per commodity is described in Figure 2.4.6.c.

The majority of output losses correspond to 'Water transport services' (25.6%), 'Construction work' (20.9%) and 'Accommodation and food services' (17.6%). The most significant decreases in the levels of employment correspond to the sectors 'Agriculture' (19.8%), 'Construction' (19.1%), and 'Hotels and restaurants' (11.6%). The most significant decreases in total imports correspond to 'Mining and quarrying' (18.8%), 'Computer, electronic and optical products' (10.1%) and 'Other transport equipment' (9.2%).

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7. For more details for Scenarios 1 and 2, see (Rodousakis and Soklis, 2020b).

Figure 2.4.6

The total effects of COVID-19 Scenario 2:
(a) the distribution (%) of the losses in GDP per commodity;
(b) the distribution (%) of the losses in employment per sector; and
(c) the distribution (%) of the losses in total imports per commodity

a

- Construction work
- Water transport services
- Accomodation and food services
- Real estate services
- Other commodities
- Food products
- Coke and refined petroleum products

b

- Construction
- Hotels and restaurants
- Legal and accounting activities
- Architectural and engineering activities
- Other sectors
- Agriculture
- Manufacture of food products

c

- Coke and refined petroleum products
- Computer, electronic and optical products
- Machinery and equipment
- Other transport equipment
- Other commodities
- Food products
- Mining and quarrying

2.4.3. Sectoral policies for the post-pandemic period

The recently announced EC Recovery Fund of 750 billion euro made up of grants (500 billion euro) and loans (250 billion euro) constitute a share for Greece amounting to approximately 32 billion euro (22.5 billion euro in grants and 9.5 billion euro in loans) to be disbursed over a four-year period. In turn, it gives us the opportunity to mention the following:

- Given the current structure of the economy, an effective demand management policy could be implemented, mainly, by the public sector and, secondarily, the tourism sector. Therefore, taking into account the fiscal constraints of the economy, it is suggested that a growth-oriented policy should be directed towards selective fiscal stimulus and an increase in autonomous demand of the key commodities of the Greek economy.

- However, given that such a policy cannot be based on the industry and taking into account the relative calls of the European Commission,[8] it follows that it is a great opportunity for a long-term industrial policy programme that would enhance the productivity and competitiveness of the Greek economy, in conjunction with the green and digital transformation of its production base.

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8. *"Commission calls on Member States to recognise the central importance of the industry for boosting competitiveness and sustainable growth in Europe and for a systemic consideration of competitiveness concerns across all policy areas … the objective of revitalisation of the EU economy calls for the endorsement of the reindustrialisation efforts in line with the Commission's aspiration of raising the contribution of industry to GDP to as much as 20% by 2020"* (European Commission, 2014).

3. Developments in the competitiveness of the Greek economy

3.1. Public finance

3.1.1. Introduction

Sound fiscal policies are necessary to safeguard the medium- and long-term sustainability of public finances through, among other things, the preservation of thorough public revenue and expenditure strategies. On the contrary, long-lasting non-consolidated public finances eventually obstruct the more effective allocation and distribution of public resources and eventually threaten the country's financial position, competitiveness and overall viable growth process. Against this background and in the more general context of coordinating economic and budgetary policies in Europe, Greece remains under enhanced surveillance for preventing and correcting government deficits and imbalances arising from public indebtedness.[9]

3.1.2. Recent developments in public finance

In the more recent past, Greece has managed to successfully restore its budget balance (Figure 3.1.1). In 2019, the General Government

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9. According to the Commission Implementing Decision (EU) 2020/280, as of February 2020, 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 once again prolonged for six months, commencing on 21 February 2020.

See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020D0280&from=EN>.

(GG) budget and primary balance surpluses were further enhanced, continuing their favourable course since 2016. The headline budget balance surplus reached 1.5% of GDP (as compared to 1% in 2018), remaining positive for the fourth consecutive year and well above the EA19 and EU28 averages of -0.6% and -0.8%, respectively. The primary balance surplus reached 4.4% of GDP (as compared to 4.3% in 2018), outperforming the 3.5% surplus target for the fourth consecutive year and standing well above the EU19 and EU28 average of 0.9%. At the same time, the calculated cyclically-adjusted and the structural budget balances for 2019 amounted to 3.8% and 2.8% of potential GDP, respectively (see European Commission, 2020a).

The aforementioned surpluses resulted from the developments in total revenue and expenditure in 2019 (Figure 3.1.1). Total revenue stood at 47.7% of GDP in 2019, with taxes and social contributions accounting for the major part of government revenue, reaching 26.6% and 14.3% of GDP, respectively. The recorded annual growth of 1% in total revenue (following the 2% growth in 2018) included the y-o-y decline in taxes by -1.5% (following the increase by 3.3% in 2018) and the y-o-y increase in social contributions by 1.6% (following the increase by 1.3% in 2018). The annual growth in total revenue was accompanied by a y-o-y percentage change in total expenditure around zero (following the 1.4% increase in 2018), which stood at 46.3% of GDP in 2019. Expenditure in the major categories of social benefits and compensation of employees, which amounted to 20.7% and 11.7% of GDP in 2019, respectively, recorded positive y-o-y rates of change, while the components of intermediate consumption, interest and other current expenditure declined in 2019.

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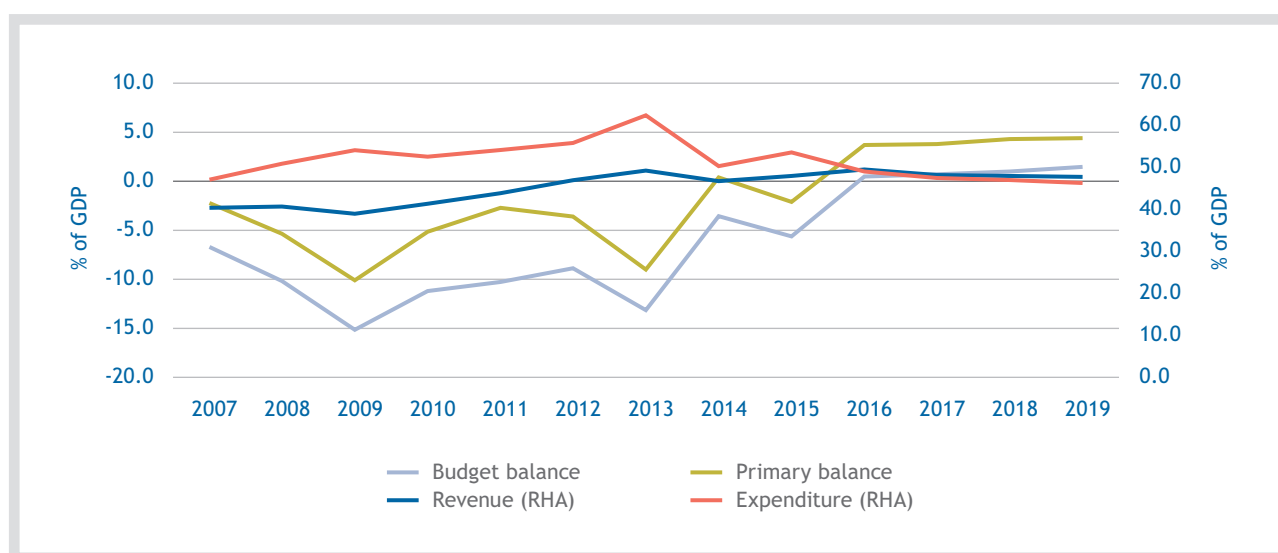
Source: Eurostat.

Out of total expenditure, public investment stood at 2.2% of GDP in 2019, lower than the trough of 2.5% recorded in crisis years 2012 and 2013 and below the 2.8% EA19 and 3.0% EU28 averages. This decline from 3% and 4.4% of GDP in 2018 and 2017, respectively, was accompanied by a significant double-digit negative annual growth rate of -25.6% (following the -29.1% y-o-y decline in 2018). As the country's investment needs remain significant, the recurrent undershooting of investment expenditure (over 1.2% of GDP at the GG level in the past three years, see European Commission, 2020d[10]) continues to create challenges as to the best use of available domestic and EU funds.

Notwithstanding progress made in correcting flow balances, the stock of public debt remains exceptionally high; Greek public debt was the highest among the EU28 countries in 2019 (Figure 3.1.2). It stood far above the scoreboard threshold of 100% and far above the EU28 and EA19 averages of 79.3% and 84.1% of GDP, respectively. Nevertheless, it decreased to 176.6% of GDP, from the peak of 181.2% recorded in 2018, with the change in government debt (of -3.660 million euro) turning negative at -2% of GDP after the significant positive

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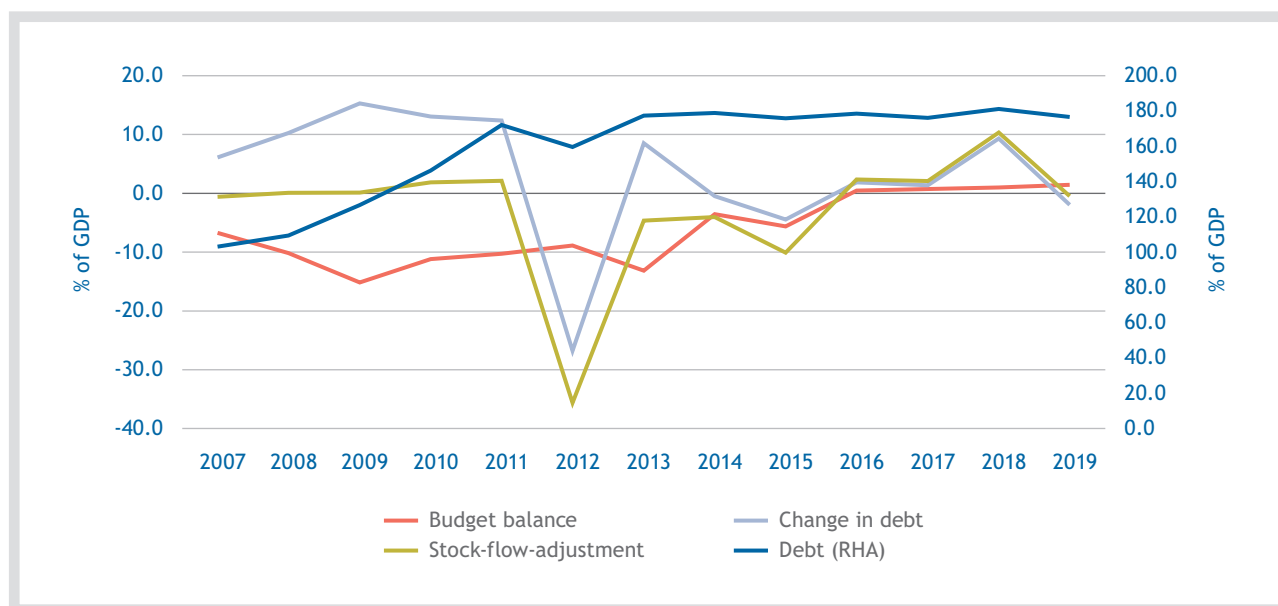
Source: Eurostat.

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10. See the report for further details on factors contributing to the under-execution of public investment and foreseen actions to improve its management. In autumn 2020, Greek authorities are supposed to work to-gether with European institutions to operationalise the possible use of SMP-ANFA income equivalent amounts in the context of progress made on improving the planning and execution of public investment (according to the related Eurogroup statement of June 2018, the amounts to be transferred to Greece on a semi-annual basis until 2022 via the ESM segregated account can be used to reduce gross financing needs or to finance other agreed investment).

change (of 17.238 million euro) at 9.3% of GDP recorded in 2018.[11] The associated stock-flow-adjustment, which links debt with the rising deficit, was also negative (-915 million euro) and stood at -0.5% of GDP in 2019, following the 10.3% of GDP (19.073 million euro) in 2018. In 2019, as has been the case since 2012, the bulk of Greece's government debt consisted of long-term loans amounting to 141.1% of GDP (over 264 billion euro), followed by long-term debt securities amounting to 24.6% of GDP (around 46 billion euro). As a result, at the end of 2019, debt-servicing needs were relatively low. Moreover, they were anticipated to remain low during the upcoming years, on the back of limited refinancing and debt-servicing risks, due to the actual debt structure and the special repayment terms agreed with the creditors.

Against this background, and given the additional measures agreed upon in June 2018,[12] debt sustainability has been enhanced. According to the debt sustainability analysis as of February 2020 (see European Commission, 2020b)[13] and the two processed scenarios,[14] Greek debt would continue to follow a downward trend, but would still remain above 100% at least until 2039 (or alternatively until 2040) and gross financing needs would remain around 12% (or alternatively 13.5%) in 2060.

The overall progress made in consolidating public finances in Greece and enhancing debt sustainability has contributed to the gradual improvement in credit ratings and has paved the way for strengthening sovereign financing. Yield spreads have been steadily declining and reached historic low levels in early 2020, while Greece has regained access to short as well as medium/long-term market financing.[15] Following the partial early repayment of the IMF loan in November 2019, further bond issuances in the future might finance other early repayments of official and private sector debts.

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11. The increase recorded in 2018 is related to the use of a large part of the last programme disbursement to increase treasury cash buffers covering more than 2 years of expected debt servicing, upon Greece's exit from the programme, as agreed in June 2018 at the Eurogroup. This disbursement, included in the stock-flow adjustment, was part of Greece's debt since it was a loan. Note that public debt would have fallen to about 173.1% of GDP in 2018, net of the last disbursement (see European Commission, 2020c).

12. See the Commission Implementing Decision (EU) 2020/280 for more information on the agreed measures to ensure debt sustainability.

13. Note that the related analysis takes into account the partial early repayment of the IMF loan and all issuances until the end of January 2020, while it assumes full compliance with the agreed primary balance track and full implementation of all the agreed medium-term measures. The disbursement and use of the income equivalents from the SMP-ANFA profits are technically foreseen only for debt servicing.

14. See the report for details and the underlying assumptions. In the first scenario, interest rates are not updated, while in the second, the additional debt-reducing impact of the revised interest rates is also evaluated. See also European Commission (2019a) for the framework adopted by the Commission for debt sustainability assessment and for details on short-, medium- and long-term fiscal sustainability analyses.

15. See Hellenic Republic Ministry of Finance (2020) for details on recent issuances of Greek bonds.

3.1.3. Concluding remarks and outlook

It is evident that Greek authorities remain committed to prudent fiscal policies with the aim to

- enhance the resilience of Greece's public finances,
- strengthen the country's creditworthiness and,
- alleviate medium- and long-term risks.

Until February 2020, the overall fiscal outlook was quite favourable,[16] reflecting

- the expectation of further surpluses near target,
- the significant cash reserves at the disposal of Greek public authorities,
- the agreed debt relief measures and low medium-term debt refinancing needs and,
- optimistic prospects for sustained GDP growth.

From this relatively favourable position (see European Commission, 2020d), the country now faces the unexpected shock of the coronavirus pandemic, which radically changed the respective fiscal outlook. Public finances in Greece are expected to be significantly affected in 2020 by the repercussions of the pandemic, leading to a deterioration of both the budget balance and public debt. This is mainly due to emergency spending to support the public health system and drastic measures (fiscal measures and liquidity provision) to avoid or dampen income losses and support businesses, in order to prevent insolvencies that would cause a major rise in unemployment.[17]

- The budget balance is expected to be adversely affected, leading to deviations from the budgetary requirements that would otherwise apply, including fiscal targets under surveillance.[18] Even though significant revenue effects are also expected, the main impact on the overall budget balance as a percentage of GDP will arise from the expenditure side. It is interesting to mention that according to May 2020 EC estimates, the total size of the unprecedented measures will reach 10.5% of GDP (including 6.9% in fiscal measures, of which 5% are budgetary measures and 1.9% are liquidity measures, and 3.6% additional impact of liquidity measures,[19] see European

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16. Apart from already existing downside risks referring, e.g., to ongoing court cases and public service obligations.

17. Note that in this case, the unusual event provision of the Stability and Growth Pact applies, where the budgetary impact of these measures on public finances will be excluded when assessing compliance with the Pact. The Commission announced the imminent activation of the general escape clause (introduced as part of the 'Six-Pack' reform of the Pact in 2011).

18. It should be a coordinated and orderly deviation that will not endanger fiscal sustainability in the medium term. See the related Communication from the Commission to the Council, <https://ec.europa.eu/info/sites/info/files/economy-finance/2_en_act_part1_v3-adopted_text.pdf>.

19. See European Commission (2020d) for the EU estimation of a primary deficit of 3.5% of GDP for 2020 in Greece. The report includes details on the adopted measures and the size of the projected overall impact on the balance (including the fiscal impact, the impact of the functioning of automatic stabilisers, etc.). See Hellenic Republic Ministry of Finance (2020) for the government estimation of a GG headline deficit at -4.7% of GDP in 2020 and for the details on the adopted discretionary measures in response to the pandemic and their budgetary impact.

Commission 2020a and 2020d). Apart from the huge cost of the implemented measures, the total range of which will remain unknown until the pandemic subsides and is, hence, subject to considerable uncertainty, the pandemic will initiate an additional fiscal impact by causing delays in the implementation of other measures or by distorting their expected effects (the property tax valuation in line with market prices, the growth-friendly tax shift from more to less distortionary taxation, privatisations, etc.).

- Public debt is not anticipated to be corrected further downwards in 2020, as initially expected, while debt sustainability will be also reconsidered in light of the developments in fiscal performance and nominal GDP growth.

Still, in the positive scenario of a steady fading out of the pandemic, and in combination with all the initiatives and supporting measures undertaken at the EU level,[20] the major fiscal effects will be limited to 2020. Public finances will re-enter the path of consolidation and the necessary fiscal space will be created to pursue overall targets such as viable medium- and long-term growth and the creation of sustainable jobs.

3.2. Current account and net international investment position

3.2.1. Introduction

The assessment of Greece's competitiveness entails the consideration of its external position, centered on the evaluation of the course of the current account (CA) and the net international investment position (NIIP). In that sense, external imbalances, as expressed by excessive CA deficits and a highly negative NIIP, call for remedies to improve or adjust competitiveness.[21] The correction of long-lasting excessive imbalances is crucial not as a procedure per se, but to signal that the country is progressing in terms of both policies and structures and is becoming more resilient to external risks and market sentiment. Intermediate short-lasting imbalances cannot be ruled out and may even be necessary

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20. According to the EC (2020c), complementary actions at the EU level include "a full flexibilisation of the use of the remaining structural funds, and the political agreements on the creation of a EUR 100 billion support scheme to mitigate unemployment risks, a EUR 25 billion guarantee fund for SMEs and a pandemic credit line from the European Stability Mechanism". More recently, the EU Commission has proposed the creation of a €750 billion recovery fund. Note further that Greek government bonds became eligible for purchases under the EUR 750 billion Pandemic Emergency Purchase Programme of the ECB (due to a waiver of the eligibility requirements).

21. 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>. For the definition of 'excessive' imbalances and the CA gap (or excess surplus/deficit or imbalance), see also IMF (2019).

to adjust to unanticipated shocks and abnormal developments. Still, balanced external positions aligned with Greece's fundamentals[22] and compatible with country-specific needs and predominant conditions, which may all vary over time, are evidently justified and desirable in the medium to long term to strengthen competitiveness (among other things). Obviously, in a dynamic environment, apart from imbalances ensuing exclusively from internal dysfunctions, interdependencies and spillover effects operating at the international and European levels affect external positions.

3.2.2. Recent developments in the current account and the net international investment position

Recent developments on the international level (see IMF, 2019[23]) indicate that, since 2013, CA deficits and surpluses have become increasingly concentrated in advanced economies, with about 35-45 percent being considered excessive in 2018. In parallel, stock imbalances have been widening, with the world's NIIP reaching record levels in 2018. On the European level, the euro area CA surplus, after peaking at 3.2% of GDP in 2016, adjusted downward to 2.7% in 2019 (from 3.1% in 2018), but still moved close to its highest point and above levels consistent with fundamentals.[24] It should be borne in mind that developments in the overall euro area external position might reflect different degrees of single-country rebalancing and adjustment. In more detail, despite the gradual correction through the reduction of the overall asymmetries between debtor and creditor countries (mainly driven by debtor countries' corrections), recent data for 2019 indicate the existence of significant divergences in CA developments across individual European countries.

Overall, unbalanced positions persist in many countries, including a few large deficit positions (-9.4% in Ireland, -6.7% in Cyprus) and several cases of huge surpluses (10.2% in the Netherlands, 9.7% in Malta, 7.7% in Denmark, 7.1% in Germany). At the same time, significant negative NIIPs in 2019 point to the persistence of large stocks of external liabilities in a number of countries (-172% in Ireland, -150.6% in Greece, -116% in Cyprus, -100.8% in Portugal), while in countries with large CA surpluses, positive NIIP positions are amplified (89.2% in the Netherlands, 78.1% in Denmark, 71.2% in Germany, 62.7% in Malta).

In Greece, CA deficits have been increasing since 2014, when the low of -0.7% of GDP was recorded, to reach -2.8% in 2018 (see Figure 3.2.1). The rising trend was reversed in

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22. Fundamentals are specified as economic drivers that are not temporary and policy variables under normal conditions. See Coutinho et al. (2018) for more details.

23. See the report for all the methodological details on the multilateral approach and the External Balance Assessment (EBA) CA models applied.

24. See European Commission (2019b), for relating the CA levels to the CA 'norm' for the euro area as assessed by the IMF staff. The Alert Mechanism Report (AMR) screens Member States for potential economic imbalances (or excessive imbalances) and identifies the needs for in-depth reviews (IDR). The AMR 2020 initiates the ninth annual round of the Macroeconomic Imbalance Procedure (MIP) whose implementation is embedded in the European Semester of economic policy coordination with the aim to ensure consistency with the analyses and recommendations made under other economic surveillance tools.

2019, with the CA deficit closing at -1.4% of GDP. This correction mainly reflects recent developments in the balance of goods and services, which stood at -0.9% of GDP in 2019 (from -1.7% in 2018), on the back of an increase in the services surplus (11.3% in 2019 from 10.5% in 2018) and an unchanged goods deficit (at -12.2% in both 2019 and 2018). The increase in the services surplus as a percentage of GDP is mainly explained[25] by the larger increase in receipts of services (to 21.4% from 20.1% in 2018), relatively to the corresponding rise in payments of services (to 10.2% from 9.7% in 2018). Still, nominal data for both receipts and payments of services indicate a downward course in annual growth rates in 2019 for the second consecutive year. The same was the case in 2019 for the lower than 1% annual growth rates in both exports and imports of goods (in nominal terms), down from the double-digit rates recorded in 2018 and 2017.

In parallel, exports and imports of goods as percentages of GDP did not change significantly in 2019 (at 17.3% from 17.5% and at 29.5% from 29.7% in 2018, respectively), justifying the unchanged rising deficit. Furthermore, the course of Greece's export market shares (as percentages of world totals) is indicative of the relative performance of its export of goods and services. In 2019, the overall (goods and services) export market share remained unchanged at 0.33%, with the corresponding export shares for goods and services

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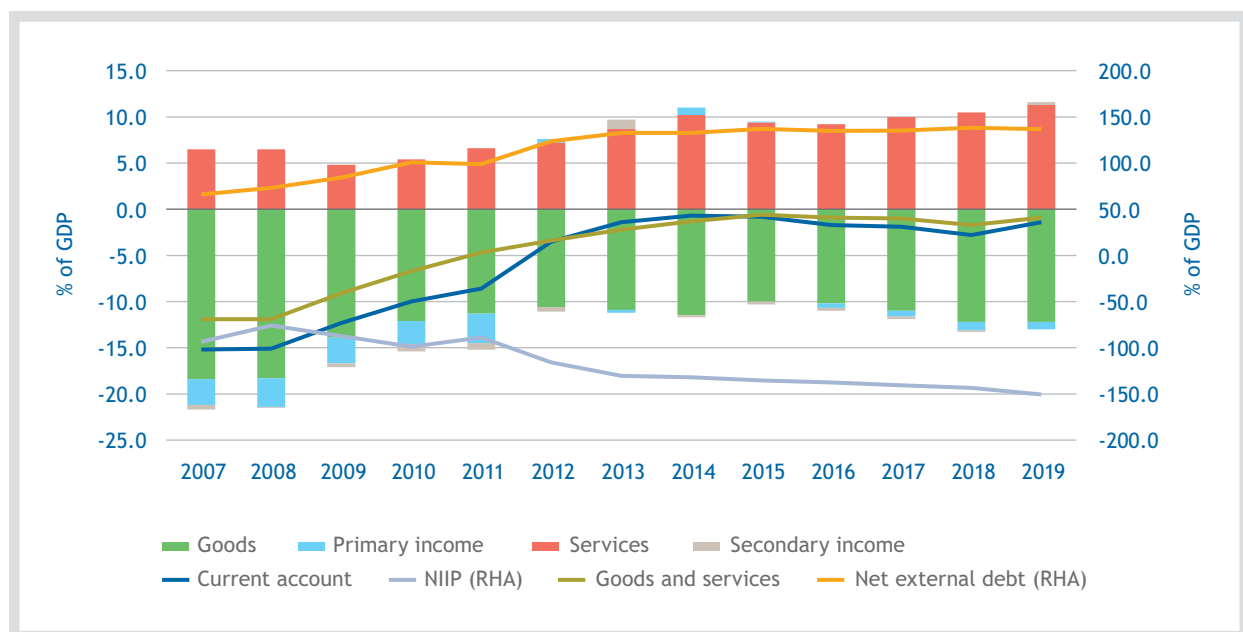
Source: Eurostat.

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25. The reference to receipts and payments of services, as well as exports and imports of good relies on Balance of Payments data obtained from the Bank of Greece.

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amounting to 0.19% and 0.77%, respectively. Despite the recorded gains since 2016, export market shares for services and, in particular, for goods remain very low, and below EU28 averages. In 2019, Greece was among the nine countries with the lowest overall export market shares and the ten countries with the lowest export shares of goods and was ranked at the 14th position with respect to the export shares of services.

Apart from developments in headline CA balances, the cyclically-adjusted CA balance in Greece, which indicates to what extent CA gaps are driven by short-term cyclical conditions or to what extent improvements are linked to potential output developments, was calculated at -5.1% of GDP for 2018.[26] In addition, in relation to the established CA benchmarks, which are interpreted as medium- and long-term anchors (see Coutinho et al., 2018), the European institutions recently assessed that CA balances remain "beyond what can be explained by fundamentals (as they deviate from CA norms) and insufficient to correct the very negative NIIP towards prudent levels (as they deviate from NIIP stabilizing benchmarks) over a 10-year horizon".[27] According to the European Commission (2020c), the required CA balance to stabilise the NIIP at the -35% of GDP threshold was estimated at 1.8% in 2018, which is actually higher than the CA balance recorded in 2019. Still, the data for the country's NIIP (see Figure 3.2.1) indicate that the gradual progress made in correcting flow balances since the onset of the economic crisis is not accompanied by an improvement in net stock liabilities. The NIIP, as composed mainly of debt instruments and related to the high levels of external public debt (mostly owned by foreigners, including official lenders), remained excessively negative in 2019 at -150.6% of GDP (from -143.6% in 2018) and, as a result, far below benchmarks (NIIP norms and prudential thresholds).

3.2.3. Concluding remarks and outlook

The overall course of Greece's external position until the end of 2019 indicates the significant progress made, while it also points to the persistence of certain more deeply-rooted distortions. The outlook for the CA and NIIP is a function of a sustainable adjustment in compliance with the underlying fundamentals and aligned with country-tailored actions.

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26. Cyclically-adjusted CA balances are often interpreted as a measure of the structural adjustment of the external balance. See ECB (2014) for the significance of cyclical, in relation to structural, factors in explaining the change in CA balances between 2008 and 2012 in Greece. Note that Coutinho et al. (2018) stress that "cyclically-adjusted current accounts cannot provide, in absence of additional devoted analysis, a complete account of the extent to which external rebalancing is structural in nature and driven by what factors". Note, further, that CA gaps are obtained as differences between cyclically-adjusted CAs and CA benchmarks/norms.

27. The most recent AMR (which incorporates the MIP Scoreboard 2018) identifies Greece at the end of 2019 as one of three countries (in addition to Cyprus and Italy) with excessive imbalances, thus, remaining subject to additional monitoring, in line with established prudential practice, with regard to the gradual correction and reduction of flow and stock imbalances (European Commission, 2019c). See Coutinho et al. (2018) for the underlying assumptions and methodologies applied to assess NIIP stabilizing CA benchmarks and CA norms (to evaluate if CAs are in line with fundamentals) and Turrini and Zeugner (2019) for the adopted methodology for the computation of NIIP benchmarks based on consistency with economic fundamentals and prudence against the risk of external crises.

The aim is to further

- increase competitiveness,
- achieve the more central policy targets, and
- strengthen the country's resilience to external disturbances and shifting market sentiment.

Further corrections are closely related to the balance of goods and services, where deeper adjustments can be accomplished through

- a more intensive sectoral reallocation towards high value-added tradable sectors,
- import substitution, and
- export diversification.

An integral part of a viable rebalancing process is the correction of the particularly unfavourable NIIP, which jeopardises the country's financial situation and creditworthiness, despite the fact that a great part of the debt is held by official sector agents, somewhat mitigating the related risks.

All the above considerations, valid under 'normal' circumstances, are put into a different light in the current conjuncture due to the severe repercussions of the coronavirus pandemic, which, above all other things, increase uncertainty and change the perception of risks.

- Measures taken worldwide and internally to protect human health are disrupting demand and trade dynamics, global supply chains and export performance, further affecting investment-saving decisions and deleveraging processes. At the same time, fiscal measures to support the economy are affecting financing conditions and fiscal positions.

- Additional challenges and new major downside risks to the outlook for Greece's CA and the NIIP now emerge, due to dependencies on foreign demand and exposure to world trade. Through its reliance on services' receipts from tourism and transport, Greece is undoubtedly particularly vulnerable.

As a result, any discussion on correcting existing excessive imbalances should be adapted to the altered conditions, as the country's external position is expected to be crucially affected in the short term, and probably in the medium term as well. Developments will strongly depend upon potential room for policies to deal with the shock, especially in countries, like Greece, already facing excessive imbalances, but also upon the determination of European leaders to pursue coordinated and supportive policies.

3.3. Cost/price competitiveness indices

One of the most commonly used cost/price competitiveness indicators is the Real Effective Exchange Rates (REERs). REERs depict a country's price/cost competitiveness relative to its principal competitors and are usually calculated using either the consumer price index (CPI) or the unit labour cost (ULC). As presented in Figure 3.3.1,[28] the CPI-based REER followed an upward trend from 2001 until 2011, while the ULC-based indicator followed a similar path until 2009, meaning that the competitiveness of the Greek economy deteriorated. As Greece entered deep recession, both indicators recovered. The ULC-based REER decreased during 2010-2016, while the CPI-based REER mainly decreased during 2012-2015, meaning that the competitive position of Greece improved. Both indicators decreased again in 2019. In addition, the nominal unit labour cost (ULC) decreased during 2011-2016 (Figure 3.3.2), whereas the average ULC in the EA and the EU28 followed an upward trend throughout the period under investigation (2001-2019).

The changes observed in REERs and ULC are not depicted in Greece's market share in global trade. During the period 2001-2009, the average market share of Greece was 0.41% (ranging from 0.38%-0.44%), while during the period 2010-2019, it was 0.32% (ranging from 0.29%-0.35%). Moreover, exports do not reflect the fluctuations of the above discussed indicators. Greek exports mainly increased from 2004-2014 (except for 2019) both as a percentage of GDP and in million euros (current prices). Exports decreased in 2015 and 2016, only to

Figure 3.3.1
Real Effective Exchange Rates (37 trading partners, 2010=100)
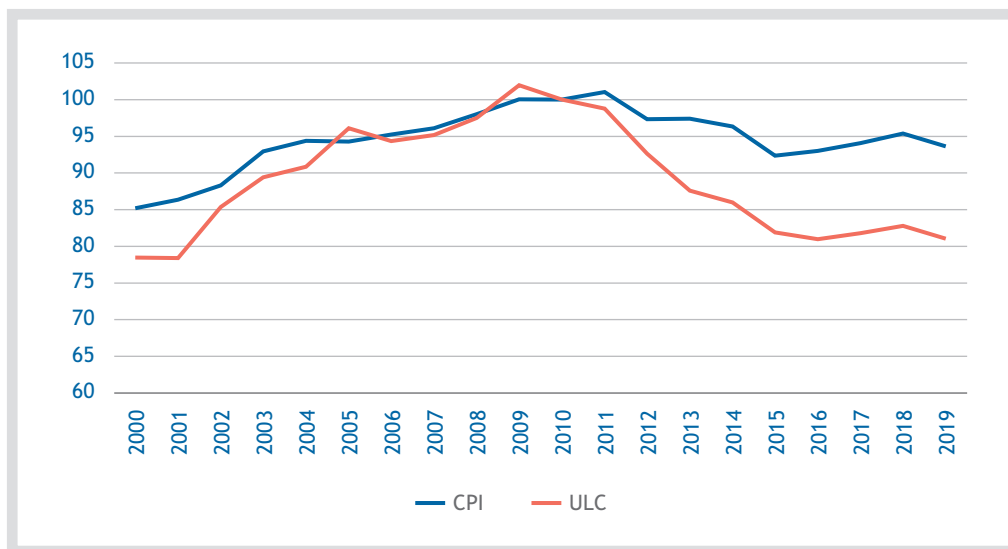
Source: Eurostat.

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28. Thirty-seven trading partners are selected, i.e., the EU28 and 9 other industrial countries.

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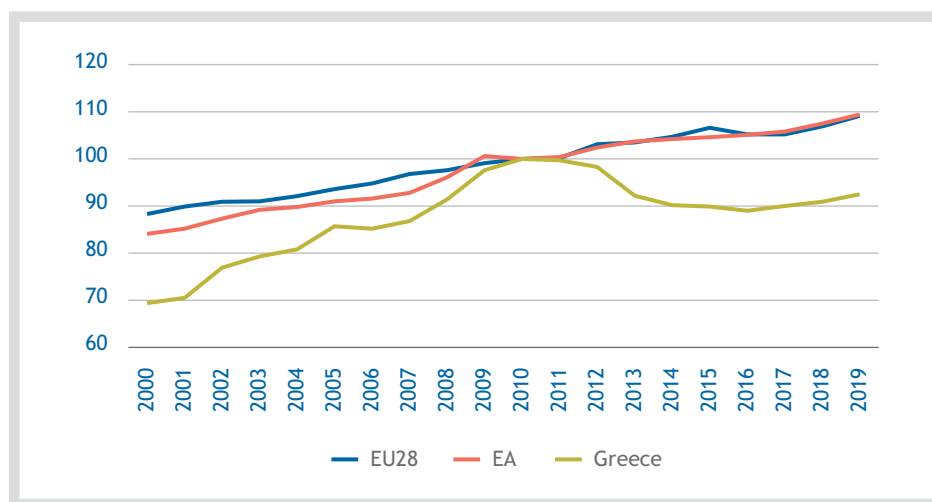
Source: Eurostat.

increase again during 2017-2019. In conclusion, REERs, ULC, exports and the market share of Greece in global trade do not follow similar patterns. This observation may be due to the fact that developing, low-cost countries are entering more dynamically the world trade arena. Moreover, internationally traded goods and services incorporate not only labour cost, but also other types of costs, while qualitative factors also play a significant role.

The effects of the coronavirus pandemic are not captured, at this point, due to lack of data, but are expected to have significant implications since economic activity suffered a sudden reduction due to lockdowns; borders were closed, major disruptions were observed in supply chains and trade plummeted. The pandemic and the consequent health and economic crises will probably not only affect the competitiveness of Greece and other EU member states, but –due to the newly uncovered sources of uncertainty and vulnerabilities of the economic environment– may also influence the way business is conducted hereafter.

3.4. International competitiveness indicators

3.4.1. The Global Competitiveness Index and *Doing Business* indicators

It is widely recognized that productivity and competitiveness are closely related (WEF, 2018). Although many indicators measuring competitiveness are often contested due to some degree of subjectivity they inherently have (a lot of data are collected through executive opinion surveys), international organizations advise countries to take competitiveness indices seriously. These indices are usually followed by internationally observed best practices, which can help an economy boost its productivity significantly.

According to the two most popular and comprehensive indices, the Global Competitiveness Index (GCI) and *Doing Business* (DB), the Greek economy slightly improved in 2019, scoring 62.6/100 and 68.4/100, respectively, compared with 62.1 and 68.0 in 2018 (WEF, 2019; World Bank, 2019). Note that data collected for the 2019 editions of the GCI and DB refer to the previous year, 2018. Despite this improvement in absolute terms (scoring), Greece's competitiveness deteriorated in relative terms (ranking). Consequently, in 2019, the GCI ranked the Greek economy 59th among 141 economies while, in 2018, it was 57th among 140 economies. Similarly, DB ranked Greece 79th in 2019, down from 72nd in 2018 among 190 economies (see Table 3.4.1). This is because other economies improved faster than the Greek economy. The speed of the reforms seems to be equally –if not more– important as the reforms themselves and needs to be taken into consideration by the policy makers. Competitiveness is a concept which puts an economy in comparison to other economies. It does not matter so much if an economy improves in absolute terms. Competitiveness is about ranking an economy relatively to other economies.

Table 3.4.1
Greece's score and rankings[1] and best performers on DB and the GCI

	Score	Rank*	Best performer (score)
Global Competitiveness Index	**62.6**	**59**	Singapore (84.8)
Institutions	50.5	85	Finland (81.2)
judicial independence	*41.4*	*83*	*Finland (94.0)*
burden of government regulation	*26.2*	*127*	*Singapore (74.4)*
quality of land administration	*15.0*	*138*	*Lithuania, Netherlands, Rwanda, Singapore, Taiwan (95.0)*
social capital	*43.3*	*118*	*New Zealand (66.8)*
Infrastructure	77.7	37	Singapore (95.4)
ICT adoption	64.7	52	Korea (92.8)
Macroeconomic stability	75.0	64	Australia, Austria, Belgium, Botswana, Canada, Chile, Czech Rep., Denmark, Estonia, Finland, Germany, Hong Kong, Iceland, Israel, Korea, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Peru, Poland, Saudi Arabia, Slovak Rep., Slovenia, Sweden, Switzerland, Taiwan, UAE, UK (100)
Health	93.5	23	Hong Kong, Japan, Singapore, Spain (100)
Skills	70.5	41	Switzerland (86.7)
extent of staff training	*43.3*	*108*	*Switzerland (79.0)*
ease of finding skilled employees	*54.5*	*64*	*USA (72.1)*
Product Market	53.8	81	Hong Kong (81.6)
extent of market dominance	*44.4*	*82*	*Switzerland (80.1)*
complexity of tariffs	*31.6*	*113*	*Hong Kong (100)*

Table 3.4.1 (continued)

	Score	Rank*	Best performer (score)
Labor market	52.7	111	Singapore (81.2)
cooperation in labor-employer relations	*50.3*	*109*	*Singapore (85.3)*
flexibility of wage determination	*55.8*	*119*	*Estonia (86.7)*
Reliance on professional management	*49.2*	*97*	*Finland (86.6)*
Financial system	49.0	115	Hong Kong (91.4)
financing of SMEs	*26.7*	*133*	*Finland (74.9)*
non-performing loans: 45.6%	*8.9*	*138*	*Taiwan: 0.3%*
Market size	59.6	57	China (100)
Business dynamism	58.8	76	USA (84.2)
willingness to delegate authority	*49.7*	*109*	*Denmark (82.4)*
growth of innovative companies	*40.1*	*124*	*Israel (80.8)*
Innovation capability	45.1	47	Germany (86.8)
diversity of workforce	*45.4*	*126*	*Singapore (79.9)*
research and development	*45.7*	*37*	*Japan (100)*
Ease of doing business	**68.4**	**79**	New Zealand (86.8)
Starting a business	96.0	11	New Zealand (100)
Dealing with construction permits	69.5	86	Hong Kong (93.5)
procedures (number): 17			*Denmark (7)*
time (days): 180			*Korea (27.5)*
Getting electricity	84.7	40	UAE (100)
Registering property	46.9	156	Qatar (96.2)
land administration index (0-30): 4.5			*Lithuania, Netherlands, Rwanda, Singapore, Taiwan (28.5)*
Getting credit	45.0	119	Brunei, New Zealand (100)
strength of legal rights index (0-12): 2			*Brunei, Montenegro, New Zealand (12)*
Protecting minority investors	70.0	37	Kenya (92.0)
Paying taxes	77.1	72	Hong Kong (99.7)
payments (number per year): 8			*Bahrain, Hong Kong, China (3)*
time (hours per year): 193			*Singapore (49)*
total tax (% of profit): 51.9			*Canada, Denmark, Singapore (26.1)*
Trading across borders	93.7	34	Austria, Belgium, Croatia, Czech Rep., Denmark, France, Italy, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovak Rep., Slovenia, Spain (100)
Enforcing contracts	48.1	146	Singapore (84.5)
time: 1,711 days			*Singapore (164 days)*
Resolving insolvency	53.1	72	Finland (92.7)
recovery rate (cents on 1$): 32.0			*Norway (92.9)*
time (years): 3.5			*Japan (0.6)*

1: Green/red colors indicate improvement/deterioration (since last edition).

*: DB ranks 190, GCI 140 and, WCY 63 economies.

3.4.2. Recent developments in Greece's competitiveness

The GCI in 2019 shows that Greece improved its ranking in the following pillars: *Macro-economic stability* (64th, up from 83rd in 2018), mostly due to the improvement of the debt dynamics; *ICT adoption* (52nd, up from 57th), mostly due to the increase in mobile-broadband subscriptions; *Institutions* (85th, up from 87th); *Infrastructure* (37th, up from 38th), mostly due to improvements in utility infrastructure; and *Market size* (57th, up from 58th), mostly due to the increase in the ratio of imports over GDP.

On the contrary, Greece lost competitiveness in the following pillars: *Product market* (81st, down from 63rd), mostly due to the extent of market dominance as well as the prevalence of non-tariff barriers; *Labour market* (111th, down from 107th), mostly due to the low flexibility of wage determination as well as the low reliance on professional management; *Business dynamism* (76th, down from 72nd), mostly due the low willingness to delegate authority; *Innovation capability* (47th, down from 44th), mostly due to the low ratio of international co-inventions; *Health* (23rd, down from 21st), due to the fall of the duration of healthy life expectancy; *Skills* (41st, down from 39th), mostly due to the low extent of staff training as well as the fall in the ease of finding skilled employees; and *Financial system* (115th, down from 114th), mostly due to the lack of soundness of banks.

According to DB, Greece improved considerably in the category *Starting a business,* in which it now ranks 11th, up from 44th in the 2018 edition. This impressive change is primarily due to the reduction in time needed to set up a business (just 4 days instead of 12.5 in 2018) as well as the reduction of the number of procedures, from four to three. *Getting electricity* is the second category in which Greece improved its ranking, by 39 places (40th from 79th). This was the result of a seemingly humble decrease of the number of procedures from seven to five as well as the time required to complete these procedures, which is now 51 days as opposed to 55 in the previous edition. The cost of getting electricity has also been reduced to 68.2% of income per capita from 69.9% in the 2018 edition. *Protecting minority investors* is the third category in which Greece improved significantly, now ranking 37th, up from 51st. Most indices used to measure this topic have been improved, such as the extent of disclosure, the extent of director liability, the extent of shareholder rights, the extent of ownership and control, and the extent of corporate transparency.

However, in the seven other categories, Greece lost competitiveness. In *dealing with construction permits,* the country had a severe deterioration of performance and ranks 86th, down from 39th in 2018, mostly due to the increase in time required to complete the task (from 123 to 180 days). In *getting credit,* Greece lost 20 places and now ranks 119th, down from 99th in 2018. A major reason for this development is the further deterioration of the strength of legal rights which now scores 2 (3 in the last edition) on a scale from 0 to 12. The strength of legal rights index captures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. *Enforcing contracts* is now worse at 146th (132nd in 2018). Although the quality of judicial processes slightly improved to 12.2 from 12.0 (on a scale between 0-18), the time for a case to be completed increased to 1,711 days, up from 1,580 in the previous year. The cost of justice

has also increased. In *resolving insolvency,* the country ranks 72nd, down from 62nd. *The recovery rate* decreased from 33.5% to 32% and the strength of insolvency framework index fell to 11.5, from 12 (on a scale between 0-16). It takes, on average, 3.5 years to resolve an insolvency in Greece, whereas in most European countries, it takes between one to two years. *Paying taxes* got slightly worse, 72nd down from 65th, mostly due to the deterioration of the post-filing index, which includes the number of hours to comply with the VAT refund and the number of weeks to obtain the refund as well as the number of hours to comply with corporate income tax correction and the number of weeks to complete such correction. The time required for a company to comply with taxes is relatively high at 193 hours. For *registering property,* Greece ranks 156th (153rd in 2018). Eleven (11) procedures need 26 days, whereas in the 2018 edition, the same number of procedures needed 20 days. The quality of land administration needs serious reform; on a scale between 0 and 30 it gets 4.5. Finally, in *trading across borders* Greece ranks 37th, down from 34th, mostly because other countries improved, rather than any significant change in Greece.

The improvement in the above three DB categories, *Starting a business*, *Getting electricity* and *Protecting minority investors,* is impressive. However, this was not enough to boost the overall competitiveness of Greece because performance in the other seven categories deteriorated, in some dramatically. The pattern is similar for the case of the GCI pillars. In five of these, Greece gained competitiveness, while in the remaining seven, it lost competitiveness.

At this point, it is important to mention a regional aspect of competitiveness DB highlights through its recent publication series on subnational levels, initiated in 2017. DB subnational reports provide a better understanding of each country's regulatory environment as well as the efficacy of the bureaucracy and administration at the local level. The 2020 report examines the same indicators for different cities of Greece (Alexandroupoli, Athens, Heraklion, Larissa, Patra and Thessaloniki), Ireland and Italy. According to the report, Ireland demonstrates homogeneous performance among its cities, whereas Greece and Italy show significant subnational variation. The disparities within Greece are quite large. For example, it takes 24 days for a business to register property in Patra (best performer) and 134 days in Heraklion (worst performer). The report estimates that that if Greece adopts all the good practices found at the different cities, it can move up the ranking by 18 places, namely from 79th to 61st.

3.4.3. Remarks on critical indicators for improvement

Concluding this brief presentation of international competitiveness indicators, it is important to stress some critical indicators that need to be improved. They are indicators which play a crucial role and their improvement could be a catalyst in boosting the overall competitiveness of the Greek economy:

  a. The *legal system* needs to be overhauled. It needs to become faster and more efficient in settling disputes as well as in challenging regulations.

b.   The *land administration* also needs considerable reform. Its quality is very low for an advanced economy and its bureaucracy poses significant challenges to any prospective entrepreneur.

c.   The *public sector* must drastically increase its performance. The index measuring the burden of government regulation places Greece 127th among 141 countries. Key to all the above is the need for digitisation and the significant reduction of time-consuming traditional bureaucratic procedures (paperwork).

It is true that with the occasion of the COVID-19 pandemic, there has been considerable effort to reduce inefficient bureaucracy. Already, some public services can be provided electronically without the physical appearance of the citizen. This improvement will most probably show up in the coming editions of the GCI and DB indices. However, many other countries are replacing redundant bureaucracy with digital solutions due to the pandemic. Consequently, it is crucial for Greece not only to implement the necessary reforms, but also to implement them fast.

3.5. Competitiveness of the manufacturing industry in Greece

For advanced and emerging economies alike, the size, productivity and competitiveness of the manufacturing industry play a critical role for economic growth and development. In the relevant literature, manufacturing output growth is considered to induce productivity gains not only inside, but also outside the manufacturing sector, thus serving as a lever for strengthening growth in the economy as a whole. Compared to other productive activities, manufacturing tends to exhibit more pronounced economies of scale, as well as a heavier exposure to international competition, enabling gains from trade through the exploitation of comparative advantage. Furthermore, the manufacturing sector's input of entrepreneurship, R&D, human capital, management and organisation, is relatively larger and tends to grow more rapidly with its growth. An increase in the competitiveness of a country's manufacturing industry may contribute to the country's prosperity in many ways, encouraging investment from national and international firms, increasing the economy's resilience to international shocks, and inducing technological progress and economic, social and environmental benefits (UNIDO, 2019). Given the importance of manufacturing for productivity and economic growth, the present section examines the performance of the Greek manufacturing industry, focusing on outcomes and characteristics that are indicative of manufacturing competitiveness and its key determining factors.

3.5.1. Capacity and technological intensity of manufacturing production

As shown in Figure 3.5.1, the manufacturing industry historically accounts for a relatively low share of GDP in Greece, as compared to the EA19 average. In the course of the Greek economic crisis, manufacturing experienced a heavy contraction in both output and jobs, with the losses in terms of real gross value added and the number of persons employed

Figure 3.5.1
Gross value added in manufacturing
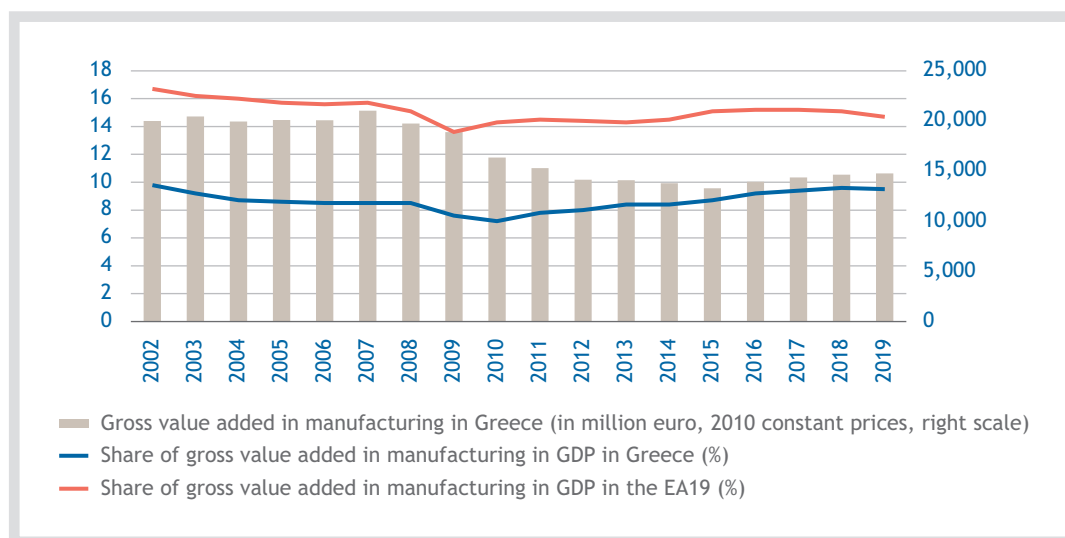
Source: Eurostat.

Note: Data from 2011 onwards are provisional.

both reaching about 33% during 2009-2015. In the subsequent period of economic recovery, 2016-2019, manufacturing activity in Greece recorded consistently positive growth rates, with the share of manufacturing gross value in GDP increasing, but with output and employment levels in manufacturing remaining much lower compared to the pre-crisis period.

The performance of individual manufacturing sectors both during and after the economic crisis period has been quite diverse, resulting in a certain degree of restructuring in manufacturing activity. As shown in Figure 3.5.2, manufacturing production in Greece exhibits an increasing degree of concentration, with the two larger sectors, i.e., *food products*; *beverages and tobacco products* and *basic metals and fabricated metal products, except machinery and equipment*, reaching about 53.0% of total gross value added in manufacturing in the most recent year for which relevant data are available (2017). Between years 2008 and 2017, both these sectors, together with *chemicals and chemical products*, experienced significant increases in their shares of total manufacturing gross value added. Conversely, the traditional manufacturing sector of *textiles, wearing apparel, leather and related products*, together with the sectors of *wood, paper, printing and reproduction* and *rubber and plastic products and other non-metallic mineral products*, experienced a substantial reduction in their respective shares, reflecting a lower degree of resilience to the crisis conditions, compared to the rest of the manufacturing industry.

Successful structural change in manufacturing entails a transition from low-technology activities that tend to face stronger price competition to sectors with higher value added and technological content. Technological deepening is an important aspect of manufacturing

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Figure 3.5.2
Share of main manufacturing sectors in total gross value added in manufacturing in years 2008 and 2017 (%)
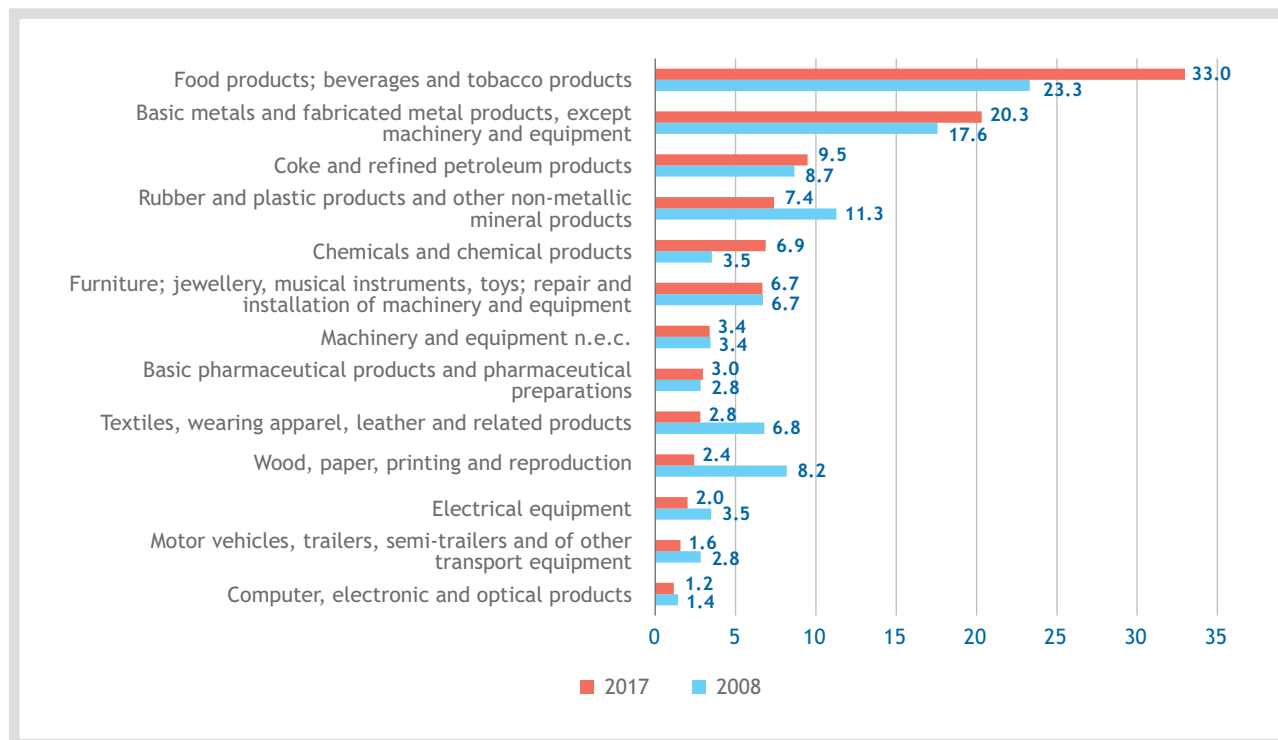
Source: Eurostat.

Figure 3.5.3
Share of medium- and high-tech manufacturing in total manufacturing value added and total manufacturing exports (%)
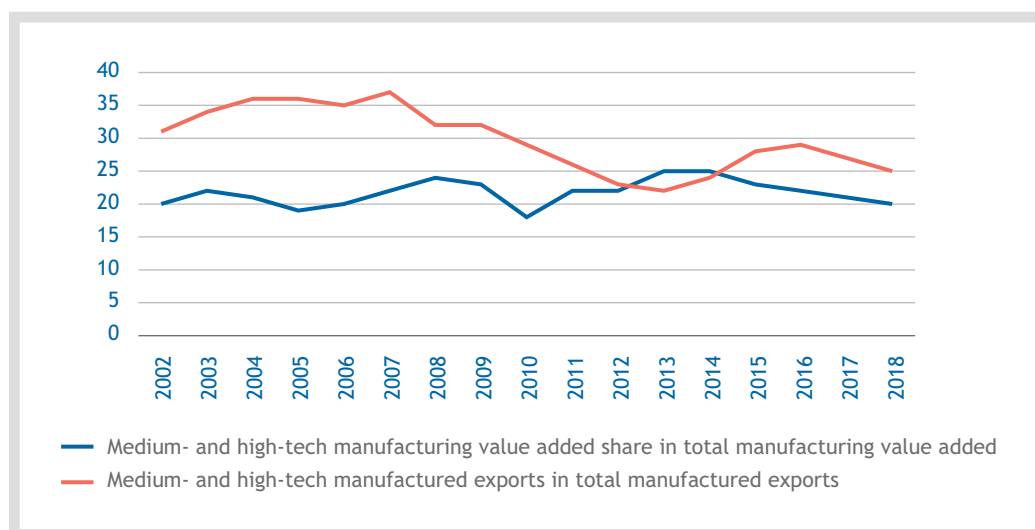
Source: UNIDO, CIP Database 2020.

competitiveness, as it plays a crucial role in the diffusion of new technologies and the absorption and retainment of skilled labour. In the case of Greece, the sectoral structure of manufacturing production, as presented above, is indicative of a relatively high degree of specialisation in activities of low and medium-low technology, compared to other EA countries. As illustrated in Figure 3.5.3 above, the share of medium- and high-tech manufacturing activities in total manufacturing value added in Greece did not exbibit much improvement over the past two decades. In 2018, medium- and high-tech manufacturing activities accounted for just 20% of total manufacturing value added in Greece, a share which was the lowest in the EA19 and lagged far behind the leading European country in this area, Germany (62%).

3.5.2. Manufacturing export performance

Manufacturing exports are an important indicator of a country's capacity to compete in international markets and achieve comparative advantages in specific industries. In the course of the crisis and in the subsequent years of economic recovery, the Greek economy experienced strong growth in goods exports, an achievement which is primarily owed to a considerable increase in the value of manufacturing exports. As shown in Figure 3.5.4, Greece's manufacturing exports per capita followed an upward trend in the course of the period 2010-2018, except for years 2015-2016, when export activity in the country was disrupted by the imposition of capital controls. Despite strong export growth, in 2018, the share of manufacturing exports in total exports in Greece remained the lowest amongst EA countries (81%, versus, e.g., 90% in Germany, 86% in Spain and 93% in Portugal). Furthermore, the value of manufacturing exports per capita in Greece was, in the same year, the second lowest in the EU (after Cyprus) and lagged far behind the corresponding per capita values in other EU countries (2.5 thousand euro in Greece versus, e.g., 14.3, 6.0 and 6.6 thousand euro in Germany, Spain and Portugal, respectively).

Concerning the technological intensity of manufacturing exports, in 2018, the share of medium- and high-tech manufacturing in manufacturing exports stood lower compared to the country's pre-crisis record (Figure 3.5.3), while, at the same time, lagging behind all other EA countries (25% in Greece versus, e.g., 74% in Germany, 55% in Spain and 43% in Portugal). The hysteresis of Greek manufacturing exports with respect to both technological deepening and their contribution to total exports, is reflected in the industrial export quality indicator of the UNIDO's Competitiveness Industrial Performance (CIP) composite index, according to which Greece ranks in the last position among the EA countries (Figure 3.5.5).

The above indications suggest that the competitive position of Greek manufacturing in international markets is still quite far from reaching its potential. According to the ITC's export potential indicator, Greece currently presents considerable untapped export potential in several manufacturing products, with the largest differences between actual and estimated potential exports identified in pharmaceuticals, aluminum products, tubes and pipes of refined copper, cheese, food preparations, data processing machines, polypropylene and tricycles.

Figure 3.5.4
Greece's manufacturing exports per capita (in euros) and as a share in total exports (%)
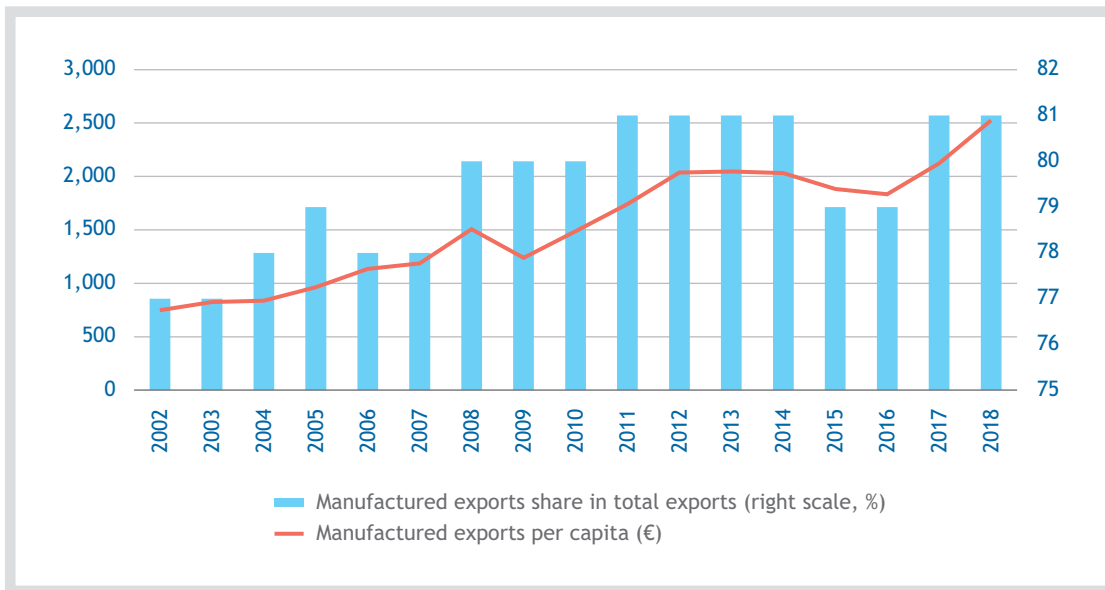
Source: UNIDO, CIP Database 2020.

Figure 3.5.5
Industrial export quality index (%), 2018
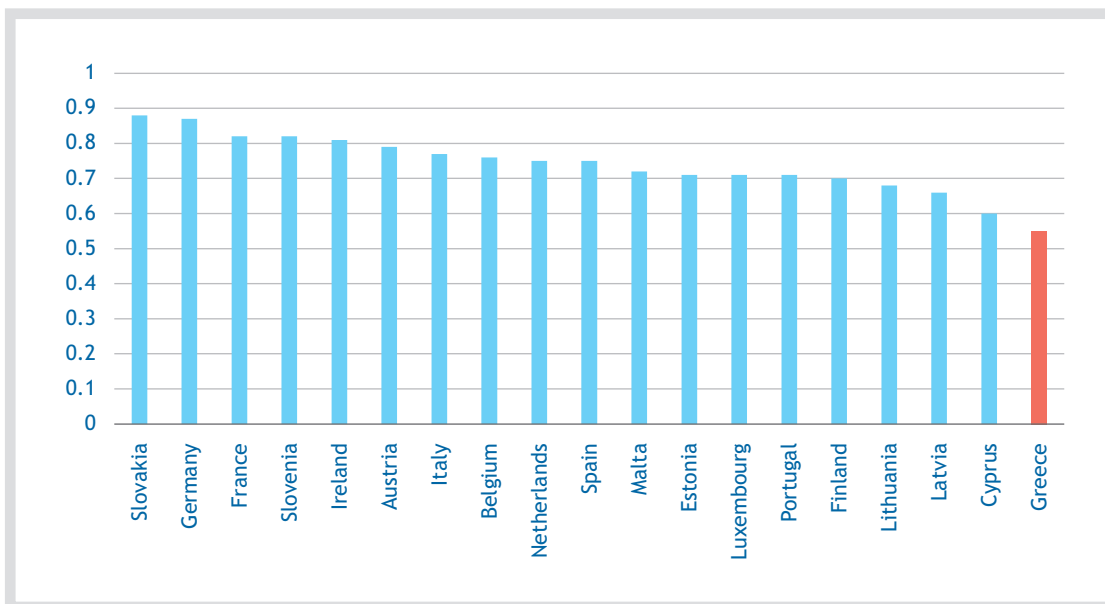
Source: UNIDO, CIP Database 2020.

3.5.3. An input-oriented assessment of Greek manufacturing competitiveness

3.5.3.1. *The need for an input-oriented assessment of competitiveness*

Over the last 30 years, Greek manufacturing has witnessed a profound deterioration of its ranking in UNIDO's CIP composite index.[29] The drop of the country from the 35th position in 1990 to the 50th position in 2017 is a strong indication that Greek manufacturing has suffered a large competitive loss, thereby suggesting an inadequate response of Greek industries to the challenges of international competition over the same period. Similar conclusions arise when the attention is shifted from composite indices of competitiveness to individual ones, that is to say, indices that isolate and capture specific aspects of "outcome" competitiveness. For example, the relatively low shares of manufacturing value added in total value added (Figure 3.5.1) reveal the country's low capacity to produce manufacturing goods. Likewise, the small ratios of high-tech exports to total manufacturing exports (Figure 3.5.3) imply that the Greek industrial sector has made little progress in upgrading to technologically advanced manufacturing processes and structures.

While an outcome-oriented assessment of competitiveness provides valuable information regarding the comparative advantages or disadvantages of Greek manufacturing, it does not explain why the country's manufacturing sector holds low positions in international rankings of several taxonomies. To answer the "why" question, it is more appropriate to adopt an "input-oriented" approach. Namely, the factors and forces that determine the competitive performance of Greek manufacturing must be examined.

From this perspective, the purpose of this subsection is twofold. Firstly, to evaluate a number of factors that affect the capacity of Greek manufacturing industries to develop and sell their products in domestic and foreign markets. Secondly, to examine how these factors differentiate from those of Greece's European trading partners. In view of the multidimensional and complex nature of the determinants of industrial competitiveness (see Box 3.5.1), the analysis is based on commonly used, and, thus, less controversial indicators for which data availability permits cross-country comparisons. To make the discussion more tractable, the cost and the quality dimension of industrial competitiveness are examined separately.

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29. See UNIDO Statistics Portal at <https://stat.unido.org/database/CIP%202019>.

Box 3.5.1
The determining factors of industrial competitiveness

Shifting the scope of analysis to inputs of competitiveness and establishing a connection between outcome competitiveness and its sources is not a straightforward procedure. The identification, classification, quantification, indexation and measurement of what affects outcome competitiveness are all subject to conceptual particularities and methodological limitations.

More specifically, among the factors that have been identified as determinants of competitiveness, some factors exert particular influence on firms' "cost" competitiveness (e.g., energy, labour and capital costs), others are mostly relevant for product differentiation thereby affecting firms' "quality" competitiveness (e.g., enterprise expenditures on R&D), and others lie somewhere between the cost and the quality dimension of the competitiveness concept (e.g., firms' investments in new technologies).

For practical and policy evaluation reasons, the very same set of factors can be classified in relation to the firms' control over their competitiveness. According to this taxonomy, some factors are conceptually and empirically perceived as internal, meaning that they are shaped by processes and forces within firms (e.g., investments in energy-saving technologies), and others are identified as environmental or external, in the sense that firms do not have direct control over them (e.g., the quality of institutions of the nation-state in which firms operate). Of course, the distinction between internal and external factors is neither simple nor clear-cut. For instance, a firm's decision to organise and direct its energies and resources towards R&D is strongly affected by the immediate market environment and the national socio-economic framework in which it operates.

If tracking and classifying the inputs of industrial competitiveness are controversial procedures, then measuring these inputs is the avatar of confusion and complication. One important reason lies in the fact that some inputs are very difficult or even impossible to directly observe and objectively measure (e.g., the quality and professionalism of a firm's management). In some other cases, diverse theories and estimation methods point towards different indices of the same variable (e.g., labour productivity). Last but not least, the quality and time dimension of disaggregated data at an industry level vary considerably across countries.

3.5.3.2. Cost competitiveness

The elements of manufacturing production costs which exhibit considerable variation across countries and, thus, are traditionally linked to manufacturing cost competitiveness, involve labour, capital and energy costs. Starting with labour costs, Figure 3.5.6. shows that unit labour costs (ULC) of Greek manufacturing have been on a downward trend for most of the period 2011-2019, similar to the national economy's ULC (section 3.3). Decomposing the ULC index into labour compensation and productivity also reveals that wage restraint and improvements in labour productivity have both contributed to reducing the ULC of Greek manufacturing. As for the factors that lie behind the observed (slight) deterioration of the ULC index in 2019, provisional data point to a combination of negative productivity growth with moderate increases in the compensation of employees.

Regarding the energy costs of manufacturing production, these are primarily determined by electricity, natural gas and oil prices. However, given that oil prices (excluding taxes) are determined internationally, electricity and natural gas prices are more likely to exhibit greater variation across countries. Indeed, an overview of the prices for electricity (euro per kWh) over the second half of 2019 (Figure 3.5.7) shows that Greek manufacturing industries with an annual consumption between 500 MWh and 2000 MWh were charged 0.1084 euro per kWh, that is, nearly 25% higher than their counterparts in neighbouring Bulgaria. Over the same period, Greek manufacturing industries with an annual consumption of natural gas below 1000 Gigajoules were paying the 9th highest price in the EU (0.0517

Figure 3.5.6
Real unit labour costs in the manufacturing industry, 2008-2019

Source: AMECO.

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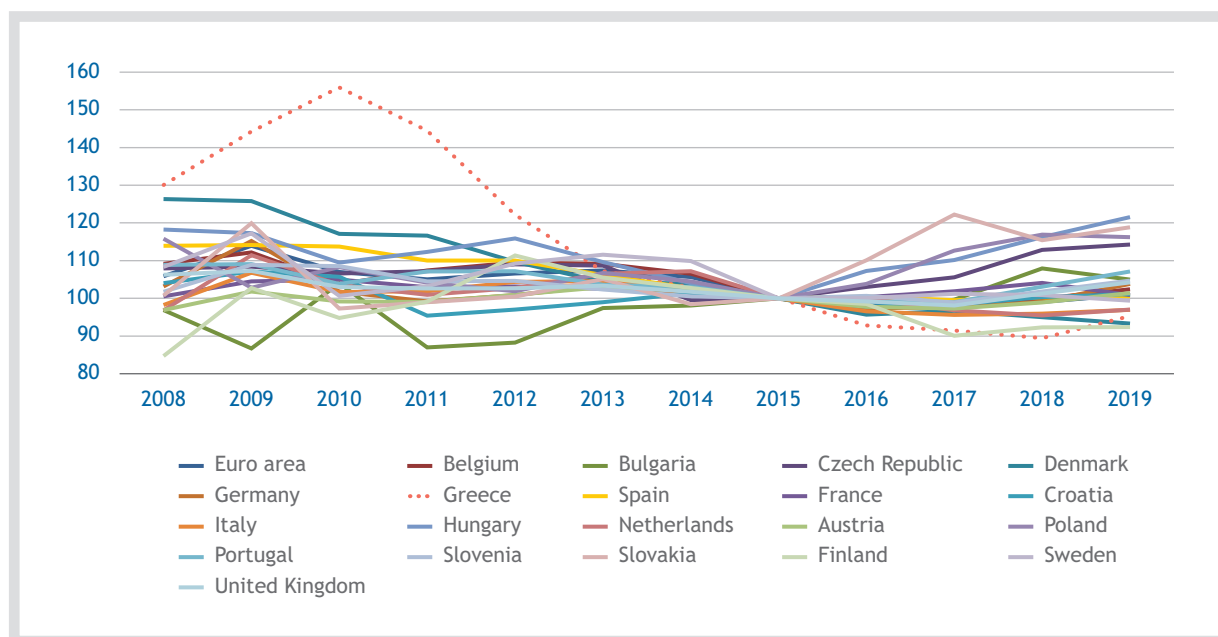
Figure 3.5.7

**Electricity prices registered during July-December 2019
for enterprises with annual consumption between 500 and 2000 MWh
(euro per kWh, excluding VAT and other recoverable taxes and levies)**
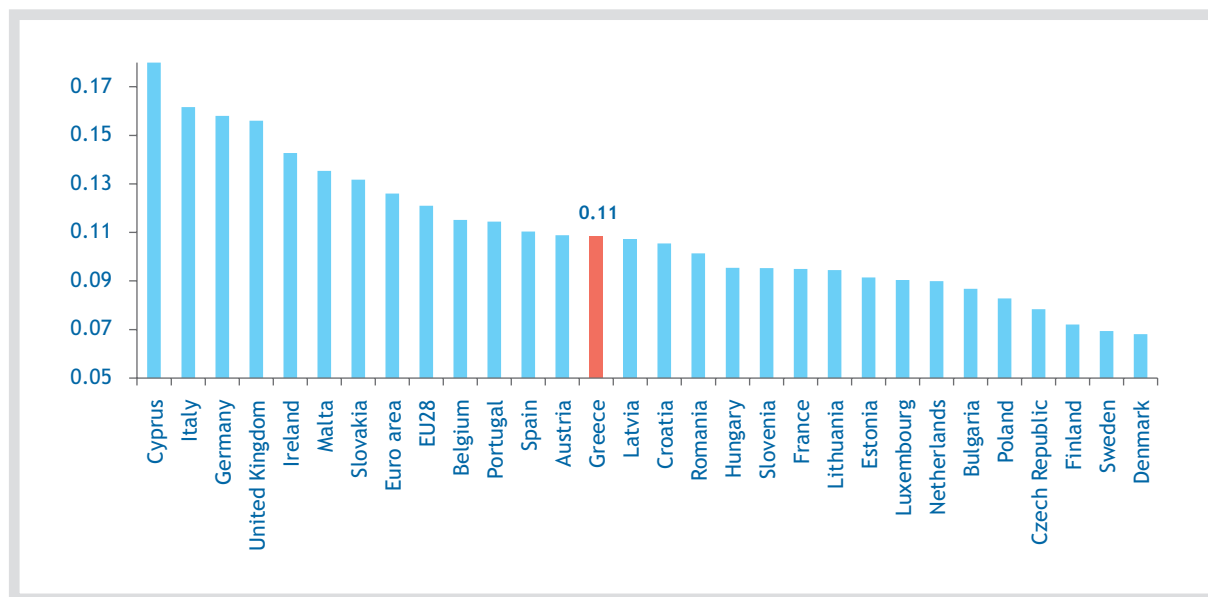
Source: Eurostat.

Figure 3.5.8

**Composite cost of borrowing indicator for non-financial corporations
(12-month average of period March 2019-February 2020)**
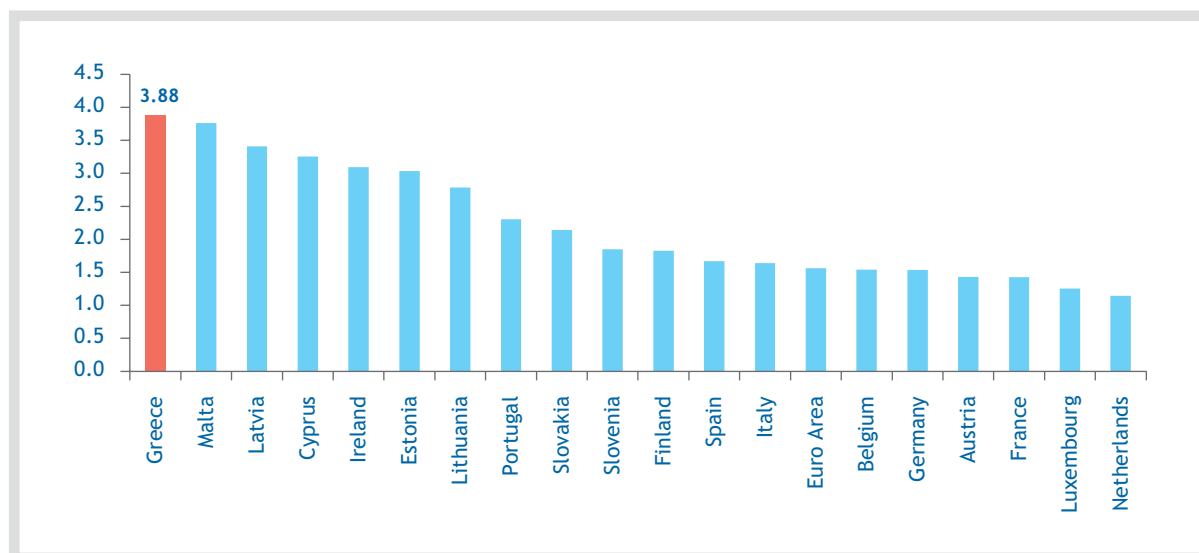
Source: European Central Bank.

euro per kWh). Curiously, natural gas in Greece is comparatively more expensive for large bands of consumption. For example, during the second half of 2019, Greek industries with annual consumption ranging between 100,000 and 1,000,000 Gigajoules were charged the third highest price in the EU (0.0295 euro per kWh).

In relation to capital costs, one type of measure that can be linked to the cost of external finance and simultaneously permits cross-country comparisons is the composite cost of borrowing indicator for non-financial corporations, which is published on a regular basis by the European Central Bank. According to this index, Greek manufacturing firms that seek and receive banking finance are charged with the highest interest rates in the EA (Figure 3.5.8 above). This is particularly worrisome considering that banking loans remain the most important source of external finance for the majority of manufacturing enterprises in Greece.

3.5.3.3. Quality competitiveness

Shifting attention from cost factors to factors that affect the ability of firms to produce differentiated products of higher quality entails the examination of selected indicators that capture the two key ingredients of successful quality competitiveness: firm-level investment in R&D and human resources. From this perspective, Figures 3.5.9 and 3.5.10 depict manufacturing expenditures on R&D and shares of R&D personnel in total persons employed, respectively.

Figure 3.5.9
Manufacturing expenditures on R&D in the EU, 2017

Source: Eurostat.
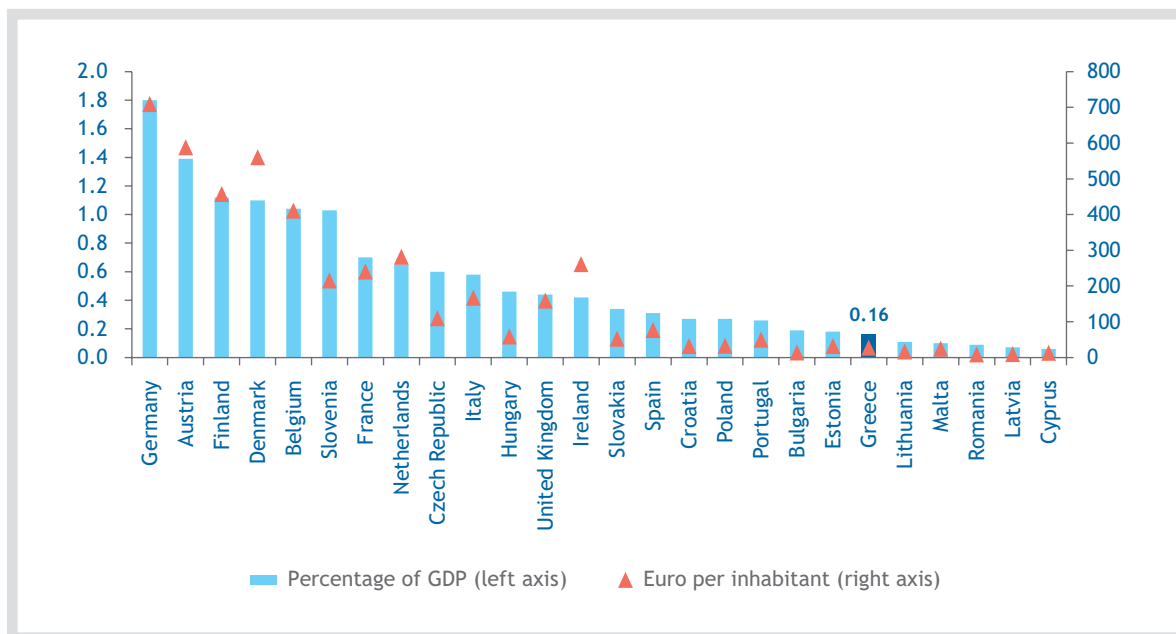
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Figure 3.5.10

Manufacturing total R&D personnel as % of total persons employed in manufacturing in the EU, 2017
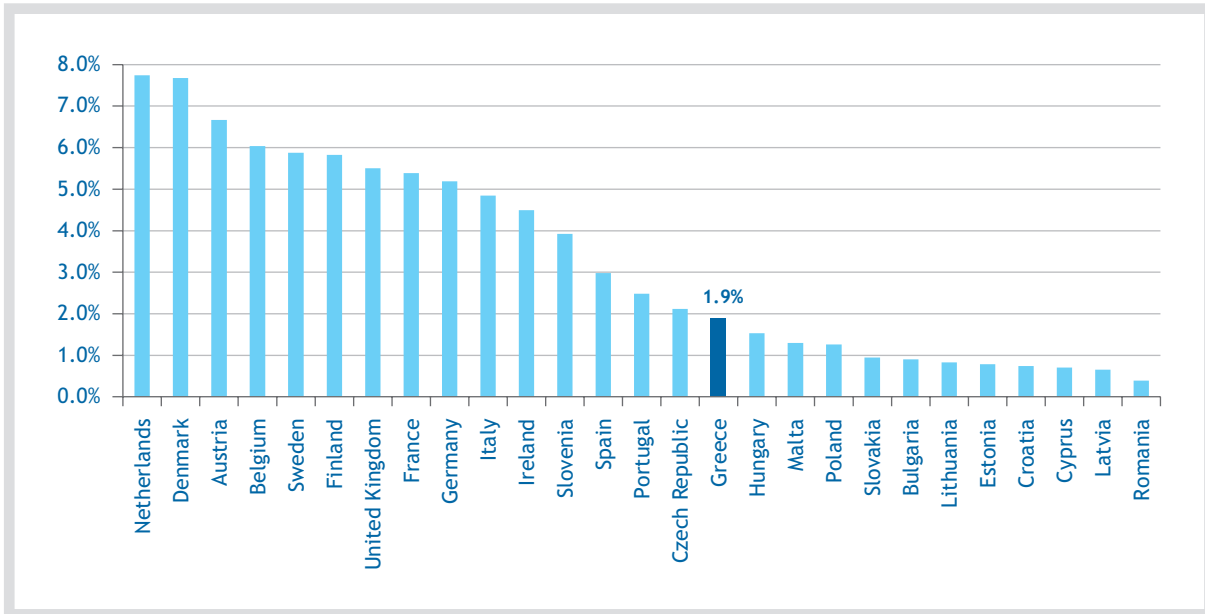
Source: Eurostat.

Figure 3.5.11

Aggregation of the Greek manufacturing industry according to technological intensity in 2016 (proportion of enterprises in high-, medium high-, medium low- and low-technology sectors)

Medium high-technology manufacturing — 9%
High-technology manufacturing — 1%
Medium low-technology manufacturing — 30%
Low-technology manufacturing — 60%
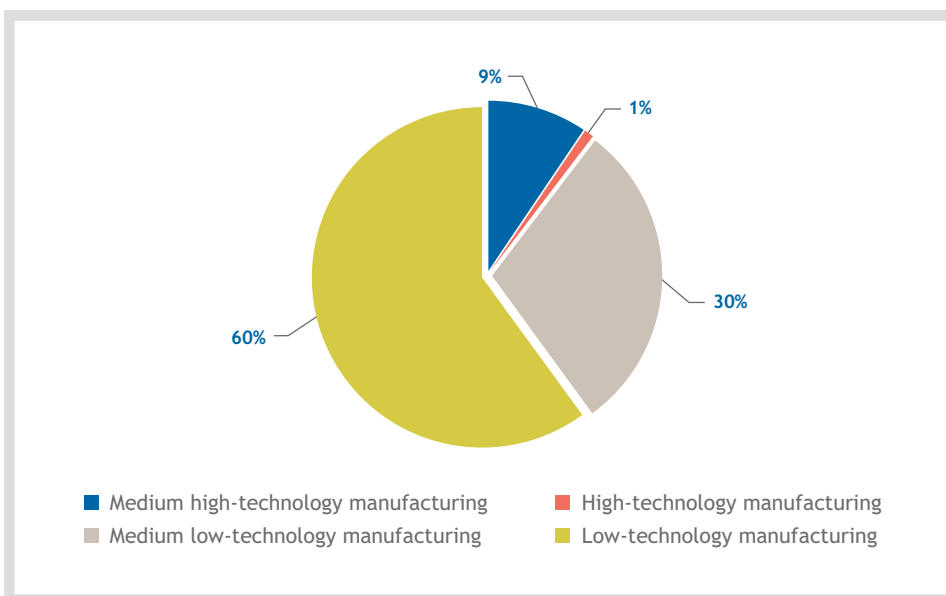
Source: Eurostat.

A visual inspection of Figure 3.5.9 is quite revealing of the large gap that separates Greek manufacturing from the industrial pioneers of Europe. Indeed, with manufacturing expenditures on R&D reaching 0.16% of GDP (i.e., 27.3 euro per inhabitant), Greece is placed among the laggards according to R&D intensity. As regards the allocation of human resources in manufacturing R&D, the picture derived from Figure 3.5.10 above suggests that Greek manufacturing ranks below the European average. To a certain extent, the low R&D intensity of Greek manufacturing is a reflection of the country's industrial structure. This structure remains skewed in favour of medium low- and low-technology production activities (Figure 3.5.11 above). This fact also explains why the competitiveness of Greek manufacturing is more associated with cost rather than quality.

3.5.4. Concluding remarks on industrial competitiveness

Against the background discussed above, the issue of the production costs of Greek manufacturing has preoccupied the domestic debate regarding the orientation of industrial policy in Greece. Specifically, Greek politicians, economists and business experts see the industrial policy as an integral part of the country's efforts to create a business-friendly environment. In this respect, prudent macroeconomic policy along with fiscal tax reforms are perceived as the best avenue to lower taxes for Greek manufacturing. Structural reforms that tackle business restrictions and enhance competition in the energy, transport and business-to-business sectors are viewed as a fundamental step towards lower prices of industrial inputs.

Nevertheless, a narrow focus on prices of industrial inputs can be quite misleading. The actual costs of production are not solely determined by input prices. Investments that lead to efficiency improvements (e.g., firm-level investment in energy-saving technologies) can mitigate or cancel out rising prices. By the same token, productivity-enhancing investments (e.g., firm-level investment in human and tangible capital) can reduce the burden of rising labour costs. But investments require access to external finance at reasonable interest rates. For this reason, any arrangement that is designed to facilitate access to external finance and any measure that exerts a downward influence on the borrowing costs of domestic industries may play a key role in improving the competitive performance of Greek manufacturing.

In an environment in which Greece faces multiple challenges from low-cost competitors, the structural shift of Greek manufacturing towards highly sophisticated and specialised output is of vital importance. However, choosing the 'high road' to competitiveness is not as simple as it sounds. As international experience suggests, countries that have a comparative advantage in the production of high-tech manufacturing products are also characterised by well-established national innovation systems. From this perspective, the country's transition to 'quality competitiveness' requires a rich network of institutions that will facilitate the creation and diffusion of all important elements for manufacturing technological upgrading and innovation.

4. Thematic productivity challenges and structural policies

4.1. Education and skills development

4.1.1. The link between education and skills

Human capital is defined as the "*knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being*" (OECD, 1998). Hence, human capital is a wider concept that incorporates skills. Education and on-the-job training, reflected in years of work experience, are the two most commonly known inputs (or investments) contributing to the accumulation of human capital and, thus, the acquisition of skills. *Ceteris paribus*, more years of education and/or work experience increase the amount of skills and competencies a person embodies, and more human capital is accumulated. More human capital is associated with higher productivity, which is, in turn, associated with higher wages and, at the macro level, with both a higher GDP and a higher GDP growth rate[30] through education-related externalities that are mostly associated with technological innovation.[31] Therefore, there is a direct link between education and skills, since education is a necessary process of enhancing existing skills and developing new ones; thus, it is also directly related to labour productivity (see Box 4.1.1).

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30. See, for instance, Aghion et al. (2009). The authors point out that according to empirical studies, economic growth in Europe has been slower than in the USA in recent years because it invests a smaller share of its GDP in higher education. On the other hand, after WWII, Europe grew faster than the USA because it invested more in primary and secondary education. Either way, investment in education is important.

31. See Asteriou and Agiomirgianakis (2001) for evidence on Greece.

Box 4.1.1
Labour productivity and skills mismatch

More skills are associated with higher productivity. However, skills mismatch can have a detrimental effect on labour productivity. There is evidence that higher skills mismatch is associated with lower labour productivity through a less efficient allocation of resources, *"presumably because when the share of over-skilled workers is higher, more productive firms find it more difficult to attract skilled labour and gain market shares at the expense of less productive firms"* (McGowan and Andrews, 2015). Moreover, skills mismatch, either vertical or horizontal (see section 4.1.3), reflects a poor allocation of available human capital and a waste of resources; people are expected to be most productive when they utilise their skills effectively. Hence, reducing skills mismatch allows the economy to realise its growth potential. On the other hand, there is also evidence that skills shortages and over-education are positively correlated with labour productivity (Vandeplas and Thum-Thysen, 2019). However, it is also the choice of the counterfactual that is important. It makes a difference to compare the productivity of an over-skilled individual to the productivity of an individual with the matching set of skills for the job (the former would be more productive) or to the productivity of an individual

Figure B.4.1.1
Skills matching index
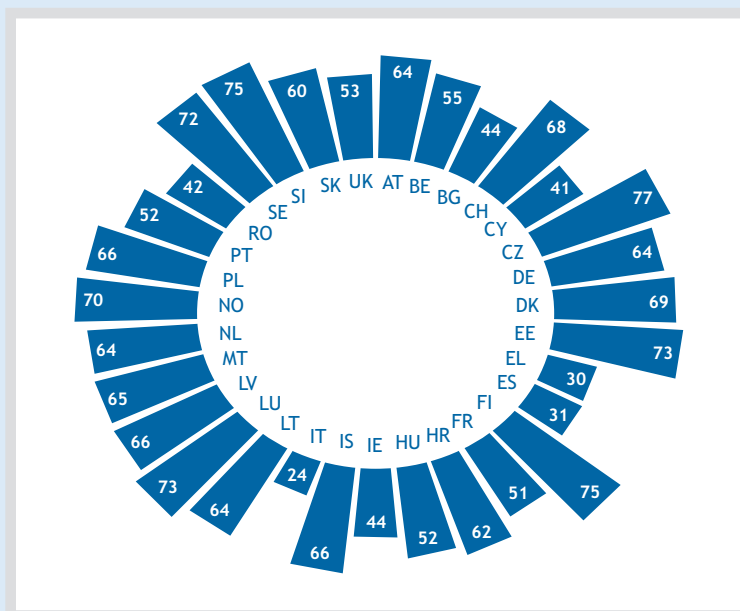
Source: CEDEFOP, European Skills Index.
<https://skillspanorama.cedefop.europa.eu/en/indicators/european-skills-index>.

with the same set of skills but performing a matching job (the latter would be more productive). Labour productivity, as measured by the real output per unit of labour input, i.e., total number of hours worked, was lower in Greece than the EU27 average in 2018 (the fifth lowest amongst the EU27) (see, also, Chapters 1 and 2 of this Report). Recall further that Greece had the lowest skills matching index according to CEDEFOP's 2018 calculations (see Figure B.4.1.1 above), i.e., it performed worse than any other country. Hence, improving skills matching should increase labour productivity.

Education, compulsory or post-compulsory, is usually linked to school. However, although school is probably the primary, it is not the only means or place to accumulate skills. Lifelong learning processes, years after someone has completed education, can increase a person's level of skills. Further education and training programmes during the working life allow individuals to develop new skills (reskilling) and upgrade existing ones (upskilling). This set of instruments constitutes part of the skills system, which also includes the activation of skills of different groups into the labour force to increase the skills base of the economy. The role of the skills system is to ensure, as far as it is feasible, that skills demand is met by skills supply in a way that optimises the use of the skills available in the labour force (CEDEFOP, 2020). The latter point is very important, since it is clear by now that a skilled population is not enough to achieve high and inclusive growth, as skills need to be put to productive use at work (Quintini, 2014). In this sense, it is not only the supply of skills that matters, but also the demand for skills, which initially triggers the accumulation of skills[32] and then puts them to good use. An economy that does not produce high-skilled jobs will not be able to fully utilize its high-skilled human resources. The role of firms/employers is crucial; introducing new technologies can increase the need for skills upgrading. Encouraging, or at least supporting, the participation of their employees in education and training programmes should be the next move. Moreover, formal education is only the beginning of the process of human capital —and, thus, skills— accumulation; however, the quality of skills accumulated through education is not always a given. It is both the curriculum and syllabus of formal education that matters, while differences in quality and content are often difficult to measure given the diversity in ability involved. Therefore, the focus has shifted towards skills, rather than education credentials, and the lifelong process of skills accumulation and skills accreditation.

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32. A strong demand for skills means improved job and compensation prospects.

4.1.2. The level of human capital/skills in Greece and other countries

There is no readily available national index of skills in Greece. The reason is that there is no information on the type and level of skills embodied in the population. However, a number of measures have been devised. The share of tertiary education (levels 5-8) graduates in the population is often used to assess the level of skills in an economy. According to official statistics,[33] in 2019, this share was 27.8% in Greece compared to 27.9% in the EU27. However, there are countries with considerably bigger shares, such as Belgium (36%), Spain (35.1%), Ireland (40.7%), Finland (38.5%) and Sweden (37.8%).[34] Greece performs better than the EU27 when the share of tertiary education graduates aged 30-34 is considered: the share is 43.1% vs. 40.3%, respectively.[35] Once again, there are countries with considerably bigger shares, such as Ireland (55.4%), Luxembourg (56.2%) and Sweden (52.5%). One should bear in mind that some European countries are more attractive to highly-skilled immigrants than others, since they offer better job prospects. These countries seem to reap the benefits and avoid bearing the costs of education and training. Moreover, some countries rely more than others on the provision of higher education studies. As a result, they attract many foreign students, some of whom stay in the country for several years after graduation.

Another source of information is the composite European Skills Index (ESI) developed by CEDEFOP.[36] The latest publication is in 2020, but the input data refer to 2018. There are three sub-indices for each country, namely the skills development index, which represents the education and training activities in the country; the skills activation index, which includes the transition from education to work and the labour market participation rate for various population groups; and the skills matching index, which will be discussed in the next section.[37] Irrespective of the index used, Greece's performance is poor. In particular, Greece scores 43 out of 100, the sixth worst performance amongst 31 European countries, in the skills development index. It also scores 45 out of 100, the fifth worst performance, in the skills activation index. Hence, Greece does a very poor job not only in developing skills, but also in utilising those available. No wonder the ESI for Greece is 30 out of 100, which is quite alarming given that Italy is the only country doing worse (24/100). Perhaps the only thing which is more alarming is that the ranking of Greece has not changed in period 2016-2018 (CEDEFOP, 2020). Therefore, things are not improving.

A third source of information on the skills level in Greece is the OECD Skills Survey, also known as the Programme for the International Assessment of Adult Competencies (PIIAC).

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33. See Eurostat [edat_lfse_03].

34. The UK has the biggest share, standing at 40.6%, but it is not included in the EU27.

35. There is a relevant target in the Europe 2020 strategy set at 40%. Additional information for each country can be retrieved at: <https://ec.europa.eu/eurostat/web/europe-2020-indicators/europe-2020-strategy/headline-indicators-scoreboard>.

36. Detailed information for every index separately can be found at: <https://skillspanorama.cedefop.europa.eu/en/indicators/european-skills-index>.

37. Details can be found at the 2020 European Skills Index Technical Report available at: <https://skillspanorama.cedefop.europa.eu/sites/default/files/ESI%20Technical%20Report%202020.pdf>.

PIIAC assesses the proficiency of adults from age 16 in literacy, numeracy and problem solving in technology-rich environments in several countries;[38] these skills are known as core or transversal skills and their lack is difficult to remedy, since they are developed early in life. The results suggest that adults in Greece underperform in all aspects compared to the OECD average.[39] The mean score in literacy in Greece is 254 points compared to an average of 266 across participating countries and 252 points in numeracy compared to 262 on average. Moreover, approximately 47.9% of adults in Greece scored at or below level one[40] in problem solving in technology-rich environments compared to 42.9% in the rest of the countries. These results suggest a poor educational outcome, verified also by PISA,[41] coupled with low levels of post-school skills development. Workers in Greece use their numeracy and problem-solving skills at work as frequently as the average across OECD countries, but their proficiency in these skills is not rewarded with higher wages, as in other OECD countries (OECD, 2016). This could mean that such skills are abundant and, thus, are less well rewarded so that Greek workers are less motivated to develop new ones.

The OECD also provides the World Indicators of Skills for Employment (WISE), which constitutes a comprehensive system of information concerning skills development. It consists of five inter-related domains of indicators: (1) contextual factors, (2) skill acquisition, (3) skill requirements, (4) the degree of matching and (5) economic performance and employment and social outcomes.[42] There is a distinction between hard-to-find vs. easy-to-find skills, but also abilities and knowledge, which means that the WISE covers a wider area than skills.[43] Figure 4.1.1 focuses on general skill sets and presents those that are abundant or in short supply. Interestingly enough, technical skills are abundant in Greece, more so compared to the OECD average also. At the same time, the biggest shortage is reported in basic skills (content), i.e., developed capacities that facilitate learning or the more rapid acquisition of knowledge, followed by complex problem-solving skills, i.e., developed capacities used to solve novel, ill-defined problems in complex, real-world settings, and basic skills (process). In all three skill sets, the shortage in Greece is bigger than the OECD average.

Going into more detail, the specific skills that are the hardest to find include, amongst others, social perceptiveness, judgement and decision making, instructing, persuasion, time

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38. The list of participating countries in each one of the three rounds is available at: <http://www.oecd.org/skills/piaac/about/piaac1stcycle/>.

39. <https://www.oecd.org/skills/piaac/Skills-Matter-Greece.pdf>.

40. This is the lowest level of competence.

41. Every three years, 15-year-old students are assessed on proficiency in reading, mathematics and science under the Programme for International Student Assessment (PISA). The results for Greece are available at: <https://www.oecd.org/pisa/publications/PISA2018_CN_GRC.pdf>.

42. At <https://oecdskillsandwork.wordpress.com/2015/10/08/wise-database/> more details can be found.

43. At <http://www.oecd.org/els/emp/OECD%20Skills%20for%20Jobs%20Definitions.pdf> a detailed description of attributes can be found.

Figure 4.1.1
Relative abundance of (general) skills for jobs in Greece, 2018

Basic skills (content)
Basic skills (process)
Complex problem solving skills
Social skills
System skills
Resource management skills
Technical skills

in excess ←   → hard to find
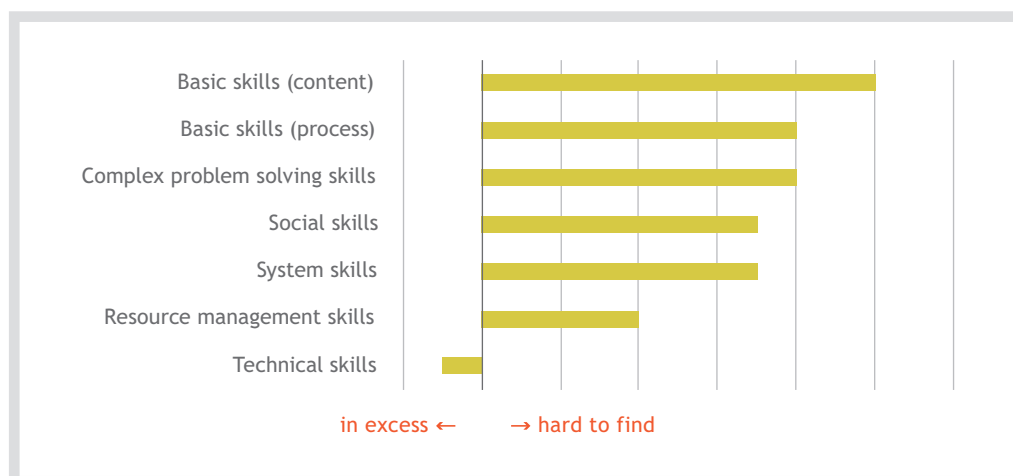
Source: OECD Skills for Jobs Database.[44]

management, coordination, negotiation, etc. Shortages in basic and social skills are probably the most difficult to tackle, because they involve qualities that are usually acquired early in life. Hence, primary school or even kindergarten can shape some of the skills required in adult life. This means that policy makers should know that the output of the education system —any level of the education system— is at the same time an input for the labour market. On the other hand, Greece is doing very well and there seems to be an abundance of troubleshooting, equipment selection, equipment maintenance and repairing and installation skills. These skills are in excess in Greece even when compared to the OECD average.

Somewhat different information is provided by the Human Capital Index (HCI), which is part of the Human Capital Project launched by the World Bank, in order to address gaps in human capital investment across countries. The project is intended to raise awareness of the costs of inaction and make the case for investing in people through country engagement and analytical work (World Bank, 2018). The HCI is a composite index that builds on information regarding the probability of survival to age 5, expected years of schooling, harmonised test scores from the Global Dataset of Education Quality,[45] learning adjusted years of school,[46] the fraction of children under 5 not stunted and the adult survival rate. Greece ranks 38th (HCI: 0.68) amongst a total of 48 high-income countries. Finland, Ireland, Sweden, Germany and many other European countries outperform Greece. The HCI is bigger for females than males, both in Greece and in the remaining high-income countries.

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44. <https://www.oecdskillsforjobsdatabase.org/imbalances.php#EL/_/OECD/_/[%22skills%22]/co>.
45. See Patrinos and Angrist (2018).
46. Therefore, it accounts to some extent for the content of the education services provided.

4.1.3. The extent of skills mismatch in the Greek labour market

There is a skills mismatch in the labour market when the skills required by the employers (labour demand) are different than those offered/embodied by the labour force (labour supply). There are two main types of skills mismatch: vertical and horizontal. There is a vertical skills mismatch when the skills required in a job are superior or inferior to the skills embodied by the labour force, i.e., either someone who already has the job or someone who is applying for it. The most usual case is for the job to require inferior skills to those available. Vertical skills mismatch exists, for example, when a higher education graduate holds a job that could be performed by a secondary education graduate. There is a horizontal skills mismatch when the skills required in a job are of similar complexity/level with the skills embodied by the labour force, but of different content. Horizontal skills mismatch exists, for instance, when a physicist teaches mathematics. A higher education degree is necessary in both cases, but the field of study is different.

Skills mismatch is important for both firms and individuals supplying their labour to the labour market. On the firms' side, skills mismatch means that some jobs are vacant, because there are no suitable labourers to fill them. Hence, some goods are not produced, and some services are not offered. This means that firms operate at a non-optimal level. On the individual's side, skills mismatch could lead to unemployment or, at best, holding a job which does not utilise the available human capital or skills set. This usually leads to lower wages, but could also lead to migration to look for work abroad.[47] Moreover, there may be side effects in terms of reduced employment, since filling one job may be associated with creating additional job opportunities. One important question that usually monopolises the social dialogue is whether there is a skills mismatch in the labour market.

As far as Greece is concerned, there seems to be a discrepancy regarding evidence related to skills mismatch. On the one hand, in order to be able to talk about widespread skills mismatch in the labour market, a high unemployment rate must be coupled with a high job vacancy rate (JVR). Clearly, this does not seem to be the case in Greece. The unemployment rate, despite the slow decrease recorded since 2014, is still very high: it stood at 17.3% in 2019 for individuals over 15.[48] On the other hand, in the last quarter of 2019, the JVR stood at 0.5%.[49] The respective rates for the EU27 stood at 6.7% and 2.2%. However, there are countries with a JVR of over 3% coupled with comparatively low unemployment rates in 2019: 5.4% in Belgium, 3.2% in Germany and 3.4% in the Netherlands. And, then, there is the Czech Republic with a JVR of 5.9% in the last quarter of 2019 and an annual unemployment rate of 2%.

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47. The migration of highly skilled individuals in search of a job abroad has been hotly debated in Greece over the past few years. Labrianidis and Pratsinakis (2016) provide several interesting figures. The phenomenon is known as "brain drain", and it is caused by several pathogenies in Greece, including skills mismatch.

48. Eurostat data: <https://ec.europa.eu/eurostat/databrowser/view/tps00203/default/table?lang=en>.

49. Eurostat data: <https://ec.europa.eu/eurostat/databrowser/view/tps00172/default/table?lang=en>.

On the other hand, there is empirical evidence of a skills mismatch in the Greek labour market, and it is quite extensive. Part of the ESI calculated by CEDEFOP, discussed earlier, is the skills matching index, which represents the extent to which skills are utilised at work and matched successfully. Hence, there are two sub-pillars; skills under-utilisation and skills mismatch. The former has information on the share of the long-term unemployed and the share of underemployed part-timers (i.e., willing to work full time). The latter is built on information regarding the share of over-qualified higher education graduates, the share of high-skilled workers in low-wage jobs and the share of qualification mismatch.[50] A low index of skills matching means that the labour market does a poor job matching skills; Greece scores 34 out of 100 in skills under-utilisation (Spain is the only country doing worse) and 5 out of 100 in skills matching (the worst performance). Overall, the skills matching index stands at 17 out of 100, which is the worst performance.

The European Working Conditions Survey conducted in 2015[51] revealed that Greek workers consider themselves over-skilled more often compared to their European counterparts (37% vs. 28%), especially women and individuals younger than 35. It is interesting that, contrary to the European average, the share of over-skilled individuals in Greece is negatively correlated with age. This is a sign that skills matching improves with age (or years of experience), and it suggests that there are obstacles in the labour market that delay the process in Greece. Moreover, employees with permanent contracts consider themselves over-skilled less often compared to employees with other types of contracts (34% vs. 43%), while there is no difference between the two groups in the EU; perhaps a permanent job contract is the result of a good match. The fact that very few Greek workers consider further training a necessity to cope with their duties at work (7% vs. 14% in the EU) is alarming, but not surprising given the low share of employed individuals participating in education and training programmes, and the fact that many consider themselves over-qualified. Note that the share of employed individuals aged 18-64 participating in education and training in Greece stood at 5.4% in 2019, almost 10 percentage points lower compared to the EU27 (14.3%).[52] This share gets even lower if employed persons aged 25-64 are considered (3.4%).

Education or qualification mismatch[53] is not always identical to skills mismatch. A person may consider herself as over-qualified for a specific job, but under-skilled for the same job. The most obvious reason is that the skills provided by a course or level of education and training are different than those the labour market expects of that specific course or level of education and training. The 2014 European Skills and Jobs Survey (ESJS)[54]

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50. There is more detailed information available on page 10 of the Technical Report available at: <https://skillspanorama.cedefop.europa.eu/sites/default/files/ESI%20Technical%20Report%202020.pdf>.

51. <https://www.eurofound.europa.eu/surveys/european-working-conditions-surveys/sixth-european-working-conditions-survey-2015>.

52. Eurostat [trng_lfs_04].

53. The terms "over-education" and "over-qualification" are used interchangeably in the literature.

54. More information can be found at: <https://www.cedefop.europa.eu/en/events-and-projects/projects/european-skills-and-jobs-esj-survey>.

conducted by CEDEFOP reported that 18% of over-educated workers and 22% of matched workers considered themselves under-skilled at the time they were first hired (McGuinness et al., 2017). However, only 4% of the same over-educated workers continued to consider themselves as under-skilled at the time of the interview. This sharp drop indicates the importance of acquiring skills on the job and strengthens the argument in favour of skills building throughout a person's lifetime.

In this context, there are experimental data published by Eurostat that also seem to suggest Greece is facing wide skills mismatch (see Figures 4.1.2 and 4.1.3).[55] The share of people aged 20-64 with a higher education degree employed in ISCO[56] 4-9 was 31.6% in 2018 —the third biggest in the EU27, where the average share stood at 22.1%. Moreover, the share in Greece has increased since 2008 by 11.7 percentage points, when the situation has been almost stable in the EU27 (an increase of 1.7 percentage points over the same period). Hence, over-qualification is getting worse, facilitated by the high unemployment rate that forces people to accept jobs that require a lower level of skills than those they embody.

Interestingly, there are stark differences across industries. The biggest share of over-qualified individuals is found in the industries wholesale and retail trade, etc. (70.1%) and transport and storage (49.6%). The former also has the biggest change in the share since 2008 (33.4 percentage points). Construction is the only industry in which the share of over-educated employed individuals has dropped since 2008.

There are also data on horizontal skills mismatch (Figure 4.1.3) in Eurostat, i.e., the share of employed individuals who have completed ISCED levels 5-8 (i.e., higher education), belong to the age group 25-34 and have jobs that require skill sets of the same level but of different fields. The horizontal skills mismatch rate in Greece was 31.2% in 2018 compared to 28.1% in the EU27; hence, there was a gap of only three-percentage points. However, a single figure masks the stark differences across fields of education. In this context, the rate of horizontal skills mismatch exceeds 70% in agriculture and veterinary studies graduates, but it is barely above 10% among services graduates. Graduates of humanities, languages and arts also face severe difficulties, as well as graduates of engineering, science, mathematics and computing. The fact that some of these fields of study are often considered in high demand, e.g., computing, but still have a high rate of horizontal skills mismatch, probably indicates a weak link between the skills supplied by the education system and the skills required by firms. The high rate in other fields, e.g., agriculture and veterinary, could reflect an excess supply of graduates or, alternatively, a lack of demand for such skills.

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55. <https://ec.europa.eu/eurostat/web/experimental-statistics/skills>.

56. ISCO stands for ILO's International Standard Classification of Occupations. Details can be retrieved from: <https://www.ilo.org/public/english/bureau/stat/isco/>.

Figure 4.1.2
Share (%) of over-qualified employed individuals aged 20-64 by industry in Greece
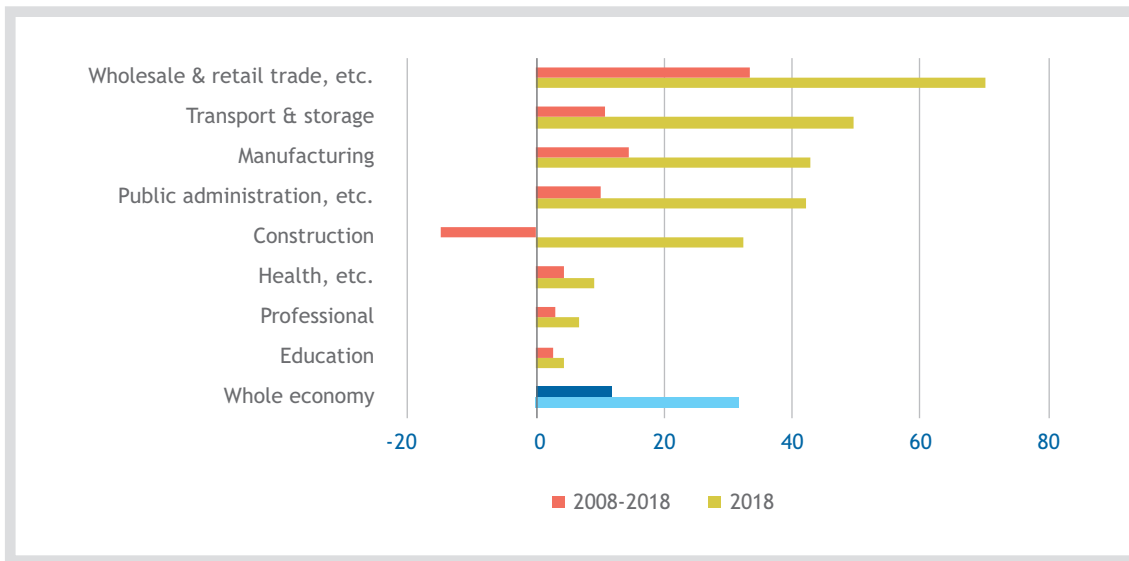
Source: Eurostat <https://ec.europa.eu/eurostat/web/experimental-statistics/skills>.

Figure 4.1.3
Horizontal skills mismatch rate (%) in Greece

Source: Eurostat <https://ec.europa.eu/eurostat/web/experimental-statistics/skills>.
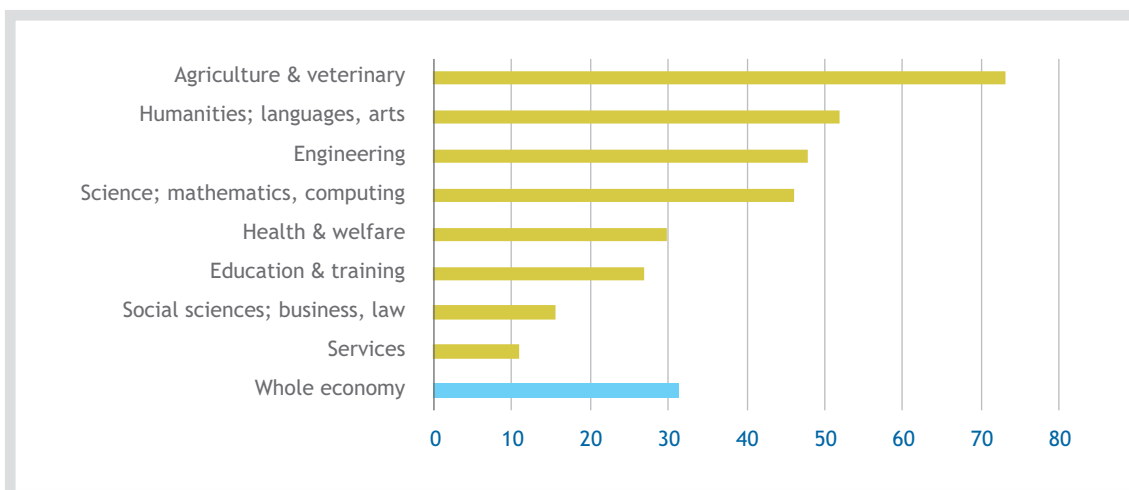
GREEK NPB   2020 Annual Report

Table 4.1.1
Share (%) of firms facing talent shortages by firm size in Greece and globally

	Micro <10 employees	Small 10-49 employees	Medium 50-250 employees	Large 250+ employees
Globally	40	53	62	72
Greece	74	76	78	82

Source: Manpower (2020) <https://go.manpowergroup.com/talent-shortage>.

Moreover, a sizeable skills mismatch also seems to be suggested by surveys conducted by private firms and independent researchers. For instance, a global survey by Manpower reveals that many firms have trouble finding talent in Greece, i.e., workers with the skill sets they require (Manpower, 2020). Greek firms report bigger than average talent shortages irrespective of their size. However, the size of the firm does matter. Globally, bigger firms, i.e., employing more people, face more difficulties in finding the right skill sets; this is even more pronounced in Greece (Table 4.1.1). No wonder Greece is listed amongst the countries with the most difficulties in filling jobs, second only to Japan and Bulgaria.

SEV[57] stresses the need to continuously upskill the labour force in line with the new demands that originate from the digital economy (4th industrial revolution) and the depreciation of skills resulting from technological advances (SEV, 2018). The depreciation of skills is expected to be faster amongst technology-intensive skills, such as informatics and communication, financial and scientific activities. Moreover, Greece relies heavily on jobs that run the risk of becoming automated. Taken together, these facts suggest that it is the same industries and skills to which there are important shortages in the labour market that are sensitive to depreciation due to technological change. To gather the necessary information that will allow the drafting of useful industry-specific reports, SEV has set up and operates a mechanism for diagnosing firms' needs for occupations and skills.[58] In this context, it has published a number of reports addressing specific occupations in specific industries, e.g., R&D scientists in the food industry[59] and software engineers in ICT[60]. These findings concern mostly big firms, but they are typical of the potential usefulness of the mechanism.

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57. SEV stands for Hellenic Federation of Enterprises.
58. A short description of the mechanism can be found at <http://www.sev.org.gr/Uploads/pdf/mixanis-mos_10.7.2013.pdf>.
59. See the report at <http://old.sevstegi.org.gr/sites/default/files/TROFIMA_1.pdf>.
60. See the report at <http://old.sevstegi.org.gr/sites/default/files/TPE_2.pdf>.

A field research in 1,600 firms located in Thessaly and Western Greece was conducted by EIEAD,[61] in order to explore skill mismatches more thoroughly (EIEAD, 2018). Firms were asked to assess the significance of a range of skills (numeric ability, creativity, problem solving, teamwork, etc.) in specific jobs, as well as the degree of their employees' proficiency in these skills; the more significant a certain skill is for a firm and the less proficient the employees are in it, the bigger the skills mismatch. Unsurprisingly, the degree and type of skills mismatch seem to differ by occupation. For example, service workers, one of the biggest groups in Greece, turned out to be under-skilled with respect to organizational skills, taking initiative and entrepreneurship and problem solving. Given the local nature of the survey, it would be risky to generalise the results to the whole country. However, skills mismatch is evident.

Another survey suggests that 80% of interviewed employers believe that the education system in Greece does not equip its graduates with the necessary skill sets required by the labour market, i.e., social skills such as business ethics, teamwork, flexibility, adaptability and communication skills (Adecco, 2018). In particular, Greece ranks 97th out of 119 countries in matching supply of and demand for skills. The report also specifies a number of occupations facing the biggest skills shortages: business administration professionals, ICT professionals, ICT support technicians, sales managers, marketing managers and development managers.

Skills imbalances in the Greek labour market were aggravated when the economic crisis was at its peak (Pouliakas, 2014).[62] The systematically high youth unemployment rate, even before the crisis erupted, is treated as evidence of the skills mismatch. The problematic transition from education to work is also a symptom of skills mismatch. Even before the crisis, it took a Greek graduate twice as long to get a job after graduation compared to the average EU27 counterpart (13.1 months vs. 6.5 months).[63] Higher education graduates find it easier to get a job in Greece compared to graduates from lower levels of education, but the difference is smaller than that in most other EU countries. Interestingly enough, estimates suggest that over-qualified Greek workers are more likely to be found in jobs with precarious contracts and more demanding working conditions (part-time jobs, temporary contracts, shift work, jobs with longer working hours, jobs that do not entail supervisory duties). Moreover, smaller firms, those that rely on the hiring of casual labour and those requesting from their employees to work at irregular hours (not necessarily the same firms) are more likely to report skills shortages and difficulties in filling vacancies (Pouliakas, 2014).

One plausible explanation for the different conclusions reached according to the measure of skills mismatch used is that the two types of evidence refer to different things.

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61. EIEAD: National Institute for Labour and Human Resources.

62. An extensive literature review regarding difficulties facing youth in the Greek labour market can be found in Tsakloglou et al. (2010). Livanos (2010) also discusses the weak link between higher education and the labour market in Greece, at least for some disciplines.

63. See Eurostat [edat_lfso_09t2].

CEDEFOP, OECD and others, measure primarily skills mismatch in Greece that does not lead to vacancies. For instance, a firm is willing to hire a higher education graduate to do the job of a secondary education graduate, if the wage cost is similar; partly because a higher education graduate may also compensate for the lack of core and transversal skills identified by the OECD. On the supply side, the high unemployment rate often forces people to accept job offers than they would normally reject. Hence, non-optimal matching occurs with a small number of job vacancies, which is important in many other aspects, of course. It causes waste of resources, since investment in skills building through education and training does not produce the expected returns, it does not allow firms and the economy to realise their full potential, it forces many high-skilled persons to emigrate in search of suitable jobs, it makes people crave for a job in the public sector, where credentials matter, etc. However, it does not lead to unemployment. It seems more plausible that the high unemployment rate in Greece is more a problem of inadequate demand for labour.

On the other hand, there are surveys discussed above which capture skills mismatch that leads to vacancies. Such skills mismatch is important for a few industries or specific firms in Greece following technological advances closely and competing in the international markets, but not for the market as a whole; therefore, the JVR is so low despite soaring unemployment. That does not mean, of course, that nothing should be done. Filling job vacancies could allow firms to produce multiple benefits for the Greek economy, ranging from new and sustainable jobs —which could, to some extent, tackle the issue of inadequate demand for labour mentioned above— to increasing the value added produced, by improving the country's presence in international value chains. Another explanation that cannot be ruled out is that job vacancies are not measured correctly, i.e., they are under-reported for various reasons; that hypothesis is difficult to test however.

4.1.4. Policy recommendations to improve skills matching

Hopefully, the above discussion made clear that improving skills matching and, more importantly, the utilisation of human resources is not an easy task, although it is a necessary one to unleash the growth potential of the Greek economy. It is complex and requires a holistic approach in order to capture all the aspects involved and increase the probability to succeed. The first step should be to realise that skills development is a lifelong process. This has two implications.

First, any interventions should start at school and end at the end of someone's working life, since there are multiple channels to accumulate new skills or upgrade existing ones besides formal or informal education and training. Lifelong learning is one, but informal learning should not be underestimated either. Therefore, policy interventions and reforms should start at formal education, but should address all types of learning. In this context, skills accreditation processes are crucial. New generations should improve the soft skills that older generations are missing, while corrective actions should be undertaken for the latter also.

Second, given the broadness of the issue, there must be cooperation between different policy makers and decision-making centres, e.g., between different ministries and directorates, in order to form a coherent intervention strategy. In this context, government policy initiatives, such as the National Coalition for Digital Skills and Jobs[64] and the National Digital Academy,[65] focusing on the development of digital skills are moves in the right direction and should be preserved and expanded. However, building a coherent skills development strategy requires more and broader efforts. Cooperation between stakeholders is certainly not an easy task given the lack of cooperation culture and social trust in Greece. However, setting measurable long-term goals with intermediate check points and engaging all stakeholders could make a difference.

In particular, the main areas of recommended interventions to improve skills matching are included in the following non-exhaustive list:

- *Reform labour market processes, tools and bodies*: modernise occupational profiles; reinforce and upgrade EOPPEP,[66] OAED[67] and EIEAD; set up forecasting of future skills' needs; expand and deepen the role of the Labour Market Diagnosis System.

- *Redesign Active Labour Market Policies (ALMP)*: introduce vouchers; increase the population coverage; modernise VET content to match the needs of the labour market; monitor, evaluate and fine-tune ALMPs.

- *Activate stakeholders and make institutional changes*: facilitate the participation of small businesses in training, especially those located far from urban centres; encourage the cooperation between firms and education institutions.

- *Reform the education system*: among others, improve the quality and efficiency of education services; ensure equal opportunities; monitor and evaluate the education outcome; introduce measures to reduce early school drop-out rates for vulnerable population groups; and, most importantly, reform and upgrade vocational education and training, mainly by reinforcing the dual education system.

- *Stimulate labour demand*: encourage more investments; improve the subsidies system; rationalise non-wage costs; protect workers against unfair layoffs; introduce industry-targeted policies on future skills and knowledge needs.

- *Consider possible synergies in other policy areas*: address demographic issues, encourage female labour force participation, refocus immigration policy.

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64. See www.nationalcoalition.gov.gr for details.
65. See nationaldigitalacademy.gov.gr for details.
66. EOPPEP: National Organisation of the Certification of Qualifications & Vocational Guidance.
67. OAED: Public Employment Service.

4.2. ICT adoption and business performance[68]

4.2.1. How ICT adoption affects productivity and competitiveness

In the era of digital transformation, the rapid developments in information and communication technologies (ICT) are significantly affecting economies and societies. Digitalisation has been acknowledged as a critical driver of productivity, competitiveness and development at local, regional and national levels. ICTs are the main channel through which digital transformation unfolds (OECD, 2019). ICTs have been acknowledged as general-purpose technologies and can be used in almost all business processes and activities in most industries, resulting in beneficial multiplier effects which spread in the whole economy via spillover mechanisms, externalities and innovation complementarities (Fabiani et al., 2005; Cardona et al., 2013).

Effective ICT adoption and utilisation by firms is associated with reduced operating, marketing and transaction costs, increased organisational efficiency, improved customer service, access to new business opportunities and the strengthening of firms' competitive advantage and market position (Arvanitis, 2005; Tan et al., 2009; Ghobakhloo et al., 2011). Recent studies consider ICT as a necessary condition for businesses to survive and grow even in times of economic crisis (Bertschek et al., 2019). The current health crisis, as a result of the new coronavirus pandemic, which has currently put societies and economies worldwide under severe stress, has, more strongly than ever, highlighted the key role ICT and e-commerce can play in mitigating the social and economic consequences of the crisis.

In this context, the present section is intended to analyse the performance of Greek firms in adopting and using various types of ICT in comparison with other EU countries and identify potential linkages between ICT adoption and firms' labour productivity. In what follows, subsection 4.2.2 focuses on the performance of Greek firms with respect to various ICT indicators, while subsection 4.2.3 analyses the digital divides between low- and high-productivity firms. Finally, subsection 4.2.4 summarises the main findings and provides some concluding remarks.

4.2.2. ICT adoption in Greek firms

Harnessing the benefits of digital transformation heavily depends on firms' investment in ICT and in complementary assets, mainly in knowledge-based capital (OECD, 2020). In order to analyse the performance of Greek firms, as far as ICT adoption is concerned, data based on the Community survey on "ICT usage and e-commerce in enterprises", conducted by the National Statistical Institutes of the member states, are used.[69]

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68. The analysis presented in this section is based on the KEPE report of Kontolaimou et al., forthcoming.
69. The survey population consists of firms with 10 or more employees. The financial sector is excluded.

For the purposes of our analysis, ICT adoption indicators are grouped into four categories concerning: a) human capital, b) ICT infrastructure, c) firms' internal organisation and d) firm visibility and communication with consumers. Furthermore, the performance of Greek firms in digital trade is analysed through six e-commerce indicators. All indicators are expressed as percentages of firms with computers and refer to year 2018, unless otherwise stated.

The human capital dimension is approached through three indicators: the percentage of firms employing ICT specialists, the percentage of firms that in the year preceding the survey provided training to ICT specialists to develop/upgrade their ICT skills and the percentage of firms that provided training to their personnel (in general) to develop/upgrade their ICT skills. Greece is above the EU28 average as far as the employment of ICT specialists is concerned (25% of Greek firms employ ICT specialists while the EU28 average is 20%) and is ranked 8th among the 28 member states. On the other hand, Greece is below the EU28 average with respect to the two training indicators; 10% of Greek firms provided training to their ICT specialists (Greece ranks 14th along with Austria, Sweden and Spain) and 16% to their personnel (Greece ranks 22nd), while the EU28 average is 11% and 23%, respectively (Figure 4.2.1).

To approach the technology infrastructure dimension, three indicators are used: the percentage of firms using DSL or other fixed broadband connection, the percentage of firms using internet connections via mobile telephone networks (for business purposes) and the percentage of firms that buy cloud computing services used over the internet. Broadband connection to the internet is nowadays considered a mainstream technology, with 94% of European firms and 97% of Greek firms using broadband connection. Mobile connection is not so widespread, but is gaining ground rapidly, with 67% of European firms and 58% of Greek firms (Greece ranks 26th) using internet connections via mobile telephone networks. Greece also falls below the EU28 average as far as cloud computing is concerned; 15% of Greek firms buy cloud computing services (Greece ranks 24th) while the EU28 average is 27% (Figure 4.2.1).

The organisational dimension is captured through two indicators: the percentage of firms using ERP[70] software packages and the percentage of firms using software solutions like CRM[71] (the reference year for both indicators is 2017). Greece is above the EU28 average as far as the use of ERP software is concerned and is ranked 5th among its EU counterparts. The EU28 average is 35%, while 42% of Greek firms use ERP software. On the other hand, Greece falls below the EU28 average regarding the use of CRM software, ranking 22nd; 22% of Greek firms and 34% of European firms use CRM software (Figure 4.2.2).

ICTs have revolutionised the way firms approach, attract, communicate and share information with their customers, creating new marketing tools. The visibility and communi-

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70. ERP (Enterprise Resource Planning) is a software package used to manage resources by sharing information among different functional areas.

71. CRM (Customer Relationship Management) refers to any software application for managing information about customers.

Figure 4.2.1
Human capital and ICT infrastructure indicators: Greece and the EU28 average

% of firms that employ ICT specialists

% of firms that buy cloud computing services used over the internet

% of firms that provide training to ICT specialists to develop/upgrade their ICT skills

% of firms that use internet connections via mobile telephone networks, for business purpose

% of firms that provide training to their personnel to develop/upgrade their ICT skills

% of firms using DSL or other fixed broadband connection

—●— Greece   —●— EU28

Source: Eurostat.

Figure 4.2.2
Organisation, visibility and communication indicators: Greece and the EU28 average

% of firms using ERP software packages

% of firms paying to advertise on the internet

% of firms using software solutions like CRM

% of firms using any social media

% of firms with a website

—●— Greece   —●— EU28
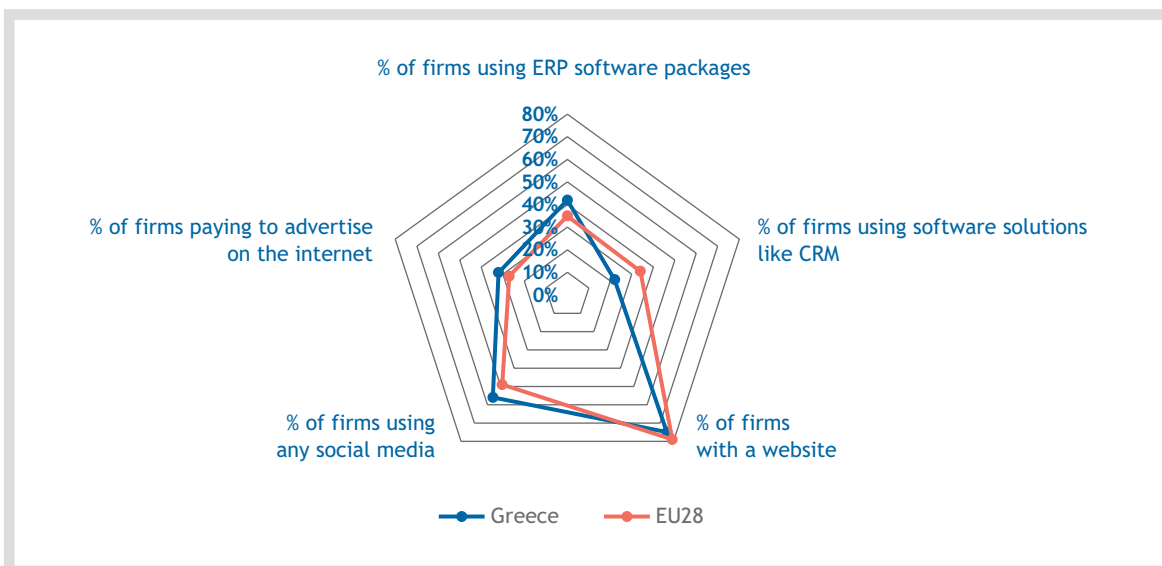
Source: Eurostat.

Notes: The ERP, CRM and social media indicators refer to year 2017; the remaining indicators refer to year 2018.

cation dimension is approached through three indicators: the percentage of firms with a website, the percentage of firms using social media and the percentage of firms paying to advertise on the internet. Most Greek firms have an internet presence; 75% of Greek firms have a website, but Greece still falls below the EU28 average (79%), ranking 18th. As far as the other two indicators are concerned, Greece is above the EU28 average; 56% of Greek firms use social media (Greece ranks 10th, the reference year is 2017) and 32% pay to advertise on the internet (Greece ranks 11th), while the EU28 average is 49% and 27%, respectively (Figure 4.2.2).

E-commerce is a key area of ICT implementation. It can significantly improve a firms' efficiency in their day-to-day operations and transactions, increase information flows, and open new cross-border distribution channels (Ongori and Migiro, 2010). Effective e-commerce adoption is positively linked to improved business performance, cost reduction and profit maximisation (Abebe, 2014; Khoo et al., 2018; Braojos et al., 2019). As shown in Figure 4.2.3, the digital divide related to e-commerce between Greece and the EU is considerable, with Greece underperforming in all six e-commerce indicators examined. In 2018, 11% of Greek firms received orders via a website or apps and just 1% received orders placed via EDI-type messages,[72] while the EU28 average was 16% and 6%, respectively.

Figure 4.2.3
E-commerce indicators: Greece and the EU28 average
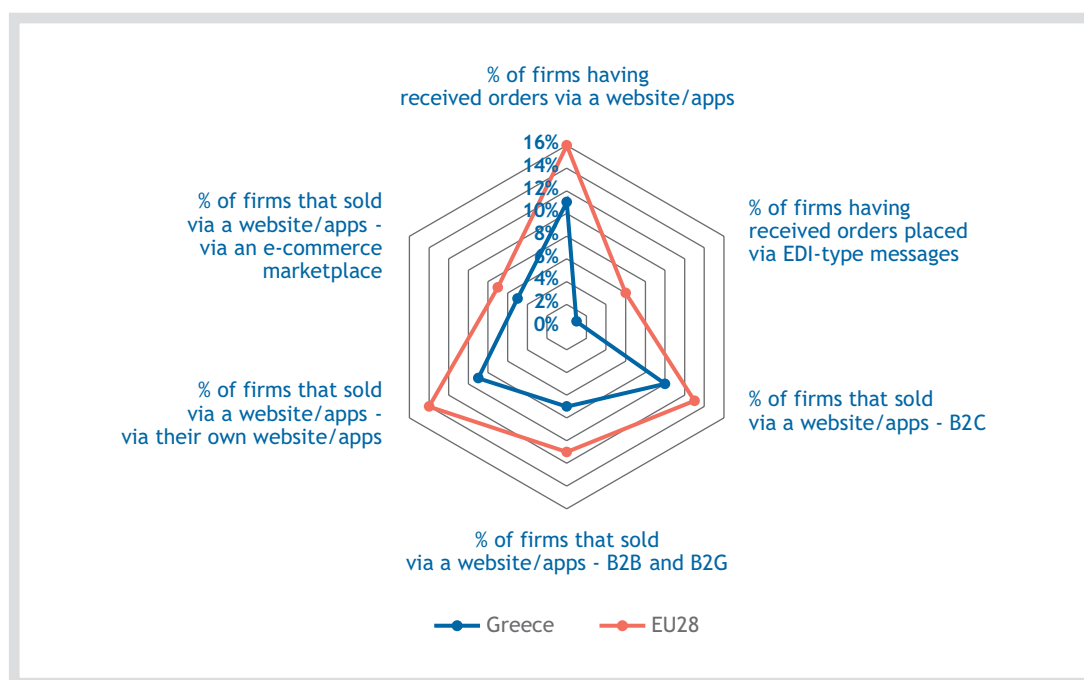
Source: Eurostat.

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72. EDI-type messages (EDI: Electronic Data interchange) are messages in an agreed or standard format suitable for automated processing, without the individual messages being typed manually.

Customers placing electronic orders can be either individuals (B2C: Business-to-Consumer), other firms (B2B: Business-to-Business), or public authorities (B2G: Business-to-Government). A rather low percentage of Greek firms, i.e., 10%, received orders via website or apps from individual customers (B2C) and 7% received orders from other businesses or public authorities (B2B and B2G), while the EU28 average was 13% and 11%, respectively. Moreover, 9% of Greek firms received orders via their own website or apps and 5% via an e-commerce marketplace, while the EU28 average was 14% and 7%, respectively.

4.2.3. ICT and productivity

The effects of ICT on productivity and growth have attracted much research interest during the last decades (Draca et al., 2007; Cardona et al., 2013). Typically, these effects can occur through three transmission channels as acknowledged in the relevant literature (e.g. Pilat, 2004; Timmer and Van Ark, 2005). First, ICT may increase efficiency in the use of capital and labour, thus resulting in growth of multifactor productivity (MFP) in the ICT producing sector. Second, ICT contributes to capital deepening via productivity gains generated from the use of these technologies as capital input in the non-ICT sectors and therefore help raise labour productivity. Third, greater use of ICT as a general-purpose technology throughout the economy may result in increases in the overall efficiency of firms, thus improving MFP.

The above effects have been examined at three levels of analysis, i.e., the macroeconomic or country level, the industry level and the microeconomic or firm level. A large volume of relevant research, especially at the country level, has focused on the so-called "productivity paradox" or "Solow paradox" (Solow, 1987), which concerns the limited contribution of ICT to productivity.[73] Even though the debate is still open (Acemoglu et al., 2014; Kijek and Kijek, 2019), the majority of empirical studies provide evidence of the positive effects of ICT on productivity, suggesting the refutation or resolution of the productivity paradox (e.g., Dedrick et al., 2003). Limited available evidence for Greece, based on country-level data (Antonopoulos and Sakellaris, 2009) as well as data at the firm level (Arvanitis and Loukis, 2009; Loukis et al., 2009), indicates the existence of a positive correlation between ICT investment and productivity.

The superiority of firm-level analyses over country- or industry-level studies on the topic has been largely highlighted in the empirical literature (Pilat, 2004; Draca et al., 2007; Kijek and Kijek, 2019). In this vein, we utilise firm-level data to explore whether the adoption of various types of ICT is linked to labour productivity in Greek businesses by identifying potential digital divides between low- and high-productivity firms. The data come from the Community survey on "ICT usage and e-commerce in enterprises" as before, but for the purposes of the present analysis, they are provided by the Hellenic Statistical Authority

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73. Solow (1987) examined US productivity in the 1970s and 1980s based on existing evidence and noted that, despite the widespread adoption of computers, the productivity in the US began to slow down from the mid 1970s. This led him to the commonly cited remark: "You can see the computer age everywhere but in the productivity statistics".
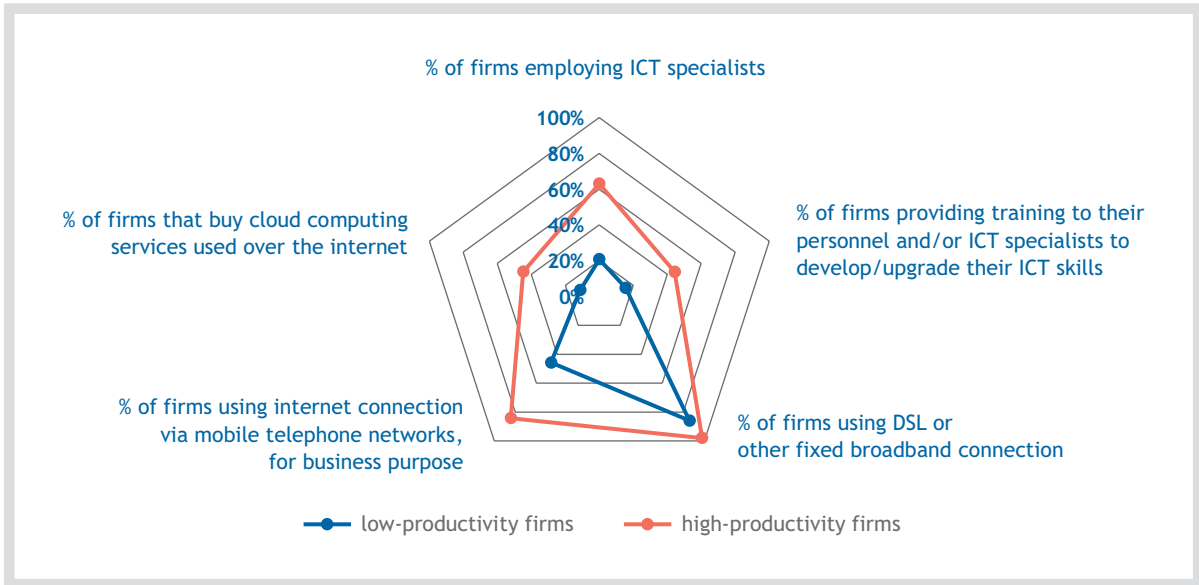
(ELSTAT) at a firm level. Labour productivity is computed as the ratio of firms' total annual sales to the total number of employees. Following the related literature (e.g., Andrews et al., 2015), high-productivity (frontier) firms are defined based on the upper 10% of the productivity distribution of firms in our sample. Accordingly, low-productivity (laggard) firms are defined as those belonging to the lower 10% of the productivity distribution of firms in our sample. The productivity measure as well as the ICT indicators, which are expressed in terms of percentages of firms with computers, refer to year 2018, unless otherwise stated.

Figure 4.2.4 shows the digital divides between low- and high-productivity firms with respect to two human capital indicators (employment of ICT specialists and training of employees —either ICT specialists or personnel in general— in ICT related issues) and three ICT infrastructure indices (fixed broadband connection, mobile internet connection and cloud computing). High-productivity firms appear to outperform their low-productivity counterparts in all examined indicators. The highest divides are observed in the cases of the ICT specialists and mobile internet connection indicators, reaching 42 percentage points (p.p.) and 38 p.p., respectively. The use of cloud computing services and the provision of training for employees in ICT related issues follow with significant digital divides of 33 p.p. and 29 p.p., respectively. The smallest difference between high- and low-productivity enterprises is observed regarding the use of DSL or other fixed broadband connection (12 p.p.), which is a basic technological infrastructure available in most Greek firms.

Figure 4.2.5 presents the digital divides between low- and high-productivity firms with respect to two ICT indicators concerning firms' internal organization (use of ERP and CRM software packages), three indices related to firm visibility and communication with consumers (website availability, paying to advertise on the internet and use of social media) and an e-commerce indicator (receipt of orders via a website, apps or EDI-type messages). The picture is similar to that in Figure 4.2.4, indicating the superiority of high-productivity firms in the adoption and use of all types of technologies under examination.

The highest divide, exceeding 50 p.p., is observed for the ERP indicator (reference year 2017), suggesting that, contrary to high-productivity firms, software solutions related to resource planning are not commonly used by enterprises with low labour productivity. Significant differences are also observed in the cases of website availability and the use of software solutions like CRM (reference year 2017), with the digital divides being 37 p.p. and 31 p.p., respectively. The divides appear to be smaller regarding the remaining indicators, i.e., the use of social media (17 p.p., reference year 2017), online paid advertising (17 p.p.) and receipt of orders via website, apps or EDI (15 p.p.). The smallest divide is observed in the case of the e-sales metric and is potentially related to the low adoption rates of e-commerce that characterise, in general, Greek businesses.

Figure 4.2.4
Human capital and ICT infrastructure indicators:
Low- and high-productivity firms

% of firms employing ICT specialists

% of firms that buy cloud computing services used over the internet

% of firms providing training to their personnel and/or ICT specialists to develop/upgrade their ICT skills

% of firms using internet connection via mobile telephone networks, for business purpose

% of firms using DSL or other fixed broadband connection

— low-productivity firms   — high-productivity firms

Source: ELSTAT, own computations.

Figure 4.2.5
Organisation, visibility, communication and e-sales indicators:
Low- and high-productivity firms

% of firms using ERP software package

% of firms having received orders via a website/apps/EDI

% of firms using software solutions like CRM

% of firms paying to advertise on the internet

% of firms with a website

% of firms using any social media

— low-productivity firms   — high-productivity firms
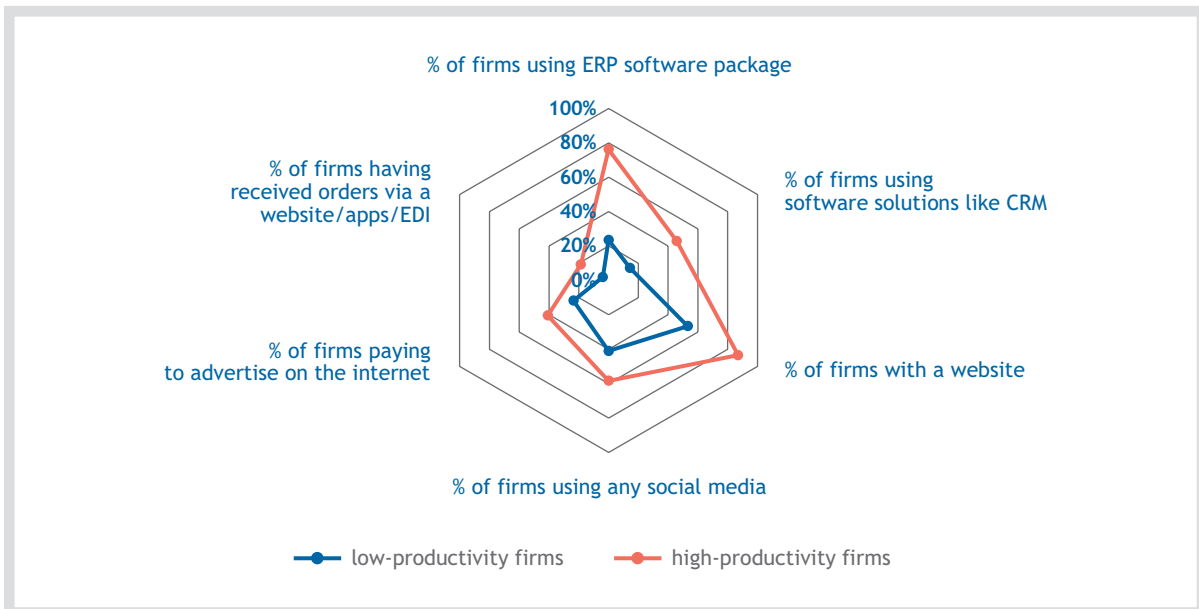
Source: ELSTAT, own computations.

Notes: The ERP, CRM and social media indicators refer to year 2017; the remaining indicators refer to year 2018.

4.2.4. Concluding remarks

The digital transformation of the global production/business model has created huge opportunities for enterprises, linked to multiple benefits and gains in terms of efficiency, productivity, competitiveness and growth. The analysis of this section yielded the following main findings:

- Greek firms underperform their European counterparts in a number of ICT indicators, especially those related to the use of cloud computing services and CRM software solutions, internet connections via mobile telephone networks, the provision of training to personnel in ICT-related issues and e-commerce practices.

- Greek enterprises lag behind the EU28 average with respect to all six examined dimensions of e-commerce, which concern different ways of receiving electronic orders (via own website/apps, e-commerce marketplace and EDI-type messages) and different types of customers (B2C and B2B or B2G).

- The analysis, based on firm-level data, revealed significant digital divides between low- and high-productivity firms in Greece, with high-productivity enterprises outperforming their low-productivity counterparts in all examined ICT indicators.

Based on the above, we can conclude that Greek firms have not taken full advantage of ICT, especially as far as e-commerce is concerned. Moreover, the digital divides identified between low- and high-productivity firms imply that ICT adoption may be positively correlated with firms' labour productivity.

In light of the current health crisis due to the new coronavirus pandemic, encouraging and facilitating e-business and e-commerce should be a top priority within a national strategy, in order to mitigate the social and economic impact of the crisis in such turbulent times. Human capital and technological infrastructure appear to be of high significance for e-commerce adoption by Greek firms, while common e-sales obstacles are mainly associated with the perceived unsuitability of firms' products for e-sales, the high costs of implementing e-commerce technologies and problems related to payment methods and the legal framework (e.g., Kontolaimou and Skintzi, 2018). Hence, an effective government action plan intended to encourage e-business and e-commerce and mitigate related barriers could include

- specially designed actions for the technological upgrading of firms, in order to apply e-business and e-commerce solutions,

- flexible training programmes in ICT-related issues for firms' personnel, and distance learning and mobility programmes for exchanging and enhancing ICT skills at all levels of education,

- provision of systematic and continuous information to businesses about regulations, procedures, challenges and opportunities related to e-commerce via seminars, workshops, trade fairs and digital entrepreneurship forums, and

- a thoroughly designed and regularly reviewed regulatory framework emphasizing issues related to consumer protection, security of transactions, privacy of records, and intellectual property.

Finally, the high digital divides between low- and high-productivity firms may imply that rather few leading enterprises in Greece are able to take full advantage of the opportunities that emerge in the context of the new technological wave, while the rest fall behind. Decreasing this divide requires the promotion of proper and adequate policies and initiatives such as the establishment of centres and/or networks for technology transfer and diffusion as well as structures for fostering industry-university collaborations to reduce the cost and the risk associated with potential ICT investments. Encouraging and supporting laggard firms to adopt new technologies is crucial since the intensive use of ICT increases their chances of survival and enhances their profitability, competitiveness and growth. Overall, greater government support in realising and accelerating the digital transformation of businesses seems to be of high significance in order for Greek firms to be capable of improving their digital performance and competitiveness, especially in the context of a single digital market.

5. Conclusions and policy suggestions

5.1. Aggregate and sectoral productivity growth

The productivity of the Greek economy shows divergence from that of the EA, and its TFP remains quite low —about half of the TFP of the frontier economies in the EU and worldwide, such as those of Germany and the USA. Despite its slight gradual increase during the recovery period since 2016, the coronavirus pandemic is anticipated to cause a large drop of TFP in the Greek and the other European economies, and the recovery during 2021 will only partially compensate the losses during 2020.

In the context of a long-term recovery plan and in conjunction with the resources to be utilised over the multiannual financial framework 2021-2027, emphasis should be given to both the quantitative (capital deepening and employment growth) and qualitative (digital upgrading and human capital enhancement-upskilling) attributes of production inputs to boost the productivity and efficiency of the Greek economy. Although the issue of the energy transition of the country to a low-carbon economy is not analytically discussed in this report, it is also important to say that all policy actions must be aligned with the achievement of the sustainable development goals and the gradual adjustment to climate change, according to the National Energy and Climate Plan and the European Green Deal (Lychnaras, 2020).

The productive investments must be accompanied with a coherent framework of structural reforms to promote (see also below) innovation and entrepreneurship; all levels of education and training; research and technology; the effectiveness of the public sector; the legal system; financing conditions; the sustainability

and fairness of the insurance, social security and taxation systems; and the affordability of childcare, education, healthcare and other basic necessities.

The aggregate and sectoral productivity growth and the inter-sectoral analysis of the Greek economy signified the need for the deployment of a comprehensive growth strategy. Beyond the short-term actions for the recovery through stimulating effective demand, mostly in the public sector and tourism industry, this strategy should focus on activities that can enhance productivity and competitiveness, including structural policies to strengthen exports and the value-added content of the domestic economy on global value chains, a new industrial policy, and an investment programme to attract and allocate resources towards the most efficient sectors of the economy.

5.2. Enhancement of competitiveness

Despite the favourable course of public finances and debt sustainability during the last years, which helped to enhance Greece's credit ranking and sovereign financing, the country's investment expenditure remains at a low level, and public debt is at the highest position among the EU27. Moreover, the increased uncertainty and emergency spending and the fiscal measures to support the public health system and businesses and private-sector employment deteriorate both the budget balance and public debt as well as the outlook for the country's CA imbalances and NIIP, due to dependencies on foreign demand and exposure to world trade.

The investigation of international competitiveness indicators stresses the need for dealing with some critical indicators that play a crucial role and whose improvement could be catalyst in boosting the overall competitiveness of the Greek economy, such as those related to the legal system, the land administration and the public sector performance. At the same time, improvement efforts should also focus on treating the bureaucracy and public administration inefficiencies at the local level, where significant disparities are observed.

Particularly in relation to the competitiveness of the Greek manufacturing industry, it is persistently characterised by low performance in terms of its contribution to total exports and its value-added content. Among others, this poor performance can be addressed by reducing the cost and improving the quality of input factors, e.g., through facilitating access to external finance and decreasing borrowing costs, introducing energy-efficient technologies and effective logistics services, increasing investments in human and tangible capital, and raising (at least, at the average EU level) the R&D intensity and the share of production of high-tech manufacturing products of Greek industry.

5.3. Key thematic productivity challenges and reforms

Greece is characterised by a relatively low performance in skills development, skills under-utilisation and increased skills mismatch, which exacerbate the sub-optimal operation of firms and industries, and raise unemployment and 'brain-drain'. The share of employees participating in education and training is also very low compared to the EU27 average. The problems pertaining to the education system and skills mismatch are complex and require a holistic approach. Among others, policy interventions and reforms should focus on all levels of formal education and encompass all types of learning to reinforce the link between the skills supplied by the education system and the skills required by firms.

Moreover, Greek firms have not taken full advantage of new technologies, since they lag behind the EU28 average in several ICT indicators, especially the use of cloud computing services and CRM software solutions, internet connections via mobile telephone networks and the training of personnel in ICT-related issues, while they considerably underperform in e-commerce practices. Additionally, firm-level analysis suggests significant digital divides between frontier and laggard firms in Greece in all the examined ICT indicators. Government policies for the enhancement of human capital and technological infrastructure in businesses as well as flexible training programmes for their personnel in ICT-related issues could help mitigate some barriers to e-business/e-commerce and reduce digital divides.

In addition to the newly set up reform plan for the Greek economy, the country has shown some positive developments in structural reforms, despite the temporary disturbances caused by the coronavirus pandemic (for further details and examples, see the Appendix). These developments largely focus on attracting investment, improving the business environment, and supporting business start-up, viability and employment conditions. Given that the reduction of economic freedom decreases productivity, growth and economic prosperity, the government should interfere less in the functioning of product markets, reduce its presence in key network industries (energy, transport and communication) and play a decisive role in the protection of property rights and the establishment of the rule of law.

The process of reforming/liberalising professions and activities of Greece's service sector spanned over the 2010s and has now been largely completed, bringing about an improvement in competition and a reduction of prices, through the abolition or drastic reduction of market entry barriers and conduct restrictions in many professions/activities, and increasing employment and consumer welfare. Finally, a closer connection between changes in wage costs and growth in productivity and competitiveness is required. This is because wages, which constitute a substantial share of production costs, directly affect cost competitiveness indictors, in terms of the unit labour costs and effective exchange rates, exports performance and current account imbalances.

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Appendix
Developments in structural reforms

A.1. National targets and actions to support structural reforms

Greece's reforms profile has shown a tendency toward improvement, which was interrupted by the coronavirus spread and which is expected to be a temporary shock. However, in the pre-Covid-19 period, it can be mentioned that the aim of the Greek authorities was to put an end to the "unnecessary inconvenience",[74] which leads to the loss of trust in the State, and, as an extension, a decrease of productivity and competitiveness. Therefore, the main targets of the Greek authorities were the following:

1. Removing obstacles and curing weaknesses in attracting investment, especially in licensing, environmental and urban issues, as the country must enter the digital age and apply European and international best-practices,

2. Implementing several small reforms that can change the business environment,

3. Supporting businesses that are young or have serious financial problems,

4. Ensuring full employment conditions,

5. Supporting the healthy, transparent and representative participation of social partners.

To achieve these targets, the Greek Government has taken actions to

- give incentives to set up enterprises in business parks and to attract strategic investments of 15 million euro or more,

- create the Single Digital Map, i.e., an electronic database with all the critical data related to construction activity,

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74. What follows is primarily based on the "Greece - National Reform Programme 2020" <https://oe-e. gr/wp-content/uploads/2020/05/2020-european-semester-national-reform-programme-greece_el.pdf>; and a development bill that was passed by the Hellenic Parliament on October 24, 2019, bearing number 4635/2019 (the "Invest in Greece" Law).

- accelerate the evaluation and monitoring of the implementation of investment projects (currently 2,500 files are stagnant) that have been based on the Development Law,

- motivate the telecommunications providers to facilitate investment in new-generation wireless networks, especially 5G networks,

- set barriers to undeclared work,

- expedite the judicial process by introducing electronic litigation and teleconferencing in administrative justice,

- abolish financial and time burdens of licensing processes for new investments,

- create jobs in the private sector of the economy and facilitate the acquisition of certified technical and digital skills for unemployed persons.

Last but not least, it should be noted that the government has set up a committee headed by the Nobel laureate economist Christoforos Pissaridis to submit a reform plan for the Greek economy, introducing, in that way, a long-term roadmap of structural reforms.

## A.2. Economic freedom, product markets and productivity

Over the last three decades, a growing number of countries have chosen to liberalise their economies in response to increasing global competition. Governments have now become less strict in a number of areas, including international trade, taxation and the functioning of product, labour and financial markets. The Economic Freedom of the World Index (Gwartney et al., 2017) measures the extent of government involvement in five distinct areas of economic policy: a) government size, b) the rule of law and protection of property rights, c) access to sound money, d) international trade and capital movements, and e) regulation in business, credit and labour markets. Each of these areas enters the final index with equal weighting. The economic freedom index ranges between 0-10, with a high score reflecting low government intervention and market-friendly policy orientation. This index is available across a wide array of high- and low-income countries on a yearly basis from 2000 onwards.

Figure A.2.1 illustrates that the index of economic freedom in Greece was constantly rising up to 2005. However, in the subsequent years, economic freedom declined significantly, reaching close to the value of 6.5 in 2017, which is the lowest amongst all EU countries (Figure A.2.2). This decline can be mainly attributed to the significant retreat of economic freedom in the area of government size (from 7.08 to 4.39), in the dimensions of the rule of law and protection of property rights (from 6.74 to 5.73) and access to sound money (from 9.56 to 7.98). The dimension of international trade and capital movements has not changed drastically (a slight decrease from 7.75 to 7.68), while that of regulation in business, credit and labour markets has improved from 6.10 to 7.17. During the same period, the TFP of the Greek economy decreased considerably (Figure A.2.3), while the TFP gap vis-à-vis the US economy (Figure A.2.4) has more than doubled. Figure A.2.5 shows that the TFP gap vis-à-vis Germany (Figure A.2.5) has also significantly increased.

The importance of economic freedom in raising economic growth has been proved by numerous studies (Gwartney et al., 1999; De Haan and Sturm, 2000; Carlsson and Lundstrom, 2002; Scully, 2002; Justesen, 2008; Williamson and Mathers, 2011). Figure A.2.6 also illustrates that the annual average increase in the extent of economic freedom (during the period 2000-2017) is positively associated with the annual average TFP growth of 98 high- and low-income countries during the same period.

The importance of lowering restrictions in product markets has been stressed by Nicoletti and Scarpetta (2003), who showed that lower entry barriers and less state control accelerate the process of catch-up to best-practice technologies in manufacturing industries. Productivity gains to be obtained through the reduction of the public role in the economy and through lowering entry barriers in product markets are very high for countries with high technology gaps vis-à-vis the productivity frontier, such as Greece. Dimelis and Papaioannou (2016)

Figure A.2.1
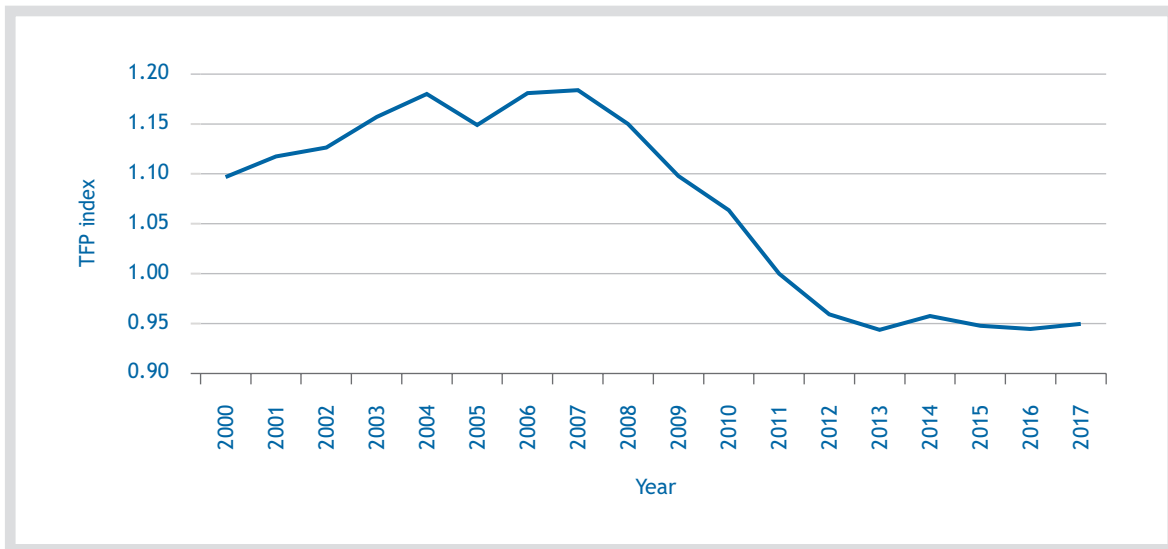## Evolution of economic freedom in Greece, 2000-2017
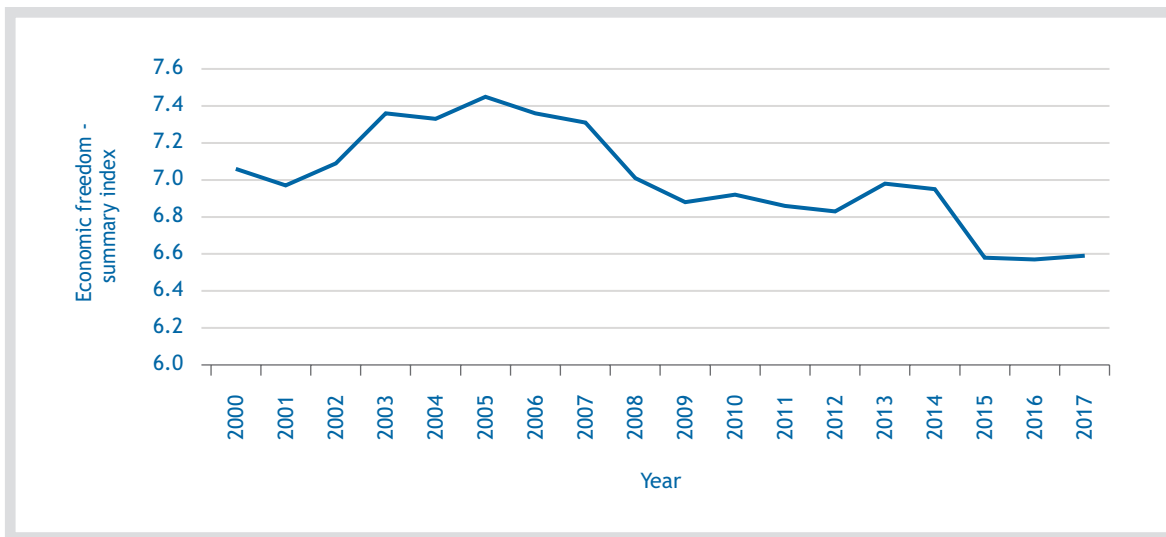
Source: Gwartney et al. (2017).

Figure A.2.2
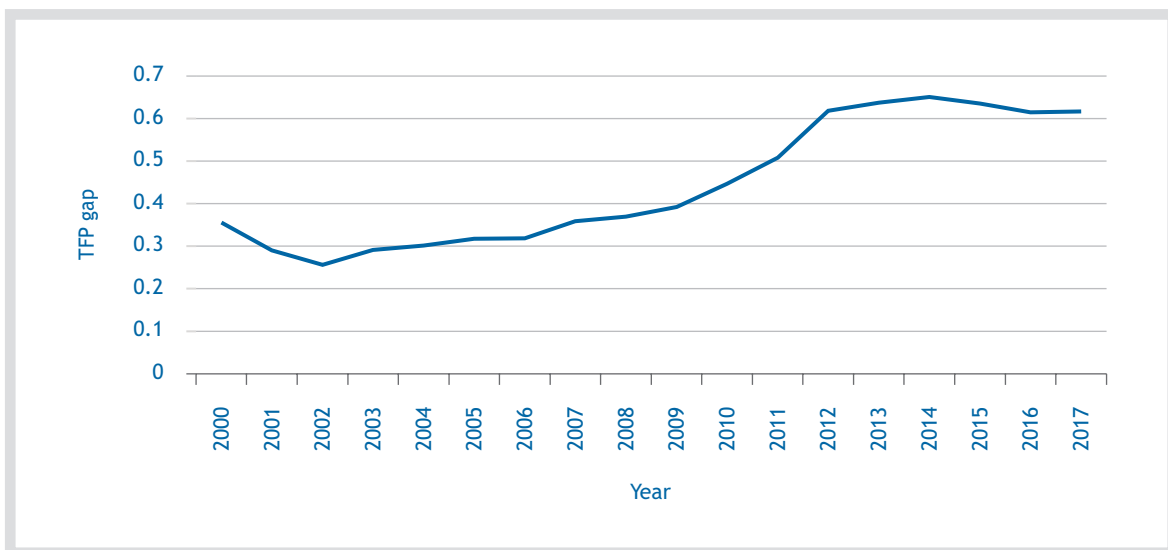## Economic freedom across EU countries, 2017
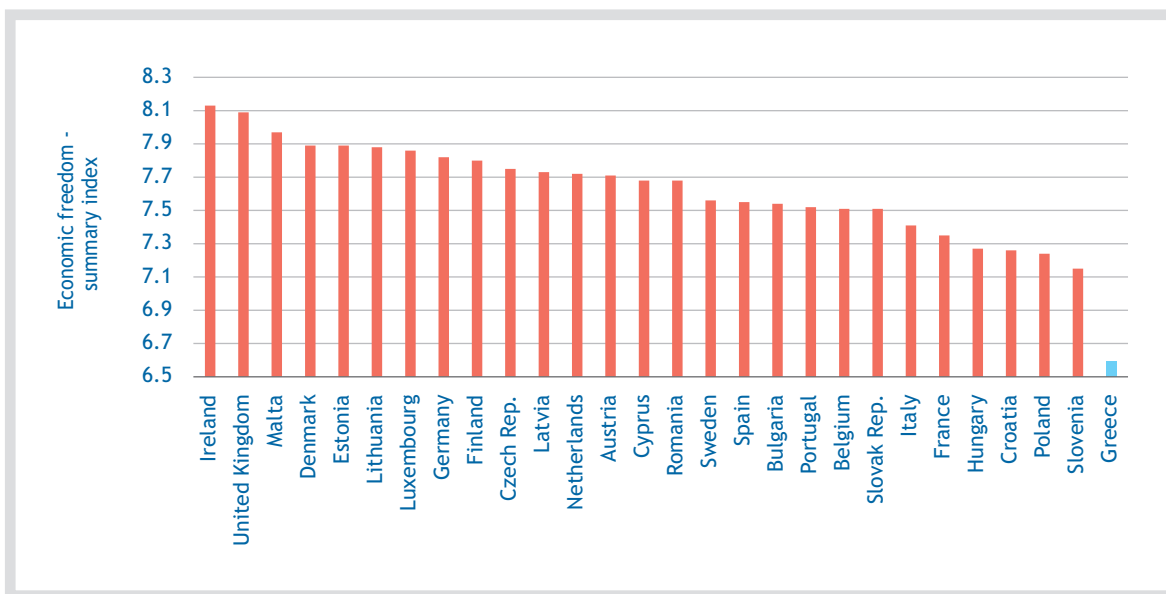
Source: Gwartney et al. (2017).

Figure A.2.3
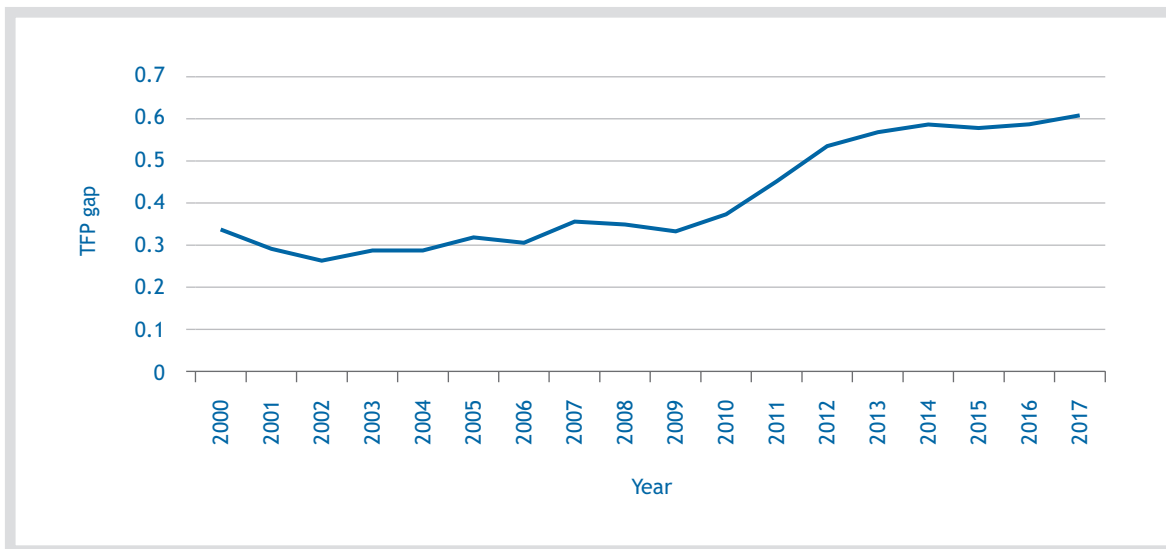## Evolution of the TFP index in Greece, 2000-2017

Source: Penn World Tables 9.1 (Feenstra et al., 2015).

Figure A.2.4
Evolution of the TFP gap vis-à-vis the US economy, 2000-2017

Source: Penn World Tables 9.1 (Feenstra et al., 2015).

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Figure A.2.5
Evolution of the TFP gap vis-à-vis Germany, 2000-2017

Source: Penn World Tables 9.1 (Feenstra et al., 2015).

Figure A.2.6
Average TFP growth and average increase of economic freedom across countries, 2000-2017
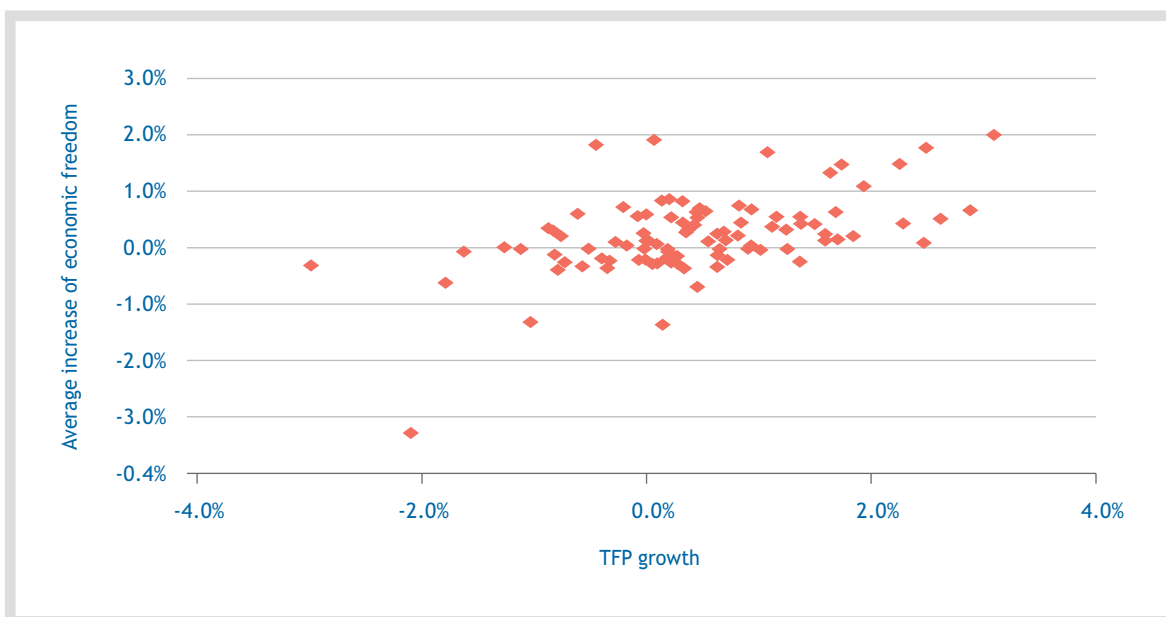
showed that a reduction in the degree of entry regulation is associated with higher industry-level TFP growth in south European countries (Greece, Italy and Spain). Papaioannou (2017) also provided evidence in favour of a negative long-run influence of regulation in network industries of energy, transport and communications on TFP growth, which is more intense in countries with already high levels of regulation and low technology gaps. It bears noting that the index of product market regulation (OECD 2018 PMR database) for Greece was equal to 1.56 in 2018 and remained one of the highest among OECD countries.[75]

Lower regulations in the upstream sectors of energy, transport and communications also exert an indirect upward effect on productivity by strengthening the favourable influence of ICT and FDI on industry-level efficiency (Papaioannou and Dimelis, 2017) and TFP growth (Papaioannou and Dimelis, 2019). Finally, Papaioannou (2018) showed that the liberalisation of services affected the TFP growth of European service sectors in a positive way, with the most significant impact taking place in medium- and high-growth industries.

Overall, the main message from this brief analysis and the review of the literature is that the reduction of economic freedom brings about lower productivity and, consequently, lower growth and economic prosperity. Therefore, the basic policy implication is that governments should interfere less in the functioning of product markets, should try to reduce their presence in key network industries of the economy (energy, transport and communications) and should play a decisive role in the protection of property rights and the establishment of the rule of law.

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75. These values are based on a new methodology and cannot be compared with previous vintages of the OECD Product Market Regulation Index.

A.3. Structural reforms in professions/economic activities of the service sector

From the year 2010 onwards, the institutional framework regulating professions/economic activities of the service sector in Greece has been revised extensively to promote competition, conform to EU regulations and fulfil commitments under the Memoranda of Economic and Financial Policies. The reform for the liberalisation of professions/activities of Greece's service sector was initiated with Law 3844/3.5.2010, the adaption of the Greek legislation to the Directive 2006/123/EC. Next came the omnibus Law 3919/2.3.2011 on the 'principle of freedom of profession, repeal of unwarranted restrictions on the access to and exercise of professions' (OG 32 A´). The implementation of this law proved a lengthy and complex process, entailing the adoption of many further acts and several new laws and the issuing of a vast series of Presidential Decrees, Ministerial Decisions and circulars. The reform process has now been largely completed, bringing about the abolition or drastic reduction of market entry and conduct restrictions in a wide range of service sector professions/activities.

Given the importance of increased competition for the improvement of economic performance, the encouragement of business growth and the reduction of the cost of goods and services in the economy as a whole, the reform was expected to lift obstacles to growth (Box A.3.1) and have potentially substantial short-term and long-term economic benefits, contributing to the recovery of the Greek economy from the crisis. The significance of these benefits (Box A.3.2) was strengthened by the fact that the services supplied by the relevant professions are important for consumers, and they are also key for competitiveness, as they constitute inputs in the production process of other goods and services.

In the course of the reform, KEPE conducted many studies on the extent and the type of legislative changes, the implementation procedures and the ex ante or ex post evaluation of their impact, focusing on key economic parameters, such as employment, prices, quality, GDP, etc. (Athanassiou et. al., 2015, 2019; Karagiannis et al., 2016, 2017, 2019; Kotsi et al., 2013, 2014, 2015, 2016). The relevant analyses suggested that before the extensive revision of the relevant institutional framework, the presence of restrictive regulations was widespread, while significant improvements to the regulatory regime were enacted after the application of the relevant laws.

Box A.3.1
Problems prior to the reform on professions/ economic activities

Prior to the reform, access to and practice of several service professions/ activities were subject to extensive restrictive regulations on market entry and conduct (Athanassiou et al., 2013; Athanassiou et al., 2001; Kotsi et al., 2012, 2013). More specifically, depending on the profession, the regulations applied included administrative licensing to practice the profession, restrictions (quotas) on the number of individuals granted an administrative license throughout the country or in a particular geographical district; dependence of granting the license upon the administrative authority's assessment of the need to do so (economic needs test); prohibition of practicing the profession beyond the limits of a specified geographical district; prohibition on establishing branches or practicing in more than one facility; imposition of minimum distances between premises; obligation to offer additional specific services; restrictions on the business form or prohibition of practicing under any business form, with only practicing as a single natural person being allowed; imposition of constraints on equity participation, exclusive rights to or prohibition of the supply of services from specific types of professional facilities; imposition of mandatory minimum prices; and restrictions on advertising. Many of these regulations were considered to pose significant barriers to competition, delaying the procedures for setting up a new firm, imposing extra costs to the entrepreneur and leading to a clear limitation of professional freedom, without being justified in terms of public interest protection. Furthermore, some of the regulations were in conflict with the spirit of Directive 2006/123/EC for the elimination of unjustified restrictions to the supply of services in the EU internal market (Kotsi et al., 2005).

Box A.3.2
Benefits of the reforms on professions/economic activities

More particularly, after the reforms, the requirement for the issuing of an administrative license to practice a profession/activity was abolished and replaced with a simple notification of commencement of activity accompanied by the necessary supporting credentials. Furthermore, for the majority of professions (with the exception of a few professions with special provisions), practitioners can exercise their profession nationwide, and one or more branches can be established throughout the country. In addition, inter-professional cooperation is allowed in specific professions. Reference fees/prices can be defined for some professions, to be used when a written agreement on fees has not been signed between parties, while for a limited number of professions, entry requirements comprise exclusive or shared rights of particular activities. Remaining regulations have been maintained on the grounds of public interest, public health and safety, consumer protection, protection of the environment, and protection of national heritage, and concern mainly scientific professions with high educational qualifications, a high degree of specialisation and a sensitive nature of services provided. The recent calculation of regulation indices for a sample of professions/ economic activities based on the methodology of the European Commission, suggested that the degree of regulation decreased for nearly all cases under consideration after the implementation of the reforms (Athanassiou et. al., 2019). A gradual decrease of the intensity of regulation in a sufficient number of occupations characterised by stringent restrictions before the adoption of the laws was found in similar approaches during the liberalisation process (Athanassiou et. al., 2013, 2016). The reforms seem to facilitate the entry of new practitioners in the market and lifted restrictions on the range of suppliers. The abolition of compulsory minimum/maximum prices and fees improved competition among professionals and had a positive impact on consumer welfare, by lowering prices in selected professions affected by the reforms. With respect to the effects of the reform on employment, there are indications of positive effects for the regulated professions as a whole, as, without the reform, the recession-induced reduction in their employment would have been larger.

However, it should be noted that the level of regulation on the structure and form of businesses/companies and inter-professional cooperation still differs among economic activities. For professions with restrictions on the qualifications of the owner, the reforms permitted the establishment and operation of business/branch facilities to natural and legal persons who do not fulfil the education requirements to exercise the profession, under the condition of the appointment of a qualified director/manager, who, in some cases, can participate as a shareholder with a certain predefined percentage in the capital of the firm. Furthermore, the 'reference prices' defined in specific professions may, in practice, result in a level of fees or prices applied by the majority of practitioners, if reference prices are used as focal point. The removal of restrictions on advertising is expected to lead to positive effects for consumers who may have better information to choose between the services provided, reduce the search cost and result in lower prices.

A.4. (Minimum) wages, productivity and competitiveness

A.4.1. Recent developments of minimum wages

According to Law 4173/2013, a Ministerial Decision was issued on January 30, 2019, which declared that from February 1, 2019, the new monthly minimum wage for employees was set at 650€ and the daily minimum wage was set at 29.04€, while the sub-minimum wage for workers aged less than 25 was abolished. This is equivalent to an increase of almost 11% for those over 25 and about 27% for those under 25. However, due to a Ministerial Decision on February 14, 2019, employers with employees under the age of 25 are exempted from 50% of the employer's contribution for main pensions; therefore, the increase in the minimum wage to those under 25 is limited to around 20%. Moreover, the Minister of Labour, on February 18, 2019, issued instructions for the exact setting of the minimum wage, which include increases based on past work experience. It is also noteworthy that married workers are entitled to an additional 10% increase of the minimum wage, as provided by the National General Collective Labour Agreement. From all these legal regulations, it becomes clear that, in Greece, there is no unique minimum wage, as in many other countries, but a certain number of minimum wages that depend on the previous work experience and marital status of each employee.[76]

The previous change in the minimum wage took place in mid-February 2012, when there was a drastic reduction in the minimum wage by 22%, and the monthly minimum wage fell from 751.4€ to 561.1€, while the daily minimum wage dropped to 26.18€ from 33.57€. In the case of workers under the age of 25, the percentage reduction in minimum wages was 32%, at which point the monthly minimum salary became 510.95€ and the daily minimum wage 22.83€. These drastic reductions came after unemployment rose from 10.5% in the fourth quarter of 2009 to 20.9% in the fourth quarter of 2011, while 622 thousand jobs were lost in the same two years (almost 14% reduction in employment). These reductions in minimum wages as well as the institutional reforms in the labour market took place in the context of a new agreement between Greece and the lenders (second Memorandum of Understanding between the Greek Government and the IMF, the ECB and the EU). The reductions of minimum wages were followed by a significant drop in average wages, while unemployment continued to rise, peaking at 27% in 2013, and then started to decline in the second quarter of 2014; employment followed a reverse path and has recorded a systematic recovery since mid-2014, particularly among employees.

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76. The aforementioned minimum wages on a yearly basis are remarkably higher due to a Christmas bonus (one salary), Easter bonus (half salary) and holiday bonus (half salary) that, by law, must be paid to private-sector employees.

It is worth noting that the process of minimum wage adjustment, with a decision of the Minister of Labour, has currently been postponed for the autumn of 2020, due to the outbreak of the Covid-19 pandemic. Regarding employers, minimum wages are of particular interest, if we take into consideration the non-wage labour costs. Thus, the employers' compulsory social security contributions, which amount to 29.56% of the gross salary for the most common group of private sector employees, as well as any other non-mandatory labour costs, must be taken into account. On the other side, there is also the taxation of the minimum wage earners in the form of compulsory social security contributions, with 16.5% for the former IKA-ETEAM plus 4% for supplementary insurance, which reduce workers' incentives to participate in the labour market and further expand the gap between the total labour cost of employees with minimum wage and net wage they receive (gross versus net). In other words, for each 100€ paid by the company, the employee receives 61.4€. Thus, the available money of minimum wage employees depends on the level of minimum wage, on the level of social security contributions, as well as on the amount of tax-free income and any tax exemptions they might be entitled to.

A.4.2. Productivity, wages and competitiveness

The gross value added (GVA) in constant prices decreased significantly during the years of the deep crisis (2011-2012). In 2014, it showed a small increase, returned to a decrease in 2015-2016 and, since then, it has recorded a positive growth rate. The evolution of total employment generally matches with the evolution of GVA. Between 2010 and 2013, total employment decreased by about 700 thousand people. Between 2013 and 2019 employment increased by 305 thousand jobs; however, it remained much lower than its pre-crisis level. It is noteworthy that, in the recovery period, the total increase of the GVA (by 3.5%) is clearly less than that of employment (7.6%), which, in turn, is less than the increase of working hours (by 9.5%). It is clear, then, that the country's weak economic recovery has been accompanied by a marked increase in employment, despite the fears that we would have increased production without increasing employment (jobless growth). These developments are compatible with the characteristics of the Greek economy, which is concentrated in labour-intensive sectors (see sections 2.3 and 2.4). The fact that employment increased more than production implies a lack of productivity improvement. Namely, the output per employed person did not increase, but, rather, decreased; therefore, it is difficult to justify any significant increase in wages, even if the total GDP (but not GDP per capita) increases.

The ratio of GVA to employees is a proxy of labour productivity for the economy as a whole and measures the relationship between the amount of goods and services produced and the amount of dependant labour used to create those goods and services. The level of labour

productivity, based on published macro data from EUROSTAT, was estimated at 63,378.75 euro per worker for 2010, which followed a downward trend and fell to 59,811.08 euro per worker in 2016, showing a decrease by 5.63%. This was followed by a small increase over the next two years, which, however, was offset by a 3% decrease in 2019.

The significant structural reforms that took place in the context of the memoranda (mainly changes in the functioning of labour and product markets) seem to have improved the overall functioning of markets and, hence, productivity (see section A.2). However, the decline in aggregate demand and investments during the crisis (see also sections 2.1 and 3.2) reduced productivity. Moreover, the uncertainty regarding the international orientation of the country seems to have decisively affected the decline in production and productivity.

In the period 2010-2016, there was a significant decrease in the average level of nominal wages (-15.0%) and real wages (-9.6%), which was marginally reversed in the period 2017–2019: 2.5% and 1.6%, respectively. These extensive wage cuts contributed to a drastic reduction in the unit labour cost (ULC) (see section 3.3) and to an improvement in competitiveness, thus encouraging employment and investments. High wage cuts reflect the so-called internal devaluation, which was quantitatively significant and has helped to restore the international competitiveness of labour costs of the Greek economy. The implementation of the internal devaluation, which, due to the common currency, required a reduction in nominal wages, proved to be extremely difficult in practice, because it took place in a period of persistent deflation.

It is also interesting to see the evolution of average wages and productivity in relation to that of the minimum wages (see Figure A.4.1). It turns out that, between 2005 and 2011, the annual increases in wages (average and minimum), exceeded the evolution of productivity (GDP per hour of work). With respect to average wages, this pattern started in 2004. It seems that, after the drastic reduction of (minimum and average) wages in 2012-2013, the evolution of productivity exceeds that of wages.

The evolution of wages and productivity, given the size of the Greek economy and its exposure to European and international competition, is affected by the corresponding developments in the countries with which Greece has economic transactions. When production costs, the largest fraction of which are labour costs, and/or prices in Greece increase faster than in the countries with which Greece trades, then Greek exports become less competitive, while imports are encouraged due to declining prices, leading to the deterioration of the current accounts deficit (see section 3.1) and restricting necessary imports for development. As a result, wage growth should take into account developments in the country's international cost competitiveness.

Figure A.4.1
Evolution of wages and productivity in Greece, 2002-2019 (2002=100)
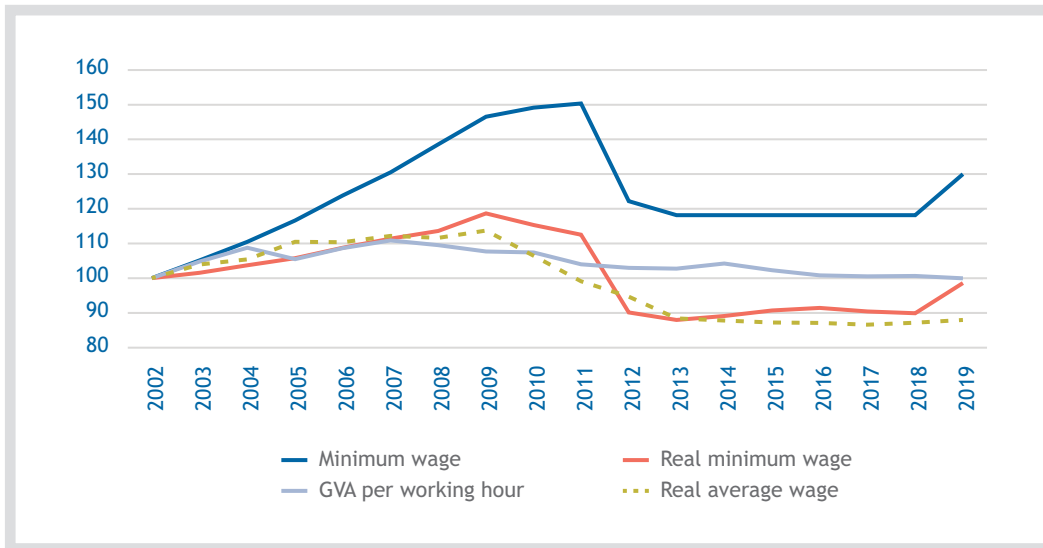
Source: Eurostat, ELSTAT, *National Accounts*.

Figure A.4.2
Evolution of wages and ULC-based REER in Greece, 2002-2019 (EU28 trading partners, 2002=100)
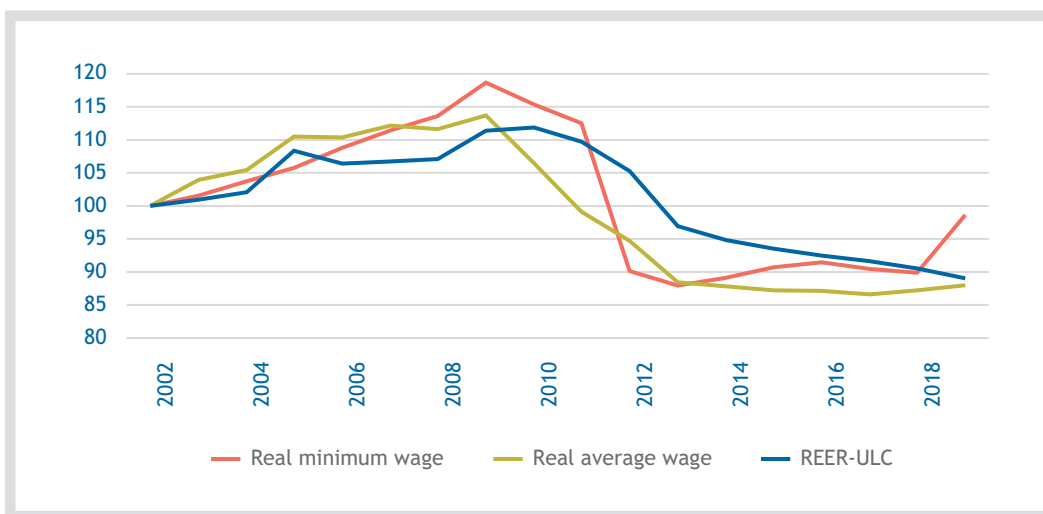
Source: Eurostat, ELSTAT, *National Accounts*.

As a conclusion, the drastic wage cuts in Greece, since 2010, have restored the loss in cost competitiveness in recent years based on labour costs for the economy as a whole (see Figure A.4.2 above). It is found that REER was deteriorating until 2010, as it was moving upwards, together with wages, while, since then, it has been declining (see also section 3.3). It is noteworthy that, since 2013, REER has recovered any losses it had since 2003, showing a restoration of the cost competitiveness of the Greek economy. The significant rise in wages, without a corresponding rise in productivity, coincides with the rise in REER, while the fall in wages coincides with the fall in REER and, therefore, the improvement in the exchange rate and cost competitiveness. The correlation coefficient between developments in REER and average wages is 0.870, while with the minimum wage, it is 0.832.[77]

The ULC-based REER deteriorated sharply until 2010, following average and minimum wage increases, while its improvement coincides with a reduction in wage costs. The evolution of REER is, to some extent, due to the course of productivity in other countries. Therefore, changes in domestic wages cannot solely be a function of domestic productivity, but also of the income policy of our main competitors.

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77. Improving cost competitiveness is not only related to labour costs, but it also involves other factors, such as financial cost, the cost of intermediate inflows, adopted innovation and technology, and productive investments that improve productivity.

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Recovery and Growth Through Enhancing
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