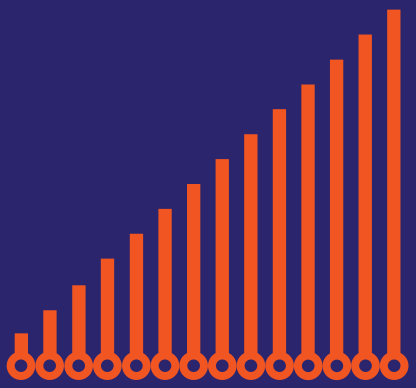
CENTRE OF PLANNING AND ECONOMIC RESEARCH

Issue 41, February 2020

GREEK ECONOMIC OUTLOOK



- **Macroeconomic analysis and projections**
- **Public finance**
- **Human resources and social policies**
- **Development policies and sectors**
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GREEK

Economic Outlook

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Editorial

In the aftermath of Brexit and focusing on the Greek economy, the issue of the non-performing loans (NPLs) of Greek banks is one of the most pressing problems that economic policy makers are urgently required to solve.Therefore, the European Central Bank (ECB) and the Greek Government, through the activation of the "Hercules" project (Law 4649/19), are looking for a process through which the problem of the high percentage of the Greek banks' NPLs will effectively and relatively quickly be resolved. This event, in the long run, will substantially facilitate a new healthy credit expansion.

At the same time, remaining focused on exploring the competitiveness and productivity of the Greek economy at regional and sectoral levels, this issue: (i) explores the adoption of Information and Communication Technologies (ICT) and e-commerce by firms in the four great geographical areas in Greece, indicating the existence of regional digital divides in most cases, which, potentially, reflect the special structural and geographical characteristics of the various regions in the country. (ii) estimates, using an input-output model, the total (direct and indirect) contribution of primary inputs to price formation for the economy as a whole and per category of final demand as well. The findings indicate the necessity for the implementation of well-targeted policies of import substitution of industrial products in order to enhance the international competitiveness of the economy.

The 41st issue of KEPE's *Greek Economic Outlook* is presented in two parts. Part One examines recent developments and prospects for the main components of demand, the Consumer Price Index in Greece and the Eurozone, the factor model forecasts for the short-term prospects of GDP as well as the developments and prospects for global economic activity.

Additionally, it examines the evolution and structure of public debt. The key variables of the Greek labour market are analyzed, as well as the changes in the employment of the financial sector in Greece over time.

As far as sectoral policies are concerned, the articles present analyses of the developments in the Greek tourism sector, the competitiveness of the Greek economy and the Greek capital market.

The second part of the magazine hosts three articles. The first article, which focuses on the issue of the NPLs of Greek banks, analyzes "The implementation of the "Hercules" project for the NPLs: assessment and sustainability prospects". In the second article, entitled "Developments in the adoption of Information and Communication Technologies and e-commerce practices in Greek firms: The regional dimension", a wide range of relevant indicators is analyzed at the peripheral level. Finally, the third article deals with an intersectoral analysis by testing "The contribution of primary inputs to price formation: An input-output analysis of the Greek economy".

NIKOLAOS RODOUSAKIS
Editor

1. Macroeconomic analysis and projections

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 4-12

1.1. Main demand components: Developments and prospects

1.1.1. Introduction – Domestic and external demand

Yannis Panagopoulos

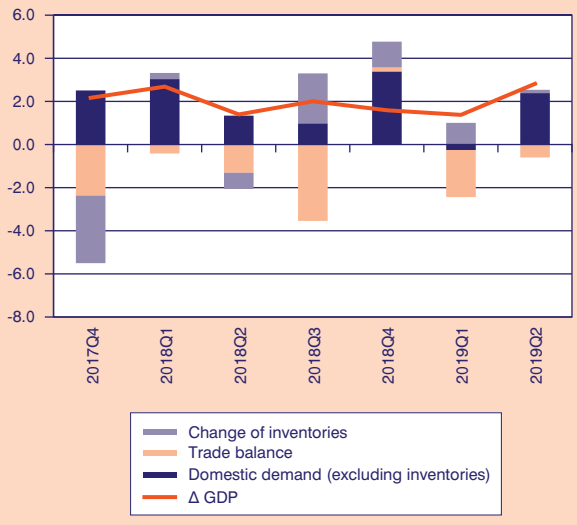
Based on the existing data, we next proceed to the analysis of the Greek economy up to the 3rd quarter of 2019. The first thing we observe here, based on the ELSTAT and the EC quarterly data, as these appear in Table 1.1.1, is the slight decline of the GDP growth rate, on a quarter-on-quarter (q-o-q) basis, during the 3rd quarter of 2019 (from 2.8% to 2.3%). Despite this small q-o-q decline in the GDP growth rate, the corresponding year-on-year (y-o-y) nine-month GDP growth rate was slightly higher, compared to the analogous period of 2018. More analytically, the y-o-y nine-month GDP growth rate was 2.16%, +0.13% higher than the corresponding growth rate of the 2018.

Regarding the contributing factors of the GDP growth rate, in the 3rd quarter of 2019, we can begin with the positive contribution of the exports of goods and services relative to the imports (9.5% versus -2.9%, accordingly) and next with the positive contribution of the fixed capital formation[1] (2.0%). Private consumption also had a slight positive contribution (0.2%) but, on the other hand, public consumption had a negative contribution (-0.5%).

Based on the existing components of the recorded *domestic demand*, for the 3rd quarter of 2019, the contribution of the fixed capital formation was ranked first (2.0), followed by the private consumption contribution (0.20). On the other hand, the contribution of private consumption to the GDP growth appears with a negative value (-0.5%). It is also noticeable that during this quarterly period, the contribution of the private and the public consumption were opposite in value (0.2 and -0.5, respectively).

From the *domestic demand*, the external (demand) sector appears with a different trend during the 3rd quarter of 2019. This sector incorporates the trade balance of goods and services in the economy (see Figure 1.1.1). More analytically, it seems that the international demand, despite the recent positive but declining GDP rate in the European & world economies, continues to influence positively the Greek economy. This was reflected in the contribution of this factor to the GDP growth (0.74). Exports – mainly tourism– were the important part here with a strong contribution to the GDP growth (9.46). On the contrary, the country's imports recorded a negative contribution to the GDP growth (-2.89). A high positive value is also recorded for the domestic demand excluding inventories contribution (4.1) while a significant positive value was recorded for the change in inventories (1.40).

FIGURE 1.1.1
Domestic and net external demand (components)*



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

1. Net investments in Table 1.1.1.

TABLE 1.1.1 Basic macroeconomic figures

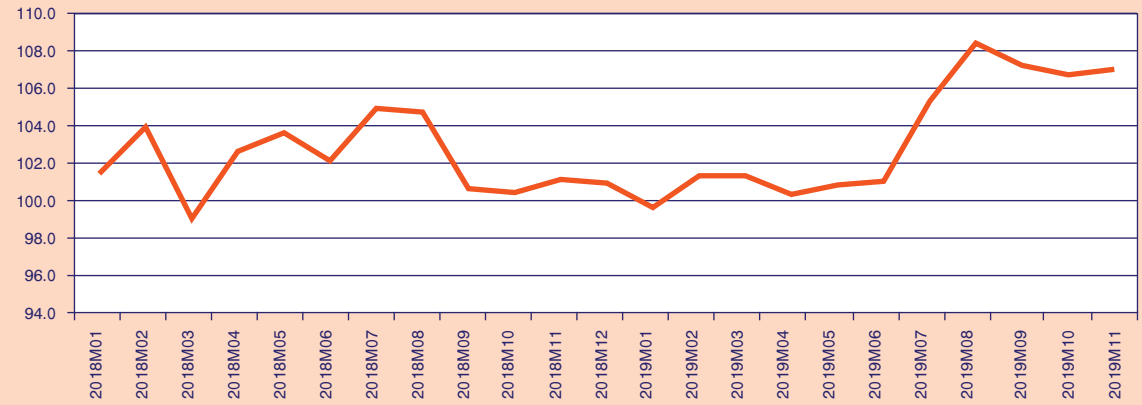
(%, seasonally adjusted data, volumes)

	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	1/18-9/18 2018	1/19-9/19 2019
Private consumption	1.1	1.3	1.3	-0.1	0.5	1.4	1.0	1.0	0.7	-0.3	0.2	0.98	0.21
Public consumption	-2.9	-1.1	0.4	1.7	-0.3	-3.9	-4.5	-1.4	0.2	9.4	-0.5	-2.88	3.04
Fixed capital formation	7.7	-8.9	26.3	12.7	-8.9	18.8	-22.6	-26.4	8.1	-6.1	2.0	-4.23	1.36
Domestic demand*	0.6	1.7	0.5	2.5	3.0	1.3	1.0	3.4	-0.3	2.4	4.1	1.79	2.09
Exports of goods and services	6.1	9.2	6.7	5.5	8.8	9.3	6.4	10.2	4.5	5.8	9.5	8.17	6.61
Exports of goods	3.6	8.2	2.8	8.1	11.2	6.9	7.4	8.1	-0.4	4.1	6.2	8.49	3.33
Exports of services	9.6	11.6	10.1	2.4	5.7	12.6	5.9	12.5	9.8	8.1	14.5	8.07	10.80
Imports of goods and services	16.1	5.8	4.8	3.2	-7.5	2.8	15.6	2.2	9.8	3.7	-2.9	3.61	3.53
Imports of goods	17.9	4.3	4.1	2.2	-11.3	0.0	15.5	0.3	10.1	3.9	-4.9	1.41	3.01
Imports of services	9.8	13.6	5.2	7.8	11.8	16.0	16.7	13.2	6.3	2.8	8.6	14.81	5.93
GDP	0.0	1.7	1.9	2.2	2.7	1.4	2.0	1.6	1.4	2.8	2.3	2.03	2.16

Source: Quarterly data of the *National Accounts* and EC Forecasting, Spring 2019.

* Excluding Inventories.

FIGURE 1.1.2
Economic Sentiment Index



Source: EUROSTAT.

As regards to the trend of the Economic Sentiment Index (ESI), as a "proxy" of future demand, it is known that, like some other leading indices, it offers valuable information from the perspectives of both businesses and households concerning the economy. It is also an important indicator for the economy and can be used for predictions relating to the future of GDP growth. As demonstrated by Figure 1.1.2, the ESI, from July 2019 until the September 2019, showed an upward trend, beginning from 101 points up to 108 points. However, this upward trend stopped in October and slightly retreated to 107 points at the end of 2019. The sharp rise should probably be attributed to the recent change of government while the small retreat has a rather corrective role in the trend. In general, however, as far as 2020 is concerned, the picture is positive and relatively optimistic on behalf of both companies and households.

Next, a more detailed discussion follows on the contribution of the trade balance of goods and services with respect to the GDP growth for the 3rd quarter of 2019.

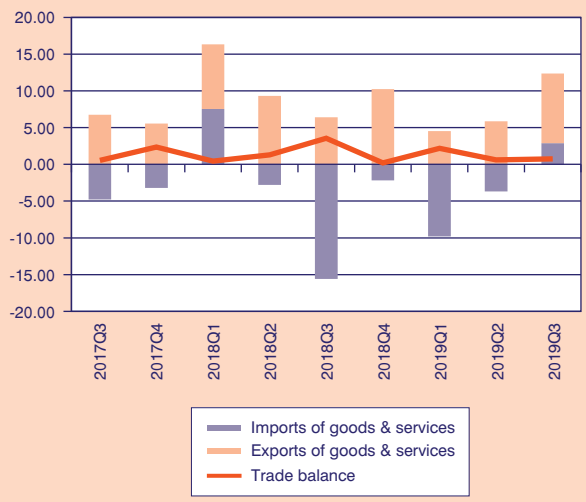
Trade Balance (goods and services)

As already mentioned above, the contribution of the external sector (exports minus imports) regarding the growth of GDP, for the 3rd quarter of 2019, ends up with a positive sign and reflects mainly the importance of international demand as well as the perspectives of the international economic climate.

More specifically, we will refer separately to the rate of change of goods and services for both imports and exports. Starting from the exports, we should underline that they have increased, at the 3rd quarter of 2019, with a high growth rate (9.5%). More analytically, the services, which are the relatively smaller portion of the total exports in billions of euros, demonstrated an annual increase of 14.5% while the goods, which are most of the exports, experienced an annual growth of 6.2% during the same period. Concerning now the imports of goods and services, unlike the composition of the exports, they are more balanced as a distribution and, additionally, they have increased overall with a rate of 2.9%. The imported services increased with a rate of 8.6% (much lower rate than that of the corresponding quarter of 2018, which was 16.7%). On the other hand, the rate of the imported goods, during the same time period, deceased with a -4.9% (contrary to the corresponding increasing rate of 15.5% at the 3rd quarter of 2018).

Concerning now the contribution of the trade balance of goods and services to the GDP growth rate, we can emphasize its slight increase for both of the two last quarters of 2019 (2nd and 3rd). More specifically, from the positive contribution value of the 2nd quarter of 2019 (0.59), we moved, at the 3rd quarter, slightly higher (0.74). The strong decrease of the growth rate of imports during the 3rd quarter of 2019 (from 3.7% to -2.9%) and the corresponding increase of the growth rate of exports during the same period (from 5.3% to 9.5%) was the main reason for the improvement of the trade balance contribution's value in the GDP rate. This much higher exports contribution relative to that of imports, in the two last quarters of 2019, is illustrated in Figure 1.1.3 where the change in the size and trends of imports and exports appear in the corresponding histograms.

FIGURE 1.1.3
Components of external demand



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

This positive recorded trend, during the 3rd quarter of 2019, of the balance of goods and services in the domestic demand either as a contribution (0.74 units) or as a difference between the rates of change of imports and exports provides, for the time being, an important positive weight concerning the contribution of net external demand in the GDP growth.

1.1.2. Private consumption and investment

Konstantinos Loizos

1.1.2.1. Private consumption

Based on quarterly seasonally adjusted *National Accounts*[2] private consumption, both in terms of current prices and in chain-linked volumes with 2010 as a reference year, increased in the third quarter of 2019. In terms of current prices, it maintained the rising trend which was manifested in the beginning of that year. On the contrary, in terms of chain-linked volumes, it recovered after its fall during the second quarter. Indeed, taking into account data revision by ELSTAT, private consumption reached 31,576 million euros in current prices during the first quarter of 2019, to rise afterwards to 31,585 million euros in the second quarter and 31,733 million euros in the third quarter of 2019. However, in chain-linked volumes, we observe a fall from 32,519 million euros in the first quarter of 2019 to 32,458 million euros in the second quarter, whilst in the third quarter the related figure was higher at 32,581 million euros. Consequently, in percentage changes of seasonally adjusted chain-linked volumes, private consumption fell in the second quarter of 2019, with respect to both the second quarter of 2018 (-0.3%) and the first quarter of 2019 (-0.2%). Nevertheless, this downturn was followed by a percentage increase in the third quarter of that year which was 0.2% with respect to the same quarter of 2018 and 0.4% with respect to the second quarter of 2019.

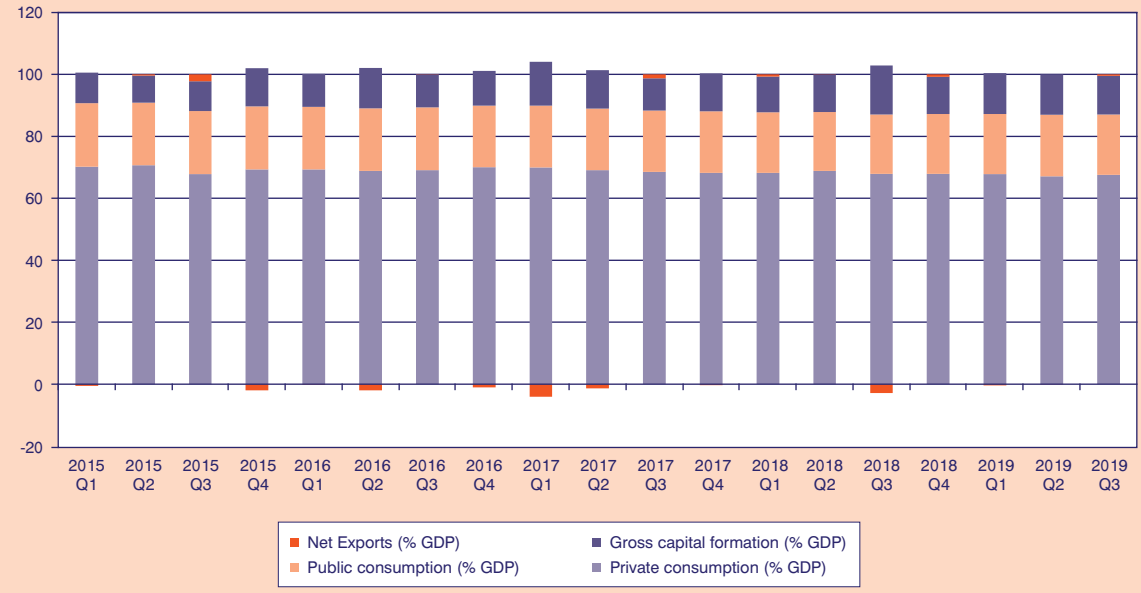
On the other hand, the negative trend of private consumption as percentage of total Gross Domestic Product (GDP) which prevailed at the beginning of the year, was reversed during the third quarter, thus exhibiting a rise from 67.1% in the second quarter to 67.5% in that last quarter (Figure 1.1.4). Correspondingly, public consumption as percentage of GDP fell from 19.9% in the second quarter to 19.5% in the third quarter. Finally, the share of gross capital formation (both in terms of fixed capital and changes in inventories) declined (from 13.1% to 12.4%) whilst net exports turned positive (from -0.02 to 0.5) from the second to the third quarter.

Figure 1.1.5 depicts the evolution of retail trade according to the monthly data provided by ELSTAT. We observe negative percentage changes, with respect to the same month in the previous year, only in July 2019 for the overall volume index, the automotive fuel index and the other items (except food and automotive fuel) index. On the contrary, both for the food items index in this month and for all categories during August and September, positive percentage changes were recorded. Finally, the overall index was, on average, positive in terms of percentage changes during the quarter July-September 2019 with a mean value of 1.40%. We observe the same positive trend in the food items index (average value 1.56%), the other items index (average value 1.77%) and the automotive fuel index (average value 1.53%). Hence, the developments in retail trade during the period July-September 2019, with respect to the corresponding quarter of 2018, exhibit a rising average trend in all categories.

Finally, by inspecting confidence indicators published by EUROSTAT, we can obtain a sense of the economic sentiment which prevails both amongst retail trade entrepreneurs and amongst consumers, as presented in Figure 1.1.6.

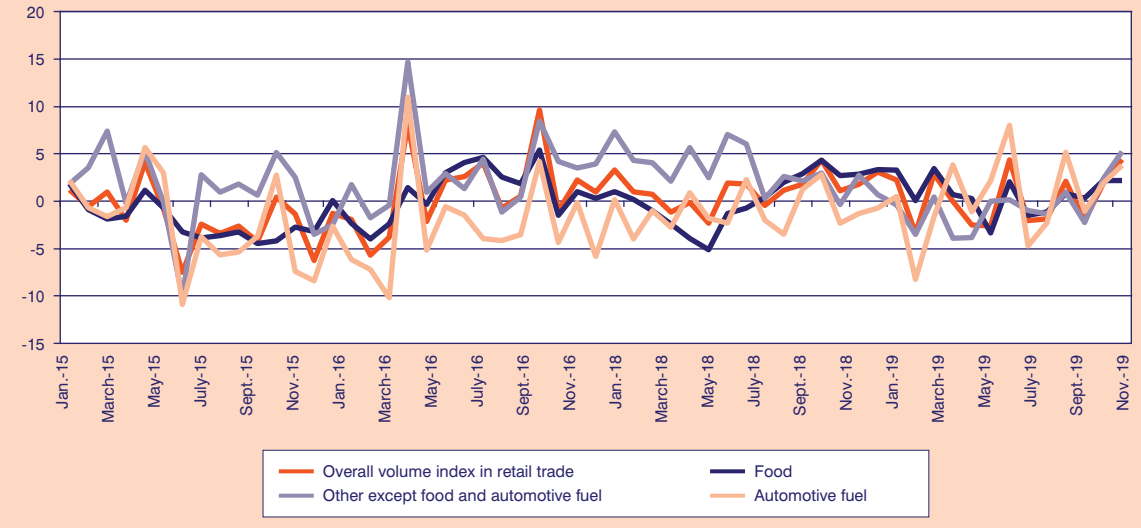
2. *Quarterly National Accounts,* Press release, ELSTAT, December 5, 2019.

FIGURE 1.1.4
The evolution of private consumption as a percentage of GDP (expenditure approach)
(seasonally adjusted data in current prices)



Source: ELSTAT, data processing by the author.

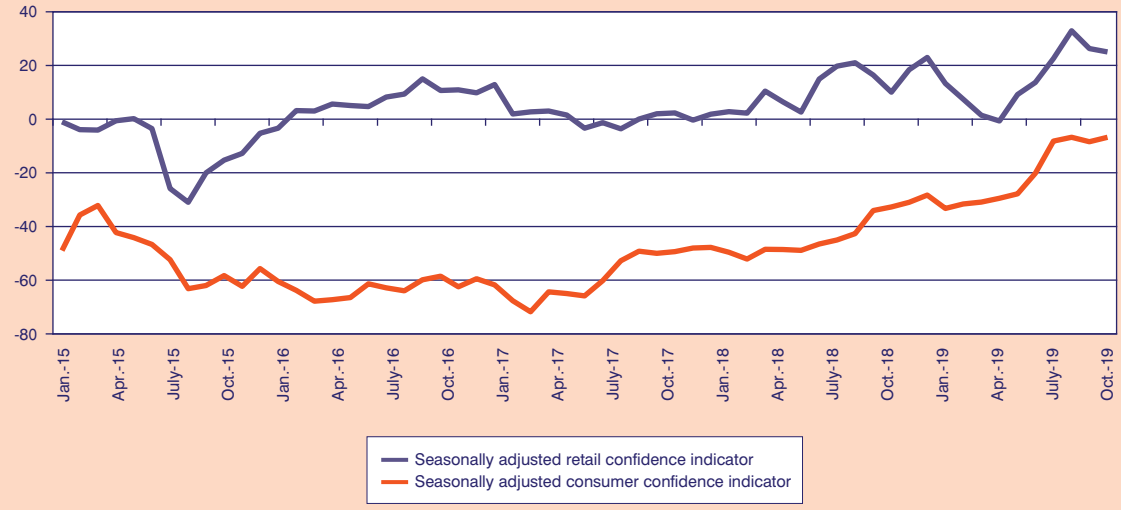
FIGURE 1.1.5
Percentage changes in the seasonally adjusted overall volume index and the main sector indices in retail trade



Source: ELSTAT, data processing by the author.

The rising trend of entrepreneurial expectations in retail trade from June 2019 was interrupted in October and November of the same year. The same happened in consumer expectations, though the latter returned to a rising path in last November. To sum up, consumers' expectations seem to maintain their continuous improvement despite being in a negative territory. On the other hand, entrepreneurs' expectations in retail trade remain in a positive territory even as they have exhibited a falling trend during the last few months.

FIGURE 1.1.6
Confidence indicators in retail trade



Source: EUROSTAT, data processing by the author.

The evolution of confidence indicators along with our previous remarks concerning recent developments in retail trade hint at an improving consumer demand as of July and especially during the third quarter of 2019, which might continue in the following period.

1.1.2.2. Investment

Gross fixed capital formation in current prices rose in the third quarter of 2019 with respect to the previous quarter, as opposed to its fall in the second quarter with respect to the first quarter. In this sense, during the third quarter of 2019, gross fixed capital formation reached 5,405 million euros in current prices, much higher than 5,194 million euros in current prices in the second quarter of the same year, or even 5,330 million euros in current prices in the first quarter, according to the revised data which were provided by ELSTAT. However, in terms of chain-linked volumes, we observe a rise from 5,502 million euros in the first quarter to 5,607 million euros in the second quarter, whilst in the third quarter gross fixed capital formation fell to 5,326 million euros.

The above become evident as we observe the evolution of percentage changes with respect to the previous quarter in terms of seasonally adjusted chain-linked volumes. Indeed, there are positive changes during the first two quarters of 2019 (7.9% and 1.9%, respectively) and a negative change in the third quarter (-5%). Contrary to the above, percentage changes with respect to the same quarter of 2018 were positive in the first and third quarters (8.1% and 2%) and negative in the second quarter (-6.1%). In any case, the evolution of gross fixed capital formation in terms of chain-linked volumes in 2019 seemed to be less volatile than the one in 2018 since it fluctuated within a much narrower range. This is evident by comparing the above values with those corresponding to the first, second and third quarters of 2018 (-8.9%, 18.8% and -22.6%).

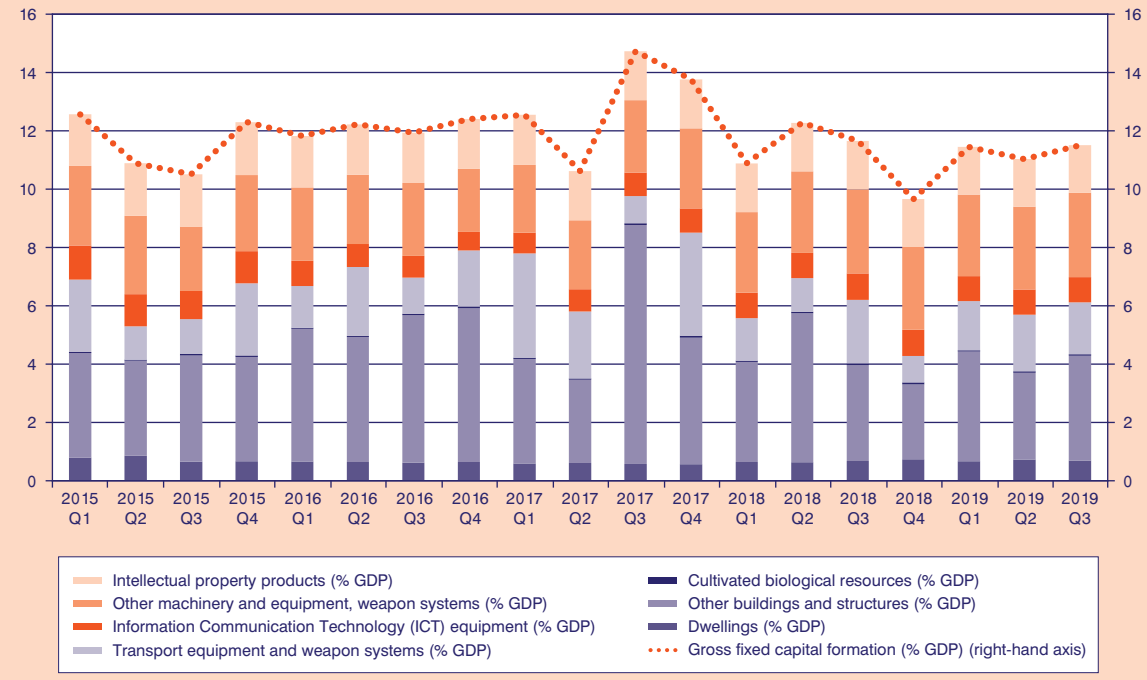
During the first three quarters of 2019, gross investment in total remained at levels above 11% of GDP (Figure 1.1.7) whilst gross fixed capital formation rose in the third quarter of 2019 (4.3%) after its fall (-3.6%) in the second quarter.

As far as investment components are concerned, the share of construction in gross investment seems to have recovered at the expense of machinery and transport equipment during the third quarter of 2019 compared to the previous quarter (Figure 1.1.8).

Within the general “buildings” category, “dwellings” fell in percentage terms by -5.14% in the third quarter as opposed to the “other buildings and structures” which rose (20.76%) in the third quarter with respect to the second quarter. However, in the “buildings” category as a whole, there was a rising trend in the third quarter of 2019 with respect to the previous quarter (15.7%). The same holds for the third quarter of 2019 with respect to the corresponding quarter of 2018 where a positive change of 8.14% is recorded.

In “machinery and transport equipment”, the subcategory “transport equipment and weapon systems”

FIGURE 1.1.7
Gross fixed capital formation as a percentage of GDP (overall and by asset)
(seasonally adjusted data in current prices)

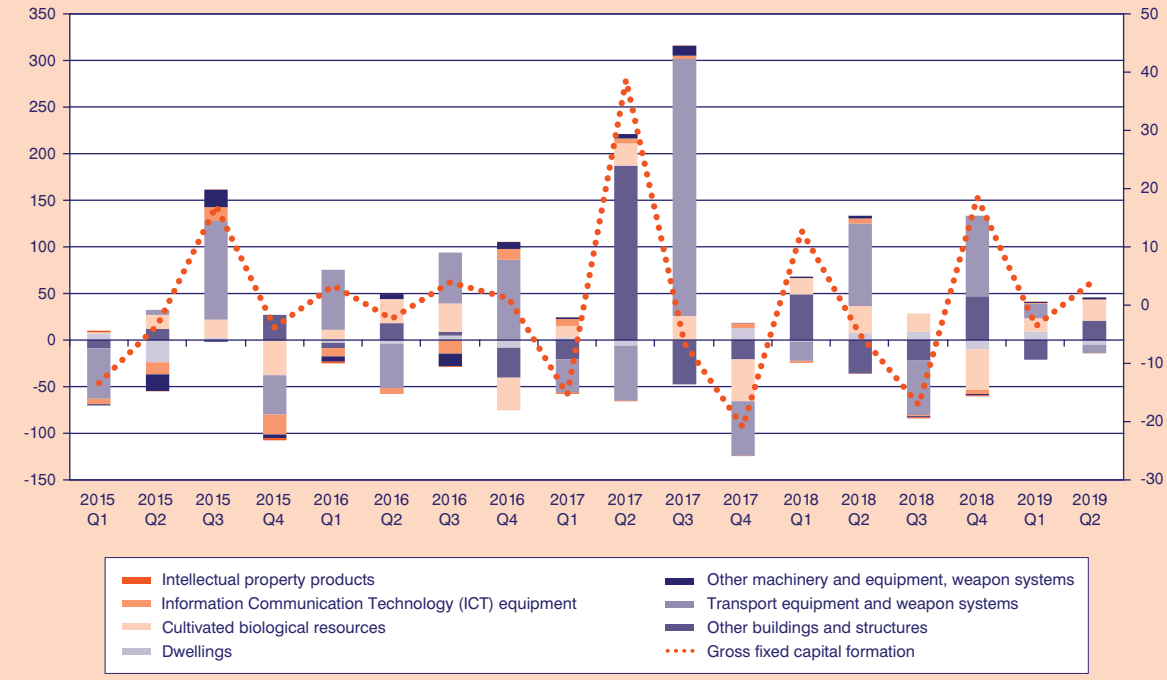


Source: ELSTAT, data processing by the author.

FIGURE 1.1.8
Machinery, transport equipment and buildings as a percentage of gross fixed capital formation

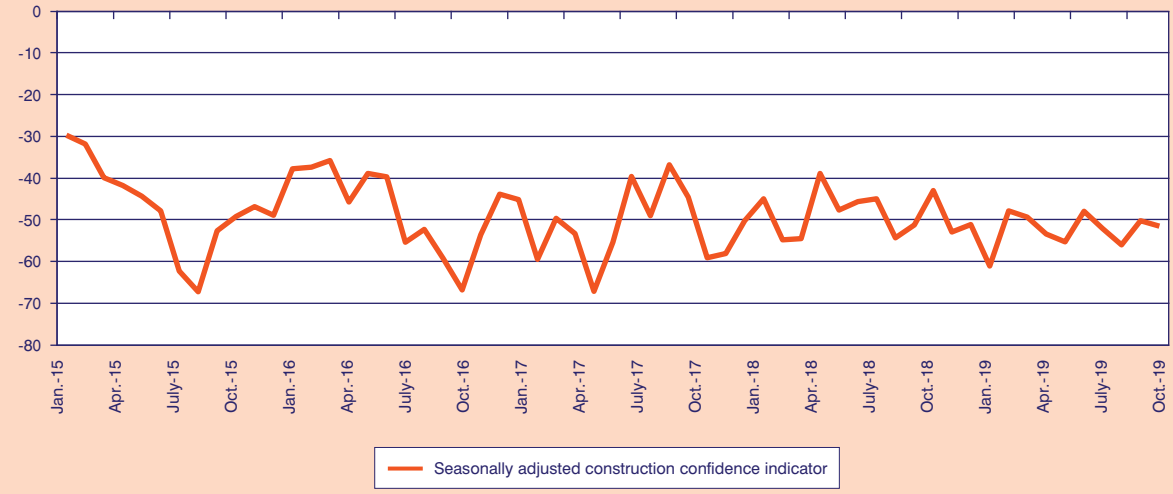
Source: ELSTAT, data processing by the author.

FIGURE 1.1.9
Components of gross investment as a percentage of GDP (percentage changes)



Source: ELSTAT, data processing by the author.

FIGURE 1.1.10
Construction confidence indicator



Source: EUROSTAT, data processing by the author.

continued to exhibit wide fluctuations since a positive change of 15.3% in the second quarter was followed by a negative change -8.7% in the third quarter. The subcategories "Information Communication Technology (ICT) equipment", and "other machinery and equipment, weapon systems" showed positive changes in the third quarter, yet of a smaller scale (0.08% and 1.9% correspondingly). Percentage changes in machinery and transport equipment in total were negative in the third quarter both in terms of the previous quar-

ter (-2%) and in terms of the corresponding quarter of 2018 (-7.4%).

Figure 1.1.10 depicts how entrepreneurial expectations in the construction sector have evolved during the last five years. As far as the last few months of 2019 are concerned (July-November), the construction confidence indicator remained in negative territory and fluctuated around an average value of -51.7. Therefore, there are no clear signs of a sustainable recovery in this sector, at least from the point of view of expectations prevailing therein.

1.1.2.3. Conclusions

The above analysis indicates that private consumption expenditure recovered in the third quarter of 2019 whilst expectations in retail trade followed a rising trend for the greater part of the period after July 2019. In addition, consumer demand as a percentage of GDP increased during the third quarter of 2019. Gross fixed capital formation as a percentage of GDP also rose in the third quarter of 2019, though this increase was related mainly with the corresponding rise in dwellings. Nevertheless, the construction confidence indicator still reflected uncertainty which prevails in this sector of the economy. Therefore, there is still need for initiatives that will improve the economic environment so as to be conducive to investment. The recently passed law on the “Hercules” plan, which will cope with 40% of non-performing loans in the banking system, is a significant step towards restoring liquidity in the economy. Other initiatives, such as the one proposed by the Bank of Greece to face up to the remaining 60% of non-performing loans, should conclude the necessary interventions in this area. Finally, targeted development policies to uphold innovative and outward-looking entrepreneurship might contribute to a sustained recovery of demand on a sound and long-term basis.

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 13-15

1.2. The evolution of the Consumer Price Index (CPI) in Greece and in the Eurozone

Emilia Marsellou

Greece

The national Consumer Price Index (CPI) in December 2019 recorded an annual increase by 0.8%, versus an increase of 0.2% in November and a decrease of 0.7% in October. In December, the core CPI[1] grew by 0.7%, slightly slower than the 1.0% growth in November, while in October the growth rate was 0.4% (Table 1.2.1.).

A similar trend is also recorded by the country's harmonized CPI (HICP), showing slightly higher rates of change. Specifically, in December the rate of growth of HICP increased by 1.1%, versus 0.5% in November, while it temporally passed through the deflationary area in October (-0.3%). The core HICP in December 2019 remains at the same annual rate as in November (1.2%), twice as much as in October (0.6%).

From May to November 2019, the slowdown of HICP is attributed to the inclusion of specific categories of goods and services (processed food and accommodation services) at a lower VAT rate as well as the downward trend in international oil prices. The last column in Table 1.2.1. reports the HICP with fixed taxes, which shows a significantly higher rate of increase (November 2019: 1.9% increase in HICP with fixed taxes versus 0.5% in HICP; October 2019: 1.0% increase in HICP with fixed taxes versus -0.3% HICP). However, the increase in HICP by 1.1% from 0.5% in November

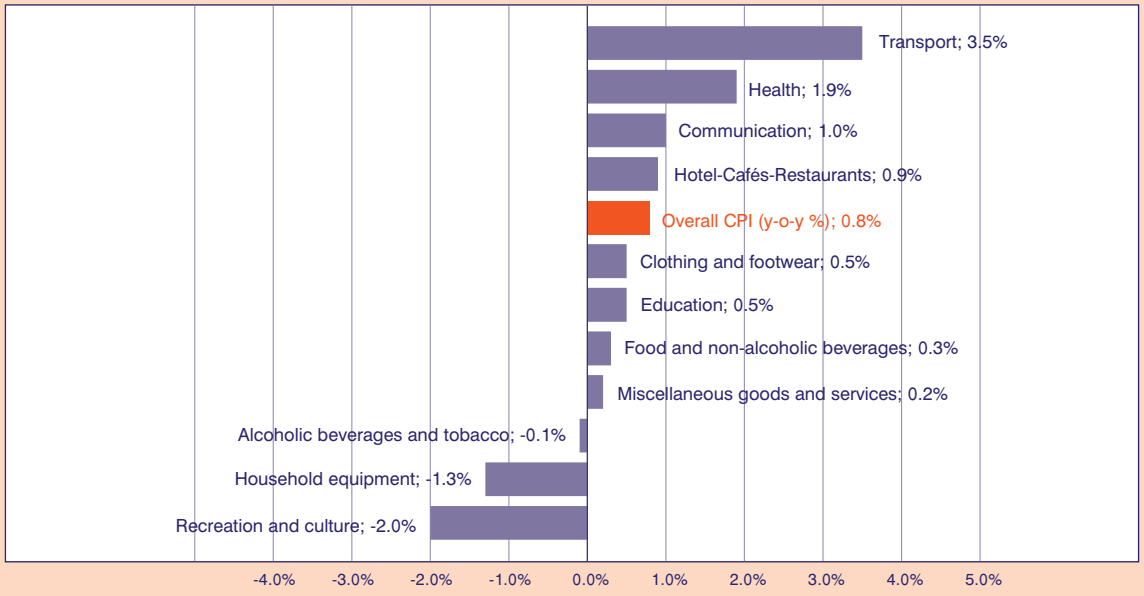
TABLE 1.2.1 Inflation in Greece (December 2019)

	Headline inflation (Greece)	Core inflation (Greece)	Harmonised inflation (Greece)	Core Harmonised inflation (Greece)	Harmonised inflation constant taxes
2018:M12	0.6%	0.6%	0.6%	0.7%	0.5%
2019:M1	0.4%	0.3%	0.5%	0.5%	0.6%
2019:M2	0.6%	0.2%	0.8%	0.5%	0.8%
2019:M3	0.9%	0.4%	1.0%	0.8%	1.1%
2019:M4	1.0%	0.5%	1.1%	0.8%	1.1%
2019:M5	0.2%	0.2%	0.6%	0.6%	0.8%
2019:M6	-0.3%	0.3%	0.2%	0.8%	1.6%
2019:M7	0.0%	1.0%	0.4%	1.3%	1.8%
2019:M8	-0.2%	0.7%	0.1%	0.9%	1.4%
2019:M9	-0.1%	0.7%	0.2%	1.0%	1.6%
2019:M10	-0.7%	0.4%	-0.3%	0.6%	1.0%
2019:M11	0.2%	1.0%	0.5%	1.2%	1.9%
2019:M12	0.8%	0.7%	1.1%	1.2%	-

Source: ELSTAT, EUROSTAT.

1. Core Inflation Index is calculated from the Overall Consumer Price Index excluding the divisions of Food and non-alcoholic beverages, Alcoholic beverages and tobacco and Energy prices.

FIGURE 1.2.1
Annual changes in sub-categories of goods and services CPI (December 2019)



Source: ELSTAT.

might reflect a positive trend that offsets the fading effects of the above factors on the prices of goods and services.

The 0.8% annual increase of the Greek CPI in December 2019 is mainly attributed to increases in the prices of the following sub-categories of goods and services:

- 0.3% in the *Food and non-alcoholic beverages category* mainly due to price increases in meat, fresh whole milk, cheese, fresh fruit. This increase was partly offset by price decreases mainly in bread and cereals, fresh fish, oils and fats, potatoes, preserved or processed vegetables, sugar-chocolates-sweets-ice creams, other food, coffee-cocoa-tea and fruit juices.
- 0.5% in the *Clothing and footwear category*.
- 1.9% in the *Health* category, due to price increases mainly in pharmaceutical products.
- 3.5% in the *Transport* category, due to price increases mainly in fuels and lubricants and tickets for passenger transport by air.
- 1.0% in the *Communication* category, due to price increases mainly in telephone services.
- 0.5% in the *Education* category, due to price increases mainly in fees of pre-primary and primary education.
- 0.9% in the *Hotel-Cafés-Restaurants* category, due to price increases mainly in restaurants-confectioneries-cafés-buffets and hotels-motels-inns.
- 0.2% in the *Miscellaneous goods and services* category, due to price increases mainly in motor vehicle insurance.

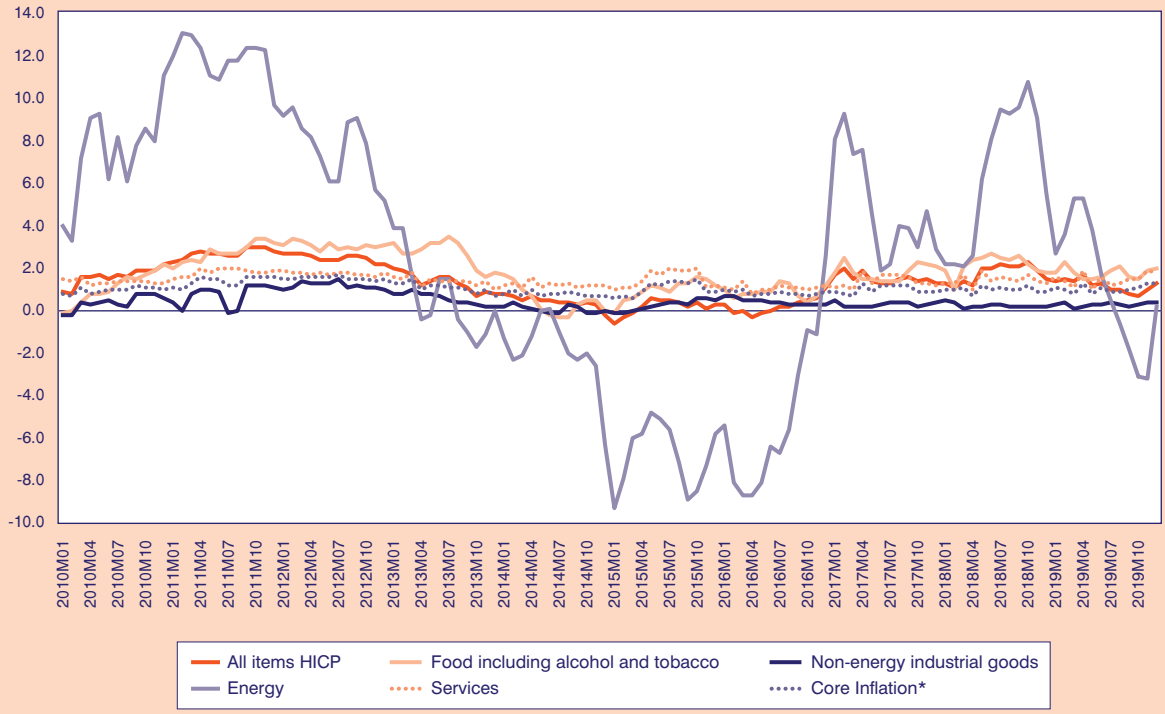
Part of the aforementioned price increases was offset mainly by the decrease in the prices of the following sub-categories of goods and services:

- 0.1% in the *Alcoholic beverages* and tobacco category, due to price decreases mainly in alcoholic beverages (not served).
- 1.3% in the *Household equipment* category, due to price decreases mainly in furniture and furnishings, household textiles, household appliances and repair. This decrease was partly offset by the price increases mainly in non-durable household articles.
- 2.0% in the *Recreation and culture* category, due to price decreases mainly in audiovisual and information processing equipment and small recreation items-flowers-pets.

The Eurozone

The harmonized CPI of the euro area (HICP-EA19) moved at a higher pace of growth for a second con-

FIGURE 1.2.2
HICP in the Eurozone, annual change (2015=100)



Source: Eurostat.

*Overall index excluding energy, food, alcohol and tobacco.

secutive month. In December 2019 recorded an increase by 1.3% (y-o-y), up from 1.0% in November. Inflation in December 2019, though improving, remains below the European Central Bank (ECB) medium-term target of 2.0%. Among the euro area countries, Slovakia (3.2% y-o-y) and the Netherlands (2.8% y-o-y) recorded the highest inflation in December 2019, while Portugal (0.4% y-o-y) and Italy (0.5% y-o-y) had the lowest.

Regarding the key sub-categories of goods and services of inflation in the Eurozone in December 2019, the Food, Alcohol and Tobacco category grew annually by 2.0%, against 1.9% in November, the Services category by 1.8% against 1.9% in November, the Non-Energy Industrial Goods category increased by 0.5% against 0.4% in November and the Energy category grew by 0.2% against -3.2% in November. The core HICP-EA19 rose by 1.3%, as much as in November 2019.

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

Factor Model Economic Forecasting Unit
Ersi Athanassiou, Theodore Tsekeris, Ekaterini Tsouma

The current section presents the updated short-term forecasts of KEPE concerning the evolution of the rate of change of real GDP in Greece in the last quarter of 2019 and the first two quarters of 2020.[1] The forecasts are produced by implementing a dynamic structural factor model, a detailed description of which can be found in Issue 15 (June 2011, pp. 19-20)[2] of *Greek Economic Outlook*. The underlying time series database used to estimate the model and produce the forecasts includes 126 variables, covering the main aspects of economic activity in the country on a quarterly basis, spanning the time period from January 2000 up to September 2019. Specifically, the database incorporates both real economy variables (such as the main components of GDP from the expenditure side, general and individual indices concerning industrial production, retail sales, travel receipts and the labour market) and nominal variables (such as the general and individual consumer price indices, monetary variables, bond yields, interest rates, exchange rates and housing price indices). In addition, the data sample includes a considerable number of variables reflecting expectations and assessments of economic agents (such as economic sentiment and business expectations indicators). It is noted that the seasonal adjustment of all time series is carried out by use of the Demetra+ software, which is freely available from Eurostat.[3]

According to the econometric estimates presented in Table 1.3.1, and having incorporated published (provisional) GDP data up to the third quarter of 2019 alongside the estimated growth rate of 2.7% for the last quarter of 2019, a more favourable outlook emerges for the fourth quarter as compared to the preceding projection (2.1%) and, as a result, for both the second half of 2019

TABLE 1.3.1 Real GDP rate of change *(%, y-o-y)*

	2019	2020	
Quarters	**2019Q4**	**2020Q1**	**2020Q2**
Quarterly rate of change	2.69 [2.64 , 2.75]	3.19 [3.09 , 3.30]	1.97 [1.81 , 2.12]
Mean rate of change, 1st half*	-	2.58 [2.45 , 2.71]	
Mean rate of change, 2nd half**	2.50 [2.47 , 2.52]	-	
Mean annual rate of change***	2,30 [2.29 , 2.31]	-	

Note: Values in brackets indicate the lower and upper boundaries of the 95% confidence interval of the forecasts. *The mean rate of change is not reported for the first half of 2019, since it does not incorporate a forecast. **The mean rate of change for the second half of 2019 incorporates the officially available (provisional) data for the third quarter of 2019, on a seasonally adjusted basis. ***The mean annual rate of change incorporates the officially available (provisional) data for the first three quarters of 2019, on a seasonally adjusted basis.

1. The date of the forecast is January 14, 2020.
2. <https://www.kepe.gr/images/oikonomikes_ekselikseis/issue_15enb.pdf>.
3. The TRAMO/SEATS filter is used for the seasonal adjustment.

and the whole year 2019.[4] More specifically, the estimations lead to an improved forecast of 2.5% for the mean rate of change of real GDP for the second half of 2019 and to an enhanced projection of 2.3% for the mean annual rate of change (compared to 1.9% and 1.7%, respectively, according to the previous estimates). It should be stressed that the upgraded forecasts (as compared to the preceding period of reference) for the last quarter, the second half and the whole year 2019 are linked, to a significant degree, to the major upward real GDP growth rate revisions carried out by ELSTAT for the first (from 1.1% to 1.4%) and, in particular, for the second (from 1.9% to 2.8%)[5] quarter of 2019. In parallel, the forecasted rates of change for the first two quarters and the first half of 2020 show the advancement of growth dynamics in the short term. In more detail, the model forecasts a growth rate of 2.6% for the first half of 2020, based on the estimates of 3.2% and 2% for the first and second quarter of 2020, respectively.

The above-presented projections for 2019, which are in line with the developments in the incorporated economic variables during the first nine months of 2019 as well as the growth forecasts for the first half of 2020, signal the improvement of economic conditions in Greece, on top of the progressive enhancement of the growth process. According to the evidence provided by the data, the Greek economy is following a stable recovery path, against the backdrop of major developments, such as the completion of the economic adjustment programmes and the progress made in terms of the rebalancing of major fiscal aggregates. Economic recovery is, also, significantly related to the further unwinding of uncertainty and the improvement in confidence. At the same time, growth dynamics remain subdued, mirroring the sluggish increase in private consumption expenditure and the lack of a steady investment growth during the first nine months of 2019. The respective course in these two major GDP components, which basically drive developments in domestic demand, is associated, on the one hand, with the overall financial burdens weighing on enterprises and households and, actually, relating to the service of their debt and tax obligations. On the other hand, it is related to the obstacles often hindering the completion of all necessary procedures for the initiation of flagship investment projects in the country, causing delays in their implementation schedule.

The above assessments are in compliance with the recent course of the major GDP components and a significant number of other economic variables, as indicated by the non-seasonally adjusted statistical data (with the exception of the economic sentiment indicator) for the third quarter of 2019 compared to the same quarter of 2018. In particular, with respect to favourable developments in major GDP components, exports of goods increased, while the rise in exports of services was even greater. In parallel, the key macroeconomic component of investment recorded a positive course, although not a particularly dynamic one, against the backdrop of the increases in the categories of *other buildings and structures*, *dwellings* and *other machinery equipment and weapon systems* (contrary to the fall in the category of *transport equipment and weapon systems*). At the same time, private consumption expenditure remained weak, registering a marginal increase. With respect to the industrial sector, marginal increases characterized (a) the general industrial production index, based on the increase in a number of sub-indexes, except for the sub-indexes for the categories of *energy* and *intermediate goods*, which declined and (b) the general turnover index in industry for the domestic market, against the backdrop of the increase in most sub-indexes, except for the index for the category of *energy*. Increasing trends were further depicted in the course of: (a) the general volume index in retail trade and a number of the related sub-indexes (with the exception, primarily, of those relating to the categories of *department stores* and *food-beverages-tobacco*), (b) travel and transport receipts, (c) passenger cars, based on licenses issued, as well as the turnover index for *wholesale-retail trade-repair of motor vehicles and motorcycles*, (d) building activity, which was significantly enhanced in terms of volume, on the basis of permits issued and (e) the General Index of the Athens Stock Exchange. Positive signs were also provided by the indicated course in spreads (the difference between Greek and German 10-year bonds), which declined significantly compared to the respective quarter of 2018. Moreover, favourable trends characterized the course of several indicators reflecting expectations and assessments by agents on an overall and/or sectoral level, alongside the increase in the economic sentiment indicator for Greece. In addition, improvements were recorded

4. It should be noted that, any potential effects arising from the interim implementation of specific policy measures are not explicitly estimated, but are implicitly taken into account by updating the included economic variables to the most recent period of reference, which in the case of the above-presented forecasts is the third quarter of 2019.

5. Note that the respective revision is mainly due to the major upward revision of the increase in the component of final consumption expenditure by the General Government.

in terms of competitiveness, as implied by several of the underlying indicators.

Furthermore, of great importance for the overall conditions in the country was the continuation of the gradual reduction in unemployment (on an aggregate level, as well as for the long-term and the newly unemployed), accompanied by the preservation of the increasing trend in employment (on an aggregate level, as well as in the secondary and tertiary sectors and except for the primary sector). Nevertheless, conditions in the domestic labour market still need to improve further in terms of these two aggregates.

On the opposite side,[6] a marginal decrease was recorded in final consumption expenditure of the General Government. Moreover, falling trends characterized: (a) the general turnover index in industry for the overall and for the non-domestic market, in both cases mainly driven by the decrease in the corresponding sub-indexes for the category of *energy*, (b) the turnover index in wholesale trade and (c) the overall production index in construction, based on the unfavourable developments which characterized both sub-indexes (the *production of building construction* and the *production of civil engineering* sub-indexes). Finally, among the indicators reflecting expectations, business expectations in industry and construction declined, alongside export expectations, while the economic sentiment indicator for the European Union also decreased.

The estimated course of the real GDP in the last quarter of 2019, as well as during the first half of 2020, may evolve according to a more or less promising scenario (than indicated by the aforementioned projections), conditional upon a wide range of crucial and decisive factors, which are expected to shape the developments in the overall economic environment. These factors are associated, on the one hand, with the course of major GDP components namely the progressive enhancement in private consumption and a boost in investment, in conjunction with the preservation of growth in exports. Such a favourable course is necessary in order to safeguard the viability of growth dynamics and reinforce the production capacity in crucial sectors of the Greek economy, with the aim to create new and sustainable jobs. On the other hand, these factors relate to any further reinforcement of the economic sentiment in Greece, through improving reliability and the confidence that the country is still committed to balanced fiscal aggregates and ongoing progress with structural reforms. In addition, any potential short and medium-term effects resulting from the recent implementation of certain policy measures, mainly concerning tax reductions for households and enterprises, may also play a central role in shaping the domestic economic environment. Moreover, these factors will be linked to the underlying growth developments in Europe and worldwide, while the broader geopolitical risks and the crucial issue of dealing with migration flows will, definitely, play a key role in the short and medium term.

6. Here again, the ascertainments refer to the course of the variables on a non-seasonally adjusted basis, except for the economic sentiment indicator for the European Union.

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 19-23

1.4. International environment: Recent developments and prospects of global economic activity

Aristotelis Koutroulis

The global economy is moving along a path of low inflation, historically low interest rates, but weak economic growth. Although growth prospects vary from country to country, the forecasts of international organizations converge to the view that global economic growth will remain subdued in the medium term. As estimates regarding international trade expansion are not particularly encouraging, the effects of weakened economic activity are expected to become more pronounced in economies with an export orientation.

1.4.1. Trends and developments in the global economy

Economic activity

Last year's global economic activity was characterized by two distinguishing features: The first one is related to the sharp slowdown of worldwide economic expansion as global GDP growth fell to 2.9% from 3.6% in 2018 (see Table 1.4.1). The second one is related to the high degree of synchronization among national economies regarding their poor economic performance. Both features are closely related to the tensions that prevail in international trade and the uncertainty these have caused in the ranks of entrepreneurs, investors, and industrialists of the manufacturing sector (IMF, 2019; OECD, 2019; and World Bank, 2020). The uncertainty that surrounds the future direction of economic policy in the US and the European Union, along with the continuing geopolitical tensions in the Middle East and Asia, have played a negative role as well (European Commission, 2019).

Supported by private consumption, loose monetary policy and favourable labour market conditions in advanced economies, the global economy is expected to regain some of its lost momentum over the course of the next two years (European Commission, 2019). Nevertheless, predictions by international organizations suggest that the overall improvement in the performance of the global economy will be marginal (see Table 1.4.1).

Analysts' pessimism about the medium-term prospects of the global economy is explained by the fact that many of the problems that hinder economic activity (e.g., tensions in international trade, increased protectionism, high uncertainty, low rates of productive investment, adverse shocks in manufacturing, etc.) remain unresolved. In addition, as a recent OECD report argues, the world is undergoing a phase of significant economic changes –the digitization of the production process, major climate change, and the replacement of multilateralism by unilateral negotiations– which are not fully incorporated into economic policy models (OECD, 2019). This omission, in turn, leads to inadequate or inappropriate policy responses. For example, the lack of co-ordination of national policies and the lack of a clear direction of existing measures to tackle climate change create uncertainty in manufacturing thereby leading to suboptimal levels of investment.

Inflation and Unemployment

Due to weak economic activity, inflationary pressures in the advanced world remained subdued in 2019 with inflation ranging below central bank target rates in Japan, the US and the Eurozone (see Table 1.4.2). With the exception of countries that experienced a nominal depreciation of their currency (e.g., Argentina) or countries that suffered serious shortages of necessities (e.g., Venezuela), inflation in developing and emerging economies remained at comparatively low levels as well. For 2020, it is projected that inflationary pressures will remain soft in most regions of the world.

With regard to employment, the most notable development relates to the continuing decline in US and Eurozone unemployment rates (see Table 1.4.3). While unemployment is expected to remain on its downward path over 2020, new data shows that the rate of job creation in most OECD member states has fallen. In addition, pressures in many labor markets have begun to soften as shortages of skilled labor have declined and working hours are on a downward trend (OECD, 2019). Finally, with specific regard to sectoral unemployment, the biggest problems are identified in the manufacturing sector due to suboptimal investment rates.

TABLE 1.4.1 Real Gross Domestic Product[1,2]
(annual percentage changes)

	2019*				2020*				2021*			
	IMF	EU	OECD	WB	IMF	EU	OECD	WB	IMF	EU	OECD	WB
World economy	2.9	2.9	2.9	2.9	3.3	3.0	2.9	3.2	3.4	3.1	3.0	3.3
Advanced economies	1.7	1.7	:	1.6	1.6	1.6	:	1.4	1.6	1.6	:	1.5
USA	2.3	2.3	2.3	2.3	2.0	1.8	2.0	1.8	1.7	1.6	2.0	1.7
Euro Area	1.2	1.1	1.2	1.1	1.3	1.2	1.1	1.0	1.4	1.3	1.2	1.3
Japan	1.0	0.9	1.0	1.1	0.7	0.4	0.6	0.7	0.5	0.6	0.7	0.6
United Kingdom	1.3	1.3	1.2	:	1.4	1.4	1.0	:	1.5	1.4	1.2	:
Developing economies	3.7	3.9	:	3.5	4.4	4.2	:	4.1	4.6	4.3	:	4.3
Brazil	1.2	0.8	0.8	1.1	2.2	1.5	1.7	2.0	2.3	1.8	1.8	2.5
Russia	1.1	1.0	1.1	1.2	1.9	1.4	1.6	1.6	2.0	1.5	1.4	1.8
India	4.8	5.6	5.8	5.0	5.8	6.1	6.2	5.8	6.5	6.3	6.4	6.1
China	6.1	6.1	6.2	6.1	6.0	5.8	5.7	5.9	5.8	5.6	5.5	5.8

Sources: IMF, *World Economic Outlook, Update, January 2020;* OECD, *OECD Economic Outlook, November 2019;* European Commission, *European Economic Forecast, Autumn 2019;* World Bank, *Global Economic Prospects, 2020.*

* Estimations.

Notes: 1. The observed differences between the available macroeconomic projections partly reflect the differences between the macro-econometric models and the data used by each international organization.
2. The sub-group of emerging economies is included in the group of developing economies.

TABLE 1.4.2 Inflation[1]

(annual percentage changes)

	2019*			2020**			2021**		
	IMF	EU	OECD	IMF	EU	OECD	IMF	EU	OECD
Advanced Economies	1.5	:	:	1.8	:	:	:	:	:
USA	1.8	1.8	1.8	2.3	2.1	2.2	:	2.0	2.1
Euro Area	1.2	1.2	1.2	1.4	1.2	1.1	:	1.3	1.4
Japan	1.0	0.5	0.6	1.3	1.1	1.1	:	0.7	1.2
United Kingdom	1.8	1.8	1.2	1.9	2.0	2.0	:	2.2	1.8
Developing Economies	4.7	:	:	4.8	:	:	:	:	:
Brazil	3.8	:	3.7	3.5	:	3.1	:	:	3.6
Russia	4.7	4.5	4.9	3.5	3.7	4.0	:	4.0	4.0
India	3.4	:	3.5	4.1	:	3.9	:	:	4.2
China	2.3	:	2.5	2.4	:	2.2	:	:	1.9

Sources: IMF, *World Economic Outlook, October 2019;* OECD, *OECD Economic Outlook, November 2019;* European Commission, *European Economic Forecast, Autumn 2019.*

* Estimations, ** Projections.

Note: 1. The sub-group of emerging economies is included in the group of developing economies.

TABLE 1.4.3 Annual unemployment rates

	2019*			2020**			2021**		
	IMF	EU	OECD	IMF	EU	OECD	IMF	EU	OECD
USA	3.7	3.7	3.7	3.5	3.7	3.5	:	3.7	3.7
Euro Area	7.7	7.6	7.6	7.5	7.4	7.5	:	7.3	7.4
Japan	2.4	2.3	2.4	2.4	2.2	2.4	:	2.2	2.3
United Kingdom	3.8	3.8	3.8	3.8	4.0	4.0	:	4.1	4.1
Brazil	11.8	:	:	10.8	:	:	:	:	:
Russia	4.6	5.1	:	4.8	4.9	:	:	4.7	:
India	:	:	:		:	:	:	:	:
China	3.8	:	:	3.8	:	:	:	:	:

Sources: IMF, *World Economic Outlook, October 2019;* OECD, *OECD Economic Outlook, November 2019;* European Commission, *European Economic Forecast, Autumn 2019.*

* Estimations, ** Projections.

1.4.2. Economic developments across the Globe

Advanced economies

The combination of favourable labour market conditions with accommodative monetary policy is expected to continue supporting private consumption and therefore overall economic activity. On the other hand, anemic investment, subdued international trade and sluggish manufacturing activity will weigh heavily on economic expansion. In a nutshell, the balance of positive and negative factors that shaped the general growth pattern of the advanced world in 2019 is expected to remain in force throughout the current year.

USA: After a period of high economic growth, the US economy seems to enter to a phase of mild economic expansion. GDP growth, which fell from 2.9% in 2018 to 2.3% in 2019, is expected to decline further and settle bellow 2% over the next two years (see Table 1.4.1). This projection mainly reflects the heightened concerns about the consequences of trade tensions with China on US manufacturing activity and external demand. Despite the economic slowdown, private consumption is expected to remain robust on the back of low unemployment rates and rising real wages.

Eurozone: GDP growth in the Eurozone is estimated to have declined by 0.7 percentage points in 2019, mainly on account of low external demand, subdued manufacturing activity and rising concerns regarding trade tensions (ECB, 2019). Nevertheless, at the same time, relaxed monetary conditions, decreasing unemployment rates and rising consumer confidence made the economy less vulnerable to adverse developments and irregularities of the international economy. On the basis of the assumption that these factors will continue to have a favourable effect on the economy, GDP growth is expected to range between 1.1 and 1.4% over the next two years.

Japan: Economic activity in Japan has been adversely affected by developments in manufacturing, export stagnation and extreme weather conditions. In addition, the planned increase of the consumption tax rate last October brought about a considerable weakening of private consumption. Over time however, this effect started to be offset by increased public expenditures. In 2020, GDP is expected to rise by a rate slightly lower than in 2019 (see Table 1.4.1).

United Kingdom: Given that the UK and the EU have reached an agreement regarding the country's withdrawal from the EU, the possibility of a 'no-deal Brexit' has been ruled out. Nevertheless, the business sector remains under pressure as the future trade relationship between the UK and the EU has not been settled yet. So prospects for the UK economy remain less optimistic leading to the estimation that annual GDP growth will not exceed 1.5% over the next two years (see Table 1.4.1).

Developing economies

After a sharp slowdown observed in the course of 2019, economic expansion in developing and emerging economies is beginning to gain momentum with average growth rates projected to average around 4.3% over the next two years. As noted by analysts of The World Bank, the main reason behind the developing world's recovery is the stronger rebound of certain major economies (World Bank, 2020). In Brazil, for example, it is expected that the successful implementation of structural reforms regarding the country's pension system will boost the economy via an increase of the business sector's confidence (IMF, 2020). In Russia, accommodative economic policy, along with increased public investment expenditures, is set to contribute to the revitalization of the economy. In India, the reduction of corporate tax rates is expected to have a favourable effect on the economy throughout 2020. As for China, the high uncertainty caused by the trade tensions with the US lead to the estimate that economic expansion will continue decelerating over the course of the next two years.

1.4.3. World trade and commodity prices

The expansion rate of international trade (volumes of goods and services) fell to 1% in 2019 from 3.7% in 2018 (see Table 1.4.4). Among the factors contributing to this disappointingly poor performance, particularly

TABLE 1.4.4 World trade volume
(annual percent changes, goods and services)

	2019*	2020**	2021**
World economy	1.0	2.9	3.7
Advanced economies	1.3	2.2	3.1
Developing economies	0.4	4.2	4.7

Source: IMF, *World Economic Outlook, Update, January 2020.*

* Estimations, ** Projections.

influential were: (a) the protection measures implemented by US and China, (b) the suboptimal levels of investment worldwide and, (c) the stagnation of manufacturing production. Although trade policy issues remain unresolved, the recent agreement between the US and China in mid-October last year may signal the beginning of a gradual decline in trade tensions (World Bank, 2020). On the basis of the assumption that the situation in international trade will soon stabilize, it is estimated that international trade will begin to gain momentum during the next two years (see Table 1.4.4).

Regarding price trends of basic commodities during 2020, prices of basic metals are expected to be held back due to low demand from the manufacturing sector while prices of agricultural products should stay steady. As for international oil prices, most forecasters expect a fall with the annual average price of a barrel standing at $59.

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2. Public finance

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 24-29

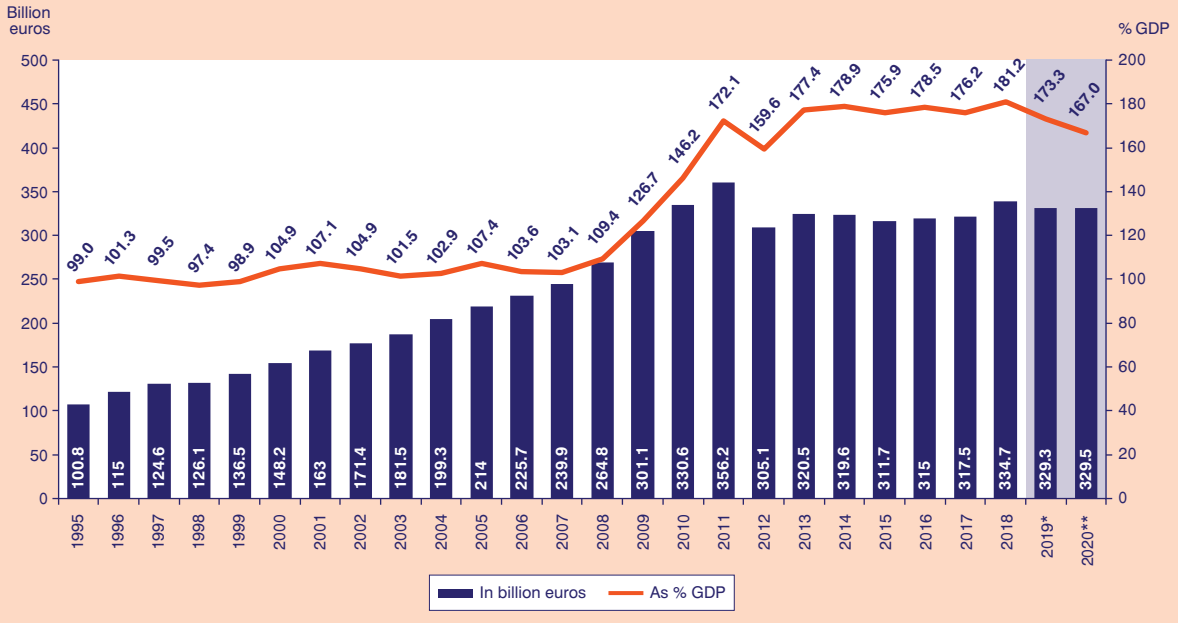
2.1. The evolution and structure of public debt

Fotini Economou

The early repayment of the more expensive portion of the International Monetary Fund's (IMF) loans to Greece (2.7 billion euros) resulted in the improvement of public debt sustainability. This, combined with the upgrade of the country by the international rating agencies (Standard and Poor's, Rating and Investment and Fitch), the upgrade of the Greek economy's outlook by DBRS and the complete lifting of capital controls enhance the country's credibility and international investors' confidence, resulting also in significantly reduced borrowing costs.

More precisely, according to the Public Debt Management Agency (PDMA) and the latest available credit ratings (at the time of writing this article), Greece received a BB- rating from Standard & Poor's with a positive outlook (October 2019), a BB from Fitch with a positive outlook (January 2020), a B1 from Moody's with a stable outlook (March 2019), a BB from Rating and Investment with a stable outlook (December 2019) and a BB (LOW) from DBRS with a positive outlook (No-

FIGURE 2.1.1
General Government debt (1995–2020)



Sources: Historical data from the European Commission, AMECO (last update 7/11/2019). PDMA estimates/forecasts as presented in the State Budget 2020.

Notes: *Estimate, ** Forecast.

vember 2019). In this context, the country's return to investment grade[1] remains a key objective.

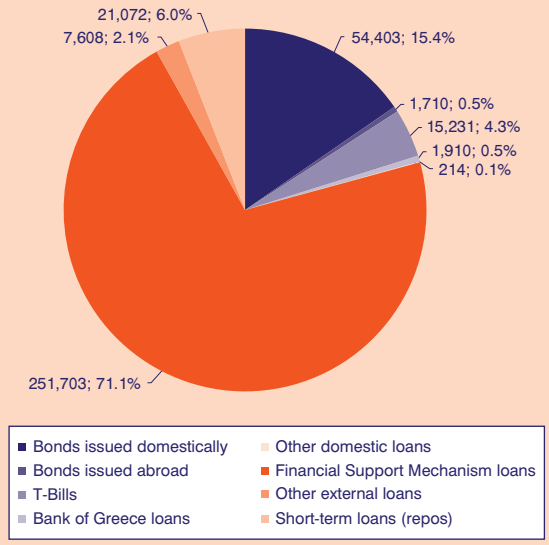
According to the PDMA data presented in the 2020 State Budget, General Government Debt is expected to reach 173.3% of GDP in 2019, i.e., 329.3 billion euros, and is expected to further decline to 167% of GDP in 2020, i.e., 329.5 billion euros. These percentages are the lowest since 2013 (Figure 2.1.1 above).

In addition, according to the quarterly data of the PDMA Public Debt Bulletin, the level of Central Government Debt[2] decreased by 2.7 billion euros in the third quarter of 2019, from 356.55 billion euros in June 2019 to 353.85 billion euros in September 2019 (Table 2.1.1). According to the 2020 State Budget, the Central Government Debt is expected to amount to 350.96 billion euros in 2019 from 358.95 billion euros at the end of 2018.

Also note two key parameters of Government Debt according to PDMA data: (a) the weighted average maturity of the Central Government Debt was 20.8 years in September 2019 including the extension of EFSF loans agreed on Eurogroup of 22/6/2018, from 18.2 years in 2018 and (b) the Central Government Debt annual effective weighted average interest rate (cash basis) was 1.75% in September 2019 from 1.61% in 2018.

Regarding the structure of Central Government Debt, there were no significant changes in the third quarter of 2019 in terms of the share of total debt. Bonds stood at 56.11 billion euros in September 2019, showing a decrease of 1.25 billion euros from 57.37 billion euros in the previous quarter. This amount accounts for 15.9% of the Central Government Debt compared to 16.1% at the end of June 2019. The Central Government financing through short-term securities (Greek government treasury bills) remained at 4.3% of the Central Government Debt, i.e., 15.23 billion euros. The share of debt in loans slightly increased as a percentage of the total debt at 73.9% in September 2019 (Figure 2.1.2), even though it recorded a decrease in absolute terms from 262.02 billion euros in June 2019 to 261.43 billion euros in September 2019. Finally, short-term borrowing through repos agreements with General Government entities remained relatively stable in the third quarter

FIGURE 2.1.2
Central Government debt (September 2019), (million euros and % debt)



Source: PDMA Public Debt Bulletin (September 2019).

of 2019. Specifically, in September 2019 the intra-governmental borrowing through repos slightly dropped by 0.84 billion euros compared to the previous quarter, reaching 21.07 billion euros from 21.91 billion euros in June 2019 (Figure 2.1.3). Thus, in June 2019, this source of funding accounted for 6% of Central Government Debt compared to 6.1% in June 2019.

Regarding the structural characteristics of the Central Government Debt, in September 2019 the share of debt at fixed rate stood at 93.8% of the debt, against 93.2% of the debt in June 2019 (Table 2.1.2). Moreover, the non-negotiable debt rose slightly to 79.8% of the debt from 79.6% of the debt in June 2019; there was no significant change in the debt expressed in euro, which was 98.2% from 98.1% in the previous quarter (Table 2.1.2).

In addition, according to PDMA, the Greek Government's cash reserves[3] stood at 20.23 billion euros in September 2019 from 20.82 billion euros in the previous quarter, and the reserves in the special public

1. A country's bond is considered to be investment grade if it receives ratings BBB- or higher from the international rating agencies S&P and Fitch or Baa3 or higher from Moody's.

2. Central Government Debt differs from General Government Debt by the amount of intra-sectoral debt holdings and other ESA adjustments (see PDMA Public Debt Bulletin, September 2019).

3. Included balance of dedicated cash buffer account, 15,697.3 million euros on 30/6/2019 and 30/9/2019 (PDMA Public Debt Bulletin, September 2019).

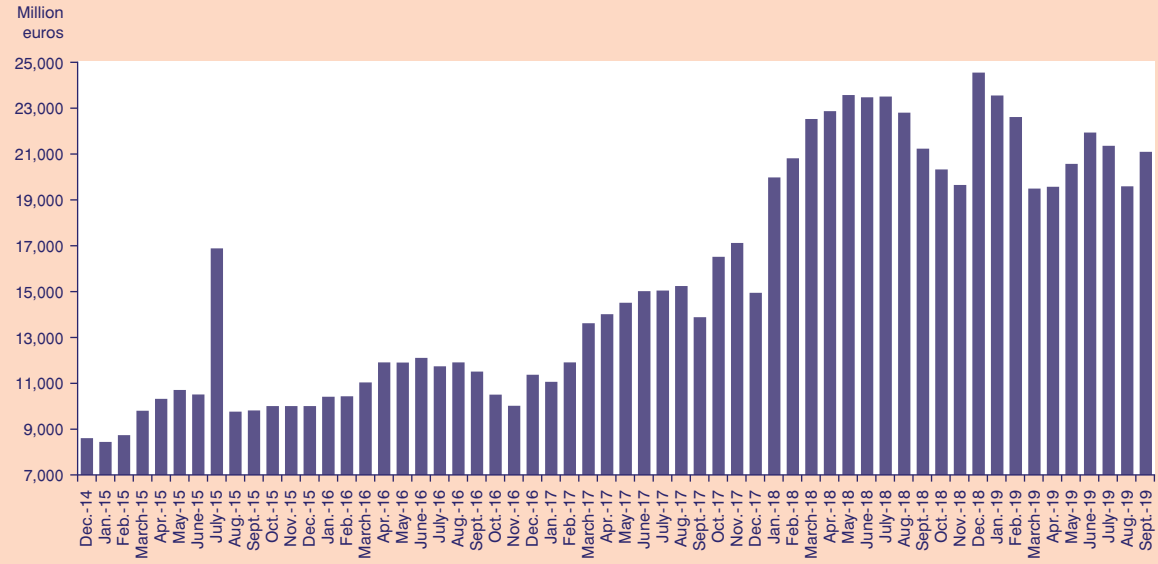
TABLE 2.1.1 Structure of Central Government debt

	2011		2013		2017		2018		June 2019		September 2019	
	Million euros	% debt	Million euros	% debt	Million euros	% debt	Million euros	% debt	Million euros	% debt	Million euros	% debt
A. Bonds	**259,774**	**70.6**	**76,296**	**23.7**	**50,457**	**15.4**	**51,551**	**14.4**	**57,367**	**16.1**	**56,113**	**15.9**
Bonds issued domestically	240,940	65.5	73,415	22.8	48,681	14.8	49,779	13.9	55,656	15.6	54,403	15.4
Bonds issued abroad*	18,833	5.1	2,880	0.9	1,776	0.5	1,771	0.5	1,712	0.5	1,710	0.5
B. T-Bills	**15,058**	**4.1**	**14,970**	**4.7**	**14,943**	**4.5**	**15,280**	**4.3**	**15,252**	**4.3**	**15,231**	**4.3**
C. Loans	**93,145**	**25.3**	**230,210**	**71.6**	**248,373**	**75.6**	**267,598**	**74.6**	**262,017**	**73.5**	**261,434**	**73.9**
Bank of Greece	5,683	1.5	4,734	1.5	2,849	0.9	2,377	0.7	1,908	0.5	1,910	0.5
Other domestic loans	836	0.2	115	0	247	0.1	229	0.1	221.68	0.1	214	0.1
Financial Support Mechanism loans	73,210	19.9	213,152	66.3	232,959	70.9	253,105	70.5	252,147	70.7	251,703	71.1
Other external loans**	13,414	3.6	12,208	3.8	12,318	3.7	11,887	3.3	7,739	2.2	7,608	2.1
D. Short-term loans* **	**0**	**0.0**	**0**	**0.0**	**14,931**	**4.5**	**24,521**	**6.8**	**21,913**	**6.1**	**21,072**	**6.0**
Total (A+B+C+D)	**367,978**	**100.0**	**321,477**	**100.0**	**328,704**	**100.0**	**358,950**	**100.0**	**356,549**	**100.0**	**353,850**	**100.0**

Source: PDMA Public Debt Bulletins (December 2011, December 2013, December 2017, December 2018, September 2019) and Issue No 40 of the *Greek Economic Outlook*.

Notes: * Including securitisation issued abroad.
**Including special purpose and bilateral loans.
*** Including repos.

FIGURE 2.1.3
Central Government short-term loans (repos) (December 2014-September 2019)



Source: Ministry of Finance, General Government Bulletin (various months).

Note: The July 2015 performance is widely diverted as it includes the short-term "bridge" loan of 7.16 billion euros from the European Financial Stability Facility that Greece received during the period between the second and third adjustment programs.

TABLE 2.1.2 Composition of Central Government debt

	December 2011	December 2013	December 2017	December 2018	June 2019	September 2019
A. Rate						
Fixed rate[1]	62.0%	28.5%	48.1%	89.2%	93.2%	93.8%
Floating rate[1, 2]	38.0%	71.5%	51.9%	10.8%	6.8%	6.2%
B. Trade						
Tradable	74.7%	28.4%	19.9%	18.6%	20.4%	20.2%
Non-tradable	25.3%	71.6%	80.1%	81.4%	79.6%	79.8%
C. Currency						
Euro	97.5%	95.9%	97.4%	97.9%	98.1%	98.2%
Non-Euro area currencies	2.5%	4.1%	2.6%	2.1%	1.9%	1.8%

Source: PDMA Public Debt Bulletins (December 2011, December 2013, December 2017, December 2018, September 2019) and Issue No 40 of the *Greek Economic Outlook.*

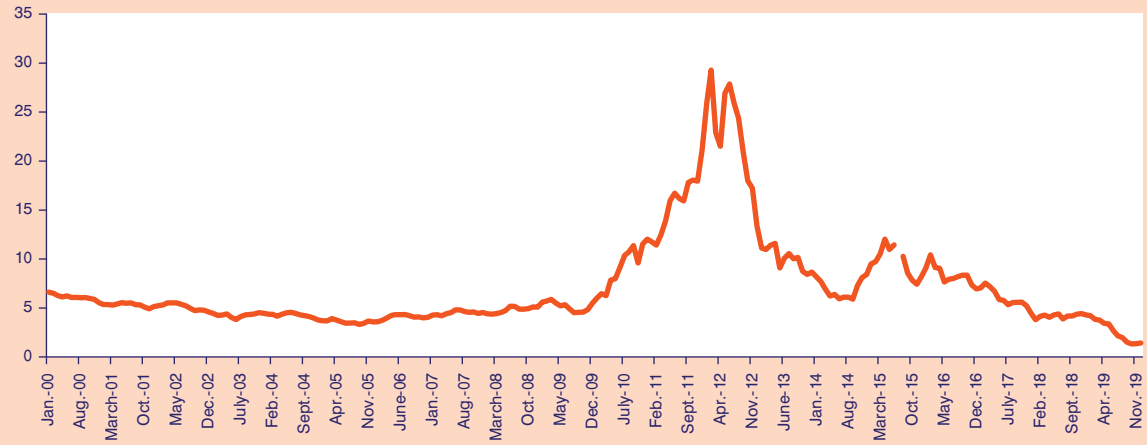
Notes:
1. Fixed/floating ratio is calculated taking into account: i) interest rate swap transactions, ii) the use of funding instruments by the ESM regarding the loans that have been granted to the Hellenic Republic and iii) the incorporation of the risk metrics of the EFSF's liability portfolio into the Greek debt portfolio.
2. Index-linked bonds are classified as floating rate bonds.

debt account stood at 38.1 million euros in September 2019, from 122.7 million euros in June 2019 (see Public Debt Bulletin, September 2019).

Note that the financial needs in 2019 were covered by the issuance of five-year, seven-year and ten-year bonds, as well as through the issuance of three-month, six-year and one-year Treasury bills and repository cash management operations in the form of repos to refinance short-term debt. The reduced costs of new borrowing reflect the improvement of investor confidence and reduce the cost of public debt financing.

Focusing on ten-year Greek government bonds, in the course of 2019 there was a a significant decline

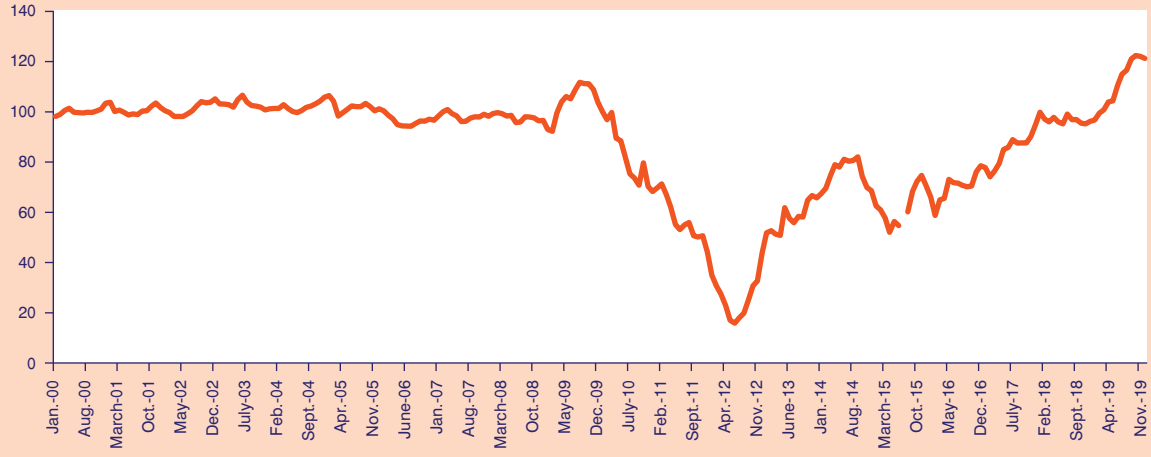
FIGURE 2.1.4
Greek Government benchmark bond monthly average yield (%)
(January 2000-December 2019)



Source: Bank of Greece.

Note: There is no observation for July 2015 due to the bank holiday.

FIGURE 2.1.5
Greek Government benchmark bond monthly average price
(January 2000-December 2019)



Source: Bank of Greece.

Note: The bond prices given are the clean prices per € 100 nominal. There is no observation for July 2015 due to the bank holiday.

in yields at historically low levels accompanied by rising prices. Specifically, according to Bank of Greece data, the average monthly yield of the 10-year bond reached 1.42% in December 2019 (Figure 2.1.4) and its average monthly price stood at 121.10 euros (Figure 2.1.5). In December 2018 the average monthly yield of the 10-year bond was at 4.28% and its average monthly yield at 96.08 euros. At the same time, at the end of December 2019, the Government raised funds through six-month Treasury bills with zero yield, while in the corresponding issuance in early December, it raised funds with a negative yield of -0.02%. Borrowing costs through three-month Treasury bills in the most recent issuance of November (-0.083%) and October 2019 (-0.02%) were also negative. Finally, the borrowing cost of the 12-month Treasury bills dropped significantly to 0.07% in the December 2019 issuance from 0.29% in September 2019. The borrowing costs in all bond categories declined sharply compared to the end of 2018 (Table 2.1.3).

Overall, these developments are quite positive, leading to lower borrowing costs as well as to the improvement of the public debt repayment capability, and contribute to the key objective of reaching investment grade by international rating agencies in the near future.

TABLE 2.1.3 Greek Government T-bills yields

Auction date	13 weeks	Auction date	26 weeks	Auction date	52 weeks
6/11/2019	-0.083%	31/12/2019	0.00%	11/12/2019	0.07%
9/10/2019	-0.02%	4/12/2019	-0.02%	11/9/2019	0.29%
7/8/2019	0.095%	30/10/2019	0.00%	12/6/2019	0.47%
10/7/2019	0.23%	2/10/2019	0.097%	13/3/2019	0.95%
8/5/2019	0.34%	28/8/2019	0.15%	12/12/2018	1.09%
10/4/2019	0.35%	31/7/2019	0.15%		
6/2/2019	0.50%	3/7/2019	0.23%		
9/1/2019	0.67%	5/6/2019	0.41%		
7/11/2018	0.71%	30/4/2019	0.46%		
		3/4/2019	0.58%		
		27/2/2019	0.72%		
		30/1/2019	0.75%		
		2/1/2019	0.90%		
		5/12/2018	0.90%		

Source: Ministry of Finance.

3. Human resources and social policies

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 30-39

3.1. Recent developments in key labour market variables

Ioannis Cholezas

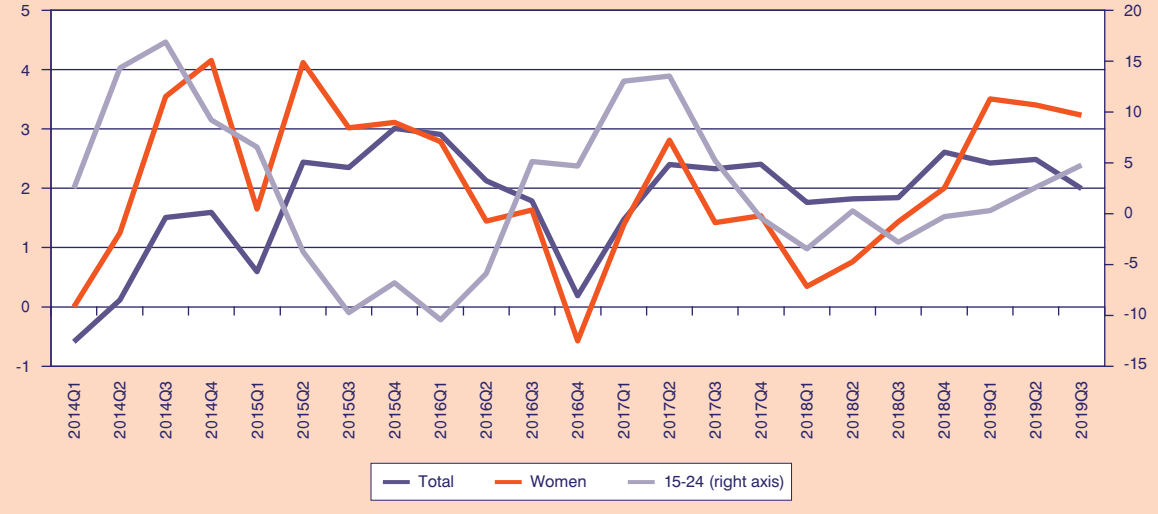
3.1.1. Introduction

The number of the employed continued to increase in the third quarter of 2019 following the seasonal boom of economic activity. Similarly, the number of the unemployed decreased, although some demographic groups, such as women, youth and foreigners, continued to face sharp employment issues. Despite the expansion in employment, underemployment is still an issue, especially amongst women and youth. Some industries, such as Transport and storage and Manufacturing, have contributed to the creation of new jobs in 2019. At the same time, demand seemed to favour either unskilled or highly skilled individuals. The discussion on paid employment suggests that the number of paid employees has been increasing, but the terms of employment continued to diverge from the pre-crisis levels, with respect to both working hours and wages. Moreover, several institutional reforms have either already been realised or will be realised soon, bringing about additional changes to the labour market.

3.1.2. Employment

Based on the Labour Force Survey (LFS) data, the number of the employed over 15 years of age increased in the third quarter of 2019 (2019Q3). There was an increase not only with respect to the previous year, i.e., the third quarter of 2018, by 77.7 thousand, but also with respect to the previous quarter, i.e., 2019Q2, by 15.5 thousand. Hence, the number of the employed increased further in 2019. A close look at Graph 3.1.1 on the annual evolution of the number of the employed reveals that since the second quarter of 2015, the rate of change has always been positive, but not constant. Also, since 2015, the annual change in the third quarter of the year has been stable at approximately 2%. Despite the drop in the rate of change

GRAPH 3.1.1
Annual change for the employed in % (same quarter in two consecutive years)



Source: Labour Force Survey, ELSTAT.

recorded in 2019Q3, the rate of change (2%) remained bigger than 2018 (1.8%), but smaller than 2017 (2.3%).

The increase in the number of the employed by 77.7 thousand in period 2018Q3-2019Q3 represents a 3.6 percentage change. The relative increase was bigger for women than men (5.5% vs. 2.2%) and for youth aged 15-24 than the employed over 25 (12.4% vs. 3.3%). However, the employment rate for women continued to be significantly lower than for men (35.5% vs. 52.5%). The same is true for youth compared to older individuals (15.4% vs. 47.3%). In 2019Q3 the employment rate reached 43.7%, approximately one percentage point higher than the respective rate in 2018 and marginally higher compared to the second quarter in 2019.[1]

Education

Most new jobs in period 2018Q3-2019Q3 were occupied by upper secondary education graduates (62.5% of total) followed by holders of PhD and/or master's degrees (23.8% of total). The only groups of employed graduates which shrank were primary education graduates (some have even less education) and upper technical vocational education. Comparing population shares, the fastest increase involved the number of holders of PhD and/or master's degrees (8.3%) followed by upper secondary education graduates (3.6%). University graduates increased, but at the same rate with lower secondary education graduates. At first sight, then, there seems to have been a polarisation in the labour market in period 2018Q3-2019Q3, in a sense that those hired were either unskilled or highly skilled. That impression is further strengthened by the quarterly change in employment. Between the second and the third quarter in 2019 some 18.3 thousand jobs occupied by upper technical vocational education graduates and 15.3 thousand jobs occupied by university graduates were lost. Except for university graduates, there were no similar losses during the same period in 2018. However, even in that case, the reduction in the number of the employed in 2018 was much smaller (5.2 thousand).

Industries

Wholesale and retail trade, Agriculture and Tourism remained the biggest employers in the Greek economy in 2019. Over the past year, though, there has been a significant loss of jobs in Agriculture, nearly 25 thousand. These losses were compensated by new jobs created in Transport and storage (24.4 thousand) and Manufacturing (22.9 thousand), while Tourism (18.1 thousand) and Education (14.4 thousand) also contributed significantly to employment. In relevant terms and limiting our focus to big industries in terms of employment, the number of the employed in Transport and storage expanded by approximately 13%. On the contrary, amongst smaller industries, the number of the employed in Construction (-2.5%) and Financial and insurance services (-2.3%) declined.

Underemployment

The number of the underemployed[2] declined in the third quarter in 2019 by 6.7 thousand compared to the second quarter of the same year, amounting to 232.8 thousand; that is almost 1,000 fewer individuals compared to 2018Q3. Therefore, it is safe to describe the phenomenon as almost stable in period 2018Q3-2019Q3 and moving around 6%. During the same period, though, there was a decrease in the number of underemployed men by 8.6% and an increase in the number of underemployed women by 6.5%. Note that 57.5% of the underemployed are women; also note that the share of underemployed women equalled 8%, almost twice the share of men. Similarly, the number of underemployed youth aged 15-24 increased (17.6%) contrary to the share of older individuals, which declined (2.3%). It is worth mentioning that the share of the underemployed amongst youth was 15.6%, almost three times the share of people over 25. These remarks indicate that the recovery in employment is not something that affects all population groups similarly. On the contrary, underemployment is strengthened among population groups which already face more problems.

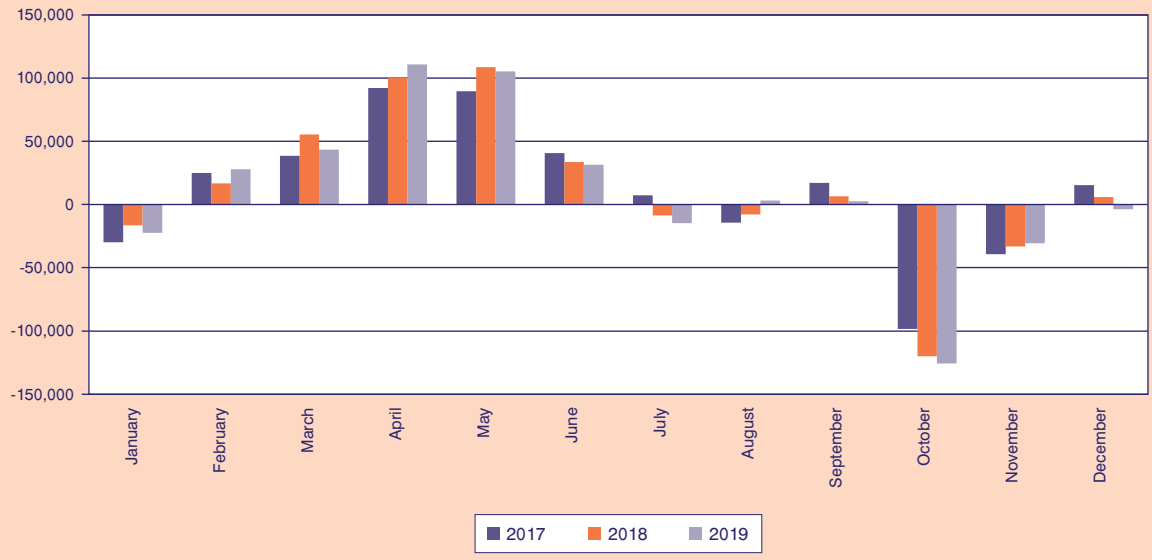
3.1.3. Paid employment

Most of the employed in Greece are paid employees, henceforth employees. Despite the reduction in their number over the past years by nearly 10%, their share in the total employed increased, since the size of the

1. Numbers refer to those aged over 15.

2. The definition of underemployment by ELSTAT refers to people who are employed but would like to work more hours. Unfortunately, they cannot find suitable jobs; in this respect, they resemble the unemployed. See ELSTAT Bulletin, 5, December 2013, Labour Force Survey: Indexes of unemployment and potentially additional labour force.

GRAPH 3.1.2
Net new jobs of paid employment



Source: ERGANI reports, Ministry of Labour and Social Affairs.

rest of the groups of the employed decreased faster. Hence, the share of employees in total employment increased from 65% in 2018Q3 to 69% in 2019Q3. That equals approximately 2.74 million paid employees in both the private and the public sector. Therefore, discussing the attributes of paid employment is useful in order to draw conclusions that can be generalized for the entire labour market. The main source of information for paid employment is the informational system ERGANI and its periodic reports.

Before discussing the specifics of the employees, it is useful to form a more general picture based on the December 2019 report. There were 127,444 new jobs of paid employment created in 2019, which is the lowest performance for the past four years (Graph 3.1.2). It should be stressed that there had been a slower pace of job creation already in 2018, when approximately 2.5 thousand fewer jobs had been created compared to 2017. Hence, this slowdown seems to have continued in 2019. A closer look at Graph 3.1.2 reveals that the monthly number of new jobs created fluctuated more in 2019, a fact which is verified by the standard deviation on an annual basis. For instance, the number of jobs lost was bigger in January, July and October 2019 compared to the respective months in 2018. On the contrary, the number of new jobs created in February and April was bigger than the two previous years. Nevertheless, the slowdown in the creation of new jobs should not be ignored.

The fact that hires in 2019 involved less often work-in-shift job contracts is a positive development (11.8% in 2019 vs. 12.4% in 2018 and 13.8% in 2017). On the other hand, the share of part-time job contracts increased (38.3% in 2017, 39.2% in 2018 and 40.4% in 2019). Moreover, full-time job contracts decreased as a share of total hires in 2019 to the 2017 levels. Part-time employment is too heterogeneous, regarding the working hours involved and the associated wages, to draw safe conclusions as far as the quality of employment is concerned. It is surely preferable to unemployment however. The fact that a large share of the part-time employed (not necessarily employees) would prefer to work full-time is not comforting. Note that according to the LFS, in the third quarter in 2019, this share stood at 62.3%, which was the lowest share since 2014Q2 and approximately 20 percentage points higher than the 2008 average.

On the other hand, converting full-time job contracts to flexible job contracts is a rather negative development (Table 3.1.1). In December 2019 alone, some 3,719 full-time job contracts were converted to flexible ones. A similar number had been recorded in December 2015 (3,555), but the number of conversions had been constantly declining since then. Another disappointing development is that a large part of those conversions, over 22%, did not have the consent of the employee involved. A similar share was recorded back in 2014 (18.6%), but it had also been declining ever since. The

TABLE 3.1.1 Full-time job contracts converted to flexible types of job contracts

			Part-time job contract	Work-in-shifts contract	Work-in-shifts contract without consent	Total
2014	December	N	1,509	783	522	2,814
		%	53.6%	27.8%	18.6%	6.1%
	Total	N	25,488	12,405	7,896	45,789
		%	55.7%	27.1%	17.2%	100.0%
2018	December	N	1,914	704	186	2,804
		%	68.3%	25.1%	6.6%	5.4%
	Total	N	35,795	12,230	3,808	51,833
		%	69.1%	23.6%	7.3%	100.0%
2019	December	N	2,132	746	841	3,719
		%	57.3%	20.1%	22.6%	6.8%
	Total	N	39,230	11,180	4,059	54,469
		%	72.0%	20.5%	7.5%	100.0%

Source: ERGANI reports, Ministry of Labour and Social Affairs.

situation seems less alarming when the entire year is included in the analysis. For the entire year, the number of conversions reached 50 thousand, while the share of conversions without the consent of the employee was close to 7.5%, like 2018, but lower compared to previous years. Therefore, in order to draw safe conclusions, one should be patient and work with more recent data. Data on 2020 should reveal whether the increase in the number of contract conversions is a temporary phenomenon or not. However, it is likely that these conversions are somehow associated with the increase in the minimum wage and the attempt of the employers to alleviate the increased wage cost.

Using the 2019 Special Annual Report of the informational system ERGANI and the respective report in 2014, one could draw some useful conclusions regarding several features of paid employment for which there is no information available in monthly reports.

The first feature is the size of the employers in the Greek labour market, i.e., the businesses that form the demand for paid employees. Unsurprisingly, most businesses are small, although their share has been dropping slowly over time. It suffices to report that their share in period 2014-2019 dropped by one and a half percentage points. Currently (i.e., in 2019), 87% of businesses employ up to 10 persons, even though only one out of three employees are working in a small business (Table 3.1.2). This means that bigger businesses, although few, are important for employment. Specifically, nearly 28% of paid employees were working for medium-sized businesses in 2019 (employing 10-49 people), which represented only 10% of overall businesses. Likewise, almost one in four paid employees was working for a business employing more than 250 people and representing just 0.2% of total businesses.

The slow recovery of the Greek economy over the past years has contributed to the increase in the number of businesses and the number of employees working for them. The number of businesses, both private and public, increased by approximately 24% in period 2014-2019, while the number of employees increased slightly more (32.2%), which means that the average size of business also increased (Table 3.1.2). The number of employees working for medium-sized businesses employing 10-49 individuals increased faster (approximately by 43%) followed by the employees working for small businesses employing 5-9 individuals (approximately by 39%). One look at the number of businesses in period 2014-2019 reveals that the number of privately owned businesses increased similarly to the total number of businesses, i.e., 24%, while –oddly enough– the number of Legal Entities under

TABLE 3.1.2 Number of businesses and employees by groups of employees

	2014			2019			2014-2019	2014-2019
Range	Number of businesses	Number of employees	% empl.	Number of businesses	Number of employees	% empl.	Number of businesses	Number of employees
1-4	161,766	281,372	17.8	191,823	343,088	16.5	18.6	21.9
5-9	27,554	178,896	11.3	38,120	248,445	11.9	38.3	38.9
10-49	21,629	407,387	25.8	30,776	582,039	27.9	42.3	42.9
50-249	2,942	294,638	18.7	3,851	378,418	18.1	30.9	28.4
>250	518	415,703	26.3	642	533,591	25.6	23.9	28.4
Total	214,409	1,577,996	100	265,212	2,085,581	100	23.7	32.2

Source: Special Issue in December 2014 and Special Annual Issue in 2019, Informational System ERGANI.

TABLE 3.1.3 The distribution of employees by group of weekly working hours

	2014		2019		2014-2019
	N	%	N	%	%
1-2	11,982	0.8	11,494	0.6	-4.1
2,1-4	15,313	1.0	26,995	1.4	76.3
4,1-10	60,489	4.0	79,252	4.0	31.0
10,1-20	216,994	14.2	245,364	12.4	13.1
20,1-35	162,633	10.6	248,749	12.5	53.0
>35	1,063,768	69.5	1,374,482	69.2	29.2
Total	1,531,179	100.0	1,986,336	100.0	29.7

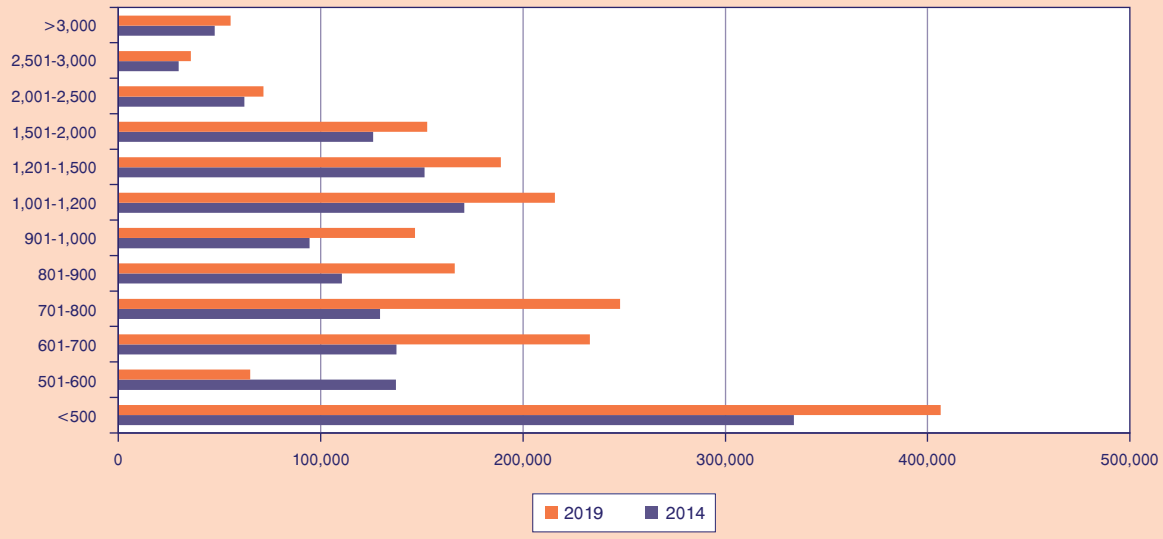
Source: Special Issue in December 2014 and Special Annual Issue in 2019, Informational System ERGANI.

Public Law (NPDD) nearly doubled. In any case, privately owned businesses with employees represent 99% of all businesses.

The total number of employees increased in period 2014-2019 by approximately 30% or 455 thousand individuals. Men represented 53% of all employees in 2019. Small deviations from the numbers reported above are because some employees are working for more than one business. The number of such employees more than doubled in the respective period, reaching 99 thousand in 2019 compared to 47 thousand in 2014. It is worth noting that the number of male employees has been increasing faster than female employees (30.6% vs. 28.7%), expanding the gap between the two groups.

Another interesting feature that reflects the low degree of labour force utilisation in Greece is hours worked (Table 3.1.3). Despite the increase in the number of part-time employees during the crisis and the decrease that followed, the share of employees working more than 35 hours per week remained almost constant in period 2014-2019 (approximately seven out of ten). This means that the number of part-time employees has been changing similarly to the total number of employees. One of the strongest changes is the increase in the share of employees working 2.1 to 4 hours per week and those working 20.1 to 35 hours per week. Therefore, the gradual improvement in working conditions and the increase in the number of the employed was characterised by more than pro-

GRAPH 3.1.3
Employee wage distribution



Source: Special Issue in December 2014 and Special Annual Issue in 2019, Informational System ERGANI.

portional increases in the number of these two groups of part-time employees.

Undoubtedly, the level of wages is an important piece of information in order to assess the situation in the labour market. An increase in wages is a sign of a booming labour market. Given that the unemployment rate is still very high and that there are additional problems facing the labour force, no major changes were expected with respect to wages. ERGANI data seem to verify that. The average monthly gross wage bill reached 2.078 billion euros in 2019, which was approximately 30% higher than the 1.596 billion euros in 2014, very close to the increase in the number of the employees. Therefore, the average wage (taking the number of employees into account) stood close to 1,045 euros and has remained almost constant.

Another interesting feature is the wage distribution of employees[3], which is represented in Graph 3.1.3. There was a big increase in the number of employees with monthly wages between 701 and 800 euros (approximately 92%), while the number of employees with wages between 501 and 600 euros was the only one that decreased. A plausible explanation is that the number of employees in both the previous group (below 500 euros) and the next group (601-700 euros) increased sharply. Maybe these movements were related to the increase in the minimum wage and the subsequent increase in the number of full-time job contracts being converted to flexible types of job contracts coupled with the fact that many new jobs involve flexible employment. It seems, then, that the labour market adjusted to the new environment. A more thorough look at the data shows that the number of employees with monthly wages lower than 1,000 euros[4] increased faster compared to those with wages higher than 1,000 euros.

The age composition of employees reveals that the number of employees younger than 19 years of age increased and so did the number of employees older than 64. The third biggest increase was recorded for employees aged 45-64. The first group grew in order to satisfy the increased supply of labour, probably to support household income and perhaps combining studies with work, but also because the abolition of the lower minimum wage for youth led to a substitu-

3. Relevant reports are not clear whether these are gross or net wages. However, since the total wage bill is reported in gross wages, we assume that the same holds in this case too. Moreover, it is also not clear whether wages involve just December or the entire year.

4. The employees with monthly wages lower than 500 euros are not reported as a separate group in the 2014 report, since the distribution starts from group 501-600 euros. Another group labelled "part-time or work-in-shift employment" is reported instead. However, it is very likely that the majority of those in that group are paid less than 500 euros per month and, thus, they can be matched with the respective group in 2019.

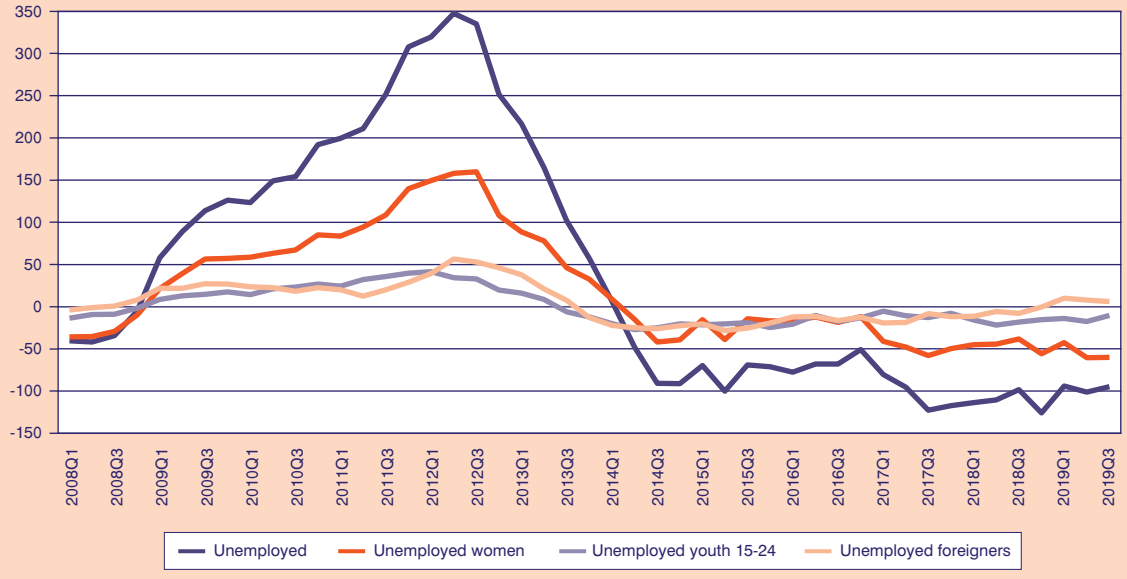
tion effect stronger than the income effect and made participation in the labour force more attractive. On the other hand, the increase in the number of employees aged over 64, by 140%, is probably the result of the increase in the retirement age to 67 years.

3.1.4. Unemployment

The increase in the number of the employed in the third quarter of 2019 was accompanied by the reduction in the number of the unemployed and the unemployment rate. The total number of the unemployed over 15 years old stood at approximately 777 thousand, according to the Labour Force Survey by ELSTAT. The unemployment rate stood at 16.4%, which is two percentage points lower than the third quarter of 2018. The annual decrease in the number of the unemployed equals 93.6 thousand (Graph 3.1.4). However, unemployment does not equally involve all population groups; some face more intense employment problems than others.

There are three population groups that face more severe unemployment issues than others: women, youth and foreigners. The unemployment rate for women over 15 stood at 20.5% in 2019Q3 compared to 13% for men. It is interesting that the female disadvantage is different across the age distribution. For example, women aged 30-44 do worse than other age groups compared to men, since the unemployment rate they face is twice as big as the men's (21.1% vs. 11.6%). On the other hand, both men and women aged 15-24 face similar unemployment rates.[5] Youth constitute the second population group with a significantly higher unemployment rate than the average. It suffices to mention that the respective unemployment rate stood at 32.4% in 2019Q3 compared to 15.5% for people over 25. The third group that faces employment difficulties are foreigners. Their unemployment rate stood at 22.1% in 2019Q3 compared to 15.9% for Greek nationals. It is particularly disturbing that while the number of the unemployed Greek nationals went down over the past year, the number of the unemployed foreigners increased by 9.1% or 6 thousand people. This means that contrary to the unemployed women and youth, whose number decreased faster than their counterpart groups over the past year (i.e., compared to men and people over 25), the number of unemployed foreigners continued to increase, moving in the exact opposite direction

GRAPH 3.1.4
Annual change of the number of the unemployed (same quarter in consecutive years)



Source: Labour Force Survey, ELSTAT.

5. In 2019Q3, the unemployment rate for women aged 15-24 was 35.1% and for men it was 30.3%. The unemployment rates ratio equals 1.2 and it is bigger only compared to the 65+ ratio, since women in this age group face a lower unemployment rate than men.

than unemployed Greek nationals. This is a development that should trouble policy makers and it has already been noted in the previous issue of the *Greek Economic Outlook*.

Despite the decrease in the unemployment rate over the past few years, employment prospects are still poor, especially for specific population groups. This is obvious compared to other EU member-states. The only country with a similar unemployment rate to Greece is Spain (13.9%), while the average unemployment rate across the Eurozone stood at 7.3% in 2019Q3. Therefore, we still have a long way to go to reduce the unemployment rate to an acceptable level, while in the meantime, the cost in terms of underutilised human resources will continue to be high for the Greek economy.

3.1.5. Institutional changes

Since the new government took over in the summer of 2019, several institutional changes have been introduced to the labour market and others are expected to be introduced in the coming months. Some of those important changes are discussed next, but the list is not exhaustive.

An amendment in August 2019 abolished the provision which introduced the "valid reason" [6] as a prerequisite to layoff an employee (article 48, Law 4611/2019). The usefulness of that provision was questioned from the beginning. The key argument was that the provision complicated the layoff process and the severance pay due to the layoff, since Greek law has provided for a severance pay in case of layoff, irrespective of the reason for the layoff, since 1955. The only case in which the employee was not entitled to a severance pay was if the employer justified his/her layoff decision. Thus, the need to justify the layoff could possibly leave the legal space to employers to refuse to pay severance by justifying the layoff.

The same amendment also abolished the responsibility of the assigning contractor and subcontractor towards the employees in case their immediate employer refused to pay the employees their wages or the social security contributions due or even the severance pays in case of a layoff (article 9, Law 4554/2019). Although there are arguments in favour and against this abolition, the provision probably exerted pressure on non-compliant employers through their clients/partners to comply with the labour law. This pressure is no longer there.

Lastly, the same amendment reinstated the three-month delay deadline in order to contest the validity of a layoff and the six-month delay deadline to claim a severance pay. The official argument put forward was that the extension of the delay deadline extended the time necessary for the courts to rule on the cases, since the lawsuit depended on the decision of the Labour Inspection Corps (SEPE) regarding whether the layoff was valid or not.

A few months later, Law 4635/2019 (article 53) provided for specific exemptions from the terms of collective agreements and the introduction of special terms. This means that firms or group of firms facing economic problems will be allowed to be exempted from the terms and conditions of sectoral or occupational Collective Agreements (SSE) so long as all parties involved agree on it. Moreover, the right of the Minister of Labour and Social Affairs to intervene in collective bargaining has been institutionalised, since it is he/she who decides the specific criteria for the exemption. The exemption is likely to involve special types of businesses, such as social economy businesses, non-profit legal entities and businesses that face severe economic problems (e.g., they are in danger of bankruptcy or have already initiated the legal processes involved). Until the writing of this article, the provision had not been implemented yet.

Article 55 in the same law states that the sectoral or firm-level collective agreement takes precedence when there is a conflict with an occupational collective agreement in case businesses involved face severe economic problems or have initiated bankruptcy processes or are under extrajudicial compromise or are reorganised. The Minister of Labour and Social Affairs will decide on the firms exempted. Moreover, the firm-level agreement takes precedence over the sectoral collective agreement. However, a relevant ministerial decision to implement the provision has not been issued yet. On the contrary, the national sectoral or occupational collective agreement does not take precedence over the respective local one already in place since November 2019.

Regarding the extension of the provisions in collective agreements or court decisions that involve employment terms and conditions, Law 4635/2019 (article 56) makes it harder for the former to be generally mandatory; thus, it makes it more difficult to extend

6. Some examples of "valid reasons" include layoffs because the employee is unable to perform his/her tasks efficiently, he/she exhibits inappropriate behaviour, or the operational needs of the business have changed.

their implementation. At the same time, it repeats the exemption of specific businesses from the provisions of collective agreements of court decisions, which are generally mandatory. This provision had not been applied by the writing of the present article.

Moreover, article 58 in Law 4635/2019 defines the delay, on the part of the employer, in paying the employee his/her wage beyond two months as a one-sided harmful change of the terms of employment, irrespective of the cause of the delay. Note that previous relevant provisions referred to a "noteworthy delay" in paying the employee his/her wage without being specific and, hence, allowed for various interpretations. This specific provision has not been implemented yet.

Law 4635/2019 (article 59) provides for part-time employment and extra working hours. Specifically, should there be a need for extra hours beyond those already agreed upon, the employee is obliged to accept, so long as he/she is able to and his/her refusal would contradict good faith. Should extra hours of labour be realized, the part-time employee is entitled to extra payment with a 12% premium over the agreed pay for every extra hour of work. The part-time employee can refuse to work extra hours, if this is common practice. In either case, the extra hours should not exceed the hours offered daily by a comparable full-time employee.[7] This provision seems to protect part-time employees from regularly working more hours and, in this manner, it aims at undeclared work.

Moreover, there have been changes in the institutional framework for undeclared work. For instance, article 65 states that within 12 months since the offense of undeclared work has been verified, the offender business should be inspected at least one more time, in order to discourage recurrence. The employer also has the right to appeal within 60 days without suspending the fine. Finally, in case of hiring the undeclared employee for 12 months with a full-time contract, the fine decreases to 2,000 euros (down from 10,500 euros), while for the seasonally employed, the duration of the full-time contract is set to at least 3 months and the fine decreases to 5,000 euros (article 66 in Law 4635/2019). The relevant provisions had not been implemented with the necessary ministerial decision by the writing of this article.

The Minister of Labour and Social Affairs issued a new decision which restructured the fines for violating the labour law. The decision is said to have set up a new and objective system of fines, putting aside subjective criteria used in the past. The aim was to have the same fines for the same violations for everyone so that the employers know beforehand the exact amount of money they would be fined for each specific violation of the labour law. Allegedly, that would shape a transparent and clear framework capable of protecting the interests of the employees and securing healthy competition between businesses. The new system provides for fines of different amounts based on the severity of the violation (the biggest fines are provided for when violations involve women, pregnancy, minors or those involved with trade unionism), the number of the employees involved and the size of the firm. According to these criteria, a system of fines has been set up which is known *a priori* to all businesses so that there are no surprises.[8]

According to the press,[9] it is the intention of the government and the Minister of Labour and Social Affairs to allow for the electronic voting of syndicalists in the decision-making process. At the same time, there are thoughts to set up an electronic registry of trade unions and to set up a National Registry of Collective Agreements easily accessible to all employees and employers. It is also likely to reinstate the blockage in submitting periodic statements (APD) for the non-compliant employers.

As far as planned interventions are concerned, the law for restructuring ERGANI (ERGANI II) is expected to be voted on soon. According to statements of the Minister of Labour and Social Affairs,[10] the law will provide, among other things, for the development and integration to the ERGANI system of new digital functions, such as the digital work schedule and the time card (initially in retail trade businesses and banks). The aim is to protect the employees more effectively and to reduce the compliance cost for the employers. However, it is rather difficult to predict all the possible ways

7. A comparable employee is probably one who works for 8 hours daily for five days a week or one who works for 6.6 hours daily for six days a week. In any case, there should be in total 40 hours of work per week.

8. <https://www.naftemporiki.gr/finance/story/1555584/ta-nea-prostima-gia-tis-parabaseis-tis-ergatikis-nomothesias>.

9. See, for example, <https://www.kathimerini.gr/1041658/article/oikonomia/ellhnikh-oikonomia/sarwtikes-allages-sta-ergasiaka-menomosxedio-skoypa>.

10. See <https://www.capital.gr/epikairotita/3387652/g-broutsis-erxetai-i-ergani-ii-oi-axones-proteraiotitas-gia-tin-anaptuxi-tis>.

to circumvent the rules, since it is impossible to fully monitor daily practices.

In the same context, the Under-Minister of Labour and Social Affairs[11] stated that a reduction in social security contributions (equal to 0.9 percentage points) is to be introduced in the second semester of 2020. The respective provision will be included in the forthcoming social security law. The immediate effect will be to increase net wages and to reduce the wage cost for the employers. Interestingly enough, the reduction in social security contributions will involve full-time employees only. This is expected to reduce the employers' motive to hire part-time workers, since the cost wedge between the two types of employment will be reduced. It is likely that additional interventions have already been considered, although not publicly announced yet, to compensate for the loss in the revenues of the social security funds due to the reduction in social security contributions, since there are no plans to reduce pensions.

11. See <https://www.taxheaven.gr/news/46962/n-mhtarakhs-apo-ton-ioylio-toy-2020-h-meiwsh-kata-09-twn-asfalistikwn-eisforwn-gia-toys-misowtoys-plhroys-apasxolhshs>.

3.2. The employment adjustment of the financial sector in Greece

Vlassis Missos
Konstantinos Loizos

3.2.1. Introduction

Since the outbreak of the 2008 global economic crisis, numerous scientific studies have placed the broad developments of the financial sector at the epicenter of their analyses. Aside from their methodological differences and theoretical treatment, most of these treatises have indicated the urgent need to take action and promote measures for securing the general framework of financial intermediation, underlining the need for a more stable and resilient financial sector.[1] In addition, European Union policy briefs[2] have opted for the formulation of a sound framework within which credit institutions would continue playing their role of financing the economy. Nevertheless, this has formed the basis upon which systemic financial institutions have become subject to regular and thorough audits, supervised by the European Central Bank. The primary aim of such audits is to assess the quality of risks emerging from standard portfolio management practices and the financial institutions' policy reactions to certain market scenarios. Within the current institutional framework and under the particular macroeconomic circumstances –such as the high non-performing-loans ratios[3]– the Greek financial market has undergone an essential readjustment process of revising its entrepreneurial model,[4] having a severe impact on employment.

Such developments are directly reflected in the core position the issue of stability of the financial sector occupies in the policy measures undertaken by the economic adjustment programs implemented since 2010 in Greece.[5] Large-sized bank recapitalizations were put forward for depositors and investors to resume confidence in the financial sector while, on the other hand, a series of institutional arrangements –extensive bank-firm merges– have taken place, leading to significant sectoral changes in size and resilience. High officials in the banking industry were approaching the current crisis as an opportunity to rationalize banks' operational costs. Consequently, a series of adjustments were put forward that might rejuvenate the sector's lost dynamism.[6] Reductions in employment seem to have played an essential role in the process of the adjustment of the financial sector to the new macroeconomic conditions that were shaped after the prolonged recession in Greece.

In what follows, we focus on the changes in the size of employment in the broad financial sector in Greece, from the early 2000s until the second semester of 2019. Moreover, we make good use of the official data published by the Hellenic Banking Association (HBA) concerning the number of bank employees in order to highlight the relationship between this and the number of active banking branches. Finally, we shed some light upon the relative income of those working in financial institutions by taking advantage of the data from the European Union's Survey of Income and Living Conditions.

3.2.2. Employment and unemployment

Comparing the size of employment in the broad sector of financial intermediation and insurance compa-

1. Adrian T. & Shin S. H. (2010), "The changing nature of financial intermediation and the financial crisis of 2007-09", Staff Report no. 439, Federal Reserve Bank of New York και IMF (2019) *Global financial stability report: Lower for longer,* Washington: International Monetary Fund.

2. EBA (2019) "Report on NPLs: Progress made and challenges ahead", European Banking Authority.

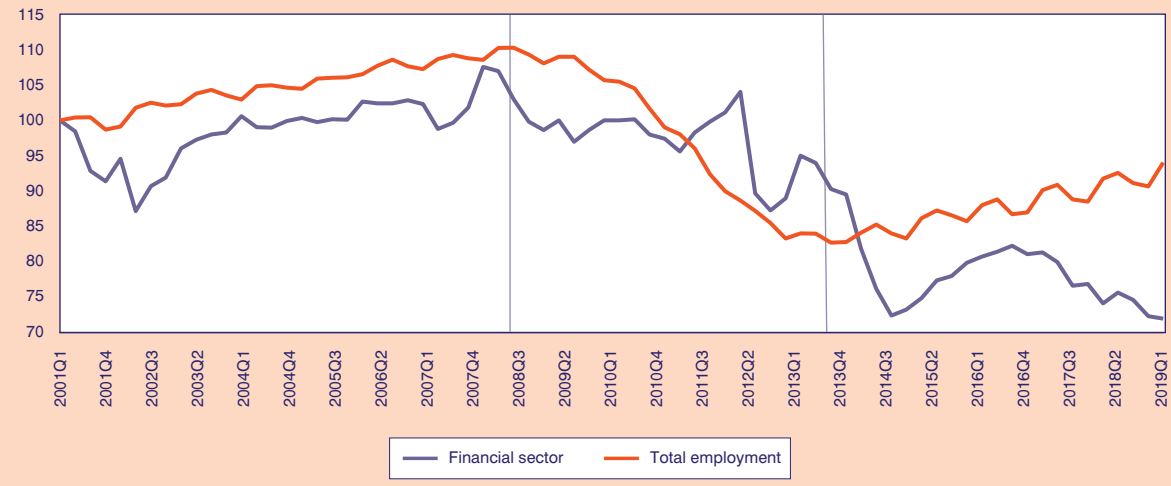
3. Loizos K. (2019), "Solving the NPLs' problem in Greece: where do we stand?", in *Ten years into the global financial crisis - The current state of finance in the EU: Prospects and alternatives,* Nicos Poulantzas Institute, transform! Europe/EuroMemorandum Group.

4. Speech by the Governor of the Bank of Greece "A systemic approach towards improving asset quality of Greek banks". Tackling NPLs within the Greek banking system, Greek Bank Union and PwC, 24 January 2019.

5. See Chapter 3 at European Commission (2012), "The second economic adjustment programme for Greece", *European Economy,* Occasional Economic Papers 94.

6. Speech by the governor of the Bank of Greece '*Teachings from the financial crisis and the challenges the Greek banking sector faces*' [in Greek: *Διδάγματα της χρηματοπιστωτικής κρίσης και προκλήσεις για τον ελληνικό τραπεζικό τομέα*], 14 November 2018, International Center for Monetary and Banking Studies.

FIGURE 3.2.1
Changes in the level of employment in comparison with the 2001q1 (=100), 2001Q1 – 2019Q2, Greece



Source: Labour Force Survey, ELSTAT.

nies with the changes that occur in total employment, some observations of critical importance are in order. Figure 3.2.1 presents the quarterly changes between total employment and that of the financial sector, taking the first quarter of 2001 (=100) as the basis for comparison. The two dashed vertical lines signify the *highest* and *lowest* level of national unemployment, as it was officially documented by the Labour Force Surveys. According to the data, from 2001 up to the third quarter of 2008, total employment has moved upwards by almost 10%, while in the financial sector, the level of employment seems to have gone through a period which is characterized by a lack of relative stability. Although a slight upward trend is the average outcome between 2003q2 and 2008q1, the level of employment in the financial sector cannot keep up with the national average.

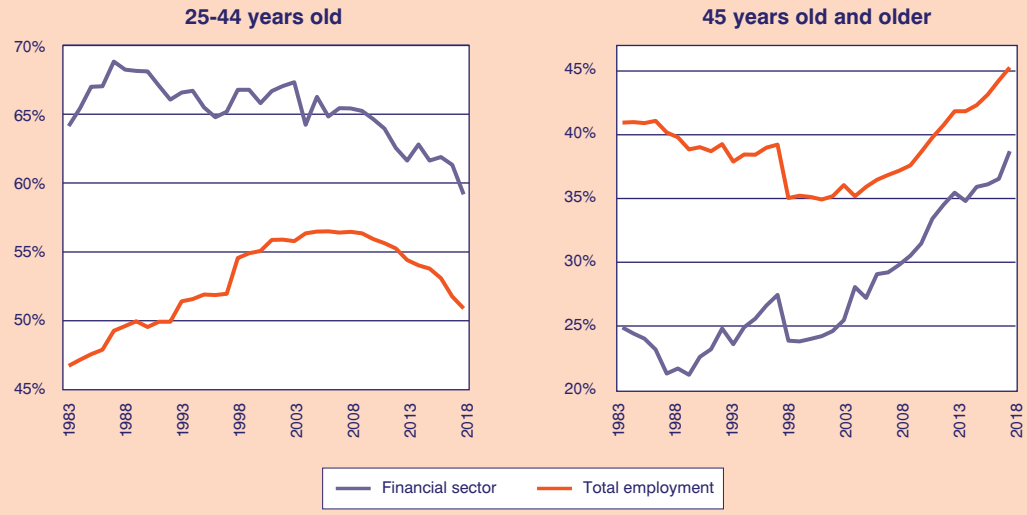
The period that extends between 2008 and the fourth quarter of 2013 is marked by an abrupt reduction in the absolute number of jobs, ending up to a level of employment which is lower by 18 percentage points than that of 2001. During the same period, the size of employment in the financial sector, despite its variability, displays a relative steadiness when compared with the corresponding figure of the economy as a whole. While the fourth quarter of 2013 constitutes the lowest level of the total employment rate documented within the years of prolonged recession, the level of employment in the financial sector seems to follow its own autonomous trend. More specifically, between 2014 and the second quarter of 2019, the number of financial sector employees shows a substantial fall, by almost 20%, diverging from the general trend of mild recovery that has been consistently recorded from the fourth quarter of 2013 onwards.

As it is shown in Figure 3.2.2, over the last three decades, changes in the percentage share of each age group in total employment are of interest. In particular, from the early 1980s to 1998, the average share of the 45-plus age group in total employment is estimated at 38%, whereas for the financial sector, it is 24% (lower by 14 percentage points [p.p.]). Both trends, however, are moving upwards, although the rate of change is quite higher in the financial sector. As a result, in 2018, the share of that age group is 45% in total employment and 38.7% in the financial sector.

Nevertheless, between 2004 and 2018, the share of the younger age group (25-44 years old) of employees in the financial sector has presented a decreasing, and even accelerating, long-term trend. Moreover, from 1983 to 1996, the difference between the average shares of younger employees of the financial sector and that of the total economy was 17 p.p., whereas during the next period (1997-2018), it was reduced to 9 percentage points. Two very important developments have contributed to this result: On the one hand, the chronic population ageing in Greece has contributed to the average age of total employment becoming higher. On the other, the prolonged recession and its impact on the overall level of employment seems to have inhibited younger-aged new hirings.

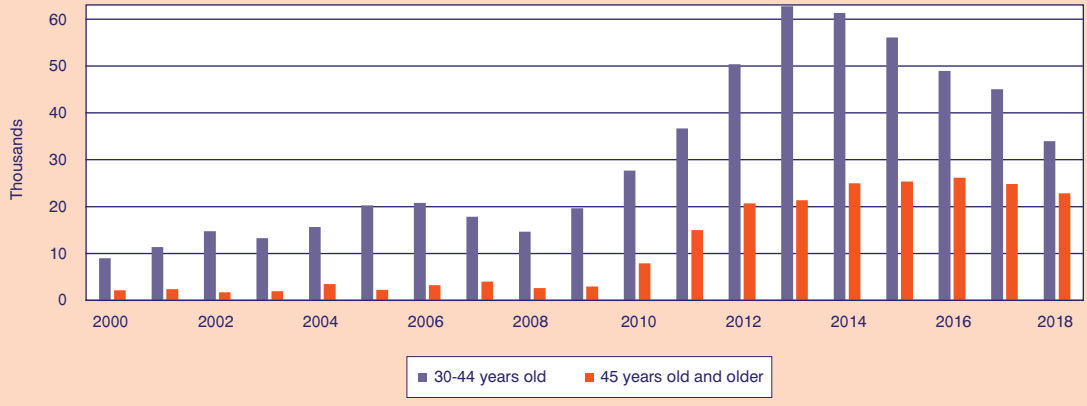
Figure 3.2.3 presents the evolution of the share of the unemployed population whose last working activity

FIGURE 3.2.2
Employees per age-group as a percentage of the financial sector and total employment, respectively, 1983-2018, Greece



Source: Labour Force Survey, ELSTAT.

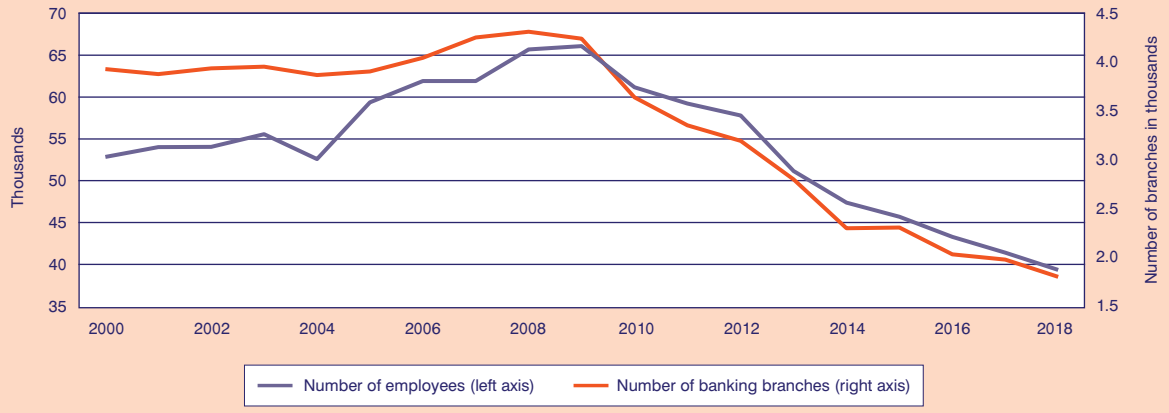
FIGURE 3.2.3
Unemployed population (in thousands) of the broad financial sector, per age group, 2000-2018, Greece



Source: Labour Force Survey, ELSTAT.

was in the financial sector. All estimates refer to the period between 2000 to 2018. As before, Figure 3.2.3 distinguishes between the two age groups, that of 25-44 and of 45-and above. Obviously, from 2000 to 2008, the younger unemployed population was relatively high, reflecting the intensity of labor mobility characterizing that age group. Furthermore, the older age group constitutes a smaller part of overall unemployment. From 2009 and on, both magnitudes have highly increased, thus shortening the gap between them. More specifically, in 2018, the younger unemployed age group was estimated to be 34 thousand persons, whereas the older one was close to 23 thousand. Combining the outcomes derived from the two Figures (3.2.2 and 3.2.3) and by taking for granted that the population of the older age group has increased, we conclude that the younger unemployed persons have probably changed their employment

FIGURE 3.2.4
Number of employees (in thousands) and number of banking branches (thousands) linked to or members of the Greek Banking Union, 2000-2018



Source: Labour Force Survey, ELSTAT.

orientation and stopped searching for work in the financial sector.

A closer look at the data regarding the Greek banking sector reveals the essential changes and restructuring of the financial institutions that have taken place during the period of economic recession. After the merging processes were over,[7] the remaining banking firms went through a phase of gradual reduction in size and in the number of branches. In more detail, in 2009, the number of branches was 4,163, whilst in 2018 it was just 1,874– more than 50% lower. As Figure 3.2.4 shows, these developments run in parallel with the relevant changes in the level of employment.

The annual data presented in Figure 3.2.4 are officially published by the HBA and refer to the number of employees of those banks which are members or are linked to the Greek authority. As it is obvious, between 2000 and 2009, the numbers of workers is particularly stable. Since then, the level of employees has reduced sharply, fluctuating from 66.9 to 38.5 thousand workers– more than a 42% reduction. This frustrating outcome was followed by a mild positive trend of GDP growth, inaugurating a critical phase during which the Greek banking sector had to deal with the new challenges ahead and to carry out the difficult task of portfolio restructuring with a focus on asset quality. For example, one of the most pressing issues was the reduction of the NPLs. In addition, pressures on banks to cut back on operating costs becomes obvious by the 7.5 thousand voluntary redundancies recorded in the 'Ergani' system between August 2013 and October 2019. Incentives were offered to high-cost personnel to accept voluntary redundancy deals in exchange for cash benefits, so that mutual agreement could be achieved.

3.2.3. Relative income and poverty rate of financial sector employees

The level of disposable income of those working in the financial sector is another important aspect which may offer valuable information concerning their standard of living and the poverty rate. By utilizing the data published by the European Survey of Income and Living Conditions (EUSILC), we take a thorough examination of income comparisons among individual employees working in different sectors. The statistical analysis and process of the EUSILC data has been presented in earlier issues of the *Greek Economic Outlook.*[8] Here, it would suffice to mention that the term "income" as it appears in Tables 3.2.1 and 3.2.2 below, refers to the individual *disposable* income, i.e., the remaining part

7. Notably, in 2007, apart from cooperative banks, the Greek financial sector was comprised of 19 institutions based within Greece, 18 institutions from other European countries and 4 institutions from countries outside Europe. In 2018, the total number of banking firms that were active in Greece was only 13.

8. Missos V. (2019), "Income inequality indices in the European Union (EU15)", *Greek Economic Outlook*, 39, 38-41.

TABLE 3.2.1 Poverty rate of financial-sector employees, 2009 and 2016, EU15

Welfare system	Country	2009	2016	Difference between 2009-2016
Social democratic	Denmark	0.6	2.0	1.4 p.p.*
	Sweden	5.4	0.0	-5.4 p.p.
	Finland	0.1	0.0	-0.1 p.p.
	Netherlands	0.0	7.0	7.0 p.p.
Conservative-corporatist	Austria	1.7	5.0	3.3 p.p.
	Belgium	2.3	2.0	-0.3 p.p.
	Germany	2.1	3.0	0.9 p.p.
	France	1.8	1.0	-0.8 p.p.
	Luxembourg	2.6	3.0	0.4 p.p.
Liberal	Great Britain	3.9	4.0	0.1 p.p.
	Ireland	2.0	0.0	-2.0 p.p.
South-European	Italy	2.6	4.0	1.4 p.p.
	Spain	4.5	6.0	1.5 p.p.
	Greece	3.1	3.0	-0.1 p.p.
	Portugal	0.0	1.0	1.0 p.p.

Source: EUSILC.
* Percentage points.

of total income, after direct taxes and social contributions have been subtracted. This is the part of income which the individual can use either for consumption or for saving.

Table 3.2.1 refers to the relative poverty rate of those working in the financial sector. It shows the share of employees whose income is less than the national poverty line.[9] For purposes of comparison, two distinct years are depicted: 2009 and 2016. The first one is, by convention, taken as the year in which the crisis broke out while the second is the last one available at the time this article went to press. As we observe, in all countries of the EU15, the poverty rate of financial-sector employees have been consistently recorded at very low levels. This is a more or less expected outcome since financial activities are considered as well paid.

In central Europe, between 2009 and 2016, the poverty rate increased significantly. It is estimated that the poverty rate in the Netherlands moved upwards by 7 p.p. and in Austria by 3.3 p.p. What is more, countries that belong to the South European Welfare system also seem to document very low poverty rates. Greece's rate fluctuates around 3%, whereas in Spain and Italy the rates are 6% and 4%, respectively. In addition, Portugal has a quite low rate as well.

The standard rate of poverty cannot incorporate those changes that occur at the level of disposable income, since it is based on the current median income of the population. Hence, it is important to understand that even a notable decrease of the median income can result in a slight reduction of the poverty rate. To compare the income of that population group (financial-sector employees) among all countries of EU15, the level of disposable income should be converted into terms of Purchase Power Parity (PPP). In that way, comparisons can readily be made by taking any country as a point of reference for evaluating the rel-

9. The poverty line is defined as the 60% of median disposable income of the total population. <https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty_rate>.

TABLE 3.2.2 Differences between the median disposable income of financial-sector employees in terms of Purchase Power Parity (PPP), in comparison with Denmark (100), 2009 and 2016, EU15

Welfare system	Country	2009	2016	Difference between 2009-2016
Social democratic	Denmark	100	100	-
	Sweden	83.7	78.8	-4.9 p.p.
	Finland	93.4	89.6	-3.8 p.p.
	Netherlands	87.7	85.0	-2.7 p.p.
Conservative-corporatist	Austria	114.5	95.7	-18.8 p.p.
	Belgium	91.5	92.2	0.6 p.p.
	Germany	95.9	84.8	-11.1 p.p.
	France	88.7	79.8	-8.9 p.p.
	Luxembourg	148.9	123.7	-25.2 p.p.
Liberal	Great Britain	86.4	86.6	0.3 p.p.
	Ireland	112.1	97.3	-14.8 p.p.
South European	Italy	96.2	79.4	-16.8 p.p.
	Spain	101.9	81.0	-20.9 p.p.
	Greece	83.3	47.8	-35.5 p.p.
	Portugal	86.1	62.3	-23.8 p.p.

Source: EUSILC.

ative performance of others. Table 3.2.2 depicts the median disposable income in PPP terms, for those working in the financial sectors of the EU15. Denmark's disposable income has been chosen as a basis for comparison.[10]

As shown in the data depicted in Table 3.2.2, the distances between the disposable income earned by the financial sector workers in Denmark and the great majority of the EU15 have grown. Apart from Belgium and the UK, in all other European countries the median income has lost a great part of its value when compared with that of the benchmark nation. In particular, the South European countries have endured some considerable level of devaluation. In 2009, the disposable income of Greek financial employees was estimated to be 83.3% of those in Denmark; in 2016, it was 47.8% (decreased by 37.7 p.p.). Decreases of a similar size have also been documented for Portugal, where this disposable income has gone down by 23.8 p.p., as well as for Spain (20.9 p.p.) and Italy (16.8 p.p.). During the period between 2009 and 2016, depicted in Table 3.2.2, the implementation of income-cutting policies along with measures imposing high taxes have increased income differences between workers of the same sector among the countries of the EU15.

3.2.4. Conclusions

To conclude, employment in the financial sector in Greece does not seem to follow the mild upward trend of total employment. A possible reason behind this development, which deserves special attention and further research, may be attributed to the new, smaller and more flexible entrepreneurial model followed by the financial institutions. According to this

10. Denmark has been arbitrarily chosen as point of reference. Any other country of those listed in Table 3.2.2 could have been chosen instead.

model, banks have revised their views on labor demand and costs. Moreover, the average age of financial sector employees is increasing. The percentage of workers in the age bracket of 45-plus years old grows faster than that of the younger ones. In addition, a significant number of the unemployed (25-44 years old) whose last activity was related to the financial sector have changed their professional orientation and no longer anticipate getting a job in finance. Furthermore, bank branches have shut down, having an additional negative impact on the creation of new jobs. Lastly, the poverty rate of financial-sector employees remains low over time (at nearly 3%), but the disposable income has suffered significant losses compared with the financial-sector employees of other EU15 countries.

4. Development policies and sectors

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 47-59

4.1. Outlook of the Greek tourism sector

George Soklis
Nicholas Vagionis

This article presents the performance of the Greek tourism sector in 2019, based on the most recent data for the Turnover Index in Accommodation and Food Service Activities, arrivals and nights spent in hotels, similar establishments and tourist campsites, and inbound tourism (at both country and regional levels).[1]

4.1.1. The Turnover Index in the Greek tourism sector

Table 4.1.1 presents the Turnover Index in Accommodation and Food Service Activities for the period 2010-2019. The year-by-year and quarter-by-quarter analysis of the index indicates that in the first quarter of 2019, the turnover index decreased by 22.3% compared to the corresponding quarter of the previous year, recording its lowest value for the period under examination (see also Figure 4.1.1, which presents the respective percentage changes). On the contrary, in the second and third quarters of 2019, the index increased by 1.7% and 6.1%, respectively, recording the highest values for the period under examination.

TABLE 4.1.1 Turnover Index in the Accommodation and Food Service Activities
Annual and quarterly averages, Base 2015 = 100

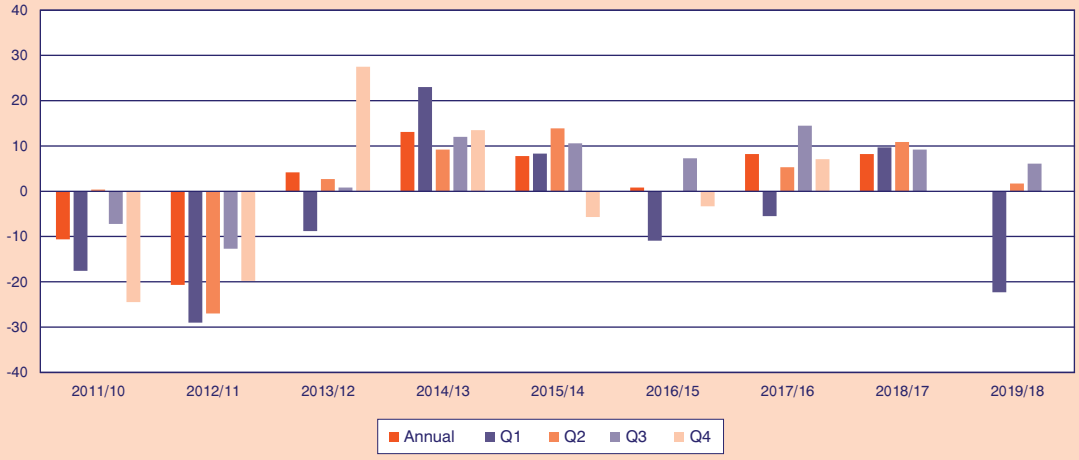
	Annual	Q1	Q2	Q3	Q4
2010	**111.1**	84.0	112.3	163.2	84.8
2011	**99.4**	69.2	112.7	151.5	64.0
2012	**78.8**	49.1	82.3	132.3	51.3
2013	**82.0**	44.8	84.5	133.4	65.4
2014	**92.8**	55.1	92.3	149.4	74.2
2015	**100.0**	59.7	105.1	165.2	70.0
2016	**100.8**	53.2	105.0	177.3	67.7
2017	**109.1**	50.3	110.6	203.0	72.5
2018	**118.0**	55.2	122.7	221.6*	72.5*
2019	**-**	42.9*	124.8*	235.2**	-

Source: Hellenic Statistical Authority.

* Revised data. ** Provisional data.

1. For the analysis of the performance of the Greek tourism sector in 2018 and the first quarter of 2019, see Vagionis and Rodousakis (2019) and Vagionis and Soklis (2019).

FIGURE 4.1.1
Turnover Index in Accommodation and Food Service Activities, 2010-2019
% change of the annual and quarterly indices



Source: Hellenic Statistical Authority.

Despite the significant percentage decline of the index in the first quarter, the increase recorded in the second and third quarters tends to offset the decline of the first quarter due to the increased relative importance of the second and third quarters for Greek tourism. Thus, the average nine-month turnover index for 2019 increased by 0.9% compared to the corresponding period of 2018.

4.1.2. Data for arrivals and nights spent in hotels, similar establishments and tourist campsites

In what follows, we present the data for arrivals and nights spent that have been recorded in hotels, similar establishments and tourist campsites in the period January-September 2019 compared to the same period of the previous year.[2] Table 4.1.2 and Figure 4.1.2 present the monthly arrivals in the establishments for the period January-September 2019 as well as for the same period of 2018. We notice that the total arrivals in the first nine months of 2019 reached 19,324,078, recording an increase of 0.1% compared to the same period of 2018. The rise in arrivals was driven by 0.5% increase in arrivals of residents, which offset the decrease by 0.04% of the arrivals of non-residents.

Figure 4.1.3 presents the month-by-month percentage changes in arrivals between 2019 and 2018. The largest increase in arrivals was recorded in April (+5.8%), while the largest decrease was recorded in January (-7.0%). The largest increase in arrivals of residents was recorded in June (+10.9%), while the largest decrease was recorded in May (-10.3%). Finally, the largest increase in arrivals of non-residents was recorded in April (+6.5%), while the largest decrease was recorded in March (-11.3%).

Figure 4.1.2 also shows the seasonality of the arrivals in the establishments of the country, with the majority of the arrivals concentrated in the period June-August. However, if we examine separately the monthly distribution of the arrivals of residents and non-residents (see Figure 4.1.4), we observe that the seasonality of the total arrivals is due to the seasonality of the arrivals of non-residents. On the contrary, the monthly arrivals of residents are more equally distributed in the first nine months of 2019.[3]

2. The data are provisional and derived from the *Survey on Arrivals and Nights Spent in Hotels, Similar Establishments and Tourist Campsites*, conducted by the Hellenic Statistical Authority.

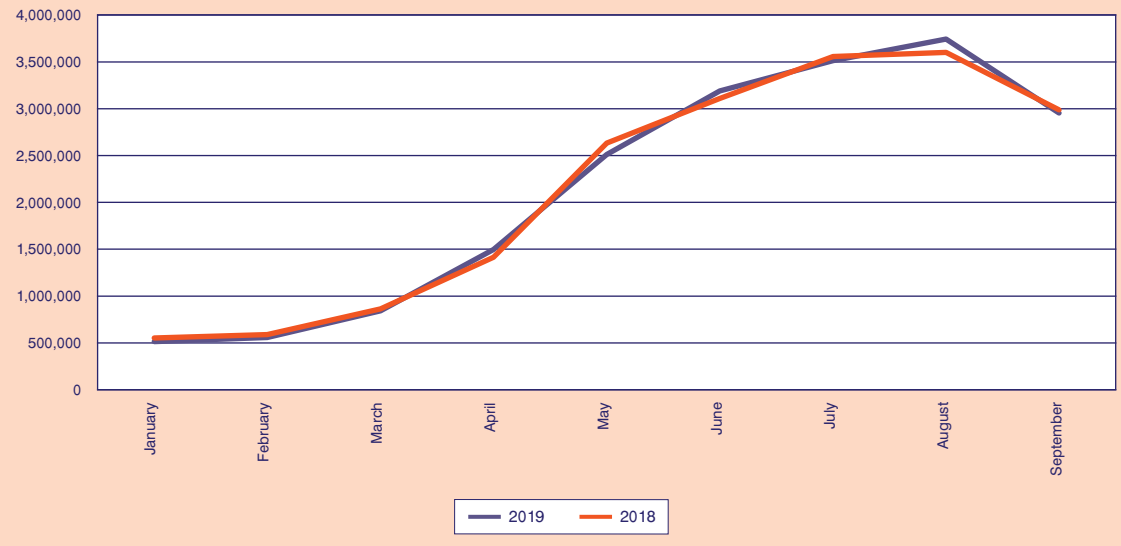
3. For a detailed analysis of the seasonality of Greek tourism as well as proposed policies to overcome seasonality, see, e.g., Zacharatos et al. (2014) and Krabokoukis and Polyzos (2019).

TABLE 4.1.2 Arrivals in hotels, similar establishments and tourist campsites
January-September 2019 and 2018

Month	2019 Arrivals	2019 Residents	2019 Non-residents	2018 Arrivals	2018 Residents	2018 Non-residents
January	513,826	342,187	171,639	552,227	367,135	185,092
February	558,096	355,825	202,271	589,500	382,053	207,447
March	843,676	482,975	360,701	862,791	456,234	406,557
April	1,497,702	548,447	949,255	1,415,611	523,958	891,653
May	2,510,543	481,944	2,028,599	2,633,143	537,427	2,095,716
June	3,188,534	598,258	2,590,276	3,108,472	539,614	2,568,858
July	3,513,799	682,302	2,831,497	3,556,154	684,917	2,871,237
August	3,744,029	830,468	2,913,561	3,600,390	781,697	2,818,693
September	2,953,873	516,153	2,437,720	2,986,799	540,514	2,446,285
Jan.-Sept.	**19,324,078**	**4,838,559**	**14,485,519**	**19,305,087**	**4,813,549**	**14,491,538**

Source: Hellenic Statistical Authority.

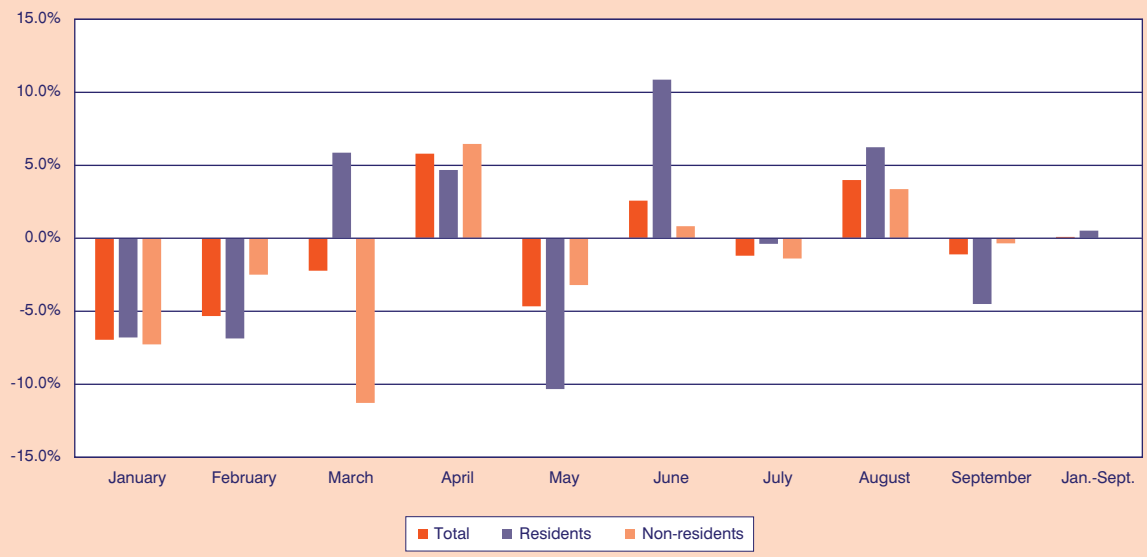
FIGURE 4.1.2
Arrivals in hotels, similar establishments and tourist campsites,
January-September 2018 and 2019



Source: Hellenic Statistical Authority.

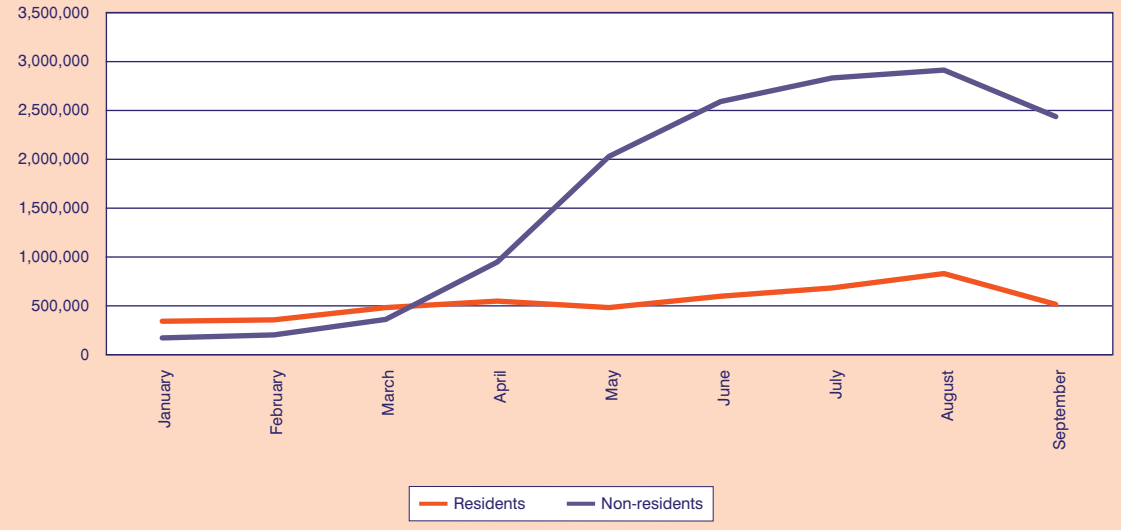
Table 4.1.3 and Figure 4.1.5 present the nights spent in the establishments for the period January-September 2019 as well as for the same period of 2018. We notice that the total arrivals in the first nine-month of 2019 reached 80,966,575 recording a decrease by 0.8% compared to the same period of 2018. The fall

FIGURE 4.1.3
Arrivals in hotels, similar establishments and tourist campsites
% change per month for January-September of 2019 compared to 2018



Source: Hellenic Statistical Authority.

FIGURE 4.1.4
Arrivals of residents and non-residents in hotels, similar establishments and tourist campsites, 2019



Source: Hellenic Statistical Authority.

in nights spent was driven by a 1.0% decrease in nights spent of non-residents, which offset the increase by 0.6% of the nights spent of residents.

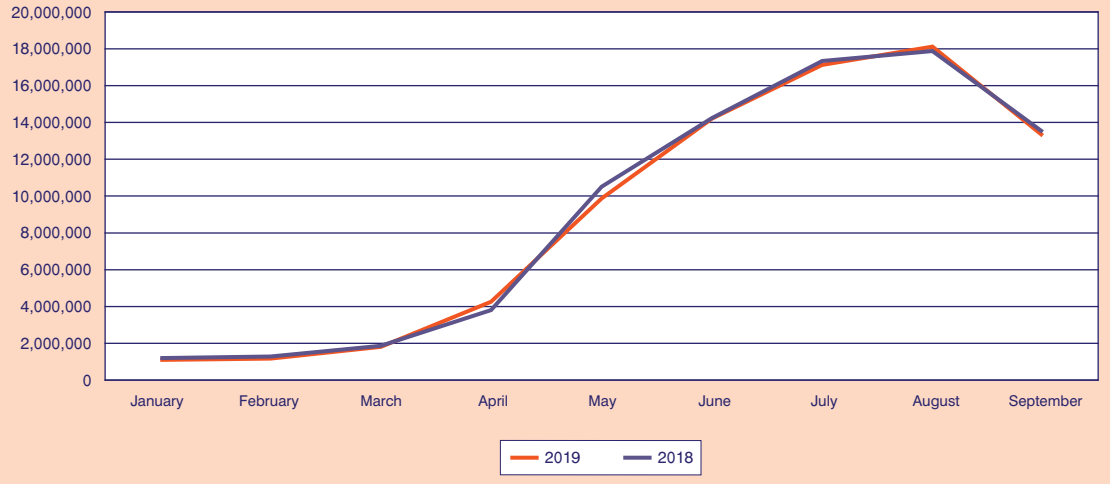
Figure 4.1.6 presents the month-by-month percentage changes in nights spent between 2019 and 2018. The largest increase in nights spent was recorded in April (+11.7%), while the largest decrease was recorded in January (-8.1%). The largest increase in nights spent of residents was recorded in June (+12.1%), while the largest decrease was recorded in May (-11.4%). Final-

TABLE 4.1.3 Nights spent in hotels, similar establishments and tourist campsites
January-September 2019 and 2018

	2019			2018		
Month	**Nights spent**	**Residents**	**Non-residents**	**Nights spent**	**Residents**	**Non-residents**
January	1,093,725	675,571	418,154	1,190,677	739,218	451,459
February	1,173,124	682,514	490,610	1,276,130	763,048	513,082
March	1,813,849	950,178	863,671	1,867,056	897,213	969,843
April	4,255,107	1,168,329	3,086,778	3,810,987	1,122,098	2,688,889
May	9,877,054	1,000,801	8,876,253	10,505,106	1,129,544	9,375,562
June	14,205,988	1,403,095	12,802,893	14,235,517	1,251,091	12,984,426
July	17,136,241	1,961,845	15,174,396	17,347,942	1,967,338	15,380,604
August	18,125,815	2,762,452	15,363,363	17,886,981	2,625,299	15,261,682
September	13,285,672	1,199,086	12,086,586	13,492,126	1,244,299	12,247,827
Jan.-Sept.	**80,966,575**	**11,803,871**	**69,162,704**	**81,612,522**	**11,739,148**	**69,873,374**

Source: Hellenic Statistical Authority.

FIGURE 4.1.5
Nights spent in hotels, similar establishments and tourist campsites
January-September 2018 and 2019

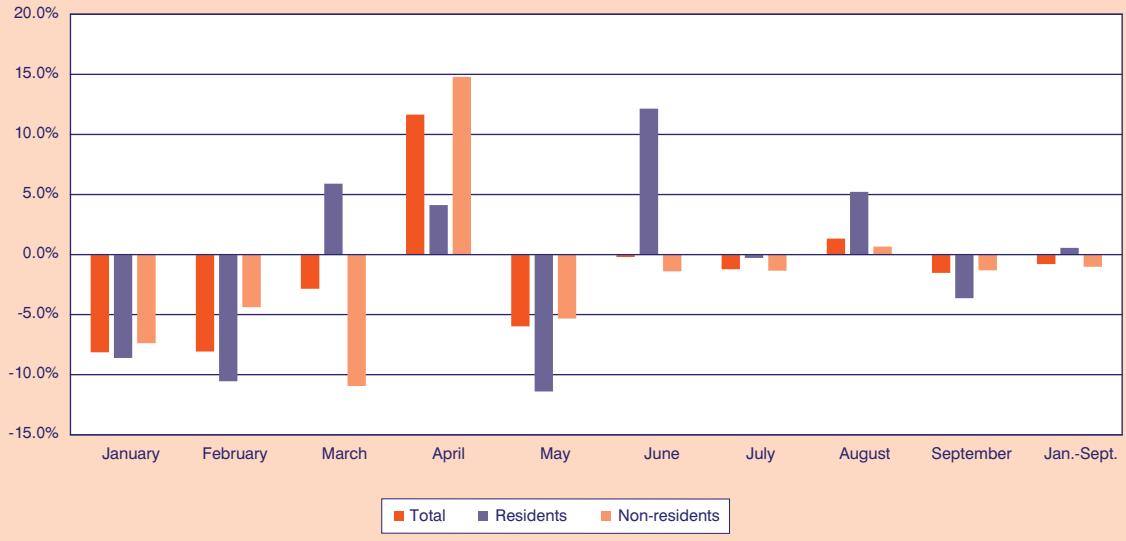


Source: Hellenic Statistical Authority.

ly, the largest increase in nights spent of non-residents was recorded in April (+14.8%), while the largest decrease was recorded in March (-10.9%).

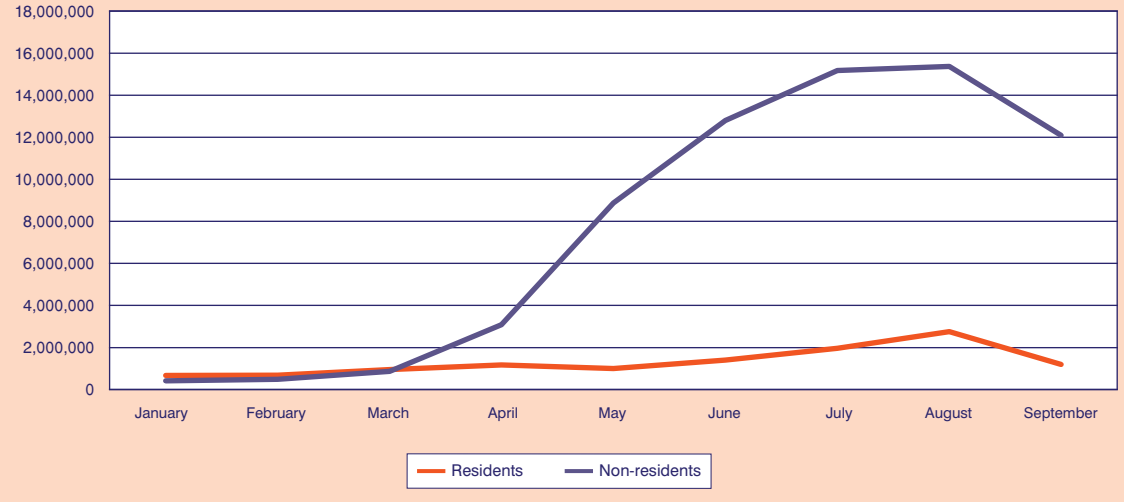
Figure 4.1.5 also shows the seasonality of the nights spent in the establishments of the country, with the majority of the nights spent concentrated in the period June-August. However, if we examine separately the monthly distribution of the nights spent of residents and non-residents (see Figure 4.1.7), we observe that the seasonality of the total nights spent is due to the seasonality of the nights spent of non-residents. On the

FIGURE 4.1.6
Nights spent in hotels, similar establishments and tourist campsites
% change per month for January-September of 2019 compared to 2018



Source: Hellenic Statistical Authority.

FIGURE 4.1.7
Arrivals of residents and non-residents in hotels, similar establishments and tourist campsites, 2019



Source: Hellenic Statistical Authority.

contrary, the monthly nights spent of residents are more equally distributed in the first nine months of 2019.

Finally, Table 4.1.4 presents the bed occupancy recorded per month in the period January-February 2019 as well as of the same period of 2018.

Thus, it follows that the average bed occupancy in the first nine months of 2019 reached 55.4%, recording a 2 unit decline relative to the same period of 2018. The month-by-month analysis of the occupancy rates shows that, with the exception of April, bed

TABLE 4.1.4 Bed occupancy (%) in hotels and similar establishments by month

January-September 2018 and 2019

Month	2019*	2018
January	17.5%	19.4%
February	19.7%	22.2%
March	22.3%	23.7%
April	27.8%	26.0%
May	48.1%	52.7%
June	66.2%	68.2%
July	73.3%	75.2%
August	75.8%	77.0%
September	64.4%	66.7%
Jan.-Sept.	**55.4%**	**57.4%**

Source: Hellenic Statistical Authority.

* Provisional data.

occupancy declined in all the months of the period under examination.

4.1.3. Inbound tourism

We now turn to the analysis of the country's inbound tourism, based on the findings of the *Frontier Survey* by the Bank of Greece (BoG).

International travel receipts

Table 4.1.5 and Figure 4.1.8 show the country's international travel receipts for the period 2010-2019, both annually and quarterly.[4] Except for the years 2012 and 2016, travel receipts increased over the period under examination, with receipts exceeding € 16 billion in 2018. In the first six months of 2019, travel receipts increased by 13.3%, compared to the corresponding period of 2018, exceeding € 5.4 billion.

The largest contribution to this increase was from residents of the United States (13.3%), France (11.7%) and Austria (10.3%). Furthermore, according to BoG provisional data, in the first ten months of 2019, travel receipts amounted to approximately € 17.5 billion, recording an increase of 13.1% compared to the same period of 2018.

International travel arrivals

Table 4.1.6 and Figure 4.1.9 show the international travel arrivals in the country for the period 2010-2019, both annually and quarterly. We notice that international arrivals increased throughout the entire period under investigation, exceeding 33 million in 2018. In the first six months of 2019, arrivals decreased by 3.6% compared to the corresponding period of 2018, reaching approximately 10.2 million.

The fall in arrivals was driven by a 30.2% decrease in cruises. Regarding the countries of origin, the largest contribution to the fall of arrivals was the decreased arrivals from residents of Germany (27.8%), Sweden (25.4%) and Romania (22.9%). Furthermore, according to BoG provisional data, travel arrivals in the first ten months of 2019 amounted to about 29.7 million, recording an increase of 3.7% compared to the same period of 2018.

Non-residents' expenditure per journey

Table 4.1.7 shows the expenditure per journey of non-residents for the period 2010-2019, both annually and quarterly. We notice that the expenditure per journey decreased in the period 2010-2016 and increased the last two years. In the first six months of 2019, the expenditure per journey increased by 17.5% compared to the same period of 2018, reaching € 532.8 per journey.

Furthermore, according to BoG provisional data, in the first ten months of 2019, expenditure per journey amounted to € 575.3, recording an increase of 9.3% compared to the same period of 2018.

Regional distribution of international travel receipts

Table 4.1.8 reports the breakdown of international travel receipts for the year 2018 as well as the first six months of 2019 into the thirteen regions of the country.[5]

4. From 2012 onwards, the data include amounts for *Cruises* additional to those of the *Frontier Survey*.

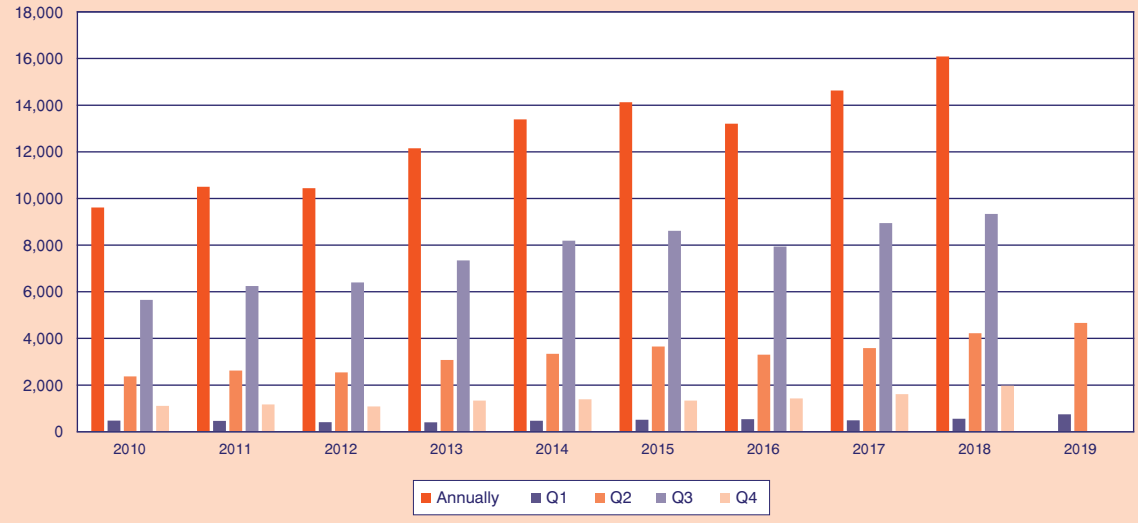
5. It is noted that the regional statistics do not include data for *Cruises* additional to those of the *Frontier Survey*. Therefore, there are some differences with respect to the data presented in the preceding sections for the whole country.

TABLE 4.1.5 International travel receipts, 2010-2019
Annually and quarterly (in million euros)

	Annually	Q1	Q2	Q3	Q4
2010	**9,611**	477	2,375	5,651	1,108
2011	**10,505**	467	2,621	6,246	1,171
2012	**10,442**	413	2,546	6,402	1,083
2013	**12,152**	402	3,074	7,343	1,333
2014	**13,393**	471	3,339	8,190	1,392
2015	**14,126**	516	3,655	8,617	1,338
2016	**13,207**	539	3,302	7,940	1,426
2017	**14,630**	489	3,588	8,944	1,609
2018	**16,086**	554	4,223	9,336	1,973
2019	-	747	4,667	-	-

Source: Frontier Survey, Bank of Greece.

FIGURE 4.1.8
International travel receipts, 2010-2019
Annually and quarterly (in million euros)



Source: Frontier Survey, Bank of Greece.

Figure 4.1.10 presents the breakdown of international travel receipts into the thirteen regions of the country in the first six months of 2019. We notice that more than 2/3 of receipts are concentrated in three regions of the country, i.e., the Southern Aegean (25.7%), Attica (20.8%) and Crete (20.6%).

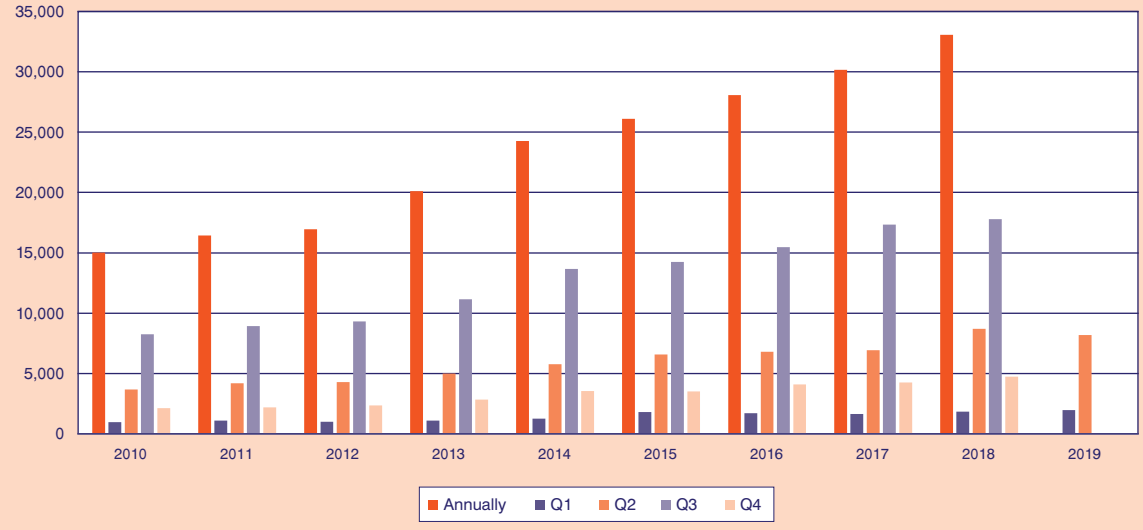
These data indicate that the largest increases in travel receipts compared to the same period of 2018 were

TABLE 4.1.6 International travel arrivals, 2010-2019
Annually and quarterly (in thousands of travellers)

	Annually	Q1	Q2	Q3	Q4
2010	**15,007.5**	980.4	3,674.8	8,238.1	2,114.2
2011	**16,427.2**	1,108.4	4,195.8	8,925.7	2,197.4
2012	**16,946.5**	998.1	4,288.7	9,315.0	2,344.8
2013	**20,111.4**	1,091.1	5,009.9	11,165.7	2,844.7
2014	**24,272.4**	1,259.6	5,781.6	13,676.4	3,554.8
2015	**26,114.2**	1,792.8	6,574.9	14,227.9	3,518.5
2016	**28,070.8**	1,709.9	6,798.5	15,475.6	4,086.8
2017	**30,161.0**	1,637.4	6,937.0	17,339.2	4,247.4
2018	**33,072.2**	1,840.0	8,695.8	17,786.3	4,750.1
2019	-	1,969.0	8191.8	-	-

Source: Frontier Survey, Bank of Greece.

FIGURE 4.1.9
International travel arrivals, 2010-2019
Annually and quarterly (in thousands of travellers)



Source: Frontier Survey, Bank of Greece.

recorded in the regions of Central Greece (39.6%), Western Greece (33.8%), the Northern Aegean (31.3%) and Attica (24.3%), while the only region that recorded a decrease in travel receipts was the Ionian Islands (-2.7%). The regions of Attica (34.5%), the Southern Aegean (27.6%), Central Macedonia (14.4%) and Crete (11.8%) had the largest contribution to the rise of travel receipts. Moreover, the analysis of the travel receipts of each region per country of origin of the travelers indicates that the largest contribution to the

TABLE 4.1.7 Non-residents' expenditure per journey, 2010-2019
Annually and quarterly (in euros)

	Annually	Q1	Q2	Q3	Q4
2010	**640.4**	486.1	646.3	686.0	524.3
2011	**639.5**	421.1	624.7	699.8	532.9
2012	**616.2**	413.4	593.6	687.2	461.7
2013	**604.2**	368.3	613.6	657.7	468.7
2014	**551.8**	374.2	577.6	598.9	391.5
2015	**540.9**	287.8	555.9	605.6	380.3
2016	**470.5**	315.3	485.7	513.1	348.8
2017	**485.1**	298.9	517.2	515.8	378.8
2018	**486.4**	301.0	485.6	524.9	415.4
2019	**-**	379.1	569.7	-	-

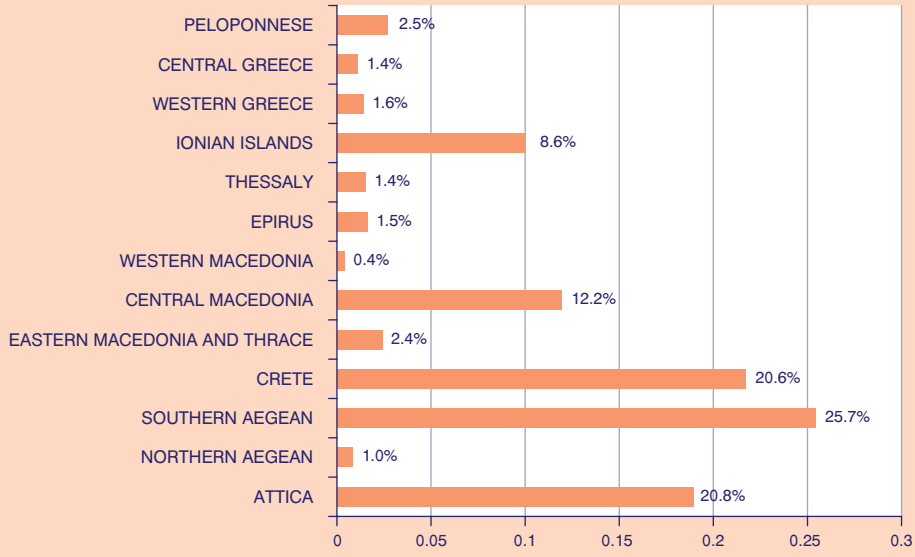
Source: Frontier Survey, Bank of Greece.

TABLE 4.1.8 Regional distribution of international travel receipts, 2018-2019
(in million euros)

		2018				2019
Region	**Annual**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1-Q2**
ATTICA	2,278.9	271.5	604.5	849.2	553.6	1,089.3
NORTHERN AEGEAN	164.2	7.7	31.1	111.5	13.8	51.0
SOUTHERN AEGEAN	4,414.1	16.7	1,159.4	2,817.4	420.6	1,347.1
CRETE	3,133.9	9.5	995.4	1,800.1	329.0	1,078.0
EASTERN MACEDONIA AND THRACE	321.6	42.1	69.3	169.5	40.7	125.5
CENTRAL MACEDONIA	2,275.4	98.9	452.8	1,465.5	258.2	641.0
WESTERN MACEDONIA	60.6	6.6	12.1	32.8	9.0	21.7
EPIRUS	221.9	20.9	53.2	121.5	26.4	77.0
THESSALY	270.5	12.0	57.7	175.7	25.1	75.6
IONIAN ISLANDS	1,691.1	7.2	457.0	1,137.7	89.2	451.5
WESTERN GREECE	211.8	24.3	40.0	112.9	34.6	86.0
CENTRAL GREECE	193.8	12.9	38.1	111.9	30.8	71.2
PELOPONNESE	415.5	16.9	107.7	237.4	53.4	129.4
TOTAL	**15,653.2**	**547.3**	**4,078.3**	**9,143.2**	**1,884.4**	**5,244.4**

Source: Frontier Survey, Bank of Greece.

FIGURE 4.1.10
Regional distribution of international travel receipts, Q1-Q2 2019



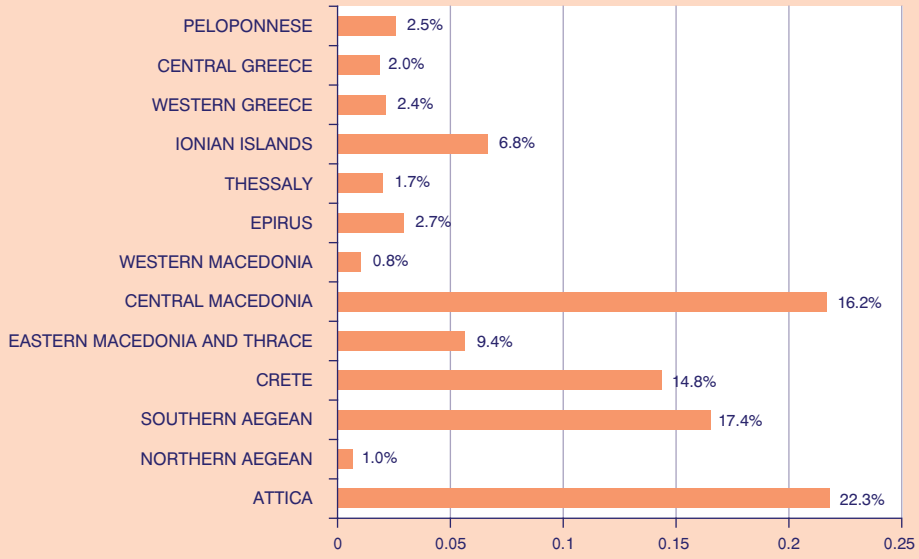
Source: Frontier Survey, Bank of Greece.

TABLE 4.1.9 Regional distribution of international travel visits, 2018-2019
(in thousands of visits)

		2018				2019
Region	**Annually**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1-Q2**
ATTICA	5,680.8	751.4	1,611.9	2,075.9	1,241.6	2,416.8
NORTHERN AEGEAN	388.9	12.6	59.6	293.4	23.2	103.2
SOUTHERN AEGEAN	6,629.4	47.0	1,742.9	4,026.1	813.5	1,877.1
CRETE	5,228.4	20.9	1,534.4	2,981.4	691.8	1,604.0
EASTERN MACEDONIA AND THRACE	1,929.9	247.6	366.3	990.0	326.0	1,012.0
CENTRAL MACEDONIA	7,830.2	559.7	1,789.9	4,474.3	1,006.3	1,753.8
WESTERN MACEDONIA	348.9	40.5	72.7	196.8	38.9	90.8
EPIRUS	823.2	106.3	212.6	389.6	114.7	292.1
THESSALY	675.0	46.9	169.8	382.7	75.5	184.7
IONIAN ISLANDS	3,162.3	19.9	700.3	2,232.7	209.3	735.8
WESTERN GREECE	699.2	76.3	156.3	331.7	134.9	257.7
CENTRAL GREECE	548.9	63.0	139.7	241.6	104.6	215.4
PELOPONNESE	886.0	61.1	217.7	457.2	150.0	270.4
TOTAL	**34,831.1**	**2,053.3**	**8,774.2**	**19,073.3**	**4,930.3**	**10,813.8**

Source: Frontier Survey, Bank of Greece.

FIGURE 4.1.11
Regional distribution of international travel visits, Q1-Q2 2019



Source: Frontier Survey, Bank of Greece.

rise of travel receipts was from residents of the United States (8.4%), Cyprus (6.5%) and France (5.4%) who visited Attica, as well as residents of the United States (5.7%) who visited the Southern Aegean.

Regional distribution of international travel visits

Table 4.1.9 above reports the breakdown of international travel visits into the thirteen regions of the country for the year 2018 as well as the first half of 2019.[6]

Figure 4.1.11 presents the breakdown of international travel visits into the thirteen regions of the country in the first six months of 2019. We notice that more than 70% of the visits are concentrated in four regions of the country, i.e., Attica (22.3%), the Southern Aegean (17.4%), Central Macedonia (16.2%) and Crete (14.8%).

In the first six months of 2019, total visits decreased by 0.13% compared to the same period of 2018, mainly because of the decrease of visits in the region of Central Macedonia, by 25.4%, which was partly offset by the increase of visits in the region of Eastern Macedonia and Thrace, by 64.9%. The analysis of the visits per country of origin of the travelers indicates that the aforementioned changes are due to the decrease by 66.2% of visits to Central Macedonia by residents of Bulgaria and to a corresponding increase by 122.2% of visits to Eastern Macedonia and Thrace. Regarding the rest of the regions, it is worth mentioning the increase by 37.7% and 16.8% of visits to Attica by residents of France and the United States, respectively; the increase by 14.3% of visits to the Southern Aegean by residents of the United Kingdom; the decrease by 11.9% of visits to Crete by residents of Germany; and the decrease by 11.6% of the visits to the Ionian Islands by residents of the United Kingdom.

4.1.4. Conclusions

The available data so far indicate that trends for the tourism sector in 2019 were positive, both in terms of turnover and international travel receipts. The rise in travel receipts was mainly driven by the increased tourism flows in the regions of Attica and the Southern Aegean and, more specifically, by the increased tourism flows of residents of the United States to the regions of Attica and the Southern Aegean, and the

6. It is noted that *Visits* are not identical with *Arrivals*, since travellers may visit more than one region during their trip.

increased tourism flows of residents of France to the region of Attica. A significant increase has also been recorded in the expenditure per journey of non-residents. Despite the positive trends in international travel receipts, the respective arrivals have not recorded the same positive trends, mainly because of the fall in travel flows from residents of Germany and Sweden. Moreover, the arrivals of non-residents recorded in hotels, similar establishments and tourist campsites in the first nine months of 2019 has declined, while the average bed occupancy also declined in the same period. On the contrary, the arrivals of residents recorded in hotels, similar establishments and tourist campsites has risen.

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4.2. The competitiveness of the Greek economy

Athanasios Chymis

Last year, 2019, the Greek economy slightly improved its competitiveness score as measured by the major international indicators of competitiveness, such as the Global Competitiveness Index (GCI), published annually by the World Economic Forum (WEF), and Doing Business, also published annually by the World Bank. However, this little improvement in score is not enough to push Greece to a higher ranking because other countries improve their score faster, leaving Greece behind. As a result, Greece keeps falling in the ranking of competitiveness indicators.

More specifically, according to the last edition of the GCI (2019)[1], the Greek economy scored 62.6, slightly above 62.1 in the 2018 edition and 61.7 in the 2017 edition. Despite this rise in its competitiveness score, Greece fell to the 59th rank, down from 57th in 2018 and 53rd in 2017. It is worth noting that a perfect score is 100, which is the ideal; the first economy in the ranking in the 2019 edition, Singapore, got a score of 84.8.

Similarly, according to the last edition of the Doing Business index (2019), Greece scored 68.40, slightly up from 68.08 in 2018 and 68.02 in 2017. Despite this improvement, the Greek economy fell to 79th place, down from 72nd in 2018 and 67th in 2017. The Index's highest (ideal) score is 100 and the first ranking economy, New Zealand, scores 86.8.

Tables 4.2.1 and 4.2.2 show the score of the Greek economy compared to five other economies. Four of them –Cyprus, Ireland, Portugal and Spain– went through a similarly severe economic crisis while the fifth, Estonia, became a European Union (EU) member relatively recently (2011) and was gravely affected by the world financial crisis of 2008-2009.

Institutions (Table 4.2.1) remain a major weakness of the Greek economy and have been in poor shape for decades. As a result, citizens as well as entrepreneurs show low levels of trust toward the state. This leads to high levels of tax avoidance and tax evasion, low public revenues and poor budgetary conditions. Despite the significant improvement of the macroeconomic stability of the Greek economy, it lags well behind its counterparts in the EU. Product and labor markets still have a long way to go to reach the levels of other member-states, despite the important reforms that took place during the crisis years. The financial system is very weak due to the severe handicap of the banking sector, namely, the highest level in the EU of non-performing loans. This handicap undermines the capability of the banking sector to finance the real economy. It is worth noting that before the crisis the most problematic factor in doing business in Greece, according the WEF annual surveys, was the inefficient government bureaucracy. After the crisis, access to financing became the most problematic factor in doing business while the degree of efficiency of the government bureaucracy has not improved a lot.

It is promising that the indicator of starting a business (Table 4.2.2) has considerably improved. However, the Greek economy falls behind in many other important factors that are critical to any potential investor's decision to start a business in Greece. Specifically, enforcing contracts takes too much time. It takes 1,711 days (up from 1,580 days in previous editions) to resolve a simple commercial case in court. This is the third most time consuming among 190 countries, only ahead of Suriname (1,715 days) and Guinea-Bissau (1,785 days). This performance is simply unacceptable for a high income, economically developed member state of the EU. Registering property is another uncompetitive, time-consuming and burdensome activity that scares away any potential entrepreneur. Getting credit, as discussed above, is a thorny issue for any entrepreneur and paying taxes is a complicated and time-consuming procedure. For example, in Greece it takes 193 hours to pay taxes while in Estonia it takes 50. At the same time, the level of tax rates (including all kinds of contributions) in Greece is at 51.9% of profits, while in Cyprus it is at 22.4%.

Concluding this short reference to the latest developments in competitiveness, it is interesting to show the evolution of the real growth in Greece relative to

1. Note that data used in the 2019 edition refer to at least one year earlier, that is 2018. This is the case in every edition of all international competitiveness indicators.

TABLE 4.2.1 The scores of selected economies according to the Global Competitiveness Index

Pillar/Country	Greece	Estonia	Cyprus	Ireland	Spain	Portugal
Total Index	*63*	*71*	*66*	*75*	*75*	*70*
Institutions	51	70	64	73	65	65
Infrastructure	78	76	75	77	90	84
ICT adoption	65	79	62	67	78	71
Macroeconomic stability	75	100	90	100	90	85
Health	94	84	96	95	100	94
Skills	70	79	72	77	72	70
Product market	54	62	61	61	61	60
Labor market	53	70	66	76	61	63
Financial system	49	65	58	69	77	70
Market size	60	43	40	65	77	60
Business dynamism	59	70	66	77	67	70
Innovation capability	45	52	46	66	64	54

Source: World Economic Forum, *Global Competitiveness Report 2019*.

TABLE 4.2.2 The scores of selected economies according to Doing Business

Indicator/Country	Greece	Estonia	Cyprus	Ireland	Spain	Portugal
Total Index	*68.4*	*80.6*	*73.4*	*79.6*	*77.9*	*76.5*
Starting a business	96.0	95.4	92.0	94.4	86.9	90.9
Dealing with construction permits	69.5	82.6	64.2	76.6	70.8	73.2
Getting electricity	84.7	83.3	78.4	84.2	83.0	83.3
Registering property	46.9	91.0	67.9	71.7	71.7	78.4
Getting credit	45.0	70.0	60.0	70.0	60.0	45.0
Protecting minority rights	70.0	58.0	76.0	80.0	72.0	62.0
Paying taxes	77.1	89.9	85.5	94.6	84.7	83.7
Trading across borders	93.7	99.9	88.4	87.2	100	100
Enforcing contracts	48.1	76.1	48.6	57.9	70.9	67.9
Resolving insolvency	53.1	60.1	72.5	79.2	79.2	80.2

Source: World Bank, *Doing Business 2020.*

the other five countries. Although the Greek economic crisis has significant differences with the other economies' crises,[2] the comparison to other economies is unavoidable and conclusions are quite painful for Greece. It is obvious that the low levels of competitiveness of the Greek economy have significant impact on its rate of growth.

Table 4.2.3 shows the evolution of the real growth rate for the six selected economies for the last 15 years. Data for 2019 is not yet finalized, but a rate of growth around or above 2% is expected. Despite its severe recession, the Greek economy has not yet achieved annual real growth rates of such magnitude that would permit the rapid recovery of the lost GDP during the crisis years. On the contrary, Cyprus, Ireland and even Estonia, which also had severe recessions and considerable losses of GDP, managed to achieve high real growth rates such that allowed for the full recovery of the lost GDP.

Table 4.2.4 complements Table 4.2.3 and shows the proportion of GDP that every economy lost as well as the degree of recovery. Contrary to all the selected economies, which also had a severe crises, the Greek economy has recovered only a small fraction of the lost GDP. In 2018, Greek real GDP was at 76.1% of the GDP of 2007. The economy that recovered first was Ireland, in 2014, followed by Estonia in 2016, Cyprus and Spain in 2017 and Portugal in 2018. This means that all these economies reached the high pre-crisis levels of their real GDP and have left the crisis well behind. Ireland achieved tremendous post-crisis growth, and its GDP now (2018) is 55.1% above the pre-crisis high GDP level. Any comparison is frustrating for Greece. In 2007, Greek real GDP was 117% of the Irish one; in 2018, it was only 57.4% of the Irish. Not only that, but the diversion seems to continue in 2019 given the expected high rate of growth of the Irish economy and the low rate of growth of the Greek economy.

TABLE 4.2.3 Real rate of growth in selected economies

	Greece	Estonia	Cyprus	Ireland	Spain	Portugal
2018	1.9	4.8	4.1	8.2	2.4	2.4
2017	1.5	5.7	4.4	8.1	2.9	3.5
2016	-0.2	2.6	6.7	3.7	3.0	2.0
2015	-0.4	1.8	3.4	25.2	3.8	1.8
2014	0.7	3.0	-1.9	8.6	1.4	0.8
2013	-3.2	1.3	-6.6	1.4	-1.4	-0.9
2012	-7.3	3.1	-3.4	0.2	-3.0	-4.1
2011	-9.1	7.4	0.4	0.3	-0.8	-1.7
2010	-5.5	2.7	2.0	1.8	0.2	1.7
2009	-4.3	-14.4	-2.0	-5.1	-3.8	-3.1
2008	-0.3	-5.1	3.6	-4.5	0.9	0.3
2007	3.3	7.6	5.1	5.3	3.6	2.5
2006	5.7	9.7	4.7	5.1	4.1	1.6
2005	0.6	9.5	4.8	5.7	3.7	0.8
2004	5.1	6.8	5.0	6.7	3.1	1.8

Source: <https://data.worldbank.org/indicator>.

2. A major difference is that while in other economies it was the private sector that went bankrupt, in Greece it was the public sector. The systematically low performance of the public sector for many decades is closely related with the lack of competitiveness, as demonstrated by the systematically low rankings of the Greek indicators, such as Institutions, and this is one of the major causes of the deep economic crisis.

TABLE 4.2.4 Real GDP evolution in selected economies (billion €)

	Greece	Estonia	Cyprus	Ireland	Spain	Portugal
Pre-crisis high GDP	2007 240.523	2007 21.158	2008 19.418	2007 205.592	2008 1,119	2008 190.185
Lowest GDP due to the crisis	2013 176.730	2009 17.183	2014 17.255	2019 186.406	2013 1,024	2013 175.162
Recovery year	...	2016 21.329	2017 19.872	2014 209.994	2017 1,142	2018 194.404
2018	183.056	23.629	20.678	318.772	1,169	194.404
2018 GDP to pre-crisis high ratio	0.761	1.117	1.064	1.551	1,045	1.022

Source: <https://data.worldbank.org/indicator>.

Finally, it is noted that the Portuguese real GDP has overtaken the Greek, and the five economies mentioned here have per capita real GDP greater than Greece. The per capita real GDP of Estonia (a previously poor country of the former Soviet Union) was 36% of Greece's in 2004. In 2018, Estonia reached a level of per capita real GDP 113% of Greece's.

KEPE, *Greek Economic Outlook,* issue 41, 2020, pp. 64-69

4.3. Developments in the Greek capital market

Fotini Economou

4.3.1. Introduction

Recent international and domestic experiences highlight the need for alternative sources of financing, apart from traditional bank lending, as well as the importance of good corporate governance. In this context, the Greek capital market has to attract investors' interest, based on its recent positive performance, in order to contribute to the country's economic growth.

After several years of low or even sharply negative returns for the Greek capital market, 2019 was a particularly positive year, generating positive expectations for the future as well. The performance of the Athens Stock Exchange (ATHEX) reached a 20-year high return, bringing the Greek market to the top of world returns for 2019, while Greek bond yields experienced historically low levels. The improvement of the country's macroeconomic and financial outlook, the upgrading by international rating agencies, the full lifting of capital restrictions and the gradual recovery of investor confidence in the Greek economy and the domestic capital market, are some of the factors that contributed to this positive result. Also note that this timing was favorable for companies to raise capital from the market, through either corporate bond issuances or share capital increases.

This article attempts a brief overview of developments in the Greek capital market in the course of 2019, focusing on the stock market, the bond market, and the institutional management sector.

4.3.2. Developments in the stock market

The year 2019 could be considered a milestone year for the Greek stock market with significant positive returns, following the upward trend of the international stock markets. According to ATHEX data (Table 4.3.1), all stock indices displayed positive returns. More specifically, the Athex Composite Share Price Index recorded an impressive increase of 49.47% compared to a sharp decrease of -23.56% in 2018. This remarkable performance was the highest over the last 20 years and the highest performance internationally in 2019. The Athex Composite Share Price Index exceeded 900 units at the end of December 2019 (i.e., at February 2015 levels) with a three-year (2017-2019) cumulative return of 42.42% and a five-year (2015-2019) cumulative return of 10.95%. Taking a closer look at the volatility of the index, the standard deviation of the daily returns of the Athex Composite Share Price Index was 1.20% in 2019, down from 1.26% in 2018.

It should also be noted that the other ATHEX indices also reported impressive returns, with the ATHEX Mid & Small Cap Price Index reaching 49.84% (Table 4.3.1), while the performance of the individual sectoral indices was also positive. The FTSE/ATHEX Banks index reported the highest return of 101.34%. This performance is impressive compared to the significant negative performance of the sector in 2018, when it reached historically low levels and annual losses of -49.82%. The FTSE/Athex Basic Resources, FTSE/Athex Utilities and FTSE/ATHEX Real Estate indices also displayed high positive returns in 2019, above 50% (96.84%, 81.09% and 80.96%, respectively). The FTSE/Athex Chemicals and FTSE/Athex Oil & Gas indices had the lowest returns of 8.43% and 3.88%, respectively.

The development of the trading value and capitalization of the ATHEX in 2019 was also impressive (see Figure 4.3.1). According to ATHEX data (2020a), the value of transactions increased significantly by 74.8%, from € 758.2 million in December 2018 to € 1,325.6 million in December 2019, with an average daily trading value of € 77.92 million from € 42.12 million in December 2018 (+85%). Over the same period, the ATHEX total market capitalization increased by 43%, from € 35.21 billion on 31/12/2018 to € 50.35 billion on 31/12/2019. The participation of international investors in total market capitalization (without the participation of the Hellenic Financial Stability Fund, HFSF) also increased from 64.6% in December 2018 to 68.9% in December 2019, remaining above 66% since May 2019. Taking into account the participation of the HFSF in the total market capitalization, the share of foreign investors reached 66.4% in December 2019 from 63.3% in December 2018. Also note that in December 2019, foreign investors accounted for 54.7% of ATHEX transactions, from 57.5% in December 2018.

TABLE 4.3.1 Prices and returns for selected indices of the ATHEX in 2019

	31/12/2019	31/12/2018	Year min	Year max	Year change (%)
ATHEX Mid & Small Cap Price Index	5,936.94	3,962.08	3,914.71	5,994.42	49.84%
Athex Composite Share Price Index	916.67	613.30	600.12	921.87	49.47%
FTSE/Athex Large Cap	2,298.02	1,608.40	1,580.73	2,306.88	42.88%
Athex All Share Index	215.66	158.02	157.01	216.69	36.47%
FTSE/ATHEX Mid & Small Cap Factor-Weighted Ind	2,975.68	2,215.20	2,173.67	3,022.05	34.33%
FTSE/Athex Mid Cap Index	1,195.17	975.09	945.49	1,467.88	22.57%
FTSE/Athex Banks	885.16	439.63	363.54	924.17	101.34%
FTSE/Athex Basic Resources	6,458.00	3,280.77	3,146.82	11,171.70	96.84%
FTSE/Athex Utilities	3,185.42	1,758.98	1,729.19	3,260.05	81.09%
FTSE/ATHEX Real Estate	5,465.04	3,020.04	2,928.70	6,158.58	80.96%
FTSE/Athex Telecommunications	3,925.16	2,620.45	2,614.94	3,985.72	49.79%
FTSE/Athex Travel & Leisure	1,939.68	1,323.07	1,309.57	2,003.28	46.60%
FTSE/Athex Personal & Household Goods	9,810.13	6,878.36	6,649.54	10,049.22	42.62%
FTSE/Athex Industrial Goods & Services	2,561.57	1,909.50	1,884.26	2,967.88	34.15%
FTSE/Athex Financial Services	996.89	780.26	744.92	1,191.69	27.76%
FTSE/Athex Technology	900.44	709.21	692.80	1,087.14	26.96%
FTSE/Athex Construction & Materials	3,083.14	2,582.29	2,437.75	3,183.37	19.40%
FTSE/Athex Retail	69.64	59.91	58.44	82.89	16.24%
FTSE/Athex Food & Beverage	11,264.09	10,110.82	10,000.70	13,120.06	11.41%
FTSE/Athex Chemicals	8,864.83	8,175.81	7,722.79	11,217.47	8.43%
FTSE/Athex Oil & Gas	5,048.57	4,860.12	4,612.01	5,758.60	3.88%

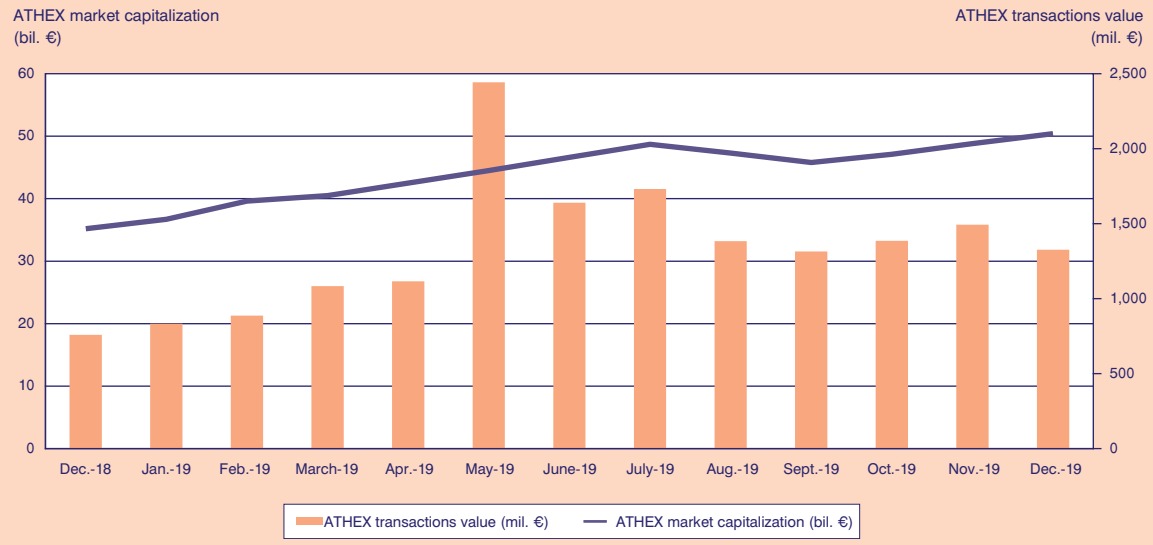
Source: Daily official list of trading activity of the ATHEX (31/12/2019 and 31/12/2018).

Note: The FTSE/Athex Health Care and FTSE/Athex Insurance indices do not appear along with other sectoral indices in the table as their prices were not available for the whole period.

Shifting attention to the derivatives market, according to ATHEX data (2020b), there were 35,391 active investor accounts in December 2019 from 35,406 in December 2018, of which 2,211 (6.25% of the total active investor accounts) traded, from 2,041 (5.76% of the total active investors' accounts) in December 2018. The total number of open interest was 354,022, from 249,183 at the end of 2018, and the participation of international investors in the total open interest of the Derivatives Market was 4.15%, from 5.25% at the end of 2018. The total trading volume decreased from 1,323,543 contracts in December 2018 to 1,028,836 contracts in December 2019.

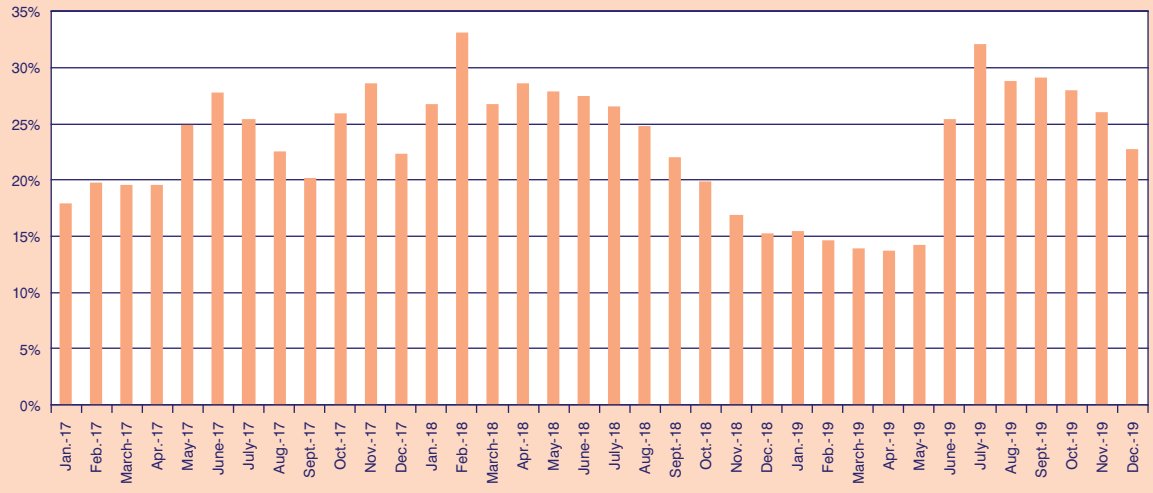
Finally, the positive performance of the stock market is also reflected in the evolution of the KEPE GRIV implied volatility index, which reflects the uncertainty of the derivatives market participants about the expected short-term course of the Greek market and is calculated based on the prices of FTSE/Athex Large Cap options. The KEPE GRIV index decreased from 23.75% on 29/11/2019 to 22.24% on 31/12/2019. The index remains below its historical average level (since January 2004), which stands at 33.33%. Although the index value is higher compared to the end of 2018 (15.61%), it is lower compared to the high levels of the year (over 30%) that preceded in July 2019 due to the

FIGURE 4.3.1
ATHEX market capitalization and transactions value in 2019



Source: Athens Exchange Group, Monthly Statistics Bulletin AxiaNumbers, Securities Market, December 2019.

FIGURE 4.3.2
Average daily value of the KEPE GRIV index per month from 2017 to 2019



Source: Centre of Planning and Economic Research.

pre-election period. Figure 4.3.2 presents the average daily value of the index per month for the last three years (2017-2019). The average daily value of the index gradually declined in the last months of 2019 to 22.79% in December 2019. Figure 4.3.2 also depicts the fact that the index is more sensitive to falling than rising market changes. Practically, this means that it takes more time for the index to return to lower values compared to the time it took to increase, as the effect of fear is stronger on the market compared to investor optimism. Finally, the average daily index value for 2019 dropped to 22.22% from 24.63% in 2018, with significant volatility in the daily observations. These developments are considered positive as they reflect the gradual restoration of investor confidence in the Greek market.

TABLE 4.3.2 Greek Government benchmark bond prices and yields for maturities of 3, 5, 7, 10, 15, 20 and 30 years (Dec. 2018 – Dec. 2019)

	Monthly average price							Monthly average yield (%)						
	Maturity (Years)							Maturity (Years)						
Date	**3**	**5**	**7**	**10**	**15**	**20**	**30**	**3**	**5**	**7**	**10**	**15**	**20**	**30**
December 2018	-	100.84	96.75	96.08	91.30	87.48	87.35	-	3.28	3.98	4.28	4.76	5.07	5.15
January 2019	104.87	101.42	97.42	96.58	91.93	88.71	88.59	2.89	3.12	3.86	4.21	4.70	4.96	5.05
February 2019	106.53	101.45	99.56	99.30	94.92	91.82	91.78	2.38	3.13	3.46	3.84	4.40	4.68	4.80
March 2019	107.51	103.52	101.58	100.60	96.65	93.63	93.60	2.04	2.69	3.08	3.76	4.22	4.53	4.66
April 2019	108.40	105.45	103.80	103.80	100.56	97.91	97.83	1.72	2.28	2.66	3.42	3.85	4.17	4.35
May2019	108.49	105.86	104.15	104.19	100.87	98.37	98.34	1.63	2.17	2.59	3.37	3.82	4.13	4.32
June 2019	109.73	109.03	108.39	110.25	109.72	109.26	109.99	1.18	1.48	1.80	2.67	3.02	3.30	3.55
July 2019	110.92	110.46	107.61	114.83	114.54	116.13	118.59	0.73	1.15	1.51	2.16	2.61	2.82	3.05
August 2019	110.60	110.37	101.31	116.39	117.07	117.65	121.37	0.73	1.13	1.67	1.98	2.40	2.72	2.89
September 2019	111.15	111.69	104.25	120.87	123.55	126.02	131.36	0.45	0.81	1.22	1.50	1.89	2.18	2.38
October 2019	111.14	112.38	105.60	122.24	124.27	127.16	133.29	0.35	0.62	1.02	1.34	1.83	2.11	2.28
November 2019	110.89	112.67	106.15	121.85	124.07	126.15	132.04	0.32	0.51	0.92	1.36	1.83	2.16	2.34
December 2019	110.77	112.32	105.54	121.10	123.35	125.32	131.34	0.25	0.54	1.00	1.42	1.88	2.21	2.36

Source: Bank of Greece.

Note: Monthly average observation. The bond prices given are the clean prices per € 100 nominal, while the respective yields are expressed in percentages.

4.3.3. Developments in the bond market

The performance of Greek bonds was particularly positive in 2019, while the Greek government witnessed a significant decrease in its new borrowing cost[1]. More specifically, in the course of 2019, the Greek government issued five-year, seven-year and ten-year bonds. According to Bank of Greece data, bond yields of all categories (with maturity of 5, 7, 10, 15, 20 and 30 years) decreased in December 2019 compared to December 2018, with the largest decrease observed for the Greek government seven-year bond (from 3.98% to 1%) (Table 4.3.2 above). Note that the 10-year bond yield fell to historically low levels in 2019. The lowest average monthly yield was recorded in October 2019 at 1.34% and its respective price at € 122.24. Over the same period, the cost of borrowing through Greek Government Treasury bills (T-bills) declined significantly compared to 2018, reaching 0.07% for 12-month (December 2019), 0.00% for 6-month (December 2019) and -0.083% for 3-month T-bills (November 2019). In addition, according to Bank of Greece data, the total nominal value of transactions in the Electronic Secondary Securities Market (HDAT) on the Greek government securities in 2019 increased significantly from € 5,002 million in 2018 to € 8,536 million in 2019 (+70.65%).

At the same time, ATHEX data (2020a) indicate a significant increase in corporate bond capitalization from € 0.96 billion on 31/12/2018 to € 1.42 billion on 31/12/2019 (+49.02%). In addition, the total value of bonds transferred due to settlement amounted to € 236.98 million in 2019 from € 163.70 million in 2018 (+44.77%), and the respective daily average value was € 0.96 million in 2019 from € 0.66 million in 2018 (+45.94%). However, the total number of corporate bonds transferred decreased from 27,125,596 units in 2018 to 14,985,751 units in 2019 (-44.75%), and the respective daily average value decreased from 108,938 units in 2018 to 60,671 units in 2019 (-44.31%).

Finally, the Hellenic Corporate Bond Price Index, which is based on the net price of each bond, reached 95.63 points at the end of 2019, recording annual margin losses of -0.17%. During the same period, the Hellenic Corporate Bond Index, which is based on the net price, accrued interest; the value of the payments of each bond reached 120.16 units at the end of 2019, recording a 3.29% annual increase.

4.3.4. Institutional management sector

The generally positive developments of 2019 were also reflected in the institutional management sector. Hellenic Fund and Asset Management Association data report a significant increase of 29.13% in the total Undertakings for Collective Investment in Transferable Securities (UCITS) assets from € 6,086.4 million at the beginning of 2019 to € 7,859.5 million at the end of the year. Note that the implementation of Regulation (EU) 1131/2017 on Money Market Funds (MMFs), resulted in a partial reclassification into the money market and bond UCITS categories. More precisely, 37.28% of these assets are bond UCITS, 22.96% balanced, 16.91% equity, 14.27% Funds of Funds, 4.28% money market, 3.90% specialist, and the remaining 0.41% index funds. Note that 87.8% of the total assets is managed by five of the fourteen Mutual Fund Management Companies in operation.

The year 2019 was a year of positive returns for the UCITS with the Index Equity Funds and Equity Funds-Greece standing out with particularly high returns (on average[2]), 45.66% and 40.18%, respectively, following the positive course of the ATHEX. Over the same period, the UCITS recorded total net inflows of € 580.56 million after several years of net outflows.

Finally, Hellenic Fund and Asset Management Association (2020) data report an increase of 17% in the total amount of funds under management in the institutional management sector in 2019, at € 17 billion on 31/12/2019. These assets are 46.2% UCITS, 39.3% Asset Management sector, 14% Real Estate Investment Companies (REICs), and 0.4% Alternative Investment Funds (AIFs).

4.3.5. Conclusions

The developments observed in 2019 reflect the gradual restoration of investor confidence in the Greek economy and market. More specifically, in 2019 the capital market experienced particularly high stock market returns, an increase in the ATHEX capitalization and trading, as well as a decline in Greek government bond yields at historically low levels, while the institutional management sector also followed the positive course of the market. In addition, by the end of 2019 the KEPE GRIV index displayed lower values compared to the year's high levels in July 2019, indicating the gradual investment climate change.

1. Further information can be found in the article "2.1. The evolution and structure of public debt" in the current issue.

2. Without UCITS activated within the year 2019.

In this positive environment for the Greek market, the capital market should further enhance its role to promote growth via actions that encourage and facilitate fund raising. One such example is the launch of the first phase of the Roots[3] program in the last months of 2019, which aims to enhance the growth prospects of innovative SMEs and facilitate their access to investment funds via a business guidance process, also making use of the wider ecosystem of the Greek capital market. In addition, the recent tax reforms in December 2019, such as the reduction of the tax rate on dividends, the rationalization of taxation of investment companies, etc., may attract new investment funds. At the same time, in the course of 2020, the authorities are expected to pass legislation to further safeguard the Greek capital market and promote corporate governance. In addition, new ATHEX indices are expected to launch in order to increase investment interest. Under these positive conditions, one of the next challenges for the Greek capital market is the Greek stock market upgrade from emerging markets to developed markets,[4] which may further boost investor interest, as well as fund raising from the capital market in order to support businesses. The banking sector is also at the forefront of interest, as the implementation of the "Hercules" plan is expected to enhance financial stability, with a positive impact on businesses and the Greek economy in general.

Finally, in the context of strengthening corporate governance, the National Corporate Governance Council (HCGC)[5] is also active, having as immediate priorities[6] the preparation and publication of proposals for general principles, good practices and guidelines for improving corporate governance, the organization of relevant training activities for business executives, as well as the submission of proposals for the establishment of more effective control mechanisms. A key objective is to strengthen the corporate governance culture of both listed and non-listed firms. In the same spirit, the ATHEX undertook an initiative to strengthen corporate governance by publishing an Environmental, Social and Corporate Governance (ESG)[7] Reporting Guide to help businesses publish high-quality, comparable ESG data.

Overall, reform initiatives aiming to safeguard the capital market, protect investors and promote good corporate governance practices may further enhance the credibility of the domestic market and boost investors' interest with long-term benefits for businesses and investors.

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3. The program is an ATHEX initiative that started in December 2018, in cooperation with the American-Hellenic Chamber of Commerce and the support of the Global Federation of Competitiveness Councils (GFCC), the European Bank for Reconstruction and Development (EBRD), the Hellenic Republic Ministry of Foreign Affairs and the Hellenic Republic Ministry of Economy and Development. More information is available on the program's website (www.roots-program.com).

4. The Greek stock exchange was downgraded by MSCI in 2013 and by FTSE in 2015.

5. The HCGC was established in 2012 with the joint initiative of ATHEX and the Hellenic Federation of Enterprises (SEV). Since October 2018, the Hellenic Banking Association has been a regular member of the HCGC, and in June 2019, the Hellenic Fund and Asset Management Association also became a regular member of the HCGC. More information is available on the ATHEX website (www.helex.gr).

6. See HCGC press release, June 6, 2019.

7. The ESG Reporting Guide was presented in November 2019 and it is available on the ATHEX website (www.helex.gr).

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The implementation of the "Hercules" project for the NPLs: Assessment and sustainability prospects

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Abstract

The purpose of the article is, initially, a presentation of the "Hercules" project (Law 4649/19), as a mechanism for easing the balance sheet of credit institutions from the non-performing loans (NPLs), in relation to the general network of mandates proposed by European Union, like the corresponding Italian plan, which was used as a guideline for the Greek case. In this framework, we include the blueprint of actions proposed by the European Commission through its 2018 report (AMC blueprint). This agenda also includes additional measures with respect to the NPLs, which are expected to help rationalize the way credit institutions operate. Then, in the empirical part of the article, a computational sustainability assessment of this project is presented, which is roughly equivalent to that followed by Italy's banking system a few years ago. The structure and the possibility of selling the Notes of such a project is the most critical factor in search for an effective answer to the issue of the NPLs of the Greek credit institutions. Finally, some thoughts are recorded for a more efficient implementation of such an operation, in the long run.

***Keywords**: Non-performing loans (NPLs), Special purpose vehicles (SPVs), securitization, "Hercules" project*

***JEL classification**: G28, G33*

1. Introduction

As we have already pointed out in our previous articles (e.g., Mouzoulas et al., 2017, 2018 & 2019), the issue of non-performing loans (NPLs) of systemic banks was and remains one of the most critical issues for the future growth of the Greek economy. In the 1st semester of 2019, the NPLs continued to be at high levels, as a percentage of the total portfolio loans of the systemic banks (39.20%, according to the data of the 1st semester of 2019).[1] As emphasized in the AMC blueprint of the European Commission (2018), when the banks' NPLs are too high, as a percentage of total loans, a massive sell is not recommended and the implementation of an asset management approach by an asset management company (AMC) is suggested or NPLs transfer into a special purpose vehicle (SPV).

In this context, both the European Central Bank (ECB) and the Greek Government, through the activation of the Hercules project (Law 4649/19), which is an application of the aforementioned AMC blueprint (2018), are looking for a process through which the problem of the high percentage of the Greek banks' NPLs will effectively and relatively quickly be resolved. This event, in the long run, will substantially help for a new healthy credit expansion. The fundamental issue of the whole project is the establishment and the effective financing of an SPV, associated with the securitisation of the NPLs, which could contribute in: a) the partial success in collecting claims from the NPLs on behalf of the systemic banks and (b) the overall effort of a broader plan

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1. See Chalamandis and Veloudas, 2019.

to reduce NPLs by approximately € 50 billion from the banking system by the end of 2021.

In Section 2, which follows, the inclusion of the "Hercules" project in the general regulatory framework –of both the European Union and Greece– concerning the NPLs is attempted, in order to be assessed as an explicit measure for the decrease of these "problematic" loans. Then, in Section 3, we proceed to a (mainly diagrammatic) presentation of how the "Hercules" project functions, as a mechanism for the creation and operation of an SPV. This presentation also reflects the Italian banking experience and replicates the guidelines which are sourced from the blueprint of the EC (AMC blueprint, 2018). In Section 4, a computational sustainability assessment of the "Hercules" project is presented as part of a mechanism which could potentially ease the banks' balance sheets. Finally, in Section 5, some thoughts are recorded for a more efficient implementation of such an operation in the long run.

2. The "Hercules" project based on the regulatory framework for NPLs

2.1. Regulatory initiatives at the European Union level

Under the present circumstances, there isn't any harmonized system at the EU level in order to handle the credit institution's issue on NPLs. This issue needs to be dealt with through rules that are adopted by national legislatures and these rules will leave broad discretion about the categorization on NPLs to the banks, while the practical application of these rules depends, to a great degree, on the domestic legal system.[2] It is left to the Member-States to designate whenever a loan is considered non-performing, as well as to choose the means of forcing the repayment of these types of loans.[3]

It should be noted that Directive 2019/1023 of the European Parliament and of the Council includes provisions that are directed towards the harmonization of NPL restructuring, with a view to improve their management. The European Central Bank (ECB) attempted to implement a general outline, in accordance to which some Member-States where the NPL issue presented an acute problem (i.e., Italy, Greece), could adopt securitization models for these loans.[4] The European Commission, after submitting proposals as measures for the reduction of "problematic" loans and the strengthening of the financial capacity of credit institutions,[5] published, in 2018, a new report with the primary subject being the above issues.[6]

In 2018, the European Commission presented, at the same date with the above-mentioned report, a Directive proposal for the credit managers and the credit purchasers and for the recovery of collateral.[7] This Directive proposal is aimed at the creation of a secondary market for the NPLs, actions which are included in the Commission's report. The ultimate goal is to reduce the exposure of the credit institutions to NPLs, by removing these loans from the balance sheets and adopting effective extra-judicial arrangements, in order to recover value from the collateral and to reduce the loan's management costs by transferring them to the market.[8]

The out of court dispute resolution of NPLs has the main advantage of quickly resolving settlement disputes. This parameter has particular interest for Greece, where the judicial protection system operates with a long delay until the settlement's finalization. This delay acts as an obstacle for the removal of those loans from the balance sheets of the Banks, through their restructuring and sale.[9]

The need for restructuring the NPLs was also acknowledged by the European Council, in its effort to establish a harmonized system that would face the possible insolvency of credit institutions.[10] To that effect, it em-

2. See, A. Miglionico "Restructuring non-performing loans for bank recovery: Private workouts and securitization mechanisms", ECFR 6/2019, 748.

3. Ibid.

4. See European Central Bank, "Stocktake of national supervisory practices and legal frameworks related to NPLs", June 2017.

5. See European Commission, "Communication, Completing the banking union", COM (2017) 592 final.

6. European Commission, AMC Blueprint, Accompanying the document, "Communication, Second progress report on the reduction of non-performing loans in Europe", SWD (2018) 72 final, 14.3.2018.

7. COM (2018) 135 final 14.3.2018.

8. Miglionico, 767.

9. Ibid, based on the Italian example, which has similarities with the Greek legal system.

10. See ECOFIN Council, "Action Plan to tackle non-performing loans in Europe", 11173/17/11.7.2017.

phasized the need to increase the supervision of the administration of the credit institutions and enhance their capital base and, at the same time, to impose internal procedure obligations for the efficient management of NPLs, in order to enable these institutions to deal with the problems that are created from their exposure to such loans.[11]

2.2. The response to NPLs in Greece until today

The ECB, as the competent supervisory authority of the systemic credit institutions, has imposed on the Greek banks to proceed with important reductions in the amount of NPLs in order to improve the situation in the Greek financial system. The achievement of this goal requires the reduction of these loans up to EUR 50 billion by the end of 2021.[12]

In Greece, following Law 4353/15, which foresees the possibility of a transmission of NPLs to Special Purpose Vehicles (SPV) (MPLs Acquisition Companies), in order for these loans to be managed by specialized companies (NPLs management companies), by regulating –to some degree– the functioning of these companies and their supervision, the Bank of Greece adopted specific guidelines for the management of NPLs. All banks also took action in this direction.

Therefore, Law 4649/14 established a warranty program in securitizations of credit institutions ("Hercules" plan), which was brought to the attention of the European Commission before the adoption of the Law approving it. The Commission examined the above program under the legal framework perspective that concerns state aid.[13] The implementation of the "Hercules" plan, which is addressed to every Greek credit institution, aims to reduce NPLs and to facilitate the administration of these loans with market conditions. In fact, Law 4649/19 established a private model,[14] according to which a vehicle of securitization will purchase the loans from the banks and will issue bonds, which will be offered to the investors. The State, from its side, will provide a guarantee for the senior bonds, receiving a fee that will be determined based on market conditions. The provision of security is submitted with the condition that a percentage higher than 50% of the junior bonds will be sold to private investors.

2.3. The compatibility of the "Hercules" plan with EU legislation on State aid

The "Hercules" plan is based on the Italian securitization model for credit institutions' NPLs, which also aims to facilitate the alienation of the institutions that have carried out lending from the "problematic" loans, through a mechanism of securitization without the use of state aid. Like in the "Hercules" plan, the European Commission decided that for the Italian model there is no aid within the meaning of Article 107 of the Treaty of the European Union, with the relevant guarantee provided by the Italian State.[15]

However, as the collapse of some Italian credit institutions (Banca Popolare di Vicenza, Veneto Banca) demonstrated, there is no clear distinction between state aid measures and national law rules for insolvency, meaning that the danger that state interference restructuring credit institutions infringes on the rules of aid prohibition cannot be completely eliminated.[16] The European Commission underlines that, theoretically, the possibility that this plan infringes on rules for state aid cannot be ruled out, when the plan is addressed to the lenders that are under insolvency status, or when it could be used, under specific circumstances, in order to grant guarantees higher than 80% of the current financial liabilities.[17]

As the European Commission underlines,[18] this framework, in order to not fall within the definition of state

11. See Miglionico, 768.

12. European Commission State aid S.A. 53519 – Greece – Hellenic Asset Protection Scheme (''Hercules''), C (2019) 7309 final, 10.10.2019, 2.

13. See European Commission, State aid S.A. 53519 –Greece– Hellenic Asset Protection Scheme ("Hercules"). This issue has already been examined by the Commission, on the report, "Second progress report on the reduction of non-performing loans in Europe", 6 and following and annex. See for the state aid issue, P.-M. Sabbadini, *Les aides d'État, Aspects juridiques et économiques,* Larcier, Bruxelles, 2015 and M. Karpenschiff, *Droit Européen des aides d' État,* Bruylant, Bruxelles, 2015.

14. Miglionico, 729 in fine-730.

15. See European Commission, "Communication on the return to viability and the assessment of restructuring measures in the financial sector in the current crisis under the State aid rules", 2009/C195/04 and European Commission, "State aid: Commission approves impaired asset management measures for banks in Hungary and Italy", IP/16/279/10.2.2016.

16. See Miglionico, 764 in fine-765.

17. European Commission, State aid S.A. 53519-Greece- Hellenic Asset Protection Scheme ("Hercules"), 10.

18. European Commission, State aid S.A. 53519-Greece- Hellenic Asset Protection Scheme ("Hercules"), 9.

aid, and not have a distortion of competition, should not provide an advantage to the involved banks that they could not obtain though the market. The meaning of the framework's private nature therefore emerges, as well as of the conditions under which this framework operates, in comparison to the relevant conditions that are normal in the market for these types of transactions, in order to prevent its characterization as state aid.

Both the Italian model and the "Hercules" framework ensure that the corresponding scheme operates indeed according to the terms of the financial market, stressing in this way the private nature of the mechanism. The European Commission emphasizes, firstly, the fact that the State receives a fee, with market terms, for the provided service, according to the scheme and, secondly, on the condition that the risk transfer from that bank to the State, as a guarantor, is carried out in terms that would apply to any other non-governmental agent, based on the market value of the relevant assets or the actual value of these assets, with contractual public assistance.[19]

The private character of the chosen mechanism is the basic common ground of the Italian and Greek securitization model of credit institutions' NPLs, with the purpose of reducing the exposure of institutions on such loans and preventing the insolvency risk because of the exposure. The European Banking Authority (EBA), however, underlines that, for the implementation of the securitization, one should take into account that not only is high capital adequacy of the credit institutions required, but also the adoption of compliance and due diligence mechanisms.[20]

2.4. Towards a more comprehensive confrontation of the NPL issue in Greece

The European Commission's 2018 Report is of particular importance, because it proposes measures towards a more comprehensive confrontation of the NPL issue. For that purpose, it creates an action plan, which is broken down into more sub-actions. Specifically, the Commission finds it necessary:

a) To develop a secondary NPL market, which will allow credit institutions to manage their loans in a more effective way.

b) To enhance the supervisory powers of the competent authorities, so that they could take corrective measures regarding the provisions for financial losses caused by NPLs, in order to avoid the cover-up of these losses, on the ground that they are not realized.

c) To facilitate the management of NPLs by the credit institutions, through the collection of accurate, updated and standard data regarding the loans shown in their balance sheets and through the notification to the competent supervisory authorities of these data. In this way, it will be easier for credit institutions to transfer NPLs to other institutions.

In general, the NPLs issue is associated with the insolvency of credit institution rules. The Commission, in the above Report, points out the need for the banks to have an adequate coverage for the eventual losses resulting from the hereinafter granted loans and the loans that will become non-performing. For that purpose, the meaning of the terms included on the loan agreements is critical, as well as the provided collateral.[21] Furthermore, the Commission's proposal for a Directive to establish a system regarding the restructuring of a business in insolvency status[22] is channeled towards the harmonization of the NPLs restructuring mechanism, before the company placed under insolvency.

It must be stated that under these circumstances the "Hercules" framework is only one aspect of the legal regulatory framework that regulates the management of non-performing loans. This program uses the provisions of Law 4354/15 for the NPLs Management Companies, which are the managers within the meaning of Law 4649/19. Particularly, the measures that the Commission proposes in the action plan, which has been analyzed in the 2018 Report, will operate as facilitating measures for the effective implementation of Law 4649/19.

3. The "Hercules" project and the Italian experience in the management of NPLs

The release of NPLs from the banks' balance sheets through the "Hercules" project (Law 4649/19) is at-

19. European Commission, State aid S.A. 53519-Greece- Hellenic Asset Protection Scheme ("Hercules"), 10.

20. European Banking Authority, Opinion of the European Banking Authority to the European Commission on the regulatory treatment of non-performing exposure securitizations, EBA-Op-2019-13.

21. See also Miglionico, 768.

22. Proposal for a directive on preventing restructuring, insolvency and discharge procedure and amending directive 2012/30/EU, COM (2016) 723 final.

tempted for two reasons: to clear these balance sheets from the NPLs, but also to free funds (equity) from the liabilities of systemic banks, in order to get new, cheap financing for Greek businesses and households.

The "Hercules" project will allow the reduction of NPLs in a compatible manner with the strong European competition rules, allowing, at the next stage, the opening of the European deposit guarantee and the further integration of capital markets, aiming to a cross-border financing of businesses and households. These developments are expected to help strengthen European banking integration.

With this institutional project ("Hercules"), the possibility of intervention for the Member. State is established and rewarded (or damaged), based on the risk it undertakes from the total amount of the transferred NPLs, just as if it were a private investor.[23] This can be secured in accordance with the following elements:

a) The risk undertaken by the State will be limited,[24] since the State guarantee applies only to the Senior tranche sold by the SPV (after the securitisation). An independent credit rating agency, approved by the ECB, will determine the size of the higher guarantee tranche[25] (EC, 2019).

b) The State guarantee for the Senior tranches will be operational, provided that its valuation has already been done –based on the NPLs it covers/represents– and if more than half (50%+1) of Junior tranches issued by the SPV have already been successfully sold to private investors (Article 10, Law 4649/19). This way, the market will test and determine the risk distribution of the different parts of the securitisation (e.g., Senior, Mezzanine & Junior tranches) before the State undertakes any specific risk.

c) The fees from the Public/State guarantees, for the risk it undertakes, will be in line with market conditions and will correspond to the level and the duration of the risk it undertakes when this guarantee is granted (e.g., these guarantees will extend over a period of 10 years and will be forward-looking). In other words, the payment of these fees (State guarantees) will be relatively favorable to banks[26].

d) There will be a qualified auditor who will certify that the management of the securitised NPLs has been entrusted to a servicer/administrator who is not controlled by the transfer bank (i.e., an independent administrator).

As far as the Greek banks are concerned, their participation in the "Hercules" project initially has two important advantages: a) it improves the qualitative composition of their balance sheets, since it reduces the banks' exposure (RWA)[27] to "problematic" liquid elements and b) it institutionally imposes the holding of the higher guarantees tranches of the NPLs securitisation (Senior Notes). The existence of Senior Notes in the balance sheets of banks operates positively in two ways: under the context of capital adequacy Basel III (2016) mandates, it creates a release of equity, since these new securities have a zero risk weighted factor (RWA) and, therefore, through the short-term securities exchange operation (repos), could constitute the necessary "guarantees" to the ECB in case of a liquidity search.

Let us point out here that the Greek Government and the BoG, through the activation of the "Hercules" project, shows, to some extent, their "compliance" with the aforementioned proposal/framework of the European Commission (AMC blueprint) and implicitly, but clearly, their preference to the Italian model for reducing the NPLs of the systemic banks. A schematic presentation of this model is presented in Diagram 1.[28]

Further interpreting Diagram 1, in the Italian model, the guarantees to the Senior notes were not "given" and their pricing, on behalf of the State, was calculated based on an identified basket of CDS spreads of Italian bonds. Fees that Italian banks (or alternatively SPVs) were required to pay to the State were calculated on this basket. This fee was a staggered function of the

23. The European Commission's AMC blueprint (2018, p. 30-39) also provides other institutional scenarios for the transfer NPLs outside the banks, but these scenarios were not selected for the Greek project.

24. According to the estimates which were developed due to the recent Law 4649/19 on the NPLs securitisation, the state guarantees are not expected to exceed the € 12 billion (Article 6).

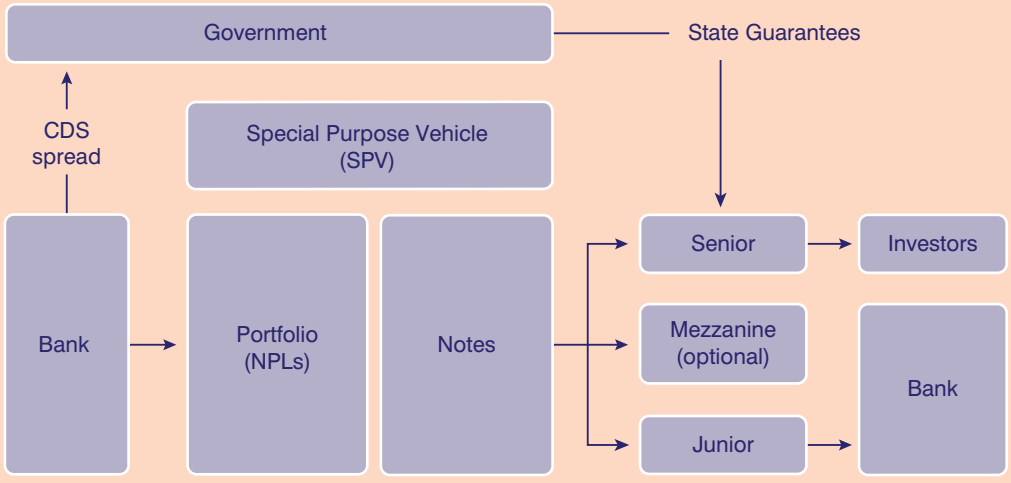
25. The European Commission underlines that the higher guarantee tranches (Seniors) should obtain a BB- or even higher-ranking evaluation by an international credit rating agency.

26. The method of calculating the fees is analytically presented in the Annex B of the Law 4649/19 for the securitisation of the NPLs.

27. RWA: risk weighted assets.

28. The Italian model, for the reduction of banks' NPLs, was adopted in February 2016 by the European Commission under the name of GACS (*Garanzia sulla Cartolarizzazione delle Sofferenze*).

DIAGRAM 1
Description of the banking securitisation of the NPLs (Italy)



Source: European Commission (2018).

maturity time of the CDS on the amount of the Senior Notes, from the NPLs' securitisation, plus some penalty (which is based on the reliability of Note payments made in previous years). This process, as Crociata (2016) reports, was a method for the Italian State to avoid any violation of EU competition principles.

Additionally, neither the middle nor the low priority tranches of remuneration (Mezzanine and Junior tranches, respectively) of the SPVs are covered by any form of guarantee by the Italian State. Finally, it should be underlined that the Italian banks –unlike to the "Hercules" project– were instructed to retain only the Junior Notes of the securitisation process in their balance sheets.

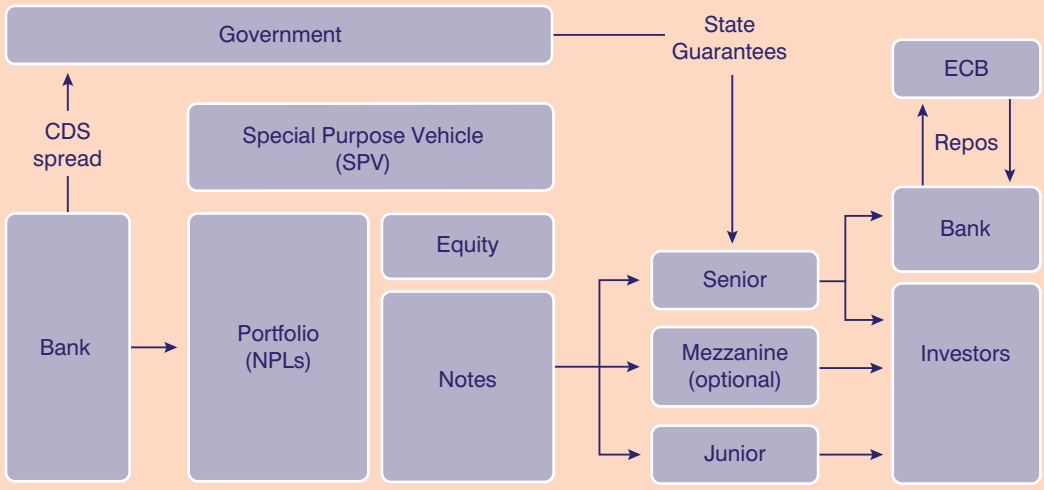
As regards the case of the Greek banking system, due to the idiosyncracies which are mainly produced by the percentage of NPLs, in relation to the total amount of loans, some further differences are expected in relation to the Italian case. More specifically, in contrast to the Italian case, the Senior tranches of the SPVs will be held by the systemic banks, while the Junior tranches (and possibly the Mezzanine tranches) will be made available to private investors. On the basis of such a development, the Senior tranches that will be held by banks, as we have already mentioned, will constitute guarantees to the ECB in case of a liquidity search by them, through the short-term securities exchange operation (repos).[29] In Diagram 2, a schematic simulation of the "Hercules" project, is presented.

As far as the way the different tranches of the securitisation will be defined from the market (e.g., Senior, Mezzanine & Junior tranches), we can mention that this will be determined –as Law 4649/19 claims– through a reliable international financial agency, which will assess/grade these tranches of the NPLs. Based on this classification, the time of maturity, the coupons and the repayment contracts of their respective Notes will then be determined. Thus, for example, as in the Italian case, the coupons of the Senior tranches, given the guarantee of the Greek State, will be very low while the coupons of the two lower priority tranches (Mezzanine & Junior) will be clearly higher and without State guarantees. In conclusion, an extensive evaluation of the individual categories of NPLs will ensure that the obligations arising from the corresponding issued Notes, from the SPV, in the coming years, can be covered by the inflows from the management of the individual loan portfolios.

Incidentally, an indirect and empirical way of quantifying the distinct tranches of the Notes, from the highest to the lowest repayment priority, based on the classification of the NPLs, is presented in the European Commission's AMC blueprint (2018).

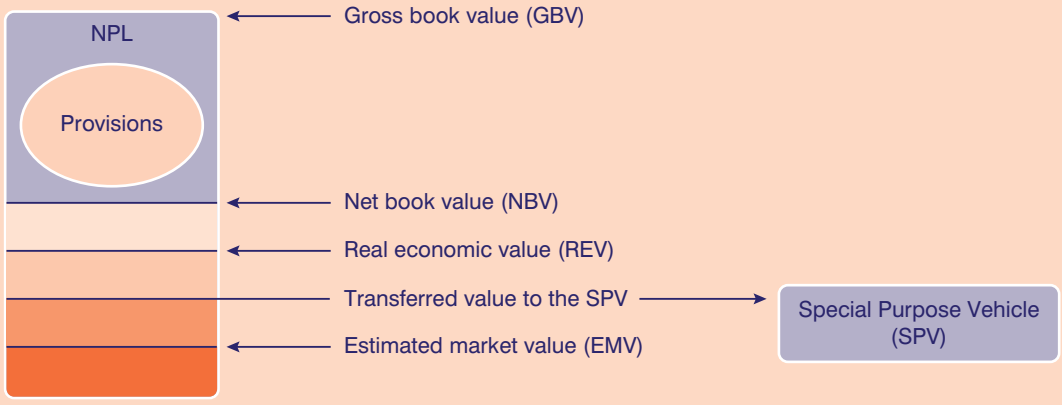
29. See European Commission (AMC blueprint, 2018), p. 15.

DIAGRAM 2
Description of the banking securitisation of the NPLs ("Hercules")



Source: Authors.

DIAGRAM 3
The empirical pricing of NPLs according to the AMC blueprint (2018)



Source: European Commission (2018).

In particular, based on Diagram 3, it is understood that NPLs –as the banking market might expect– are usually not sold to the SPVs at net book value (NBV) for reasons related to either to the accounting rules of banking or to general incentives of banks (e.g., banks' forecasts have a clear form of subjectivity and volatility). Often, the real economic value (REV) of NPLs is lower than NBV. Additionally, the more non-efficient and illiquid a banking market is, the more the estimated market value (EMV) of NPLs falls, as the AMC blueprint (2018) reports, in levels smaller than that of the transfer value to the SPV. It points out that if the liquidity and efficiency of the NPLs banking market are high, both the REV and the EMV will tend to equate (towards the REV).

Thus, based on the above analysis, it is expected that in the high-rated NPLs, the two values (NBV and EMV) will converge towards the Real (REV), while in the lower-rated NPLs, the two values will diverge towards the Estimated (EMV). Thus, the high-rated NPLs will correspond to the high-rated Notes of the SPV (Seniors), while the lowest-rated NPLs will correspond to lower-rated Notes (Juniors).

For a better understanding concerning the issuing of Notes, we will give a simple accounting example: Let's assume that all the securitized loans (NPLs) have a nominal value of € 100, but, due to impairment provisions, their NBV in the banks is € 60. Let us also assume that these loans, when they are finally transferred to the newly formed SPV, will be sold for an average amount of € 40. By extension, high-rated NPLs are expected to have a value of € 50, which rather corresponds to REV, while low-rated NPLs are expected to have a value of € 30, which corresponds to EMV. So, the (average) nominal difference is € 20 (NBV–transfer value to SPV). But this price difference should not be recorded in banks' balance sheets as real losses, in order to avoid any requirement for new capital.

In order to avoid this –i.e., the realization of losses in the banks' balance sheet– the (average) accounting price difference of € 20, as mentioned above, could be covered by a quantitative issue of high-priority Notes (Seniors) for the "less problematic" NPLs, which could receive the guarantee of the Greek State and then would be exclusively retained by the systemic banks. On the other hand, with another quantitative issue of low-priority Notes (Juniors), the "very problematic" NPLs will be matched without any further external guarantee. An additional and necessary condition in order to avoid new provisions on behalf of the Greek banks and consequently to suffer capital losses, from the transfer of NPLs to the SPV, is the upgrading of the Greek bonds to an internationally accepted investment grade.

The severe condition for the activation of the higher-paid priority Notes, as Law 4649/19 reports**,** prerequires the minimum sale, in the international market, of 50%+1 of lower categories of Notes, i.e., the medium and low priority Notes. This way it is secured that the banks will not support the coverage of the NPLs exclusively or largely with Notes guaranteed by the Greek State. It should also be remembered that the Greek State guarantee to Senior Notes cannot be considered as State-aid since the State will receive a guaranteed fee from the banks, which will be determined from a basket of CDS from various time-duration Greek bonds (see Annex B of Law 4649/19).

An additional issue that appears to be highlighted in the Greek case of the SPV foundation, and is demonstrated schematically in Diagram 2, is the necessity for the existence of equity for the initial phase of operation (setup) of the entire "Hercules" project. More analytically, the existence of some equity in the liabilities of the SPVs will be necessary, in order to confront any legal, administrative, or management costs, at the initial period of these vehicles' operation. The existence of equity operation is presented as a substitute of the Greek state guarantee (see AMC blueprint, 2018, p. 16).

4. A computational estimation for the sustainable operation of the SPVs

The purpose of this section is to assess, on the basis of certain assumptions, the yield an SPV should have (under the "Hercules" project), derived from the transferred NPLs, so that the returns, resulting from these NPL inflows, perform adequately to meet the obligations its issued Notes generates. This mechanism also ensures its long-term sustainable functioning, which is a necessary condition for an effective relief of the systemic banks from their NPLs.

The problem

The SPV will issue various categories of Notes in exchange for the transferred NPLs. As it is known, these Notes, according to the embedded credit risk they involve, will be graded as Senior, Mezzanine and Junior Notes (see Diagram 2). Every category of Notes will carry out a different coupon that will be linked with the pay priorities in connection with the amount of cash flow available from the SPV management of the NPLs. The coupon will be the actual Note's yield calculated carefully in order to avoid any mispricing effect. Its actual price (coupon) will be the outcome of the agents' buying interest.

The Senior Notes will receive the State guarantee, under certain conditions, and therefore the coupon they will bear, to a large extent, will meet the credit conditions of the guarantor. In addition, these Notes preceded, concerning the repayable rights, vis-à-vis the remaining categories and therefore they have a priority for repayment from the available cash flows generated by the SPV assets. Therefore, the price level attached to these coupons is expected –reflecting these two characteristics– to be lower compared to the other two categories of Notes (Mezzanine & Junior).

The Mezzanine & Junior Notes follow the Senior Notes in terms of priority repayment rights and do not carry any collateral or any kind of guarantee. For this reason, their coupons are higher than those of the Senior Notes in order to provoke the prospective buyers to invest.

The NPLs transferred from the banks have a specific book value, resulting from their face value after deduction of the provisions formed mainly due to the "problematic loans". These provisions correspond, to some extent, to the potential loss derived from the liquidation

of any collateral of those loans, or to the potential loss produced from the insufficient amount of cash flows, on behalf of the counterparty, to repay the liabilities generated by those loans (repayments of capital and interest). In addition to the book value, these "problematic loans" have:

- Market Value, which essentially involves the price of an NPL at which an independent investor would be willing to buy it and in the future to recover the value paid for its purchase, either by restructuring it or by selling its attached collateral at market prices reduced by the expenses involved throughout the management period. In the expenses we should also include the general operating costs of the investor, etc. In general, the most important factors that make the market value stand below the book one, are: a) that banks, in the valuation of their NPLs, do not take into consideration the staff and indirect management costs, but only the direct recovery costs and (b) the buying price at which the investor is willing to purchase such assets. More specifically, in order to estimate such a price, the investor discounts the expected cash flows at an interest rate which largely reflects the SPV's equity structure. Such a structure, to a large extent, requires higher yields (e.g., return of equity).
- Transfer Price, which is the market value of an NPL in the absence of State intervention. The State intervention, expressed through the State guarantee, is provided only to the Senior Notes, and this way, the NPL default risk is eliminated. Additionally, the State, as a partner and guarantor, imposes a strict legal framework concerning the management and monitoring of the transferred NPLs. This framework requires the managers to prepare a detailed business plan. Penalties will be imposed in case a business plan fails to meet the predefined performance targets. However, a temporary legal right of an arranged and controlled conditional default will be granted for some of the series of the SPV's Notes in case the economic reality and business forecasts differ significantly. The above measures are intended to actively contribute to matching the receipts (inflows) of the management of NPLs and the payments (outflows) for interest and capital obligations arising from the Notes issued.
- Real Economic Value, which is the value that essentially results from the market value, if losses and discounts are added. This pricing policy is followed by an independent prospective buyer of a loan portfolio, due to the existence of asymmetric information and a lack of liquidity in the market concerning this type of asset. In theory, under full information, efficiency, extensive liquidity and in-depth market conditions, the two prices will match, i.e., the economic value of the loan with their market value, with the second value apparently approaching the first.

Concerning now the quantity of Notes of each category, it is expected that high repayment priority Notes (Seniors) will dominate the remaining two categories. These Notes will be given to banks in exchange for the transfer of the majority of their NPLs to the SPV and thus, in this way, the banks' provisions will be the smallest possible. This happens because the NPLs will be substituted by Notes with the State guarantee (Seniors), with some very favorable terms of repayment. Moreover, as mentioned in Section 3, these new securities of the systemic banks may operate as repos products or can be used as collateral to the ECB to get cash liquidity.

In addition, the under-priority repayment Notes should be made available to private investors and the State should also introduce specific quantitative restrictions on the minimum volume of this type of Note to be sold in order to achieve adequate dispersion of the risk and, moreover, in order to fully discharge the "toxic" balance-sheets assets from the banks. The equivalent interest rates, as well as the capital reimbursements of these Notes, will follow the high-priority Notes in the classification of repayments (with interests on the medium-priority repayment Notes following the interests of the high-priority repayment Notes). These Notes carry no State guarantee or any kind of assurances. The fundamentals of these Notes, e.g., the higher yield than the corresponding yield of the highest priority repayment Notes, make them attractive for future investors.

The current strict regulatory framework of the SPV, as well as the disciplines it imposes on management, the process of repayments, and the default process upon the lower-priority Notes payments, can be also an incentive for independent investors to purchase these Notes. Additionally, if the inflows of the selling high-priority Notes covers the transfer value of the NPLs, this will give some "space" to part of the raised funds from the disposal of the lower-priority series of Notes to be used by the SPV in order to encounter its initial liabilities and costs which are derived from the everyday management of the NPLs portfolio. This happens because at the early stages of the SPV operation it is likely to be subdued either due to some bureaucratic reasons or due to an inactive and inefficient SPV management, on behalf of the new servicer. Additionally, the transfer of the personnel who manages the NPLs, from the originating bank to the SPV, would be considered as greatly helpful for reducing the time period of inactive management of the portfolio of these loans.

Finally, the low priority repayment Notes may be helpful and, together with the existence of equity, they might restrain, to some extent, any possible initial losses of the SPV, in the early stages of its operation, as a result of the above reasons (low profitability).

Consequently, we look for:

1) the time period, in years, which is required until each type of issued Note is to be fully repaid, i.e., the high, medium and low priority repayment Notes. This period is also investigated in terms of securitisation portfolio yield and in terms of the type of the Notes' value. According to the following tables, we infer on the required minimum yield's performance of the transferred loans to the SPV, in order to fulfil its obligations, which basically relate to the repayments of interest and capital of the Notes which will be issued. These yields come from the expected cash flow resulting from the management of the NPLs, in addition to the fees paid to the SPV's servicer for the management of the loans portfolio.

2) the required yield on the NPLs portfolio in order to avoid outstanding capital from the non-secured repayment Notes (given that high priority Notes are covered by the State guarantee), as well as the NPLs portfolio yields that generate capital losses and the extent of these losses.

3) the importance of low and middle-priority repayment Notes, as well as the combination of these securities, which can speed up the repayment period of all Notes, including those of the high priority.

4) the required yield of the NPLs portfolio in order to achieve the shortest possible repayment of all series of Notes. This issue is important and affects both the State's decision to provide its guarantee of high priority Notes and the successful disposal of low and medium-term priority Notes, since it will be decisive on both the provision of the State guarantee as well as of the interest, on behalf of the investors, to buy any non-guaranteed Notes.

The method of approach

For the empirical approach, we assume a portfolio of NPLs with a nominal value of € 1,000. Table 1 contains the other assumptions of the problem.

After the transfer of the portfolio of NPLs in Table 1, all three categories of Notes will be issued in order to finance the buyout of the "problematic loans": the high, the medium and the low priority repayment Notes.

We assume that high-priority repayment Notes will be the highest in value. The value of these Notes will outweigh all the other Notes because, as we said, the banks will replace with them the majority of the loans they will transfer to the SPV while, at the same time, ensuring the formation of the smallest possible capital provisions, which actually minimises the negative effect upon the net worth of their equity capital. These Notes will also be given to the bank in exchange for the transfer of the NPLs and will cover most of their transfer price. They will carry the state guarantee until their final repayment. Additionally, they will be paid in priority, before any middle-priority Note's capital repayment and, of course, before any low-priority Note interest and capital repayment. The coupon of such a category of Notes will have the lowest price, given the independent agency rating assessment and given the repayment priority and the provision of a State guarantee. The interest rate, we initially assume, will be 5%, which includes the fees to be paid in exchange for the State guarantee to the bank. The fees for this State guarantee should be adjusted in accordance to the duration of the Notes to which it will be granted, but in the context of this article, it is supposed to remain stable regardless of the time that will be taken to be repaid.

In order for the State guarantee to be provided to the transferring bank, for a full exemption of the balance sheets from their NPLs, we expect that some adequate amount of middle and low priority Notes should be made available to the investors.

We also assume that the middle-priority Notes will "cover" part of the total NPL transfer value. The capital of these Notes will be repaid after the full repayment of the corresponding capital of the high priority Notes. It

TABLE 1 The characteristics of the transferred NPLs portfolio

	Euro (€)
Nominal value of the NPLs portfolio	1,000
Estimated market value of the NPLs portfolio	250
Transfer price	400
Real economic value of the NPLs portfolio	300
Book value of the NPLs portfolio	500

is not necessary to grade these middle-priority Notes, since they will not have any kind of guarantee. We expect that the coupon of the middle-priority Notes should be around 10% in order to be considered as attractive securities to prospective buyers.

Finally, low-priority Notes will begin to be repaid last, after the full repayment of capital and interest on the higher priority Notes. Given the existence of uncertainty in the repayment process of the high-priority Notes, low-priority repayment Notes will be made available to prospective investors at a price that will effectively discount their face value, e.g., at an assumed rate of 15%, whenever it starts to be repaid. Thus, if the nominal value of these Notes is assumed at € 100 and investors estimate that they will start to be repaid after the highest priority Notes have been repaid, e.g., after the 12th year of the SPV operation, then the highest price these investors are prepared to pay for them today will be € 18.69. In Table 2 the present value of a low-priority Note with a nominal value of € 100 is presented, which will start to be repaid after x years.

In Table 2, a purchase price, by a prospective investor, for the low-priority Notes would be presented based on a discount rate and coupon at 15% and a nominal Note value of € 100. It is obvious that the shorter the repayment period for the Notes according to repayment priority (e.g., Seniors), the greater the value that potential investors would offer for the purchase of lower-priority Notes. This creates an additional incentive for banks to transfer to the SPV their most likely repayment/recovery NPLs in order to cover the required minimum grade standards and, consequently, the analogus high-priority repayment Notes to benefit from the State's guarantees. Additionally, through this classification, the non-guaranteed Note series will be obtained by the prospective buyers at preferential prices and provided that are convinced that their placement funds are not at unbalanced risk and that they will yield the returns that are expected for the risk they undertake.

TABLE 2 The annual relationship between the repayment of low-priority Notes and their present value

First year of low priority Notes repayment	Present value of Junior Notes (nominal value of € 100)
4	57.18
5	49.72
6	43.23
7	37.59
8	32.69
9	28.43
10	24.72
11	21.49
12	18.69

So, if the SPV manages to attract the funds mentioned above, it will raise the amount of € 400 and, consequently, the bank's accounts will be released from these NPLs.

Table 3 is enriched with the annual outflows which are created, for the SPV, by the issued Notes that are expected to be financed from inflows provided by the management of NPL assets. In the first row of Table 3, the year-on-year estimated portfolio yield per € 1,000 nominal loan value is presented. The priority in the series of Notes is demonstrated from the timing of repayment concerning interest and capital, e.g., the high and medium-priority repayment coupons, are preceded by the capital repayment of these Notes, which need to be made in full before any cash flow is released for the repayment of the capital of the medium priority Notes. On the contrary, both interest and the capital of the low priority Notes will be repaid after the full repayment of all previous securities.

All the above are specified in Table 3 in order, accordingly, to modify these initial assumptions and values, to study the sensitivity impact on variables containing uncertainties. It is important to notice here that from the management of the NPLs portfolio, its face value is expected to decrease gradually. Therefore, the assumption of a stable NPLs portfolio value in time seems rather unrealistic. Additionally, the use of a stable yield on NPLs portfolios for all examined years of the SPV duration is unrealistic. Later, in this article, the assumption of a fixed yield for all years is overturned (Tables 14-15).

In order to determine the value of each type of the issued Note, the minimisation of the [weighted] financial cost is sought here, as an objective optimization function, weighted by the participation rate of each type of Note in the entire securities portfolio. It is considered that the financial costs are a critical factor for the sustainability of the SPV. The restrictions used concern: a) the amount of the capital raised, which must be equivalent to the transfer value of the NPLs portfolio (i.e., € 400, in our example), b) the full repayment of capital and interest of all series at the end of the period, on

TABLE 3 The outflows of the SPV Notes Portfolio

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Annual effective portfolio return (%) intended to serve the portfolio of the Notes issued by € 1,000 NPL's	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%
Initial amount of high-priority repayment Notes (Seniors) (€)	357.00															
High-priority repayment Notes rate (Seniors)	5.0%															
Initial amount of medium-priority repayment Notes (Mezzanine) (€)	30.00															
Medium priority Notes rate (Mezzanine)	10.0%															
Interest on high-priority repayment Notes (Seniors) (€)		17.85	16.64	15.37	14.04	12.65	11.18	9.64	8.02	6.32	4.54	2.66	0.70	0.00	0.00	0.00
Interest on medium repayment priority Notes (Mezzanine) (€)		3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.26	0.00	0.00
Outstanding capital of high-priority repayment Notes (Seniors) (€)	357.00	332.85	307.49	280.87	252.91	223.56	192.73	160.37	126.39	90.71	53.24	13.91	0.00	0.00	0.00	0.00
Outstanding capital of medium-priority repayment Notes (Mezzanine) (€)	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	2.60	0.00	0.00	0.00

TABLE 3 (continued)

	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Initial amount of low-priority repayment Notes (Juniors) (€)	70.00															
Low-priority repayment Notes rate (Juniors)	15.0%															
Present value of low-priority repayment Notes (initial capital for Juniors) (€)	11.38															
Interest on low-priority repayment Notes (Juniors) (€)		0	0	0	0	0	0	0	0	0	0.00	0	0	11	6	0
Outstanding capital of low-priority repayment Notes (€)	70	70	70	70	70	70	70	70	70	70	70	70	70	38	0	0
Total amount of lending intended for the purchase of the portfolio of the NPLs (€)	457.00	433	407	381	353	324	293	260	226	191	153	114	73	38	0	0
Capital to be raised (€)	398.38															

TABLE 4 The dispersal of Notes based on the costs minimisation of the SPV

Average yield of the SPV portfolio	Notes category (in euros) Senior	Mezannine	Junior	Average interest rate
4.53%	357	30	70	7.78%
4.60%	357	30	70	7.76%
4.80%	354	33	67	7.76%
5.00%	352	33	67	7.74%
6.00%	348	33	67	7.68%
6.50%	345	33	67	7.64%
7.00%	342	33	67	7.60%

the basis of the initial repayment priorities and c) the fact that Senior Notes should prevail in value of the other categories, and for this reason, a ratio of 75-25 was chosen.

With these elements, a non-linear programming process is applied as a method of optimization, and the results appear in Table 4.

Table 4 shows the structure of the Notes' portfolio of an SPV, which is then used for the minimalization of the financial costs for different yields of the NPLs' securitisation so that the viability of the SPV is ensured and the raising of the funds required for the purchase of these NPLs is also achieved.

Based on available data, the financial structure of the SPV's Notes that exist in the first series, on Table 4, was selected. This includes all types of Notes and corresponds to values of € 357-€ 30-€ 70 of Senior-Mezzanine-Junior respectively. These amounts, in fact, are the initial Notes' values (see Table 2). Additionally, this mix of values ensures the viability of the SPV, under the restriction of a predetermined NPL portfolio yield, and implies the same for even higher NPL portfolio yields shown in Table 4.

At these prices and within the specific limits of the average portfolio yield variation, the SPV will be able to repay coupons of all Notes issued, avoiding this way any financial losses to the investors who trusted and purchased these securities.

Tables with variations of the initial assumptions of the basic variables and the produced effects[30]

The main objective is to study the impact of price differentiation of the main variables regarding the repayment time period of the issued Notes described in Table 3.

In Table 5, we present the effect as regards the duration in years, concerning the high priority repayment Notes derived from the variation in the yield of the NPLs portfolio. The time period to repay these Notes also depends on the required amount in euro and the performance of the NPLs portfolio (reverse analogy). The rest of the variables remain unchanged. In conclusion, the sooner these Notes are repaid, the faster the uncertainty of a partial or total state guarantee default will be removed as a result of an unexpected underperformance of the SPVs assets (i.e., the NPLs).

Similarly, Table 6 explores the impact on the maximum time maturity of the repayment of high priority Notes, from the diversification of the coupon in relation to the average NPLs portfolio yield of the SPV. In this case, a joint low yield of coupons and NPL portfolio performance leave the Senior Notes unpayable, and this increases the likelihood of the State guarantee activation. It is important to stress here that a short-term repayment period of the high priority Notes creates higher boundaries for the repayment of lower priority Notes. This leads to an increase in the demand of Jun-

30. The following tables were compiled with the help of the *Data Table* and *Goal Seek* commands of the Excel programme.

TABLE 5 Years of repayment of the high-priority repayment Notes (value)

	Value of Senior Notes (in euros)					
	250	270	300	357	370	390
Average yield of the SPV portfolio per € 1000 NPLs	**Years of Senior Notes repayment**					
2.0%	N/C	N/C	N/C	N/C	N/C	N/C
2.5%	N/C	N/C	N/C	N/C	N/C	N/C
3.0%	13	15	N/C	N/C	N/C	N/C
3.5%	11	12	14	N/C	N/C	N/C
4.1%	9	10	11	14	14	15
4.5%	8	9	10	12	13	13
5.0%	7	7	8	10	11	12
5.5%	6	7	8	9	10	10
6.0%	6	6	7	8	9	9

Note: The N/C indicates the case when the time value cannot be determined, since it is outside the predetermined maximum duration period of the SPV securitisation (15 years). Cells in orangish constitute the values of the variables in the first row and column that succeed in raising the required funds for the transferred NPLs and the complete repayment of all Notes series.

TABLE 6 Years of repayment of the high-priority repayment Notes (coupon)

	Senior Notes Coupons					
	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%
Average yield of the SPV portfolio per € 1000 NPLs	**Years of Senior Notes repayment**					
2.0%	N/C	N/C	N/C	N/C	N/C	N/C
2.5%	N/C	N/C	N/C	N/C	N/C	N/C
3.0%	N/C	N/C	N/C	N/C	N/C	N/C
3.5%	14	14	15	N/C	N/C	N/C
4.1%	11	12	12	13	13	14
4.5%	10	11	11	11	12	12
5.0%	9	9	10	10	10	10
5.5%	8	8	9	9	9	9
6.0%	7	8	8	8	8	8

Note: The N/C indicates the case when the time value cannot be determined, since it is outside the predetermined maximum duration period of the SPV securitisation (15 years). Cells in orangish constitute the values of the variables in the first row and column that succeed in raising the required funds for the transferred NPLs and the complete repayment of all Notes series.

TABLE 7 Years of repayment of the middle-priority repayment Notes (value)

	Mezzanine Notes values (in euros)					
	20	25	30	35	40	50
Average yield of the SPV portfolio per € 1000 NPLs	**Years of Mezzanine Notes repayment**					
2.0%	N/C	N/C	N/C	N/C	N/C	N/C
2.5%	N/C	N/C	N/C	N/C	N/C	N/C
3.0%	N/C	N/C	N/C	N/C	N/C	N/C
3.5%	N/C	N/C	N/C	N/C	N/C	N/C
4.1%	14	14	14	15	15	N/C
4.5%	12	12	13	13	13	14
5.0%	10	11	11	11	11	12
5.5%	9	9	10	10	10	11
6.0%	8	9	9	9	9	9

Note: The N/C indicates the case when the time value cannot be determined, since it is outside the predetermined maximum duration period of the SPV securitisation (15 years). Cells in orangish constitute the values of the variables in the first row and column that succeed in raising the required funds for the transferred NPLs and the complete repayment of all Notes series.

TABLE 8 Years of repayment of the middle-priority repayment Notes (coupon)

	Mezzanine Notes coupons					
	8.0%	8.5%	9.0%	9.5%	10.0%	10.5%
Average yield of the SPV portfolio per € 1000 NPLs	**Years of Mezzanine Notes repayment**					
2.0%	N/C	N/C	N/C	N/C	N/C	N/C
2.5%	N/C	N/C	N/C	N/C	N/C	N/C
3.0%	N/C	N/C	N/C	N/C	N/C	N/C
3.5%	15	15	15	15	15	15
4.1%	12	12	12	12	12	12
4.5%	11	11	11	11	11	11
5.0%	10	10	10	10	10	10
5.5%	9	9	9	9	9	9
6.0%	8	8	8	8	8	8

Note: The N/C indicates the case when the time value cannot be determined, since it is outside the predetermined maximum duration period of the SPV securitisation (15 years). Cells in orangish constitute the values of the variables in the first row and column that succeed in raising the required funds for the transferred NPLs and the complete repayment of all Notes series.

TABLE 9 The relationship between NPLs portfolio yield with the years of Notes repayment

Average yield of the SPV portfolio per € 1000 NPLs	Years of the SPV all Notes repayment
2.0%	N/C
2.5%	N/C
3.0%	N/C
4.3%	15
4.5%	15
4.7%	14
5.0%	13
5.5%	11
6.0%	10

Note: The N/C indicates the case when the time value cannot be determined, since it is outside the predetermined maximum duration period of the SPV securitisation (15 years).

ior Notes and, simultaneously, the accumulation of a higher amount of funds from the SPV.[31]

In Table 7 above, the time maturity for the repayment of the middle-priority Notes in relation to their nominal value and to the expected yield on the NPL securitisation portfolio is examined. The smaller the issued amount (in euro) of these Notes, the easier their repayment process for the same NPL portfolio yield. At the high level of NPLs portfolio yields, the time period of the Notes' repayment is shortened and this leads to an easier repayment of the other categories (of Notes).

Similarly, in Table 8 above, the difficulty in repaying the middle-priority Notes is presented under a sub-yield NPLs portfolio performance and a high level of coupon.

Table 9 shows the required period for the full repayment of all Notes (e.g., high, medium and low priority) for different levels of NPLs portfolio yields. As the results indicate, the repayment time period of these securities shrinks with the increase in the yield of the portfolio of NPLs.

Table 10 gives a clear picture concerning the potential losses that can be incurred by the holders of the middle and low prioriy Notes as a result of the NPLs portfolio sub-yield and under the assumption that Notes of

TABLE 10 Possible losses for the Noteholders from outstanding capital of middle and low-priority Notes

Average yield of the SPV portfolio per € 1000 NPLs	Outstanding amount of Mezzanine Notes (end of the period) (€)	Average yield of the SPV portfolio per € 1000 NPLs	Outstanding amount of Junior Notes (end of the period) (€)
3.0%	30	3.0%	70
3.5%	30	3.5%	70
3.8%	16.9	3.8%	70
3.9%	0	3.9%	75.8
4.0%	0	4.0%	53.4
4.2%	0	4.1%	42.3
4.5%	0	4.2%	17.9
5.0%	0	4.5%	0
5.5%	0	5.0%	0

31. In particular through the mechanism which will allow the principle of repayment of interest and capital in these series over a shorter period.

TABLE 11 Years of repayment of all Notes with an average annual yield on securitised loans (NPLs) at 6%

	Mezzanine Notes nominal value (€)			
	40	30	25	0
Nominal value of Junior Notes	Years of all Notes repayment			
50	10	10	9	9
70	11	10	10	9
90	11	11	10	10
100	11	11	11	10

TABLE 12 Years of repayment of all Notes with an average annual yield on securitised loans (NPLs) at 5%

	Mezzanine Notes nominal value (€)			
	40	30	25	0
Nominal value of Junior Notes	Years of all Notes repayment			
50	13	12	12	11
70	13	13	12	11
90	14	13	13	12
100	14	14	13	12

TABLE 13 Years of repayment of all Notes with an average annual yield on securitised loans (NPLs) at 4.5%

	Mezzanine Notes nominal value (€)			
	40	30	25	0
Nominal value of Junior Notes	Years of all Notes repayment			
50	15	14	14	12
70	15	14	14	12
90	N/C	15	15	13
100	N/C	15	N/C	14

Note: The N/C indicates the case when the time value cannot be determined, since it is outside the predetermined maximum duration period of the SPV securitisation (15 years).

€ 30 & € 70 nominal value will be issued respectively as reported in the above example.

Table 11 shows the required time period, in years, up to the full repayment of all Notes, since the average annual yield on securitised loans (NPLs) is 6%. It is reasonable that the repayment time period of all Notes is not affected when middle-priority securities are not issued at all for the corresponding total nominal values of the issued middle and low-priority Notes. The same applies for different levels of NPLs portfolio yields, as is evident in Table 12 (e.g., with an average annual yield on securitised loans [NPLs] at 5%).

However, the above are also confirmed even when the yields are low. For example, in Table 13, the repayment time period of all available Notes is presented, when the NPLs yields are marginal and, in this case, when the average annual yield of the NPLs portfolio is at 4.5%. We observe that for middle and low priority Notes of € 100 (nominal value), the total amount of Notes issued (Senior included) are repaid in 14 years while for the same amount of Notes with exclusively low priority securities, the total amount of Notes are repaid at the same time period (14 years).

Next, two additional cases are studied: The case of the differentiated annual yield on the NPLs portfolio and the case of the average annual yield of the SPV with a shorter time period of operation (from 15 to 10 years).

At the beginning of this article, it was assumed that the yield of the NPLs portfolio would be stable for all duration years of the SPV. This stable performance was initially adopted for reasons of simplicity, although, as an assumption, it was slightly unrealistic. In Table 14, the NPLs portfolio yield is no longer considered fixed, but under the constraints that are in position to finance the issued Notes and even with a different structure of the Notes categories. For comparability reasons, in this table (Table 14), the average yields of the NPLs portfolio is calculated as well as the initial fixed annual portfolio yield for the entire duration of the SPV.

From the results of Table 14, we observe a gradual decline in yields as we progress through the years of duration which, to some extent, is expected due to the gradual maturation of the portfolio's yield of the SPV.

TABLE 14 Minimum yield required for the viability of the SPV (15 years)

	Years																
Minimum yields for the SPV viability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Average yields**	**Stable annual yield**
Value of Notes (s-m-j)* (€)																	
300-80-90	7.1%	6.6%	6.2%	5.7%	5.3%	4.9%	4.5%	4.2%	3.9%	3.5%	3.2%	2.9%	2.7%	2.4%	2.1%	4.35%	4.64%
357-30-70	6.8%	6.3%	5.9%	5.4%	5.0%	4.6%	4.3%	3.9%	3.6%	3.2%	2.9%	2.6%	2.4%	2.1%	1.8%	4.06%	4.53%
350-38-62	6.8%	6.3%	5.9%	5.4%	5.0%	4.6%	4.2%	3.9%	3.6%	3.2%	2.9%	2.6%	2.4%	2.1%	1.8%	4.05%	4.86%
340-60-20	6.7%	6.2%	5.7%	5.3%	4.9%	4.5%	4.1%	3.8%	3.4%	3.1%	2.8%	2.5%	2.2%	2.0%	1.7%	3.92%	4.25%

Note: * s: senior, m: mezzanine, j: junior (in euro).

TABLE 15 Minimum yield required for the viability of the SPV (10 years)

	Years											
Minimum yields for the SPV viability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Average yields**	**Stable annual yield**
Value of Notes (s-m-j)* (€)												
300-80-90	7.8%	7.4%	6.9%	6.5%	6.1%	5.7%	5.3%	4.9%	4.6%	4.3%	5.94%	6.16%
357-30-70	7.6%	7.1%	6.7%	6.2%	5.8%	5.4%	5.1%	4.7%	4.4%	4.0%	5.70%	5.78%
350-38-62	7.5%	7.1%	6.6%	6.2%	5.8%	5.4%	5.0%	4.6%	4.3%	4.0%	5.64%	6.07%
340-60-20	7.4%	6.9%	6.5%	6.1%	5.7%	5.3%	4.9%	4.5%	4.2%	3.9%	5.53%	5.86%

Note: * s: senior, m: mezzanine, j: junior (in euro).

Finally, Table 15 above is also presented containing the minimum NPLs yields required for the viability of the SPV if its duration time is not 15 years, as originally assumed, but 10 years.

Completing this technical part of our analysis, two questions are raised:

1) Will the "Hercules" project, with the creation of SPVs, be the effective tool for dealing with the NPLs of the domestic systemic banks?

   Indeed, the "Hercules" project is planned to be an effective mechanism for releasing the Greek systemic banks from their NPLs. It is estimated that through this mechanism, € 30 billion in loans will be transferred. In other words, they will try to transform an almost negative yield asset with high surveillance cost into a satisfactory cash amount. If the systemic banks manage to get rid of this NPL amount (€ 30 billion) and if the transfer value is equivalent to that used in the previous example, they will manage to raise around € 10-12 billion, which corresponds to 5%-6% of the country's current GDP. These resources can then be channel into the market through credit expansion into efficient and productive activities that will have multiple effects on the country's economy. The multiple effects will consequently influence the NPLs portfolios yield and this implies an expected improvement of both the collectivity and liquidity of the participating loans. Moreover, the international financial environment, but especially the public finances of Greece, are particularly favorable. The public securities (bonds) are facing high demand and consequently their yields are lowering, favoring, thereby, the issue and the pricing of securities which the State will provide its guarantee. These are the high-priority repayment Notes of the SPVs that will be created to absorb the problematic loans. The lower the SPVs Notes are invoiced, the easier the ability to repay them and the greater the likelihood of the SPV's sustainability as emphatically presented in our example.

2) Will, the "Hercules" project be the only tool for the clearing and complete consolidation of bank balance sheets?

   The answer to this question is negative. As stated, the banks will transfer to the SPVs, at least in the first phase, their relatively "good" NPLs. The term "good" refers to those NPLs with a high probability of recovery, compliance with the [existing] legal regulations and the conditions of their contacts or those whose collaterals secure them a high probability to recovery. The total amount of NPLs today exceeds € 70 billion. This means that a significant amount of NPLs will remain in the management of the systemic banks. As has already been announced by the Governor of the Greek Central Bank, a new mechanism for further easing is already being sought. Greece has recently exited the financial crisis, after 10 years. However, as it turns out, the impact of this crisis will continue to concern the domestic economic and banking system for years to come.

5. Conclusions

In this article a management model of the systemic banks' NPLs under the "Hercules" project, (Law 4649/19), was presented. In simple terms, we discussed the framework, though the foundation of an SPV, for releasing systemic banks from their NPLs, to, subsequently, perform their traditional role, which is to support the Greek economy through a new healthy credit expansion.

In the empirical part, which is also the main part of this article, a hypothetical example of an SPV's computational sustainability assessment was presented, within the framework of this project, in order to check its "operating limits". From the recorded results of the simulations, it is understood that the structure, the years of maturity, the existing yields and, above all, the possibility of selling to future investors all categories of Notes of such an SPV (e.g. Seniors, Mezzanine & Juniors), will be the most critical factors in the search for an effective answer to the issue of the NPLs of the Greek credit institutions. The efficient application of the "Hercules" project will not provide the final solution to the NPLs question, but it will be an important step forward for effectively confronting the issue.

At a macroeconomic level, a long-term positive trajectory of the Greek economy (e.g., GDP and employment) will have a beneficial impact on the whole project. Simply, if we expect a satisfactory average long-term GDP growth rate, this will play a decisive role for having high yields of an SPV portfolio, which will further facilitate the sustainability of the whole plan and, by extension, will contribute to the success of the "Hercules" project.

Finally, we shouldn't forget to highlight that the issue of confronting the NPLs of the credit institutions has an undeniable European dimension, mostly because the dangers lurking from their maintenance on a high level are, to a large extent, systemic. Therefore, it is necessary to take action at the European Union level,

in order to shape a harmonized legal framework for non-performing loans.

On the other hand, the Italian model has been already tested in practice and delivers its full benefits. So, it is reasonable for someone to expect the same results from the implementation of the Greek framework "Hercules". This expectation doesn't reduce the value and the necessity for the framework's enrichment and the other measures proposed by the Commission. Even more, there is an urgent need the relevant Commission's proposals to be the starting point for a thorough discussion at the EU level for the creation of a more complete European system for NPLs.

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Developments in the adoption of Information and Communication Technologies and e-commerce practices in Greek firms: The regional dimension

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Abstract

In the last years, digital entrepreneurship and e-business have been critical drivers of productivity, competitiveness and development not only at a country level, but also at a regional or local level. In this article, we explore the adoption of Information and Communication Technologies (ICT) and e-commerce by firms in the four great geographical areas in Greece (Attica, the Aegean Islands-Crete, Northern Greece, Central Greece) over the 2008-2018 period. The data used in the analysis come from the survey on the "Use of Information, Communication and Electronic Commerce Technologies" which is undertaken by ELSTAT on an annual base. More specifically, we examine the evolution of a series of ICT adoption indicators over time. These indicators refer to the organization and management of internal processes and firm resources, the visibility and communication of the firm with other firms and consumers, as well as e-commerce. Comparative analyses indicate the existence of regional digital divides in most cases, which, potentially, reflect the special structural and geographical characteristics of the various regions in the country.

Keywords: *Information and Communication Technologies (ICT), e-commerce, regional dimension*

JEL classification*: L20, M15, O33, R10*

1. Introduction

In the context of the "new economy", "knowledge economy" or the "digital economy", the implementation and use of Information and Communication Technologies (ICT) is considered a necessary condition for firm survival and growth, even in times of crisis (Bertschek et al. 2019). In the last years, digital entrepreneurship and e-business have been acknowledged as critical drivers of productivity, competitiveness and development at local, regional and national levels. ICT, as many general-purpose technologies, 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).

The issue of ICT adoption has been extensively explored in the international literature[1] with many studies highlighting the significance of factors related to a firm's organization (e.g., Bayo-Moriones and Lera-López 2007; Hollenstein 2004), technical infrastructure (e.g., Zhu et al. 2003; Wang et al. 2010) and competitive environment (e.g., Bayo-Moriones and Lera-López 2007; Alshamaila et al. 2013). Also, a small number of studies emphasizes the potential role of spatial and geographical factors in adopting ICT. More specifically, the empirical results of Fabiani et al. (2005), and Giunta and Trivieri (2007) for Italy show that ICT investments and the probability of ICT adoption are larger for firms located in the Northern regions of Italy in comparison with the regions in the South. Similarly, Haller and Siedschlag (2011) provide evidence of significant location effects on the probability of ICT adoption by Irish firms, since they find that enterprises located outside the capital city region are less likely to have a website and accept orders online.

In the Greek context, there is a relatively small number of studies on the topic of ICT adoption (Spanos et al. 2002; Pontikakis et al. 2006; Papastathopoulos and Beneki 2010) and an even smaller number of pa-

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

1. Several scholars have occasionally attempted to present and summarize the findings of the relevant literature (see, for example, Wang et al. 2010; Ghobakhloo et al. 2011; Oliveira and Martins 2011).

pers that examine –at least to some point– the regional dimension (Giotopoulos et al. 2017; Kontolaimou and Skintzi 2018 a,b). Giotopoulos et al. (2017) find that firm location, i.e., whether firms are located in the two major cities of Greece (Athens or Thessaloniki) or in the Greek Periphery, does not appear to be significant in the cases of most ICT adoption measures that are examined. On the contrary, the recent studies by Kontolaimou and Skintzi (2018a, b) show that the regional dimension potentially plays an important role in the adoption of ICT and e-commerce practices in Greek firms.

This article contributes to the literature on the ICT adoption by enterprises, emphasizing the potential digital divide among the Greek regions, which is a dimension that has not been adequately examined by existing studies. The Greek case is of interest due to the deep and prolonged recession that the economy experienced in the previous years, with many scholars and policy-makers highlighting the significant role that new technologies can play in Greece, on its way to rebalancing and economic recovery (Giotopoulos et al. 2017; Kontolaimou and Skintzi 2018b).

However, it is worth noting that according to the last report on the Digital Economy and Society Index (DESI) of the European Commission (EC 2019), Greece underperforms most European countries, ranking 26th out of the 28 EU Member States. Particularly, regarding Integration of digital technology by businesses, which is one of the five dimensions of DESI, Greece ranks 22th among EU countries, well below the EU average, despite some slight progress observed in specific sub-indicators (EC 2019). The above imply that the country has not taken full advantage of the opportunities and possibilities offered by the new technologies and there is plenty of scope for utilizing ICT in terms of efficiency, resource savings and productivity, with multiple benefits at local and regional levels.

In this context, using data of a large sample of Greek firms over the 2008-2018 period, in the present article we examine and compare the evolution of ICT and e-commerce adoption indicators across the four great geographical areas in Greece (Attica, the Aegean Islands-Crete, Northern Greece, Central Greece). The ICT indicators under study concern: (a) the organization and management of internal processes and firm resources (ERP and CRM software packages, use of cloud computing services), (b) the visibility and communication of the firm with other firms and consumers (website availability, use of social media, paid internet advertising), and (c) e-commerce (e-sales and e-procurement).

The article is structured as follows: Section 2 describes the data and the main characteristics of the sample used in the statistical analyses. Section 3 presents the evolution of specific indicators of ICT and e-commerce adoption over time and undertakes comparisons among the great geographical areas in Greece. The last section summarizes the results and concludes.

2. Data and sample description

The data used to capture the evolution of ICT and e-commerce adoption over time, at a regional level,[2] are derived from the survey "Use of Information, Communication and Electronic Commerce Technologies (ICT)", which is carried out by ELSTAT[3] on an annual basis. The survey is addressed to firms with at least 10 employees; therefore, the sample does not include micro enterprises. The time period under examination is 2008-2018. It should be noted that the questionnaires sent by ELSTAT to firms vary each year. Consequently, data referring to some indicators are not available for the entire period under consideration.

The average number of firms surveyed per year is 2,729. As far as other characteristics of the sample are concerned, on average, 32% of the firms come from the manufacturing sector, 44% from the service sector (financial services are excluded) and 24% from the trade sector (wholesale and retail). Moreover, on average, 55% of the surveyed firms are small (less than 50 persons are employed), 32% are medium (the number of persons employed is between 50 and 249) and 13% are large (at least 250 persons are employed) .[4]

2. The analysis is conducted at a NUTS 1 level, which refers to great geographical areas. It is noted that the great geographical area of Attica (Attiki) includes the region of Attica; the Aegean Islands-Crete (Nisia Aigaiou-Kriti) include the regions of the Northern Aegean, the Southern Aegean and Crete; Northern Greece (Voreia Ellada) includes the regions of Eastern Macedonia and Thrace, Central Macedonia, Western Macedonia and Epirus; and Central Greece (Kentriki Ellada) includes the regions of the Peloponnese, Western Greece, Continental Greece, Thessaly and the Ionian Islands.

3. More information about the survey can be found in: <https://www.statistics.gr/el/statistics/-/publication/SIN24/->.

4. The size classification is based on the number of persons employed according to the official definitions of small, medium and large enterprises in the European Union (EU).

TABLE 1 Percentage distribution of surveyed firms by sector and location, annual average (2008-2018)

Great geographical areas	Manufacturing	Services (financial services are excluded)	Trade (wholesale and retail)
Attica	41.5%	48.9%	55.0%
Aegean Islands-Crete	5.8%	13.0%	7.6%
Northern Greece	32.8%	21.3%	23.0%
Central Greece	19.9%	16.8%	14.4%
Total	100%	100%	100%

Source: ELSTAT, authors' computations.

TABLE 2 Percentage distribution of surveyed firms by size and location, annual average (2008-2018)

Great geographical areas	Small	Medium	Large
Attica	39.4%	52.6%	74.6%
Aegean Islands-Crete	11.2%	8.1%	4.9%
Northern Greece	28.2%	24.5%	15.0%
Central Greece	21.2%	14.8%	5.5%
Total	100%	100%	100%

Source: ELSTAT, authors' computations.

TABLE 3 Percentage of firms using PCs and percentage of firms having access to the internet, on average (2008-2018)

Great geographical areas	% of firms using computers[1]	% of firms having internet access[2]
Attica	96%	99%
Aegean Islands-Crete	95%	98%
Northern Greece	95%	98%
Central Greece	94%	99%

Source: ELSTAT, authors' computations.

Notes: 1. Percentage of the total number of surveyed firms by great geographical region,
2. Percentage of the surveyed firms using computers.

Table 1 presents the percentage distribution of the surveyed firms, on average, for the period 2008-2018, by location and sector of economic activity. For example, on average, 41.5% of the surveyed firms operate in the manufacturing sector and are located in Attica. It is noted that the majority of examined firms is concentrated in Attica and Northern Greece. Table 2 presents firm distribution in our sample by size and location. It is noted that most of the surveyed firms are also located in Attica and Northern Greece. As far as large firms are concerned, 74.6% are based in Attica. Generally, the firm distribution presented in Tables 1 and 2 reflects, to a large extent, the structural and demographic characteristics of Greek economic activity, implying the significant concentration of firms in the largest urban centers of the country (Athens and Thessaloniki).

Regarding basic technological infrastructure, it is observed that more than 90% of the Greek firms used computers, on average, for the time period 2008-2018, in all four great geographical areas (Table 3). Notably, the percentage of firms that used computers in 2018 was 97% in Attica and the Aegean Islands-Crete, 96% in Northern Greece and 94% in Central Greece.

In addition, more than 98% of the firms using computers had access to the internet, on average, during the period under examination (Table 3). Specifically, in 2018, the percentage of firms that had access to the in-

ternet (as a percentage of firms using PCs) was 100% in three great geographical areas; in Central Greece, the corresponding percentage was 99%.

3. Evolution and comparison of ICT and e-commerce adoption indicators across the great geographical areas in Greece over time

The internet, new technologies, and in particular ICT, have significantly transformed the way firms operate and communicate with other firms and with consumers. In this section, the evolution of ICT and e-commerce adoption indicators is presented by great geographical area (NUTS 1). The indicators are grouped into three categories: a) indicators concerning the organization and management of internal processes and firm resources, b) indicators concerning the visibility and the communication of the firm with other firms and consumers, and c) e-commerce indicators. It should be noted that all indicators are calculated as a percentage of the number of enterprises with computers.

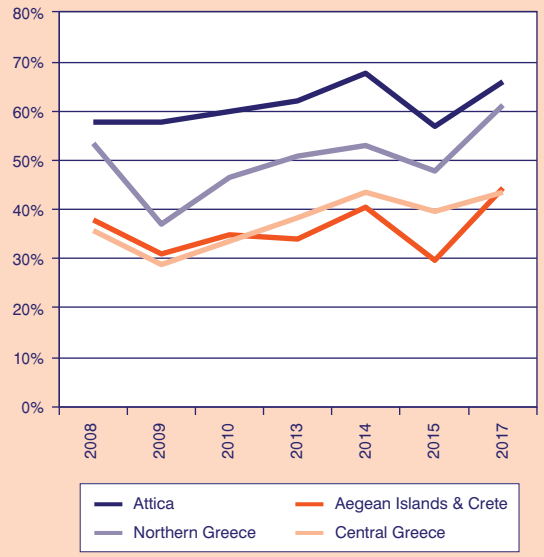
3.1. ICT used in the management of internal processes and firm resources

Information-sharing technologies within the enterprise, like Enterprise Resource Planning (ERP[5]) and Customer Relationship Management (CRM[6]) software packages, are relatively widespread among firms in the EU. In 2017, 35% of firms in the EU used ERP software packages and 34% used CRM software. As indicated in Figure 1, the use of ERP software packages is widespread in Greece (data are available for the years 2008-2010, 2013-2015 and 2017). More than half of the enterprises located in Attica (61% on average) used ERP software packages during the period under examination (2008-2017). Northern Greece follows, where 50% of the firms used ERP software packages. The corresponding percentages for Central Greece and the Aegean Islands-Crete are 38% and 36%. Therefore, a significant gap is observed between Attica and the remaining great geographical areas, especially Central Greece and the Aegean Islands-Crete. However, it is worth noting that there is an upward trend of 1 percentage point (p.p.) per year in all areas.

The use of CRM software is not as widespread as the use of ERP software packages; nevertheless, a significant number of firms has adopted CRM solutions, as presented in Figure 2 (data are available for the years 2008-2010, 2013-2015 and 2017). In this case, Attica outperforms the other areas as well, since 32% of the surveyed firms based in Attica used CRM software, on average. Attica is followed by the Aegean Islands-Crete (26%), Northern Greece (23%) and Central Greece (19%). Central Greece is the only area where the number of firms using CRM software has remained stable, on average, during the examination period. An increasing trend, of 2 p.p. annually, is observed in Attica and of 1 p.p. in the Aegean Islands-Crete and in Northern Greece.

Furthermore, cloud computing services[7] are constantly gaining ground both in Greece and in the EU. In 2018, 27% of the firms in the EU bought cloud computing services. In Attica, 25% of firms, on average over the period 2014-2018, bought cloud computing services. The corresponding figures for the remaining areas are significantly lower. Attica is followed by the Aegean Islands-Crete (14%), Northern Greece (13%) and Central Greece (8%). Nevertheless, a steady upward trend is

FIGURE 1
Percentage of firms using ERP software packages across the great geographical areas of Greece, 2008-2010, 2013-2015, 2017



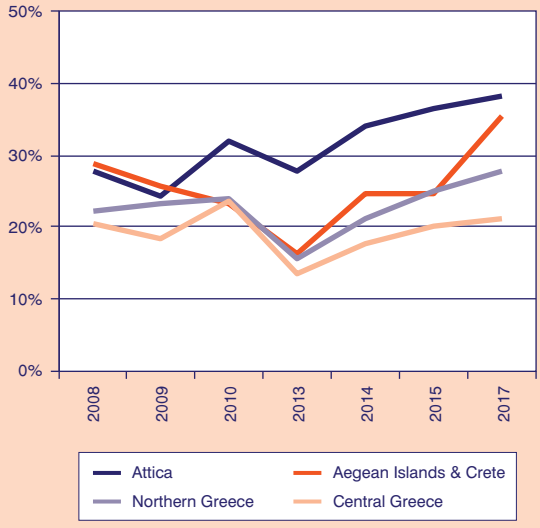
Source: ELSTAT, authors' computations.

5. An ERP is a software package used to manage resources by sharing information among different functional areas (e.g., accounting, planning, production, marketing, etc.).

6. CRM refers to any software application for managing information about customers.

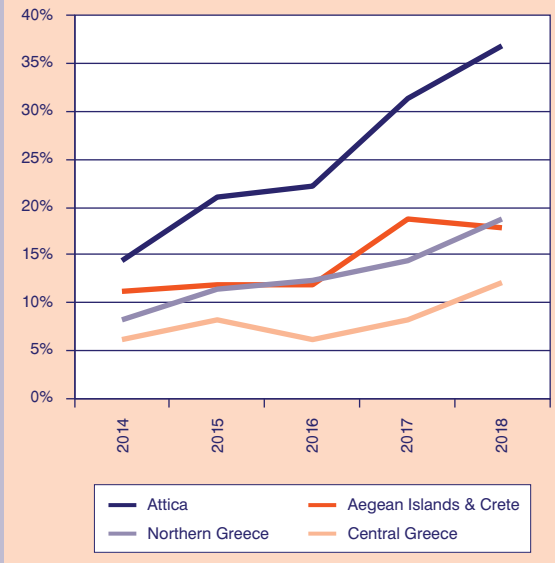
7. Cloud computing refers to ICT services that are used over the internet to access software, computing power, storage capacity, etc.

FIGURE 2
Percentage of firms using CRM software across the great geographical areas of Greece, 2008-2010, 2013-2015, 2017



Source: ELSTAT, authors' computations.

FIGURE 3
Percentage of firms buying cloud computing services across the great geographical areas of Greece, 2014-2018



Source: ELSTAT, authors' computations.

TABLE 4 Digital divide between Attica and the other great geographical regions: ERP, CRM and cloud computing services (in p.p.)

ERP software packages

	2008	2009	2010	2013	2014	2015	2017
Aegean Islands-Crete	20	27	25	28	27	27	22
Northern Greece	4	21	14	11	14	9	5
Central Greece	22	29	26	24	24	17	23

CRM software

	2008	2009	2010	2013	2014	2015	2017
Aegean Islands-Crete	-1	-1	9	12	9	12	3
Northern Greece	6	1	8	12	13	11	10
Central Greece	8	6	8	14	16	16	17

Cloud computing services

	2014	2015	2016	2017	2018
Aegean Islands-Crete	3	9	10	12	19
Northern Greece	6	10	10	17	18
Central Greece	8	13	16	23	25

Source: ELSTAT, authors' computations.

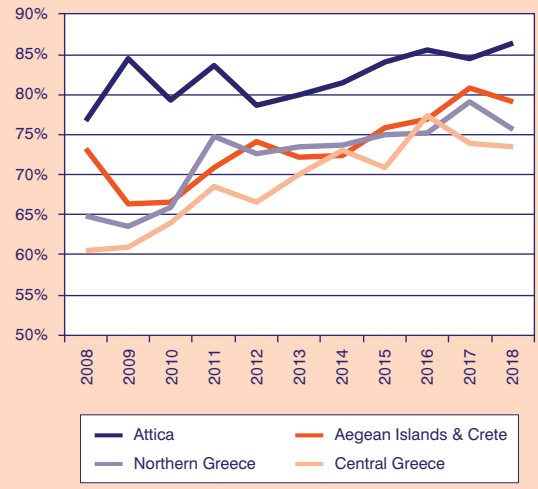
observed in all areas. In Attica the percentage of firms buying cloud computing services increases annually, on average, by 6 p.p.; in the Aegean Islands-Crete by 2 p.p.; in Northern Greece by 3 p.p. and in Central Greece by 2 p.p.

In conclusion, in all three indicators examined in this section, there is a significant gap between Attica and the other great geographical areas. Table 4 above presents the digital divide, calculated as the difference between the percentage of firms using the specific ICT in Attica and the corresponding percentage in the remaining areas, in percentage points. For example, the greatest difference is observed between the percentage of firms using ERP software packages in Attica and the corresponding percentage in Central Greece in 2009 (29 p.p.). The only case where this difference is negative concerns the percentage of firms using CRM software in the Aegean Islands-Crete, in 2008 and 2009, which is greater than the corresponding percentage in Attica by 2 percentage points. However, the difference becomes positive in the years that follow. Moreover, it should be noted that although the digital divide concerning ERPs is significant, it remains stable over time, while the gap concerning the use of CRM software and cloud computing services has increased.

3.2. ICT facilitating the communication of the firm with other firms and with consumers

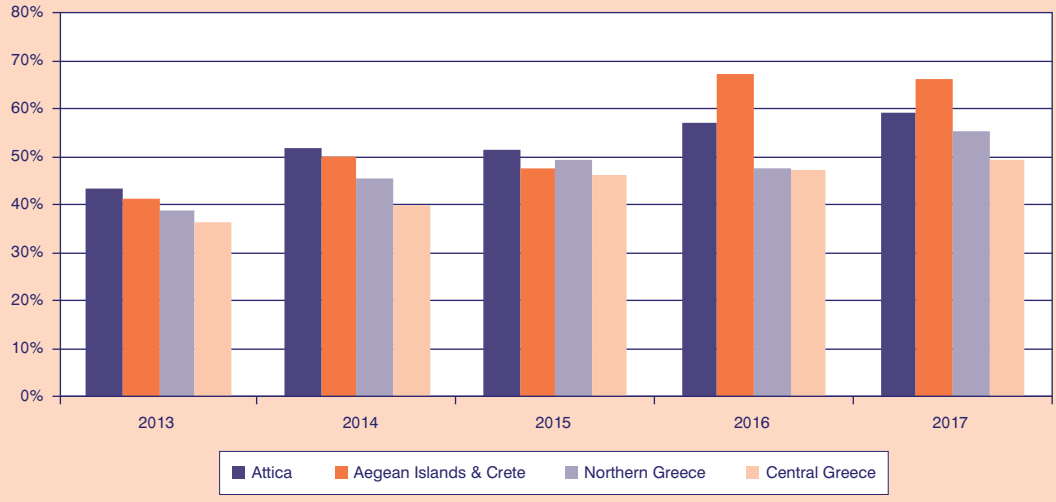
ICT have transformed drastically the way firms approach and communicate with their customers and the general public. The internet and social media are highly effective marketing tools. According to Eurostat data, 79% of EU firms have their own website, 49% use social media and 27% pay to advertise on the internet. In Greece, on average for the period 2008-2018, 82% of firms located in Attica have their own website. The corresponding percentages for the Aegean Islands-Crete, Northern Greece and Central Greece are 73%, 72%

FIGURE 4
Percentage of firms having a website across the great geographical areas of Greece, 2008-2018



Source: ELSTAT, authors' computations.

FIGURE 5
Percentage of firms using social media across the great geographical areas of Greece, 2013-2017

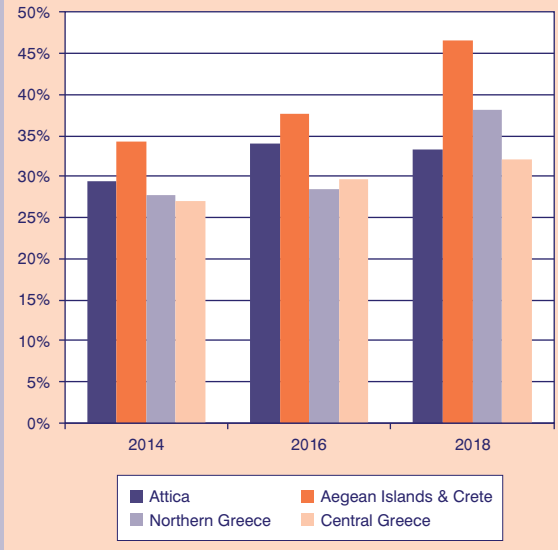


Source: ELSTAT, authors' computations.

and 69%, respectively. The trend over time is upward for all four main geographical areas, as shown in Figure 4 above, and the average annual change is close to 1 percentage point. Regarding the use of social media, the time period for which data are available is more limited (2013-2017). Figure 5 above illustrates the evolution of the use of social media by Greek companies over time. It should be noted, that unlike other ICTs examined, social media are more widespread in the Aegean Islands-Crete (during the last two years for which data are available), with 54%, on average, of firms making use of social media during the period under examination. The corresponding percentages for Attica, Northern Greece and Central Greece are 52%, 47% and 44%, respectively. Moreover, the Aegean Islands-Crete show the highest average annual change, 6 p.p., whilst the other three areas also demonstrate an upward trend. The average annual change in Attica and Northern Greece is 4 p.p. and in Central Greece is 3 percentage points.

In addition, a significant percentage of Greek firms pay to advertise on the internet. Data were collected for only three years: 2014, 2016 and 2018. Similarly to the case of social media, paid on-line advertising is more

FIGURE 6
Percentage of firms paying to advertise on the internet across the great geographical areas of Greece, 2014, 2016, 2018



Source: ELSTAT, authors' computations.

TABLE 5 Digital divide between Attica and the other great geographical regions: Website, social media and paid advertising on the internet (in p.p.)

Website

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aegean Islands-Crete	4	18	13	13	5	8	9	8	9	4	7
Northern Greece	12	21	13	9	6	6	8	9	10	5	11
Central Greece	16	23	15	15	12	10	8	13	8	11	13

Social Media

	2013	2014	2015	2016	2017
Aegean Islands-Crete	2	2	4	-10	-7
Northern Greece	4	6	2	10	4
Central Greece	7	12	5	10	10

Paid advertising on the internet

	2014	2016	2018
Aegean Islands-Crete	-5	-4	-13
Northern Greece	2	6	-5
Central Greece	2	4	1

Source: ELSTAT, authors' computations.

widespread in the Aegean Islands-Crete, where 40% of firms paid to advertise on the internet in 2018. The corresponding percentages for Attica, Northern Greece and Central Greece are 32%, 31% and 30%, respectively. It should be noted that an upward trend is observed in all four areas under examination.

In conclusion, the digital divide between Attica and the other areas is detected mainly in the case of firms having a website, as illustrated in Table 5 above. The gap between Attica and the Aegean Islands-Crete is 9 p.p., on average, 10 p.p. when Attica is compared to Northern Greece and 13 p.p. when compared to Central Greece, and it remains rather stable over time. On the contrary, as far as social media and paid on-line advertising are concerned, the Aegean Islands-Crete perform better than Attica and the remaining regions.

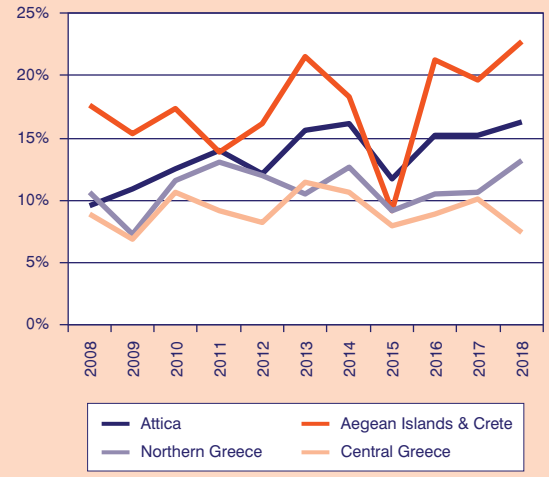
3.3. E-commerce

E-commerce, as a form of ICT application, has radically changed the way enterprises sell and purchase products and services and has opened new cross-border distribution channels which can contribute to the internationalization of firms (Ongori and Migiro 2010). In the context of the present analysis, e-commerce refers to receiving or placing orders for goods or services via a website, apps or Electronic Data Interchange (EDI) systems. It covers both orders of goods or services that a firm receives from its customers (consumers, other enterprises and public organizations) and orders that a firm places to other firms (suppliers).

Figure 7 presents the percentages of firms that received electronic orders across the large geographical areas in Greece over the examined period. In general, e-sales do not seem to be a common practice of Greek firms in Greece. As shown in Figure 7, the Aegean Islands-Crete exhibit the highest firm percentage, i.e., about 18%, on average, over the period 2008-2018. Attica follows with an average percentage of about 14% over the studied period, while the corresponding percentages for Northern Greece and Central Greece are 11% and 9%, respectively. Nevertheless, a positive trend is observed, which becomes more apparent during the last years under study, with firms adopting electronic sales in Attica and the Aegean Islands-Crete increasing in 2018 by approximately 7 and 5 p.p., respectively, in comparison to 2008. Central Greece constitutes an exception to this, since the corresponding trend is slightly downward and a 1.5 p.p. decrease in the number of firms adopting e-sales is observed between 2008 and 2018.

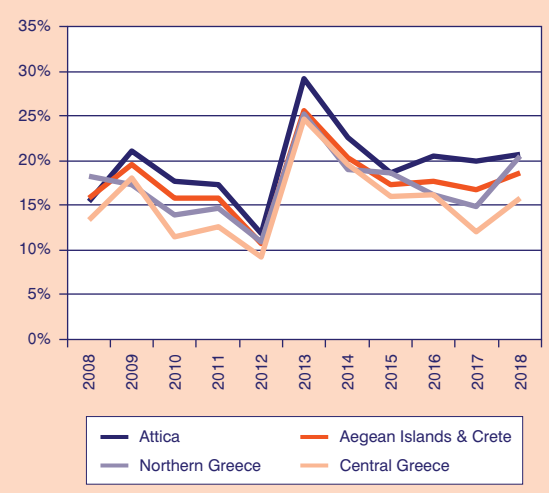
Finally, focusing on firms' e-commerce purchases, i.e., electronic procurement, the picture is different. Particularly, as shown in Figure 8, the percentages of firms that place electronic orders do not differ significantly among the geographical areas under study over the period 2008-2018. Attica seems to have small lead, where about 20% of firms, on average, engage in e-commerce purchases of products and services from other enterprises over the examined period. The Ae-

FIGURE 7
Percentages of firms that receive electronic orders across the great geographical areas of Greece, 2008-2018



Source: ELSTAT, authors' computations.

FIGURE 8
Percentages of firms that place electronic orders across the great geographical areas of Greece, 2008-2018



Source: ELSTAT, authors' computations.

TABLE 6 Digital divide of Attica and the other great geographical areas in Greece: E-sales and e-procurement (in percentage points)

	E-sales										
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Aegean Islands-Crete	-8	-4	-5	0	-4	-6	-2	3	-6	-5	-6
Northern Greece	-1	4	1	1	0	5	4	2	5	5	3
Central Greece	1	4	2	5	4	4	6	4	6	5	9
	E-procurement										
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Aegean Islands-Crete	0	2	2	1	1	4	2	1	3	3	2
Northern Greece	-3	4	4	3	1	4	4	0	4	5	0
Central Greece	2	3	6	5	3	5	3	3	4	8	5

Source: ELSTAT, authors' computations.

gean Islands-Crete and Northern Greece follow with corresponding percentages of 17.6% and 17.2%, while the lowest average percentage is reported in Central Greece (about 15%). Furthermore, it is worth noting that a slightly positive trend is observed for all great geographical areas in Greece over the examined period, with the increase in the corresponding firm percentage between 2008 and 2018 being greater in Attica (about 5%).

Table 6 presents the differences in p.p. between Attica and the other great geographical areas in Greece with respect to the examined e-commerce indicators, providing a clearer picture of the digital divides at the regional level. In accordance with the above, we observe that regional digital divides are smaller in the case of e-sales than those in the case of e-procurement. In addition, Attica appears to exhibit the highest average performance over the studied period (positive digital divides on average) in all cases, except for the e-sales indicator, where the average divide between Attica and the Aegean Islands-Crete is negative, suggesting the superior performance of the Aegean Islands-Crete in receiving electronic orders by customers. This interesting finding may be relevant to the special structural and geographical characteristics of this area. More specifically, as noted in related studies (Kontolaimou and Skintzi 2018a, 2018b), firms that are located in relatively remote and difficult to reach areas, like island regions, may resort to the adoption of e-commerce practices since this could be a way to access more domestic and international markets and increase their competitiveness. Moreover, a large number of firms in these areas engage in activities in the tourism sector, where e-commerce practices are more popular compared to other sectors (Kontolaimou and Skintzi 2018b).

4. Conclusions

In this article, we examine and compare the evolution of ICT and e-commerce adoption indicators across the four great geographical areas in Greece (Attica, the Aegean Islands-Crete, Northern Greece, Central Greece), using data of a large sample of Greek firms over the 2008-2018 period. The examined ICT indicators concern the organization and management of internal processes and firm resources (ERP and CRM software packages, use of cloud computing services), the visibility and communication of the firm with other firms and consumers (website availability, use of social media, paid internet advertising), and e-commerce (e-sales and e-procurement). The main findings obtained from statistical analyses show that Attica outperforms the other great geographical areas in Greece in most ICT indicators, while Central Greece has the lowest performance in all measures under study.

More specifically, regarding specialized ICT indicators which relate to the organization and management of

internal processes and firm resources, the analysis reveals the existence of significant digital divides between Attica and the other great geographical areas in Greece over the whole period under study. The highest divide is observed in the case of ERP software package use, which, however, remains unchanged over time. On the contrary, the divide referring to the use of CRM software packages as well as the purchase of cloud computing services seems to widen over time, indicating a divergent trend in favour of Attica at the regional level.

The picture is differentiated in the case of ICT measures referring to the visibility and communication of the firm with other firms and the general public. The relevant analysis showed that Attica outperforms the other examined areas only in the case of the website indicator. With respect to the use of social media and paid internet advertising, the Aegean Islands and Crete appear to perform better than Attica. The comparative analysis on electronic sales, which is a significant aspect of e-commerce, led to a similar finding. More specifically, firms in the Aegean Islands-Crete seem to adopt to a greater extent e-commerce practices in order to serve their customers, in comparison with their counterparts in Attica. This more intense use of ICT and practices related to e-commerce and firm communication with its customers recorded in island regions of the country is potentially related to the special geographical and industrial characteristics of these areas. In all cases, the present analysis shows the existence of regional digital divides in Greece, which should be taken into account in designing and applying policies intended to support and promote digital development and regional convergence in the country.

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The contribution of primary inputs to price formation: An input-output analysis of the Greek economy

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Abstract

Using an input-output model and data from the Symmetric Input-Output Table of the Greek economy for the year 2010, this article estimates the total (direct and indirect) contribution of primary inputs to price formation for the economy as a whole and per category of final demand as well. The main finding is that the cost of imports, and particularly, the imports of industrial commodities, constitutes the main factor in the price formation of sectoral prices as well as of the price indices of private consumption and exports. On the other hand, the price index of government consumption is mainly formed by the wages of sectors related to government activities. These findings seem to be in accordance with the results of the implementation of the internal devaluation policy, which had a relatively higher impact on the improvement of the state budget deficit and a relatively lower impact on the improvement of the performance of the external sector and the decrease of the consumer price index. At the same time, these findings indicate the necessity for the implementation of well-targeted policies of import substitution for industrial products in order to enhance the international competitiveness of the economy.

Keywords: *Economic policy, Greek economy, Input-Output analysis, Prices, Primary inputs.*

JEL classification: *C67, D57, E64*

1. Introduction

The "decomposition" of commodity prices to the direct and indirect requirements in primary inputs plays a central role in the implementation of economic policy. Since 2010, the Greek government has attempted to correct the imbalances of the economy through the application of measures that included significant reductions in government expenditures, increases in taxes and cuts in unit labour costs. This economic policy, known as "internal devaluation strategy", resulted in a significant improvement of the state budget deficit, but it did not have a corresponding positive impact on the improvement of the performance of the external sector and the decrease of the consumer price index.[1] These facts indicate that an investigation of the relationships between the cost of primary inputs and the prices of commodities could offer further insights into the factors that contribute, directly and indirectly, to price formation in the Greek economy.

As is well known, the prices of net products can be decomposed into the costs of the primary inputs that were used in their production. Moreover, into the production of each commodity also enter, directly or indirectly, other commodities as intermediate inputs. Thus, the price of each commodity is formed not only from the costs of the primary inputs of the industry that produces a specific commodity, but also from the costs of the primary inputs of the industries that produce the commodities that are used as intermediate inputs in the production of this commodity. Therefore, the estimation of the contribution of primary inputs to price formation should also take into account the intersectoral relationships in the economy.

The purpose of this article is to estimate the direct and indirect contribution of primary inputs to price formation for the economy as a whole and per category of final demand as well. For this purpose, we use "Input-Output Analysis" as an analytical tool and data from the Symmetric Input-Output Table (SIOT) of the Greek economy for the year 2010.[2]

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

1. For a thorough analysis of the external sector of the Greek economy in this period as well as its performance in terms of productivity and competitiveness, see Greek National Productivity Board (2019).

2. As far as we know, the last relevant estimation for the Greek economy was that of Garganas and Momferatos (1979) and was based on data from the Input-Output Tables of the year 1970.

The remainder of the paper is structured as follows. Section 2 outlines the analytical framework. Section 3 presents and evaluates the empirical results. Finally, Section 4 concludes.

2. The analytic framework

Consider the price system of the open input-output system of Leontief (1951):[3]

$$\mathbf{p}^{\mathrm{T}}\hat{\mathbf{x}} = \mathbf{p}^{\mathrm{T}}\mathbf{A}\hat{\mathbf{x}} + \mathbf{v}^{\mathrm{T}} \tag{1}$$

Where $\mathbf{p}$ is the $n \times 1$ vector of unit prices of commodities; $\mathbf{x}$ the $n \times 1$ vector of the supply of commodities in the economy; $\mathbf{A}$ the $n \times n$ matrix of technical coefficients; $\mathbf{v}$ the $n \times 1$ vector of primary inputs; the symbol "^" above a vector denotes the diagonal matrix formed by the elements of this vector; "T" denotes the transpose of a matrix-vector; and n is the number of the produced commodities. Moreover, the prices of all commodities are taken to be equal to 1, i.e., $\mathbf{p}^{\mathrm{T}} = [1,1, \ldots, 1]$,; that is to say, the physical unit of measurement of each commodity is that unit which is worth of a monetary unit.[4] Post-multiplying equation (1) by $(\hat{\mathbf{x}})^{-1}$, we obtain:

$$\mathbf{p}^{\mathrm{T}} = \mathbf{p}^{\mathrm{T}}\mathbf{A} + \boldsymbol{\pi}^{\mathrm{T}} \tag{2}$$

where $\boldsymbol{\pi}^{\mathrm{T}} \equiv [\mathbf{v}^{\mathrm{T}}\ (\hat{\mathbf{x}})^{-1}]$ is the vector of primary inputs per unit of output. Assuming that the system is viable or, equivalently, the Perron-Frobenius eigenvalue, λ_{PF}, is less than 1, the solution of equation (2) is given by:

$$\mathbf{p}^{\mathrm{T}} = \boldsymbol{\pi}^{\mathrm{T}}[\mathbf{I} - \mathbf{A}]^{-1} \tag{3}$$

Thus, the term on the right-hand side of equation (3) gives the vector of total (direct and indirect) requirements in primary inputs necessary to produce one unit of each commodity.

Now we define the $k \times n$ matrix $\mathbf{B} \equiv [b_{ij}]$, where k is the number of categories of primary inputs, n is the number of the sectors in the economy, while each element b_{ij} of this matrix represents the direct requirements in i-th primary input necessary to produce 1 unit of commodity j. Post-multiplying the matrix $\mathbf{B}$ with the 'Leontief Inverse Matrix', $[\mathbf{I} - \mathbf{A}]^{-1}$, we obtain the $k \times n$ matrix, say $\mathbf{C} \equiv [c_{ij}]$, each element of which represents the total (direct and indirect) contribution of the i-th primary input to the price formation of commodity j, while the sum of each column of matrix $\mathbf{C}$ equals 1. In formal terms:

$$\mathbf{C} = \mathbf{B}[\mathbf{I} - \mathbf{A}]^{-1} \tag{4}$$

Thus, matrix $\mathbf{C}$ can be used to estimate the contribution of the different categories of primary inputs to price formation in the economy. Moreover, we can estimate the contribution of primary inputs to price formation per sector of origin of each primary input using the following equations:

$$\mathbf{D} = \hat{\boldsymbol{\pi}}[\mathbf{I} - \mathbf{A}]^{-1} \tag{5}$$

and

$$\mathbf{D}_k = \widehat{\mathbf{c}_k}\,[\mathbf{I} - \mathbf{A}]^{-1} \tag{6}$$

where $\mathbf{D} \equiv [d_{ij}]$ is an $n \times n$ matrix, each element of which represents the total (direct and indirect) contribution of the primary inputs of sector i to price formation of commodity j; $\mathbf{c}_k$ is the vector of the k-th primary input per unit of output; and $\mathbf{D}_k \equiv [d_{ij}^k]$ is the $n \times n$ matrix, each element of which represents the total (direct and indirect) contribution of the k-th primary input of sector i to price formation of commodity j.

In order to estimate the contribution of primary inputs to the formation of the price indices of the different categories of final demand, we have to take into account the weight of each commodity in the different 'baskets' of final demand. For this purpose, we define the $n \times m$ matrix $\mathbf{E} \equiv [e_{ij}]$, where n is the number of produced commodities in the economy; m the number of categories of final demand; and each element, e_{ij}, of the matrix represents the share of commodity i to the j-th category of final demand.[5] We may now estimate the contribution of primary inputs to the formation of the price indices of the different categories of final demand on the basis of the following equation:

$$\mathbf{F} = \mathbf{CE} \tag{7}$$

where $\mathbf{F} \equiv [f_{ij}]$ is a $k \times m$ matrix, each element of which represents the total (direct and indirect) contribution of the i-th primary input to the formation of the price index of the j-th category of final demand.[6] Moreover, if we denote by $\mathbf{e}_j$ the vector derived from matrix $\mathbf{E}$ if

3. See also, e.g., Pasinetti (1977, Chap. 4).

4. This assumption does not affect the results of our analysis. For more details, see Leontief (1986, pp. 22-23) and Miller and Blair (2009, pp. 41-43).

5. Thus, the sum of each column of matrix **E** equals 1.

6. Thus, the sum of each column of matrix **F** equals 1.

we extract its *j*-th column, then the contribution of the primary inputs to the formation of the different price indices per sector of origin of each primary input can be estimated by the following equation:

$$\mathbf{f}_k^j = \mathbf{D}_k \mathbf{e}_j \quad (8)$$

where $\mathbf{f}_k^j \equiv [\mathbf{f}_i^{k,j}]$ is an $n \times 1$ vector, each element of which represents the total (direct and indirect) contribution of the *k*-th primary input of sector *i* to the formation of the price index of the *j*-th category of final demand. Finally, by summing the contributions of the different primary inputs of each sector to the formation of the price index of each category of final demand, we can estimate the total contribution of each sector to the formation of the price index of each category of final demand. In formal terms:

$$\mathbf{g}_j = \sum \mathbf{f}_k^j \quad (9)$$

where $\mathbf{g}_j \equiv [\mathbf{g}_i^j]$ is an $n \times 1$ vector, each element of which represents the total (direct and indirect) contribution of the primary inputs of sector *i* to the formation of the price index of the *j*-th category of final demand.

In what follows, we present the findings of the application of the previous analysis to the SIOT of the Greek economy for the year 2010.

3. Empirical application in the Greek economy

The SIOT of the Greek economy for the year 2010 describes 64 commodities/sectors and is available via the website of the Hellenic Statistical Authority, www.statistics.gr.[7] From this table we can identify seven categories of primary inputs, i.e.: 1) Net taxes, 2) Wages, 3) Employers' contributions, 4) Other net taxes on production, 5) Depreciations, 6) Profits, 7) Imports.[8] Moreover, in the SIOT of the Greek economy we can identify eight categories of final demand, i.e.: 1) Private consumption, 2) Final consumption of NPISH, 3) Government consumption, 4) Gross fixed capital formation, 5) Changes in valuables, 6) Changes in inventories, 7) Exports intra EU, 8) Exports extra EU.

3.1. The contribution of primary inputs to price formation

We begin with the estimation of the matrix **C** of the Greek economy (see equation (4)), which gives the direct and indirect contribution of primary inputs to price formation. According to what we noted above, the dimensions of the matrix **C** for the Greek economy will be 7×64. The results of our estimations are presented in Figures 1-2 and in Table 1. Figure 1 gives a visual representation of the values of the elements in this matrix: near zero (zero) values are shown in a shade of grey (as white), while negative (positive) values tend to be bluish (orangish).[9] The rows in this figure describe the primary inputs in the order (1-7) given above, while the columns describe the 64 sectors of the economy in the order (1-64) given in Table A1 in the Appendix of this article. The sectors 1-4 belong to 'Primary production'. The sectors 5-27 belong to 'Industry'. The sectors 28-64 belong to 'Services'. Figure 2 gives the distribution chart of the values of the matrix **C**. More specifically, the columns of the chart give the range of values for each primary input, while the lines that appear in these columns give the respective quartiles of 75%, 50% and 25%. Finally, Table 1 gives the respective statistics of this matrix, i.e., the maximum (max) and minimum (min) values for each primary input, the median, and the quantiles of 75% and 25% of the respective values.

From Figures 1-2, Table 1 and the associated numerical results, it follows that imports, profits and wages have the largest contribution in price formation. It is also deduced that imports have a relatively large contribution in the price formation of industrial commodities. More specifically, the average contribution of imports in the price formation of industrial commodities is about 50%.

Next, we estimate the 64×64 matrix **D** of the Greek economy, i.e., the direct and indirect contribution of primary inputs to price formation per sector of origin of each primary input. Figure 3 gives a visual representation of the values of the elements in this matrix, while Figure 4 gives the respective distribution chart of the values in the matrix. From these figures and the associated numerical results, it follows that the primary inputs of the Service sectors have a relatively small

7. The described sectors in the SIOT of the Greek economy are reported in Table A1 in the Appendix to this article.

8. Considering the imports as a primary input means that the total output of each sector also includes the imported goods and services that are considered as part of the total supply of each sector (see also Gargarnas and Momferatos, 1979, p. 29).

9. Negative values can appear in our analysis either because of negative net taxes or negative profits.

FIGURE 1
Representation of the matrix of the total contribution of primary inputs

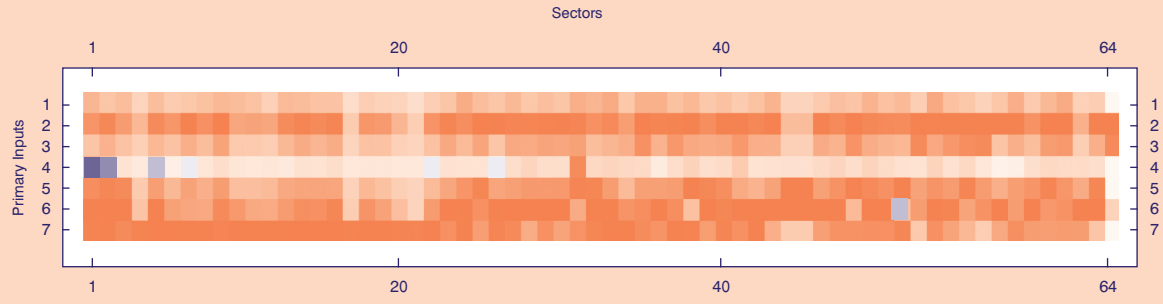


FIGURE 2
Distribution chart of the values of the matrix of the total contribution of primary inputs

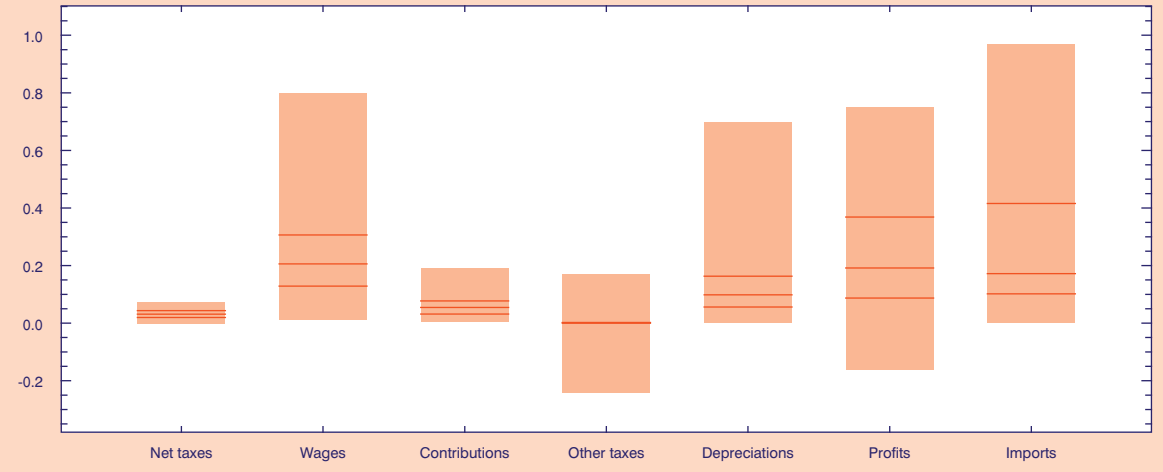


TABLE 1 Statistics of the matrix of the total contribution of primary inputs

	Max	75%	Median	25%	Min
Net taxes	0.0731028	0.0435577	0.031321	0.0197834	0
Wages	0.799503	0.306184	0.205894	0.128691	0.0138826
Employers' contributions	0.192242	0.0771973	0.054641	0.0314547	0.00508657
Other net taxes on production	0.16946	0.00243222	0.000978926	0.000294503	-0.244185
Depreciations	0.696803	0.163242	0.0984419	0.0562308	0
Profits	0.749131	0.368411	0.191619	0.0872264	-0.162395
Imports	0.967458	0.415785	0.172093	0.101617	0

FIGURE 3
Representation of the matrix of the total contribution of primary inputs per sector of origin

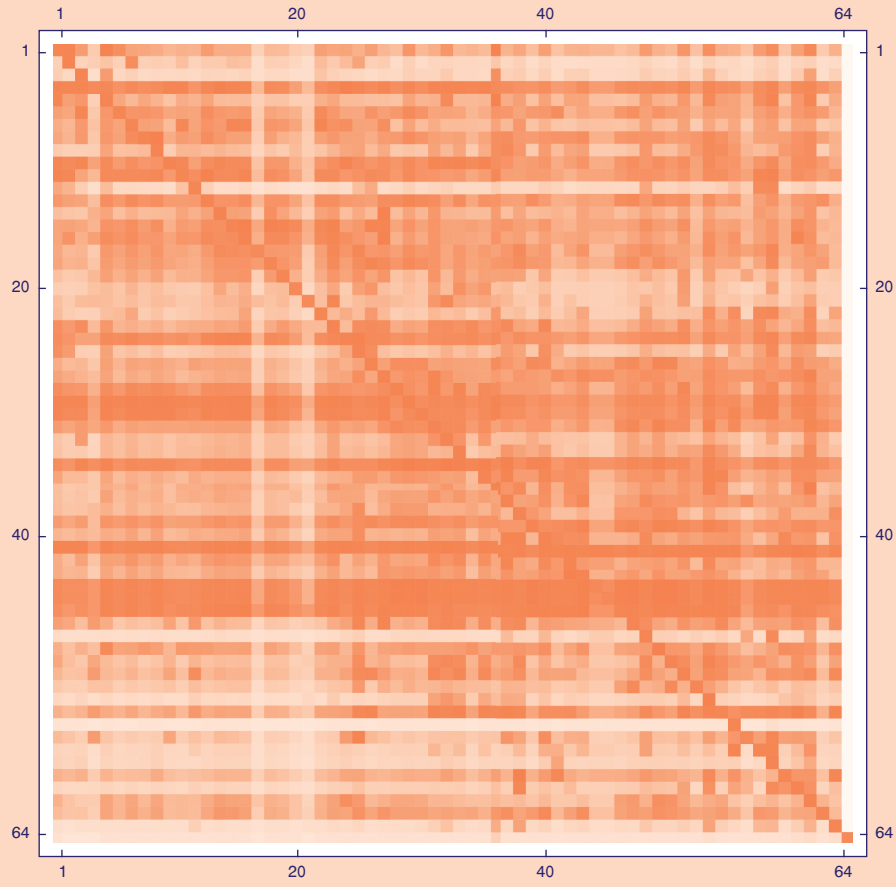


FIGURE 4
Distribution chart of the values of the matrix of the total contribution of primary inputs per sector of origin

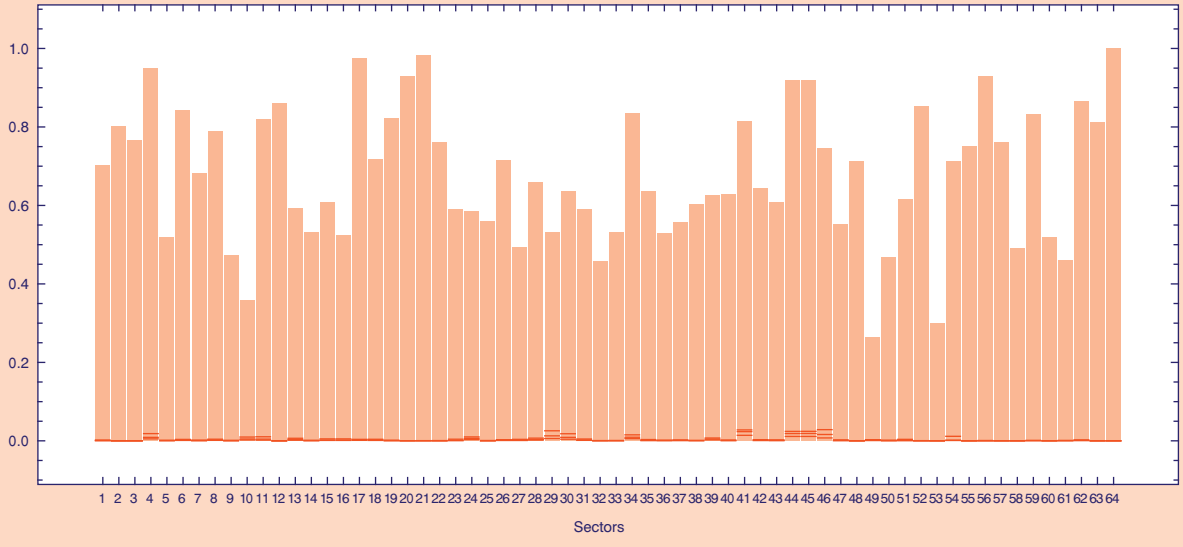


FIGURE 5
Representation of the matrix of the total contribution of imports per sector of origin

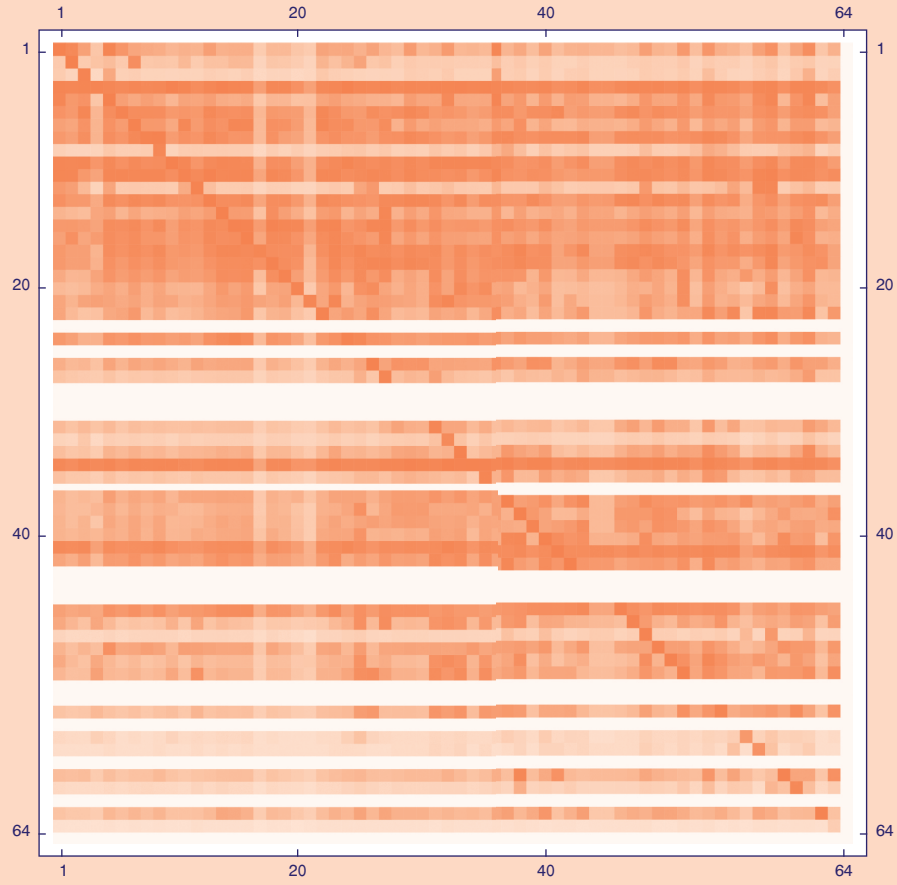
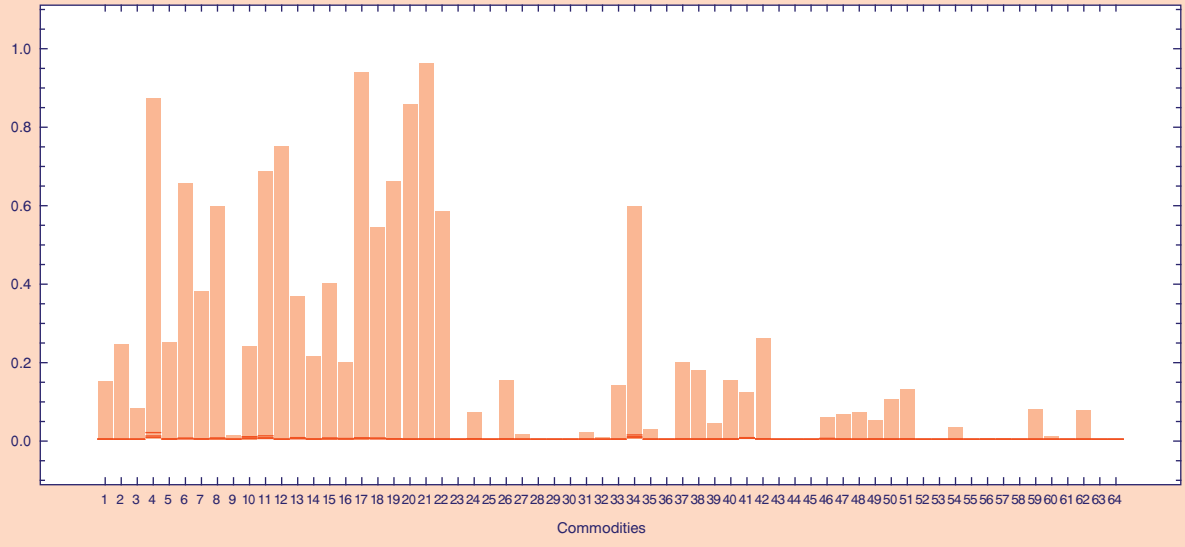


FIGURE 6
Distribution chart of the values of the matrix of the total contribution of imports per sector of origin



contribution to the price formation of industrial commodities.

Moreover, we estimate the matrices $\mathbf{D}_k$ of the Greek economy (see equation (6)), i.e., the direct and indirect contribution of primary inputs to price formation per sector of origin for each primary input. Figure 5 above gives a visual representation of the values of the elements of the $\mathbf{D}_k$ for the case of imports, while Figure 6 gives the respective distribution chart of the values in the matrix.[10]

From these figures and the associated numerical results, it follows that the imports of industrial commodities have a relatively larger contribution to the price formation of most of the commodities of the economy. As a matter of fact, Figure 6 above demonstrates that, in many cases, the imports of a single industrial commodity forms more than half of the price of some commodities.

It must be obvious that the above findings, which have been presented in brief through the matrix and distribution charts, represent a large number of quantitative estimates that could be taken into account by economic policy authorities in the formulation of sectoral policies.

3.2. The contribution of primary inputs to the formation of the price indices of final demand

In what follows, we estimate the matrix **F** for the Greek economy (see equation (7)), i.e., the total (direct and indirect) contribution of primary inputs to the formation of price indices of the different categories of final demand. Since we have identified eight different categories of final demand from the SIOT, the matrix **F** will be of dimensions 7×8. The results derived for the case of the Greek economy are presented in Table 2.

The rows of the table describe the different categories of primary inputs, while the columns describe the different categories of final demand. The last column of the table reports the contribution of primary inputs to the formation of the price index of total final demand. We observe that profits (29%), imports (24%) and wages (23%) have the largest contribution to the formation of the price index of total final demand, while the primary inputs with the highest contribution to the price indices per category of final demand are: (a) profits, which form about 36% of the price index of private consumption; (b) wages, which form about 39% of the price index of government consumption; and (c) imports, which form about 38% of the price index of gross fixed capital formation, 36% of the price index of exports intra EU and 37% of the price index of exports extra EU. These findings could be useful in the formulation of anti-inflationary policies and, therefore, in export-oriented policies through boosting the competitiveness of the economy.

Next, we estimate the vectors $\mathbf{f}_k^j$ and $\mathbf{g}_j$ of the Greek economy (see equations (8) and (9), respectively), i.e., the contribution of primary inputs to the formation of the different price indices per sector of origin of each primary input. By also taking into account the results from the estimation of the matrix **F**, we can decompose the price index of each category of final demand per primary input and sector of origin. For the sake of brevity, we focus on the results of the categories of final demand with the most significant contribution to total final demand. In order to get a picture of the contribution of all sectors to the formation of the price indices of final demand, Figure 7 gives a visual representation of the values of the elements of the matrix that is formed by the different vectors $\mathbf{g}_j$ of the Greek economy for the following categories of final demand: 1) private consumption, 2) government consumption, 3) exports intra EU, 4) exports extra EU, and 5) total final demand.[11] Thus, the first row of the figure corresponds to the vector $\mathbf{g}_1$ and shows the contribution of the 64 sectors of the Greek economy to the formation of the price index of private consumption; the second row corresponds to the vector $\mathbf{g}_2$ and shows the contribution of the sectors to the formation of the price index of government consumption, etc. Figure 8 gives the distribution chart of the values in this matrix, while Table 3 presents the respective statistics.

We observe that the range of the values of the vectors $\mathbf{g}_j$ that correspond to government consumption and exports extra EU is relatively larger than those for private consumption and exports intra EU. The highest value for government consumption (36.36%) corresponds to sector 55 ("Public administration and defence services; compulsory social security services"), while the highest value for exports extra EU (21.99%) corresponds to sector 32 ("Water transport services"). Regarding the rest of the categories of final demand, sectors 45 and 44 ("Real estate services") have the largest contribution to the formation of the price index

10. For the sake of brevity, we do not present the matrices $\mathbf{D}_k$ for the rest of the primary inputs. All the available empirical results are available on request from the authors.

11. Private consumption, government consumption and exports compose more than 85% of total final demand.

TABLE 2 The contribution of primary inputs in the formation of price indices

	Categories of final demand								
Categories of primary inputs	**Private consumption**	**Final consumption of NPISH**	**Government consumption**	**Gross fixed capital formation**	**Changes in valuables**	**Changes in inventories**	**Exports intra EU**	**Exports extra EU**	**Total final uses**
Net taxes	3.09%	6.55%	2.30%	3.07%	2.21%	5.08%	3.64%	4.13%	3.11%
Wages	19.82%	44.53%	39.36%	19.67%	14.32%	39.88%	17.68%	14.99%	23.17%
Employers' contributions	5.43%	11.74%	12.07%	5.80%	3.85%	10.40%	4.97%	4.07%	6.64%
Other net taxes on production	-0.88%	0.29%	0.71%	0.09%	0.11%	-10.45%	-0.94%	-0.50%	-0.37%
Depreciations	14.51%	12.43%	16.17%	8.49%	9.72%	19.26%	12.16%	14.23%	13.76%
Profits	36.34%	13.81%	16.25%	25.39%	39.60%	65.78%	27.00%	26.01%	29.26%
Imports	21.69%	10.65%	13.13%	37.49%	30.19%	-29.96%	35.50%	37.06%	24.43%

FIGURE 7
Representation of the matrix of the total contribution of sectors to the formation of price indices

FIGURE 8
Distribution chart of the values of the matrix of the total contribution of sectors to the formation of price indices

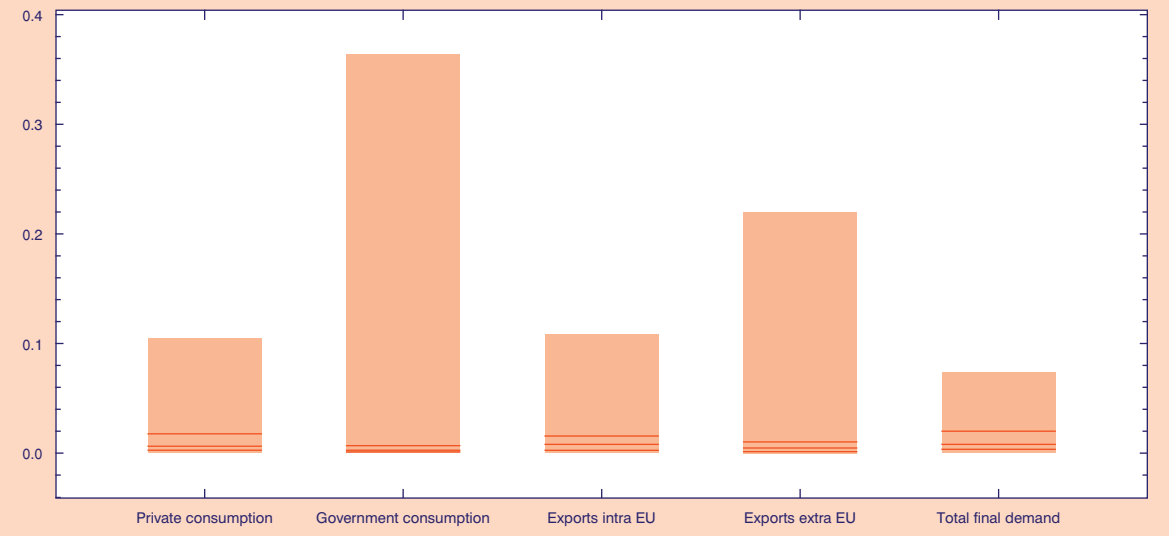
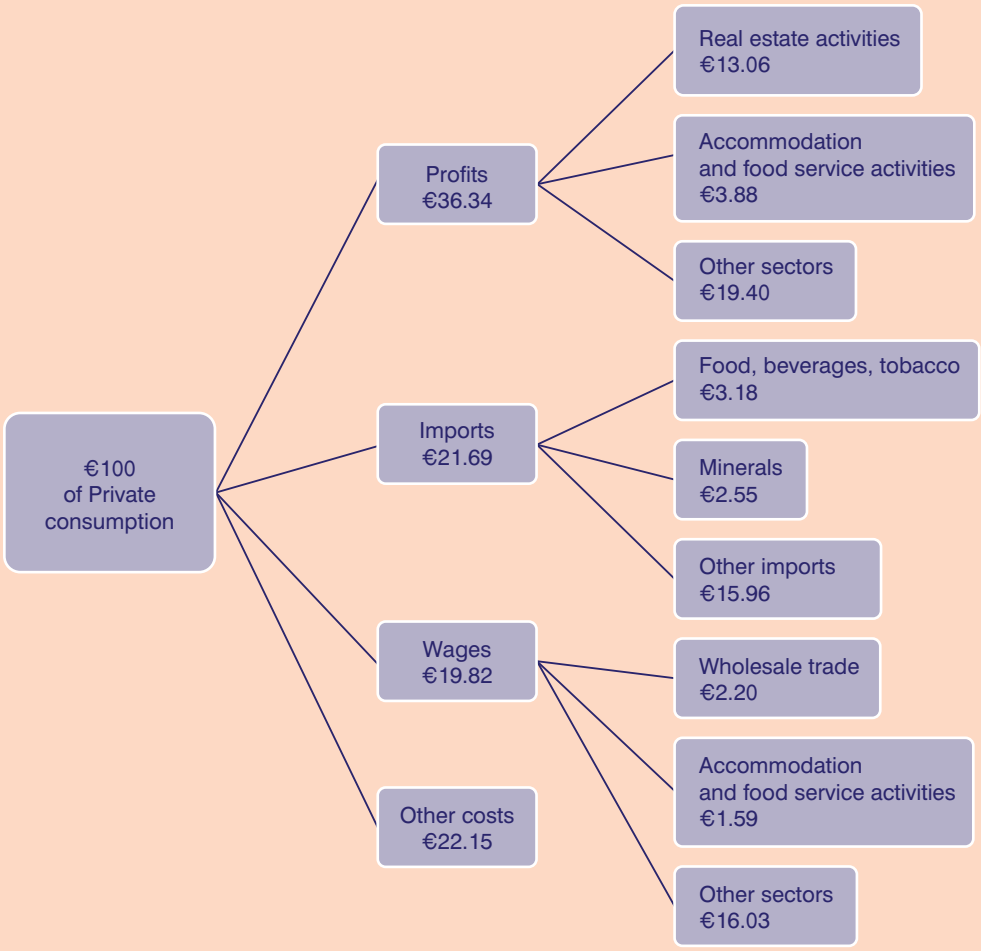


TABLE 3 Statistics of the matrix of the total contribution of sectors to the formation of price indices

	Max	75%	Median	25%	Min
Private consumption	0.104592	0.0176559	0.00629493	0.00265484	0.000316106
Government consumption	0.363622	0.00677396	0.00265284	0.00109537	1.2735×10^{-7}
Exports intra EU	0.107921	0.0156135	0.00798317	0.00258007	7.59369×10^{-10}
Exports extra EU	0.219928	0.0102403	0.00466614	0.00137293	7.31334×10^{-10}
Total final demand	0.0735378	0.0200374	0.00800609	0.00346547	0.000408383

FIGURE 9
Decomposition of Private consumption per primary input and sector of origin

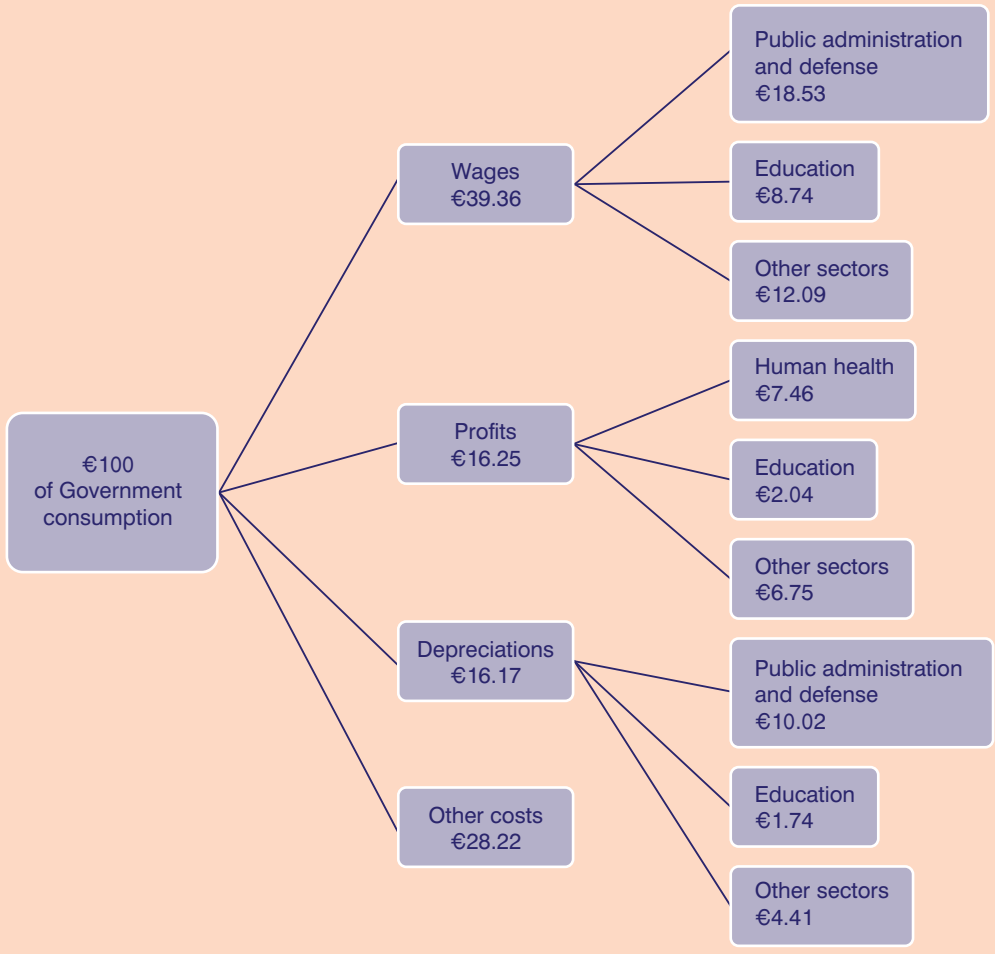


of private consumption, with 10.46% and 10.41%, respectively, while sector 32 has the highest contribution to the formation of the price index of exports intra EU (10.79%). Finally, sectors 55, 45 and 44 have the highest contribution to the formation of the price index of total final demand, with 7.35%, 6.48% and 6.45%, respectively. Furthermore, Figures 9-13 present the decomposition of each € 100 of private consumption, government consumption, exports intra EU, exports extra EU, and total final demand per primary input and sector of origin.

From Figure 9 it is deduced that 13.06% of private consumption is formed by profits of the sector "Real estate activities", 3.18% is formed by imports of Food, beverages and tobacco, 2.20% is formed by wages of the sector "Wholesale trade", etc. Further analysis of the sectors of origin of the remaining primary inputs reveals that 7.07% of private consumption is formed by depreciations of the sector "Real estate activities". Thus, this sector forms over 20% of the price index of private consumption. Further analysis of the sectors of origin of the rest of the imports reveals that 14% of private consumption is formed by imports of industrial commodities, while the total imports of primary production and industry form about 18% of the price index.

From Figure 10 it is deduced that 18.53% of government consumption is formed by wages of the sector "Public administration and defence", 8.74% is formed by wages of the sector "Education", 7.46% is formed by profits of the sector "Human health activities", 10.02% is formed by depreciations of the sector "Public administration and defence", etc. Further analysis of the sectors of origin of the remaining primary inputs

FIGURE 10
Decomposition of Government consumption per primary input and sector of origin

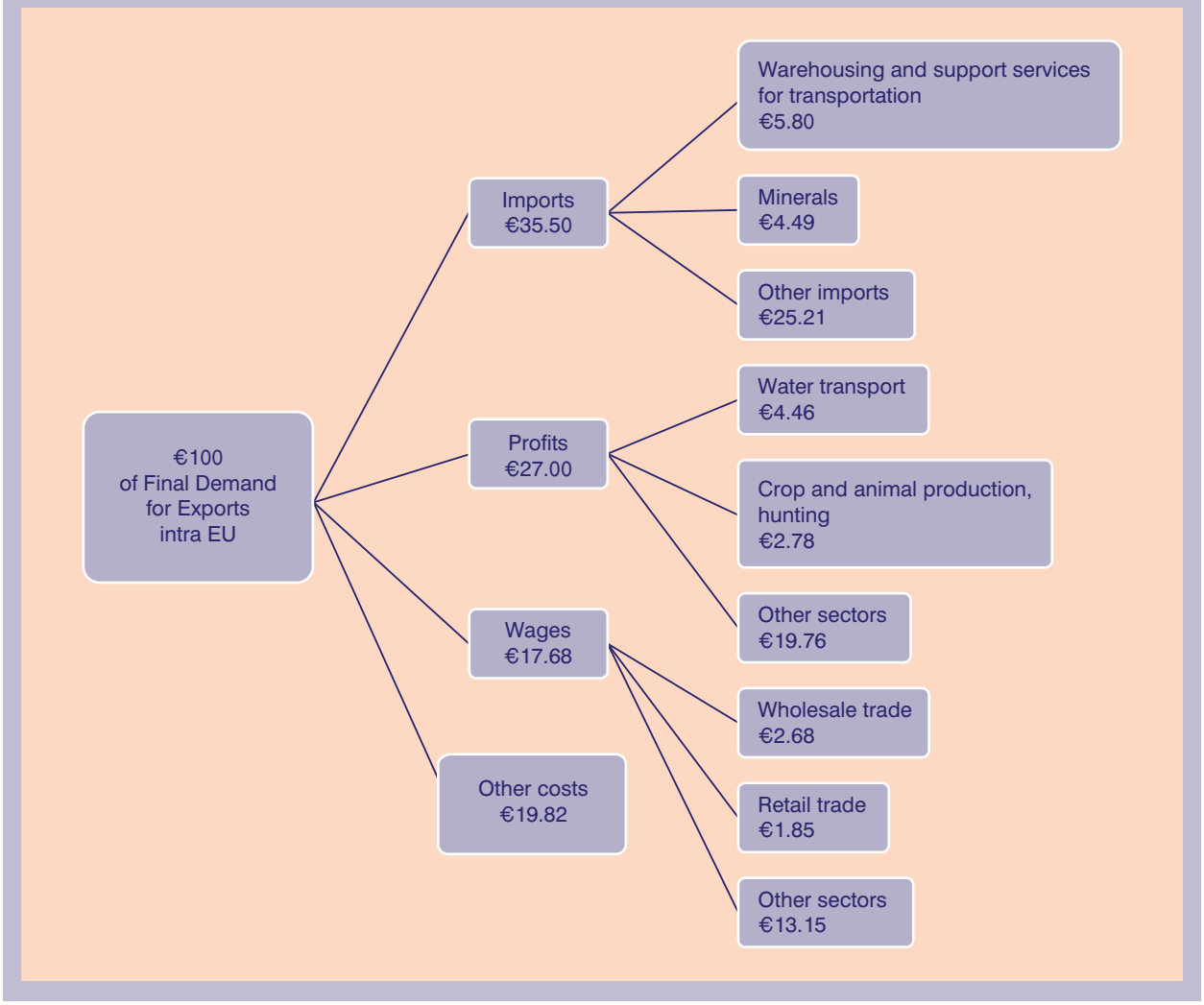


reveals that about 10% of government consumption is formed by employers' contributions of the sectors "Public administration and defence" and "Education", while 7.27% is formed by imports of "Basic pharmaceutical products and pharmaceutical preparations". Thus, the sectors "Public administration and defence" and "Education" form over 50% of the price index of government consumption.

From Figure 11 it is deduced that 5.80% of final demand for exports intra EU is formed by imports of "Warehousing and support services for transportation", 4.49% is formed by imports of minerals, 4.46% is formed by profits of the sector "Water transport", 2.78% is formed by profits of the sector "Crop and animal production, hunting", 2.68% is formed by wages of the sector "Wholesale trade", etc. Further analysis of the sectors of origin of the remaining primary inputs reveals that 6% of the price index of final demand for exports intra EU is formed by depreciations of the sectors "Water transport" and "Real estate activities". Further analysis of the sectors of origin of the rest of the imports reveals that about 21% of the price index is formed by imports of industrial commodities, while the total imports of primary production and industry form almost 27% of the index.

From Figure 12 it is deduced that 9.81% of final demand for exports extra EU is formed by imports of Minerals, 7.59% is formed by imports of "Warehousing and support services for transportation", 9.09% is formed by profits of the sector "Water transport", 1.83% is formed by profits of the sector "Crop and animal production, hunting", 2.69% is formed by wages

FIGURE 11
Decomposition of Exports intra EU per primary input and sector of origin

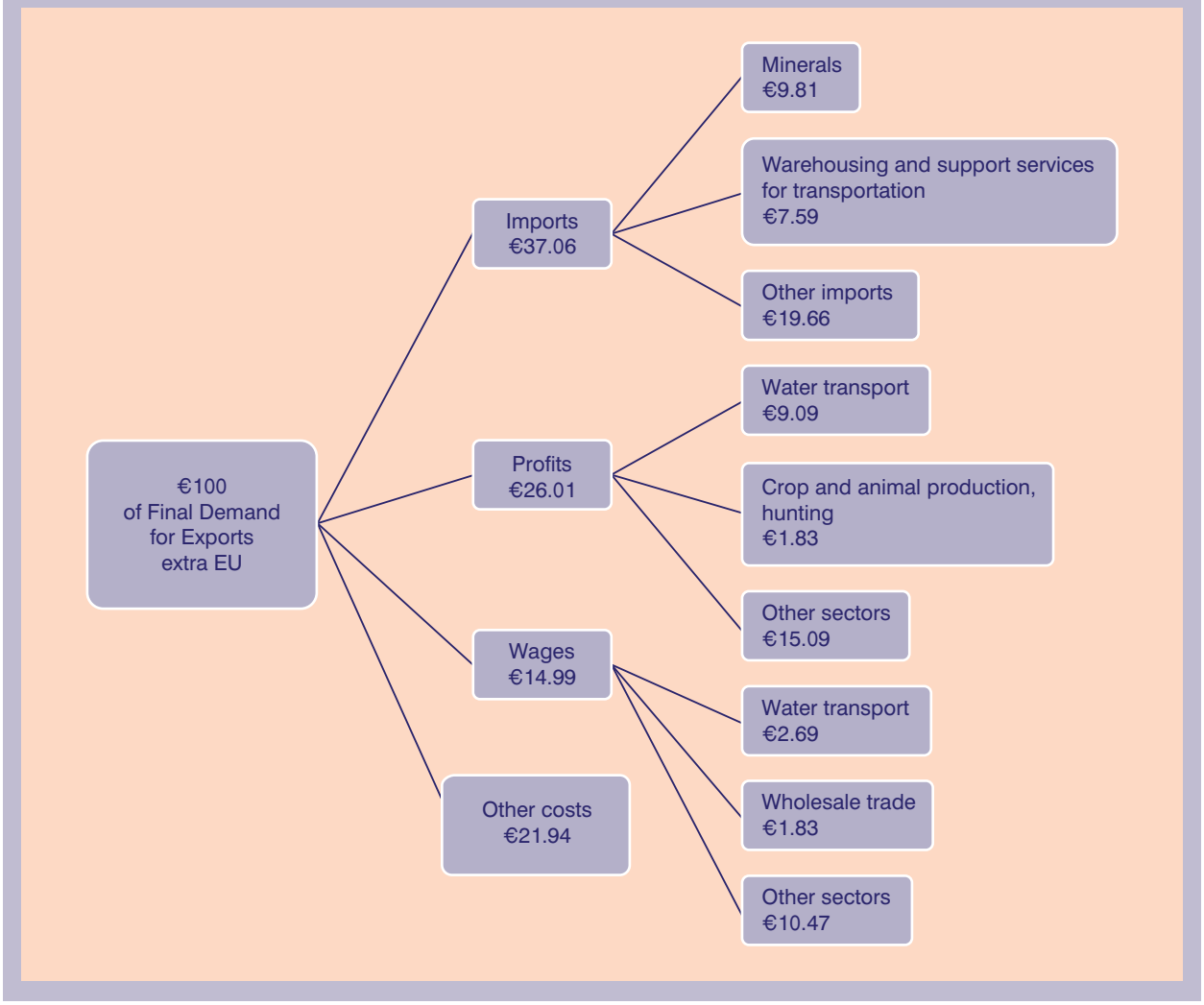


of the sector "Water transport", etc. Further analysis of the sectors of origin of the remaining primary inputs reveals that about 10% of the price index of final demand for exports extra EU is formed by depreciations and net taxes of the sector "Water transport". Thus, the sector "Water transport" forms over 20% of this price index.[12] Further analysis of the sectors of origin of the rest of the imports reveals that about 17% of the price index is formed by imports of industrial commodities, while the total imports of primary production and industry form over 27% of the index.

Finally, from Figure 13 it is deduced that 8.09% of total final demand is formed by profits of the sector "Real estate activities", 3.41% is formed by imports of Minerals, 3.75% is formed by wages of the sector "Public administration and defense", etc. Further analysis of the sectors of origin of the remaining primary inputs reveals that 4.38% of total final demand is formed by depreciations of the sector "Real estate activities", while about 3.50% of the price index is formed by depreciations and employers' contributions of the sector "Public administration and defense". Thus, these two sectors form about 20% of the price index of total final demand. Further analysis of the sectors of origin of the rest of the imports reveals that 14% of total final demand is formed by imports of industrial commodi-

12. Similar findings have been reported by Tsekeris and Skintzi (2017) who found that the exports of transport and warehousing services have the highest domestic value added for the Greek economy.

FIGURE 12
Decomposition of Exports extra EU per primary input and sector of origin

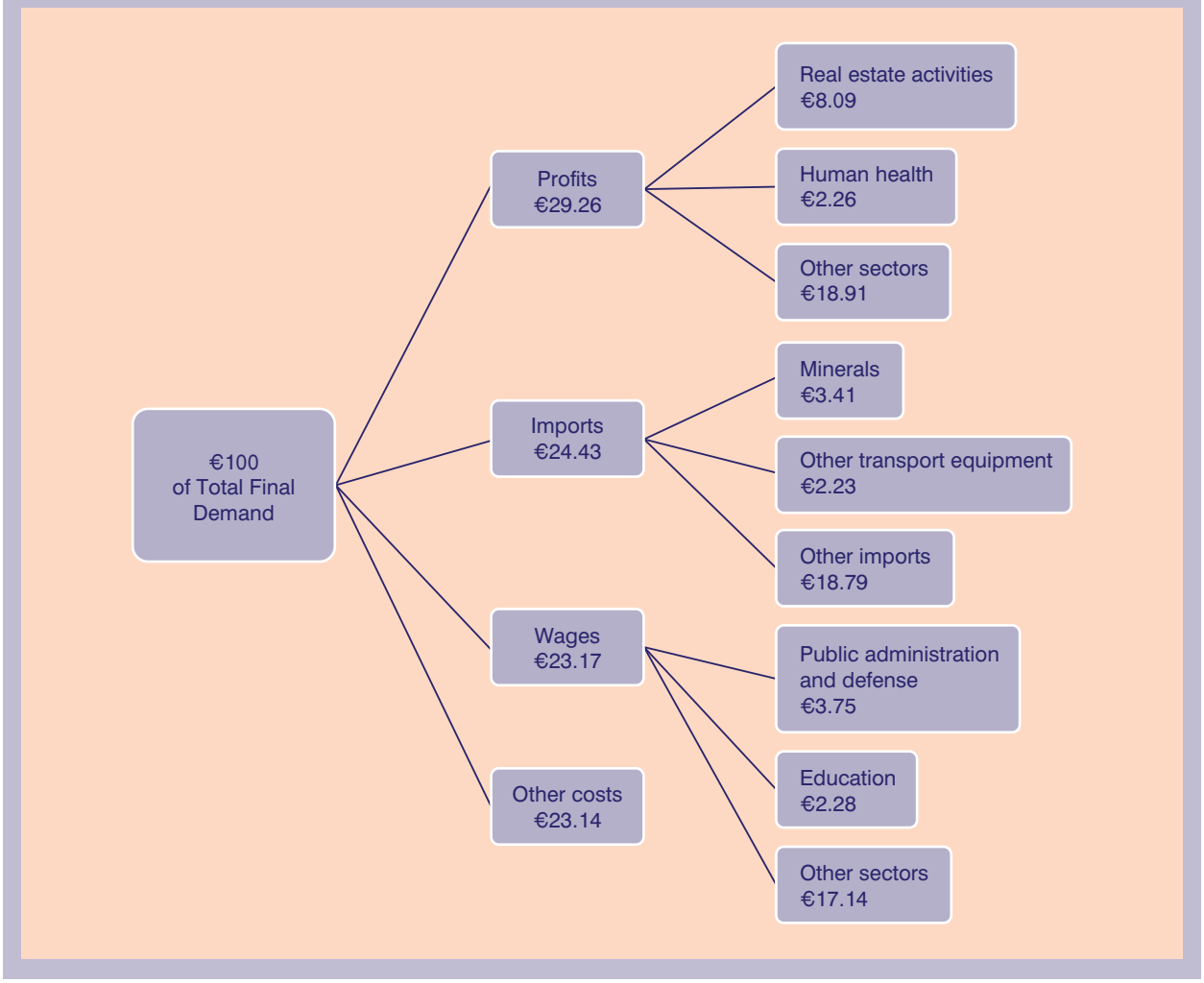


ties, while the total imports of primary production and industry form almost 20% of total final demand.

The previous findings offer a wide range of alternative economic policy choices. They seem to be in accordance with the results of the internal devaluation policy followed by the Greek governments in the previous years since, according to our findings, cuts in wages ("internal devaluation") tend to be more effective in the reduction of the price index of government consumption and less effective to the reduction of the price indices of private consumption and exports. That is because wages have a high contribution to the price formation of commodities that are related to government activities, while imports have a low contribution to the relative price index. On the other hand, wages have a relatively low contribution to the formation of the exports' price index, while imports have a high contribution to the relative price index. Similar findings are reported by Athanassiou and Tsouma (2013), who estimate the import content of consumption and exports in Greece and detect a high technological dependency of the country on imported industrial inputs.[13] Thus, the improvement of the performance of the external sector of the economy requires the application of im-

13. For further findings related to the dependency of the Greek economy on imported commodities, see, e.g., Ntemiroglou (2016), Leriou et al. (2016), Mariolis (2018), Mariolis and Soklis (2018), and Mariolis et al. (2019a), while for findings related to the international competitiveness of the Greek industrial sector, see, e.g., Konstantakopoulou (2015), and Konstantakopoulou and Skintzi (2015a, 2015b).

FIGURE 13
Decomposition of Total Final Demand per primary input and sector of origin



port substitution policies and, in particular, import substitution of industrial commodities.[14]

4. Concluding remarks

On the basis of the open input-output system of Leontief and data from the Symmetric Input-Output Table of the Greek economy for the year 2010, this article estimated the total (direct and indirect) contribution of primary inputs to price formation for the economy as a whole as well as per category of final demand. It has been found that:

(i) Imports, profits and wages have the largest contribution in price formation, while imports have a relatively larger contribution in the price formation of industrial commodities. More specifically, the average contribution of imports in the price formation of industrial commodities is about 50%.

(ii) The primary inputs with the highest contribution to the price indices per category of final demand are:

14. For the investigation of the relationships between the competitiveness of the external sector of the Greek economy and the internal and external deficits of the economy, see Aliber (2010; 2011), while for the effects of wage reduction to the effective demand of an economic system, see Bhaduri and Marglin (1990), and Stockhammer and Onaran (2012). For the multiplier effects of changes in effective demand to the output and the employment of the Greek economy, see Athanassiou et al. (2014); Mariolis and Soklis (2018); Ntemiroglou (2016); Tsekeris (2017), and Mariolis et al. (2018). Finally, for a comparative analysis between internal and external devaluation in the Greek economy, see Mariolis et al. (2019b).

(a) profits, which form about 36% of the price index of private consumption; (b) wages, which form about 39% of the price index of government consumption; and (c) imports, which form about 38% of the price index of gross fixed capital formation, 36% of the price index of exports intra EU and 37% of the price index of exports extra EU.

(iii) The price index of private consumption and, especially, the price indices of exports are mainly formed by the cost of imported industrial commodities, while the price index of government consumption is mainly formed by the wages of sectors related to government activities.

These findings seem to be in accordance with the results of the internal devaluation policy, which had a relatively higher impact on the improvement of the state budget deficit and a relatively lower impact on the improvement of the performance of the external sector and the decrease of the consumer price index. At the same time, these findings indicate the necessity for the implementation of well-targeted policies of import substitution of industrial products in order to enhance the international competitiveness of the economy.

Future research efforts should also take into account the corresponding findings from the analysis of the system of physical quantities of the Greek economy and extend the analysis to more recent input-output tables.

Appendix

TABLE A1 Sector classification of the Greek economy

No	Nomenclature
1	Crop and animal production, hunting and related service activities
2	Forestry and logging
3	Fishing and aquaculture
4	Mining and quarrying
5	Manufacture of food products, beverages and tobacco products
6	Manufacture of textiles, wearing apparel and leather products
7	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
8	Manufacture of paper and paper products
9	Printing and reproduction of recorded media
10	Manufacture of coke and refined petroleum products
11	Manufacture of chemicals and chemical products
12	Manufacture of basic pharmaceutical products and pharmaceuticals
13	Manufacture of rubber and plastic products
14	Manufacture of other non-metallic mineral products
15	Manufacture of basic metals
16	Manufacture of fabricated metal products, except machinery and equipment
17	Manufacture of computer, electronic and optical products
18	Manufacture of electrical equipment
19	Manufacture of machinery and equipment n.e.c.
20	Manufacture of motor vehicles, trailers and semi-trailers
21	Manufacture of other transport equipment
22	Manufacture of furniture; other manufacturing

TABLE A1 continued

No	Nomenclature
23	Repair and installation of machinery and equipment
24	Electricity, gas, steam and air conditioning supply
25	Water collection, treatment and supply
26	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
27	Construction
28	Wholesale and retail trade and repair of motor vehicles and motorcycles
29	Wholesale trade, except of motor vehicles and motorcycles
30	Retail trade, except of motor vehicles and motorcycles
31	Land transport and transport via pipelines
32	Water transport
33	Air transport
34	Warehousing and support activities for transportation
35	Postal and courier activities
36	Accommodation and food service activities
37	Publishing activities
38	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities
39	Telecommunications
40	Computer programming, consultancy and related activities; information service activities
41	Financial service activities, except insurance and pension funding
42	Insurance, reinsurance and pension funding, except compulsory social security
43	Activities auxiliary to financial services and insurance activities
44	Real estate activities (excluding imputed rent)
45	Imputed rents of owner-occupied dwellings
46	Legal and accounting activities; activities of head offices; management consultancy activities
47	Architectural and engineering activities; technical testing and analysis
48	Scientific research and development
49	Advertising and market research
50	Other professional, scientific and technical activities; veterinary activities
51	Rental and leasing activities
52	Employment activities
53	Travel agency, tour operator reservation service and related activities
54	Security and investigation activities; services to buildings and landscape activities; office administrative, office support and other business support activities
55	Public administration and defence; compulsory social security
56	Education
57	Human health activities
58	Social work activities

TABLE A1 continued

No	Nomenclature
59	Creative arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities
60	Sports activities and amusement and recreation activities
61	Activities of membership organisations
62	Repair of computers and personal and household goods
63	Other personal service activities
64	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

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