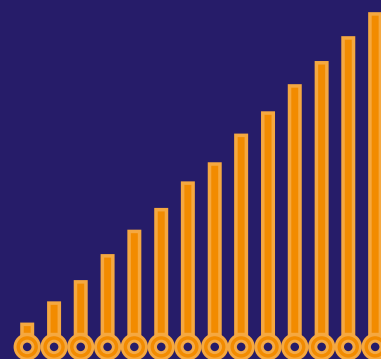


GREEK ECONOMIC OUTLOOK



- Macroeconomic analysis and projections
- Public finance
- Human resources and social policies
- Development policies and sectors
- Special topics



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In the current economic conditions, the stabilization and reconstruction of the economy with emphasis on tackling social problems and the process of economic development are the axes of priority.

The need for efficient and complete recording of economic activity and GDP has been stressed again from this editorial. Taxation should increase its base and reduce its intensity. The need to curb the out-migration of the country's human capital due to unemployment is dire, but also its reutilization within the country. It is also imperative to restart investment, to facilitate the financing of new business ventures and the technological upgrading of production facilities and service provision businesses.

The economic sectors recording export performance and the industries with comparative advantage should be preserved and bolstered through development laws and European programmes and institutions. The banking system needs to regain the trust of the depositors and gain the flexibility to again become a lever for economic development.

The *Greek Economic Outlook*, of October 2015, contributes in several of these areas with interesting articles.

The magazine is developed in four sections. The first section, "Macroeconomic analysis and projections", analyzes the demand, the current account, the consumer

price index estimation model of the recession, the presentation of KEPE provisions for the Greek Economy and the predictions of the factor model of KEPE for short-term developments in GDP. The second section, "Public finance", presents and analyses the state of execution of the State Budget and the development of the Public Debt. The third section, "Human resources and social policies", examines the fundamentals of the Greek labor market as well as the labor and demographic characteristics in Western Greece. The fourth section, "Development policies and sectors", presents and analyzes the developments in Greek Tourism, as well as the basic institutional framework of Renewable Energy Resources.

The second part presents four topical scientific articles, particularly useful in the current context. The first is entitled "The relationship between Tourism Receipts, Real Exchange Rate and Economic Growth in Greece" and the second "Education and unemployment prospects across regions in Greece." The third article is titled "Competitiveness of the Manufacturing Sector in the Eurozone countries, EU19" while the fourth is titled "Introducing the Influential Expectations Hypothesis for Aggregate Expectations".

NIKOLAOS VAGIONIS
Editor

1. Macroeconomic analysis and projections

1.1. Recent developments and prospects in the main demand components

Ersi Athanassiou, Ekaterini Tsouma

The first half of 2015 was characterized by a considerable deterioration of the economic climate in Greece (Figure 1.1.1) and an alternation between periods of intensifying uncertainty and intervals of optimism, in the midst of negotiations on the country's financing programme. These conditions, in conjunction with the escalating liquidity problems, had a negative impact on total investment and goods exports, while also placing imports back on the downward trajectory followed during the long period of recession. However, these conditions did not appear to have negatively affected the course of recovery of private consumption, and therefore the related boost to the GDP was significant until the second quarter of 2015. Furthermore, exports of services continued to

increase, as the country's tourism receipts recorded a further increase. Thus, while several elements of the growth dynamics exhibited by the Greek economy in the course of 2014 appear to have been diluted during first half of 2015, the change in real GDP remained positive during the first quarter of 2015 and strengthened further in the second quarter, compared to the corresponding quarters of the previous year.

The latest data of the quarterly National Accounts (EL.STAT., provisional data, September 2015) cover the period up to June 2015 and therefore do not incorporate the effects of the bank holiday, the capital controls and the new agreement for the financing of the country. According to these data, the rate of change of the GDP amounted to 0.6% in the first quarter of 2015, and increased substantially to 1.6% in the second quarter. On the domestic demand side, the data presented in Table 1.1.1 point not only to a continuing rise in private consumption with an acceleration of the relevant rate of change in the second quarter of the year, but also to a decline of investment in the second quarter, versus an increase in the first quarter. On the whole, the contribution of domestic demand to the rate of change of the GDP

TABLE 1.1 Main macroeconomic aggregates

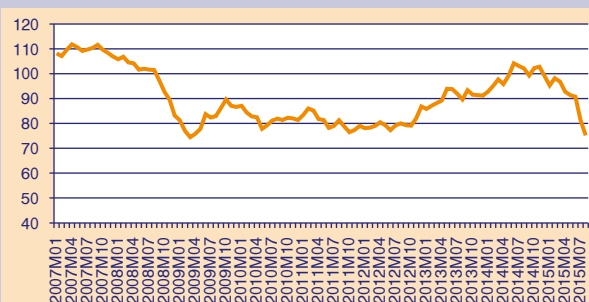
*% rates of change compared to the corresponding period of the previous year
(seasonally adjusted data at constant prices)*

	2013Q4	2014Q1	2014Q2	2014Q3	2014Q4	2015Q1	2015Q2	6 month period Jan.-June	
								2015	2014
Private consumption	1.5	0.6	0.8	2.9	1.3	1.7	2.5	2.1	0.7
Public consumption	-3.5	0.7	2.1	-3.5	-2.5	-1.2	2.3	0.5	1.4
Gross fixed capital formation	-10.8	-6.1	-3.3	2.3	19.3	13.9	-3.3	5.1	-4.7
Domestic demand*	-1.1	-0.2	0.4	1.8	2.6	2.4	1.6	0.1	-5.9
Exports of goods and services	-2.5	7.7	9.2	8.2	9.9	1.1	-1.8	-0.4	8.4
Exports of goods	-8.5	4.9	4.6	1.7	9.6	0.2	-4.2	-2.0	4.7
Exports of services	6.9	10.9	14.3	15.4	10.1	2.6	1.6	2.1	12.6
Imports of goods and services	-7.7	-0.2	9.2	3.7	17.5	9.7	-3.5	2.8	4.5
Imports of goods	-7.2	-0.4	9.4	5.7	19.3	9.3	-4.0	2.4	4.5
Imports of services	-11.3	2.7	8.2	-6.2	8.5	12.3	-1.1	5.5	5.5
Balance of goods & services	-51.8	-68.2	9.1	-43.3	147.6	262.5	-23.5	-35.1	-36.2
GDP	-2.8	-0.2	0.2	1.4	1.4	0.6	1.6	1.1	0.0

Source: National Accounts, EL.STAT. (August 2015), own calculations.

*Excluding the change in inventories.

FIGURE 1.1.1
Economic sentiment indicator



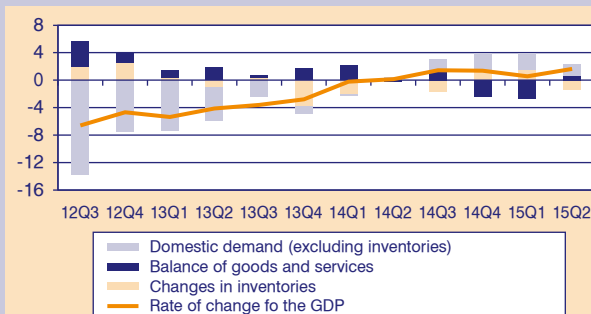
Source: Eurostat.

reached 2.5 percentage points in the first quarter of 2015 and 1.6 points in the second quarter, from -0.2 and 0.4 points, respectively, during the corresponding quarters of 2014 (see Figure 1.1.2).

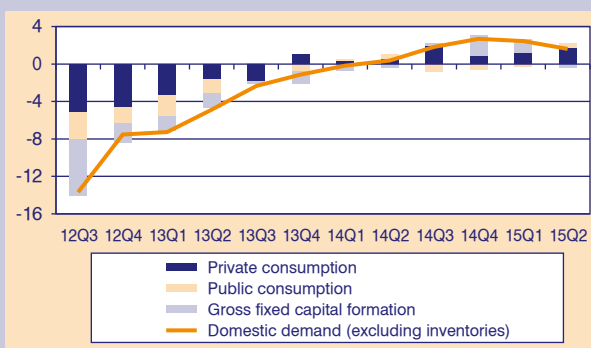
On the side of the external sector, imports, which had been back on a rising path since the second quarter of 2014 as a result of the gradual recovery of domestic demand, displayed once again a decrease in the second quarter of 2015. In parallel, the country's performance with respect to goods exports deteriorated significantly, as there was only a marginal increase in the first quarter and a decline in the second quarter. With respect to services exports, developments remained positive, although it should be noted that the relevant rates of change subsided significantly compared to the previous year. Overall, the contribution of the external sector to the rate of change of the GDP amounted to -2.7 percentage points in the first quarter of 2015 and 0.6 points in the second quarter, from 2.2 and -0.2 points, respectively, during the corresponding quarters of 2014.

The strengthening of the rate of change of the GDP in the second quarter of the year had an impact on the econometric estimates of recession probabilities, presented in Section 1.4. However, given that the National Accounts data do not incorporate the crucial economic developments taking place in the country from late June onwards, the examination of the short-term indicators that are available beyond June 2015 assumes particular importance for the assessment of the course and prospects of the main macroeconomic aggregates. The path of the economic sentiment indicator presented in Figure 1.1.1, already indicates a significant deterioration of economic conditions in July and August. The next sections provide a more detailed analysis of recent developments in a variety of selected short-term indicators, combined with the relevant National Accounts data.

FIGURE 1.1.2
Contributions to the rate of change of the real GDP
Domestic and net external demand



Individual components of domestic demand



Source: National Accounts, EL.STAT., own calculations.

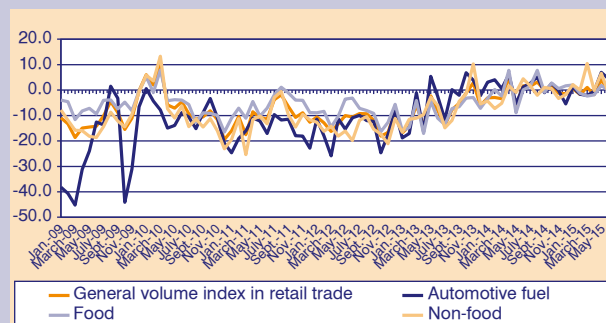
1.1.1. Private consumption

According to National Accounts data, the rise in private consumption continued during the first half of 2015, with the relevant rate of change reaching 1.7% in the first quarter of the year and 2.5% in the second quarter, from 0.6% and 0.8% during the corresponding quarters of 2014.

Additional indications on the course of private consumption expenditure during the first half of 2015 are provided by the recent evolution of the monthly volume index in retail trade, which was mainly characterized by the alternation between positive and negative percentage changes. More specifically, following the decrease and increase recorded in January and February 2015, respectively, the general index rose in March (by 1%) and May (by 4.1%) and fell in April (by -1.8%) and June (by -0.4%, according to provisional data). As a result, during the first half of 2015¹ the general volume index in retail trade increased marginally by 0.3%, as compared to the same period in 2014. It is interesting to observe that developments in two main retail sector categories, namely the

1. All the following references to the six-month period include provisional data for the month of June.

FIGURE 1.1.3
Percentage changes in the general volume index and the main sector indices in retail trade



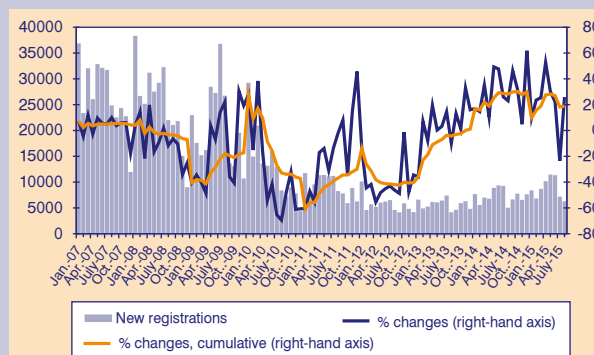
Source: EL.STAT., own calculations.

automotive fuel and *non-food* sectors, contributed positively (through increases in the corresponding indices amounting to 1.4% and 4%, respectively) to the above outlined path of the general index. During the same time period, the volume index in the third main retail sector category recorded a marginal fall of -0.3% (Figure 1.1.3).

Evidently, the observed trends in retail trade are further mirrored in the evolution of the indices in the eight specific store sub-categories, where in four cases the six-month period January-June 2015 was characterized by negative developments. In particular, and in accordance with the observations of the previous periods of reference, the indices in the *department stores*, *food-beverages-tobacco*, *pharmaceuticals-cosmetics* and *furniture-electrical equipment-household equipment* sub-categories recorded negative rates of change (amounting to -3.6%, -5.8%, -0.2% and -0.2%, respectively) in the first half of 2015, as compared to the corresponding half-year period in 2014. It is, once again, worth mentioning that certain retail trade sub-sectors which are linked to non-durable and, in particular, necessary goods, such as the food and pharmaceuticals-cosmetics categories, continue to be on a downward path. On the contrary, the volume indices in the *supermarkets*, *automotive fuel*, *clothing-footwear* and *books-stationery-other goods* sub-categories increased (by 0.8%, 1.4%, 7.1% and 6.5%, respectively).

The evolution of the private passenger cars market is further indicative of the course of private consumption, and also consistent with the most recent favourable developments in the respective sector. More specifically, statistical data for passenger cars put into circulation for the first time, based on new registrations, indicate the continuation –with the exception of the figure for

FIGURE 1.1.4
New private passenger car registrations



Source: EL.STAT., own calculations.

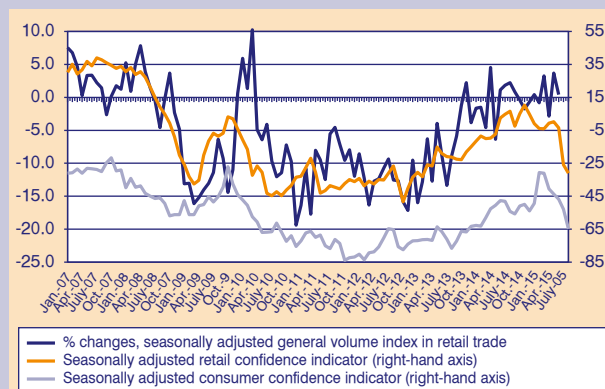
the month of July– of the strongly rising trends which were initially observed in late 2013. The significant monthly two-digit positive rates of change (30.3% in May, 22.1% in June and 25.8% in August) contributed to the maintenance of a two-digit cumulative percentage change of 18.9% for the eight-month period January-August 2015, despite the noteworthy fall of 23.6% recorded in July (Figure 1.1.4).

The continuation of the expansion in the cars market is further evidenced by the most recent data on the quarterly turnover index for motor trade, which concern the first two quarters of 2015.² In more detail, the percentage changes in both the quarterly index of motor vehicles (17.9% in the first and 10.4% in the second quarter of 2015) and the respective more comprehensive index of wholesale and retail trade, repair, sales of parts and accessories for motor vehicles and motorcycles (17.1% in the first and 12.7% in the second quarter of 2015) remained positive and significant, as compared to the corresponding 2014 quarters.

The above analysis indicates that private consumption expenditure continued to recover significantly during the first half of 2015, and in particular in the second quarter, against the background of the marginal improvement in the conditions prevailing in the labour market and the non-imposition of additional financial burdens to households. These two factors contributed to the further easing of the, until recently, predominant tendencies for the reluctance and holding back of consumption expenditure, and had a positive effect on labour compensation and, hence, on household disposable income.

2. Note that the data for the second quarter are provisional.

FIGURE 1.1.5
General volume index in retail trade and confidence indicators



Source: EUROSTAT, own calculations.

Nevertheless, it should be noted that the evolution of private consumption until June 2015 does not yet incorporate crucial developments in the domestic economic environment, which could potentially affect the dynamics of this major GDP component to a significant degree and in various ways. In other words, both (a) the imposition of the bank holiday and capital controls, with all their direct and indirect implications for households (for example, through the impact on domestic business activity and, hence, on household income through employment), and (b) the agreement reached in August between the Greek government and the country's European partners and the ensuing conclusion on the third financial assistance programme for Greece, with any additional financial burdens which might heavily weigh on household income within the upcoming months, are expected to exert multidimensional effects on consumption expenditure. Taking, additionally, into account the uncertainty conditions, which accompanied the time period until the two sides came to an agreement and which continued to dominate affairs while expecting the results of the September elections, it becomes clear that any further delay in securing the necessary stability and safety conditions in the economy will inhibit the enhancement of the dynamics and the ultimate recovery in private consumption expenditure.

In any case, both consumers and retailers appear to be particularly pessimistic with regard to the anticipated evolution of private consumption, as evidenced by the information incorporated in the consumer and retail confidence indicators, which reflect the relevant expectations. More specifically, the retail confidence indicator recorded a sharp drop from 0.2 and -3.5 in May and June 2015, respectively, to -25.9 in July and -31 in August, reaching levels which had not been recorded since early 2013. Similar developments are observed in

the case of the consumer confidence indicator, which steadily and continuously deteriorated, reaching -43.6, -46.8, -52.9 and -64.8 in May, June, July and August, respectively, hence returning to the adverse levels of late 2013 and early 2014 (Figure 1.1.5).

1.1.2. Investment

The path of recovery which gross fixed capital formation had followed since the third quarter of 2014, continued in the first quarter of 2015, but was subsequently interrupted in the second quarter. As evident from Table 1.1.2, the rate of change of investment amounted to 13.9% in the first quarter of 2015 and -3.3% in the second quarter, versus 2.3% and 19.3% during the last two quarters of 2014. As a result, the contribution of investment to the rate of change of the GDP equalled 1.5 percentage points in the first quarter of 2015 and -0.4 points in the second quarter.

More particularly, with regard to investment other than construction, developments in the course of the first half of 2015 remained favourable, with the relevant rates of growth, however, decelerating significantly in the second quarter of the year. More particularly, transport equipment expenditure recorded a rapid increase in the first quarter (126.2%) and a much milder rise in the second quarter (13.4%). In parallel, expenditure on other machinery presented a large boost in the first quarter (23.3%) and a milder rise in the second quarter (11.7%). Concerning investment in other products, expenditure remained stagnant in the first quarter and increased marginally in the second quarter (1.3%).

Concerning investment in construction, a particularly unfavourable development was the considerable decline in the other constructions category, both in the first quarter (-22.6%) and in the second quarter of 2015 (-29.6%). In addition, a further decline was recorded during the same period in the case of investment in dwellings, albeit with a significant amelioration of the relevant negative rate of change (-29.7% in the first quarter and -8.1% in the second quarter of 2015, from -49.9% and -58.0% in the corresponding quarters of 2014).

The deceleration of the rate of growth of investment in transport equipment and machinery, and the contraction of investment in other constructions, reflect the significant deterioration of the country's investment climate in the second quarter of 2015. The escalating uncertainty regarding the outcome of negotiations with the institutions and the related informal suspension of payments on the part of the state, intensified the market's financing and liquidity problems and contributed to delays in the progress of road works and other construction projects. In parallel, these conditions, in combination with the indications for continuation of the regime of high taxation on real estate

TABLE 1.2 Main investment aggregates

% rates of change compared to the corresponding period of the previous year
(seasonally adjusted data, constant prices)

	Quarters						6 month period Jan. - June	
	2014Q1	2014Q2	2014Q3	2014Q4	2015Q1	2015Q2	2015	2014
Cultivated biological resources	10.9	-0.5	5.1	91.3	-0.2	-32.0	-19.1	3.8
Other machinery and weapon systems	-14.7	3.4	13.2	19.9	23.3	11.7	17.2	-6.2
Transport equipment and weapon systems	27.8	23.2	22.5	227.6	126.2	13.4	67.1	25.4
Dwellings	-49.9	-58.0	-44.4	-52.4	-29.7	-8.1	-20.3	-53.8
Other buildings and structures	18.8	10.5	5.3	-11.6	-22.6	-29.6	-26.0	14.6
Other products	3.0	0.6	-2.9	-2.9	0.0	1.3	0.6	1.8
Gross fixed capital formation	-6.1	-3.3	2.3	19.3	13.9	-3.3	5.1	-4.7

Source: National Accounts, EL.STAT. (August 2015), own calculations.

property, appear to have acted against the recovery of the housing market, thus prolonging the decline of investment expenditure in this sector despite the historically low levels to which this expenditure has already subsided.

Additional information about recent developments in residential investment is derived from the residential buildings indicator with respect to square meters of useful floor area, based on building permits. Both the individual monthly observations of the residential buildings indicator and the estimated private building activity³ data continued to exhibit a certain degree of variability in the most recent reference period. This kind of variability, which still concerns a relatively short period of time, is hard to interpret and it, hence, becomes difficult to draw safe conclusions on whether the observed tendencies towards a containment of the particularly adverse dynamics characterizing earlier periods of reference came to a halt. In particular, the monthly percentage changes in the residential buildings indicator moved from the positive rates of 13.2% and 5.8% in February and March to the negative rates of -3.8% and -18.4% in April and May 2015, as compared to the respective months of the previous year. Correspondingly, while the negative rates of change in the estimated private building activity moderated until April (-14.5% in February, -13.3% in March and -11.6% in April), a worsening was observed again in May 2015 (-14.1%) (Figure 1.1.6).

The ongoing contraction in residential building activity continues to be accompanied by further decreases in

the construction cost for new dwellings and housing and apartment prices. Nevertheless, according to the most recent data for the second quarter of 2015, it seems that there has been a temporary interruption or reversal in the moderating tendencies which characterized downward cost and price developments up to the previous period of reference (Figure 1.1.6). More specifically, the index of construction costs for new dwellings fell by -2.3% in the second quarter of 2015, as compared to the corresponding quarter of 2014, while the price index of dwellings in all urban areas dropped by -5.9% in the same quarter, as compared to the same quarter of the previous year.⁴

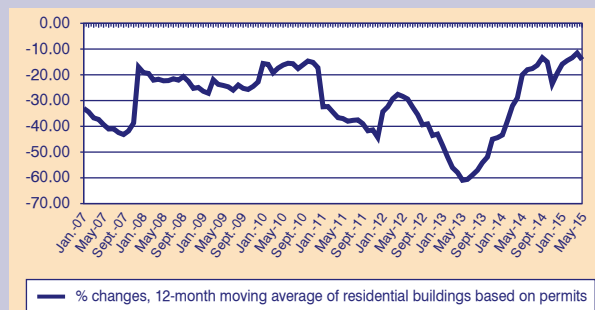
Additionally, interesting findings emerge from the analysis of apartment prices,⁵ which also show single and, hence, potentially temporary signs of a reversal of the easing course in negative percentage changes. In more detail, decreases in apartment prices with respect to geographical area appear to be more pronounced in almost all cases in the second quarter of 2015 (-5.2% for the area of Athens, -8.2% for the area of Thessaloniki, -7.1% for the category of other large cities and -4% for the category of the other urban areas, as compared to the corresponding quarter of the previous year), after nearly seven consecutive quarters of decelerating trends. Similar evidence is gathered for the case of apartment prices with respect to age, with the relevant negative percentage changes being more marked in the second quarter of 2015 and moving around -7.1% in the case of

3. A twelve-month moving average and the related percentage point changes are calculated.

4. Note that statistical data on the price index of dwellings in all urban areas for 2014 and 2015 are provisional.

5. Note that statistical data on apartment price indices are provisional from the third quarter of 2014 onwards.

FIGURE 1.1.6
Estimated residential building activity based on permits



Price index of dwellings and construction costs index



Source: EL.STAT., EUROSTAT, Bank of Greece, own calculations.

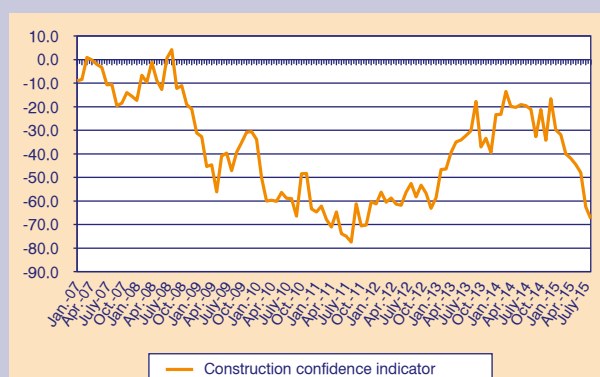
new (up to 5 years) and -4.7% in the case of old (older than 5 years) apartments.

For the construction sector as a whole, additional information is derived from the available statistical data on the course of the general production index in construction in the first and second quarter of 2015.⁶ It is interesting to observe that the particularly favourable developments in the first quarter of 2015, expressed by a percentage change of 43.1% as compared to the respective quarter of 2014, were followed by a marginally positive rate of change in the second quarter, amounting to 0.9%. This weakening of the dynamics in the overall construction activity is mainly due to the related reversal in conditions characterizing infrastructure works (concerning, among other things, highways, bridges, tunnels, pipelines, networks and port development), as indicated by the evolution of the sub-index of production of civil engineering, which increased by 57.5% in the first and fell by -0.7% in the second quarter of 2015. This turn may signal delays in the completion of significant infrastructure works, with

potentially direct or indirect implications and multiplier effects at the aggregate or sectoral level, but in particular with respect to the preservation of jobs. On the contrary, the second sub-index of production of building construction (concerning, among other things, dwellings, industrial and commercial buildings and other buildings) remained on a positive track for the third consecutive quarter, increasing by 28.5% in the first and 3.2% in the second quarter of 2015, as compared to the corresponding quarters of 2014.

Indicative of the foreseen developments in the construction sector in the near future is the most recent evolution of indicators reflecting the expectations of the parties involved. More specifically, the latest statistics for both the construction confidence indicator and the business expectations in construction index reinforce the anticipation of worsening conditions. In accordance with the findings of the preceding period of reference, the construction confidence indicator continued to decline in the four-month period May-August 2015 and reached the levels of -44.5%, -48%, -62.5% and -67.5% in May, June, July and August, respectively (Figure 1.1.7). The index of business expectations in construction also moved in the same direction, recording a downward course in the three-month period May-July 2015 (57.5 in May and 55.7 in June), with the value of 39.3 for the month of July being by far the worst performance since early 2013. It is worth mentioning that the respective development can be attributed to both sub-indices, which concern public construction works and private construction projects, whereby the drop in the business expectation index of public construction works in July constituted the worst performance since 2012.

FIGURE 1.1.7
Construction confidence indicator



Source: EUROSTAT.

6. Note that the reference concerns the indicator adjusted for the number of working days while data for the second quarter of 2015 are provisional.

Regarding the short-term prospects for fixed capital investment, developments over the second half of 2015 are expected to be mostly negative. The bank holiday and capital controls have undoubtedly gravely affected the attractiveness of investment in the country, liquidity conditions and the processing of the imports required for performing investment. Nevertheless, the new agreement for the financing of the country includes 35 billion in European funds for the support of growth, and provides for the promotion of crucial structural reforms that are expected to contribute decisively to the improvement of the investment climate in the country. These prospects, in combination with the dynamics already exhibited by investment prior to the recent adverse developments, justify a certain degree of optimism for the recovery of investment within the prospective year. However, the fulfilment of this expectation is conditional upon the smooth implementation of the new financing programme, within an environment of political stability and consent.

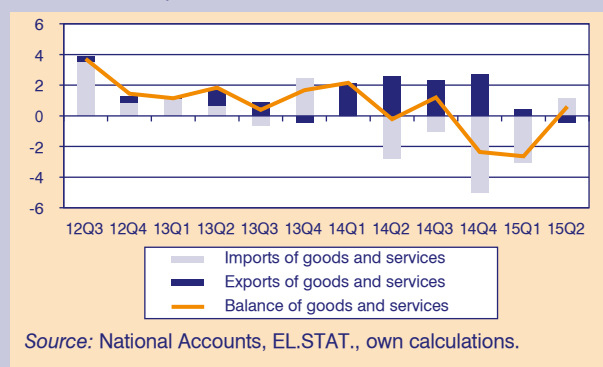
1.1.3. External balance of goods and services

Developments in the main aggregates of the external sector during the first half of 2015 reflect the deterioration of the domestic economic climate and the growing problems of liquidity in the economy.

More specifically, with respect to exports, their contribution to the rate of change of the GDP amounted to 0.4 percentage points in the first quarter of 2015 and -0.4 points in the second quarter, versus 2.1 and 2.6 points during the corresponding quarters of 2014. More particularly, in the field of services there was an increase in exports by 2.6% in the first quarter of the year and 1.6% in the second quarter. This increase reflected the continuing significant rise in tourism receipts (by 8.2% in the first half of the year according to Bank of Greece data), which coincided, however, with a decline of receipts in the other services category (by -5.4%, respectively, according to Bank of Greece data). Concerning goods exports, a marginal increase in the first quarter of 2015 (0.2%) was followed by a decrease in the second quarter of the year (-4.2%).

With respect to imports, the first quarter of the year was characterized by a considerable increase both in the case of goods (9.3%), and in the case of services (12.3%), the result being a negative contribution of -3.0 percentage points to the rate of change of the GDP (see Figure 1.1.8). In the second quarter, however, developments in goods and services imports turned to the opposite direction (-4.0% and -1.1%, respectively), contributing positively by 1.1 percentage points to the rate of change of the GDP. The decrease in imports is related to the weakening of

FIGURE 1.1.8
Contributions to the rate of change of the GDP
Individual components of external demand



the economic climate and the decline in investment and the production of goods for export.

Concerning the prospects of the external sector, its contribution to the rate of change of the GDP is expected to be positive in the immediate future, as the reduction in imports due to the capital controls is expected to be more substantial than the corresponding negative impact on exports. With regard to the prospects for 2016, the contribution of the external sector to the GDP will depend on the further improvement of services exports and the decisive strengthening of goods exports, and also on the degree to which a possible increase in internal demand will be covered more by domestically produced goods and less by imports. It is clear that in the current conjuncture, a decisive role in the country's performance in the above fields will be played by the implementation of the new investment necessary for the strengthening of the country's productive capacity.

1.1.4. Conclusions and prospects

According to the above analysis of the main demand components, a number of elements inherent in the growth dynamics exhibited by the Greek economy in the course of 2014 appear to have been diluted during the first half of 2015, without, however, leading to a reversal of the upward course of the quarterly real GDP.

More particularly, and in accordance with the estimated recession probabilities for the current phase of the business cycle (Section 1.4), the real GDP continued to register positive rates of change in the first two quarters of 2015, supported mainly by the favourable course of private consumption. However, given the critical developments in the domestic economy from the end of June onwards, and considering the forecasts provided by the recession probability model (see Section 1.4) and the KEPE dynamic factor model (see Section 1.5), it seems

that the positive dynamics have been interrupted and favourable developments cannot be expected in the short run. On the contrary, during the second half of 2015 the Greek economy may once more record negative rates of change of the GDP.

Similar conclusions can be drawn with regard to private consumption, which recorded the highest increase in the second quarter of 2015, among all the recent periods of reference. Nevertheless, its course in the upcoming quarters remains uncertain, as it is expected to be affected in various ways by diverse forces related to the capital controls still in force, the accumulation of potentially postponed but also additional financial burdens, the overall economic and political uncertainty and more adverse –than initially anticipated– developments in the

labour market, with direct and indirect effects on household disposable income.

With respect to investment, developments over the second half of 2015 are expected to be mostly negative, given the adverse effects of the bank holiday and the capital controls. Nevertheless, the smooth implementation of the new financial support programme justifies a certain degree of optimism for the recovery of investment within the prospective year, as it will contribute to the definitive stabilization of the economy and the direct and decisive resolution of the serious difficulties in the liquidity and financing of businesses. These conditions will also determine to a significant extent the margins for a substantial improvement in the country's export performance from 2016 onwards.

1.2. Current Account developments

Ioanna Konstantakopoulou

In the January-June 2015 period, the current account showed a deficit. Specifically, the deficit of the current account (see Table 1.2.1) stood at 1.94% of GDP, compared with 1.52% in the corresponding period of 2014, a change of 27.8%. In absolute terms, the deficit increased by €0.37 billion (see Table 1.2.2). This decline comes mainly from the primary income account, which recorded a deficit of 0.16% of GDP, compared with a surplus of 0.83% of GDP in the corresponding period of 2014. In addition, while the balance of goods deficit shrinks, considered the negative evolution of the component (i.e. the balance of goods excluding oil and ships), a widening

of the deficit is observed, derived mainly from the revival of their respective imports.

In the first half of 2015, the goods balance deficit as a percentage of GDP stood at 9.14%, a reduction of 9.7% compared to the same period of 2014 (see Figure 1.2.1.). In absolute terms, the deficit reached €8.12 billion, compared with €0.88 billion, in the corresponding period of 2014. This positive development is attributable mainly to the contraction of the ships deficit and secondarily to that of the oil balance, while the total effect moderated the expansion of the trade deficit excluding oil and ships.

Specifically, the deficit of the balance of oil declined by €1.22 billion compared with the same period in 2014, reaching €0.35 billion. As a percentage of GDP, the oil balance deficit stood at 0.4% (see Figure 1.2.1). The ship balance showed the same variation, but to a lesser ex-

TABLE 1.2.1 Current Account (as percent of GDP)

	CA	Goods	Exports	Imports	Services	Primary Income	Secondary Income
2009	-10.87	-12.96	6.34	19.30	5.33	-2.84	-0.40
2010	-9.92	-12.48	7.41	19.88	5.85	-2.52	-0.78
2011	-9.92	-13.10	9.48	22.58	7.04	-3.14	-0.72
2012	-2.38	-10.11	11.18	21.29	7.81	0.42	-0.49
2013	0.60	-9.46	12.21	21.67	9.32	-0.25	0.99
2014	0.89	-9.99	13.14	23.13	10.98	0.09	-0.19
2013 a (January-June)	-2.78	-8.95	11.79	20.75	6.08	-0.03	0.12
2014 a (January-June)	-1.52	-10.12	12.80	22.92	7.56	0.83	0.22
2015 a (January-June)	-1.94	-9.14	11.45	20.59	7.51	-0.16	-0.15

Sources: Bank of Greece and EL.STAT.

TABLE 1.2.2 Current Account (in EUR billions)

	CA	Goods	Exports	Imports	Services	Primary Income	Secondary Income
2009	-25.82	-30.78	15.04	45.82	12.65	-6.74	-0.95
2010	-22.51	-28.29	16.79	45.08	13.26	-5.71	-1.76
2011	-20.63	-27.24	19.72	46.96	14.64	-6.53	-1.51
2012	-4.62	-19.65	21.72	41.37	15.17	0.82	-0.95
2013	1.09	-17.24	22.25	39.49	16.99	-0.46	1.80
2014	1.59	-17.85	23.48	41.33	19.62	0.16	-0.33
2013 a (January-June)	-2.58	-8.30	10.93	19.22	5.63	-0.03	0.11
2014 a (January-June)	-1.35	-9.00	11.39	20.39	6.72	0.73	0.19
2015 a (January-June)	-1.72	-8.12	10.17	18.29	6.67	-0.14	-0.13

Sources: Bank of Greece.

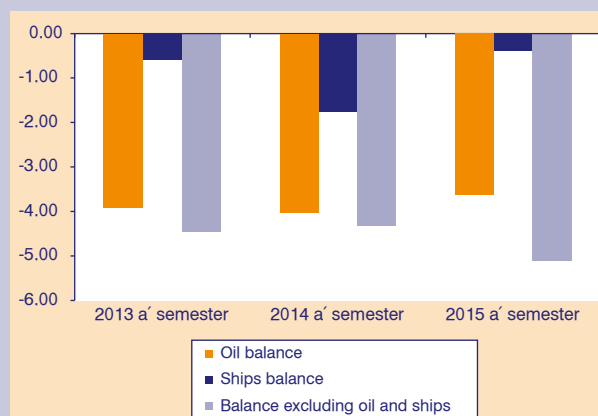
tent, where the deficit decreased by €0.35 billion. Instead, the balance of goods excluding oil and ships widened the deficit by €0.67 billion compared to the first half of 2014 due to the increase in imports of €0.70 billion, i.e. an increase of 6.5%, while exports remained stagnant. As a percentage of GDP, imports excluding oil and ships reached 11.5%, while exports 6.9% of GDP.

The surplus in the services balance expressed as a percentage of the GDP was 6.67% in the first half of 2015. In absolute terms, the surplus stood at €7.51 billion. The increase in payments for transport services was offset by the increase in travel receipts.

The primary income showed a deficit of €0.14 billion as against €0.73 billion in the corresponding period of 2014. Moreover, the deficit of primary income expressed as a percentage of the GDP was 0.16%, whereas for the first half of 2014 it was 0.83%. The change of the sign of balance comes mainly from the decrease in net revenues for investment income (interest, dividends and profits), the latter variable stood at €1.8 billion against €1.4 billion in the corresponding period of 2014. Finally, there was a fall in net other primary income.

In the January-June 2015 period, the surplus of the secondary income account turned into a deficit. The deficit of the secondary income was €0.13 million, against a surplus of €0.13 million, in the same period of 2015.

FIGURE 1.2.1:
The components of trade balance
(as percent of GDP)



Sources: Bank of Greece and EL.STAT.

1.3. The evolution of the Consumer Price Index (CPI) in Greece

Yannis Panagopoulos

At the aggregate level

Following the recent information regarding both the headline and the harmonized deflation in Greece, we outline here some recent evidence of change. As we can see from Table 1.3.1 and Diagram 1.3.1, the headline inflation and its core is recorded with some rigidity for most of 2015. More specifically, up to July 2015 the headline inflation ranged around -2.1% and -2.2% on a y-o-y¹ basis. On the other hand, core inflation ranged around -1.6% and -1.7%. However, in August 2015, a decline in headline deflation was recorded (-1.5%) which, however, remains to be verified in the following months.

The harmonized inflation (deflation) and its core present a better evolution. More specifically, a clear deceleration of deflation is observed, reaching only -0.4% in August 2015. Additionally, since July 2015 core harmonized inflation has returned to positive values (0.1%). If this trend continues, we will see the end of deflation in Greece in the near future.

Finally, in Diagram 1.3.1, we present the headline and core inflation rates in Greece (y-o-y), for the time period between 2010M1-2015M8.

At the sectoral level

According to the Hellenic Statistical Authority (ELSTAT) report, the aforementioned deflation level of the Consumer Price Index (CPI) change (-1.5%, y-o-y) in August 2015 can be mainly attributed to subsequent price decreases in seven main sub-categories, namely: (a) the “Housing” category (by 7.3%) due to reductions in the prices of house rents as well as due to reductions in the prices of residential heating and natural gas,² (b) the “Transportation” category (by 4.3%) mainly due to decreases in the gasoline prices,³ (c) the “Miscellaneous goods and services” category (by 3.2%) basically due to reductions in the prices of personal care products and car and motorcycle insurance, (d) the “Education” category (by 3.1%) mainly due to decreases in the fees for pre-school, primary, secondary and technical college education, (e) the “Household equipments” category (by 2.2%) mainly due to decreases in the prices of immediate consumption goods as well as in some household textile products, (f) the “Recreation and culture” category (by 1.9%) mainly due to decreases in the prices of visual equipments for PCs and in the prices of leisure services and equipment, e.g. theater tickets, electronic games, newspapers, journals, etc. and (g) the “Health” category (by 1.2%) especially due to price reductions for pharmaceutical products and medical, dental and paramedical services.⁴

Part of the aforementioned deflation process was offset by the increase in the prices mainly of three sub-categories, namely: (a) the “Food and non-alcoholic beverages” category (by 4.3%), due to price increases

TABLE 1.3.1 Inflation in Greece for 2015

	Headline inflation	Core inflation	Harmonized inflation	Core Harmonized inflation
2015M1	-2.8	-1.5	-2.8	-1.2
2015M2	-2.2	-1.2	-1.9	-0.6
2015M3	-2.1	-1.6	-1.9	-0.8
2015M4	-2.1	-1.6	-1.8	-0.7
2015M5	-2.1	-1.6	-1.4	-0.2
2015M6	-2.1	-1.8	-1.1	0.2
2015M7	-2.2	-1.7	-1.3	0.1
2015M8	-1.5	NA	-0.4	NA

Source: ELSTAT, EUROSTAT.

1. y-o-y: year on year.

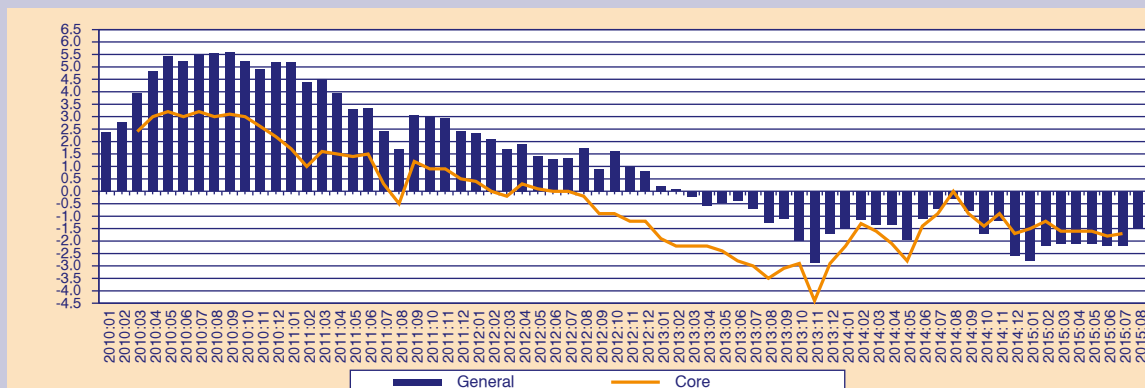
2. Part of this reduction was offset by the increases in prices of electricity.

3. Part of this reduction was offset by the increases in prices of combined public transport tickets.

4. Part of this reduction was offset by the increases in prices regarding private medical services.

DIAGRAM 1.3.1

CPI, % change relative to the respective month of the previous years



Source: ELSTAT, EUROSTAT.

mainly in bread, olive oil, fresh fruits, milk products, vegetables, eggs, potatoes, etc.,⁵ (b) the “Alcoholic drinks and tobacco” category (by 2.1%) due to price increases mainly in cigarettes and alcoholic drinks and (c) the “Restaurants-Hotels-Cafés” category (by 1.5%) mainly due to increases in their prices.

Finally, in Diagrams 1.3.2-1.3.13, we present an analytical decomposition of the harmonized inflation rate, in twelve different sectors/categories, for the time period 2010M1-2015M8 (y-o-y). It is worth reporting here that, according to ELSTAT (2015), for every one of these twelve sectors/

categories of the Greek economy a specific weight has been calculated.⁶ This allows us to classify them according to their significance for the inflation composition. So the highest weight was granted to the “Food and non-alcoholic beverages” sector/category (21.1% of the total for 2015). The second most important sector/category is “Restaurants-Hotels-Cafés” with 15.6% and the third is “Transportation” with 13.5%. Finally, the “Housing” sector/category ranked forth with 11.5%. The remaining sectors/categories follow with one-digit percentages in the composition of the harmonized inflation rate.

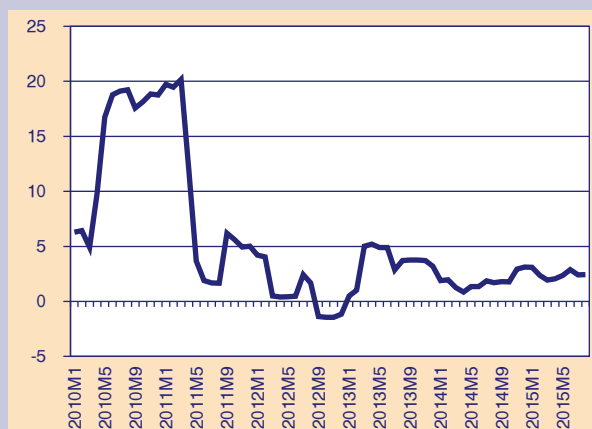
DIAGRAM 1.3.2

Food & non-alcoholic beverages



DIAGRAM 1.3.3

Alcoholic beverages & tobacco



5. Part of these increases was offset by the reduction in prices mainly of mineral water and fruit juice.

6. Every weight is calculated according to the distribution of household income in the consumption of goods and services.

DIAGRAM 1.3.4
Clothing and footwear

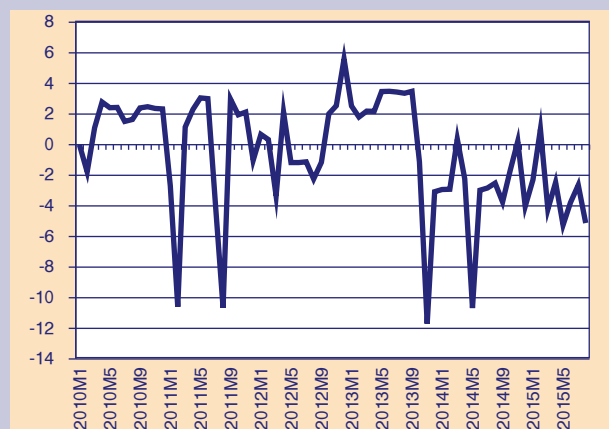


DIAGRAM 1.3.5
Housing

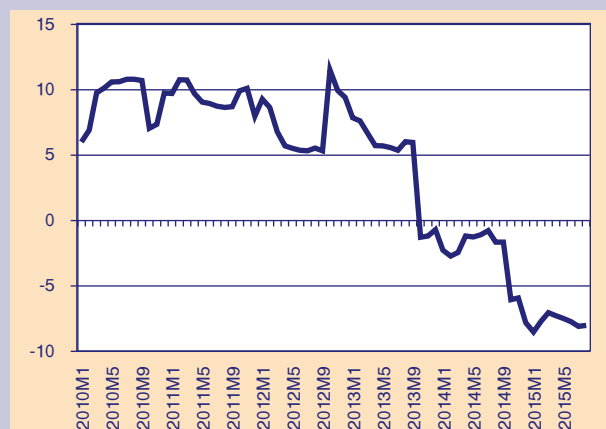


DIAGRAM 1.3.6
Household equipment

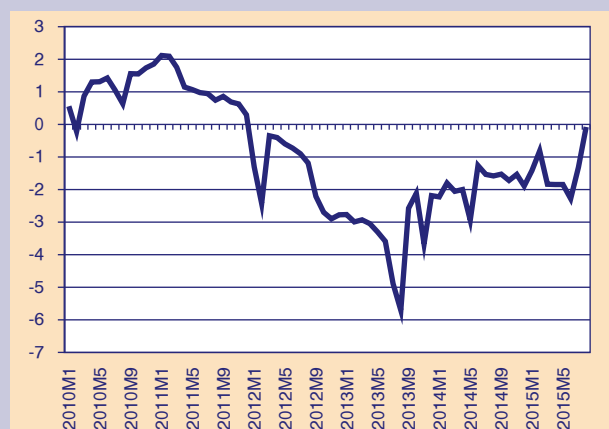


DIAGRAM 1.3.7
Health

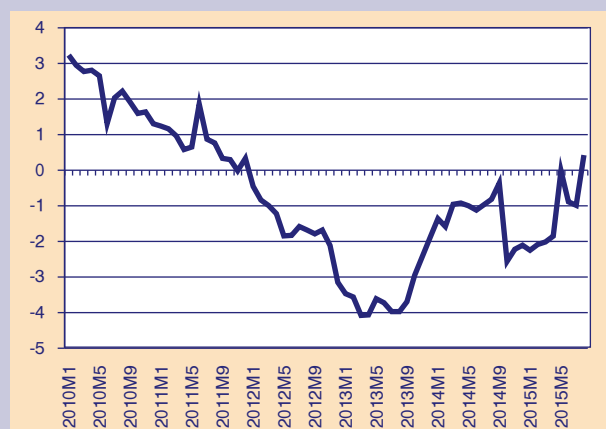


DIAGRAM 1.3.8
Transport

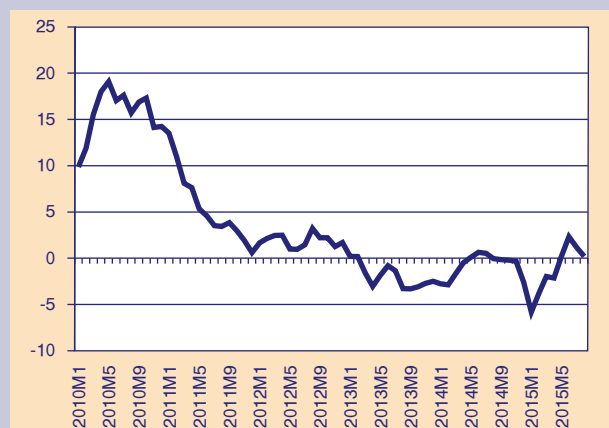


DIAGRAM 1.3.9
Communication

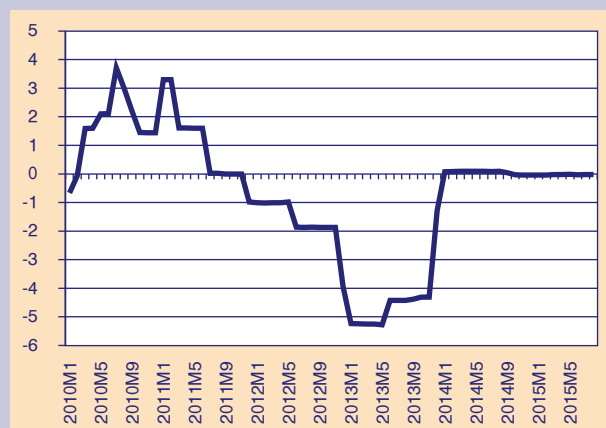


DIAGRAM 1.3.10
Recreation & culture

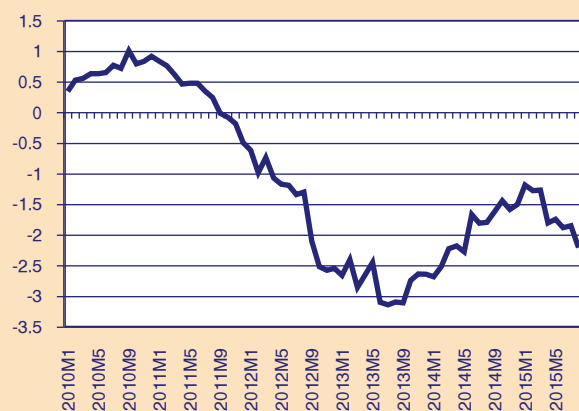


DIAGRAM 1.3.11
Education

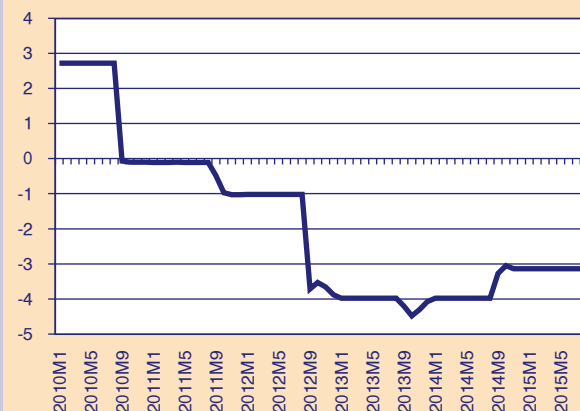


DIAGRAM 1.3.12
Hotels-café-restaurants

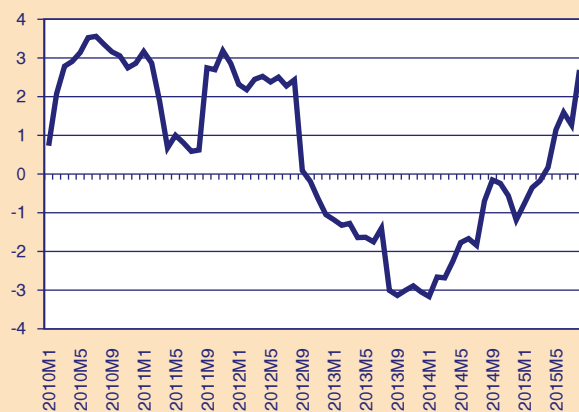
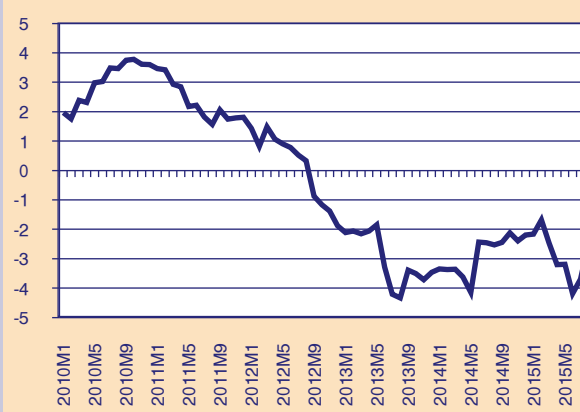


DIAGRAM 1.3.13
Miscellaneous goods & services



1.4. Recession probabilities for the Greek economy – Current period and forecasts

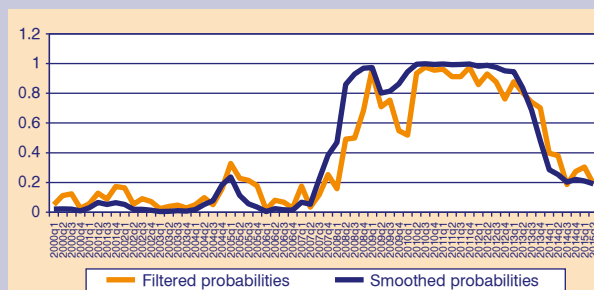
Ekaterini Tsouma

As has been analyzed in previous issues of the *Greek Economic Outlook*, it is possible to assess whether the Greek economy undergoes a recessionary (or expansionary) business cycle regime on the basis of recession (or expansion) probability estimates. Such estimates can be obtained by applying different models, like (a) Markov switching models and (b) probit models, and can either refer to the most recent time period and/or incorporate forecasts.

In the case of the Markov switching model,¹ which describes the business cycle as a process switching between an *expansionary* and a *recessionary* regime, the rate of change of the quarterly GDP² is used, whereby the GDP presents the selected measure of economic activity. The estimated filtered (based on information available up to time t) and smoothed (based on information available through time T) recession probabilities concern the most recent period for which economic data become available. Figure 1.4.1 depicts the estimates of the respective recession probabilities for the time period from the first quarter of 2000 to the second quarter of 2015.³ It is noted that, according to the simple rule adopted, a recessionary period is signaled by a derived recession probability higher than 0.5.

Both the obtained filtered and smoothed recession probabilities clearly indicate that the Greek economy entered a recessionary regime in the late 2000s and continued to undergo this specific business cycle phase at least up to the end of 2013. At the same time, they imply that the Greek economy exited from the recessionary regime in early 2014 and remained within a regime of economic expansion thereafter, and until the most recent period of reference. More specifically, starting from the first quarter of 2014 and up to the second quarter of 2015, the estimated probability levels in the case of both

FIGURE 1.4.1
Recession probabilities from Markov switching model



the filtered and the smoothed recession probabilities lie below the 0.5 threshold value, which reflects the point of transition from the one to the alternative regime. It is further observed that earlier increasing trends, which mostly characterized the filtered recession probabilities, were reversed during the last quarter of the estimation, in which the corresponding value (which is equal in the two cases) remained at the relatively low level of 0.191.⁴ As a result, and based on available data up to the first half of 2015, it seems that the provided evidence does not point to any significant and/or constant reversal of falling trends in recession probabilities, with the estimated levels, hence, reflecting that the Greek economy moved to a growth regime and has remained there since the beginning of 2014.

Nevertheless, and given that (a) the process of staying within an expansionary regime is still fragile, and (b) current probability estimates do not incorporate data mirroring the most recent developments in the domestic economic environment (like, for example, the bank holiday and the imposed capital controls), particular caution is required when it comes to the use and interpretation of the provided results in order to draw conclusions for the state of affairs in the Greek economy. Any potentially reliable confirmation of the above findings must result from updated probability estimates, to be derived as soon as new statistical data become available. Furthermore, supplementary information can be taken into account, resulting from the implementation of alternative applications, such as the estimation of recession probabilities

1. For the detailed presentation of the specific model according to Hamilton (1989) as well as an interpretation of the resulting probabilities, see *Greek Economic Outlook* 13, September 2010, pp. 22-24.

2. Note that the most recent revision of the National Accounts data has been taken into account and that the Demetra+ software is used in order to obtain seasonally adjusted quarterly GDP figures.

3. Whereas the estimations are carried out for the period 1970-2015, the shorter time period used for illustration is chosen for reasons of comparison to the probabilities resulting from the probit model that is presented below.

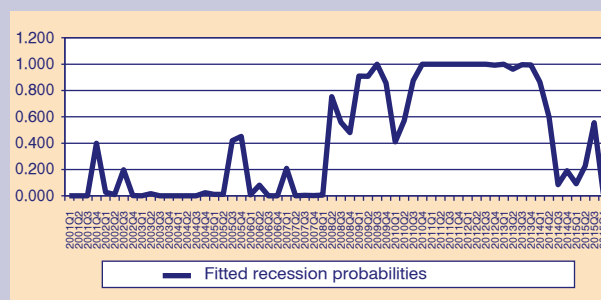
4. It is noted that some changes, as compared to the results of the preceding reference period, might be due to the fact that the present analysis incorporates the revised GDP figures.

by the use of a probit model which also enables the derivation of forecasts.

In more detail, the probit model,⁵ which offers an additional estimation of the current phase of the business cycle, assesses the state of the economy through a variable which takes two possible values, depending on whether the economy is in *recession* or not. The resulting fitted values from estimating the probability that the observable recession indicator takes the value of '1'⁶ are interpreted as the estimated recession probabilities. The selected independent variables are the rate of change of quarterly GDP and the constructed monthly Leading Indicator (see Tsouma, 2010 and Tsouma, forthcoming), which is converted to quarterly frequency for the purposes of the current application.

The data used refer to the time period from the first quarter of 2000⁷ to the second quarter of 2015, while recession probability forecasts are also included, with the forecast horizon amounting to two quarters. Consequently, recession probability forecasts are provided for the third and fourth quarter of 2015. According to the obtained estimates and forecasts and as illustrated in Figure 1.4.2, high recession probabilities were forecasted at the onset of the recession which started in 2008 and have been retained until the end of 2013 (with the exception of the probability value of 0.41 for the first quarter of 2010⁸). In accordance with the findings from the application of the Markov switching model, the year 2014 appears to signal the point of exit from the recession after a particularly prolonged time period, with the respective recession probabilities recording relatively low levels up until the second quarter of 2015. However, the increase in estimated probabilities (to 0.228 from 0.091⁹), already emphasized during the preceding reference period (see *Greek Economic Outlook*, issue 27), seems to be accompanied by a further rise in the third quarter of 2015 (forecast). In particular, the respective forecast lies at 0.556 and, thus, marginally exceeds the 0.5 threshold value. At the same time, it is interesting to observe the forecasted sharp fall in recession probabilities which follows for the last quarter of 2015, with a value of 0.015.

FIGURE 1.4.2
Recession probabilities from probit model



In summarizing, it can be inferred that the evidence obtained by applying the two recession probability models remains mixed and incorporates individual elements which indicate higher variability among recession probabilities within the year 2015. In other words, and even though the provided estimates cannot call into question the fact that the Greek economy has exited the recession in early 2014, the subsequent course of economic activity continues to be doubtful in the quarters to come. This conclusion reinforces the need to repeatedly re-estimate both models, as soon as additional statistical data become available, with the aim of constantly reassessing the current state of the business cycle. The significance of frequently obtaining revised estimates gains particular importance at the current juncture, due to the recent crucial developments in the domestic economy, relating mostly to the imposition of the bank holiday in late June and the capital controls still in force.

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- Hamilton, J. D. (1989). "A new approach to the economic analysis of nonstationary time series and the business cycle", *Econometrica*, 57, 357-384.

5. For the detailed presentation of the specific model according to Estrella and Mishkin (1998), see *Greek Economic Outlook* 14, January 2011, pp. 27-28.

6. Due to the lack of an official Greek business cycle chronology, the recession indicator used is based on a related specification applied (see E. Tsouma, 2011 and Tsouma, 2014), where the exact switch points between expansion and recession are derived.

7. The estimates start at the first quarter of 2001 due to the calculation of growth rates and the inclusion of lags. For that reason the respective figure depicts results starting in 2001.

8. The fall of the respective recession probability below 0.5 was clearly temporary and did not signal an exit from the recessionary regime. This is reinforced by the fact that the recession probabilities turned up immediately thereafter and remained at high levels afterwards.

9. See Footnote 4.

Tsouma, E. (2010). "Predicting Growth and Recessions Using Leading Indicators: Evidence from Greece", KEPE, *Discussion Papers*, 114.

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1.5. 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 two quarters of 2015 and also the resulting updated forecast for the mean annual rate of change in 2015. The forecasts are produced by implementing a dynamic structural factor model, a detailed description of which can be found in Issue 15 (June 2011) of the *Greek Economic Outlook*. The underlying time series database used to estimate the model and produce the forecasts encompasses the main aspects of economic activity in the country on a quarterly basis, spanning the time period from January 2000 up to June 2015. 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, the labor market, economic sentiment and business expectations) and nominal variables (such as the general and individual consumer price indices, monetary variables, bond yields, interest rates, exchange rates and housing price indices). It is noted that the seasonal adjustment of all time series was carried out using the Demetra+ software, which is freely available from Eurostat.¹

According to the factor model forecasts presented in Table 1.5.1, the mean rate of change of real GDP is estimated at -1.6% for the second half of 2015, with the relevant quarterly projections amounting to -1.5% and -1.7% for the third and fourth quarters, respectively, as compared to the corresponding quarters of the previous year. The respective predictions reflect a worsening in domestic economic conditions and a return to negative rates of change of the GDP during the second six-month period of the year, following the recorded growth rate of 1% in the first half of 2015, according to the available official (provisional) data. As a result, the mean annual rate of change of real GDP is estimated at -0.3%, indicating an adverse reversal of the domestic economic climate which brings the Greek economy back to a regime of moderate economic recession.

The above forecasts for the rate of change of the Greek GDP mirror the key aspects of the most recent developments in the economy. More specifically, the apparent abrupt reversal in the positive trends which characterized economic conditions in the previous quarters is, to a significant degree, linked to the increased uncertainty emerging from the fact that major issues relating to the financial assistance programme of the country, and more generally the financing conditions prevailing in the economy, remained unsolved. Up to the more recent periods of reference, the relatively smooth progress in the implementation of the programme secured the gradual rebalancing in major macroeconomic aggregates, the progressive improvement in the domestic economic climate and the reinforcement of the credibility of the country. The shift in the established conditions,

TABLE 1.5.1 Real GDP rate of change
(%, y-o-y)

Quarters	2015	
	2015Q3	2015Q4
Quarterly rate of change	-1.46 [-1.57 , -1.34]	-1.70 [-1.92 , -1.47]
Six-month mean rate of change, 2nd half year	-1.58 [-1.75 , -1.41]	
Annual mean rate of change*	-0.27 [-0.36 , -0.19]	

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

*The figure incorporates official non-seasonally adjusted data (provisional) for the first two quarters of 2015, which have been adjusted here for seasonality.

1. The TRAMO/SEATS filter was used for the seasonal adjustment.

particularly during a time of transition, led to a reversal of the upward trends, interrupting the predominant recovery dynamics. At this point of the analysis, it should be stressed that the provided forecasts do not incorporate any statistical information capturing the circumstances which characterized the domestic economy after the imposition of the bank holiday and capital controls and, thus, cannot reflect the potential implications of this major negative shock for the overall economic activity.

The above considerations are compatible with the latest course of economic data and, in particular, with the included most recent statistics referring to the second quarter of 2015. Indicative is the reversal in positive trends –registered in the first quarter of 2015– with reference to investment and exports, but also the Industrial Production Index, while the Turnover Index in Industry recorded adverse developments during the total of the first six-month period of the year. Similar are the findings with respect to the Economic Sentiment Indicator, which worsened significantly and returned to 2013 levels. Furthermore, weakening positive dynamics are found to characterize economic activity in certain sectors, which had suffered significant losses during the economic recession, but recently began to show some first signs of recovery, as appears to be the case for the construction sector. A shift towards deteriorating conditions is further recorded with reference to almost all the incorporated indicators reflecting expectations and assessments and/or displaying leading features (e.g. business expectations in manufacturing and construction, and indicators

depicting assessments regarding order-book levels in manufacturing and exports).

The ongoing significant increase in private consumption expenditure constitutes one of the exceptions from the described worsening trends, while developments in both travel and transport receipts once again signaled an upward course. At the same time, and despite the overall adverse conditions still prevailing in the domestic labour market, it appears that the slow but progressive adjustment process in the key unemployment and employment aggregates continued to take place in the second quarter of 2015.

The forecasted course of the real GDP for the second half of 2015 and, hence, for the whole year, might evolve towards a more or less favourable direction than projected, depending on the role that a number of crucial and decisive factors have already or are expected to play within the economy. These factors include (a) the impact from the imposition of the bank holiday and capital controls –the latter still being in force– on consumption and, especially, on investment activity and (b) the consequences from the implementation of the agreement on the third financial assistance programme for the country, including all potential implications in terms of the containment of uncertainty, the improvement of liquidity conditions and the enhancement of the country's credibility, but also in terms of additional economic burdens and new austerity measures.

2. Public finance

2.1. State Budget execution, January-August 2015

Elisavet I. Nitsi

According to the most recent data retrieved from the General Accounting Office,¹ on a modified base, the execution of the State Budget in the period January-August 2015 shows an improvement compared both to the corresponding period of 2014, as well as to the targets set, as they were reflected in the executive summary of the State Budget for the fiscal year 2015. More specifically, according to the data shown in Table 2.1.1, the State Budget had a deficit in the balance amounting to 1.1 billion euros in the period January-August 2015, showing

a reduction of 1.75 billion euros or 61.35% compared to the corresponding period of 2014, and 593 million euros in comparison with the target set. The State Budget Primary Balance had a surplus of 3.8 billion euros, less by 1.86 billion euros compared to the same period in 2014 and 537 million euros or 16.45% from the primary deficit target. Revenues decreased mainly for two reasons: (a) the reduced Ordinary Budget revenues, amounting to 28.7 billion euros, mainly compared to the target set in the 2015 Budget, showed a decrease of 4.07 billion euros or 12.41%, while the lag compared to the corresponding period of 2014 is 869 million euros or 2.94%, and (b) a substantial shortfall in the revenue of the Public Investment Program (PIP) by 1.28 billion euros or 38.26% versus the same period of 2014. We should, however, take into account that the reduced PIP revenue for the selected period was foreseen as it is not far away from the target of 2.15 billion euros. From the year estimate

TABLE 2.1.1 State Budget execution January-August 2015 (million €)

	Jan.-Aug. 2014	Jan.-Aug. 2015		2014	2015
	Outcome	Outcome	Targets ¹	Outcome ²	Budget ³
State Budget					
Net Revenue	32,919	30,768	34,919	51,367	55,603
Expenditures	35,769	31,869	36,613	55,063	55,705
Ordinary Budget					
Net Revenue	29,570	28,701	32,769	46,650	50,871
Expenditures	32,461	30,306	33,523	48,472	49,305
- Primary expenditure	27,000	24,720	27,517	41,928	41,887
- Interest payments (on a cash basis)	4,795	2,672	2,630	5,569	5,900
Public Investment Program (PIP)					
Revenue	3,348	2,067	2,150	4,717	4,732
Expenditures	3,308	1,563	3,090	6,592	6,400
State Budget Primary Balance⁴	1,946	3,801	3,264	1,872	5,798
State Budget Balance	-2,849	-1,101	-1,694	-3,697	-102

1. Targets as they were reflected in the executive summary of the State Budget for the fiscal year 2015.

2. The total revenue and expenditure outcome is preliminary and will be finalized after the approval of the 2014 annual Budget report (for both revenue and expenditure).

3. Annual estimates as depicted in the executive summary of 2015 Budget.

4. + surplus, - deficit

Source: General Accounting Office, Greek Ministry of Finance.

1. Based on preliminary data published in the State Budget Execution Monthly Bulletin: August 2015, General Accounting Office, September 2015.

it seems that the PIP annual revenue is expected to be at the same level as last year, i.e. 4.7 billion euros and, therefore, this revenue will be collected later in the year.

On the other hand, the State Budget shows a significant reduction in expenditure, amounting to 31.87 billion euros, down by 3.9 billion euros or 10.9% over the eight months of 2014 and 4.74 billion euros or 12.96% against the target set by the Budget. This reduction in expenditure is due both to the limitation of the Ordinary Budget expenditure (6.64% compared to the corresponding period last year and 9.6% against the target of Budget) and the PIP (52.75% and 49.42%, respectively). The improvement on the expenditure side is also a result of the restructuring of cash planning for prevailing liquidity conditions, because of restrictions on capital movement and the problem of liquidity in the Greek economy.

More specifically, the expenditure of the Ordinary Budget amounted to 30.31 billion euros, decreased by 2.16 billion euros versus the same period of 2014 and 3.22 billion euros against the target. The reduction of the Ordinary Budget expenditure can be attributed to both the reduction in primary expenditure, which amounted to 24.72 billion euros (compared to the same period in 2014 is 2.28 billion euros or 8.44%, while compared to the target set is 2.80 billion euros or 10.16%), and the interest that almost halved compared to the corresponding period of 2014 (as it decreased by 2.12 billion euros or 44.48%, while slightly increasing against the target of 42 million euros or 1.6%).

From the figures of the State Budget execution, it arises that in the first eight months of 2015 a significant primary

surplus was achieved, although a primary deficit was expected. This expectation was due to (a) the economic suffocation caused by the imposition of capital controls, (b) the political uncertainty caused by the dispute within the ruling party, which was expressed by the refusal of its Parliamentary Members to vote for the agreement put together by the government with its EU partners, and (c) the significant liquidity problem faced by the Greek economy, as there was no external financing. With these facts and as the country entered a period of stability after the agreement was signed –an agreement that ensured the country's financing needs for the next three years– the coming months are particularly critical because in that time, and if the targets agreed are met (targets that were approved by a significant majority in the Greek Parliament), two things will be decided. First, the discussion for the restructuring of the Greek debt, as stated in the agreement and, second, the equitable distribution of the burden that will occur from the measures of the agreement.

Apart from the fiscal adjustment and the Social Security System reform, which is the most important issue to be resolved by the new government as it is the “black hole” of the Budget, the government should tackle tax evasion in an organized manner. From the revenues collected, they shall find the necessary equivalent measures to provide social policies for the poor, which in a period of economic crisis is absolutely necessary. Finally, the new government should not fear the political costs of resisting the lobbying pressure of powerful special interest groups, like protected professionals, farmers, etc., who continue to avoid paying their dues to the society, as they have done for decades.

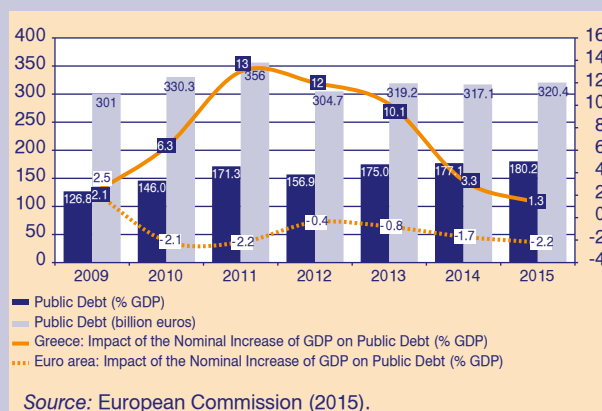
2.2. Evolution and structure of Public Debt

Christos Triantopoulos

The evolution and structure of public debt was affected both by developments in the implementation (non-completion) of the second Economic Adjustment Program –in the framework of the EU/ECB/IMF Support Mechanism– and also by developments in the wider macroeconomic and fiscal situation in Greece during the last period. These developments, as evidenced also by the recent estimations of the European Commission and the IMF, have adversely affected both the stock of public debt in the current year and the prospects for its long-term sustainability. In particular, according to data from the European Commission (which, however, is expected to be revised¹), the general government debt in 2015 is estimated to reach €320.4 billion or 180.2% of GDP, from €317.1 billion or 177.1% of GDP in 2014. This forecast on the public debt –which is higher than the provision made at the beginning of 2015 (170.2% of GDP)– is the highest among the Euro area member-states. Italy followed with public debt at 133.1% of GDP in 2015 and Portugal at 124.4% of GDP during the same year (Table 2.2.1), while in absolute terms the levels of debt vary widely, always depending on the size of each economy (Table 2.2.2). However, the factor that has decisively led to the very high level of Greece's public debt, after 2009 and during the implementation of Economic Adjustment Programs, was the shrinking of economic activity (in nominal terms).

In particular, during 2010-2014, despite the great fiscal adjustment effort and the restructuring of public debt in 2012, the level of government debt as a percentage of GDP and, by extension, its long-term sustainability were negatively affected by the recession in the domestic economy. Thus, according to the European Commission figures, the changes in the nominal GDP burdened the ratio of government debt to GDP and the annual burden, exceeding 10 percentage points of GDP during 2011-2013, while the cumulative growth effect of variations in GDP in the debt/GDP index reached, for the period 2010-2014, around 45 percentage points of GDP (Chart 2.2.1). Meanwhile, the effect of changes of the nominal GDP in public debt, in the Euro area, was positive due to lower recession or economic recovery, thus contributing

CHART 2.2.1
Public Debt and Impact of Nominal GDP



to maintaining public debt (as a percentage of GDP) at lower levels. In other words, in the Euro area, after 2009, the change in nominal GDP contributed to the reduction of public debt as a percentage of GDP (Chart 2.2.1). Thus, despite the effects of the Economic Adjustment Program and the restructuring of debt, government debt levels in Greece show a significant deviation in relation to economies of other member states, such as Italy and Belgium, which were also facing the burden of high public debt before 2010. Therefore, as stated also in the previous analysis regarding the evolution of public debt, in order to ensure the long-term sustainability of the high Greek public debt –considering the fiscal and productive capacity of the country– the return of the domestic economic and productive activity to a path of sustainable development is of great importance.

In parallel to the evolution of public debt, its structure is particularly important as it has also changed significantly in recent years, following the inability to raise funding from the international markets (private sector) and the country's entrance to the EU/ECB/IMF Support Mechanism (formal sector). In particular, until 2014 and after the dual debt restructuring in 2012, 72.3% of the Central Government debt² consisted of loans (mainly by the EU/ECB/IMF Support Mechanism) versus 25.3% in 2011, and 20.5% of bonds against 70.6% in 2011 (Table 2.2.3). The increase in loans as a share of Central Government debt was limited in 2015 after the «freezing» of funding from the EU/ECB/IMF Support Mechanism in the second half of 2014 and, therefore, the payment of loans to the Support Mechanism through other sources of funding or

1. These figures are based on the European Commission's spring estimates (May 2015), which, following the developments in the Greek economy and the third economic adjustment program, are expected to be revised upwards, as evidenced also by relevant analyses that have taken place on the sustainability of debt.

2. The Central Government debt is what occurs if, in the calculation of debt, of legal entities of the General Government, the Local Authorities, and the Social Security Administration and the so-called intergovernmental debt are not included.

TABLE 2.2.1 General Government Debt, as % of GDP

	2007	2008	2009	2010	2011	2012	2013	2014	2015*
Belgium	86.8	92.2	99.2	99.5	102.0	103.8	104.4	106.5	106.5
Germany	63.7	65.1	72.6	80.5	77.9	79.3	77.1	74.7	71.5
Estonia	3.7	4.5	7.0	6.5	6.0	9.7	10.1	10.6	10.3
Ireland	24.0	42.6	62.3	87.4	111.2	121.7	123.2	109.7	107.1
Greece	103.1	109.3	126.8	146.0	171.3	156.9	175.0	177.1	180.2
Spain	35.5	39.4	52.7	60.1	69.2	84.4	92.1	97.7	100.4
France	64.4	68.1	79.0	81.7	85.2	89.6	92.3	95.0	96.4
Italy	99.7	102.3	112.5	115.3	116.4	123.1	128.5	132.1	133.1
Cyprus	54.1	45.3	54.1	56.5	66.0	79.5	102.2	107.5	106.7
Latvia	8.4	18.6	36.4	46.8	42.7	40.9	38.2	40.0	37.3
Lithuania	15.9	14.6	29.0	36.2	37.2	39.8	38.8	40.9	41.7
Luxembourg	7.2	14.4	15.5	19.6	19.1	21.9	24.0	23.6	24.9
Malta	62.4	62.7	67.8	67.6	69.7	67.4	69.2	68.0	67.2
The Netherlands	42.7	54.8	56.5	59.0	61.3	66.5	68.6	68.8	69.9
Austria	64.8	68.5	79.7	82.4	82.1	81.5	80.9	84.5	87.0
Portugal	68.4	71.7	83.6	96.2	111.1	125.8	129.7	130.2	124.4
Slovenia	22.7	21.6	34.5	38.2	46.5	53.7	70.3	80.9	81.5
Slovakia	29.8	28.2	36.0	40.9	43.4	52.1	54.6	53.6	53.4
Finland	34.0	32.7	41.7	47.1	48.5	52.9	55.8	59.3	62.6

Source: European Commission (2015).

Note: * Estimation.

TABLE 2.2.2 General Government Debt, in € bn

	2007	2008	2009	2010	2011	2012	2013	2014	2015*
Belgium	299.7	327.3	347	363.8	387.6	403.2	412.8	428.4	438
Germany	1599.4	1666.4	1784.1	2073.7	2101.8	2179.8	2166	2170	2152.3
Estonia	0.595	0.74	0.995	0.963	0.984	1.712	1.888	2.073	2.089
Ireland	47.1	79.6	104.7	144.2	190.1	210.2	215.3	203.3	210.3
Greece	240	264.6	301	330.3	356	304.7	319.2	317.1	320.4
Spain	383.8	439.8	568.7	649.3	743.5	891	966.2	1033.9	1094.8
France	1253	1358.2	1531.6	1632.5	1754.4	1869.2	1953.4	2037.8	2107.2
Italy	1605.9	1671.1	1769.8	1851.2	1907.5	1988.9	2068.7	2134.9	2176.3
Cyprus	9.37	8.49	9.96	10.77	12.87	15.43	18.52	18.82	18.54
Latvia	1.91	4.5	6.81	8.42	8.7	9.08	8.88	9.63	9.33
Lithuania	4.61	4.76	7.81	10.15	11.63	13.27	13.55	14.83	15.82
Luxembourg	2.57	5.42	5.59	7.73	8.1	9.61	10.89	11.12	12.14
Malta	3.592	3.846	4.162	4.462	4.809	4.872	5.241	5.417	5.616
The Netherlands	259.9	348.1	348.9	372.6	393.9	426.1	441	451	463.5
Austria	183	200	228.2	242.4	253.3	258.5	261	278.1	291.2
Portugal	120.1	128.2	146.7	173.1	195.7	211.8	219.6	225.3	221.6
Slovenia	7.96	8.22	12.47	13.84	17.13	19.34	25.43	30.13	31.16
Slovakia	16.83	19.22	22.96	27.5	30.48	37.61	40.17	40.3	41.44
Finland	63.4	63.3	75.5	88.2	95.5	105.7	112.7	121.1	129.8

Source: European Commission (2015).

Note: * Estimation.

TABLE 2.2.3 State Budgetary Debt by Major Categories

	2011		2012		2013		2014		July 2015	
	€ million	% of debt	€ million	% of debt	€ million	% of debt	€ million	% of debt	€ million	% of debt
A. Bonds	259,774.18	70.6	86,297.44	28.2	76,296.25	23.7	66,559.80	20.5	62,999.00	20.1
Bonds issued domestically	240,940.37	65.5	81,769.19	26.8	73,415.28	22.8	63,792.01	19.7	60,301.00	19.3
Bonds issued abroad*	18,833.81	5.1	4,528.25	1.5	2,880.97	0.9	2,767.79	0.9	2,698.00	0.9
B. T-Bills	15,058.63	4.1	18,356.98	6.0	14,970.82	4.7	14,528.65	4.5	14,935.00	4.8
C. Loans	93,145.19	25.3	200,882.91	65.7	230,210.90	71.6	234,434.52	72.3	218,367.00	69.7
Bank of Greece	5,683.99	1.5	5,212.33	1.7	4,734.61	1.5	4,264.10	1.3	3,794.00	1.2
Other domestic loans	836.71	0.2	118.50	0.0	115.50	0.0	112.50	0.0	113.00	0.0
Financial Support Mechanism loans	73,210.36	19.9	183,098.58	59.9	213,152.48	66.3	217,924.68	67.2	202,654.00	64.7
Other external loans**	13,414.13	3.6	12,453.50	4.1	12,208.31	3.8	12,133.24	3.7	11,807.00	3.8
D. Short-term loans***	0.00	0.0	0.00	0.0	0.00	0.0	8,604.89	2.7	16,872.00	5.4
Total (A+B+C+D)	367,978.00	100.0	305,537.33	100.0	321,477.97	100.0	324,127.86	100.0	313,703.00	100.0

Source: Public Debt Bulletin (December 2011, December 2012, December 2013, December 2014) and General Government Bulletin (July 2015).

Notes: * Including securitization issued abroad.

** Including special purpose and bilateral loans.

*** Including repos.

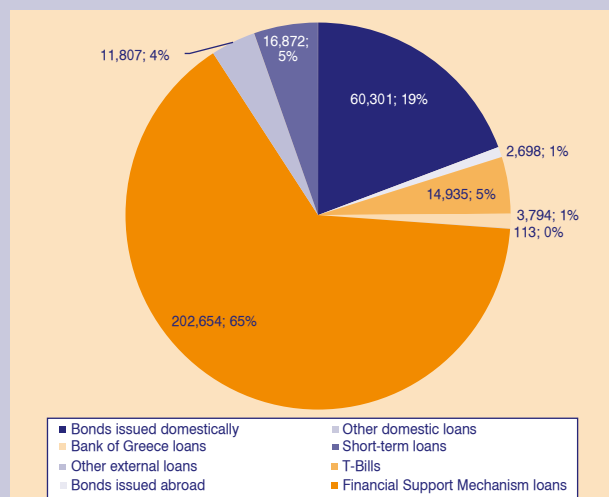
liquidity. Therefore, according to data from the General Accounting Office, in July 2015 the liabilities in loans decreased by approximately €16 billion compared to the end of 2014, reaching €218.4 billion from €234.4 billion at the end of 2014. This reduction, together with the repayment of debt obligations, is due to the refund of €10.9 billion from the Hellenic Financial Stability Fund (HFSF) to the European Financial Stability Facility (EFSF), following the Eurogroup agreement of 20 February 2015. Thus, in July 2015 the Central Government debt regarding loans of the EU/ECB/IMF Support Mechanism decreased to €202.6 billion from €217.9 billion in December 2014 (Table 2.2.3), representing now 65% of the total Central Government debt (Chart 2.2.2). The course of liabilities in bonds at the Central Government level is similar, as the exposure of the debt in bonds in July 2015 fell to €63 billion from €66.6 billion in December 2014, due to the fact that the country –up until June 2015– repaid its obligations to the EU/ECB/IMF Support Mechanism without receiving new financing, being, at the same time, unable to borrow from the international capital markets.

However, the financing needs were addressed by raising mainly short-term loans, which translates into the sale

of securities through the method of repos to General Government entities³ and in raising funding from the country's European partners under a 'bridge' program covering the period from June 2015 to the beginning of the third Economic Adjustment Program. In particular, the use of the method of repos was extended through a series of legislative measures that increased the range of General Government entities and, in substance, was developed as an intragovernmental borrowing tool, which covered the inability to raise funding either from the EU/ECB/IMF Support Mechanism or from the markets. Thus, according to the figures of June 2015, repos agreements with General Government entities covered €10.5 billion of Central Government debt, compared to €8.6 billion at the end of 2014. In parallel, after the end of the second Economic Adjustment Program in June 2015, the country benefited from a special financing status from its European partners until the conclusion of the third program agreement, in order to meet its debt obligations of July and August 2015. In sum, therefore, the July 2015 short-term loans, including both sources of funding, increased to €16.9 billion.

3. It is a method developed by the Public Debt Management Agency (PDMA) since 2014, providing a new way of responding to the short-term borrowing needs of the Government, primarily through cash flow management in the form of repo agreements between the PDMA and General Government entities.

CHART 2.2.2
**Central Government Debt (July 2015), (€ million;
 % of debt)**



Source: Ministry of Finance, General Government Bulletin July 2015.

Additionally, a change is also detected regarding the characteristics of the Central Government debt in recent years, as in June 2014 the largest part of the debt was non-tradable (73.9%) and at a floating rate (66.0%), reversing in both cases the situation as compared to 2011 (Table 2.2.4). This development in the composition of debt is, of course, due to the financing of the country by the EU/ECB/IMF Support Mechanism, which is based on non-negotiable and floating rate loans. However, it is

worth noting that the share of Central Government debt at a fixed interest rate increased in June 2015 by 5.5 percentage points compared to December 2013 (28.5%) due to financial coverage by General Government entities through repos.

In total, the Central Government debt, according to data of the General Accounting Office, amounted to €313.7 billion in July 2015 compared to €324.1 billion in December 2014 (because of the return of funds to the EFSF), while at the General Government level, at this stage, it is even lower, as it does not take into account the intragovernmental debt created by the increase in short-term borrowing by the General Government through the aforementioned repos method. These two developments (the increase of intragovernmental debt and the return of funds from the HFSF to EFSF), combined with the lower interest rates of the EFSF, and the lower performance of the growth rate –including the deterioration in the revision of historical data– initially allowed, the IMF⁴ to estimate (assuming the full implementation of the agreed Economic Adjustment Program and the achievement of program objectives) that public debt –as part of the debt sustainability analysis– could stand at 116.5% of GDP in 2020 and 104.4% of GDP in 2022. However, as highlighted in the report, and its updated version, the lower fiscal targets of the program, the lower expected revenues from the privatization program, the lower levels of growth, the increase in arrears, the need to restore the liquidity buffer, but also the need for a new recapitalization of the banking system deteriorated the situation regarding the sustainability of public debt, while increasing, at the same time, the financing needs. Thus,

TABLE 2.2.4 Composition of Central Government Debt

	December 2011	December 2012	December 2013	December 2014	June 2015
A. Rate					
Fixed rate ¹	62.0%	32.7%	28.5%	33.2%	34.0%
Floating rate ^{1, 2}	38.0%	67.3%	71.5%	66.8%	66.0%
B. Trade					
Tradable	74.7%	34.3%	28.4%	25.0%	26.1%
Non-tradable	25.3%	65.7%	71.6%	75.0%	73.9%
C. Currency					
Euro	97.5%	96.7%	95.9%	95.7%	95.4%
Non-euro area currencies	2.5%	3.3%	4.1%	4.3%	4.6%

Source: Public Debt Bulletin (December 2011, December 2012, December 2013, December 2014, June 2015).

Notes: ¹ Fixed/floating participation is calculated including Interest Rate Swap transactions.

² Index-linked bonds are classified as floating rate bonds.

4. The report of the IMF is available at: <http://www.imf.org/external/pubs/ft/scr/2015/cr15165.pdf>

according to the updated IMF analysis on the sustainability of public debt (taking into account the estimated deterioration of the domestic macroeconomic and financial environment due to the bank holiday and capital controls),⁵ public debt is estimated to approach 200% of GDP during the next two years and reach 170% of GDP in 2022 (the initial estimation in the debt sustainability analysis a few days before the update was 142% of GDP in 2022). In the same vein, the European Commission,⁶ in a text regarding the Greek request for funding by the European Stability Mechanism (ESM), underlined that, according to the adverse scenario, the country's public debt could reach 176% of GDP in 2022.

In this context, and taking into account the recent developments, the macroeconomic and financial conditions,

and the risks regarding the achievement of objectives, both the IMF and the European Commission underline the need for a public debt relief (with various techniques), making, however, both special reference to the importance of focusing the debt sustainability analysis on gross financing needs and not on the stock of public debt, which is very high, thus making possible –following the Eurogroup's decision of November 2012– the implementation of objectives regarding debt sustainability in other ways than the «haircut». However, as highlighted by both institutions, any initiative with regard to debt relief should be accompanied by the implementation of all necessary reforms and the achievement of distinct objectives under the Economic Adjustment Program. Consequently, the forthcoming first evaluation of the third Economic Adjustment Program is of great significance.

5. The report of the IMF is available at: <http://www.imf.org/external/pubs/ft/scr/2015/cr15186.pdf>

6. The report of the European Commission is available at: http://ec.europa.eu/economy_finance/assistance_eu_ms/documents/2015-07-10_greece_art_13_eligibility_assessment_esm_en.pdf

3. Human resources and social policies

3.1. Recent developments in key variables of the Greek labour market

Ioannis Cholezas

3.1.1. Introduction

The economic and political developments in Greece, which led to a banking holiday approximately 20 days long (28 June – 19 July) followed by the introduction of restrictions in capital mobility (capital controls), seem to have deeply scarred the labour market, although the size and depth of those scars has not yet been fully determined due to the lack of data¹ and the fact that it takes more time for the impact to be realised.² A first look reveals the deterioration of the Greek labour market, which had already started in August 2014 and seems to evolve further in the first eight months of 2015, probably due to the unstable and uncertain business environment, especially those businesses related to foreign markets, i.e. exports and imports of goods and services, tourism included.³ The worsening of labour market conditions is verified by the increase in the number of the unemployed, based on July data, and negative flows of paid employment in July and August. Given the general environment formed, similar developments will probably continue in the following months. A key factor of reversal, given there is one, could be the smoothing of the political and economic conditions after the elections of September 20.

3.1.2. Quarterly Labour Force Survey data (LFS)

The unemployment rate in the first quarter of 2015, marked by the new government coalition formed in January, increased to 26.6% from 26.1% in the last quarter of 2014 (2014d). This is nothing more than the usual

seasonal unemployment increase reported each year, although it is slightly smaller than the respective increase a year ago. The unemployment rate for men increased on a quarterly basis by a mere 0.2 percentage points (pp), while the women's unemployment rate increase by 1 pp. This equals a 4.4 thousand increase in male unemployed and a 22.3 thousand increase in female unemployed. Furthermore, the unemployment rate decreased by 1.2 pp compared with 2014a, which equals 70 thousand fewer unemployed, mostly men, who exhibit higher volatility compared to women. The gender unemployment differential compared both with the previous quarter and with the previous year widened, reaching 7.1 pp, at the expense of women (30.6%).

Age

In 2015a youth continue to be more likely unemployed, since the unemployment rate for those aged 15-19 is 59.7%, those aged 20-24 is 50.9% and those aged 25-29 is 39.7%. With the exception of age group 45-64, which exhibits a slight unemployment increase, the remaining age groups have a lower unemployment rate compared with 2014a. The largest decreases involve the younger age groups and, particularly, are as high as -11.7 pp in group 15-19 and -3.6 pp in group 20-24. The first age group, however, records the largest increase compared to the previous semester (+6.7 pp), an observation that leads one to conclude that younger cohorts are more vulnerable to seasonal unemployment volatility. An interesting aspect of the unemployment problem, which is often neglected, is the age composition of the pool of unemployed. For instance, the share of youth unemployed aged 15-24 or 15-29 decreased compared with 2014a from 12.8% to 11.9% and from 30.2% to 28.3%, respectively. This reduction is probably due to the large number of interventions against youth unemployment, but it also puts forward a matter of priority, since the

1. At the time of writing available sources included data for employment and unemployment until July 2015. The data involve quarterly or monthly information for paid employees only or all employed and unemployed country wide.

2. The last report of the Parliamentary Budget Office (July 2015) states clearly that the impact of events that took place in the first semester of the year are expected to continue to harm the Greek economy, despite the deal of July 12, since restoring trust in Greek politics and the banks takes time, while capital controls, which are not expected to be revoked soon, pose serious obstacles mainly for importing businesses. The report is available at the following address: <http://www.protothema.gr/files/1/2015/07/29/q2-2015-gr.pdf>.

3. More recent ELSTAT data for July show a decrease in the trade balance deficit by 19.5% in the first seven months of the year, while the decrease in imports reached 32.0% and in exports 8.0%, just in July, due to capital controls. The respective press release is available at: http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/A0902/PressReleases/A0902_SFC02_DT_MM_07_2015_01_P_GR.pdf.

larger unemployed age group, i.e. 30-44, receives much less publicity and support from the state.

Education

Graduates from higher levels of education continue to enjoy lower unemployment levels compared to graduates from lower levels of education, in 2015a. In particular, the unemployment rate for Master and/or PhD holders is 12.9% and for University graduates it is 19.8%, while, on the other end of the spectrum, the unemployment rate for graduates from Elementary education (Dimotiko) or with even lower education is 27.6% and for Gymnasium graduates it is 31.0%. The unemployment rate for graduates from the top level of education went down considerably compared to 2014a (-2.4 pp) and only marginally compared to 2014d (-0.3 pp), which makes it the only educational group which saw its unemployment go down in the last quarter. On the other hand, the unemployment rate for University graduates continued to rise, especially compared with 2014a (+1.2 pp), while the unemployment rate for Technical education graduates, Lyceum graduates and Gymnasium graduates all went down compared to 2014a (-2.0 pp, -1.7 pp and -2.1 pp, respectively).

As far as the educational composition of the pool of unemployed is concerned, the share of University graduates increased compared to 2014a, from 11.9% to 13.6%, while changes in all other groups are less than one percentage point. This is an interesting observation given the large number of interventions targeted at combating University graduate unemployment and probably indicates that changes are necessary, either in planning or in implementing these interventions, in order to improve their effectiveness. In any case, most of the unemployed continue to be Lyceum graduates (38.5%) and, thus, interventions are necessary to support them.

3.1.3. Monthly data

Due to the rapid political and economic events and the lack of more recent quarterly data from LFS, an attempt is made to draw a picture of the labour market with the use of monthly data which, unfortunately, have less information available compared with quarterly data.

Labour Force Surveys (LFS)

Currently, the most recent data for the labour market from ELSTAT refer to June 2015 and come from the LFS data addressing the second quarter of the year.⁴ The seasonally adjusted unemployment rate is 25.2% which is higher compared to May 2015 (25.0%), but lower compared to June 2014 (26.6%). Funnily enough, despite the higher unemployment rate, the number of unemployed is smaller by 0.2% or 2,600 individuals in a month and reflects the increase in hires in tourism.⁵ A closer look at the data reveals that the unemployment rate went up due to the fastest decrease in the labour force. On the other hand, compared with June 2014 the unemployed decreased by 6.3% or 81,500 individuals, continuing the downward movement that started back in 2013 when the total number of unemployed peaked at 1.35 million.

Women continue to face a higher unemployment rate than men (29.5% vs. 21.7%) and, compared with June 2014, the differential increased to 7.8 pp, the widest gap since 2010 for this particular month. Individuals aged 25-34 are the only group exhibiting a reduction in the unemployment rate, which is bigger than the total (-3.1 pp vs. -1.4 pp), while for groups 35-44 and 55-64 the unemployment rate remained almost constant. Finally, out of seven decentralised commands⁶ three have higher unemployment rates than the country's average: Epirus-West Greece, Thessaly-Stereia Ellada and Attica, the area with the largest population. Furthermore, Epirus-West Greece, the Aegean and Crete now face a higher unemployment rate compared to May, while in Thessaly-Stereia Ellada and Attica the unemployment is higher compared to June 2014.

Data for the unemployed from the Manpower Employment Agency (OAED)

The most recent data for the unemployed from OAED refer to July 2015 and, thus, they provide a more recent snapshot of labour market developments. The number of the unemployed based on OAED data is smaller than the one based on LFS data, as stressed in previous issues of the *Greek Economic Outlook*, because of the different definitions of unemployment used and the way the unemployed are recorded. Additionally, there is a basic distinction in OAED data between the unemployed

4. See the ELSTAT press release for August 6, 2015.

5. For instance, in 2013b and 2014b the number of employed increased in "Accommodation and food service activities" by 26.4 thousand and 53.3 thousands, respectively, while the number of the unemployed decreased (-4.8 thousand and -62.2 thousand, respectively). Similar results are expected in 2015.

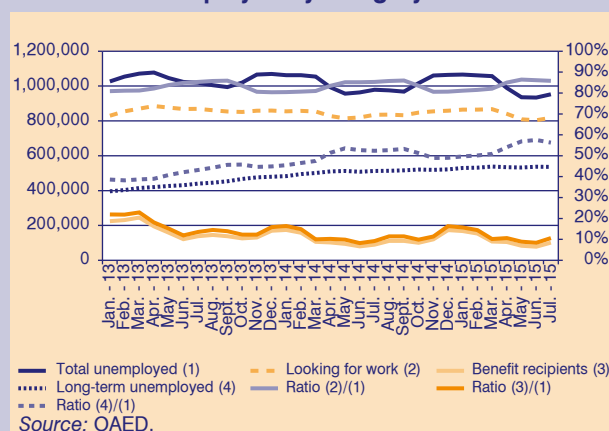
6. Monthly data are reported using seven decentralised commands due to the small sample size which could lead to large sampling errors. These decentralised commands are: Macedonia-Thrace, Epirus-West Macedonia, Thessaly-Stereia Ellada, the Peloponnese, West Greece & the Ionian Islands, Attica, the Aegean and Crete.

in total and the unemployed who are looking for a job, while there is also information on the unemployed who receive an unemployment benefit and those who are long-term unemployed, i.e. unemployed more than 12 months. That information is summarised in Graph 3.1.1.

A first look is enough to observe that the number of the unemployed decreased during the summer, an outcome of the tourism effect which is clear even during the crisis. The reduction in the number of the unemployed begins in April or May and finishes in September. In the period of concern, i.e. January 2013 – July 2014, the largest number of unemployed is recorded in April 2013 and the smallest in June 2015; both observations are in accordance with the LFS data. It is interesting and at the same time worrisome that in July 2015 the number of the unemployed increased. A similar phenomenon was recorded in 2014 and 2011, but the increase was smaller then (1.6% and 0.9%, respectively, vs. 2.0% this year). The most plausible explanation is that the weak downward trend in the number of the unemployed was interrupted in the second half of the previous year, while the unstable political and economic environment and the liquidity problems facing the Greek economy, which intensified in July 2015, had a direct negative impact on the labour market.

A few more points that are worth mentioning and have also been stressed in previous issues of the *Greek Economic Outlook* include the large and still increasing number of long-term unemployed, which increased by 21.9% compared to July 2013, reaching 56.3% of total unemployed. This group of unemployed requires more attention and direct intervention from the state in order to stop this human capital from depreciating. The second point involves the low degree of support available to the unemployed, since in July 2015 only 10.6% received an unemployment benefit, when in July 2013 the respective share was 13.6%, a share equally depressingly low given the aim of the unemployment benefit in the first place. Unsurprisingly, the number of the unemployed who receive an unemployment benefit has decreased by 26.7% since July 2013, which is typical of the lack of support offered to the unemployed at a time it is needed most and when households with no one employed are a bitter reality. Last but not least, the share of those registered with OAED and actively looking for a job is almost stable and fluctuates around 80-85%, slightly decreased compared with previous years, which is expected given the fatigue and the disappointment caused by the lack of jobs and long-term unemployment.

GRAPH 3.1.1
Number of unemployed by category



Note: Unemployed (registered), unemployed looking for a job, unemployed who receive an unemployment benefit and long-term unemployed are measured on the left hand axis and are expressed in number of persons. Ratios, on the other hand, are measured on the right hand axis and are expressed in percentages.

3.1.4. Data for paid employment - ERGANI

Paid employment is the largest part of the labour market. Therefore, when paid employment changes one should expect similar changes to the entire employment structure. In this framework, the intensified political and economic uncertainty which started last autumn and peaked this year had the expected adverse effects on paid employment also. Factors that have had adverse effects on the evolution of paid employment are the continued reduction in disposable income, which has led to even lower demand for goods and services, and reduced liquidity in the market due to the banking holidays followed by capital controls. These factors have driven increased economic uncertainty and ever lower demand.

Data on paid employment provided by the ERGANI project for July and August gives a first glimpse of what will follow if conditions do not improve in the economy. Things already looked troublesome in June, since, despite the fact that the hires vs. fires balance (i.e. voluntary quits or layoffs) continued to be positive, fires increased faster compared with June 2014 and as a result new positions of paid employment were considerably less (44%) compared with the previous year. In July and August the situation was even more disappointing, as shown in Table 3.1.1. Contrary to what the case was a year ago, paid employment flows were negative. In other words, there were fewer jobs, despite the fact that tourism did exceptionally well.⁷

7. SETE reports an increase in tourist traffic. In particular, in the first seven months of the year the arrival of foreign tourists in airports went up by 26.5% or approximately 500 thousand persons. In July only, visitors increased by 27.8%, despite capital controls. The data are available at the following address: <http://sete.gr/el/statistika-vivliothiki/statistika/>.

Table 3.1.1 Paid employment flows July-August

	July 2014	July 2015	August 2014	August 2015
I. Hires	157,255	143,972	103,551	120,631
II. Fires (inc. voluntary quits or layoffs)	143,980	160,630	102,240	121,072
A. Notice of termination/expiration of open-ended/fixed-term contracts	85,028	93,577	48,826	55,715
% Fires	59.1%	58.3%	47.8%	46.0%
B. Voluntary quits	58,952	67,053	53,414	65,357
% Fires	40.9%	41.7%	52.2%	54.0%
III. Balance (I-II)	13,275	-16,658	1,311	-441

Source: ERGANI reports, KEPE processing.

The reduction reached 16,658 jobs in July and 441 jobs in August. This is the worst performance since July 2001 (Graph 3.1.2). More specifically, there were 8.4% fewer hires in July and 11.6% more fires compared with July 2014, most of which refer to notices of termination or job contract expirations. In August, on the other hand, hires increased by 16.5% compared with August 2015, while fires increased by 18.4%. Moreover, the majority of fires in August involves voluntary quits, in contrast with July.

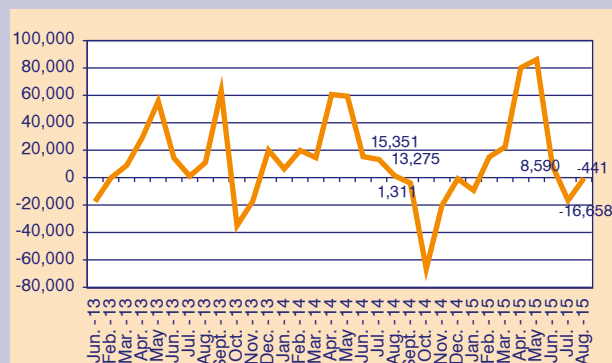
As far as voluntary quits are concerned, they seem to have an ever expanding share of total fires: their share has increased by more than 16 pp since August 2012, while during the past year it increased by 2 pp (August 2014 – August 2015). Given the lack of new jobs and, thus, of mobility between jobs for those already employed, voluntary quits might involve increased flows towards retirement. Otherwise, if they head towards the pool of unemployed, the behaviour of those quitting during a deep crisis with high unemployment rates seems strange and raises several doubts about their intentions and choices.

In the first eight months of the year, the paid employment balance continues to be positive (186,024 new jobs), but it is seriously diminished compared with 2014 (190,883 new jobs). Although hires exceeded last year's figure (+14.2%) the same thing happened with fires (+18.0%), especially voluntary quits (+22.9%). Nevertheless, judging by the evolution of paid employment in July and August, the future looks ominous. Under specific conditions, for example, the introduction of VAT in private education is expected to have a negative impact on paid employment. On the one hand, education traditionally involves a large number of employed, i.e. it is a labour intensive activity, and, on the other hand, the increase in private education cost is expected to place an extra burden on middle income households' family budget. Specifically,

if demand for private schools is adequately elastic, one would expect fewer enrolments with adverse effects on the industry's employment.

The first signs of concern for the developments in the field of paid employment started in August 2014, since this was the first time that fewer jobs were recorded compared with the same month of the previous year (Graph 3.1.2). Moreover, in September 2014 the biggest lag in the creation of new jobs was recorded for the previous 18 months, since approximately 4,000 jobs were lost compared with more than 63,000 jobs created in September 2013. Therefore, it seems that the positive movement of paid employment had already stopped much earlier than 2015. Nevertheless, over the past eight months a further deterioration is clear, which is even stronger in the last couple of months. For instance, in January the balance of paid employment flows was negative contrary to January 2014, while in February there were fewer jobs created compared to the previous year, by almost 5,000. On the other hand, in March, April and May 2015 paid employment net flows exceeded those in the respective months of 2014. Undoubtedly, paid employment took the largest hit in July and, despite the August recovery fueled by tourism, it still lags behind past performances.

Perhaps one of the most typical features that reflect the uncertainty in the labour market is the type of job contracts signed. Specifically, in the first eight months of 2015 hires under part-time (16.5%) and rotation contracts (66.6%) increased, while hires under full-time contracts decreased. As a result, the share of hires under full-time contracts decreased from 52.9% to 46.2%, while the share of hires under rotation contracts increased from 13.0% to 19.0%. These differences are even more pronounced compared with July 2014, since full-time job hires decreased from 48.2% to 16.1% and rotation job hires increased from 15.6% to 47.0% of the total. Signs

GRAPH 3.1.2**Paid employment balance, Jan. 2013 – Aug. 2015**

Source: Various ERGANI reports, KEPE processing.

of paid employment recovery are clear in August with full-time hires dominating (47.3% of total) and part-time hires following (37.3%).

The labor market outlook seems even more disappointing, if one considers the conversions of full-time job contracts to part-time or rotation job contracts. During the first eight months of 2015 conversions went up by 23.3% in total. The biggest increase is recorded for conversions to rotation jobs without the employee's consent (33.6%). The situation got worse in July and improved slightly in August. Compared with the previous year (July 2014) conversions went up by 2.5 times, from 3,288 to 8,348. Of these, conversions from full-time to part-time jobs increased 1.7 times, conversion of full-time to rotation jobs with the consent of the employee increased by 2.8

times and without the consent of the employee by 5.8 times. Respectively, in August conversions of full-time jobs to part-time jobs increased by 1.6 times, to rotation jobs with the consent of the employee by 2.2 times and without the employee's consent by 4.2 times. It is rather obvious that irrespective of the angle of approach, reality is ruthless and has significantly worsened compared to the recent past.

3.1.5. Conclusions

The situation of the labour markets leaves no room for optimism. The use of more recent but less rich monthly data from available sources addressing the evolution of the number of the unemployed and paid employment flows in July and August indicate a general deterioration of the situation of the employed during the summer, a conclusion which is reinforced by the new drop in wages recorded in the second quarter of 2015 compared with the respective quarter of 2014, by 4.2%.^{8,9} Naturally, this could represent an effort to adjust to lower demand through cutting wages instead of cutting jobs, as was the case at the beginning of the crisis. Precise predictions for the developments in the labour market are not attempted, but given that the labour market variables are characterised by hysteresis it should be considered highly probable that the situation will deteriorate further, especially if political and economic stability are not restored. But then, the nature of the stabilisation could have either a positive or a negative impact on labour market prospects. For instance, the impact of deregulating group dismissals cannot be *a priori* determined.

8. ELSTAT's relevant press release is available at the following address:

http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/A0199/PressReleases/A0199_DKT08_DT_QQ_02_2015_01_F_GR.pdf.

9. Bear in mind that the second quarter of the year includes data up to June, thus the consequences of the shocks that took place in July are not recorded.

3.2. Evidence of intraregional heterogeneity in employment, unemployment and non-participation in the workforce: the case of Western Greece

*Pródromos Prodromidis*¹

The purpose of the article is to complement the analysis carried out in the previous pages regarding labor market developments during the economic recession in Greece, by pointing out that the said developments diverge from one part of the country to the other, and even within the same region. It is a perspective which policy-makers may want to take into account in view of the need to make the most of the scarce resources.

To illustrate with an example, we study the employment, unemployment and non-participation patterns of residents aged 15 years and older across Western Greece (i.e., the part of the country that consists of Achaea, Ilis, Aetolia and Akarnania) on the basis of the Labour Force Survey (LFS) figures estimated from representative samples of the population by Greece's Statistical Authority (ELSTAT, formerly, the National Statistical Service of Greece).

It appears that while the number of unemployed increased (especially in the period 2008-9 and 2010-14) and the number of employed and non-participants in the labor market decreased (especially in 2011-14 and 2011-15, respectively) (see Diagram 3.2.1, relying on first quarter figures and, thus, evading seasonal effects), a close examination by demographic group and subregional classification (urban, rural, intermediate)² reveals considerable heterogeneity.

More specifically, once the seasonal effects are econometrically removed from the LFS figures reported from the first quarter of 2008 (2008a) to the second quarter of 2014 (2014b),³ and the long-term (trend) and me-

dium-term (cyclical) components only are considered, it appears that in the majority of demographic-and-sub-regional combinations (see Box 1) there is a:

- Rise in the number of unemployed in relation to the number of non-participants of the same age-group, with exceptions in the cases of men aged 15-24 and women aged 20-24 in urban and rural areas. For instance, in Diagram 3.2.2, the ratio of unemployed women aged 20-24 to non-participating women of the same age in urban areas, at the end of the period, is lower than the corresponding ratio at the beginning of the period (from more than 0.35:1.00 to less than 0.30:1.00), and is even lower at times in between.
- Fall in the number of employed men in relation to the number of non-participants of the same age-group, with exceptions in the cases of men aged 30-39 and 50-54 in urban areas and men aged 15-24 in intermediate areas. For instance, in Diagram 3.2.3, the ratio of employed men aged 50-54 to non-participating men of the same age in urban areas, at the end of the period, is higher than the corresponding ratio at the beginning of the period (from less than 5.00:1.00 to more than 8.00:1.00), and is even higher at times in between.
- Rise in the number of employed women in relation to the number of non-participants of the same age-group, with exceptions in the cases of women aged 15-24 in urban areas; 15-24 and 30-34 in intermediate areas; and 15-24 and 35-64 in rural areas. For instance, in Diagram 3.2.4, the ratio of employed women aged 35-39 to non-participating women of the same age in urban areas, at the end of the period, clearly exceeded the original ratio (from less than 0.50:1.00 to more than 4.00:1.00).

In view of the above, and as the patterns in the number of employed and unemployed men and women vis-à-vis the number of non-participants from the same demographic groups are not uniform at the subregional level, the obvious course of action by policy-makers who wish to intervene is to engage in spatially and demographically targeted interventions.

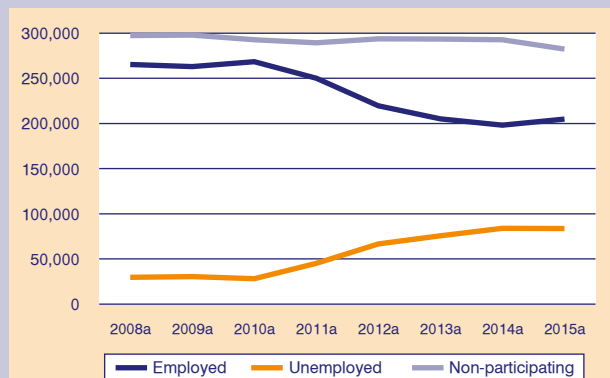
1. Thanks are due to Emily Vgenopoulou and George Economou for executing a large number of econometric regressions, of which only a few are supplied here in Diagrams 3.2.2-3.2.4 in the interest of brevity. The analysis is part of a broader study conducted at KEPE for the regional authorities of Western Greece in order to support the five-year development plan of the region.

2. ELSTAT classifies communities as urban, rural or intermediate on the basis of their resident population: over ten thousand, fewer than two thousand, in between, respectively.

3. After which the recessionary trend in terms of increasing job losses and number of unemployed in Western Greece began to reverse.

DIAGRAM 3.2.1

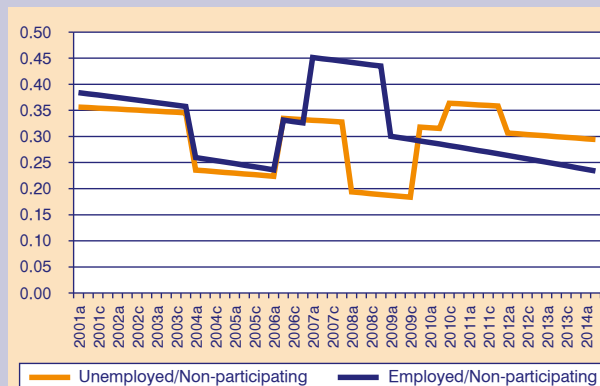
Evolution of the number of employed, unemployed and non-participant residents aged 15 years and older in Western Greece: 2008-2015, from the first quarter of one year to the first quarter of the next year



Source: LFS, own calculations.

DIAGRAM 3.2.2

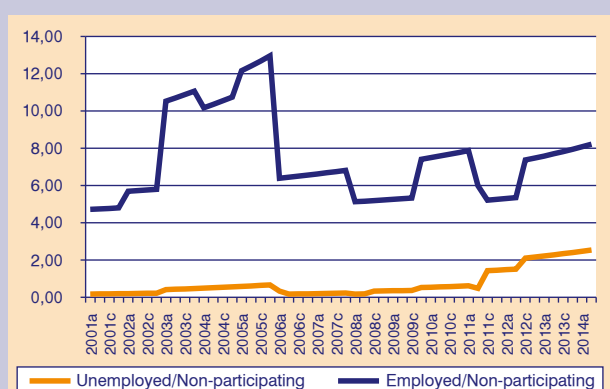
Evolution of the number of females aged 20-24 years in the urban areas of Western Greece (mid-term cycles and long-term trends, without seasonal effects)



Source: LFS, own calculations.

DIAGRAM 3.2.3

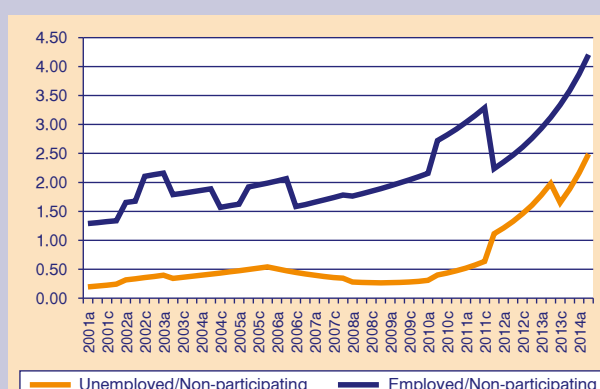
Evolution of the number of males aged 50-54 years in the urban areas of Western Greece (mid-term cycles and long-term trends, without seasonal effects)



Source: LFS, own calculations.

DIAGRAM 3.2.4

Evolution of the number of females aged 35-39 years in the urban areas of Western Greece (mid-term cycles and long-term trends, without seasonal effects)



Source: LFS, own calculations.

BOX 1: A brief description of the econometric method

The number of employed, unemployed or non-participating male and female residents of Western Greece aged 15 years and older is explained in terms of (i) the long-term trend (time, t , and its square, if the latter is statistically significant at the 1% level), (ii) categorical variables for each quarter (with the first quarter serving as a reference), and (iii) mid-term cycles, mt . The latter take the form of categorical variables for successive quarters which exhibit statistically significant variation from the trend, such as the time period between the third quarter of 2007 (2007c) and the fourth quarter of 2010 (2010d) next.

For example, the number of employed men aged 50-54 years in semi-urban areas =
 $3,354.6 - 254.7 \times (\text{quarter b}) - 432.6 \times (\text{quarter c}) - 179.0 \times (\text{quarter d}) - 22.6 \times t - 843.2 \times (mt \text{ 2001a-d}) + 1,149.2 \times (mt \text{ 2007c-2010c}) + 297.6 \times (mt \text{ 2011a-2012c}).$

$N=54$ observations, $R^2=85.06\%$. With the exception of the estimated parameter associated with the fourth quarter, the others are statistically significant at the 1% level. Once the seasonal effects are estimated, they are isolated and removed, and the analysis in Diagrams 3.2.2-4 is carried out on the basis of the trend and cyclical effects.

4. Development policies and sectors

4.1. Analysis of tourism trends in Greece

Nikolaos Vagionis

4.1.1. Analysis of the tourism turnover

As it has been noted previously, economic activity in tourism is important and has proved resilient to the crisis and supportive of the recovery of economic activity in our country.

This article originally looks at the Turnover Index of Accommodation and Food, which is a particularly useful tool for comparisons over time and for correlations with events and policies.

With an analysis of the annual and quarterly data, and also with the help of *Figures 4.1.1* and *4.1.2* it can be observed that:

Using the new base (average annual index of the year **2010 = 100**) and as shown in *Table 4.1.1*, which shows the adjusted prices of the Index from 2005 until today, one can observe that the average annual index recorded the highest receipts in the tourism sector in 2008, reaching **119.8**. Then a phase of reduction in turnover began and the average annual index fell to **108.9** in 2009, to

100 in 2010, then to **92.6** in 2011, dropping to **76.7** in 2012. In 2013 the average annual index bounced back to **80.3**, and in 2014 reached **91.4** having covered part of the losses compared to 2010 and clearly less compared to 2008.

Analyzing the data, we note the following: First, the lowest level of the decade on an annual basis was in 2012 (at 76.7) with the Turnover Index of Accommodation and Food reduced in total by 36% compared to 2008. Second, the absolute lowest index (i.e. receipts) value was recorded in the first quarter of 2013, at **32.1**, being the decade's minimum.

Analyzing the quarterly data (See *Figure 4.1.2* and *Table 4.1.1*) we see that after the decade's negative (first quarter 2013) there has been a substantial and systematic increase as follows: In the first quarter of 2014 the index rose to 46.5, recording a 45% increase over the corresponding quarter of 2013. In the second quarter of 2014, the index rose to 89.8, some 6.7% higher than the second quarter of 2013. In the third quarter of 2014 the index rebounded, reaching 158.8, 7.6% higher than the respective third quarter of 2013, and the fourth quarter of 2014 reached 70.3, up 22.2%.

The upward trend continues in 2015, with the index in the first quarter being 49.3, an increase of 6% compared to the respective quarter of 2014, which continued in the second quarter of 2015, with the index at 101.9, increasing by 13.4%, respectively, from last year.

Table 4.1.1 Turnover Index for Accommodation and Food, Year's average and quarters. 2010=100

	Year's average	Q1	Q2	Q3	Q4
2005	105.2				
2006	109.0	67.4	111.4	168.1	89.3
2007	116.1	74.1	117.4	174.3	98.3
2008	119.8	77.7	120.6	184.3	96.6
2009	108.9	62.1	115.0	180.0	78.4
2010	100	64	103.3	166.6	66.1
2011	92.6	50.8	101	164.7	54
2012	76.7	38.6	80	145.7	42.3
2013	80.3	32.1	84.2	147.5	57.6
2014	91.4	46.5	89.8	158.8	70.3
2015	n/a	49.3	101.9		

Source: Greek Statistical Authority. Calculations by the author.

Note however that the significant increase in turnover in some quarters of 2014 and 2015 have not yet approached those of 2008 (see *Table 4.1.1*). Data for receipts in the third quarter of 2015 are not yet available and the influence of the immigrant/refugee wave in the Aegean islands cannot currently be quantified.

It can be seen that the 'low season', i.e. the first and fourth quarters of each year, showed the greatest changes in the years 2011, 2012, 2013. *Figures 4.1.1* and *4.1.2* highlight the serious seasonality of the tourist phenomenon, which intensified to a considerable extent due to subsidence of the domestic non-summer tourism, but also due to the reduced attractiveness of urban destinations on the international market.

The situation seems to be quite restored, as reflected in the rising figures for first two quarters of both 2014 and 2015 (*Figure 4.1.1* and *4.1.2*). The inbound tourism

in cities and especially in large urban centers is clearly opening new international markets and the alternative to the sun-sea tourism forms, like cultural, congress, medical, professional, and religious tourism, seem to have contributed to this recovery. Domestic tourism has not recovered to the extent necessary to adequately influence the increase in arrivals in 'low-season' periods.

4.1.2. Analysis of international tourist arrivals by country of origin

By systematic analysis of recent data on "non-resident arrivals" in the country we can get good indications of inbound tourism and the recent trends of visitors from the countries of origin.

The **total number** of arrivals of visitors to the country for 2008 was 15.939 million people, while in the same period

FIGURE 4.1.1
Greece: Turnover Index of Accommodation and Food, 2007-2015
Year's mean, quarters. New base, 2010=100

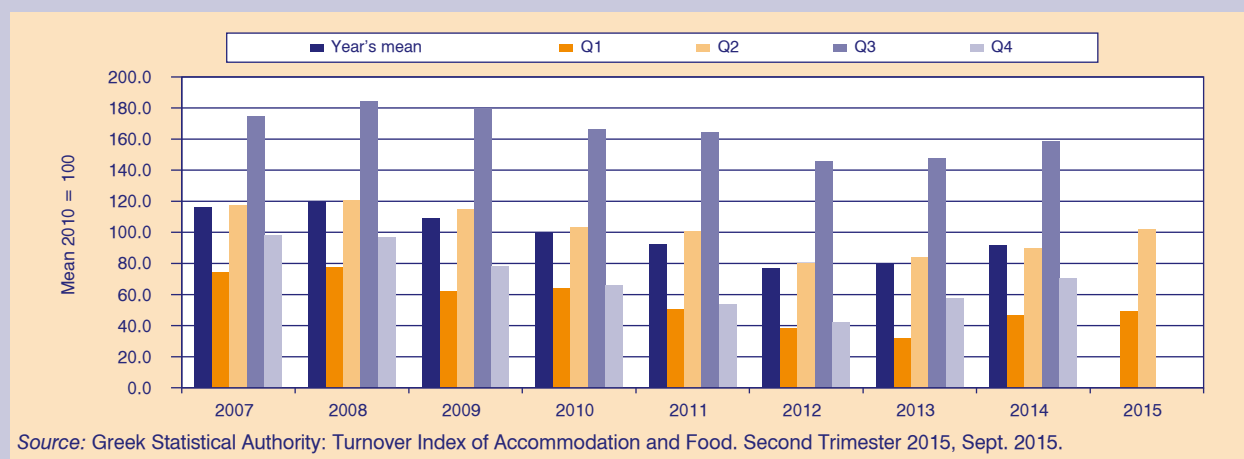
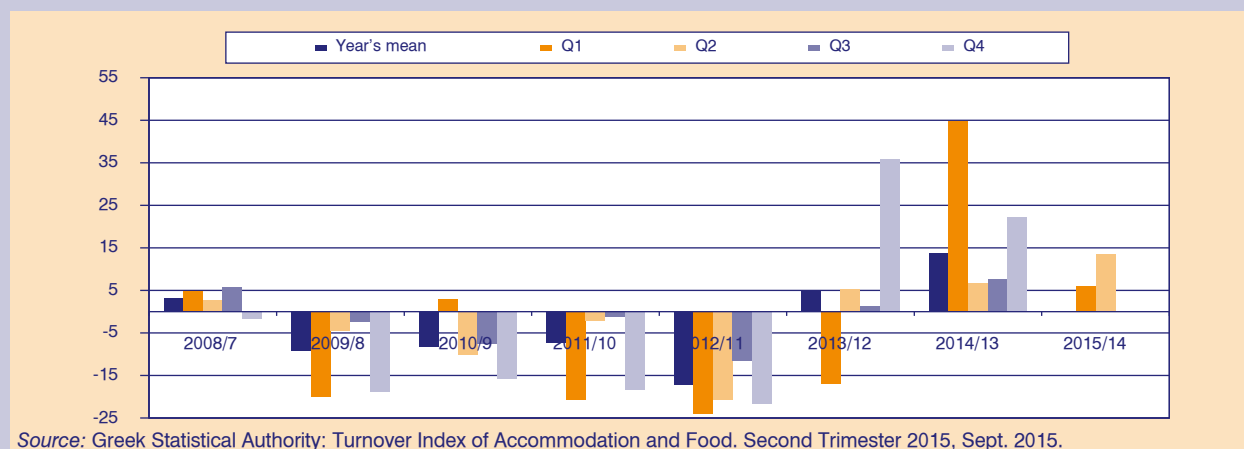


FIGURE 4.1.2
Greece: Turnover Index in Accommodation and Food, 2007-2015
Annual % change of year's mean and quarters



in 2009, arrivals decreased to 14.916 million, in 2010 to 15.008 million and in 2011 recovered to 16.427 million. In 2012 arriving travelers amounted to 15.518 million, in 2013 to 17.920, while in 2014 arrivals reached the record level of 22.033 million. From the available data, in the first eight months of 2015 it seems that arrivals may record a new high.

Let's look at the breakdown by region and country of origin for the period 2008-2014. *Figures 4.1.3, 4.1.4 and 4.1.5* show the details.

Europe

Analyzing the origin of visitors we see that arrivals from Europe (EU and other European countries) for 2008 were 14.475 million, accounting for 90.8% of total arrivals. During 2009, they fell to 13.601 million but as a percentage of the total rose to 91.2%. In 2010, arrivals from Europe were 13.276 million, and in 2011 rose to 14.652 million.

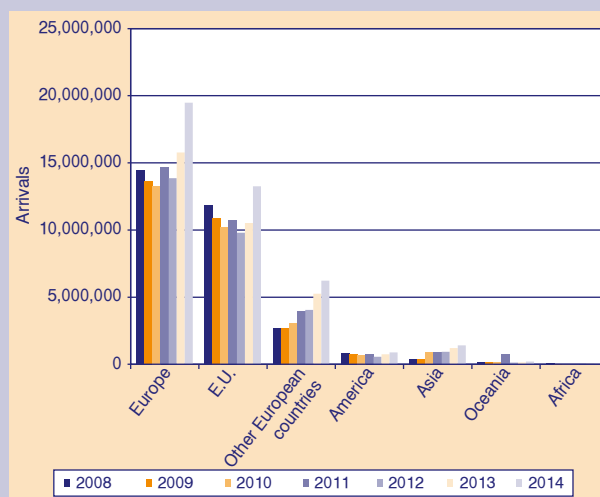
The percentages of the total for the two years were 88.5% and 89.2%, respectively. In 2012 the corresponding arrivals decreased to 13.851 million, accounting for 89.3% of total arrivals and for 2013 increased to 15.778 million and accounted for 88.1% of total arrivals. Finally, arrivals from all countries of Europe increased significantly in 2014 (23.4% compared with 2013), reaching 19.477 million travelers, who accounted for 88.4% of total arrivals (see also *Figure 4.1.3*).

Arrivals from the group of EU countries for 2008 was 11.815 million and represented 74.1% of all visitors. These were reduced to 10.888 million or 73% in 2009, and to 10.200 million or 68% of all visitors in 2010. A slight increase (4.9%) was recorded in 2011, reaching 10.698 million, however, with reduction in the percentage of total arrivals (65.1%). For 2012 there was a decrease to 9.792 million or 63.1% of all visitors, and for 2013 an increase to 10.525 million, with a rate, for the first time, below 60% of the total arrivals (58.7%).

Over the course of 2014 increased arrivals from the EU countries were recorded, at 13.249 million. However, the rate remained at 60.1%. This gradual and sustained fall from 74.1% to 60.1% is considered significant and systemic. Note that even in the first quarter of 2015 the arrivals from EU countries as a percentage of the total, reached 58.1% with 1.02 million arrivals.

In contrast, arrivals from non-EU European countries have followed a steady upward trend during the considered period and in relation to their share of total arrivals. Specifically, for 2008 the rate stood at 16.7%, in 2009 at 18.2%, and in 2010 at 20.5%. The trend of the non-EU European countries was strengthened in 2011,

FIGURE 4.1.3
International tourist arrivals at the Greek borders
by continent of origin: 2008-2014



reaching 24.1%, 26.2% in 2012, 33.3% in 2013, while during 2014 stabilized at 32%. It recorded a strong trend of particular importance. Firstly, because it indicates a shift in the markets to which the Greek tourist product is 'sold'. Second, because of the current economic dimension of this restructuring, but also due to the emerging medium-term momentum.

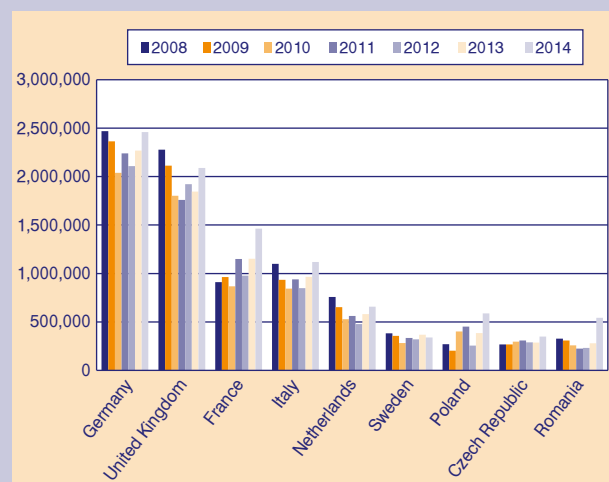
Of course, each market separately has its value (see also *Figure 4.1.4* and *4.1.5*). As of this situation, and regarding the distribution of arrivals of non-residents by country, as a percentage of the total, Germany continues to hold the greatest participation in 2014 with 11.2% (this was 12.7% in 2013 and 15.5% in 2008, respectively) followed by the United Kingdom with 9.5% (10.3% in 2013 and 14.3% in 2008), Bulgaria with 7% (3.9% in 2013 and in 2008), France with 6.6% (6.4% in 2013), with remarkable fidelity, (see and *Figure 4.1.4*) and Russia with 5.7% (from 7.5% in 2013 and 2.4% in 2008).

The focused marketing of Greek tourism in Russia appears to have had effect, but the internal problems of this country in 2014 had an impact in limiting the growth trend. By contrast, the traditional markets of Germany and the United Kingdom continued to fall, but for 2015 the figures so far show that it can be reversed.

Asia

Visitor arrivals from Asia in 2014 grew and reached 1.412 million, while in 2013 arrivals were 1.353 million. In 2012 this number was 875,000 compared to 739,000 in 2011 and only 385,000 in 2008. In 2014 Asian arrivals accounted for **6.4%** of the total arrivals in our country compared to **6.8%** in 2013 and just **2.4%** in 2008. As it

FIGURE 4.1.4
International tourist arrivals in Greece
Selected EU countries: 2008-2014



is shown, arrivals from Asia, as figures, show a large increase, which almost triples between 2008 and 2014, both in absolute numbers and as a percentage of all tourists.

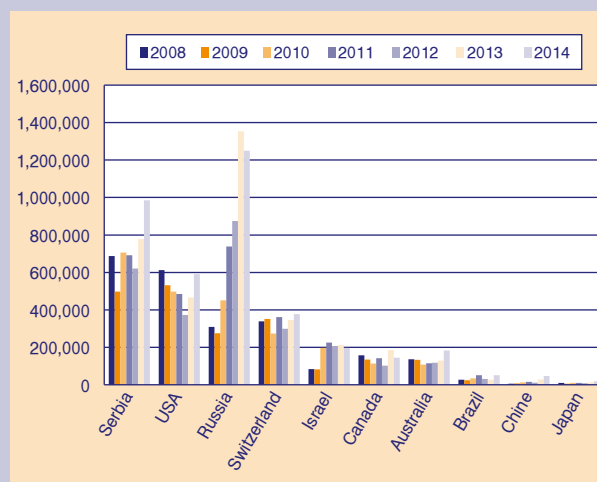
The main countries contributing to this are the following: Turkey, with 4.4% from the 6.4% of Asian tourists or 978,000 visitors in 2014 (compared to 831,000 in 2013 and only 208,000 in 2008). Israel, with 197,000 tourists in 2014, compared to 212,000 in 2013. It is also noted the increasing trend from China with 47,000 tourists in 2014, compared to 28,000 in 2013 and 6,000 in 2008, seven times up since 2008, but the figures are still quite small. Reductions are recorded by Lebanon and Syria, from 36,500 thousand in 2013 to 31,700 in 2014, as well as from Iran (from 5,200 in 2013 to 752 persons in 2014). Increases have been recorded from South Korea and other Asian countries.

America - Africa - Oceania

Overall arrivals from the Americas was 890,300 in 2014, marking a recovery of over 754,000 in 2013 and 559,000 in 2012. This recovery has the potential to continue through the activity of our tourist marketing to this continent. From Oceania there was also a significant increase with 205,000 visitors coming to Greece in 2014 (compared to 142,600 in 2013 and 160,000 in 2008). Finally, 49,000 visitors came from Africa in 2014 (versus 31,000 in 2013), of which 24,600 came from South Africa.

International tourist arrivals to Greece from selected geographic areas appear in Figure 4.1.3. It is noted that the EU remains by far the main feeder of Greek tourism, but with a downward trend, which is estimated to stabilize in

FIGURE 4.1.5
International tourist arrivals in Greece
Selected non-EU countries: 2008-2014



2015 and possibly start reversing. Also, an increase is evident from the other European countries, Russia and Asia, as well as their respective proportions. (see Figures 4.1.4 and 4.1.5).

4.1.3. Conclusions

The tourist revenues up till 2012 showed a continuing decline compared to 2008, while the recovery of 2011 related only to the arrivals and not to revenue. In 2014 a significant rise in tourism revenues over 2013 was recorded. In addition, the first two quarters of 2015 show an increase that is expected to continue in the third quarter and maybe throughout the year. The economic results are indeed positive, but have not yet reached 2008 levels, nor are relevant to Greece's capabilities. The conditions in Greece, in comparison with other Mediterranean countries were particularly favorable in view of the situation across North Africa and the near East. At least until today, when the influx of immigrants/refugees in Greece, mainly, but also in other countries has snowballed.

The **tourist arrivals** after the peak of 2008 had a decline in 2009 and 2010, recovered in 2011, only to continue downward in 2012. The year 2013 was a turning point. The absolute low and signs of recovery were noted. Recovery was confirmed in 2014 and continued in 2015. The increase of tourist arrivals had the important characteristic of restructuring of the regions of origin of tourists. Tourist arrivals from Asia and Russia doubled, there was stabilization of inflows from Western Europe and a partial recovery from America and Australia.

Apart from the increase in mass tourism arrivals, the support and promotion of special interest tourism and

activities is needed, e.g. medical, congress, ecological, tastings, wellness and rehabilitation, museums, festivals, sports, etc. These diversify the tourism product from the stereotypic 'sea and sun' vacation by acting additively and not competitively; they increase tourism consumption and help extend the tourist season, while opening new markets.

It should be noted that it is appropriate to consider ways of exploiting the resources of the country in times of low demand (1st and 4th quarter) where demand from several markets is rising (typical example is China), especially with regard to urban centers. The significant downturn in domestic tourism and the resulting number

of overnight accommodations should also be noted, which emerged due to the reduction in disposable income and very high unemployment.

Finally one should note that in 2015 tourism has supported the country's economy significantly, with a significant increase in international arrivals and revenues, until now. The year was not easy, it was a year with two general elections, a critical referendum, intense negotiations with European Institutions and conflicting opinions, and the recent phenomenon of the influx of refugees/migrants from the East, which is in progress and it is not easy to estimate the final dimension and impact.

4.2. The evolution of the main RES legal framework

Vassilis Lychnaras

4.2.1. Introduction

The option for electricity production from renewable energy sources (RES) was first included in the Greek legal framework in 1985. However, until 1999 the legislation was incomplete and poorly designed and the development of RES technologies was insignificant. After 1999, there have been milestones in the development of the legal framework, where the main target was to promote and support RES. Big steps for the market were taken between 2006 and 2010, where the favorable policy for the promotion of RES led to the rapid development of the installed capacity of RES. On the other hand, the lack of integrated planning led to the enlargement of specific technologies, such as photovoltaics, and the expansion of the problems regarding the viability of the market. As a result, after 2012, the legal framework of RES joined the obligations of Greece related to the memorandum and the main objective was to resolve problems and dysfunctions of the market. Recently, the latest readjustment of the framework in 2014 attempted to totally restructure the market. This affected the already-operating as well as the newly established RES stations. This paper records the periods/phases of the development of the main legal framework of RES in Greece. It also shows that the complexity of the framework creates inefficiency for the evolution and the functionality of the market.

4.2.2. Primary period for the RES legal framework

In Greece, RES electric power production was first legislated by **L. 1599/85** for the “**Regulations related to alternative energy sources and special issues for electricity generation**”. Based on this legislation, municipalities or other state organizations, other than the Public Power Corporation (PPC), obtained the right to produce electric power from RES, under the condition that they sell the total of power produced to the PPC, unless they spend this power for their own use. However, this law did not produce benefits, after all, due to factors such as the low pricing policy for the purchase of the produced power, the complicated licensing procedure and the investment uncertainty, which had significant negative effects.

The next legal modification came years later, in 1994, through **L. 2244/94** for the “**Regulations of issues**

related to electricity generation from renewable sources”, the first law determining the legal framework for RES electricity generation from producers other than PPC and the promotion of RES in Greece. Its basic provisions complied with the legislation implemented in other EU countries, such as Germany and Denmark. Some of these provisions were: a) to grant permission to independent producers to produce and sell RES electric power, b) to obligate PPC to buy the energy produced through long-term Power Purchase Agreements (PPA) with the producers, c) to offer attractive and relatively stable pricing to producers. This law was actually the first step in promoting and developing RES, as well as the basis for the amelioration of the legal framework.

The next big step was taken in 1999 with the enforcement of **L. 2773/99** for the “**Deregulation of the electricity market**”, which fully complied with Directive 96/92/EC and determined the regulatory framework for the deregulation of the electricity market. The basic provisions of the law were: a) to create the Regulatory Authority for Energy (RAE) as an independent authority, b) to create the Hellenic Transmission System Operator (HTSO), c) to deregulate electricity generation from RES, co-generation and other fossil fuels and d) to change PPC’s legal form into an S.A. Moreover, this law contributed to the priority penetration in the transition system of the energy produced from RES units versus the production by conventional units. At the same time, a special pricing policy was determined for RES power.

4.2.3. Period of completion of the legal framework and promotion of RES

However, even until 2006, the licensing procedure, as well as the operation of RES units, continued to stay behind due to a complicated and ineffective legal framework. These deficiencies led to **L. 3468/06** for the “**Electricity generation from RES and co-generation**”, which complied with Directive 2001/77/EC. The basic provisions of the law were: (a) to require the Administrator of the Transmission System to give priority to the penetration of the power produced by RES and co-generation units, (b) to simplify and accelerate the licensing procedure and (c) to establish the Preliminary Environmental Report for the project. Another significant provision of the law is the option to exclude some cases from the licensing procedure, i.e. the biomass or biofuel energy production units with installed capacity of less than 100 kWe and generally all pilot units with installed power capacity of up to 5 MWe, thus simplifying procedure for small RES projects. Finally, a new, more favourable, pricing policy was adopted for RES power production, according to which prices were determined at much higher levels than PPC’s rates. Especially for energy produced by solar

systems (photovoltaic, solar thermal), prices were much higher than the other RES technologies.

Additionally, in January 2009, **L. 3734/09** for the “**Promotion of the co-generation from two or more forms of energy**” came into force, complying with Directive 2004/8/EC. This law’s main stipulations were: (a) to cover the legal gaps related to the support of co-generation (b) to set the Preliminary Environmental Report as a prerequisite to obtain a production license and (c) to readjust of the RES pricing scheme.

Later, one of the most important laws for RES development was **L. 3851/10** for the “**Acceleration of RES development to help mitigate climate change**” (June 2010). The main goal was to deal with bureaucracy during the RES licensing procedure, as well as to: (a) determine the state targets related to RES share for 2020, (b) simplify the procedure to obtain a license for energy production from RES (license provided by RAE) and separate it from the rest of the procedure concerning the environmental license and next steps, (c) provide incentives to household consumers and Local Administrative Authorities of areas where RES projects are installed, (d) extend areas in which environmentally friendly RES projects could be established, (e) create the RES Office (One-Stop-Shop) of the Ministry of Environment, Energy and Climate Change, (f) rationalize pricing policy for RES and co-generation in order to support small projects with multiplying benefits and (g) proceed with special provisions concerning the installation of offshore wind parks within the national maritime zone. Moreover, the law sets a subsidy of 20% of the total investment cost for the establishment of interconnection systems in the Non-Interconnected Islands. The above measures aimed at reducing the time required for obtaining the production license from 3-5 years to 8-10 months, whereas at the same time, through the new pricing policy of the produced energy from RES, provide incentives to increase competition in energy market. In the context of L. 3851/2010, the ministerial decision regarding the “**Desired ratio for the installed capacity among various renewable energy technologies and its allocation over time**” (October 2010) set the target for 2014 and 2020.

It is indicative that one of the most important and efficient tools used in Greece for the promotion of RES is setting favourable guaranteed prices for the purchase of electricity produced. Laws 3468/2006 and 3851/2010 adopted a very favourable pricing regime that is significantly higher than PPC’s rates. Note that compared to the law of 2006, the most recent law of 2010 provides generally higher purchase prices for electricity produced from RES, while it is more detailed on technologies categorisation. Also, it was clear from the pricing scheme that a key objective of the recent law was to support small projects and less

popular technologies such as biomass and biogas, geothermal, co-generation, etc. that have multiple economic and social benefits.

4.2.4. Period for the rationalization of the market

The L.3851/2010, mainly because of its favourable pricing policy, had a significant effect on the evolution of the installed capacity of RES and especially photovoltaics. However, the promotion of technologies was not properly designed and the market led to deadlocks that have created major problems in the financing of RES. Additionally, the economic crisis in the country created further difficulties in the development of RES. Finally, the general trend in the EU was the reduction of the cost of energy produced from RES. So, the main targets of the framework adopted afterwards were to resolve the problems and ensure the viability of the RES market, as well as reduce energy costs. As a result, the legal framework of RES joined the obligations of the country that are related to the memorandums.

More specifically, in 2012, the Greek Parliament ratified **L. 4093/2012** under the title “**Ratification of Mid-term Fiscal Strategy 2013-2016 – Urgent Regulations related to the Implementation of L.4046/2012 and the Midterm Fiscal Strategy 2013-2016**”. Regarding RES, the law imposed an *extraordinary special solidarity levy* for RES and co-generation units for the period between 1.7.2012 to 30.6.2014. The range of the special levy for photovoltaics was between 25%-30% of the revenue before VAT from electricity production and 10% for the remaining RES technologies as well as co-generation. Another important decision of this law was that the contract for the sale of electricity would be based on the price (tariff) in force at the beginning of the trial operation of the unit. Before that, the investors could “lock” the price at a previous higher level and for 18 months. This had led to market distortions and created a secondary market for the licenses of RES projects.

Then, in May 2013 **L. 4152/2013** for the “**Urgent measures implementing L. 4046/2012, 4093/2012 and 4175/2013**” followed. The law set an *annual fee for the producers, in order to maintain the permission for electricity production*. According to this, all RES and co-generation units had to pay for the special account of Operator of the Electricity Market (LAGIE), an annual fee of €1,000/MW. Also, in order to address the high penetration of photovoltaics and the deficit of the special account of RES, the law suspended the new contracts for the connection of photovoltaic units until 31 December 2013. Finally, L. 4152/2013 increased the rates of the special levy that was introduced by the L. 4093/2012, for specific cases of photovoltaic units. Based on the

above law, in November 2013, the **L. 4203/2013** for the **“Settings of the Renewable Energy Sources issues and other provisions”** was ratified. Inter alia, the law included changes of the licensing process and, at the same time, set the terms and conditions for the installation of small wind turbines.

4.2.5. Recent developments and the restructure of the market

Finally, the most important recent changes of the RES legal framework took place with **L. 4254/2014** regarding the **“Measures for the support and development of the Greek economy, in the context of the implementation of Law 4046/2012, and other provisions of law”** that came into force in April 2014 and it is what we call the **“New Deal”** for the RES market. The key element of the law was the redefinition of the selling prices of electricity produced by existing operating RES and co-generation units at lower levels. According to this, the sellers signed new sales contracts with lower prices, in the context of the effort for rationalisation of the electricity market and the reduction of the deficit of the Special Account of RES. At the same time, it was decided to extend the above contracts for an extra 7-year period, in order to minimize the negative effects of the sellers because of the new pricing. Additionally, the law has also revised downwards the selling prices of the energy generated by all the newly established RES and co-generation stations. Meanwhile, another important element of this law was the abolition of the ministerial decision of 2012 for the temporary suspension of the licensing procedure of photovoltaic stations.

Another element of this law was the definition of the option for the self-production of electricity from RES, through the offset of the energy generated and consumed by the customer. So, the law allows the installation of photovoltaic power stations and small wind turbines at the facilities of self-producers that are connected to the network. According to the law, the Ministry of Environment, Energy and Climate Change should set the details and the base-period for the energy offset. Note that the surplus that might occur from the self-producer will be provided to the network without any economic revenue for the self-producer. Based on this, in December 2014, a ministerial decision was published regarding the specific terms and conditions for the Net-Metering (offset) of the energy produced from photovoltaic systems by self-producers. The base-period for the clearance of produced and consumed energy was set to one year.

4.2.6. Additional institutional framework

Along with the above basic legal framework, many other ministerial decisions related to RES have been published at times. Some of them were related to important actions undertaken for RES development. Indicatively, some of the matters dealt with in relation to these decisions are:

- licensing procedures of photovoltaics and decisions for their temporary suspension,
- the establishment program of photovoltaics from professional farmers,
- the specific development program of photovoltaic systems in buildings and especially in lofts and building roofs, with all its amendments;
- the periodic adjustment of the prices for the electricity produced by photovoltaic stations,
- the regulation for the electricity generation licenses related to RES and co-generation,
- incentives to domestic consumers in areas where RES are installed,
- decisions about Special Duty Gas Emission Reduction (ETMEAR) and other contributions to the Special Account for RES, etc.

4.2.7. Key conclusions

By recording the evolution of the legal framework of RES in Greece, we observe that the first efforts for its configuration began 30 years ago, whereas throughout the years various phases and evolution periods have taken place. However, the recent problems faced by the market indicate that, even nowadays, the framework cannot be characterized as complete, integrated and perfectly rational. Experience so far has shown that the adoption of laws without any primary design, the continuous modification of laws and decisions and, consequently, the abundance and complexity of laws and decisions in force, seem to contribute to the inefficiency of this framework. In addition to this, the entire institutional framework of RES lacks of elements of a comprehensive long-term energy plan, which should be thorough and set specific targets for the participation of RES. Therefore, for a further rational development of RES in Greece and in order to avoid the creation of problems related to adverse effects on market sustainability, production costs and the balance of energy systems, initially require a comprehensive and targeted energy plan that will set specific goals for renewable energy technologies, taking into account all the necessary technical, economic and social parameters. On this basis, a complete, simplified and clear legal framework should be adopted, which would include all the issues related to RES and will facilitate the process for investment in the sector.

The relationship between Tourist Receipts, the Real Exchange Rate and Economic Growth in Greece

Evangelia Kasimati, Nikolaos Vagionis******

The objective of this paper is to investigate whether tourism has significantly contributed to economic growth in Greece. We use a trivariate model of real GDP, tourist receipts and the real effective exchange rate to examine the relationship between tourism and economic growth. By using annual data for Greece for the period of 1988-2010, our results reveal that there is a cointegrating relationship between tourism and economic growth. However, contrary to other literature, our results using the Granger Causality Test based on the Vector Error Correction Model (VECM) indicate that there has been no significant directional impact between tourism and GDP growth in Greece.

1. Introduction

In recent years, researchers have been interested in the relationship between tourism and economic growth, empirically supporting a direct effect from the first to the second. A general consensus has emerged that it increases foreign exchange income, creates employment opportunities, stimulates the growth of the tourism industry and therefore triggers overall economic growth. As such, tourism development has become a common awareness for political authorities worldwide.

Table 1 displays the results of the analyses on the relationship between tourism development and economic growth, conducted for different countries in different years employing different methods. Tang (2011) used disaggregated data in examining the tourism-led growth hypothesis for Malaysia. The findings suggested that over the 12 tourism markets under investigation, only 5 international tourism markets Granger-cause economic growth in the long run, 6 out of the 12 international tourism markets are found to Granger-cause economic

growth in the short run, while 3 out of 12 international tourism markets do not support Granger-cause economic growth neither in the short or long run. Another analysis for Malaysia by Lean & Tang (2010) demonstrated that tourism growth always Granger-causes economic growth in Malaysia, implying that the causal relationship is stable over time. Kasimati (2011) investigated the hypothesis of tourism-led economic growth in the case of Greece by using a VECM and annual data from 1960-2010. This study revealed a cointegrating relationship between tourism and economic growth; however, Granger causality tests based on VECM indicated no directional impact between international tourist arrivals and economic growth. In their analyses conducted on the Turkish economy, Zortuk (2009) and Gunduz and Hatemi (2005) concluded that the increase in tourism income affects economic growth, while Katircioglu (2009) did not find any cointegration between international tourism and economic growth in Turkey. Oh (2005) found that the hypothesis of tourism-led economic growth could not be verified in the case of the Korean economy. The results of Oh's Granger causality test imply the existence of a one-way causal relationship in terms of economics-driven tourism growth. On the other hand, the analyses by Belloumi (2010) on Tunisia, Kim et al. (2006) on Taiwan, Dritsakis (2004) on Greece, Durbarry (2004) on Mauritius and Balaguer and Cantavella-Jorda (2002) on Spain empirically proved the existence of a bidirectional relationship between the two variables. In addition, Eugenio-Martin and Morales (2004) confirm the validity of the tourism-led growth hypothesis for low and middle income countries in Latin America while they assert that the situation is different for high income countries. Lee and Chang's study (2008), containing 32 selected countries including both OECD countries and non-OECD countries, found that there is a unidirectional relationship running from tourism towards growth for OECD countries whereas a bidirectional causality relationship exists for non-OECD countries.

Tourism is one of the growing service sectors in Greece. In 2011 the direct and indirect contribution of the Greek tourism industry to total GDP and employment reached 15.8% and 18.4% respectively (WTTC, 2011). Adding to previous literature, the aim of this paper is to investi-

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** The views expressed in this paper are those of the author and do not necessarily reflect those of the Bank of Greece.

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TABLE 1 Comparison of the empirical results for tourism development and economic growth

Samples	Authors	Empirical method	Period	Countries	Causal relationship		
One country							
	Tang (2011)	VECM	1995-2009	Malaysia	Tourism	=>	Growth
	Kasimati (2011)	VECM	1960-2010	Greece	Tourism	#	Growth
	Lean & Tang (2010)	Vector	1989-2009	Malaysia	Tourism	=>	Growth
		Autoregressive Model (VAR)					
	Belloumi (2010)	VECM	1970-2007	Tunisia	Tourism	<=>	Growth
	Zortuk (2009)	VECM	1992-2008	Turkey	Tourism	=>	Growth
	Katircioglu (2009)	VECM	1960-2006	Turkey	Tourism	#	Growth
	Kim, Chen & Jang (2006)	VECM	1956-2002	Taiwan	Tourism	<=>	Growth
	Oh (2005)	Granger Causality	1975-2001	Korea	Growth	=>	Tourism
	Gunduz & Hatemi (2005)	VAR	1963-2002	Turkey	Tourism	=>	Growth
	Dritsakis (2004)	VECM	1960-2000	Greece	Tourism	<=>	Growth
	Durbarry (2004)	VECM	1952-1999	Mauritius	Tourism	<=>	Growth
	Balaguer & Cantavella-Jorda (2002)	VECM	1975-1997	Spain	Tourism	<=>	Growth
Cross-Section							
	Eugenio-Martin & Morales (2004)	Panel Generalised Least Squares (GLS)	1980-1997	Latin American Countries	Tourism	=>	Growth*
	Lee & Chang (2008)	Panel cointegration	1990-2002	OECD & non-OECD countries	Tourism	=>	Growth
					Tourism	<=>	Growth

Notes: «Tourism=>Growth» denotes causality running from tourism development to economic growth.

«Growth=>Tourism» denotes causality running from economic growth to tourism development.

«Tourism<=>Growth» denotes bidirectional causality between tourism development and economic growth.

«Tourism#Growth» denotes no causality running from tourism development to economic growth.

* exists for low and middle income countries but not for high income countries.

gate whether tourism has really contributed to economic growth in Greece. The rest of the paper is organized as follows. Section 2 describes the data and presents the methodology. Section 3 contains empirical results and their interpretation. Finally, section 4 offers a summary and conclusions.

2. Data and methodology

There are several alternatives to measure the volume of tourism. One is tourism receipts. A second one is the number of nights spent by visitors from abroad. A third one is the number of tourist arrivals. Since a previous study by Kasimati (2011) used the number of tourist arrivals and the results did not support the hypothesis of tourism-driven economic growth, this study makes use of tourist receipts. The latter is defined as the spending within the country by international tourists for both business and leisure trips, including transportation spending. Given that the tourism-led growth hypothesis is about the contribution of tourism to economic growth, real

GDP is also included to represent the economic growth. Therefore, we estimate the following equation:

$$\ln GDP_t = \alpha + \alpha_1 \ln REC_t + \alpha_2 \ln REXR_t + \varepsilon_t$$

where,

$\ln GDP_t$ = natural logarithm of Gross Domestic Product at constant prices,

$\ln REC$ = natural logarithm of tourist receipts at constant prices,

$\ln REXR$ = natural logarithm of real effective exchange rate,

ε = the error term with the conventional statistical properties.

Many authors, such as Oh (2005), Gunduz and Hatemi (2005), Dritsakis (2004) and Balaguer and Cantavella-Jorda (2002) suggest the inclusion of real exchange effective rate in the discussion of international tourism in order to deal with potential overlooked variable problems and to account for external competitiveness.

The data are annual over the period 1988 to 2010, and obtained from the annual national accounts data of the European Commission AMECO (Annual Macro-Economic Data) database, the Hellenic Statistical Authority and the database of the World Travel and Tourism Council (WTTC).

The modeling strategy adopted in this paper is based on the now widely-used Engle-Granger methodology (Engle and Granger 1987). Testing for cointegration involves two steps: the first step, in our methodology, is to determine whether the variables we use are stationary or non-stationary. If a series is non-stationary, then all the usual regression results suffer from spurious regression problems. To this end, the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests of stationarity are performed on both the levels and the first differences of the variables (Dickey and Fuller 1981; Phillips and Perron 1988). Both the ADF and PP unit root tests use the various specifications of the following regression:

$$\Delta x_t = \alpha + \beta x_{t-1} + \lambda_t + \sum_{i=1}^k \delta_i \Delta x_{t-i} + u_t$$

where,

x_t = the level of the variable under consideration,

t = time term,

u_t = normally distributed random error term with zero mean and constant variance.

In the second stage, a cointegration test is performed to identify the existence of a long-run relationship. Johansen (1988) and Johansen and Juselius (1990) procedures set out a model in error-correction form as follows:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \dots + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-1} + \mu + \Psi D_t + \varepsilon_t$$

where,

Z_t = a $p \times 1$ vector of stochastic variables, comprised of real GDP, real tourist receipts and real effective exchange rate,

μ = a constant term,

D_t = a vector of non-stochastic variables,

k = the lag length

$t = 1, \dots, T$

$\varepsilon_t \sim \text{Niid}_p(0, \Sigma)$.

If the data are integrated of order one $I(1)$, then the matrix Π has to be reduced rank r :

$$\Pi = \alpha\beta'$$

where α and β are $p \times r$ matrices and $r < p$ and where $\beta'Z_t$ are the r long-run cointegration relations and α represents the error-correction parameters, which can be interpreted as speed of adjustment parameters.

Johansen (1988) and Johansen and Juselius (1990) propose two test statistics for testing the number of cointegrating vectors (or the rank of Π) in the VAR model, the trace (Tr) and the maximum eigenvalue (L-max) test. The likelihood ratio statistic for the trace test is

$$Tr = -T \sum_{i=r+1}^{p-2} \ln(1 - \hat{\lambda}_i)$$

where $\hat{\lambda}_{r+1}, \dots, \hat{\lambda}_p$ are the estimated $p-r$ smallest eigenvalues.

The null hypothesis to be tested is that there are, at most, r cointegrating vectors. That is, the number of cointegrating vectors is less than or equal to r , where r is 0, 1, or 2, ..., and so forth. In each case, the null hypothesis is tested against the general alternative. Alternatively, the L-max statistic is

$$L\text{-max} = -T \ln(1 - \hat{\lambda}_{r+1}).$$

In this test, the null hypothesis of r cointegrating vectors is tested against the alternative of $r+1$ cointegrating vectors. Thus, the null hypothesis $r=0$ is tested against the alternative that $r=1$, then $r=1$ against the alternative $r=2$, and so forth.

3. Empirical analysis and findings

Many macroeconomic time series contain unit roots dominated by stochastic trends as developed by Nelson and Plosser (1982). Knowing that unit root tests are sensitive to the presence of deterministic regressors, three models are estimated. The most general model with an intercept and time trend is estimated first and restrictive models, i.e. with an intercept and without either intercept or trend, respectively, are estimated thereafter. Unit root tests for each variable are then performed on both levels and first differences of variables. Table 2 reports the results for both the ADF and PP tests for only the model with an intercept and trend. It can be seen that the null hypothesis of non-stationarity cannot be rejected at the 5% level for the levels of all the variables. However, when first differences are taken, the null hypothesis of non-stationarity is rejected for all the variables. Hence it is concluded that the three variables are integrated of order one $I(1)$. This result is consistent with the finding of Nelson and Plosser (1982) that most of the macroeconomic variables are non-stationary at level, but they are stationary after first differencing.

Given that all the variables are integrated of the same order, the next step is to test for cointegration using Johansen's trivariate maximum likelihood procedure. Johansen (1988) proposes two likelihood ratio tests for the cointegration rank, a maximum eigenvalue test and a trace test. Results of both tests are reported in Table 3, where r represents the number of cointegrating vectors. When applying the cointegration test, we choose the case 3 assumption where the level data has a linear trend

TABLE 2 Results of unit root tests

Variable	Augmented Dickey-Fuller (ADF)		Phillips-Perron (PP)	
	Levels	First differences	Levels	First differences
lnGDPR	-3.084 (0.138)	0.597 (0.000)	-1.395 (0.834)	0.580 (0.000)
lnREC	-0.381 (0.982)	-4.159 (0.019)	-0.341 (0.983)	-4.158 (0.019)
lnREXR	-3.256 (0.104)	-4.586 (0.008)	-2.619 (0.276)	-4.586 (0.008)
Critical values				
1%		-4.441		-4.441
5%		-3.633		-3.633
10%		-3.255		-3.255

Note: Probabilities are in parentheses. The optimal lags for the ADF tests are selected based on optimizing Schwarz Criterion using a range of lags. Tests for unit roots have been carried out on EViews 5.0.

TABLE 3 Results of Johansen's maximum likelihood tests for multiple cointegrating relationships

Null hypothesis	Eigenvalue	Trace statistic	5% critical value (trace)	Max-Eigen statistic	5% critical value (Max-Eigen)
None ($r=0$)	0.712	35.35	24.28	23.65	17.80
At most 1 ($r \leq 1$)	0.442	11.70	12.32	11.09	11.22
At most 2 ($r \leq 2$)	0.032	0.61	4.13	0.61	4.13
Normalised cointegrating coefficients					
Variables	Cointegrating vector				
lnGDPR	-1.000				
lnREC	0.096 (0.043)				
lnREXR	1.054 (0.016)				

Note: Coefficient estimates express different elasticities. Standard errors are in parentheses.

lnGDPR, natural logarithm of real gross domestic product;

lnREC, natural logarithm of real tourist receipts;

lnREXR, natural logarithm of real effective exchange rate.

but the cointegrating equations have only intercepts. We notice that the null hypothesis of no cointegration relationships is rejected against the alternative of one cointegrating relationship at the 5% level. These results show that the single-equation estimation for an increase in tourism can capture the long-run relationship. The interpretation of the elasticity of GDP growth with respect to tourism should be considered as follows: a sustained growth rate of 1% in tourism receipts would imply an estimated increase of almost 0.10% real GDP in the long run.

We also performed Wald coefficient tests to investigate the significance estimated parameters. Table 4 reports the outcomes of the parameter restriction tests for economic growth, tourism and exchange rate variables. The

restriction is that each coefficient of the corresponding variables is zero. This hypothesis is rejected for lnREC and lnREXR for a 5% level of significance but is not rejected for lnGDPR. Since this research note attempts to investigate the validity of the tourism-led growth hypothesis for Greece, the fact that lnGDPR could be zero might affect the specification of our model.

However, there is an important inquiry that should be addressed as a last step. Is tourism causing economic growth or is economic growth leading tourism? Given the results of the cointegration tests, the procedure is as follows: when the variables are not cointegrated, the causality tests are conducted by running the standard Granger regressions. However, if the cointegration hy-

TABLE 4 Wald Coefficient Test for the significance of estimated parameter

Parameter restriction	Chi-Squared Test Statistic	Probability
$\alpha = 0$	0.19	0.661
$\alpha_1 = 0$	5.65*	0.028
$\alpha_2 = 0$	9.06*	0.007

Note: * indicates significance at 5% level.

TABLE 5 Granger Causality results based on VECM

Null hypothesis	χ^2 - statistic	Probability
$\ln\text{GDPR} \Rightarrow \ln\text{REC}$	3.670	0.157
$\ln\text{GDPR} \Rightarrow \ln\text{REXR}$	0.591	0.744
$\ln\text{REC} \Rightarrow \ln\text{GDPR}$	1.415	0.493
$\ln\text{REC} \Rightarrow \ln\text{REXR}$	1.726	0.422
$\ln\text{REXR} \Rightarrow \ln\text{GDPR}$	0.706	0.703
$\ln\text{REXR} \Rightarrow \ln\text{REC}$	4.295	0.117

Note:

$\ln\text{GDPR}$, natural logarithm of real gross domestic product;

$\ln\text{REC}$, natural logarithm of real tourist receipts;

$\ln\text{REXR}$, natural logarithm of real effective exchange rate.

pothesis is not rejected the standard Granger regressions are misspecified. Thus, error correction models can be applied to these time series for determining causality.¹

Table 5 reports the statistical analysis based on Vector Error Correction Models (VECM) on the causal relationships between income, real exchange rate and tourist receipts for Greece. Based on the estimates, there is no Granger causality between the three variables. Therefore, the tourism-led growth hypothesis is not confirmed through causality testing. Our results are in line with those of Kasimati (2011) and not consistent with the findings of Dritsakis (2004), who found evidence of a strong feedback relationship between tourism and economic growth in Greece by using quarterly data.

4. Summary and Conclusions

This paper investigates a series of unit root, cointegration and causality tests to ascertain whether there is a causality between income, tourist receipts and exchange rate in Greece. Using annual data over the 1988-2010 period and since the variables in this paper are nonstationary

and present a unit root, Johansen's cointegration technique is applied. This methodology allowed us to obtain a cointegrating relationship among the three variables. Moreover, the parameters are tested using the Wald test. The restriction is that each coefficient of the corresponding variables is zero. This hypothesis is rejected at the 5% level of significance for $\ln\text{REC}$ and $\ln\text{REXR}$, but not for $\ln\text{GDPR}$. Finally, using the concepts and methods of the cointegration and Granger causality test, this paper finds no indices of a significant long-run equilibrium relationship between income and tourist receipts. Therefore, our results do not support the hypothesis of tourism-driven economic growth which is specific to developing countries. In addition, they are not consistent with the findings of the existing literature for Greece, supporting a bidirectional relationship between the two variables.

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Education and unemployment prospects across regions in Greece

*Ioannis Cholezas**

1. Introduction

According to official data, since 2008 the Greek GDP has decreased by approximately 25%,¹ while the number of unemployed persons has increased by some 900,000.² At the same time the unemployment rate has skyrocketed from 7.7% to 26.5%, while for specific population groups, i.e. women and youth, unemployment rates continue to be much higher than average. It is by now widely accepted that a high incidence of joblessness causes multiple economic, social and humanistic problems at both individual and societal levels. Note that unemployment is the most crucial factor leading to poverty in Greece, which unsurprisingly increased from 38.5% in 2010 to 46.3% in 2013³ amongst the unemployed. This paper investigates the variations in regional unemployment rates fuelled by the crisis and the respective contribution of education.

More specifically, empirical studies presented next show that the consequences of the crisis on the labour market, as reflected in the unemployment rates, tend to differ across regions, sometimes substantially. Undoubtedly, there were important variations across regions with regards to unemployment even before the crisis.⁴ As will be shown next, those variations stemmed from various factors, among which are differences in the production structure of regions, geographic peculiarities, population composition, historical reasons, etc. The focus of this paper is to study the role of education across Greek regions and, in particular, the extent to which it influences an individual's probability of unemployment, the differences recorded across regions with regards to this influence, as well as the changes brought about by the crisis.

2. Short review of the literature

Differences in key labour market variables, such as unemployment, across regions are well established in international literature. Generally, there are three reasons why studying unemployment across regions is interesting. The first reason is that differences in unemployment rates across regions are sometimes as big as differences across states (Elhorst 1995; Taylor and Bradley 1997; European Commission 1999). The second reason is that macro studies provide no explanation for unemployment differences across regions, since factors usually considered responsible for differences across states, e.g. labour market institutions, wage setting mechanisms, social security frameworks, retirement schemes, etc., do not apply within a country (Beenstock 1988; Layard et al. 1991; Phelps 1994; Malinvaud 1994; Bean 1994; OECD 1994; Scarpetta 1996). The third reason has to do with inefficiencies linked to unemployment differences across regions and, therefore, the increase of GDP should these be successfully contained (Taylor 1996).

In addition, there are many studies worldwide which attempt to determine the factors contributing to regional heterogeneity, both static and dynamic, i.e. the way regions differ through time in their ability to adapt to external shocks such as the recent crisis. Different models are developed aiming at interpreting those differences and a large number of features-characteristics have been utilized, despite the usually admitted lack of data. The most commonly used variables include the natural rate of population change (as reflected in the birth rate), commuting between the place of residence and the workplace, wages, unionization, employment, regional GDP, the dynamism of the local market (e.g. proximity to large cities), the region's size and its population density, the industrial composition, various economic and social obstacles (e.g. house market, social security, inflexible labour market, etc.), the qualification of the human capital (i.e. educational attainment) and long-term unemployment (Elhorst 2003).

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1. See http://www.statistics.gr/portal/page/portal/ESYE/PAGE-themes?p_param=A0702&r_param=SEL15&y_param=TS&mytabs=0. The percentage of the cumulative GDP decline is estimated using current prices GDP. Note that since 2011 data are provisional.

2. See http://www.statistics.gr/portal/page/portal/ESYE/PAGE-themes?p_param=A0101&r_param=SJO01&y_param=TS&mytabs=0.

3. Source: Statistics on Income and Living Conditions (SILC). Available time series: http://www.statistics.gr/portal/page/portal/ESYE/PAGE-themes?p_param=A0802&r_param=SFA10&y_param=TS&mytabs=0, see Table 5.

4. Eurostat has a special database devoted to regional statistics: <http://ec.europa.eu/eurostat/web/regions/data/database>. A short review of regional unemployment differences across the European Union can be found at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics_at_regional_level.

On the other hand, there are a few Greek studies investigating the reasons behind regional economic variations in general and local labour markets in particular. Older studies attribute wide differences across Greek regions to the negative impact of European integration on the industrial base of the country and the variations that were caused by the different production structures of regions, the importance of large centres of economic activity (big cities) from which growth originates, the availability of high quality human capital, labour-intensive activities and the extension of tourism activities (Ioannides and Petrakos, 2000).

Furthermore, regarding Greece, various studies focus on factors determining the performance of regional labour markets using unemployment, participation and/or employment as criteria. For instance, regional unemployment does not seem to follow any specific pattern (Bakas and Papapetrou 2012), while the inverse relationship between GDP and unemployment (Okun's law) seems to be justified for only some of the regions (Christopoulos 2004). The remaining factors investigated, regarding their contribution to regional unemployment differences, include personal characteristics, such as level of education, gender, age, etc. (Rodokanakis and Vlachos 2012; Mitrakos et al. 2010), as well as wider regional features, such as supply and demand factors, spill-over effects, the geographical position and production structure, etc. (Lolos and Papapetrou 2012). The main conclusion in all studies is heterogeneity across regions, while patterns related to high unemployment rates, low employment levels, and low participation rates, often linked with certain industries, are also reported. For example, tourism seems too often to go hand-in-hand with better labour market performance (Eleftheriou and Alexiadis 2010). However, the level of analysis is not uniform, since some authors insist on utilizing more detailed information (micro-regions) stressing the need to draw and implement targeted labour market policies (Prodromidis 2008, 2012).

Last but not least, the consequences of ongoing crisis in the country and the diversity with which regional labour markets react to them, precisely due to their preexisting differences, have attracted the attention of academics and scholars. Analysing the evolution of unemployment across regions gives interesting results, by observing more intense effects of the crisis on the autonomous labour demand in metropolitan areas and north/northwest regions, i.e. regions that initially had lower unemployment rates, as well as stronger adaptation of the value the labour market attaches to personal characteristics in central non-rural regions and especially Athens (Monastiriotis and Martelli 2013). The observation that regions that

strongly rely on tourism and the agricultural sector were less hurt by the crisis, at least in terms of unemployment, seems to be proven by many studies, while the same is true for the role of production structure, the bonds with neighbouring regions, exports, savings, etc. (Karafolas and Alexandrakis 2015; Palaskas et al. 2015).

3. Regional labour markets

A major feature of the Greek economic crisis is the increase in unemployment. Table 1 shows how unemployment has developed for the past eleven years for age group 15-64 per region. In most regions (9 out of 13) unemployment reached its lowest point in 2008, while in three regions the increase had already started by then. In either case, based on recent data, unemployment increased during the crisis throughout the country, without exception, while in seven regions the highest unemployment rates are reported in 2014. In the remaining regions, unemployment in 2014 shows signs of stabilisation and a slight decline. Two key conclusions can be drawn from Table 1. First, the rise in unemployment starts at different points in time and, second, the increase in unemployment is not homogeneous across regions. For instance, during the crisis the unemployment rate increased by almost six times in the North Aegean (2008-2014), but it did not increase more than 2.6 times in the South Aegean (2008-2013). This heterogeneity in the adaptation of regions to the crisis with respect to unemployment is also noted in the previous section and is attributed, among other things, to external shocks and how they are internalised by each region (Palaskas et al. 2015). With the exception of the North Aegean which is not an urban territory, Attica and Central Macedonia, including Thessaloniki, exhibit larger unemployment increases.

The heterogeneous impact of the crisis across regions also involves graduates of different levels of education. This is consistent with economic theory and empirical studies (see Kanellopoulos et al. 2013; Mitrakos et al. 2012), due to the different characteristics of individuals and job opportunities available associated with different levels of education. Table 2 depicts the evolution of unemployment rates for various levels of education across regions.⁵ Note that the descriptive statistics reported are weighted and represent the entire population.

The first observation refers to the relationship between education and unemployment, which seems to have a reverse "u" shape. For instance, unemployment is higher for Post-secondary education graduates for all years under review with few exceptions, a fact which is often used as an argument in favour of the view that Post-secondary

5. Levels of education were grouped to form six broader levels. See Table 2, Note 1.

TABLE 1 Unemployment rates by region (%), age: 15-64

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
EM&TH	13.7	12.1	11.4	10.3	9.3	11.6	15.1	21.0	23.8	30.0	29.7
CM	12.8	11.6	9.8	9.4	8.8	10.4	14.1	20.3	27.1	32.1	32.9
WM	17.3	18.3	14.6	12.7	12.9	12.9	15.7	23.5	30.9	35.0	31.8
EP	11.6	11.7	10.2	10.6	10.4	11.8	13.3	17.1	23.2	29.1	32.5
THS	10.4	10.2	8.9	8.5	9.0	9.9	12.9	17.8	23.8	28.2	32.4
INI	11.9	8.9	11.8	9.4	8.6	9.8	14.9	14.6	15.0	20.5	29.2
WG	13.3	11.2	9.9	10.3	10.3	10.1	12.3	18.0	26.3	32.0	34.2
SE	13.2	11.4	9.6	9.9	9.0	10.9	12.8	19.7	29.1	33.9	32.1
AT	9.6	9.6	8.8	8.0	6.9	9.3	13.0	18.5	26.6	32.6	30.4
PL	9.6	9.0	7.7	7.9	7.6	8.4	10.1	14.4	19.9	23.5	27.8
NA	10.1	11.0	9.9	8.5	4.8	6.9	10.0	15.5	22.3	24.3	27.5
SA	9.4	10.0	9.2	9.6	8.6	12.6	14.8	15.9	15.7	22.9	19.4
CR	8.5	7.4	7.6	5.6	6.7	9.5	12.5	16.5	22.9	27.5	26.7

Source: Primary quarterly LFS data (weighted), KEPE processing.

Note: EM&TH= East Macedonia & Thrace, CM= Central Macedonia, WM= West Macedonia, EP= Epirus, THS= Thessaly, INI= Ionian Islands, WG= West Greece, SE= Sterea Ellada, AT= Attica, PL= the Peloponnese, NA= North Aegean, SA= South Aegean, CR= Crete.

education, and especially vocational education, provides an unsuitable set of skills to graduates, leaving them with few chances for employment. In any case, graduates from the three top levels of education, i.e. ATEI, AEI and Master/PhD, face lower unemployment rates compared with graduates from the lowest three levels of education, i.e. before Lyceum, Lyceum and Post-secondary studies. This pattern has not changed during the crisis, although unemployment has increased for everyone, just not uniformly. For example, available LFS data for the last three quarters show a disproportionate increase in unemployment for AEI graduates throughout the country (Cholezas 2015).

The second observation refers to the heterogeneity of unemployment rates across regions for graduates of the same level of education. This heterogeneity seems to increase for higher levels of education during the crisis. For example, the standard deviation of unemployment rates across regions in 2014 for ATEI graduates equals 9.8 percentage points (pp), since the highest rate is found in the North Aegean (18.0%) and the lowest in the Ionian Islands (53.6%). Master/PhD holders exhibit even higher volatility although care should be exercised in interpreting the results due to the often small size of the sample. Respectively, Lyceum graduates previously exhibited the

lowest volatility throughout the years considered. Moreover, regarding the intertemporal evolution of unemployment, in 2014 the standard deviation of unemployment rate distribution in all thirteen regions for Lyceum graduates was 2.5 times higher compared with 2008 (5.7pp vs. 2.3pp). On the other hand, for ATEI graduates it was 2.6 times higher (9.8pp vs. 3.7pp) and for AEI graduates it was 1.9 times higher (5.8pp vs. 3.0pp).⁶

Regional unemployment differences and their evolution could be influenced by labour market conditions up to a certain point. If, for example, the supply of graduates from a specific level of education is much larger than the demand for those graduates, then unemployment is high. Table 3 reports the educational composition of the labour force by region and reflects labour supply. It seems that for the country as a whole there is a tendency for the share of upper levels of education graduates to increase, while the share of graduates from lower levels of education decreases (from 34.7% in 2004 to 22.1% in 2014⁷). The share of ATEI graduates increases even more, from 5.0% in 2004 to 9.2% in 2014. Generally, it seems that the impression regarding the increasingly competitive labour market is verified resulting in youth seeking further education in order to increase their chances of finding a job.⁸ This phenomenon appears to be strengthened

6. Due to space limitations, standard deviations are not reported but are available from the author.

7. Due to space limitations the results are not reported but are available from the author.

8. This could be the case either because the labour market demands individuals with more education or because education is used as a sign for higher productivity.

TABLE 2 Unemployment rates by region and level of education (%) for selected years (2004, 2008, 2014), age: 15-64

	Year	I	II	III	IV	V	VI
EM&TH	2004	12.0	15.2	17.5	14.8	14.3	0.0
	2008	8.0	11.8	12.6	10.1	5.8	3.6
	2014	28.7	31.3	31.8	31.9	28.1	14.5
CM	2004	10.9	14.3	17.8	14.3	10.7	5.4
	2008	7.3	9.7	13.7	12.6	5.4	4.9
	2014	32.9	35.7	37.9	27.6	28.3	19.5
WM	2004	15.3	21.8	30.7	15.6	5.9	0.0
	2008	12.1	13.6	19.7	14.4	9.5	0.0
	2014	28.9	33.4	39.0	28.5	29.2	31.3
EP	2004	8.6	14.8	19.5	12.2	10.7	19.4
	2008	8.4	11.0	15.3	16.0	9.9	0.0
	2014	27.2	38.1	43.0	31.1	26.8	3.0
THS	2004	6.8	11.8	24.6	14.9	9.1	0.0
	2008	5.9	9.5	15.6	14.1	10.0	7.2
	2014	24.0	33.8	41.4	35.7	35.1	31.1
INI	2004	11.7	12.7	9.9	20.5	8.9	0.0
	2008	7.4	10.5	17.6	15.7	2.9	0.0
	2014	26.9	28.3	41.1	53.6	15.6	0.0
WG	2004	10.2	16.0	25.7	16.7	10.2	11.1
	2008	6.6	11.8	22.9	13.1	8.1	21.3
	2014	30.4	35.5	40.4	40.0	29.8	36.4
SE	2004	12.1	14.6	17.7	15.7	9.2	0.0
	2008	8.3	8.3	17.4	10.6	7.0	34.2
	2014	24.4	33.7	38.5	43.0	30.7	37.3
AT	2004	10.7	9.9	11.4	8.0	7.4	6.6
	2008	8.3	6.3	8.6	6.1	5.8	4.9
	2014	38.9	36.7	32.9	27.2	21.1	11.9
PL	2004	7.9	11.6	14.1	9.9	9.1	6.3
	2008	4.6	10.1	15.6	11.6	5.4	0.0
	2014	25.5	26.7	36.2	33.1	27.4	56.0
NA	2004	6.9	12.5	13.6	20.5	7.6	0.0
	2008	5.1	5.5	7.3	5.3	0.7	0.0
	2014	31.0	24.1	33.2	18.0	30.1	30.0
SA	2004	9.8	10.7	9.1	5.7	4.4	-
	2008	8.5	10.4	10.5	5.2	1.5	0.0
	2014	23.2	19.2	16.4	18.1	15.2	28.8
CR	2004	7.5	8.9	15.0	10.0	6.1	6.4
	2008	5.7	7.1	8.4	9.4	5.7	10.6
	2014	25.1	25.6	38.7	26.6	26.7	0.0

Source: Primary quarterly LFS data (weighted), KEPE processing.

Note 1: I= before Lyceum, II= Lyceum, III= Post-secondary, IV= ATEI (Tertiary Vocational Institutes), V= AEI (Universities), VI= Master/PhD.

Note 2: Caution should be exercised when interpreting statistics for Master/PhD holders due to the small sample size in a number of regions.

during the crisis. Alternatively, this could be the outcome of discouragement spreading amongst lower education graduates due to their inability to get a job and the consequent decision to drop out of the labour market towards retirement or economic inactivity.

At a regional level a relatively large share of Lyceum graduates in 2014 is found in the South Aegean (43.4%), Sterea Ellada (42.2%) and West Macedonia (41.0%). In contrast, Attica has the largest share of AEI graduates (23.1%), followed by Central Macedonia (18.1%). This

TABLE 3 Labour force share of graduates from selected levels of education (%) in 2004, 2008 and 2014, age: 15-64

	Lyceum			ATEI			AEI			Master/PhD		
	2004	2008	2014	2004	2008	2014	2004	2008	2014	2004	2008	2014
EM&TH	29.8	30.7	29.3	4.7	6.4	6.8	9.4	11.4	12.5	0.5	0.5	1.2
CM	33.7	34.0	36.8	5.8	7.5	9.4	15.3	16.3	18.1	1.8	1.5	2.3
WM	34.2	35.3	41.0	5.8	7.2	8.9	11.3	12.1	13.9	0.4	0.2	1.5
EP	31.3	32.2	37.8	5.2	6.7	10.6	13.6	13.1	15.8	0.3	0.5	1.1
THS	30.4	34.4	38.8	5.1	6.8	9.9	12.3	15.8	14.9	0.8	0.3	2.6
INI	34.7	30.7	39.7	2.4	3.0	6.2	7.9	10.0	11.7	0.6	0.5	0.2
WG	32.5	35.7	39.0	4.9	5.4	10.1	10.9	13.0	12.2	1.1	0.6	1.4
SE	34.7	36.1	42.2	3.9	5.0	8.6	9.0	10.2	12.3	0.2	0.2	0.3
AT	34.6	34.0	34.5	5.2	6.4	10.1	19.4	19.8	23.1	4.1	2.6	5.8
PL	32.6	36.1	38.9	3.3	4.6	7.6	12.2	11.9	13.8	0.2	0.2	0.2
NA	33.1	38.8	36.1	4.3	4.8	8.5	14.2	14.6	15.6	0.9	0.5	1.2
SA	35.4	37.4	43.4	3.7	3.9	6.5	8.8	8.3	12.5	0.7	0.0	1.1
CR	31.5	33.8	34.8	5.1	7.8	8.5	12.7	12.6	12.1	0.9	1.4	1.2
All	33.4	34.2	36.5	5.0	6.3	9.2	15.0	15.9	17.7	2.2	1.4	3.1
Std.Dev.	1.8	2.4	3.7	1.0	1.5	1.5	3.1	3.0	3.2	1.0	0.7	1.5

Source: Primary quarterly LFS data (weighted), KEPE processing.

TABLE 4 Share of employed graduates from selected levels of education (%) in 2004, 2008 and 2014, age: 15-64

	Lyceum			ATEI			AEI			Master/PhD		
	2004	2008	2014	2004	2008	2014	2004	2008	2014	2004	2008	2014
EM&TH	29.3	29.8	28.4	4.6	6.4	6.6	9.3	11.9	13.1	0.6	0.5	1.5
CM	33.1	33.6	35.3	5.7	7.2	10.0	15.7	16.9	19.4	1.6	1.8	2.8
WM	32.3	35.0	40.0	5.9	7.0	9.4	12.8	12.6	14.3	0.2	0.5	1.5
EP	30.2	32.0	34.8	5.2	6.3	10.6	13.8	13.2	17.2	0.4	0.4	1.5
THS	29.9	34.2	37.9	4.8	6.4	9.4	12.4	15.6	14.2	0.4	0.8	2.6
INI	34.4	30.1	40.0	2.2	2.8	3.8	8.2	10.6	13.8	0.5	0.7	0.3
WG	31.5	35.1	38.2	4.7	5.2	9.0	11.3	13.3	13.0	0.6	1.0	1.3
SE	34.2	36.4	41.1	3.7	4.9	7.0	9.4	10.4	12.6	0.3	0.1	0.3
AT	34.5	34.2	31.1	5.3	6.5	10.3	19.9	20.1	26.3	2.7	4.2	7.4
PL	31.9	35.1	39.2	3.3	4.4	7.0	12.3	12.2	13.8	0.2	0.2	0.1
NA	32.2	38.5	38.1	3.8	4.8	9.0	14.6	15.3	14.7	0.5	0.9	1.0
SA	34.9	36.7	43.4	3.8	4.0	6.5	9.3	8.9	13.3	0.0	0.8	1.1
CR	31.3	33.6	34.9	5.0	7.5	8.5	13.0	12.7	12.1	1.4	0.8	1.7
All	32.3	34.2	37.1	4.5	5.6	8.2	12.5	13.4	15.2	0.7	1.0	1.8
Std.Dev.	1.9	2.5	4.1	1.1	1.4	1.9	3.2	3.0	3.9	0.7	1.1	1.9

Source: Primary quarterly LFS data (weighted), KEPE processing.

should come as no surprise given, for example, the high concentration of public sector employees in these regions. Moreover, these are the only two regions that outperform the country average and at the same time exhibit a significant and accelerating increase compared with the previous two years of reference, i.e. 2004 and 2008. As

far as ATEI graduates are concerned, the largest shares are recorded in Epirus (10.6%), West Greece (10.1%) and Attica (10.1%). Considering the share of Master/PhD holders (5.8% in Attica and 2.3% in Central Macedonia in 2014), which has increased sizably during the crisis, it seems that the gap dividing these two regions from the

rest of Greece, regarding the education of the labour force, has widened. This observation should be carefully considered given that a well educated labour force could fuel growth prospects and allow laggard regions to catch up. Conversely, the lack of a well educated workforce could lead to a widening differential. Therefore, the need for targeted interventions might be necessary.⁹

Contrary to labour supply, which more or less identifies with the labour force at every given point in time, labour demand is harder to define without some special mechanism in place. What one observes are points of equilibrium, in other words the number of employed individuals, the result of matching labour demand with labour supply. Table 4 above presents the intertemporal evolution of the employed aged 15-64 by region and level of education completed. Countrywide the composition of the employed shows an increase in the share of more educated individuals with a similar pace as the labour force. This could mean that the supply of educational qualifications is met by a proportional demand. On the other hand, there is no information regarding the quality of the matching process, given well known problems in the Greek labour market, such as overeducation and mismatch. Attica and Central Macedonia have the largest shares of tertiary education graduates, which reflect their production structure. Furthermore, the difference from the country's average seems to have widened during the crisis.

4. Methodology and data

The methodology used in order to determine the effect of education on the probability of unemployment is largely decided upon by the nature of the issue examined, which is to estimate the unemployment probability (0=employed, 1=unemployed), and relies on the estimation of the following equation using logit:

$$\text{Pr}(y_i = 1 | x_i) = \frac{\exp(x_i\beta)}{1 + \exp(x_i\beta)} \quad (1)$$

where $y_i = 1/0$ when the individual is employed/unemployed, x_i = the matrix of independent variables discussed next and \exp is the exponential distribution. In order to estimate standard errors correctly one should take into account that some observations tend to repeat themselves, since the same individual typically participates in the sample up to six times (quarters). This is accomplished by estimating equation (1) using clustering. Furthermore, equation (1) is estimated for each region separately and

for two periods: period 2004-2008, "before crisis", and period 2009-2014, "during the crisis".

Based on the literature and numerous empirical studies, the independent variables used include individual characteristics, namely gender, age (five year groups) and level of education (six groups). Economic and social conditions might differ substantially across areas within regions, so the degree of urbanity is employed. Citizenship is another feature which might affect employment probabilities without being able to determine the sign of that effect, since it depends on the region and the dominant industries. Relevant studies find a considerable concentration of employed immigrants in certain industries, such as Construction, at least before the crisis (Cholezas and Tsakloglou 2009). Furthermore, seasonality, captured by the inclusion of quarters' dummies, probably changes unemployment probabilities, especially in regions with a strong presence of seasonally volatile industries, such as tourism. Last but not least, the quarterly regional unemployment level is used to account for regional employment prospects, irrespective of individual characteristics, shaped by the factors referred to above.

The data employed come from the quarterly Labour Force Surveys (LFS) conducted by the Greek Statistical Authority (ELSTAT). The surveys are countrywide, range from 2004 to 2014 and provide a rich set of information. The sample consists of individuals aged 15-64 who are employed or are actively looking for a job (unemployed). Thus, economically inactive individuals like students, pensioners, housewives, etc. are not included. Note that, as of 2004, LFS are a rotating panel, which means that interviews with the same households are repeated on a quarterly basis for six consecutive quarters, while every quarter 1/6 of the sample is renewed. ELSTAT adopts the definition for unemployment proposed by the International Labour Office (ILO) and assumes that a person is actively seeking employment, has made specific actions towards that end during the last four weeks prior to the survey, did not have paid employment, even for an hour, during the week prior to the survey, and is willing to take a job within a week, if offered.¹⁰

5. Results

The purpose of this paper is to study the differential effect of education on the unemployment probability across regions and how the crisis has impacted it, so Table 5

9. Depending on the production structure of each region, different interventions might be necessary. For instance, in a region which relies heavily on tourism, tertiary education graduates might be less desirable than Lyceum or Post-secondary education graduates.

10. The definition could easily be criticised, especially under the assumption that a person is considered employed if he/she had paid employment for just an hour during the week. Given the fact that the majority of those working part-time state that they could not get a full-time job (Cholezas 2015), the problematic nature of the definition is clear.

TABLE 5 Unemployment probability across regions by level of education (odds ratios)

		2004-2008		2009-2014	
		Odds ratio	p-value	Odds ratio	p-value
EM&TH	Before Lyceum	1.019	0.838	1.331 ***	0.000
	Post-secondary	0.980	0.884	0.868	0.253
	ATEI	0.765 *	0.090	0.660 ***	0.002
	AEI	0.538 ***	0.000	0.530 ***	0.000
	Master/PhD	0.544	0.394	0.439 **	0.028
CM	Before Lyceum	1.246 ***	0.001	1.419 ***	0.000
	Post-secondary	1.057	0.500	1.060	0.424
	ATEI	0.921	0.389	0.896	0.160
	AEI	0.704 ***	0.000	0.610 ***	0.000
	Master/PhD	0.744	0.164	0.530 ***	0.000
WM	Before Lyceum	1.593 ***	0.000	1.464 ***	0.001
	Post-secondary	1.083	0.663	1.093	0.529
	ATEI	0.789	0.221	0.742 *	0.076
	AEI	0.463 ***	0.000	0.622 ***	0.001
	Master/PhD	0.074 ***	0.005	0.326	0.123
EP	Before Lyceum	1.244 **	0.027	1.301 ***	0.004
	Post-secondary	0.978	0.868	1.200	0.149
	ATEI	0.788	0.115	0.807	0.101
	AEI	0.769 ***	0.040	0.679 ***	0.001
	Master/PhD	0.387	0.111	0.617	0.331
TH	Before Lyceum	1.038	0.732	1.346 ***	0.001
	Post-secondary	1.157	0.313	1.167	0.252
	ATEI	1.150	0.376	0.854	0.203
	AEI	0.674 ***	0.003	0.660 ***	0.000
	Master/PhD	0.204 ***	0.010	1.014	0.968
INI	Before Lyceum	1.258 *	0.099	1.023	0.855
	Post-secondary	1.183	0.509	1.107	0.600
	ATEI	1.904 **	0.030	1.094	0.706
	AEI	0.498 **	0.021	0.494 ***	0.001
	Master/PhD	1.138	0.898	2.621	0.311
WG	Before Lyceum	0.997	0.973	1.208 **	0.026
	Post-secondary	1.227	0.130	1.069	0.591
	ATEI	0.952	0.761	1.117	0.343
	AEI	0.549 ***	0.000	0.604 ***	0.000
	Master/PhD	1.289	0.512	0.707	0.248
SE	Before Lyceum	1.437 ***	0.000	1.399 ***	0.000
	Post-secondary	1.284 *	0.078	1.121	0.345
	ATEI	1.041	0.810	1.046	0.726
	AEI	0.636 ***	0.005	0.708 ***	0.002
	Master/PhD	1.338	0.800	0.440	0.059
AT	Before Lyceum	1.533 ***	0.000	1.557 ***	0.000
	Post-secondary	1.076	0.258	0.973	0.591
	ATEI	0.831 **	0.075	0.696 ***	0.000
	AEI	0.857 **	0.022	0.546 ***	0.000
	Master/PhD	0.753 *	0.069	0.411 ***	0.000
PL	Before Lyceum	1.129	0.222	1.261 ***	0.007
	Post-secondary	0.960	0.782	1.212	0.146
	ATEI	0.764	0.179	1.118	0.408
	AEI	0.653 ***	0.004	0.758 **	0.015
	Master/PhD	1.096	0.906	1.052	0.942

TABLE 5 (continuity)

		2004-2008		2009-2014	
		Odds ratio	p-value	Odds ratio	p-value
NA	Before Lyceum	1.262	0.216	1.952 ***	0.000
	Post-secondary	1.121	0.668	1.264	0.261
	ATEI	1.560	0.119	1.085	0.739
	AEI	0.494 **	0.017	0.753	0.158
	Master/PhD	0.258	0.142	1.023	0.966
SA	Before Lyceum	1.375 ***	0.009	1.214 *	0.081
	Post-secondary	1.097	0.625	1.076	0.664
	ATEI	0.882	0.705	0.537 ***	0.006
	AEI	0.343 ***	0.000	0.577 ***	0.005
	Master/PhD	-	-	0.845	0.731
CR	Before Lyceum	1.089	0.319	1.198 *	0.010
	Post-secondary	1.243 *	0.074	1.253 **	0.030
	ATEI	0.973	0.847	0.995	0.963
	AEI	0.684 ***	0.005	0.748 ***	0.004
	Master/PhD	0.862	0.727	0.379 ***	0.005

Note 1: *(**)(***)= statistically significant at 10%(5%)(1%) level of significance, respectively.

Note 2: The results for Master/PhD holders should be treated with caution due to the often small sample size.

presents strictly the results that serve that purpose.¹¹ The results are expressed in odds ratios and the interpretation is simple: when the odds ratio is greater than unity, then education –*ceteris paribus*– increases the unemployment probability compared with the reference group, i.e. Lyceum graduates. The reverse is true if the odds ratio is less than unity.

A close look at the results leads to a number of interesting conclusions. To start with, the effect of education on the unemployment probability is not great, at least when statistical significance of the odds ratios is considered. This means that compared with Lyceum graduates, more or less education does not seem to make a difference, i.e. increase or decrease the probability of getting a job. For instance, there is almost no differentiation between Lyceum graduates and Post-secondary education graduates with respect to their unemployment probability, while when there seems to be a differentiation (in two regions in 2004-2008 and in one region in 2009-2014) the latter seem to be at a disadvantage, i.e. they have a higher unemployment probability. The situation is similar for ATEI graduates, but in their case at least the unemployment probability is lower. This observation ought to cause some concern, although similar results were reported in

the past and the explanations offered include not only overeducation and a low degree of labour market competition, which does not seem to reward individuals with preferable characteristics enough, but also factors related to individual preferences that may cause rigidities and informal institutions, such as social networks (Monastiriotis and Martelli 2013).

Focusing more on results that are statistically significant leads to a second observation –the unemployment probability is greater for low education graduates and decreases as the level of education increases. The gap between the highest and the lowest effect of education on the unemployment probability varies across regions, just as the effects themselves vary. For instance, in 2009-2014 Lyceum graduates in Crete were just 1.6 times more likely to be unemployed compared with AEI graduates, while in Attica they were 2.9 times more likely. Comparing odds ratios, it turns out that the difference can be attributed to the fact that the former have much worse employment potentials in Attica, while the latter much better.

Examining levels of education separately, it becomes obvious that AEI graduates have the lowest unemployment probability compared with all other graduates, with

11. The full set of results is available from the author.

the exception of individuals with post graduate studies, strictly in regions with a sufficient sample size.¹² Moreover, it is the only level of education which seems to have a relatively stable negative effect on the unemployment probability (in terms of statistical significance), over time, for almost all regions (12/13 in 2009-2014). Once again the heterogeneity of regions is evident, since AEI graduates fare better in the Ionians islands, East Macedonia and Thrace and Attica (0.494, 0.530 and 0.546 odds ratios, respectively) and less well in the Peloponnese and Crete (0.758 and 0.748 odds ratios, respectively).

The comparisons between regions seem to suggest that in regions including large urban centres, such as Attica (with Athens) and Central Macedonia (with Thessaloniki), education matters more. This conclusion relies both on the statistical significance of the odds ratios of several levels of education, which confirms that the local labour market values higher educational attainment positively, and on their dispersion. Note that the size of education's effect on the unemployment probability is influenced greatly by the region's structure of production which also defines the type of labour demanded by employers. For example, the strong presence of a public sector in a region can increase the demand for tertiary education graduates, e.g. doctors, teachers, etc.

As far as the consequences of the crisis are concerned, the most interesting observation is that the role of education is strengthened. This conclusion is verified both by the increase in odds ratios that are statistically significant and the magnitude of their change. For instance, before the crisis an individual who had not graduated from Lyceum had worse prospects of getting a job compared to a Lyceum graduate in seven regions, while during the crisis the number of regions went up to twelve. There are only a few cases in which the effect of education decreases during the crisis, e.g. Post-secondary graduates in Sterea Ellada and AEI graduates in the South Aegean. In most cases when education had a statistically significant effect before the crisis, its effect increased during the crisis. This phenomenon is particularly clear in Central Macedonia, Attica and other regions as well.

6. Conclusions

Local labour markets seem to differ substantially across regions in Greece, especially when it comes to unemployment. Since such differences are not just a Greek phenomenon, they have attracted the interest of researchers worldwide. Over the past few years, motivated by the crisis, relevant research focused on exploring

the ways regions reacted to exogenous shocks and the determination of factors responsible for such diverse reactions.

The present paper uses individual data from the Labour Force Surveys conducted by ELSTAT from 2004 to 2014. The purpose is to explore the effect of education on unemployment probabilities, how it varies across regions and how it changed because of the crisis and the diversity of its impact on Greek regions according to previous empirical evidence. The sample was split into two sub-periods: the "pre-crisis" period, 2004-2008, and the "during the crisis" period, 2009-2014. The key conclusions that can be drawn from the results of the descriptive and econometric analysis are consistent with Greek and international literature and can be summarized as follows:

1. The role of education in shaping the unemployment probability is limited, since in many cases coefficients and consequently odds ratios are statistically insignificant.
2. The effect of an AEI degree exhibits the highest stability over time and reduces the unemployment probability significantly.
3. The crisis seems to have reinforced the effect of education on the unemployment probability, which is a good thing for those who have a higher level of education.
4. The effect of education, when statistically significant, varies across regions, just as the width varies also, which is the difference between the unemployment probability of a higher education graduate and that of a lower education graduate.
5. Regions that include large urban centres, like Attica and Central Macedonia, exhibit more variation in the unemployment probability with respect to education, probably due to the wider spectrum of economic activity involved.

Given the conclusions drawn from the results, one should pinpoint the reinforcement of the role of education, which probably shows a rationalization of the labour market during the crisis in the sense that the market seems to be more able to distinguish between different levels of education and to reward those with the desirable qualifications, despite the fact that in many cases it still does not have the role it deserves according to economic theory. Further analysis incorporating more detailed information, especially as far as tertiary education is concerned, could determine which studies strengthened their role as a shield against unemployment and in which

12. In a few cases the unemployment probability varies for post graduates (Master/PhD holders). It is highly probable that this is due to the small sample size.

regions. Last but not least, the results do not negate, but rather reinforce, the policy framework for connecting the education system with the labour market through the restructuring of fields of studies, in order to improve the matching between demand and supply of labour, as well as the expansion of the introduction of apprenticeship schemes and dual education-work programmes, in order to facilitate the transition from education to employment.

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Competitiveness of the Manufacturing Sector in the Eurozone countries, EU19

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1. Introduction

The economic growth of a country directly depends on the course of the industrial production. The manufacturing sector¹ incorporates products which can be differentiated based on the intensity of the technology they incorporate. It is interesting to study the course of exports of manufacturing products and their competitiveness within the 19 Eurozone countries.

The manufacturing production in Greece is limited compared with the other Eurozone countries. The gross added value of industrial production in Greece for 2014 accounted for 8% of GDP while the corresponding average of the Eurozone countries was 15% (according to World Bank data). Moreover, the Manufacturing Production Index decreased dramatically during the deep economic recession in Greece. The value of the manufacturing index in 2014 was 87.77, reduced by 25.2% compared to 2008 (according to ELSTAT data).

The export performance of the manufacturing sector in the EU19 is examined. In addition, the competitiveness of the manufacturing sector is analyzed based on the index of Revealed Symmetric Comparative Advantage (RSCA). Manufactured products are divided into four categories based on the technology intensity they incorporate: labor and resource-intensive, low-skill and technology-intensive, medium-skill and technology-intensive, and high-skill and technology-intensive. Medium and high-skill and technology-intensive products are of particular importance to a country's economy as they incorporate innovation, research and development and increased value added. The spill-over effect of the innovation and the research conducted in the high technology sector affects the whole economy in a positive way and drives growth.

Nineteen countries of the Eurozone are examined: Greece, Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain. Two time periods are also examined:

2000-2008 (the years before the economic recession) and 2009-2014 (the years of the economic recession).

In the next section the export performance of the manufacturing sector of the Eurozone is analyzed. In the third section the comparative advantages in the manufacturing sector of the Eurozone are presented and discussed. The article finishes by drawing useful conclusions based on the preceding analysis.

2. The export performance of the manufacturing sector in the EU19

2.1. The export coverage ratio

The export coverage ratio (X/M) is examined in order to detect the surplus and deficit categories of manufactured products. Table 1 presents the average export coverage ratio for the two time periods, for all EU19 countries. Greek exports covered only 35% of imports as far as manufactured goods are concerned. In all four categories of different technology intensity, Greek imports are significantly lower than exports. It should be noted that the ratio improved in the second time period in all categories with the exception of labor and resource intensive manufactures, mainly due to the decrease of imports. Cyprus also exhibits significant deficits in all four categories.

In a significant number of Eurozone countries exports are greater than imports. Germany, Italy, Finland, Belgium and Austria exhibit high coverage ratio. They are followed by the Netherlands, Ireland, Spain, Slovakia and Slovenia.

The export coverage ratio for labor and resource intensive manufactures is higher in Finland, Italy and Portugal. Luxemburg Finland and Italy exhibit the highest export coverage ratio in low skill technology intensive manufactures (Italy also exhibits a large surplus during the second period but a deficit during the first period). Germany and Italy exhibit the largest export coverage ratio in the category of the medium skill technology intensive manufactures while Ireland, Malta, Netherlands and Italy exhibit the highest export coverage ratio for high skill technology intensive manufactures.

2.2. Structure of exports of the technology-intensive products

The economic crisis of 2008 has significantly affected economic activity in the Eurozone and with its trade partners. Consequently, exports have also been affected.

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1. The manufacturing sector is the main sub-sector of the industrial sector.

TABLE 1 Export coverage ratio

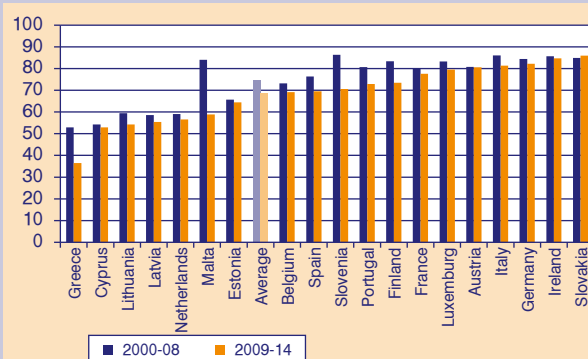
	Labor and resource-intensive		Low-skill and technology-intensive		Medium-skill and technology-intensive		High-skill and technology-intensive	
	2000-08	2009-14	2000-08	2009-14	2000-08	2009-14	2000-08	2009-14
Austria	1.06	0.95	1.28	1.41	1.13	1.15	0.77	0.87
Belgium	1.15	1.08	1.21	1.20	1.05	0.98	1.11	1.18
Cyprus	0.11	0.08	0.09	0.11	0.16	0.15	0.23	0.44
Estonia	1.27	1.27	0.48	0.75	0.52	0.88	0.72	0.88
Finland	3.08	2.15	1.75	1.53	1.10	1.17	1.22	0.84
France	0.69	0.61	0.96	0.84	1.07	0.93	1.07	1.05
Germany	0.91	0.92	1.37	1.25	2.03	2.03	1.23	1.24
Greece	0.50	0.43	0.19	0.33	0.16	0.33	0.24	0.33
Ireland	0.34	0.31	0.85	2.09	0.48	0.63	2.65	3.49
Italy	2.02	1.73	1.33	1.47	1.44	1.71	0.79	0.81
Latvia	1.04	1.14	0.67	0.93	0.24	0.60	0.30	0.64
Lithuania	1.25	1.50	0.55	0.76	0.48	0.88	0.60	0.87
Luxembourg	1.09	1.01	2.01	2.18	0.81	0.85	0.68	0.64
Malta	0.60	0.23	0.22	0.10	0.70	0.90	1.22	1.41
Netherlands	0.76	0.80	0.91	1.00	0.95	1.13	1.12	1.25
Portugal	1.52	1.55	0.53	0.78	0.65	0.86	0.44	0.48
Slovakia	1.27	1.10	1.39	1.23	1.11	1.36	0.65	0.93
Slovenia	1.31	1.11	0.88	1.03	1.19	1.36	0.79	1.01
Spain	0.87	0.92	0.83	1.15	0.84	1.16	0.56	0.68

Source: UNComtrade, own calculations.

The exports of manufactured goods have decreased in almost all Eurozone countries, with the exception of Slovakia, during the economic recession.

In more detail, Figure 1 illustrates the average export shares of manufactured products (manufactured products exports as a percentage of total exports) during two time periods, 2000-2008 and 2009-2014, for the EU19. The average export share of manufactured goods of the EU19 decreased by 8.1%. Greece not only had the lowest export share of manufactured goods among the EU19 countries during both time periods (52.9% in 2000-2008 and 36.5% in 2009-2014) but also suffered the greatest decrease. The average export share of Greece decreased by 31% in 2009-2014 compared to the previous period. Malta also experienced a severe drop in the export share of manufactured goods, by 30%. On the other hand, Slovakia was the only country that presented a slight increase, by 1.2%. The countries that suffered the greatest decrease (greater than the EU19 average of 8.1%) were: Greece, Malta, Slovenia, Finland, Portugal, Spain and Lithuania. It is interesting that the countries with an export share lower than the average of the EU19 suffered, on average, a greater loss than the remaining EU19 countries.

Thereafter, the export shares of manufactured goods for each one of the four categories of technology intensity are presented and analyzed in order to better understand how the economic recession affected each category. Table 2 presents the average export shares of the four categories of manufactured goods for the two time periods under investigation, 2000-2008 and 2009-2014.

FIGURE 1
Export shares of manufactured products, EU19

Source: UNComtrade, own calculations.

TABLE 2 Export shares of manufactured products, 2000-2008 and 2009-2014

	Labor and resource-intensive		Low-skill and technology-intensive		Medium-skill and technology-intensive		High-skill and technology-intensive	
	2000-08	2009-14	2000-08	2009-14	2000-08	2009-14	2000-08	2009-14
Austria	13.67	11.31	11.66	13.02	36.61	35.07	18.78	21.19
Belgium	9.81	7.73	7.34	6.92	23.69	19.69	32.37	34.79
France	8.95	7.88	7.55	6.99	31.30	27.08	32.36	35.66
Germany	7.69	6.89	7.42	7.37	41.37	40.43	27.95	27.45
Greece	18.52	8.45	6.61	5.55	10.24	7.78	17.51	14.75
Estonia	19.63	13.86	7.20	6.86	18.11	22.96	20.73	20.78
Ireland	1.75	1.41	2.99	4.97	5.84	5.27	75.04	73.05
Spain	12.53	11.48	8.74	8.38	36.56	31.13	18.49	18.52
Italy	21.94	18.03	10.42	10.64	34.72	33.53	18.91	19.12
Cyprus	7.69	3.94	3.30	3.24	19.39	9.36	23.83	36.36
Latvia	25.31	14.68	11.47	10.27	10.95	13.73	10.84	16.68
Lithuania	20.35	14.33	6.97	5.13	15.73	16.77	16.38	18.00
Luxembourg	12.26	11.48	25.61	24.99	21.02	23.13	24.34	19.93
Malta	7.11	2.42	5.48	3.33	14.07	12.16	57.32	40.92
Netherlands	5.52	4.84	5.16	5.78	14.37	14.16	33.97	31.75
Portugal	31.12	25.97	6.08	7.42	27.10	25.37	16.33	14.14
Slovakia	15.26	9.42	13.51	10.44	40.33	41.76	15.79	24.33
Slovenia	19.76	10.43	10.15	8.24	39.08	33.29	17.35	18.65
Finland	20.48	17.19	10.53	10.82	23.58	25.96	28.74	19.45
Average	14.70	10.62	8.85	8.44	24.43	23.09	26.69	26.61

Source: UNComtrade, own calculations.

In Greece, during the period before the economic recession, labor and resource-intensive manufactures corresponded to the largest part of exports, followed by the high, medium and low technology-intensive manufactures. During the second period, the shares of all four categories reduced but the share of high-skill technology-intensive manufactures reduced to a lesser extent than the share of the labor and resource-intensive manufactures. During the recession period (2009-2014), the largest share of exports corresponds to high-skill technology-intensive manufactures and is followed by labor-intensive, medium-skill and low-skill technology-intensive manufactures. On the other hand, in the Eurozone, in both time periods, high-skill technology-intensive manufactures have the largest share of exports, followed by medium-skill technology-intensive manufactures, labor-intensive manufactures and, finally, by low-skill technology-intensive manufactures. The economic crisis has not affected the ranking of the shares of the four categories. It should be noted that the share of exports of Greece corresponding to labor-intensive manufactures is above the Eurozone average while the export shares corresponding to low, medium and high-skill technology-intensive manufactures are smaller than the corresponding averages of the Eurozone. This is an indication that

our country is lagging behind in technology-intensive products, even in low technology-intensive products. Moreover, the most powerful economies of the Eurozone export products of medium and high technology intensity. Especially, France, Germany, Austria, Belgium, Slovakia and Spain base their exports mostly on products of medium and high intensity. In addition, high-skill technology-intensive manufactures have significantly high shares in Ireland, Malta and Cyprus. During the economic crisis most countries retained their shares of exports of high-skill technology-intensive manufactures.

Finally, the sub-sector that suffered the greatest loss, as far as export shares are concerned, is the labor and resource-intensive manufactures. The average export share of the EU19 dropped by almost 28% in 2009-2014 compared to the previous period.

3. Comparative advantage developments in the manufacturing sector of the Eurozone

3.1. Methodology

For the assessment of competitive advantages, we use the index of competitiveness, such as the revealed com-

parative advantage. Balassa (1965) proposed such an index for measuring the comparative advantage of a country. The present empirical paper is based on specific methodology, using the index disclosed Symmetric Comparative Advantage (Revealed Symmetric Comparative Advantage - RSCA) as proposed by Laursen (1998, 2000) and by Dalum, Laursen and Villumsen (1998), as an index of comparative advantage. The RSCA index is a transformation of the Revealed Comparative Advantage Index (RCA, Balassa index). The RSCA index has the following form:

$$RSCA_j^i = (RCA_j^i - 1) / (RCA_j^i + 1) \quad (1)$$

$$RCA_j^i = \frac{X_j^i / \sum_i X_j^i}{\sum_i X_j^i / \sum_i \sum_j X_j^i},$$

where

$RSCA_j^i$ represents the revealed comparative advantage of country i for the sector or product j ,

X_j^i is the exports of country i for the sector or product j , to EA19,

$\sum_i X_j^i$ is the total exports of country i ,

$\sum_i X_j^i$ is the total exports of EA19 for the sector or product j ,

$\sum_i \sum_j X_j^i$ is the total of exports.

The interpretation of the RSCA index is similar to the traditional index except that the values vary between $[-1, 1]$, for $0 \leq RSCA_j^i \leq 1$ to imply that the country i has a comparative advantage to the product or sector j , whereas if $-1 \leq RSCA_j^i \leq 0$ implies that the country i has a comparative disadvantage for the examined product or sector j .

3.2. Results

Table 3 presents the average rate of the index revealed Symmetric Comparative Advantage for the two periods under review in each category of manufactured product. Examining the labor-intensive products and resources, we observe that eight countries (Austria, Estonia, Italy, Latvia, Lithuania, Portugal, Slovenia and Finland) had competitive advantages in those products in the period before the economic crisis and maintained their competitive advantages in the next period. In contrast, Greece and Slovakia lost their competitive advantage in the second period (2009-2014), while Spain and Luxembourg

managed to transform the competitive disadvantage to advantage in the second period.

Regarding low technology-intensity products, we observe that Austria, Belgium, France, Spain, Italy, Luxembourg, Slovakia, Slovenia and Finland maintained their competitive advantages in both examined sub-periods. Latvia is the only country which lost its competitive advantage in this product category.

In the medium technology-intensive products, nine Eurozone countries (Austria, France, Germany, Spain, Italy, Malta, Portugal, Slovakia and Slovenia) maintained the competitive advantage in both sub-periods under review. Belgium is the only country that lost its competitive advantage in the second period. Estonia, Luxembourg and Finland obtained a competitive advantage in the second sub-period, having had a comparative disadvantage in the first sub-period.

Seven Eurozone countries (Belgium, France, Germany, Ireland, Cyprus, Malta and the Netherlands) had a competitive advantage in technology-intensive products during the period, 2000-2008 and managed to maintain it in the next period 2009-2014. Luxembourg and Finland lost their competitive advantage during the second time period while no country managed to turn its competitive disadvantage into an advantage.

Greece is the only country that has no comparative advantage in any of the three categories of industrial technology-intensive products. In the sub-period 2000-08, comparative advantages in the labor-intensive industrial products and resources were observed, but were lost in the next sub-period, 2009-2014. Others countries, which also have experienced economic recession, have maintained their competitive advantages, such as Ireland (in technology-intensive products), Cyprus (in technology-intensive products), Portugal (in labor-intensive products and resources and intermediate technology-intensity products), and, especially, Spain not only maintained its competitive advantage in low and medium technology-intensive products but turned and the competitive disadvantage in the labor-intensive products to advantage during the second period concerned.

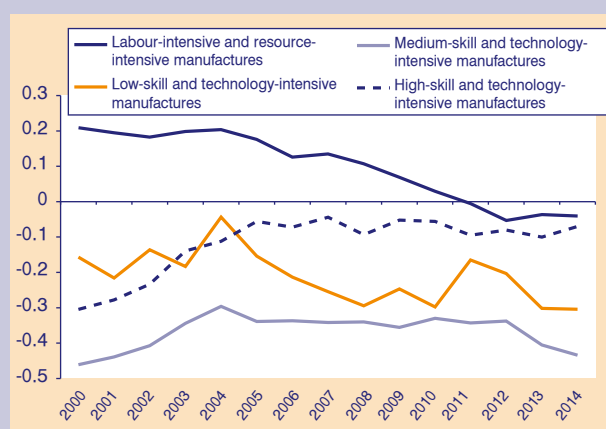
Figure 2 shows the evolution of the disclosed Comparative Advantage index and of four categories of industrial products in Greece from 2000 to 2014. We note that Greece had a comparative advantage only in labor-intensive industrial products and raw materials, which gradually decreased until 2010, while from 2011 onwards the advantage turns into a disadvantage. In technology-intensive products our country consistently has a competitive disadvantage in all three categories.

TABLE 3 RSCA: Manufactured goods by degree of manufacturing

	Labour-intensive and resource-intensive manufactures		Low-skill and technology-intensive manufactures		Medium-skill and technology-intensive manufactures		High-skill and technology-intensive manufactures	
	2000-08	2009-14	2000-08	2009-14	2000-08	2009-14	2000-08	2009-14
Austria	0.018	0.087	0.200	0.266	0.227	0.230	-0.152	-0.120
Belgium	-0.085	-0.010	0.056	0.023	0.041	-0.058	0.169	0.180
France	-0.176	-0.085	0.038	0.026	0.202	0.135	0.090	0.133
Germany	-0.205	-0.073	-0.021	0.008	0.240	0.206	0.111	0.109
Greece	0.170	-0.006	-0.183	-0.253	-0.367	-0.367	-0.148	-0.076
Estonia	0.185	0.199	-0.066	0.003	-0.032	0.099	-0.003	-0.322
Ireland	-0.815	-0.750	-0.556	-0.283	-0.540	-0.579	0.545	0.521
Spain	-0.049	0.096	0.017	0.017	0.285	0.239	-0.122	-0.131
Italy	0.192	0.275	0.180	0.218	0.218	0.191	-0.086	-0.070
Cyprus	-0.145	-0.390	-0.219	-0.368	-0.353	-0.355	0.177	0.356
Latvia	0.317	0.200	0.094	-0.029	-0.275	-0.143	-0.248	-0.100
Lithuania	0.182	0.109	-0.131	-0.245	-0.248	-0.321	-0.109	-0.069
Luxembourg	-0.033	0.087	0.510	0.470	-0.016	0.028	0.003	-0.061
Malta	-0.081	-0.341	-0.073	-0.213	0.027	0.105	0.321	0.176
Netherlands	-0.365	-0.260	-0.200	-0.113	-0.258	-0.273	0.165	0.126
Portugal	0.356	0.453	-0.084	-0.031	0.142	0.111	-0.187	-0.240
Slovakia	0.070	-0.017	0.130	0.085	0.371	0.381	-0.228	-0.018
Slovenia	0.195	0.125	0.156	0.154	0.346	0.355	-0.351	-0.236
Finland	0.269	0.302	0.153	0.266	-0.008	0.016	0.054	-0.160

Source: UNComtrade and own calculations.

FIGURE 2
RSCA: Manufactured goods by degree of manufacturing in Greece, 2000-14



4. Conclusions

This article explains the export competitiveness of industrial technology-intensive products, in the Eurozone countries. In the first step, we examined the export performance of countries.

The Greek economy shows large imbalances in the balance of technology-intensive manufactured products. In contrast, Germany, Italy, France, Finland, Ireland and Austria have higher surpluses in industrial technology-intensive products. At the time of economic crisis, in the majority of Euro area countries, the balance of these products in all categories of technological intensity, except for labor-intensive industrial products and raw materials, has shown a marginal improvement.

Exports of industrial products recorded a decrease in the share of exports in almost all the Eurozone countries, except Slovakia, during the economic crisis. At the country level, we observe that Greece not only had the smallest share of industrial products exports over time, but during the crisis these shares shrank further. Moreover, the structure of Greek industrial products lags in technology-intensive products, even in low technology-intensive products. In contrast, the strong economies of the Eurozone export industrial medium and high technology-intensive products.

Besides Greece, the remaining countries of the Eurozone have a competitive advantage in at least one of the three

categories of industrial technology-intensive products. Unfortunately, our country has lost the competitive advantage it had during the period before the economic crisis for labor-intensive industrial products and raw materials. In most countries, the economic crisis does not seem to significantly affect their competitive advantages.

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Introducing the Influential Expectations Hypothesis for Aggregate Expectations¹

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1. Introduction

The global economic turbulence that started in 2008 took off as a crisis of expectations –on the creditworthiness of individual borrowers and then of whole public sectors, as well as of expectations related to the value of tangible and financial assets. It also brought forcefully to the forefront the growing importance of the financial sector regarding the economy’s macroeconomic outcomes, a sector that is dominated by expectations.

In this paper we present for the first time a new hypothesis on expectations formation, which we call the “Influential Expectations Hypothesis” (IEH), with the aim of providing a new tool and generally applicable concept for economic models to capture and better analyze transitional dynamics as well as the short- and mid-term evolution of a market economy.

Any new foundational hypothesis, in order to be valid and useful, must satisfy the following three requirements:

- it must be based on reasonable arguments and/or evidence from data
- it must lead to different outcomes at the theoretical level than its predecessors
- these different theoretical outcomes must be consistent with the data.

Our focus is macroeconomics: we formulate our expectations-formation hypothesis with an eye towards aggregation of individual expectations and macroeconomic modeling. We do not view IEH as a general behavioral hypothesis related to the individual regarding information processing and expectations formation, applicable to any aspect of life (as is for example the “Rational Inattention” formulation of Sims [2003]). Nevertheless, the hypothesis is fully micro-founded, in the sense that it makes specific assumptions at the individual-agent level and derives the implications for the *aggregate* expectation on a macroeconomic variable, namely the expectational variable that interacts with the actual macroeconomic variables of the economy. It is a hypothesis detailing how aggregate

expectations on macroeconomic variables emerge from the aggregation of individual expectations on both individual and macroeconomic magnitudes.

In Section 2, we lay out the basic arguments that lead to the IEH. In Section 3, we solve a simple supply-and-demand model and contrast the IEH solution to the solution obtained under the Rational Expectations Hypothesis (REH), a solution that differs markedly. In Section 4, we provide indicative econometric evidence that the IEH solution is consistent with real-world data.

2. Macroeconomic variables and Aggregate Expectations: The Influential Expectations Hypothesis

In the context of a single economy, we distinguish three kinds of macroeconomic variables: “aggregates” like income, consumption, capital stock, etc. which are naturally defined as the sum of the corresponding individual variables; “indices,” which are weighted averages of the corresponding individual variables (like inflation or interest rates); and “government” variables, which to a large degree are the combined outcome of the interaction of a few decision-making centers, and sometimes of just one. Studying expectations-formation for this last category of variables requires strategic analysis from the beginning, something that is out of the scope of the present paper. Therefore, we restrict our attention to the other two categories.

2.1. The Aggregate Expectation on macro-aggregates

2.1.1. Defining the aggregate expectation

A macroeconomic aggregate is naturally defined as the sum of the corresponding individual variables. In an economy that consists of n agents, an aggregate macro-variable at time t is $Y_t \equiv \sum_{i=1}^n y_{it}$ with the lower-case denoting the individual variables of the n agents.

Each agent ultimately cares about how his personal fortunes will evolve, and so he is interested in forming expectations on $y_{i,t+1}$, denoted $y_{i,t+1}^e$ (for simplicity we treat only one-period-ahead expectations). We allow for individual expectations to depend on different information sets, denoted I_{it} .

1. This paper contains results from my ongoing PhD Thesis: “Essays on Expectations, Asset Markets, and Economic Crises” which is undertaken at the Athens University of Economics and Business under the supervision of professor George Alogoskoufis.

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It is then natural to define the *aggregate expectation* analogously with the actual macro-variable, namely, as the sum of individual expectations:

$$Y_{t+1}^e \equiv \sum_{i=1}^n y_{i,t+1}^e \quad [1]$$

Note that, by construction, Y_{t+1}^e is unobservable, and an expectation that *no one holds as one's own*, in exact analogy to the actual macro-variables, like aggregate income or aggregate consumption, which are no one's variable but rather the unintended total result of decentralized actions.

The agent recognizes that the evolution of the macro-variable is in itself of importance, in that it will influence the evolution of his individual variable. If, for example, the economy grows, the fortunes of any specific individual agent will *tend* to grow with it, *because* of the growth of the aggregate variable. This is an insight that comes from the business-cycles phenomenon. Therefore, it is reasonable to assume that the individual agent holds expectations on the macro-variable, denoted $Y_{i,t+1}^e$, and this expectation affects the formation of the individual expectation $y_{i,t+1}^e$. We turn now to discuss the $Y_{i,t+1}^e$ variables, namely, how predictions on the evolution of the aggregate variable become available and are incorporated into individual expectations.

2.1.2. Predicting the aggregate variable

A key observation in the construction of IEH is that individual agents do not form expectations “directly” on the macro-variables, in the sense that they do not process raw quantitative and qualitative information and economic data in order to arrive at them, and this is because individual agents possess neither the knowledge, the time, nor the access to do so. While this appears to be a “bounded rationality” argument, we argue that, *on the contrary*, it is an efficiency-optimizing choice and thus fully rational, because it is one more manifestation of the “division of labor” and the efficiency gains that come from specialization: most of the goods and services an individual consumes are not made or offered by himself to himself, but rather from other agents specialized in their production. Forecasting something as complex as a macroeconomic variable should not be expected to be any different.

Certainly, “economic agents know their environment” – but it is one thing to know the micro-environment, or even to know the macro-environment as a static entity (i.e. know the laws, the ethics, the “rules of engagement” in general), and an altogether different thing to know how the macro-environment *evolves*.²

Specialization in predicting macroeconomic variables is indeed observed in the real world. There exist entities (persons or organizations), that declare publicly their predictions on the macroeconomic variables. Such entities possess some degree of “public influence” either because of scientific or other credibility, or because they are believed to possess private information in relation to events that will affect the macro-variables. For this reason, we will call them Influential Expectators. For the purpose of predicting Y_{t+1} , each Influential Expectator has its own information set I_{jt} , $j = 1, \dots, m$, including information deemed relevant to the purpose at hand, which is to form $Y_{j,t+1}^e = Y_{j,t+1}^e(I_{jt})$. An important point here is that we expect I_{jt} to include information only on macro-variables and on the various markets of the economy and not on any individual variable. This has the consequence that individual variables are stochastically independent of the information sets of Influential Expectators.

The fact that individual agents take into account what Influential Expectators have to say should be obvious from casual observation. Inoue, Kilian & Kiraz (2009) study empirically the positive correlation of households' expectations on inflation with professional public inflation forecasts, as well as with “inflation news”. Carroll (2003), in building a model for the evolution of aggregate expectations about inflation, writes: “*Rather than having full understanding of the “true” macroeconomic model and constantly tracking the latest statistics to produce their own macroeconomic forecasts, typical people are assumed to obtain their macroeconomic views from the news media.*” Another approach adopted in the literature is the choice among “competing predictions” based on some optimality criterion like, for example, mean-squared prediction error (see e.g. Brock & Hommes 1997, or Guse 2010).

What we assume for our purposes is that, from the public interaction of these Influential Expectations, a *prevailing* value-expected of the macro-variable emerges, $Y_{p,t+1}^e = Y_{p,t+1}^e(Y_{1,t+1}^e, \dots, Y_{m,t+1}^e)$. The subscript p in the left-hand-side stands exactly for the word “prevailing”, since $Y_{p,t+1}^e$ reflects in a sense the “general consensus” (what is “in the air”) regarding the value-expected of the aggregate variable. To make $Y_{p,t+1}^e$ operational, we adopt the Rational Expectations approach for it: we assume that

$$Y_{p,t+1}^e = E(Y_{t+1} | I_{mt}), \quad I_{mt} = \bigcup_{j=1}^m I_{jt}. \quad [2]$$

The Prevailing Expectation is the expected value of the macro-variable conditional on all information available to the Influential Expectators. This assumption is consistent with the assumption (and partial reality) that many of the Influential Expectators, in forming their predic-

2. Lorenzoni (2009) also makes this evident remark, that agents know their micro-environment better than the macro-economy.

tions, strive for and achieve scientific accuracy rather than manipulating the public's perceptions.³ Also, it is backed by the fact that a combination of forecasts leads to better predictions.⁴

Then, we make the assumption that all agents use this "good-quality" Prevailing Expectation $Y_{p,t+1}^e$ as the input to their individual prediction function, related to the aggregate variable:

$$Y_{i,t+1}^e = Y_{p,t+1}^e, \quad i = 1, \dots, n \quad [3]$$

We will now analyze the prediction of the individual variable.

2.1.3. Predicting the individual variable

$Y_{p,t+1}^e$ will be a common input to the individual expectations function $y_{i,t+1}^e$ of each agent, $y_{i,t+1}^e = y_{i,t+1}^e(I_{it}, Y_{p,t+1}^e)$. So our agent has a prediction available of how the macro-variable will evolve, and he must now take this into account, together with any other information pertaining to the evolution of the individual variable y_i , which, after all, is *what ultimately matters to him*.

We model the process as follows: prior to incorporating $Y_{p,t+1}^e$ in his deliberations, the agent predicts his future position *under the assumption that the macro-environment will remain static*. This, to a degree, is a "*ceteris paribus*" step, since it helps the decision maker disentangle causalities and associations between the multiple factors that he must take into account.⁵ This "counterfactual" expectation is denoted as $\tilde{y}_{i,t+1}^e$, and the associated Information set as \tilde{I}_{it} . Note that, *by construction*, the non-expectational counterpart of $\tilde{y}_{i,t+1}^e$ is equal to the current level of the macro-variable:

$$\sum_{i=1}^n \tilde{y}_{i,t+1}^e \equiv Y_t \quad [4]$$

even though, in general $\sum_{i=1}^n \tilde{y}_{i,t+1}^e \neq Y_t$, since agents do not co-ordinate their expectations formation.

We now make operational assumptions on how the individuals form their counterfactual expectations. Here, too, we impose the Rational Expectations approach:

$$\tilde{y}_{i,t+1}^e = E(\tilde{y}_{i,t+1}^e | \tilde{I}_{it}). \quad [5]$$

We note that any predicted allocative/distributional changes have been taken into account in $\tilde{y}_{i,t+1}^e$. Predicting one's own individual variable under the assumption that the macro environment will remain static does not imply a forecast of "no-change": forces and trends at the

micro level (inside a household, a company, a market, or between markets), phenomena with which each agent lives daily, may indicate that the level of the individual variable will tend to increase or decrease, irrespective of the evolution of the macro-variable. These changes are allowed in our framework.

Once the agent has $\tilde{y}_{i,t+1}^e$ determined, it remains to specify how the prevailing expectation on the macro-variable $Y_{p,t+1}^e$ is combined with $\tilde{y}_{i,t+1}^e$ in order to arrive at $y_{i,t+1}^e$. An intuitive approach, and one that guarantees internal consistency, is to assume that the counterfactual expectation is adjusted proportionally by the expected evolution of the aggregate variable. In other words, we assume that

$$y_{i,t+1}^e = \frac{Y_{p,t+1}^e}{Y_t} \tilde{y}_{i,t+1}^e. \quad [6]$$

The assumption incorporated in [6] is methodologically consistent in that it satisfies the aggregation rule if written in terms of the actual variables that are predicted (in other words, it is consistent with perfect foresight). By insterting [2] and [5] into [6] we obtain

$$y_{i,t+1}^e = \frac{E(Y_{t+1} | I_{mt})}{Y_t} E(\tilde{y}_{i,t+1}^e | \tilde{I}_{it}). \quad [7]$$

It is important to clarify that the individual variable y_i is not necessarily assumed to be totally out of the control of the agent, neither is the agent "passively forecasting" its next-period level. The way we have formulated our hypothesis permits us to treat y_i as a variable over which the agent may optimize by using an optimal decision rule that embodies the agent's own objectives, such as utility or profit maximization or any other goal. The essence here is that, once we look into the future, no variable is under the complete control of the agent, and so any consideration of its future value involves the formation of expectations, even though the agent can partially influence this future value through his actions today, which are incorporated in $E(\tilde{y}_{i,t+1}^e | \tilde{I}_{it})$.

The individual expectation in equation [7] is, of course, unobservable since it includes $E(\tilde{y}_{i,t+1}^e | \tilde{I}_{i,t+1})$. But our interest lies in the aggregate expectation that will emerge by aggregating $y_{i,t+1}^e$.

2.1.4. The aggregate expectation

Summing equation [7] over i we obtain an expression for the aggregate expectation,

3. Of course, the "strategic" version of IEH is a natural future direction for research.

4. Chapter 9 in Granger & Newbold (1986) remains a convincing analysis on the matter.

5. It is also reminiscent of the income/substitution effects decomposition in demand theory.

$$Y_{t+1}^e = \frac{E(Y_{t+1} | I_{mt})}{Y_t} \sum_{l=1}^n E(\tilde{y}_{l,t+1} | \tilde{I}_{l,t+1}). \quad [8]$$

The aggregate expectation does not equal the publicly prevailing expectation $Y_{p,t+1}^e$ but also depends on the private, heterogeneous expectations of individual agents, which is only reasonable.

As it stands, the aggregate expectation is still unobservable. To arrive at an operational formulation, we consider its expected value conditional on I_{mt} :

$$E(Y_{t+1}^e | I_{mt}) = E \left[\frac{E(Y_{t+1} | I_{mt})}{Y_t} \sum_{l=1}^n E(\tilde{y}_{l,t+1} | \tilde{I}_{l,t+1}) | I_{mt} \right]. \quad [9]$$

Both $E(Y_{t+1} | I_{mt})$ and Y_t are measurable with respect to I_{mt} and they can be taken out of the expected value. Also, as noted previously, individual variables are independent from the information sets of Influential Expectators, and so from their union, since information on macro-variables and markets, (which is what I_{mt} contains), should not help in reaching conclusions for *specific* individual variables. This transforms the conditional expectation of the sum on the right-hand side of equation [9] into an unconditional expected value. Using the law of iterated expectations and equation [4], we obtain

$$E(Y_{t+1}^e | I_{mt}) = \frac{E(Y_t)}{Y_t} E(Y_{t+1} | I_{mt}). \quad [10]$$

Equation [10] represents the Influential Expectations Hypothesis. It says that the expected value of the aggregate expectation conditional on all macro-level information, equals the Prevailing Expectation on the aggregate variable weighted by $E(Y_t)/Y_t$, which is a measure of the distance between the current value of the macro-variable and its current unconditional mean (which is not necessarily constant through time).

If unconditional expected values reflect, in a sense, underlying attractors of their variable, then [10] can be seen to adjust a future forecast based on up-to-date and comprehensive information, $E(Y_{t+1} | I_{mt})$, by the relation that the present, Y_t , has with this underlying attractor, $E(Y_t)$, which, to a degree, connects the variable with its past.

We have obtained a macroeconomic result that is not just a magnified version of the micro-level: the aggregate expectation that interacts with the other macro-variables is not the “prevailing” expectation, but a dynamically scaled weighted version of it. Intuitively and informally, IEH tells us that what *seems* to be the overall consensus on “what will likely happen” is not necessarily what will actually *affect* what will indeed happen.

For reasons of brevity, we do not present in detail how one arrives at the IEH for macro-indices. The derivation is analogous as above, with only slight modifications, and the final result is the same: for a macro index r_a (say the “interest rate”), the Influential Expectations Hypothesis is

$$E(r_{a,t+1}^e | I_{mt}) = \frac{E(r_{a,t})}{r_{a,t}} E(r_{a,t+1} | I_{mt}). \quad [11]$$

Some important final remarks are in order:

First, IEH allows for a large degree of heterogeneity of agents: we did assume that all agents use the Prevailing Expectation, and that they all apply the same method to obtain their individual expectations, but, apart from that, we allow them to have different information sets, and of course different economic positions, income, wealth etc.⁶

Second, although the IEH is expressed conditional on “all macro-information available to Influential Expectators”, it can be validly implemented in an actual empirical study, where the researcher most likely will not possess such an information set, but something smaller, say $I_{kt} \subset I_{mt}$. Still, using the law of iterated expectations, the equations that embody IEH can be expressed and estimated as expected values conditional on I_{kt} , maintaining their theoretical validity.

Finally, we note a major difference between IEH and the Rational Expectations Hypothesis: the latter is formed directly as an assumption on the aggregate expectation, as Muth’s (1961) original paper clearly stated. To the contrary, we have built IEH starting at the individual level providing transparent micro-foundations. In the process, we used Rational Expectations to operationalize the prevailing expectation on the aggregate variable, and, of course, the IEH uses the mathematical expected value as a tool, as REH does. The end result is that Rational Expectations can be seen as a special case of Influential Expectations, in the following informal sense:

By the fundamental properties of the conditional expectation, from [10] we can obtain

$$\left[Y_{t+1}^e \right]_{IEH} = \frac{E(Y_t)}{Y_t} E(Y_{t+1} | I_{mt}) + e_t, \quad E(e_t | I_{mt}) = 0 \quad [12]$$

while the standard way to formulate the Rational Expectations Hypothesis is

$$\left[Y_{t+1}^e \right]_{REH} = E(Y_{t+1} | I_t) \quad [13]$$

where the Information set I_t contains “all information available”.

6. An interesting theoretical extension is to consider polarization, where two distinct groups of individuals adopt two distinct “partially” prevailing expectations.

In a stable environment, where large actual shocks are absent, the aggregate variable may be expected to stay close to its underlying attractor (which may have settled to a constant value). This will also mean that e_t , which essentially represents the cumulative prediction error made by the individual agents in counterfactually predicting their future position in a static environment, will tend to be small. Moreover, in such a relatively stable situation, the information set I_{mt} should be as efficient as I_t . In all, in such calm waters, the IEH will be “close” to REH. In symbols,

If $e_t \rightarrow 0$ and $Y_t \rightarrow E(Y_t)$, we expect $I_{mt} \approx I_t$ and then

$$\left[Y_{t+1}^e \right]_{IEH} \rightarrow \left[Y_{t+1}^e \right]_{REH}.$$

But as was our intention, IEH can accommodate a greater scope and provides a more flexible framework to model transitional dynamics as well as the short- and mid-run evolution of an economy.

3. An application : IEH on Muth's original REH model

3.1. Setup of the model

We use the model also employed by Muth (1961) in his original formulation of the Rational Expectations Hypothesis, adjusted in order to accommodate a degree of heterogeneity of economic agents. Although it is not a macroeconomic model, it contains aggregation of individual variables, and so it can be used for expository purposes. The model examines short-run price variations in a market with a one-period production lag of a commodity. Transactions do not all happen at a unique price, which allows for unspecified heterogeneity in the market.

The number of buyers is fixed and equal to n . The individual demand function is described as deviation from a reference quantity demanded at a reference price, as follows:

$$d_{i,t+1} - d_i^* = -\beta (p_{i,t+1} - p_i^*) \quad [14]$$

where a star denotes the reference values (to be discussed later). Economic agents are assumed heterogeneous in general but their marginal response factor, β , is assumed identical.

Aggregating, total demand is

$$\begin{aligned} D_{t+1} - D^* &= -\beta \left(\sum_{j=1}^n p_{j,t+1} - \sum_{j=1}^n p_j^* \right) = \\ &= -\beta n \left(\frac{1}{n} \sum_{j=1}^n p_{j,t+1} - \frac{1}{n} \sum_{j=1}^n p_j^* \right). \end{aligned} \quad [15]$$

Turning to the Supply side, each supplier must decide in advance how much quantity to produce, based on his expectations about his selling price. As mentioned before, actual transaction prices may vary between suppliers. Aggregate supply is subject to a common independent white-noise shock that affects all suppliers proportionately to their production level. There are m suppliers, and analogously with the buyer side, they differ as regards reference supply as well as actual expected selling price, but they have the same marginal response to expected price deviations. The individual supply function is

$$s_{j,t+1} - s_j^* = \alpha (p_{j,t+1}^e - p_j^*) + \left(\frac{s_{j,t+1}}{s_{t+1}} \right) u_{t+1} \quad [16]$$

where S_{t+1} is total actual supply, u_{t+1} the common aggregate shock and, denoting $I_{a,t}$ the information set containing all available *market-level* data we have

$$E(u_{t+1} | I_{a,t}) = E(u_{t+1}) = 0, \text{ Var}(u_{t+1}) = \sigma_u^2, \text{ Cov}(u_{t+k}, u_{t+\ell}) = 0, k \neq \ell.$$

Aggregating we get

$$\begin{aligned} S_{t+1} - S^* &= \alpha \left(\sum_{j=1}^m p_{j,t+1}^e - \sum_{j=1}^m p_j^* \right) + u_{t+1} = \\ &= \alpha m \left(\frac{1}{m} \sum_{j=1}^m p_{j,t+1}^e - \frac{1}{m} \sum_{j=1}^m p_j^* \right) + u_{t+1}. \end{aligned} \quad [17]$$

Under market-clearing we have $D^* = S^* \Rightarrow D_{t+1} = S_{t+1}$. Equating [15] and [17] we obtain the relation

$$\begin{aligned} -\beta n \left(\frac{1}{n} \sum_{j=1}^n p_{j,t+1} - \frac{1}{n} \sum_{j=1}^n p_j^* \right) &= \\ = \alpha m \left(\frac{1}{m} \sum_{j=1}^m p_{j,t+1}^e - \frac{1}{m} \sum_{j=1}^m p_j^* \right) + u_{t+1}. \end{aligned} \quad [18]$$

Equation [18] includes un-weighted averages of individual buying and selling prices. On the other hand, an aggregate, market-level index price p_a should in principle be a weighted average. Nevertheless, if buyers and suppliers are many and no individual agent is very large compared to the size of the market, un-weighted averages do approximate adequately p_a and the same holds for their expectational counterparts and the reference price. Therefore we set

$$\begin{aligned} \frac{1}{n} \sum_{j=1}^n p_{j,t+1} &\approx p_{a,t+1}, \quad \frac{1}{m} \sum_{j=1}^m p_{j,t+1}^e \approx p_{a,t+1}^e, \\ \frac{1}{n} \sum_{j=1}^n p_j^* &\approx \frac{1}{m} \sum_{j=1}^m p_j^* \approx p^* \end{aligned}$$

and equation [18] becomes

$$p_{a,t+1} = p^* - \phi(p_{a,t+1}^e - p^*) - (1/\beta n)u_{t+1} \quad [19]$$

where we have set for compactness $\phi \equiv (\alpha m / \beta n)$. This parameter reflects the relative strength of the Supply response to expected price deviations compared to the Demand response to actual price deviations. Equation [19] determines the market price as a linear combination of the aggregate expectation of it and of the reference price, minus the scaled aggregate supply shock. It also clarifies what the reference price p^* (and corresponding quantities) represent: the deterministic and perfect-foresight equilibrium of the model, where $u_{t+1} = 0$ and $p_{a,t+1}^e = p_{a,t+1} = p^*$.

3.2. The REH and IEH solutions of the model

The Rational Expectations solution of [19] was derived by Muth (1961) by assuming that $p_{a,t+1}^e = E(p_{a,t+1} | I_t)$, where I_t includes “all information available at time t ”. We then obtain $E(p_{a,t+1} | I_t) = p^*$ and

$$[\text{REH}]: p_{a,t+1} = p^* - (1/\beta n)u_{t+1}. \quad [20]$$

Under REH, the price process emerges as an independent white noise, with a mean value equal to the deterministic equilibrium price p^* , while it fluctuates due to the aggregate supply shock. One notable aspect of the REH solution is that *suppliers and their short-term characteristics play no direct role* in the determination of the market price.

Since the market price is an index, to solve the model under the Influential Expectations Hypothesis we use equation [11] and write the Aggregate Expectation as

$$\begin{aligned} p_{a,t+1}^e &= \frac{E(p_{a,t+1} | I_{a,t})}{p_{a,t}} E(p_{a,t}) = \\ &= \frac{\mu_t}{p_{a,t}} E(p_{a,t+1} | I_{a,t}) \end{aligned} \quad [21]$$

where we have set $E(p_{a,t}) \equiv \mu_t$, to make clear that the expected value of the price process may be variable over time, and so the process can have non-stationary phases.

Inserting this into equation [19] and taking the conditional expected value, we solve for $E(p_{a,t+1} | I_{a,t})$ and insert back into [21] to obtain an expression for $p_{a,t+1}^e$ that does not contain the conditional expectation. Finally, inserting this result back into [19] we obtain an expression for the determination of market price, free of expectational variables:

$$[\text{IEH}]: p_{a,t+1} = \frac{(1+\phi)p^*}{p_{a,t} + \phi\mu_t} p_{a,t} - (1/\beta n)u_{t+1}. \quad [22]$$

Equation [22] differs markedly from equation [20], which is the REH solution. The next-period price emerges as a non-linear positive function of the current-period price. Now note that if $\phi \rightarrow 0$, equation [22] collapses to the REH solution. So the emergence of autocorrelation in [22] depends on $\phi \neq 0 \Rightarrow \alpha \neq 0$, where α is the coefficient reflecting the strength of the Supply response to expected deviations of future price from equilibrium. In other words, the price autocorrelation that came about through IEH, is clearly linked to the very fact that supply does respond to price expectations.

3.3. Stationarity and linearization of the price process

In general, equation [22] describes a non-stationary and possibly non-convergent stochastic process. We can show that the following condition is sufficient for asymptotic stability and stationarity, for any value of ϕ , p^* :

$$0 < \gamma(1) < \text{Cov}(p_{a,t+1}, p_{a,t}) < (1+\phi)(p^*/2)^2 \quad [23]$$

where $\gamma(1)$ is the steady-state first-order autocovariance, and $\text{Cov}(p_{a,t+1}, p_{a,t})$ is the same magnitude during the non-stationary phase of the process. The upper-bound restriction on covariance in [23] is realistic from an economic point of view: we can show that it will be satisfied as long as the coefficient of variation of the price process, the ratio of its standard deviation to its mean, $\text{cv} \equiv \sigma/\mu$, is not larger than a ceiling value strictly greater than unity. But already a value of unity for the coefficient of variation would imply that *on average* actual prices would tend to come out to be 100% higher or lower than the average price, which would reflect very high and unlikely volatility. So we conclude that the IEH solution operates within the realistic bounds of market behavior.

The non-linear stationary model is obtained by setting $\mu_t = \mu$. Then we linearize it with respect to $p_{a,t+1}$ around μ to obtain

$$p_{a,t+1} \approx (1-\rho)\mu + \rho p_{a,t} - (1/\beta n)u_{t+1} \quad [24]$$

with

$$\rho = \frac{\phi p^*}{(1+\phi)\mu} < 1, \quad [25]$$

which is a stable AR(1) process with drift. The autocorrelation coefficient is strictly smaller than unity under the same condition [23] that is needed for asymptotic stability.

Actual market prices can frequently be described well by autocorrelated processes, and the IEH provides an economic reasoning for such a phenomenon. Moreover, the IEH approach implies that after a structural shift we will observe only a gradual price adjustment, and not a jump to the new long-run equilibrium. This “sluggish-

ness” of prices is also frequently observed, and in the IEH approach it emerges endogenously as a feature of the market and its equilibrium.

4. An econometric example

With a time series of market prices at hand, the IEH model can be checked for consistency with the data, while we can also recover the various parameters of the model.

Assume we estimate an autoregressive model with drift on a market price series,

$$p_{t+1} = \gamma + \rho p_t + \omega_{t+1}.$$

If the model describes the data well, we will obtain the autocorrelation coefficient $\hat{\rho}$, as well as an estimated mean and process variance consistent with the model,

$$\hat{\mu} = \frac{\hat{\gamma}}{1 - \hat{\rho}}, \quad \text{Var}(\hat{p}_{t+1}) = \hat{\sigma}^2.$$

From these, we can obtain estimates for the remaining parameters ϕ , p^* . Specifically, we have the system of equations

$$\rho = \frac{\phi p^*}{(1 + \phi)\mu} \quad \text{and} \quad \mu^3 - p^* \mu^2 + \frac{\phi}{(1 + \phi)^2} p^* \sigma^2 = 0$$

(the second is obtained by manipulating [22], then taking its unconditional expected value and imposing the steady-state condition $\mu_t = \mu_{t+1} = \mu$). Solving the first for p^* and inserting into the second, we obtain a quadratic polynomial in ϕ ,

$$(1 - \rho)\phi^2 + [1 - 2\rho + \rho cv^2]\phi - \rho = 0. \quad [26]$$

Given the obtained estimates, the coefficients of this quadratic polynomial are known. Moreover, this polynomial has only one positive real root and so it provides a single estimate for ϕ , which, in turn, can provide an estimate for p^* , completing the estimation of the model.

Empirical implementation

We obtained monthly price data on the dairy product “Cheddar Oceania”, as provided through the EU website http://ec.europa.eu/agriculture/markets-and-prices/price-monitoring/index_en.htm (accessed on April 12, 2015), in the “Commodity price dashboard” of February 2015. The period was January 2007 to March 2015 (99 observations). The data are described as “Cheddar Oceania, indicative export prices, f.o.b. (Average of mid-point of price ranges reported bi-weekly by Dairy Market News, USDA-United States Dpt of Agriculture)”. So these are business-to-business prices. The unit of measurement is Euros/100Kgr.

The series had a coefficient of variation $cv=0.147$, well inside the upper boundary derived in the previous sections as a condition for stability.

We fit an ARMA(1,1) model with drift,

$$p_{t+1} = \gamma + \rho p_t + \omega_{t+1}, \quad \omega_{t+1} \equiv (1/\beta n)u_{t+1} = (1/\beta n)v_{t+1} + \theta(1/\beta n)v_t, \quad v_t \sim \text{WN}$$

Here, the aggregate supply shock u_{t+1} is assumed to be an unobservable moving-average process of first-order. We applied exact maximum likelihood estimation using the Kalman Filter and we obtained

Model 13: ARMA, using observations 2007:01-2015:03 (T = 99)				
Estimated using Kalman filter (exact ML)				
Dependent variable: P_ched / Standard errors based on Hessian				
coefficient	estimate	std. error	z	p-value
$\gamma/(1 - \rho)$	316.01	25.505	12.39	0.00
ρ	0.957	0.026	37.38	0.00
θ	0.512	0.084	6.11	0.00

The market price series exhibits strong autocorrelation, even close to a “random-walk” behavior, validating the IEH autoregressive model of market-price determination. The correlogram of the residuals indicated a white noise series. The full set of estimates is

$\hat{\rho}$	0.957	$\hat{\phi}$	21.73
$\hat{\sigma}^2$	2148.32	$\hat{\mu}$	316.01 (€/100 Kgr)
$\hat{\sigma}$	46.35 (€/100 Kgr)	\hat{p}^*	316.30 (€/100 Kgr)

Here we end the first presentation of the Influential Expectations Hypothesis. We believe that we have shown that IEH satisfies the three requirements set in the Introduction: it is based on actual observed phenomena and plausible assumptions, it produces different theoretical results than the dominant Rational Expectations Hypothesis, and these results are compatible with real-world data.

Of course, for any such foundational hypothesis, it is required that many economic models are solved under it, alongside their econometric implementation, before one can conclude whether the hypothesis is truly useful for theoretical and empirical research. Here we have presented the beginning of this course, and it is encouraging that the first results were positive.

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