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The Eurobank Research team expresses its gratitude to Professor Gikas Hardouvelis for his decisive role in the establishment and leading of the Division and wishes to him success in his duties as Minister of Finance of the Hellenic Republic.

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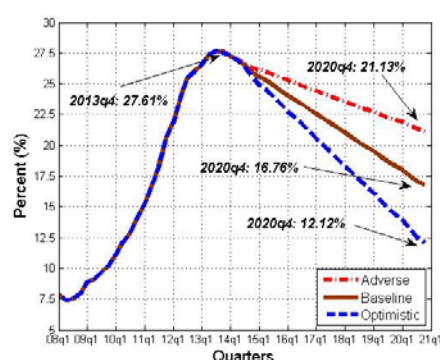
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Unemployment Rate in Greece: "The" Long Run Macroeconomic Challenge

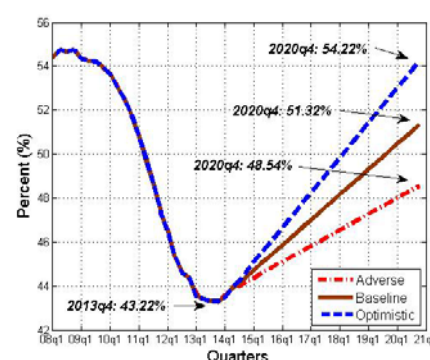
Summary:

Following six years of a severe economic recession, it has become a common belief among economists and policymakers that "The" macroeconomic challenge for the Greek economy over the next 10 years (or more) will be the return of the unemployment rate to acceptable levels, along with strong GDP growth and sustainable (decreasing) debt to GDP ratio. Especially the decline of unemployment is of crucial importance since its current level (27.6% in 2013q4 from 7.2% in 2008q3) can create the seeds for social unrest, poverty, an unstable (and unsustainable in terms of funding) social security system and low productivity growth through the ongoing destruction of the human capital stock.

(a) Unemployment Rate (Projections)



(b) Employment Rate (Projections)



In this report, after presenting some key structural characteristics of the Greek unemployment rate (age, gender, long term unemployment share) and the employment share in ten major sectors of production, we investigate how key macroeconomic variables - real GDP, real interest rate and real credit to firms - are statistically related with changes in the unemployment rate. Our econometric results reveal a negative (and statistically significant) relation with real GDP and real credit to firms' growth, as well as a positive relation with real interest rate changes. Furthermore, we find a negative (and statistically significant) relation between changes in the unemployment rate on the one hand, and changes in prices' expectations and wealth of households on the other. The latter two variables are approximated by the consumers' price expectations and households' financial situation indices from the joint harmonized EU consumer survey. Subsequently, we utilize our econometric model to perform projections for the unemployment and the employment rates in Greece over the next seven years (2014 to 2020). Our baseline scenario is consistent with a drop in the unemployment rate of approximately 10 percentage points over the next seven years, given an average annual real GDP growth rate of 3.5%, annual growth of real credit to firms by 4.5%, a reduction in the real interest rate to a level of 3.0% and an improvement in the indices of consumers' price expectations and households' financial situation.

Key Words: Labor market, Unemployment rate, GDP growth, Depression, Greece.

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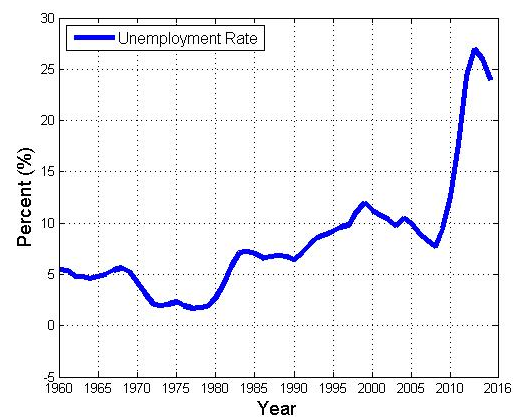
1. Introduction

According to the European Union's Labor Force Survey (EU-LFS), in the 3rd quarter of 2008, 4550k persons were employed in Greece and 369k unemployed, with a fraction of 48.2% of total unemployed classified as long term unemployed.¹ Today (2013Q4 in terms of data availability), after six years of a severe recession (a cumulative drop of real GDP of 25%), the same figures have reached the values of 3600k, 1370k and 70.5% respectively.² These labor market dynamics are clearly reflected at the big increase of the unemployment rate in Greece, from 7.2% in 2008q3 to 27.6% in 2013q4. This fact is of crucial importance for the Greek economy, since a persistent and high unemployment rate is a waste of resources and causes a destruction of human capital stock (low productivity in the future), social unrest, poverty and financial problems in the social security system (which loses social security contributions).

From a historical perspective, this very high level of the unemployment rate is similar to that in the US economy, or with that in France, Germany or United Kingdom during the "Great Depression" of the interwar period (1929-1933). Apart from the high level of unemployment, another feature worth pointing out is its remarkably steep increase (see Figure 1). In a time span of

six years (2007-2013), the unemployment rate skyrocketed by 19 percentage points (p.p). Other countries that experienced such a steep increase during the last forty years (without taking into account the 2007-2013 period), albeit not of the same magnitude as Greece, were the following: (a) Spain during the period 1976 to 1987 with an increase of 13.6 p.p (from 4.9% to 18.5%), (b) Finland during the period 1989 to 1994 with an increase of 13.5 p.p (from 3.1% to 16.6%) and (c) Ireland during the period 1979 to 1986 with an increase of 9 p.p (from 7.8% to 16.8%).³ From these, only Ireland managed to return at the pre crisis level of unemployment rate (7.5% in 1998). In fact, it managed to reduce it even more (4.4% in 2005).⁴

Figure 1: The Greek Unemployment Rate (%), 1960-2015



Note:

1. The values for the years 2014 and 2015 are AMECO projections.

Source:

1. AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

¹ For interpreting key descriptive statistics for the labor market in Greece, one must bear in mind the basic definitions of the labor market variables under concern, i.e. employment, unemployment, labor force (active population), employment rate, unemployment rate and long term unemployment share. The definitions (EU-LFS, data provided by Eurostat) are as follows:

- Employed persons are persons aged 15 years and over who, during the reference week performed work, even for just one hour a week, for pay, profit or family gain or who were not at work but had a job or business from which they were temporarily absent because of something like, illness, holiday, industrial dispute or education and training.
- Unemployed persons are persons aged 15-74 who were without work during the reference week, but who are currently available for work and were either actively seeking work in the past four weeks or had already found a job to start within the next three months.
- The labor force (economically active population) comprises employed and unemployed persons. Inactive persons are those classified neither as employed nor as unemployed.
- The employment rate is the number of people employed as a percentage of the sum between active and inactive population.
- The unemployment rate is the number of people unemployed as a percentage of the labor force.
- Long term unemployment share is the share of the unemployed persons since 12 months or more in total unemployment.

² These quarterly data are seasonally adjusted. We transformed the quarterly data to seasonally adjusted time series using the U.S. Census Bureau's seasonal adjustment program provided by EVIEWS 7 software.

At the present time, there are other economies that face serious problems with an inefficient functioning of their labor market. More specifically, the unemployment rate as of 2013q4 is 26.0% in Spain, 15.6% in Portugal, 12.7% in Italy and 11.8% in Ireland. Generally speaking, the reduction of the unemployment rate is "the" long run macroeconomic challenge not only for Greece, but also for many economies in the European Union.

³ For the case of Finland see Honkapohja and Koskela (1999).

⁴ The economy of Finland managed to reduce its unemployment rate by 10 p.p only after 14 years from the start (1994) of its recovery path. During the same time it achieved an annual average growth rate of real GDP equal to 3.58%. In what concerns the economy of Spain, after reducing its unemployment rate at the late 80s, then its labor market again started to perform poorly and in 1994 its unemployment rate was in a level of 21.3%. A drop of 10 p.p was achieved after 9 years (11.4% in 2003) with an annual average growth rate of real GDP equal to 3.57%.

Table 1: The Unemployment Rate, %

Countries	2007	2013	Change (in p.p)	Highest Change (Ordering)
USA	4.6	7.4	+2.8	8
Japan	3.9	4	+0.1	16
Austria	4.4	4.9	+0.5	15
Belgium	7.5	8.4	+0.9	14
Germany	8.7	5.3	-2.4	17
Denmark	3.8	7	+3.2	6
<u>Greece</u>	<u>8.3</u>	<u>27.3</u>	<u>+19</u>	<u>1</u>
Spain	8.3	26.4	+18.1	2
Finland	6.9	8.2	+1.3	13
France	8.4	10.8	+2.4	9
Ireland	4.7	13.1	+8.4	3
Italy	6.1	12.2	+6.1	5
Luxembourg	4.2	5.9	+1.7	12
Netherlands	3.6	6.7	+3.1	7
Portugal	8.9	16.5	+7.6	4
Sweden	6.1	8	+1.9	11
United Kingdom	5.3	7.6	+2.3	10

Note:

- In this Table the values for the unemployment rate are in a yearly base. Given that the unemployment rate is a stock variable, there are small differences (in the reported data from Eurostat) between the yearly rate and that of the 4th quarter for each year. For example in Greece: 27.3% (2013, year) and 27.6% (2013, 4th quarter).

Source:

- AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

Table 1 documents a general upward trend in the unemployment rate during the period 2007-2013 for the majority of the economies in our sample (USA, Japan and all EU-15 group of countries). Table 2 shows that unemployment increase was accompanied by poor economic performance, as measured by proportional changes in real GDP. Especially, during the period 2007-2009 that is characterized by many economists as the Great Recession, real GDP contracted in most developed economies and this resulted in a significant increase in the unemployment rate. The only exception to this general trend was the economy of Germany, where the unemployment rate actually fell.⁵ Furthermore, the sensitivity between changes in the unemployment rate and proportional changes in real GDP varied significantly across our sample economies. For example, while in Spain real GDP fell slightly less compared to the economies of Ireland and Italy (-1.01% vs -1.21% and -1.51%), the unemployment rate increased by 2.15 times more compared to

⁵ According to Balakrishnan et al. (2010) the economy of Germany massively expanded its short-time work program (Kurzarbeit) during the recession period of 2007 to 2009 and this fact can partially explain why some of the adjustment occurred in hours worked per employee rather than in job losses.

the former economy and by 2.97 times more compared to the latter. Finally, while the increase in the unemployment rate in Greece was of the same magnitude as that in Spain (19 p.p vs 18.1 p.p), the depression, measured in terms of real GDP growth rate, was 4.32 times higher (in absolute terms).

Table 2: Annual Average Growth Rate of Real GDP, %

Countries	2007-2013	Highest Growth Rate (Ordering)
USA	0.97	1
Japan	0.06	8
Austria	0.55	4
Belgium	0.38	5
Germany	0.69	3
Denmark	-0.71	11
<u>Greece</u>	<u>-4.32</u>	<u>17</u>
Spain	-1.01	13
Finland	-0.84	12
France	0.12	6
Ireland	-1.21	15
Italy	-1.51	16
Luxembourg	0.06	7
Netherlands	-0.25	10
Portugal	-1.19	14
Sweden	0.88	2
United Kingdom	-0.21	9

Note:

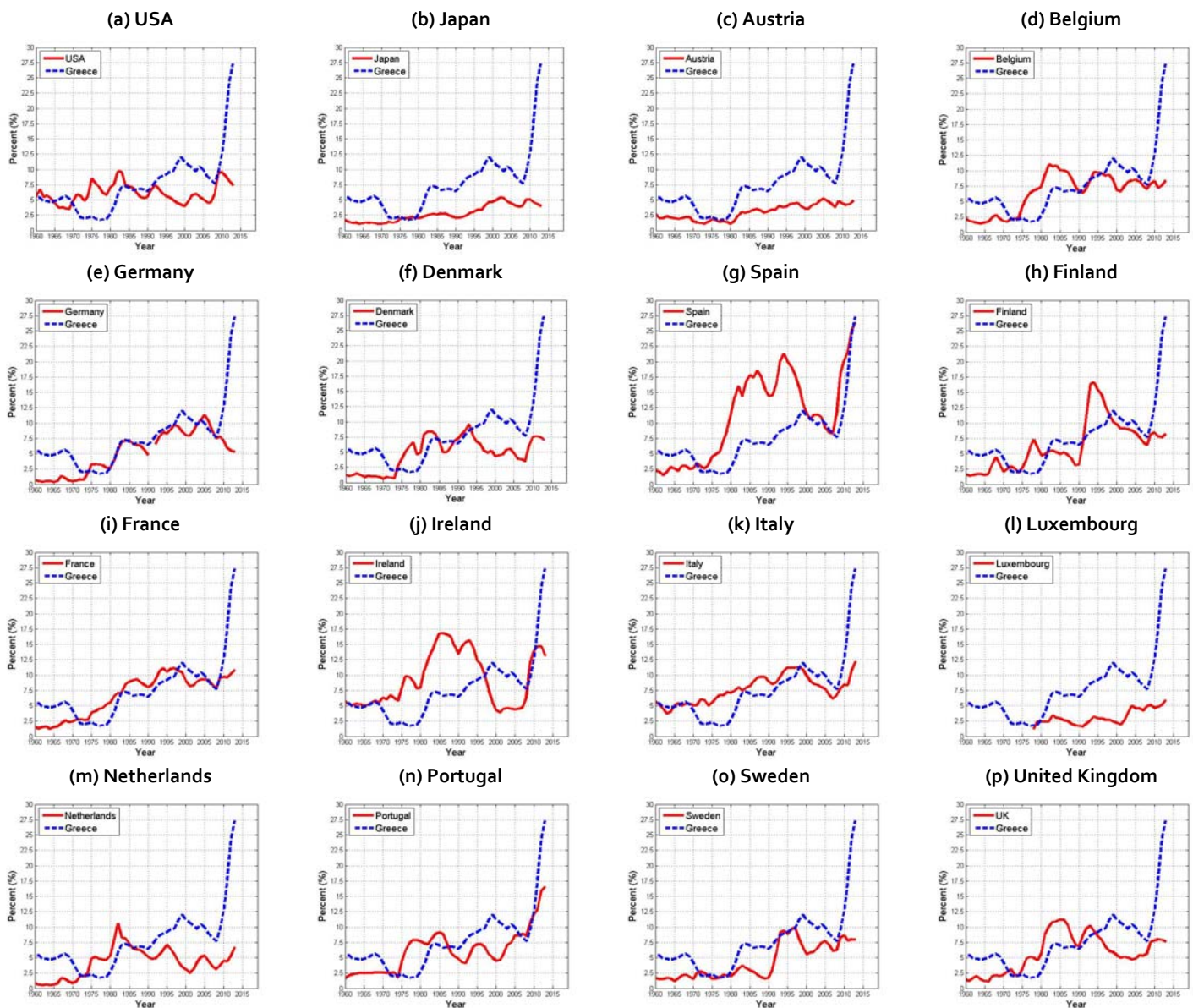
- The growth rates have been computed by taking the annual difference of the natural logarithm of real GDP for each country.

Source:

- AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

Against this background, in this report we provide a quantitative description of the unemployment rate in Greece, followed by an econometric analysis. Our work proceeds as follows: In Section 2 we present a historical description of the unemployment rate in Greece and we compare this with the experience in USA, Japan and all EU-15 group of countries. We show that other economies as well have experienced sudden high increases in their unemployment rate, however not of the same magnitude with Greece (e.g. Spain (1976-1987, 2007-2013), Finland (1989-1993) and Ireland (1980-1985, 2007-2011)). In Section 3, we present the structure of the unemployment rate, in terms of age, gender, long term unemployment share and the employment share in ten major sectors of production. It is worth pointing out the big drop (almost 50%) in the employment share of the construction sector, the high level of the unemployment rate (57%, 2013q4) among people with age 15 to 24 years old and the large increase of the long term unemployment share from 41.4% (2009q4) to 70.5% (2013q4). In Section 4, we perform a regression analysis in terms of testing the contribution of real GDP growth to yearly changes in the unemployment rate (the well known Okun's law), and we compare our findings for Greece with that from our

Figure 2: The Unemployment Rate, % (USA, Japan and EU-15)

**Note:**

1. For Germany data until 1990 refer to West Germany.
2. For Luxembourg data start in 1978.

Source:

1. AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

sample economies. We find that real GDP growth has a statistically significant relation with changes in the unemployment rate (and Okun's coefficient becomes higher - in absolute terms - if we include to our sample the 2007-2013 period). In Section 5, using quarterly data from 1999q2 to 2013q4, we investigate how key macroeconomic variables, namely real GDP (growth), real interest rate (change) and real credit to firms (growth), are statistically related with changes in the unemployment rate. Our econometric results suggest a negative (and statistically significant) relation with real GDP and

real credit to firms growth, and a positive relation with real interest rate changes. Furthermore, we find a negative (and statistically significant) relation between changes in the unemployment rate and changes in prices' expectations and wealth of households. The latter two variables are approximated by the consumers' price expectations and households' financial situation indices from the joint harmonized EU consumer survey. Subsequently, we utilize our econometric model and three different scenarios for our explanatory variables to perform projections for the unemployment and the employment rates in

Greece over the next seven years. Our baseline scenario is consistent with a drop in the unemployment rate of approximately 10 p.p over the next seven years (2014 to 2020), given an average annual real GDP growth of 3.5%, annual growth of real credit to firms by 4.5%, a reduction in the real interest rate to a level of 3.0% and an improvement in the indices of consumers' price expectations and households' financial situation. This compares to a projection of the Second Economic Adjustment Programme for Greece (fourth review, April 2014) of a 10 p.p fall in the unemployment rate by 2018 (which is more close to our optimistic scenario, see Section 5). Finally, Section 6 concludes.

2. The unemployment rate from a historical perspective

In this section, we present a comparison between the unemployment rate in Greece and the respective figure from our sample economies. To this end, we use yearly data from 1960 to 2013. Looking at Figure 2, we can identify four time phases for the Greek unemployment rate. The first starts at the early 60s and ends at the late 70s. The second is from the early 80s and ends at the late 90s. The third covers the period 1999 to 2008 and, finally, the fourth is the current depression.

During the first phase, the Greek economy managed to achieve an annual average unemployment rate equal to 3.71%. This performance was accompanied by strong economic expansion, with an annual average real GDP growth equal to 6.62% during the period 1960-1979. This was not a phenomenon specific to Greece; all the economies in our sample had a low level of unemployment, especially until the first oil crisis (October 1973). For Greece, admittedly, immigration abroad in that period contributed in containing unemployment, apart from the rapid growth.

In what concerns the second phase, the unemployment rate increased by 9.3 p.p (2.7% in 1980 to 12% in 1999) and the average annual growth rate of real GDP fell to a level of 1.35%. According to Demekas and Kontolemis (1996), this increase reflected the slowdown in growth, the restructuring of production, the increased mismatch between jobs and jobs seekers, and most important of all, the persistence of real wage aspirations.⁶ As was the case in the former subperiod, the Greek case was not an exception. Looking at Figure 2, we observe that from the mid 70s (or early 80s) the unemployment rate increased in most of our sample economies, and it has never returned to its former level.⁷ Another interesting point about this time period

was the fact that the US economy started to perform better in terms of its level of unemployment rate compared to the European economies. This phenomenon made economists to start investigating for possible factors that lie behind this increase in the unemployment rate in Europe. In two of the most influential studies, Nickell (1997) and Siebert (1997) conclude that rigidities and institutional factors can explain the poor European labor market performance.⁸

The third phase for the Greek economy lasts until 2008. From a record high of 12% in 1999, the unemployment rate fell to a level of 7.7% in 2008. At the same time, the annual average growth rate increased to a level of 3.55%. The construction works for the Olympic Games of 2004 contributed positively to this reduction by creating many jobs (directly and indirectly through complement products and services). In what concerns the other economies, the unemployment rate increased only in the USA (Fig2a.), in Ireland (Fig2j.), in Luxembourg (Fig2l.) and Portugal (Fig2n.), by 1.6 p.p, 0.8 p.p, 2.5 p.p and 3.5 p.p, respectively. The economies of Finland (Fig2h.), France (Fig2i) and Italy (Fig2k.) are more close to the case of Greece, with a decrease of their unemployment rate by 3.8 p.p, 2.6 p.p and 4.2 p.p, respectively.

Finally, the last phase of the Greek economy, which starts in 2008, was characterized by explosive unemployment due to the huge contraction of real GDP. However, unemployment seems

of unemployment rate similar (or lower for the case of Ireland) to that of the early 70s.

⁸ Not all of the rigidities can be considered to contribute to unemployment as, according to Nickell (1997), many labor market institutions that conventionally come under the heading of rigidities have no observable impact on unemployment. More specifically, Nickell (1997) argues that high unemployment is associated with the following labor market characteristics: 1) generous unemployment benefits that are allowed to run on indefinitely, combined with little or no pressure on the unemployed to obtain work and low levels of active intervention to increase the ability and willingness of the unemployed to work; 2) high unionization with wages bargained collectively and no coordination between either unions or employers in wage bargaining; 3) high overall taxes impinging on labor or combination of high minimum wages for young people associated with high payroll taxes; and 4) poor educational standards at the bottom end of the labor market. On the other hand, the author supports the idea that labor market rigidities that do not appear to have serious implications for average levels of unemployment include the following: 1) strict employment protection legislation and general legislation on labor market standards; 2) generous levels of unemployment benefit, so long as these are accompanied by pressure on the unemployed to take jobs by, for example, fixing the duration of benefit and providing resources to raise the ability/willingness of the unemployed to take jobs; and 3) high levels of unionization and union coverage, so long as they are offset by high levels of coordination in wage bargaining, particularly among employers.

⁶ Alogoskoufis and Manning (1988) conclude that the reluctance from the side of workers to revise downward their wage aspiration can explain the difference in persistence of the unemployment rate between Europe (excluding the Scandinavian countries, Austria and Switzerland) and, USA and Japan during the 80s.

⁷ The economies of USA (Fig 2a.), Ireland (Fig 2j.) and Netherlands (Fig 2m.) are exceptions, since in the early 2000s managed to return to a level

to have peaked and started descending.⁹ The year 2014 will probably mark the first year of a decreasing path for the unemployment rate. Still, the main question and challenge for the Greek economy remains, that is, how long it will take to reduce the unemployment rate by 10 to 15 p.p. We try to shed some light on this question in Section 5.

3. The structure of the labor market in Greece

3.1 Unemployment rate per age group

In this section we take a closer look at the structural characteristics of unemployment in Greece during the current depression compared to the EU-15 average, as well as to other European countries that suffered from extreme fiscal contraction and deep recession. The impact of the depression on unemployment was felt in Greece most strongly than in any other EU-15 country; the unemployment rate increased from 7.2% in 2008q3 to 27.6% in the final quarter of 2013. This is an increase of roughly 20 p.p., which is almost seven times the increase for the EU-15 average country during the same period. A large increase in the rate of unemployment was also recorded in Spain (from 11.3% in 2008q3 to 26% in 2013q4), a country that was also affected by the burst of the housing bubble, followed by Italy, Portugal and finally Ireland.

Table 3: Unemployment Rate, % (Age Groups)

Age Group	Time	EU (15)	<u>EL</u>	ES	IE	IT	PT
15-24	2008q3	15.7	<u>21.3</u>	24.2	15.1	19.5	17.1
	2013q4	22.2	<u>57</u>	55.1	24.2	43.5	35.7
25-49	2008q3	6.2	<u>7.1</u>	10.4	5.8	5.7	7.6
	2013q4	10.6	<u>28.1</u>	25	11	12.4	15.1
50-74	2008q3	4.8	<u>3.3</u>	7.3	3.5	2.8	5.3
	2013q4	7.3	<u>18.7</u>	20.6	9.2	6.4	11.6
15-74	2008q3	7.0	<u>7.2</u>	11.3	6.8	6.1	7.8
	2013q4	10.8	<u>27.6</u>	26	11.8	12.7	15.6

Note:

1. EU-15 refers to the EU-15 average, EL refers to Greece, ES refers to Spain, IE refers to Ireland, IT refers to Italy and PT refers to Portugal.

Source:

1. Eurostat Database.

Greece traditionally had one of the highest youth unemployment rates in Europe. Youth unemployment is considered to comprise all persons between 15 and 24 years old who are without work, but are available and are actively seeking for a job, and is calculated as the ratio of the unemployed aged between 15-24 over the total labor force in that age bracket. As is evident in

Table 3, before the crisis Greece had the second highest youth unemployment rate after Spain. However, youth unemployment in Greece skyrocketed to 57% in 2013q4, followed by Spain (55.1%), Italy (43.5%) and Portugal (35.7%), while Ireland's youth unemployment rates stayed close to the EU-15 average rates.¹⁰ A global financial crisis that leads to a deep recession affects everyone in the economy, but young cohorts are hit particularly hard. Youth unemployment has the tendency to be super-cyclical, i.e. more responsive to fluctuations of economic activity than unemployment of older persons.¹¹ There are several reasons for the higher business-cycle sensitivity for youth unemployment, with the most important being lower job protection that young workers usually have through temporary contracts, as well as the high concentration of youth in certain cyclically-sensitive industries such as construction.¹² Furthermore, youth's lack of job-specific experience put barriers to their entry into the labor market, while the mismatch of skills possessed by young workers and the actual needs of the labor market is a factor that could contribute to higher youth unemployment rates.¹³ Equally importantly, the unemployment rate in those ages refers to the subset of the age group with people not in higher education; it is well known that low-skills persons typically face higher unemployment rates. The problems with youth unemployment in Greece are significant and could have persistent negative implications for a worker's subsequent career, in the sense that it could hurt his productive potential and job opportunities.¹⁴ The so-called scarring effects of unemployment on youth refer to the effect of an extended period of unemployment which could lead to an increase in the probability of future unemployment spells and a decline in future earnings, through the deterioration of working skills and foregone job experience.¹⁵ Moreover, as the unemployment spell lasts, potential workers become less productive and the lower the initial level of workers' qualification, the longer the scarring effects can potentially last.

The disproportionate problems of younger generations are also reflected in the evolution of employment rates in Greece and the other stress countries. The employment rate of those aged between 15 and 24 years old is a long way below the corresponding overall rate. In particular, in Greece the overall employment rate decreased from 55% in 2008q3 to 43.1% in 2013q4, while youth employment rate declined from 23.9% to 12.2% during the crisis. The largest drop in youth employment during the most recent economic slump was recorded in Spain at more than 21 p.p. In addition, across all countries, the

¹⁰ According to Breen (2005), the intensity of labor market regulation and youth unemployment rate are positively correlated. This can partially explain the difference between the youth unemployment rate in Greece and in EU-15 or Ireland before the depression period.

¹¹ See Scarpetta et al. (2010).

¹² See OECD (2004) and OECD (2009b).

¹³ See Coenjaerts et al. (2009).

¹⁴ See O' Higgins (2007).

¹⁵ See Arulampalam (2001).

⁹ In 2013M12, 2014M1, 2014M2 and 2014M3 the unemployment rate was 27.1%, 26.8%, 26.7% and 26.6% respectively (seasonally adjusted data, source: Eurostat).

employment rate of the cohort between 25 and 49 years is higher than the overall rate before or after the crisis, suggesting that the youth employment problems do not seem to persist beyond the age of 25.

3.2 Unemployment rate per gender

The crisis also had a gender-differentiated impact on labor market conditions, and this is evident if we look at the employment for males and females separately. Indeed, males' overall employment rates declined by roughly 16 p.p, while females employment rate decrease was almost half the males decrease (8 p.p). Furthermore, the structure of gender employment rates from 2008 to 2013 suggests that the crisis particularly affected sectors with a higher presence of male employment, such as construction and manufacturing. As is evident in Table 6, which depicts the structure of the Greek economy in terms of employment and value added, the largest employment decline (as a percent of total employment) was reported in the construction sector (from 7.91% of total in 2008q3 to 4.17% in 2013q4), followed by the manufacturing sector (from 10.66% to 8.80%). Nevertheless, the unemployment rates reported in Table 4 show a similar increase in percentage points for males and females for the whole sample (15-74 years) as well as for the different age brackets. For example, men's overall unemployment rates increased by 19.8 p.p during the crisis, while females' unemployment rates increased by a similar amount of 20.9 p.p.

Table 4: Unemployment Rate, % (Age Groups and Gender)

<u>Greece</u>		Time	Males	Females
Age Group				
15-24	2008q3		16.2	28.4
	2013q4		52.6	62.5
25-49	2008q3		4.3	10.9
	2013q4		24.7	32.6
50-74	2008q3		2.7	4.5
	2013q4		17.7	20.2
15-74	2008q3		4.7	10.8
	2013q4		24.5	31.7

Source:

1. Eurostat Database.

3.3 Share of long term unemployment

Another interesting feature of the unemployment rate is its structure according to duration. More specifically, in Table 5 we present the long term unemployment share. This variable shows the fraction of the people that are unemployed and hold that status for at least 12 months. What does it mean for a labor market to have a high or low long term unemployment share? Blanchard et al. (2010) give the following description: *"Take an airport full of passengers. It may be crowded because many planes are coming and going, and many passengers are quickly moving in*

and out of the airport. Or it may be crowded because bad weather is delaying flights and passengers are stuck, waiting for the weather to improve. The number of passengers in the airport will be high in both cases, but their plights are quite different. Passengers in the second scenario are likely to be much less happy. In the same way, a given unemployment rate may reflect two very different realities. It may reflect an active labor market, with many separations and many hires, and so with many workers entering and exiting unemployment; or it may reflect a sclerotic labor market, with few separations, few hires and a stagnant unemployment pool."

Table 5: Long Term Unemployment Share, %

Time	EU (15)	<u>EL</u>	ES	IE	IT	PT
2007q4	39.6 (6.8)	<u>49.6</u> (8)	19.4 (8.6)	28.5 (4.6)	46 (6.6)	47.2 (7.9)
2008q4	33.6 (7.5)	<u>45</u> (7.9)	17.9 (13.9)	25.5 (7.5)	43.9 (7.1)	44.5 (7.9)
2009q4	35.7 (9.3)	<u>41.4</u> (10.2)	29.3 (18.8)	39.2 (12.6)	46.1 (8.6)	47.8 (10.3)
2010q4	41.7 (9.5)	<u>45.8</u> (14.1)	40.1 (20.3)	55.7 (14.4)	48.8 (8.7)	52.5 (11.3)
2011q4	43 (10)	<u>52.3</u> (20.6)	43.2 (22.9)	63.3 (14.6)	51.2 (9.6)	47.1 (14.2)
2012q4	45.5 (10.9)	<u>63.6</u> (25.9)	47 (26)	60.3 (13.8)	55.4 (11.6)	51.2 (17.2)
2013q4	49.2 (10.8)	<u>70.5</u> (27.6)	52.2 (26)	62 (11.8)	58.6 (12.7)	57.9 (15.6)

Note:

1. The numbers inside the parentheses are the respective unemployment rate figures.
2. EU-15 refers to the EU-15 average, EL refers to Greece, ES refers to Spain, IE refers to Ireland, IT refers to Italy and PT refers to Portugal.

Source:

1. Eurostat Database.

Looking at Table 5, we observe that Greece had the highest long term unemployment share in 2007q4 (49.6%), followed by Portugal (47.2%), Italy (46%), EU-15 (39.6%) and Spain (19.4%). In 2013q4 the same figures were 70.5%, 57.9%, 58.6% and 49.2%, 62.0% and 52.2%, respectively. The immediate point that stands out is the big increase in the long term unemployment share in Greece, Spain and Ireland. Even though Greece and Spain currently have similar values of the unemployment rate, the synthesis is quite different, in the sense that the long term unemployment share in Greece is almost 20 p.p higher. Finally, it is worth pointing out that, according to the literature, the longer someone stays in the status of long term unemployment the higher is the probability of not finding a job in the near future. This is created by reactions in both the demand and the supply side of the labor market. For example, in the demand side, firms

Table 6: The Structure of the Greek Economy in Terms of Employment and Value Added Per Sector
(10 sectors classification, NACE Rev 2.)

Time Period Units Sectors	2000Q1 Share (% of total)		2008Q3 Share (% of total)		2013Q4 Share (% of total)	
	Employment	Value Added	Employment	Value Added	Employment	Value Added
<i>A: Agriculture, Forestry and Fishing</i>	17.45	6.13	10.82	3.51	13.05	4.87
<i>B-E: Industry (except construction)</i>	12.88	13.56	12.03	10.76	10.31	12.13
<i>C: Manufacturing</i>	11.23	10.52	10.66	7.45	8.80	8.41
<i>E: Construction</i>	6.95	8.34	7.91	7.13	4.17	2.03
<i>G-I: Wholesale and Retail Trade, Transport, Accommodation and Food Service Activities</i>	30.35	20.74	31.49	26.62	31.39	21.63
<i>J: Information and Communication</i>	1.90	3.17	1.85	5.03	2.08	4.82
<i>K: Financial and Insurance Activities</i>	2.46	7.35	2.31	5.71	2.71	5.43
<i>L: Real Estate Activities</i>	0.04	13.21	0.10	12.87	0.05	16.23
<i>M-N: Professional, Scientific and Technical Activities, Administrative and Support Service Activities</i>	4.79	7.58	7.11	5.69	7.47	4.55
<i>O-Q: Public Administration, Defense, Education, Human Health and Social Work Activities</i>	18.59	18.75	19.97	18.87	22.44	23.76
<i>R-U: Arts, Entertainment and Recreation, Other Service Activities, Activities of Household and Extra – Territorial Organizations and Bodies.</i>	4.69	3.94	6.46	3.83	6.07	4.62
(A) + (B-E) + (F) + (G-I) + (J) + (K) + (L) + (M-N) + (O-Q) + (R-U)	100	100	100	100	100	100
Total Employment (in thousands of people)	4217		4869		3903	
Total Value Added (in millions 2005 euro)	34527		46270		35760	

Note:

1. The classification of sectors follows NACE Rev 2. - Statistical Classification of Economic Activities in the European Community. See Appendix A for a detailed definition for each sector.
2. The vertical sum for each column is not exactly equal to 100 due to rounding.
3. The above figures for total employment (which is the sum of the employees in all sectors) are different from those obtained by labor force surveys (mentioned in the main text of the report). These differences are due to integration of sources (e.g. national accounts integrate information from many sources) and due to conceptual reasons.

Source:

1. Eurostat Database.

receive the long term status of an unemployed person as a signal of low productivity (e.g. see Krueger et al. 2014).

3.4 Employment share and value added in ten major sectors of production

Another thing that is interesting to investigate is how the current Greek depression has changed the synthesis (or structure) of total employment and total value added per sector of the Greek economy. We do so by presenting the shares (% of total) of ten

major sectors of production in terms of employment and value added. The classification is according to NACE Rev 2. (Statistical classification of economic activities in the European community).

The taxonomy is as follows: Agriculture, forestry and fishing (A), Industry (B-E, except construction), construction (F), wholesale and retail trade, transport, accommodation and food service activities (G-I), information and communication (J), financial and insurance activities (K), real estate activities (L), professional, scientific and technical activities, administrative and support service activities (M-N), public administration, defense, education, human health and social work activities (O-Q) and arts, entertainment and recreation, other service activities, activities of household and extra – territorial organizations and bodies (R-U).¹⁶

As Table 6 depicts, sectors G-I, O-Q, A, B-E and F had the highest shares in total employment in 2000q1. More specifically, their shares were 30.35%, 18.59%, 17.45%, 12.88% and 6.95% respectively. In 2008q3, after 7 years of continuous aggregate economic expansion (including the adoption of Euro in 2001 as the official currency unit, which was the most important institutional change) there was a major drop in the share of Agriculture, Forestry and Fishing by 6.63 p.p, followed by subtle decreases in the shares of industry (except construction), information and communication and financial and insurance activities. Furthermore, these decreases were absorbed by increases in the shares of construction (from 6.95% to 7.91%), wholesale and retail trade, transport, accommodation and food service activities (from 30.35% to 31.49%) and sectors, M-N (from

4.79% to 7.11%), O-Q (from 18.59% to 19.97%) and R-U (from 4.69% to 6.46%).

In 2013q4, after 22 quarters of continuous depression, the largest changes in the shares of total employment were these in the construction sector (a decrease from 7.91% to 4.17%), in industry (except construction, a decrease from 12.03% to 10.31%) and in public administration, defense, education, human health and social work activities (an increase from 19.97% to 22.44%). In what concerns the construction sector, this decrease was the result of a major reduction in its share in total value added from 7.13% to 2.03%. The credit crunch, along with the over supply of the past, forced many firms in this sector to reduce their output rapidly or even go bankrupt. Finally, the increase in the share of public administration, defense, education, human health and social work activities can be explained by the nature of the labor contracts in these economic activities (the existence of permanent civil servants), and also by the increase in its share in total value added from 18.87% to 23.76%.¹⁷ Changes in the remaining sectors, in terms of their share in total employment, were negligible.

4. Changes in the unemployment rate and real GDP growth: Okun's Law

In this Section, we attempt to investigate the statistical relation between the unemployment rate and other macroeconomic variables. We do not test a theory of unemployment, our aim is to explore and quantify the statistical relation between the unemployment rate and other economic variables that mostly affect the demand side of the economy.¹⁸ We choose as our first candidate explanatory variable the growth rate of real GDP. This formulation is the well known Okun's Law (e.g. see Okun, 1962).¹⁹ It describes a statistical relation between short run changes in the unemployment rate and proportional changes in real GDP (i.e. growth rate). The rationale that underlies this relation is as follows: An increase (decrease) in demand induces firms to increase (decrease) their production. To accomplish that, they hire (fire) more workers, employment increases (decreases) and, consequently, unemployment decreases (increases). Using the same notation as Ball et al. (2013), we derive a mathematical form of Okun's law as follows:

$$E_t - E_t^* = \gamma(Y_t - Y_t^*) + \eta_t \quad (1)$$

¹⁶ Sector B-E (industry except construction) includes the following categories: Mining and quarrying (B), electricity, gas, steam and air conditioning supply (D), water supply, sewerage, waste management and remediation activities (E). Sector G-I includes: Wholesale and retail trade, repair of motor vehicles and motorcycles (G), transportation and storage (H) and accommodation and food service activities (I). Sector M-N includes: Professional, scientific and technical activities (M) and administrative and support service activities (N). Sector O-Q includes: Public administration and defense, compulsory social security (O), education (P), human health and social work activities (Q). Sector R-U includes: Arts, entertainment and recreation (R), other service activities (S), activities of households' as employers, undifferentiated goods and services – producing activities of households' for own use (T) and activities of extraterritorial organizations and bodies (U). See Appendix A. for further details.

¹⁷ Increases (decreases) in shares can be interpreted in the following way: The percentage change of the figure in the numerator (for example employment in sector i) is higher (lower) compared to the percentage change of the figure in the denominator (for example total employment).

¹⁸ For an analytical description of theories of unemployment (efficiency wage theories, contracting models and search and matching models) see Romer (2006) chapter 9.

¹⁹ It is based on a paper published in 1962 by professor (Yale University) Arthur Okun.

$$U_t - U_t^* = \delta(E_t - E_t^*) + \mu_t \quad (2)$$

Where E_t is the log of employment in year t , Y_t is the log of real GDP in year t , U_t is the unemployment rate in year t and η_t, μ_t denote disturbance terms. Furthermore, the asterisk $*$, denotes potential or natural levels in year t . Finally, $\gamma > 0$ and $\delta < 0$.²⁰

Now, by inserting equation (1) into (2) we derive the mathematical form of Okun's law:

$$\begin{aligned} U_t - U_t^* &= \delta(\gamma(Y_t - Y_t^*) + \eta_t) + \mu_t \\ \Rightarrow U_t - U_t^* &= \beta(Y_t - Y_t^*) + \varepsilon_t \end{aligned} \quad (3)$$

Where $\beta = \delta\gamma$ and $\varepsilon_t = \delta\eta_t + \mu_t$. Equation (3) is the level or the gap version of Okun's law. The coefficient β (Okun's coefficient) denotes the percentage difference between the current unemployment rate and its natural level that is statistically associated with a 1% difference between current output and its potential level. A drawback with this version is the unobservable time series for the natural level of the unemployment rate U_t^* and the potential output Y_t^* .²¹ In many research articles, economists overcome this difficulty by approximating natural levels by a Hodrick Prescott filter smoothing of the respective time series (e.g. see Hodrick and Prescott (1997)). In this study we follow the same procedure.²²

Another version of Okun's law is the difference version. That is:

$$U_t - U_{t-1} = \alpha + \beta(Y_t - Y_{t-1}) + \omega_t \quad (4)$$

This can follow from equation (3) by assuming a constant level for the natural rate of unemployment and a constant growth rate for the potential output. By taking yearly differences of equation (3) we obtain:

$$\begin{aligned} (U_t - U_{t-1}) - (U_t^* - U_{t-1}^*) &= \beta(Y_t - Y_t^*) - \beta(Y_{t-1} - Y_{t-1}^*) + \varepsilon_t - \varepsilon_{t-1} \\ \Rightarrow U_t - U_{t-1} &= \beta(Y_t - Y_{t-1}) - \beta(Y_t^* - Y_{t-1}^*) + \varepsilon_t - \varepsilon_{t-1} \\ \Rightarrow U_t - U_{t-1} &= \beta(Y_t - Y_{t-1}) - \beta g + \varepsilon_t - \varepsilon_{t-1} \\ \Rightarrow U_t - U_{t-1} &= \alpha + \beta(Y_t - Y_{t-1}) + \omega_t \end{aligned} \quad (5)$$

where g is the constant growth rate of the potential output,

$$\alpha = -\beta g \text{ and } \omega_t = \varepsilon_t - \varepsilon_{t-1}.$$

We test Okun's law by using both formulations, that is the gap version (see eq. 3) and the difference version (see eq. 4). The former is presented in Table 7 (see also Figure 4) and the latter in Table 8. Using yearly data, we run two regressions for each case, that is with a sample: 1970-2007 and with a sample: 1970-2013. We do that in order to see how the period 2007-2013 has affected the sensitivity of changes in the unemployment rate to changes in real GDP growth.

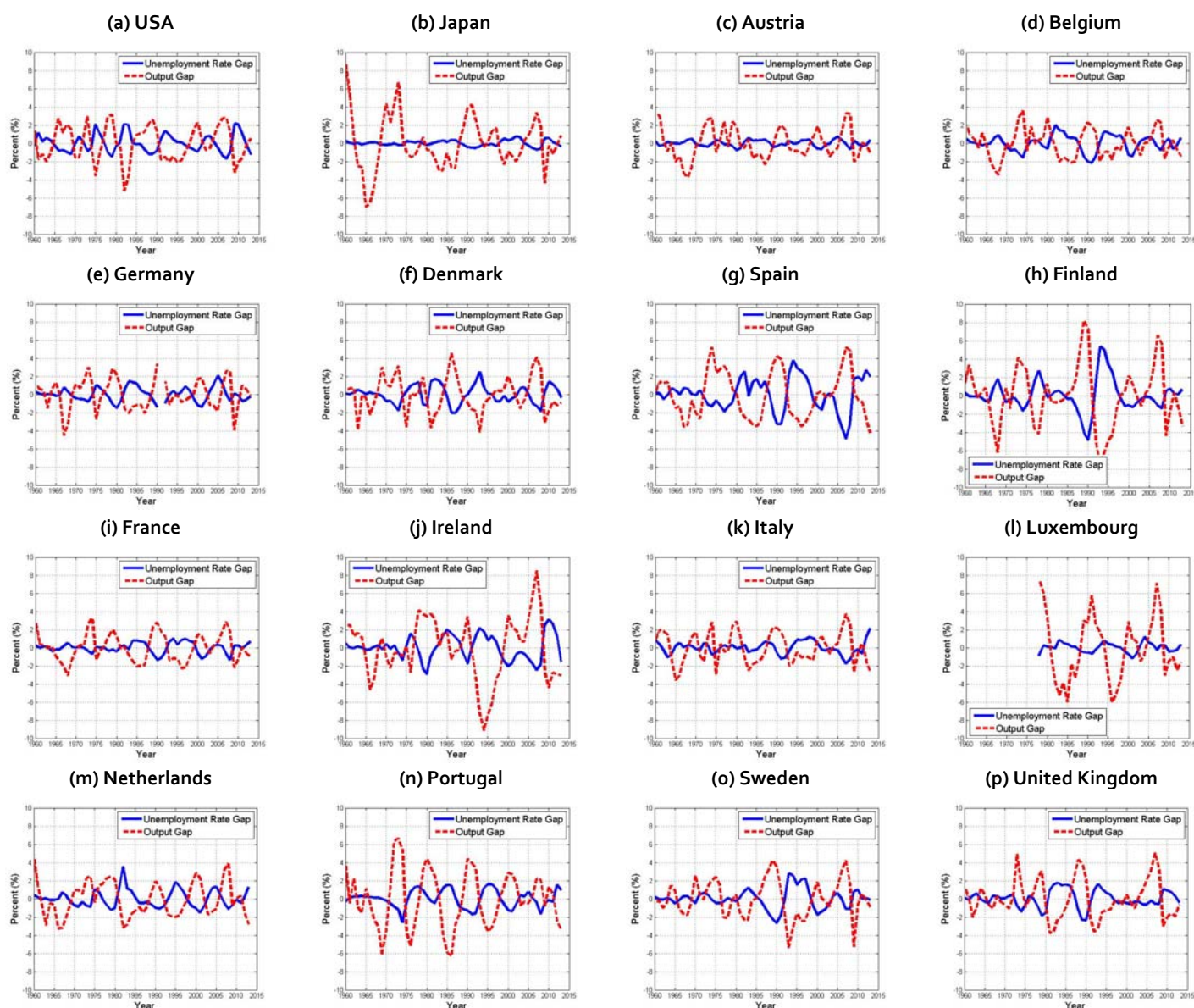
For the levels version during the period 1970-2007, we find a statistical significant relation for Greece with a value for Okun's coefficient equal to -0.23. The interpretation is as follows: a unit increase in the output gap reduces the unemployment rate gap by 0.23 p.p. Furthermore, the output gap explains 53% (adjusted R-Squared) of the variability in the unemployment rate gap. Should we include in our sample the 2007-2013 period, the coefficient increases (in absolute terms) to -0.37 and the adjusted R-Squared to 67%. This increase in sensitivity was the result of the magnitude of the current Greek depression and of institutional changes in the labor market (e.g. a reduction in the cost of firms for laying off workers).

²⁰ According to equation (2) a decrease (increase) in employment is not always equal with an increase (decrease) in unemployment. This is due to the outflows from and the inflows to the labor force.

²¹ Friedman (1968) gives the following definition for the natural rate of unemployment: "The natural rate of unemployment is the level which would be ground out by the Walrasian system of general equilibrium equations, provided that there is imbedded in them the actual structural characteristics of the labor and commodity markets, including market imperfections, stochastic variability in demand and supplies, the cost of gathering information about job vacancies and labor availabilities, the costs of mobility, and so on."

²² Our computed series for the natural rate of unemployment are very close to those which are available in AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs). There, the code name for this variable is NAWRU. The determinants of the structural unemployment in EU countries are well analyzed in Orlandi (2012). The author concludes that labor market structural indicators along with persistent demand shocks (real interest rate and TFP growth) account for 90% of the variance of NAWRU in a 13 EU countries panel covering the period 1985-2009.

Figure 3: The Unemployment Rate and Output Gap, %

**Note:**

1. For Germany data until 1990 refer to West Germany.
2. For Luxembourg data start in 1978.

Source:

1. AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

In terms of the difference version (see Table 8), the Greek Okun's coefficient is lower (in absolute terms) in both cases, that is the 1970-2007 and 1970-2013 samples, compared to the levels version. More specifically, for the period 1970-2007, a unit increase in real GDP growth is statistically related with a decrease of the unemployment rate by -0.12 p.p (adjusted R-Squared equal to 27%) and for the period 1970-2013 the respective value is -0.27 (adjusted R-Squared equal to 52%). In addition, another interesting application in the difference version of Okun's law is the fact that we are able to derive the value for

the growth rate of real GDP, which is consistent with a zero change in the unemployment rate:

$$\begin{aligned}
 U_t - U_{t-1} &= \alpha + \beta(Y_t - Y_{t-1}) + \omega_t \\
 \Rightarrow -\alpha &= \beta(Y_t - Y_{t-1}) + \omega_t \\
 \Rightarrow \frac{-\alpha}{\beta} &= Y_t - Y_{t-1} + \omega_t
 \end{aligned} \tag{6}$$

Table 7: Okun's Law – Levels Version

$$U_t - U_t^* = \beta(Y_t - Y_t^*) + \varepsilon_t$$

U_t : unemployment rate (with *, natural) in year t , Y_t : log of real GDP (with *, potential) in year t , ε_t : disturbance term

Dependent Variable: Unemployment Rate Gap (in p.p)

Independent Variable: Output Gap (% difference)

Method: OLS (with heteroskedasticity and autocorrelation consistent covariance or Newey – West estimator)

Sample: 1970-2013 (44 observations)

Countries	1970-2007		1970-2013	
	Okun's Coefficient	Adjusted R-Squared	Okun's Coefficient	Adjusted R-Squared
USA	-0.42*** (0.0234)	0.82	-0.45*** (0.0362)	0.80
Japan	-0.04* (0.0230)	0.19	-0.05* (0.0251)	0.21
Austria	-0.10*** (0.0217)	0.24	-0.11*** (0.0195)	0.28
Belgium	-0.36*** (0.0778)	0.40	-0.35*** (0.0728)	0.40
West Germany	-0.43*** (0.0546)	0.78		
Germany	-0.50*** (0.1591)	0.42	-0.31* (0.1501)	0.30
Denmark	-0.26*** (0.0411)	0.48	-0.25*** (0.0398)	0.47
Greece	-0.23*** (0.0438)	0.53	-0.37*** (0.0703)	0.67
Spain	-0.62*** (0.1101)	0.70	-0.63*** (0.0958)	0.71
Finland	-0.51*** (0.0647)	0.80	-0.47*** (0.0807)	0.76
France	-0.32*** (0.0569)	0.64	-0.33*** (0.0498)	0.63
Ireland	-0.26*** (0.0405)	0.48	-0.29*** (0.0508)	0.48
Italy	-0.16* (0.0808)	0.16	-0.20** (0.0827)	0.22
Luxembourg	-0.07*** (0.0154)	0.22	-0.06*** (0.0169)	0.17
Netherlands	-0.45*** (0.0804)	0.56	-0.43*** (0.0710)	0.56
Portugal	-0.23*** (0.0405)	0.53	-0.24*** (0.0403)	0.53
Sweden	-0.43*** (0.1017)	0.58	-0.40*** (0.1032)	0.55
UK	-0.31*** (0.0578)	0.44	-0.31*** (0.0525)	0.46

Notes:

1. The numbers inside the brackets are standard errors.
2. The asterisks ***, ** and *, refer to 1%, 5% and 10%, significance levels respectively.
3. The sample for West Germany is from 1970 to 1990, for Germany from 1992 to 2013 and for Luxembourg from 1978 to 2013.

Source:

1. AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

Table 8: Okun's Law – Difference Version

$$U_t - U_{t-1} = \alpha + \beta(Y_t - Y_{t-1}) + \omega_t$$

U_t : unemployment rate in year t , Y_t : log of real GDP in year t , ω_t : disturbance term

Dependent Variable: Change of the Unemployment Rate (in p.p)

Independent Variable: Growth Rate of Real GDP (%)

Method: OLS (with heteroskedasticity and autocorrelation consistent covariance or Newey – West estimator)

Sample: 1970-2013 (44 observations)

Countries	1970-2007			1970-2013		
	Constant	Okun's Coefficient	Adjusted R-Squared	Constant	Okun's Coefficient	Adjusted R-Squared
USA	1.27*** (0.1354)	-0.41*** (0.0330)	0.71	1.26*** (0.1206)	-0.43*** (0.0333)	0.70
Japan	0.20* (0.1075)	-0.04* (0.0233)	0.13	0.19** (0.0779)	-0.05** (0.0198)	0.15
Austria	0.35*** (0.0483)	-0.10*** (0.0196)	0.23	0.33*** (0.0579)	-0.11*** (0.0170)	0.27
Belgium	0.67*** (0.1844)	-0.21*** (0.0686)	0.18	0.55*** (0.1628)	-0.19*** (0.0583)	0.16
West Germany	1.04*** (0.2343)	-0.31*** (0.0588)	0.57			
Germany	0.97*** (0.1095)	-0.51*** (0.1053)	0.56	0.26 (0.3167)	-0.22** (0.0838)	0.21
Denmark	0.88*** (0.1684)	-0.38*** (0.0912)	0.42	0.69*** (0.1479)	-0.31*** (0.0627)	0.39
Greece	0.43** (0.2015)	-0.12*** (0.0407)	0.27	1.03*** (0.3496)	-0.27*** (0.0958)	0.52
Spain	1.71*** (0.4395)	-0.50*** (0.1751)	0.37	2.07*** (0.3083)	-0.59*** (0.1486)	0.56
Finland	1.47*** (0.3316)	-0.44*** (0.0896)	0.62	0.91** (0.4283)	-0.31*** (0.1004)	0.48
France	0.57*** (0.1599)	-0.16*** (0.0563)	0.18	0.56*** (0.1138)	-0.16*** (0.0473)	0.23
Ireland	1.50*** (0.2866)	-0.31*** (0.0415)	0.44	1.46*** (0.3444)	-0.31*** (0.0564)	0.51
Italy				0.35* (0.0545)	-0.10* (-1.8582)	0.11
Luxembourg	0.45*** (0.1416)	-0.08*** (0.0209)	0.14	0.36*** (0.0847)	-0.06*** (0.0126)	0.13
Netherlands	1.13*** (0.2578)	-0.40*** (0.1019)	0.37	0.81*** (0.2593)	-0.30*** (0.0904)	0.32
Portugal	0.77*** (0.1858)	-0.18*** (0.0518)	0.37	0.87*** (0.1454)	-0.20*** (0.0462)	0.43
Sweden	1.00*** (0.3091)	-0.38*** (0.1032)	0.53	0.78*** (0.2658)	-0.30*** (0.0850)	0.47
UK	0.94*** (0.2541)	-0.32*** (0.0770)	0.40	0.74*** (0.1819)	-0.28*** (0.0521)	0.41

Notes:

1. The numbers inside the brackets are standard errors.
2. The asterisks ***, ** and *, refer to 1%, 5% and 10%, significance levels respectively.
3. The sample for West Germany is from 1970 to 1990, for Germany from 1992 to 2013 and for Luxembourg from 1978 to 2013.

Source:

1. AMECO – The annual macroeconomic database (European Commission, Economic and Financial Affairs).

As a result, on average, the growth rate of real GDP that is consistent with a constant path for the unemployment rate is:

$$Y_t - Y_{t-1} = \frac{-\alpha}{\beta} \quad (7)$$

For Greece, during the period 1970-2007 and 1970-2013, the above growth rate was equal to 3.58% and 3.81%, respectively. In our sample economies the same figure has an average value equal to 3.3%.

As far as our sample economies are concerned (USA, Japan and EU-15), we find statistically significant relations for both versions of Okun's law (an exception is Italy during the period 1970-2007 for the difference version). In terms of the levels version, we do not observe quantitatively significant changes between 1970-2007 and 1970-2013. The only exception is the economy of Germany, where Okun's coefficient decreased from -0.50 to -0.31 in absolute terms. This was a result of a poor growth performance, accompanied by a decreasing unemployment rate during the period 2007-2013 (see Tables 1,2 and Footnote 5).²³

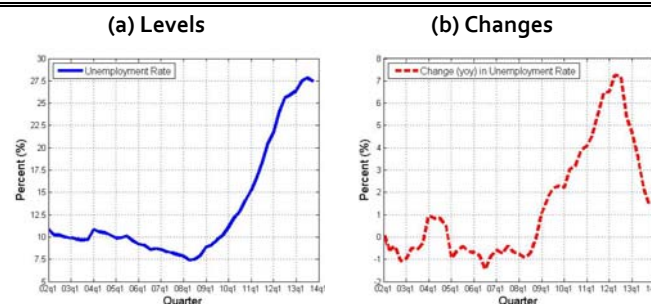
The economy with the highest sensitivity in changes of unemployment rate (or unemployment gap) due to changes in real GDP growth rate (or output gap) is Spain (Okun's coefficient equal to -0.63 (levels) and -0.59 (differences) for the period 1970-2013), while the economy with the lowest sensitivity is Japan (-0.05 in both versions), followed by Luxembourg (-0.06 in both versions) and Austria (-0.11).²⁴ Furthermore, looking at Table 8 (difference version) we observe that with the inclusion of the period 2007-2013, the value of Okun's coefficient changes quantitatively, not only for Greece and Germany, but also for Denmark (from -0.38 to -0.31), Spain (from -0.50 to -0.59), Finland (from -0.44 to -0.31) Italy (from zero and insignificant to -0.10), Netherlands (from -0.40 to -0.30) and Sweden (from -0.38 to -0.30). Generally speaking, based on the difference version of Okun's law, the period 2007-2013 resulted in an increase in the sensitivity of changes in the unemployment rate to changes in

real GDP growth rate in Greece, Spain and a reduction in most of the other economies in our sample, albeit not in a uniform way.

5. The unemployment rate in Greece 2014-2020 ("The" long-run macroeconomic challenge)

In Section 4 we have observed a statistical positive relation between changes in the unemployment rate and proportional changes in real GDP. Furthermore, our analysis reveals that the current Greek depression (2007-2013) has increased the sensitivity of the above relation, i.e. given a unit change in real GDP growth the change in the unemployment rate is higher in absolute terms (-0.12 to -0.27, see Table 8). In Section 5 we also introduce the relation between changes in the unemployment rate and other key macroeconomic variables. These are the following: real interest rate, real credit to firms and two consumer survey indices, taken from the joint harmonised EU consumer survey, namely, consumers' price expectations and households' financial situation. We attempt to quantify the – partial and joint- effect that these variables have on the employment rate.

Figure 4: The Greek Unemployment Rate (2002q1-2013q4)



Source:

1. Eurostat Database.

5.1 Economic Reasoning

Economic theory offers explanations as to why and how the variables we employ and the unemployment rate might be related. According to basic principles of economic theory, the real interest rate is negatively associated with demand and, consequently, with output.²⁵ The propagation mechanism lies in the fact that the investment expenditures are affected by changes in the real interest rate. The higher the real interest rate, the lower is the level of investment made by firms, the lower is the demand and output produced. Firms react by decreasing their production, and this creates a decrease in employment and an increase in unemployment. Therefore, in the regressions that

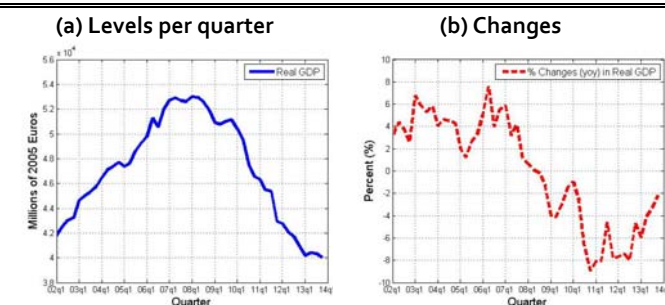
²³ The robustness of Okun's law for OECD countries is well tested in Lee (2000). Furthermore, for the case of USA see Knotek (2007).

²⁴ Ball et al. (2013) point out that in Spain the high coefficient of Okun's law can be explained by the existence of temporary employment contracts. More specifically, the authors write: "Labor market reforms in the 1980s made it easier for Spanish employers to hire workers on fixed-term contracts, without the employment protection guaranteed to permanent workers...Temporary contracts make it easier for firms to adjust employment when output changes, raising the Okun coefficient." In the same work, the authors also give an explanation about the low value in the Japanese Okun coefficient. According to their view, the existence in Japan of a tradition of lifetime employment makes firms reluctant to lay off workers. Finally in another study for the Japanese economy, that is Weiner (1987), the author attributes the stable path of the Japanese unemployment rate to the following factors: wage flexibility, hours flexibility, and labor force participation flexibility.

²⁵ There is also a positive relation between the real interest rate and output. This comes from the supply side of the economy. An increase in the real interest rate increases the returns from savings and this induces households' to work more so that they can earn more income to save. Increases in labor effort, given capital and total factor productivity, increase the output in the economy.

follow, we expect a positive (negative) relation between changes in the unemployment rate (employment rate) and changes in the real interest rate.

Figure 5: The Greek Real GDP (2002q1-2013q4)



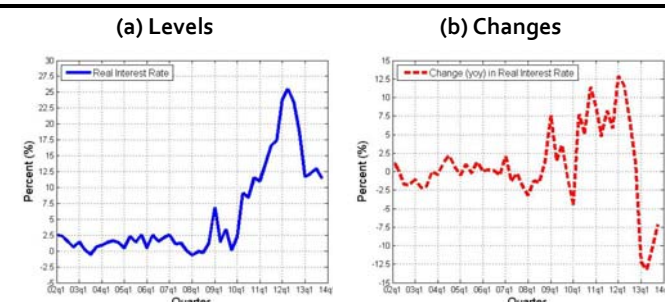
Source:

1. Eurostat Database.

As far as real credit to firms is concerned, we expect a negative relation with the unemployment rate and a positive relation with the employment rate. The rationale is as follows: Except from their net worth, firms finance their assets (working capital or fixed assets) by receiving credit from banks, creditors or other investors (by issuing corporate bonds). Furthermore, firms also use credit to cover expenses like wages and interest, especially in times when there is a mismatch between cash receipts and payments. A cut (or a reduction) in the access to credit creates liquidity problems to firms. If this situation continues, then investment projects may be cancelled (e.g. the purchase of a new machine or the construction of a new production plant) and firms may also start to layoff workers.

As mentioned above, the other two variables, which are included in our analysis, are two consumer survey indices. Since it is well known that current economic decisions are affected by the formation of expectations about future outcomes, we use the first index (consumers' price expectations) as a proxy to consumer expectations. The use of the second index, that is households' financial situation, can serve as a good proxy for changes in wealth (we try to catch wealth effects on spending). For both indices we expect to have a negative (positive) relation with changes in the unemployment rate (employment rate).

Figure 6: The Greek Real Interest Rate (2002q1-2013q4)

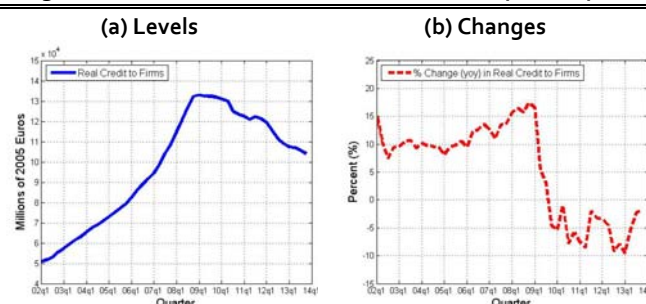


Source:

1. Eurostat Database.

For example, in what concerns consumers' price expectations one possible explanation can be the following: A decrease in consumers' price expectations (more people start to believe that prices will go down) may induce the consumers' to postpone their consumption expenditures and as result this can lead to a reduction in demand and output. On the other hand, the index of households' financial situation can catch wealth effects in spending. An increase in this index can be interpreted as a signal of increases in wealth and consequently in spending.

Figure 7: The Greek Real Credit to Firms (2002q1-2013q4)



Source:

1. Bank of Greece.

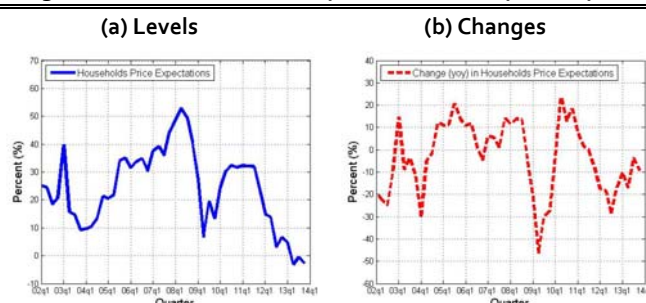
5.2 Econometric Model and Results

To quantify and test the contribution of these variables to changes in the unemployment rate (and employment rate) we employ OLS regressions (with dummy variables techniques). Our basic regressions are the following:

$$CUR_t = \beta_0 + \beta_1 CRGDP_t + \beta_2 CRIR_t + \beta_3 CRCF_t + \beta_4 CCPE_{t-1} + \beta_5 CHFS_{t-1} \quad (8)$$

$$CER_t = \beta_0 + \beta_1 CRGDP_t + \beta_2 CRIR_t + \beta_3 CRCF_t + \beta_4 CCPE_{t-1} + \beta_5 CHFS_{t-1} \quad (9)$$

Figure 8: Consumers' Price Expectations (2002q1-2013q4)



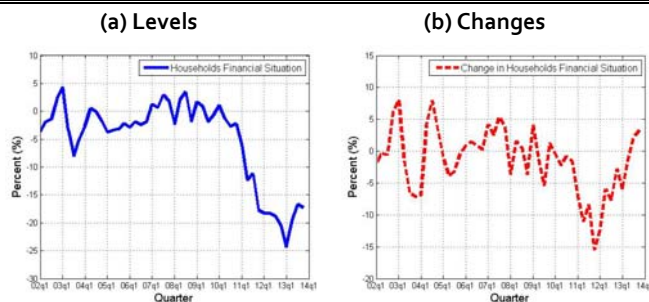
Source:

1. Joint Harmonised EU Consumer Survey.

Our dependent variables are changes in the unemployment rate, CUR, (eq. 8) and changes in the employment rate, CER (eq. 9). As far as our explanatory variables are concerned, CRGDP refers to proportional changes in real GDP, CRIR refers to changes in real interest rate, CRCF refers to proportional changes in real credit

to firms, CCPE refers to changes in consumers' price expectations and CHFS refers to changes in households' financial situation. For the last two variables we use a one period lag since these two indices are generally classified as leading indicators of economic activity. Our sample consists of quarterly data from 1999q2 to 2013q4 (seasonally adjusted). For the dependent and the explanatory variables, we use year on year (yoy) changes (see Figures 5 to 10, part (b)).

Figure 9: Households' Financial Situation (2002q1-2013q4)



Source:

1. Joint Harmonised EU Consumer Survey.

In the first part of our analysis we insert to our regressions a dummy variable (constant and coefficient), which takes on the value of "0" for the period 1999q2 to 2008q2 (before depression) and the value of "1" for the period 2008q3 to 2013q4 (during depression). The inclusion of the dummy helps us reveal any statistically significant differences in the coefficients of the explanatory variables due to the current Greek depression. In what concerns the regression with the unemployment rate, our results suggest that the coefficients of percentage changes in real credit to firms (CRCF) and changes in consumers' price expectations (CCPE) are not statistically different before and during the depression. This does not hold for the coefficients of percentage changes in real GDP (CRGDP), changes in the real interest rate (CRIR) and in households' financial situation (CHFS). For these variables we find that their effect (a unit increase) on the changes in the unemployment rate is different (and also statistically significant) during the period 2008q3 to 2013q4 compared to the period 1999q2 to 2008q2. Similar results hold for the employment rate except for consumers' price expectations, whose coefficient is not statistically significant.

In the second part of our analysis, we run regressions by inserting dummies (with the same specification as above) only to variables for which we had previously found a statistically significant difference between their value in 1999q2-2008q2 and in 2008q3-2013q4.²⁶

Our results, which are depicted in Table 9, are as follows: 1) In terms of percentage changes in real GDP, we find a negative

(positive) relation (and statistically significant) with changes in the unemployment rate. The respective coefficient is -0.35 (0.20 when it comes to employment rate). This means that a unit increase in real GDP growth is associated with a decrease (increase) in the unemployment (employment) rate by 0.35 (0.20) p.p. 2) In terms of percentage changes in real credit to firms, our findings are similar with the former explanatory variable. However, its effect on changes in the unemployment rate is weaker (quantitatively) compared to real GDP growth, i.e. a coefficient of -0.08 (0.06 for the employment rate). 3) In what concerns changes in households' price expectations (with one lag), we find a strong negative relation (and statistically significant) with respect to changes in the unemployment rate. The coefficient is equal to -0.19. 4) As far as the change in households' financial situation is concerned, we find a positive relation with the employment rate (0.16) and a negative relation with the unemployment rate (-0.02). Both coefficients are statistically significant. 5) In terms of changes in the real interest rate, we find the expected relations in terms of signs (i.e. positive for the unemployment rate and negative for the employment rate), albeit both coefficients are not statistically significant. 6) The explanatory power of our econometric model is strong. In both regressions, the explanatory variables explain a big fraction of the variance of the dependent variable (94% for the unemployment rate and 90% for the employment rate).

5.3 Projections for Explanatory Variables (2014q1-2020q4)

The estimates of Table 9 can be used to construct long-term projections for the unemployment rate in Greece over the next seven years. Table 10 presents our predictions for Greece's unemployment rate under a baseline (B), an adverse (A) and an optimistic (O) scenario given specific assumptions for the explanatory variables.²⁷

The strong contraction in domestic demand, compounded by the fiscal consolidation measures necessary for bringing the Greek public finances onto a sustainable trajectory, has led to significant fall in real GDP growth over the past 6 years (2007-2013). Nevertheless, the pace of the recession has weakened significantly during 2013 and in the first quarter of 2014, as real GDP growth declined by about 1.1% yoy in 2014q1, following a roughly 7.0% and 4.0% contraction in 2012 and 2013, respectively.

²⁷ In our projections for the unemployment and employment rate, the coefficients that we use for the variables of percentage change in real GDP, change in real interest rate and percentage change in real credit to firms, are these with the dummy variables. In other words, we assume that the sensitivity of the change in the rate of unemployment to changes in the above independent variables over the next seven years will equal the estimated sensitivity during the depression period 2008q3-2013q4, provided that labor market reforms since the onset of the crisis have led to a different regime concerning the responsiveness of changes in the unemployment to changes in the explanatory variables.

²⁶ The variable consumers' price expectations is not included in the regression for the employment rate.

Table 9: Basic RegressionsDependent Variable:

Change (yoy) in Unemployment Rate (CUR) and Change (yoy) in Employment Rate (CER).

Independent Variables:

CRGDP, CRIR, CRCF, CCPE, CHFS.

Method:

OLS (with heteroskedasticity and autocorrelation consistent covariance or Newey – West estimator).

Sample:

1999q2-2013q4 (59 observations)

	Change in Unemployment Rate	Change in Employment Rate
	β_0	β_0
Constant	0.7633** (0.3146)	-0.3488 (0.2711)
	β_1	β_1
% Change in Real GDP	-0.3509*** (0.0791)	0.2017*** (0.0648)
	β_2	β_2
Change in Real Interest Rate	0.0191 (0.0206)	-0.0010 (0.0121)
	β_3	β_3
% Change in Real Credit to Firms	-0.0804*** (0.0183)	0.0631*** (0.0183)
	β_4	β_4
Change in Consumers' Price Expectations (-1)	-0.1928*** (0.0308)	-
	β_5	β_5
Change in Households' Financial Situation (-1)	-0.0225*** (0.0064)	0.1591*** (0.0301)
Adjusted R-Squared	0.9362	0.8967
Durbin - Watson	1.7102	1.1667

Notes:

1. The numbers inside the brackets are standard errors.
2. The asterisks ***, ** and *, refer to 1%, 5% and 10%, significance levels respectively.
3. Data are seasonally adjusted.

Source:

1. Eurostat Database, Joint Harmonised EU Consumer Survey and Bank of Greece.

Leading indicators as well as hard economic data suggest that Greece will return to positive economic growth in 2014 (e.g. see Bank of Greece, 2014). According to the most recent review of the Second Economic Adjustment Programme for Greece (April 2014), the structural reforms undertaken over the last four years in labor and product markets constitute a concrete basis for a

positive annual GDP growth of 0.6% in 2014, followed by a pickup to 2.9% in 2015 and 3.7% in 2016. Our baseline scenario for the path of the unemployment rate during 2014-2020 is close to the above mentioned GDP growth forecasts of the Second Economic Adjustment Programme, with an average growth rate of about 3.5% during 2015-2020. On our adverse scenario, real economic activity is on average 1.0% lower than our baseline scenario. On the other hand, our optimistic scenario includes a stronger recovery to 4.5% on average for the following six years.

Table 10: Unemployment Rate (%) and Employment Rate (%) Projections (under three different scenarios)

Year	Unemployment Rate (%) Scenarios			Employment Rate (%) Scenarios		
	A	B	O	A	B	O
	Scenarios			Scenarios		
2014	26.7	26.6	26.5	43.9	44.0	44.1
2015	25.8	25.0	24.2	44.6	45.1	45.7
2016	24.9	23.5	21.9	45.4	46.3	47.2
2017	24.1	21.9	19.7	46.1	47.4	48.8
2018	23.2	20.4	17.4	46.8	48.6	50.4
2019	22.3	18.9	15.2	47.5	49.8	52.0
2020	21.5	17.3	12.9	48.3	50.9	53.6
Scenarios	Adverse A			Baseline B		Optimistic O
Explanatory Variables, % (Projections)	2014	2015- 2020	2014	2015- 2020	2014	2015- 2020
CRGDP	1.1	2.5	1.1	3.5	1.1	4.5
RIR	5.5	4	5.5	3	5.5	2
CRCF	2.1	3.5	2.1	4.5	2.1	5.5
CCPE	3.7	2	4.4	4	5.6	7
CHFS	3	2.2	3.7	3.2	4.5	4.3

Notes:

1. CRGDP: Proportional Change in Real GDP, RIR: Real Interest Rate, CRCF: Proportional Change in Real Credit to Firms, CHPE: Change in Households' Price Expectations, CHFS: Change in Households' Final Situation.
2. All the above values are averages of quarters and our estimates for the unemployment rate and the employment rate are seasonally adjusted.

Source:

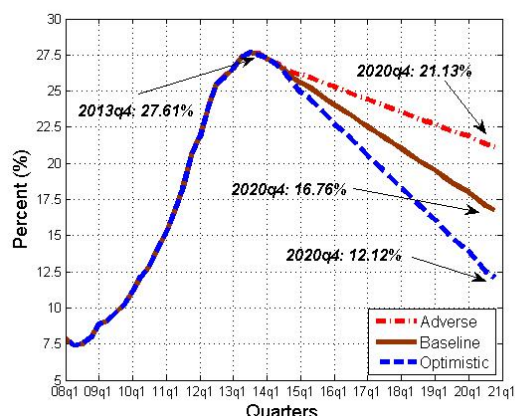
1. Eurostat Database, Joint Harmonised EU Consumer Survey and Bank of Greece.

In line with the general improvement in financial conditions, government bond yield has fallen significantly over the past year, with the government bond spread moving back to the pre-May 2010 level. The Greek government returned to the international bond markets in April 2014, issuing a new 5-year bond after four years of capital markets exclusion. Under our baseline scenario, real interest rate - as measured by the difference between the 10 year government bond yield and inflation (measured as

percentage change of the GDP deflator) - falls gradually from 11.5% in 2013q4 to 4.0% towards the end of 2014 and to 2.0% at the end of 2020. Should conditions in the financial market prove to be more favorable for Greece in the coming years, then real interest rate may move to 2.0% by 2018 (optimistic scenario). However, if the improvement in the financial conditions proves to be rather slow, then real interest rate may decline on a slower pace to about 4.0% by the end of 2020 (adverse scenario).

Although restructuring in the Greek banking sector is taking place and Greek banks have improved significantly their liquidity positions, credit to the economy has remained tight. Although the pace of contraction has weakened markedly in 2013, with negative credit growth decelerating from -9.6% yoy in 2013q1 to -1.8% yoy in 2013q4, credit growth still stays at negative territory. Given that credit institutions gradually regain credibility and access to the international capital markets, we assume that credit growth will turn slightly positive in 2014, and accelerate to an average of 4.5% during 2015-2020. Under the optimistic scenario, credit to firms accelerates more quickly to roughly 5.5% during 2015-2020. In the adverse scenario, lending to Greek firms accelerates more slowly with an average lending growth rate of about 3.5% for the years ahead.

Figure 10: Estimations - Unemployment Rate (2014q1-2020q4)



Source:

1. Eurobank Research

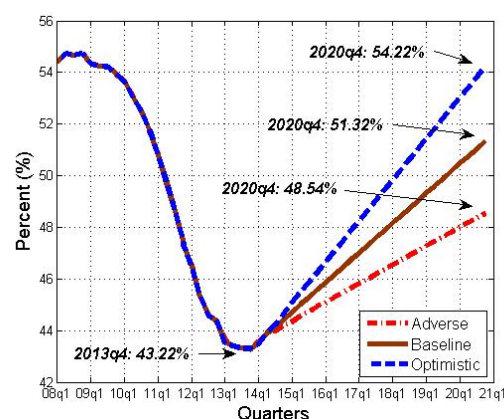
The first variable that we use as a proxy for consumer perceptions is the current financial situation of households. This leading indicator has slowed from its recent peak of 4.5% in 2008q3 to its most recent trough of -21.1% in 2012q4. Our baseline scenario assumes that gradual recovery of real economic activity and renewed global trust in the Greek economy will lead to an improvement in households' finances of about 3.2 p.p per year. Such an improvement would result in a balance of about +5.1% in 2020, and this pace of growth is in line with our baseline GDP forecasts. The optimistic scenario assumes an annual increase of about 4.3 p.p, reaching a balance of about 12.8 p.p in 2020, while under the adverse scenario, the consumer index increases by a mere 2.2 p.p per year that leaves the balance close to -1.9% in 2020. The second variable, which

approximates consumers' price expectations over the next year, has declined significantly from its pre-recession peak of 52.8% in 2008q2 to -3.7% in 2013q2. Nevertheless, it has turned positive in 2014q1 for the first time since 2013q2, and we expect it to improve by an average of 1.0 p.p per year, reaching its 20-year average of about 30.0% in 2020 (baseline). Under the optimistic scenario, the price expectations' indicator increases by an average of 1.75 p.p each year and reaches its pre-recession high of roughly 50.0% by 2020. The adverse scenario incorporates an annual increase of merely 0.5 p.p that leaves the households' financial situation indicator at 16.0%, close to 2012q2 levels.

5.3 Projections for Unemployment and Employment (2014q1-2020q4)

Our baseline scenario is consistent with an average annual decline in the rate of unemployment of approximately 1.8 p.p for the following years towards 2020, reaching a total decline of about 10.8 p.p over the next seven years (from 27.6% in 2013q4 to 16.8% in 2020q4). The adverse scenario suggests an average annual decline of about 1.0 p.p during 2014-2020, with a cumulative decline of roughly 6.5 p.p (2020q4 21.1%). A faster economic recovery than currently expected could result in a decline of 2.2 p.p per year, leading to a massive drop in the rate of unemployment of about 15.5 p.p at the end of 2020 (12.1% in 2020q4). Our forecasts under the optimistic scenario are in line with the latest IMF forecasts and estimations under the second economic adjustment programme reported in April 2014, which both project an unemployment rate of about 16.0% by 2018.

Figure 11: Estimations - Employment Rate (2014q1-2020q4)



Source:

1. Eurobank Research

As far as the employment rate is concerned, our baseline scenario projects an increase of roughly 8.0 p.p, from 43.2% in 2013q4 to 51.3% in 2020q4.

These rates of employment and unemployment can be translated into levels. Using the definitions (i.e. see Footnote 1) of employment rate, unemployment rate, active population

(labor force), inactive population and total population, and by doing some algebra we end up with the following equations:

$$er_t = \frac{empl_t}{tpop_t} \Rightarrow empl_t = er_t tpop_t \quad (10)$$

$$ur_t = \frac{unempl_t}{unempl_t + empl_t} \Rightarrow$$

$$ur_t (unempl_t + empl_t) = unempl_t \Rightarrow$$

$$unempl_t (1 - ur_t) = empl_t ur_t \Rightarrow$$

$$unempl_t = empl_t \frac{ur}{1 - ur} \quad (11)$$

$$act_t = empl_t + unempl_t \quad (12)$$

$$tpop_t = inact_t + act_t \Rightarrow$$

$$inact_t = tpop_t - act_t \quad (13)$$

Where er_t denotes the employment rate, $empl_t$ denotes employment, $tpop_t$ denotes total population (15-74), ur_t denotes the unemployment rate, $unempl_t$ denotes unemployment, $inact_t$ denotes inactive population and act_t denotes active population.

By employing equation (10) and assuming an annual population growth of 0.22% (equal with the average annual population growth since 1999), a cumulative increase in the employment rate of 8.1 p.p implies an increase of about 734k jobs (from 3600 employed persons in 2013q4 to 4334k in 2020q4).²⁸ A stronger than expected economic growth could result in a total increase

of roughly 11.0 percentage points, which translates into 979k jobs. However, our adverse scenario with a slower pace of growth that does not exceed 2.5% over the next seven years suggests an increase of 5.4 p.p in the employment rate towards 2020, which refers to about 500k jobs. As far as the level of unemployment is concerned, the drop of 10.8 p.p in our baseline scenario is equivalent to a reduction of unemployment by 497k (from 1370k in 2013q4 to 873k in 2020q4) people. Furthermore, given the computed levels for employment and unemployment, active population increases by 237k people and inactive population decreases by 113k people.²⁹

Table 11: Population and Labor Force Decomposition

	$tpop_t$	$inact_t$	act_t	$empl_t$	$unempl_t$
Unit	k	k	k	k	k
08q3	8327	3408	4919	4550	369
13q4	8322	3352	4970	3600	1370
20q4					
<u>A</u>	8446	3248	5198	4100	1098
	(+124)	(-104)	(+228)	(+500)	(-272)
<u>B</u>	8446	3239	5207	4334	873
	(+124)	(-113)	(+237)	(+734)	(-497)
<u>C</u>	8446	3235	5211	4579	632
	(+124)	(-117)	(+241)	(+976)	(-738)

Notes:

1. Data are seasonally adjusted.
2. k stands for thousands ('000').

Source:

1. Eurostat Database and Joint Harmonised EU Consumer Survey.

6. Conclusions

Although unemployment rate in Greece seems to have peaked in September 2013 (27.7% sa, Eurostat) and has been on a downward trend thereafter (26.6% sa in 2014Mo3, Eurostat), the extremely high rate of unemployment remains one of the main challenges for the Greek economy. The aim of this study is to quantitatively assess this phenomenon by descriptive analysis and econometric estimations.

After presenting some descriptive statistics for the Greek unemployment rate, we investigate statistical relations between changes in the unemployment rate and changes in other key macroeconomic variables. We emphasize on the demand side of the economy. At a first stage, we choose as our explanatory variable real GDP growth. Consequently, we test for a relation, known as Okun's law. For Greece we find a marginal effect equal to 0.27. More specifically, a unit increase in real GDP growth is associated with a decline in the rate of unemployment of 0.27

²⁸ The procedure that we adopt to convert rates into levels (and to ensure consistency in our results) is as follows: 1) Given a value for total population (15-74) in 2013q4 and a growth rate of 0.22% we compute a level for total population in 2020q4. 2) Given our estimates for the employment rate and the computed level for population in 2020q4, we use equation (10) to compute a level for employment. 3) Given a computed level for unemployment and an estimated value for the unemployment rate in 2020q4, we use equation (11) to compute a level for unemployment. 4) Given computed levels for employment and unemployment in 2020q4 we use equation (12) to compute a level for active population. 5) Given computed levels for total population and active population in 2020q4 we use equation (13) to compute a level for inactive population.

²⁹ The same figures under the two remaining scenarios (adverse and optimistic) are presented in Table 11.

p.p. We observe that the Greek depression of 2007-2013 has actually increased the responsiveness of unemployment rate to changes in real economic activity, as for the pre-crisis period (1970-2007) a unit increase in real GDP growth is consistent with a decline in the rate of unemployment of only 0.12 p.p. This increase in sensitivity is also observed in Spain and Italy. For the remaining of our sample economies (USA, Japan and EU-15 group of countries) we observe a decrease.

At a second stage, using quarterly data from 199q2 to 2013q4, we employ a simple linear econometric model that relates changes in the unemployment rate, not only with changes in real GDP growth, but also with changes in real interest rate, percentage changes in real credit to firms, changes in consumers' price expectations and changes in households' financial situation. Our results suggest a negative and statistically significant relation between changes in the unemployment rate and real GDP growth (-0.35), real credit to firms' growth (-0.08), and changes in the two consumer indices (-0.19 and -0.02) from the joint harmonized EU consumer survey. On the other hand, there is a positive but statistically insignificant relation between changes in the unemployment rate and changes in real interest rate (0.02). Finally, we also quantify the effect that the above mentioned variables have on the employment rate.

Given these estimated coefficients and by making some hypotheses on the path of our explanatory variables, we produce projections over the period 2014-2020. We present three scenarios, i.e. an adverse, a baseline and a conservative. According to our baseline scenario, we estimate that the unemployment rate in Greece will decline by approximately 10 percentage points over the next seven years -from 27.6% in 2013q4 to 16.8% in 2020q4- given an average GDP growth of 3.5%, real credit to firms' growth of 4.5%, a real interest rate of 3.0% and a gradual improvement in consumers' price expectations and in households' financial situation. As far as employment is concerned, we expect a cumulative increase of 8.1 p.p in the employment rate during 2014-2020, which translates into an increase of about 734k jobs.

Subsequently, we estimate the level of the unemployment rate under a more optimistic and an adverse scenario. A faster economic recovery that includes an average GDP growth of 4.5%, real credit growth of 5.5%, a real interest rate of 2.0% and a sharper improvement in consumer indices could result in a sharp drop in the unemployment rate of more than 15 percentage points at the end of 2020. In the adverse scenario, where GDP and credit growth are 1 percentage point lower than in the baseline scenario, real interest rate is 4.0% and consumer indices improve with a lesser degree, the unemployment rate declines by only 6.5 p.p in the next seven years.

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Appendix A.

In this Appendix we present the basic definitions for each of the economic activities presented in Table 6. These are the official definitions from NACE Rev 2. - Statistical Classification of Economic Activities in the European Community (e.g. see Eurostat – European Commission (2008)).

Economic Activity A – Agriculture, Forestry and Fishing:

It includes the exploitation of vegetal and animal natural resources, comprising the activities of growing of crops, raising and breeding of animals, harvesting of timber and other plants, animals or animal products from a farm or their natural habitats.

Economic Activity B – Mining and Quarrying:

It includes the extraction of minerals occurring naturally as solids (coal and ores), liquids (petroleum) or gases (natural gas). Extraction can be achieved by different methods such as underground or surface mining, well operation, seabed mining etc. It also includes supplementary activities aimed at preparing the crude materials for marketing, for example, crushing, grinding, cleaning, drying, sorting, concentrating ores, liquefaction of natural gas and agglomeration of solid fuels. These operations are often accomplished by the units that extracted the resource and/or others located nearby.

Economic Activity C – Manufacturing:

It includes the physical or chemical transformation of materials, substances, or components into new products. The materials, substances, or components transformed are raw materials that are products of agriculture, forestry, fishing, mining or quarrying as well as products of other manufacturing activities. Substantial alteration, renovation or reconstruction of goods is generally considered to be manufacturing. The output of a manufacturing process may be finished in the sense that it is ready for utilisation or consumption, or it may be semi-finished in the sense that it is to become an input for further manufacturing. For example, the output of alumina refining is the input used in the primary production of aluminium; primary aluminium is the input to aluminium wire drawing; and aluminium wire is the input for the manufacture of fabricated wire products.

Economic Activity D – Electricity, Gas, Steam and Air Conditioning Supply:

It includes the provision of electric power, natural gas, steam, hot water and the like through a permanent infrastructure (network) of lines, mains and pipes. The dimension of the network is not decisive; also included are the distribution of electricity, gas, steam, hot water and the like in industrial parks or residential buildings. Therefore this economic activity includes the operation of electric and gas utilities, which generate, control and distribute electric power or gas. Also included is the

provision of steam and air-conditioning supply. Operation of water and sewerage utilities and transport of gas through pipelines are excluded.

Economic Activity E – Water Supply; Sewerage, Waste Management and Remediation Activities:

It includes activities related to the management (including collection, treatment and disposal) of various forms of waste, such as solid or non-solid industrial or household waste, as well as contaminated sites. The output of the waste or sewage treatment process can either be disposed of or become an input into other production processes. Activities of water supply are also grouped in this economic activity, since they are often carried out in connection with, or by units also engaged in, the treatment of sewage.

Economic Activity F – Construction:

It includes general construction and specialized construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature.

Economic Activity G – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles:

It includes wholesale and retail sale (i.e. sale without transformation) of any type of goods, and rendering services incidental to the sale of merchandise. Wholesaling and retailing are the final steps in the distribution of merchandise. Also included in this economic activity are the repair of motor vehicles and motorcycles.

Economic Activity H – Transportation and Storage:

It includes the provision of passenger or freight transport, whether scheduled or not, by rail, pipeline, road, water or air and associated activities such as terminal and parking facilities, cargo handling, storage etc. Included in this economic activity is the renting of transport equipment with driver or operator. Also included are postal and courier activities.

Economic Activity I – Accommodation and Food Service Activities:

It includes the provision of short-stay accommodation for visitors and other travellers and the provision of complete meals and drinks fit for immediate consumption. The amount and type of supplementary services provided within this section can vary widely. It excludes the provision of long-term accommodation as primary residences, which is classified in real estate activities (economic activity L). Also excluded is the preparation of food or drinks that are either not fit for immediate consumption or that are sold through independent distribution channels, i.e. through

wholesale or retail trade activities. The preparation of these foods is classified in manufacturing (economic activity C).

Economic Activity J – Information and Communication:

It includes the production and distribution of information and cultural products, the provision of the means to transmit or distribute these products, as well as data or communications, information technology activities and the processing of data and other information service activities.

Economic Activity K – Financial and Insurance Activities:

It includes financial service activities, including insurance, reinsurance and pension funding activities and activities to support financial services. It also includes the activities of holding assets, such as activities of holding companies and the activities of trusts, funds and similar financial entities.

Economic Activity L – Real Estate Activities:

It includes acting as lessors, agents and/or brokers in one or more of the following: selling or buying real estate, renting real estate, providing other real estate services such as appraising real estate or acting as real estate escrow agents. These economic activities may be carried out on own or leased property and may be done on a fee or contract basis. Also included is the building of structures, combined with maintaining ownership or leasing of such structures and real estate property managers.

Economic Activity M – Professional, Scientific and Technical Activities:

It includes specialised professional, scientific and technical activities. These activities require a high degree of training, and make specialised knowledge and skills available to users (legal and accounting activities, activities of head offices; management consultancy activities, architectural and engineering activities; technical testing and analysis, scientific research and development, advertising and market research, other professional, scientific and technical activities and veterinary activities).

Economic Activity N – Administrative and Support Service Activities:

It includes a variety of economic activities that support general business operations. These activities differ from those in economic activity M, since their primary purpose is not the transfer of specialised knowledge (rental and leasing activities, employment activities, travel agency, tour operator and other reservation service and related activities, security and investigation activities, services to buildings and landscape activities, office administrative, office support and other business support activities).

Economic Activity O – Public Administration and Defense; Compulsory Social Security:

It includes activities of a governmental nature, normally carried out by the public administration. This includes the enactment and judicial interpretation of laws and their pursuant regulation, as well as the administration of programmes based on them, legislative activities, taxation, national defense, public order and safety, immigration services, foreign affairs and the administration of government programmes. The legal or institutional status is not, in itself, the determining factor for an activity to belong in this specific economic activity, rather than the activity being of a nature specified in the previous paragraph. This means that activities classified elsewhere in NACE do not fall under economic activity O, even if carried out by public entities. For example, administration of the school system (i.e. regulations, checks, curricula) falls under economic activity O, but teaching itself does not (see economic activity P), and a prison or military hospital is classified to health (see Q). Similarly, some of the economic activities described above may be carried out by non-government units. Finally, economic activity O, also includes compulsory social security activities.

Economic Activity P – Education:

It includes education at any level or for any profession. The instructions may be oral or written and may be provided by radio, television, Internet or via correspondence. It includes education by the different institutions in the regular school system at its different levels as well as adult education, literacy programmes etc. Also included are military schools and academies, prison schools etc. at their respective levels. Finally, this economic activity includes public as well as private education.

Economic Activity Q – Human Health and Social Work Activities:

It includes the provision of health and social work activities. They are included a wide range of activities, starting from health care provided by trained medical professionals in hospitals and other facilities, over residential care activities that still involve a degree of health care activities to social work activities without any involvement of health care professionals.

Economic Activity R – Arts, Entertainment and Recreation:

It includes a wide range of activities to meet varied cultural, entertainment and recreational interests of the general public, including live performances, operation of museum sites, gambling, sports and recreation activities.

Economic Activity S – Other Service Activities:

It includes (as a residual category) the activities of membership organisations, the repair of computers and personal and

household goods and a variety of personal service activities not covered elsewhere in the classification.

Economic Activity T – Activities of Households' as Employers; Undifferentiated Goods and Services – Producing Activities of Households' for Own Use:

It includes the activities of households' as employers of domestic personnel such as maids, cooks, waiters, valets, butlers, laundresses, gardeners, gatekeepers, stable-lads, chauffeurs, caretakers, governesses, babysitters, tutors, secretaries etc. It allows the domestic personnel employed to state the activity of their employer in censuses or studies, even though the employer is an individual. The product produced by this activity is consumed by the employing household. Furthermore it includes the undifferentiated subsistence goods-producing and services-producing activities of households'. Households' should be classified here only if it is impossible to identify a primary activity for the subsistence activities of the household. If the household engages in market activities, it should be classified according to the primary market activity carried out.

Economic Activity U – Activities of Extraterritorial Organizations and Bodies:

It includes activities of international organisations such as the United Nations and the specialised agencies of the United Nations system, regional bodies etc., the International Monetary Fund, the World Bank, the World Customs Organisation, the Organisation for Economic Co-operation and Development, the organization of Petroleum Exporting Countries, the European Communities, the European Free Trade Association etc. Furthermore it includes: activities of diplomatic and consular missions when being determined by the country of their location rather than by the country they represent.

Appendix B.

We use two variables from the Joint Harmonised EU Consumer Survey that capture households' perceptions about their financial situation, as well as their expectations about price developments over the next 12 months. More specifically, the variables are aggregate balances for the following two questions:

Consumer Price Expectations over the next 12 months:

By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months? They will...

- + + increase more rapidly
- + increase at the same rate
- = increase at a slower rate
- stay about the same
- – fall
- N don't know.

Statement on financial situation of households' - Capacity to save:

Which of these statements best describes the current financial situation of your household?

- + + we are saving a lot
- + we are saving a little
- = we are just managing to make ends meet on our income
- we are having to draw on our savings
- – we are running into debt
- N don't know.

Balances are the difference between positive and negative answering options, measured as percentage points of total answers. In particular, if a question has three alternative options, "positive" ("up", "more", "more than sufficient", "good", "too large", "increase", "improve", etc.), "neutral" ("unchanged", "as much", "sufficient", "satisfactory", "adequate", etc.) and "negative" ("down", "less", "not sufficient", "too small", "decline", etc.), and if P, E and M (with $P+E+M=100$) denote the percentages of respondents having chosen respectively the option positive, neutral, and negative, the balance is calculated as $B = P - M$.

In the case of questions with six options, i.e. the three options above plus "very positive" ("got/get a lot better", "very much higher", "increase sharply", etc.), "very negative" ("got/get a lot worse", "very unfavourable", "fall sharply", etc.) and "don't know", the balances are calculated on the basis of weighted averages. If P, E and M have the same meaning as in the previous paragraph, while PP denotes the percentage of respondents having chosen the option "very positive", MM the percentage of respondents having chosen the option "very negative" and N is the percentage of respondents without any opinion (so that $PP+P+E+M+MM+N=100$), balances are calculated as $B = (PP + \frac{1}{2}P) - (\frac{1}{2}M + MM)$. It is clear from the expressions above that

balance values range from –100, when all respondents choose the negative option (or the most negative one in the case of five-option questions) to +100, when all respondents choose the positive (or the most positive) option.

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