

ECONOMIC BULLETIN

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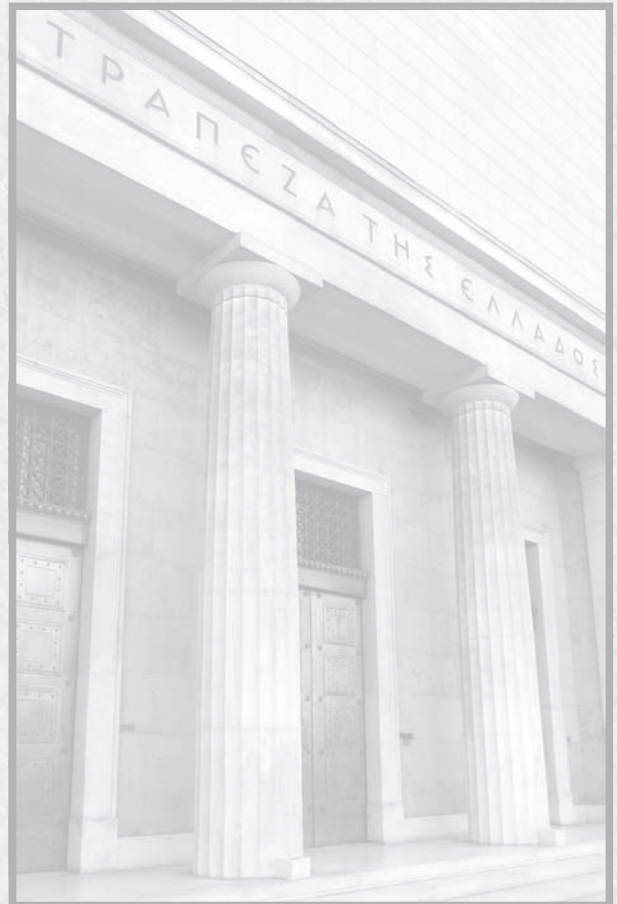
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DO RETAIL GASOLINE PRICES ADJUST SYMMETRICALLY TO CRUDE OIL PRICE CHANGES? THE CASE OF THE GREEK OIL MARKET*

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I INTRODUCTION

A question that has attracted and continues to attract public attention in many countries, including Greece, is whether domestic retail gasoline prices respond symmetrically to changes in world oil prices or not. In other words, whether retail gasoline prices adjust to both rises and decreases of crude oil prices at the same speed. The issue is particularly interesting, as asymmetry could indicate distortions and non-competitive conditions in the domestic oil market.

According to economic theory, in a perfectly competitive – and hence efficient – market, any change in the marginal cost of a commodity is fully transmitted to its price. If not, this may probably be due to market distortions. The structure of the oil market is particularly important for any economy, given that oil is a commodity that affects both the demand and the supply sides of any economy. From the supply side, oil is an important input of production and thus affects production costs; from the demand side, changes in the prices of oil, given its relatively inelastic demand, have a direct impact on consumers' disposable income. Thus, systematic asymmetry in price adjustments could imply negative consequences for the economy as a whole and a continuing deterioration of consumers' purchasing power to the benefit of producers/suppliers. Asymmetries are often interpreted as the result of speculation by suppliers that take advantage of their market power in the fuel market. In such cases, it is crucial that competition authorities monitor the market, in order to ensure competitive conditions in the market to the greatest possible extent.

This issue has been extensively addressed in the economic literature over the last twenty years. Asymmetry has been tested with respect to the speed of adjustment of prices, i.e. the time required for a crude oil price change to be reflected in domestic oil prices. A number of studies analyse the oil market in several economies. Most of the studies detect asymmetry in domestic retail price adjustments. However, not all studies provide the same results. Their findings vary depending on the period analysed, the size, and the frequency of the sample of observations, and the econometric methodology used.

The evidence on the Greek oil market, reported in studies covering country groups (Meyler, 2009; Cleridis, 2010), is also inconclusive: Meyler (2009) detects some asymmetry in the adjustment of retail fuel prices, whereas Cleridis (2010) does not find any indications of asymmetric pricing. Three recent articles analyse exclusively the Greek oil market. The study by the Foundation for Economic and Industrial Research (IOBE, 2009) offers a comprehensive overview of the domestic oil market and tests for asymmetries by applying the asymmetric error correction model (AECM) to monthly observations for the period January 2005-December 2008. Although the description of the market indicates lack of competition, the econometric analysis concludes that there is no asymmetric pricing. Angelopoulou and Gibson (2010) examine pricing in the domestic fuel market, using weekly observations for the period November 2004-February 2009. They show

* The authors' views expressed in this study do not necessarily reflect those of the Bank of Greece. Many thanks are extended to S. Degiannakis, H. Gibson and N. Karabalis for their valuable comments. Any errors are the responsibility of the authors.

that prices adjust symmetrically to world oil prices, but asymmetrically to tax changes and/or across various regions in Greece. These findings probably reflect a lack of competitive conditions in the Greek market. Polemis (2011) analyses the period January 1988-June 2006 using the asymmetric ECM framework. He provides evidence of asymmetry in the retail gasoline price adjustments in both the long and the short term, which indicates poor competition in the oil market in Greece.

The purpose of the present paper is to test for asymmetry in the Greek retail gasoline price adjustments to crude oil price changes for the period January 2005-July 2012. The value added of the present paper stands on: (i) The data sample: the paper uses all available observations for the variables under consideration. The Greek oil market is analysed using weekly observations of a larger statistical sample, which comprises observations from the period of the crisis in the Greek economy. The fact that the paper applies a large number of observations which covers also the crisis period, ensures the reliability of results in terms of economic significance and statistical inference. (ii) The econometric methodology: the paper applies the TAR ECM cointegration technique, which has been proved by the relevant literature to be the most robust econometric method for identifying such kind of asymmetries. Nevertheless, and for indicative purposes alone, the study also presents results based on the AECM econometric methodology which has been used in previous studies.

The rest of the paper is organised as follows: Section 2 presents in brief the main theoretical issues and an overview of the literature. Section 3 offers a brief description of the oil market in Greece. It analyses the importance of crude oil for the Greek economy and outlines the market's structure. Section 4 presents the econometric methodology. The data and the empirical results are presented in Section 5. The final section summarises and concludes.

2 THEORETICAL ISSUES – A REVIEW OF THE LITERATURE

Theoretical issues

According to the literature, testing starts with the estimation of the degree to which retail oil prices adjust to changes in crude oil prices. The degree of price adjustment reflects the part of the marginal cost change which is caused by changes in the price of crude oil. In a competitive market, in which price equals marginal cost, the adjustment should be 100%: any change in cost should be passed through to prices.

Adjustment asymmetries are measured by the speed of adjustment of retail prices to world oil price changes. The study examines whether the prices adjust faster upwards (following an increase in crude oil prices), or downwards (following a crude oil price decrease). The speed of adjustment is affected by factors such as adjustment costs and stock levels. Adjustment cost – i.e. the cost of re-pricing – is low for oil companies, as it is associated with adjusting the retail prices of their local vendors. The level of stocks affects pricing as follows: high stocks act as a buffer for retail price increases when oil prices rise, since the increases can be delayed until the delivery of a new load.

The literature provides several interpretations of this asymmetric behaviour (for a comprehensive overview of the theoretical arguments see Balke *et al.*, 1998). The phenomenon can be mainly explained by: (a) the market structure; (b) consumer search costs; (c) consumer behaviour in response to price changes; (d) the oil stock management and pricing practices; and (e) the adjustment cost for refineries.

(a) The market structure which reflects the market power of individual companies can explain the phenomenon. When there are only a small number of producers in a market, they have an incentive to collude and form a cartel in order to maximise their profits. In such a case, a price reduction by a producer

(during a period of decreasing prices) may be perceived by competitors as an aggressive move signalling a breach of their agreement. As a result, companies tend to keep prices rigid. In contrast, during periods of increasing prices, as a price increase cannot be misunderstood as breaching the cartel agreement, companies tend to increase their prices immediately.

(b) Search costs associated with the comparison of retail prices stem from the non-competitive structure of the market of gasoline stations. Such costs are particularly high, since prices vary on a daily basis. In addition, consumers tend to regard some stations as cheap, without verifying their belief prior to every purchase. Service stations exploit this consumer loyalty by reacting asymmetrically to changes in oil prices.

Asymmetries can arise even in competitive markets, as shown by arguments (c) to (e) below:

(c) During periods of increasing prices, consumers tend to buy more gasoline, for precautionary reasons, assuming that this upward trend will continue. However, during periods of decreasing prices, demand does not fall at the same speed, causing asymmetries on the demand side. **(d)** In turn, the suppliers' pricing practice is influenced by the future level of oil stocks. If, for instance, new natural oil reserves are discovered, suppliers will not reduce their prices immediately, because pricing depends both on stock levels and production capacity. However, if natural oil reserves are reduced, suppliers will immediately raise their prices in order to lower demand and delay supply shortages in the market. Moreover, if the fall in prices leads to high increase in demand, companies will be reluctant to reduce prices further, unless they have sufficiently high levels of stocks to meet the rise in demand. **(e)** Refineries are also constrained by production costs and production capacity in the short run, which may be another barrier to fast adjustment of gasoline prices.

Review of the literature

The asymmetric adjustment of retail fuel prices to the crude oil price changes has been analysed in a large number of papers. Studies for the UK oil market provide mixed empirical results. Bacon (1991) analyses the UK oil market and detects asymmetric adjustment of retail prices to changes in world oil prices for the period 1982-1989. Wlazlowski (2001) draws the same conclusion examining the period 1982-2001. Manning (1991) points to the lack of sufficient evidence of asymmetries for the period 1973-1988. Bermingham and O'Brien (2010) use monthly data for the period 1997-2009 in the UK and Ireland and provide evidence in favour of a symmetric adjustment process.

The literature on the US oil market is large. The studies by Shin (1994), Duffy-Deno (1996), Borenstein, Cameron and Gilbert (1997), Radchenko (2005) and Deltas (2008) provide evidence of asymmetry. In contrast, Balke *et al.* (1998) claim that there are no clear-cut results in support of asymmetric behaviour, while Backmeier and Griffin (2003) report no asymmetries. Kuper and Poghosyan (2008) analyse the period 1986-2005 using weekly observations. They show that the price adjustment of retail prices to long-term equilibrium is linear before 1999 and not linear after 1999.

Eckert's (2002) study on the Canadian oil market for the period 1989-1994 shows an asymmetric response of retail prices to world oil prices. Salas (2002) comes to the same conclusion for the oil market in the Philippines for 1999-2002. Grasso and Manera (2007) report evidence of asymmetry in a number of European countries for the period 1985-2003, particularly in Germany and France. Faber (2009) analyses the Dutch oil market using daily data for the period 2006-2008 and concludes that 38% of petrol stations react asymmetrically. Valadkhani's (2009) findings on the Australian oil market, which are based on monthly data for 1998-2009, show signs of asymmetry in four out of the country's seven largest cities.

A European Commission (2009) study reports no statistically significant evidence of asymmetry. Meyler (2009) examines a group of European countries, and the euro area as a whole, for the period 1994-2008 for which he does not detect any asymmetry. Clerides (2010) uses data of the EU Member States for 2000-2010 and finds statistically significant evidence of asymmetry in a small group of countries. A study by the ECB (2010) comes to similar conclusions for the euro area as a whole and for each country individually. Significant asymmetries are reported for France, Italy, Luxembourg, Austria and Finland.

The studies on Greece (IOBE, 2009; Angelopoulou and Gibson, 2010; and Polemis, 2011) have already been presented in the first section. Both IOBE and Polemis test for asymmetries in the Greek oil market applying the asymmetric ECM technique. However, IOBE finds no evidence of asymmetries, whereas Polemis provides evidence of asymmetries in both the short and the long run.

3 THE GREEK OIL MARKET

The importance of oil for the Greek economy

Developments in oil prices have a significant effect on economic activity and prices in advanced economies (see ECB, 2010; OECD, 2011). The economy of Greece is oil dependent and can be considered more vulnerable to world oil price shocks¹ than other European economies. The latest Eurostat figures for 2009 indicate that the economy's dependence on oil stands at 67.8%, i.e. quite higher than the EU average (EU-27: 53.9%). On average, oil consumption accounts for more than 65% of total energy consumption in Greece in the decade 2001-2010 (see Chart 1). In particular, in the crisis year 2010 it accounted for 63.7% (see Chart 2). Transport holds the highest share in oil consumption (63% on average in 2007-2012), 95% of which concerns petrol consumption (2012 data from the Hellenic Petroleum Marketing Companies Association –

Chart 1 Energy consumption in Greece (1999-2010)

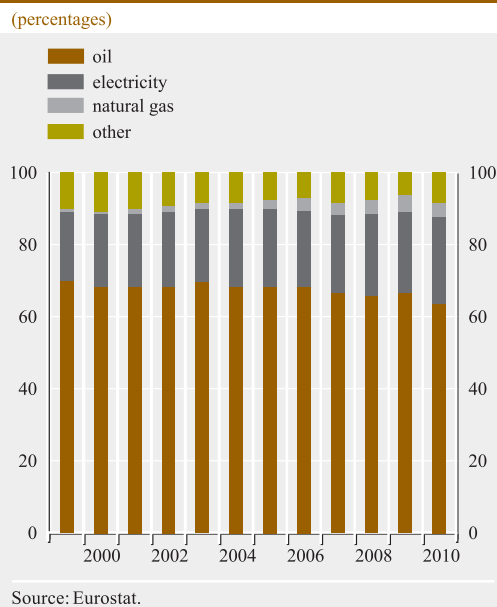
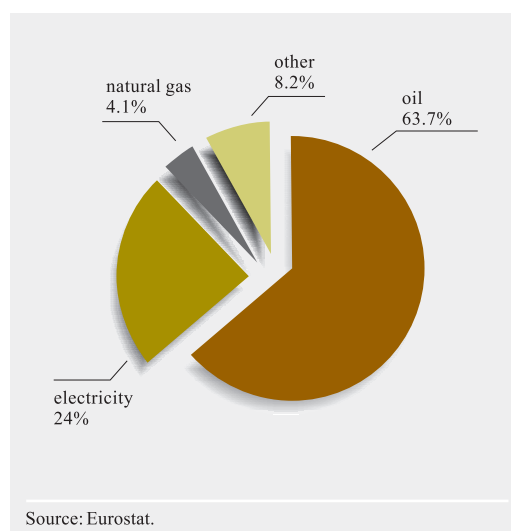


Chart 2 Breakdown of total energy consumption (2010)



SEEPE). Consequently, changes in fuel prices have a major impact on consumers' real disposable income and, for this reason, are

¹ See Papapetrou (2009) for an analysis of the impact of oil price changes on economic activity in Greece.

often the subject of public debate.² Oil is also a product which determines changes in the trade balance of Greece to a large extent.³

The structure of the Greek oil market

The Greek oil market consists of three sub-markets: (a) the refining market, in which refineries purchase crude oil and sell petroleum products to wholesale vendors; (b) the wholesale market, in which companies sell fuel to service stations; and (c) the retail market, in which service stations sell fuel to consumers.

There are two companies in the refining market, Hellenic Petroleum (ELPE) and MOTOROIL, which own all four refineries operating in Greece.⁴ ELPE, having a market share of more than 60%, clearly leads the refining market. Duopoly conditions prevail, with significant barriers to the entry of new firms in the market due to the high level of sunk costs. Market participants argue that prices are based on the Mediterranean market quotes and an additional mark-up of 3% (see press release by ELPE in *Kathimerini newspaper*, 18 September 2012). Around twenty companies are active in the wholesale market, some of which are subsidiaries of the refineries. Wholesalers may also import fuel from abroad, if prices are favourable. The market is not highly concentrated, even though the four largest companies (ELPE and MOTOROIL subsidiaries plus the multinationals BP and SHELL) have a market share of more than 50%. Although there are no formal barriers to market entry, constraints do exist due to regulations on oil stocks.⁵ However, pricing differs across regions: it is not clear how companies set their prices across the different regions in Greece. In addition, the transportation market in which transport costs are determined is not perfectly competitive (fuel is transported by public- and private-use tanker trucks). There are roughly 7,000 filling stations in Greece, of which just about 600 are independent retailers. The rest are owned by, affiliated to, or subsidiaries of the petroleum companies. This number of filling stations is high compared to other countries. In Greece

there is one station for every 1,400 inhabitants compared to one for every 3,800 in the EU (see SEEPE, 2010). However, the Greek market is geographically segmented, and competition is determined by the number of stations per geographical area. Moreover, contracts between filling station and wholesale companies may be restrictive, causing an adverse impact on retail prices.

How are prices set?

Crude oil prices are determined in the world market, where prices are driven by supply and demand conditions (reserves, extraction costs, transport costs, etc.), as well as by derivatives trading. Refineries purchase crude oil as raw material to produce fuel products, which are then sold initially to wholesale companies, then to service stations, and finally to consumers.

Therefore, retail fuel prices in the Greek market are determined by the output price at refineries, the profit margins of wholesalers and service stations, and the duties and taxes imposed by the state.⁶ Refineries set their prices according to crude oil prices, the exchange rate of the euro vis-à-vis the US dollar, and a mark-up. Crude oil prices and the exchange rate are determined exogenously to the Greek market. State duties and taxes raise the price by a specified rate, also exogenous to the Greek market.⁷ The mark-up charged by refineries and the profit margins of wholesalers and retailers depend on factors related

2 See e.g. relevant articles in the Greek daily *Kathimerini* (12 and 18 September, and 2 October 2012).

3 Oil imports represent 21.2% of total imports of goods in the period 2001-2010 and 36.27% in 2011, in nominal terms. Oil imports determine the export volume of petroleum products, which represent 17.9% of total exports of goods in 2001-2010 and 30.25% in 2011, in nominal terms (Bank of Greece data).

4 ELPE is the leading industrial and commercial group in the energy sector and MOTOROIL the largest privately held industrial complex in Greece.

5 Wholesale companies can import oil from foreign refineries, as long as they keep buffer stocks that can meet consumption for 90 days.

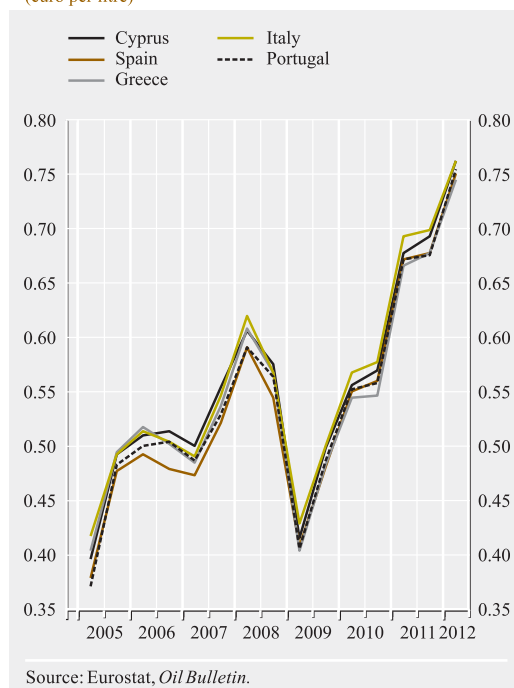
6 See IOBE (2009) for a detailed description of the fuel pricing process in the Greek economy. This study shows that the price of gasoline can be decomposed as follows: 50% is taxes, 40% is the cost of crude oil, and 10% is the gross profit rate of marketing companies and service stations.

7 It is worth pointing out that according to the applicable tax regime, VAT is calculated on the sum of the oil price and the excise duties, thereby duplicating the tax burden for consumers.



Chart 3 Unleaded gasoline prices in Southern Europe

(euro per litre)



to domestic market characteristics, such as the market structure, vertical integration, the geographical distance of regional markets from the refineries and temporary demand fluctuations.

Any pre-tax price differences between Greece and other EU economies which buy crude oil in the same market are also caused by domestic factors. Crude oil prices which apply in Greece are the MED prices quoted in the Mediterranean market of Genoa, and not the NWE prices of the North Western European market of Rotterdam.⁸ Consequently, retail fuel prices in Greece are comparable with those in Cyprus, Spain, Italy and Portugal.⁹

Chart 3 shows the evolution of gasoline prices in Southern European countries between 2005:H1 and 2012:H2. Prices at national level are roughly similar. However, it should be noted that in the period 2005-2008, i.e. before the debt crisis, Greek gasoline prices were among the highest in the European south.

From the onset of the crisis to 2012:H1, gasoline prices in Greece became the lowest in this group of countries. This evidence suggests that the mark-ups applied by refineries and the profit margins applied by wholesalers and service stations differ in the post-crisis period from the pre-crisis period. In the post-crisis period the mark-ups are lower than those of the pre-crisis period, probably as a result of lower demand.

4 ECONOMETRIC METHODOLOGY

The econometric models which are used to test asymmetries are based on the error correction model (ECM) developed by Engle and Granger (1987). The present work applies the TAR-ECM methodology, which has been shown to be the most adequate technique to identify asymmetries in adjustment of this type.

4.1 ERROR CORRECTION MODELS BY ENGLE AND GRANGER

The ECM

The EC methodology is applied to test for the existence of a long-run equilibrium between the series under consideration. In the present analysis, the variables of interest are world oil prices, R_t^b , and the retail gasoline prices paid by consumers at service (pump) stations in Greece, R_t^g . Their long-run relationship is given by:

$$r_t^g = \gamma_0 + \gamma_1 r_t^b + u_t \quad (1)$$

where r_t^g and r_t^b denote the logarithms of R_t^g and R_t^b respectively. Coefficient γ_0 represents the fixed cost which comprises all refining, marketing and distribution costs; parameter γ_1 represents the impact of oil prices on gasoline prices; u_t denotes deviations from equilibrium.

⁸ Depending on the index, prices are either f.o.b. (i.e. do not include freight) or c.i.f. (i.e. include insurance and freight costs).

⁹ However, as methodologies for measuring product price and quality differ across countries (see European Commission, *Oil Bulletin*, 2011), prices are not fully comparable; thus caution is warranted in drawing any conclusions.

The first step in the Engle and Granger (1987) methodology is to test whether the errors are stationary or not, using the standard Dickey-Fuller tests. Dickey and Fuller (1979) test the hypothesis $H_0: \rho=0$ against $\rho<0$, on an estimated equation of the form:

$$\Delta u_t = \rho u_{t-1} + v_t \quad (2)$$

where Δ denotes the first difference and ρ denotes the speed of adjustment of the errors to their mean value. In case that the errors are stationary the short-run dynamic relationship for gasoline prices can be given by:

$$\Delta r_t^g = \mu_0 + \sum_{i=1}^{k_1} \beta_{1,i} \Delta r_{t-i}^g + \sum_{i=0}^{k_2} \beta_{2,i} \Delta r_{t-i}^b + \alpha u_{t-1} + e_t \quad (3)$$

where $\alpha < 0$

where k_1, k_2 denote time lags. According to (3), short-run gasoline price changes Δr_t^g are determined by gasoline price changes in previous periods $\sum \Delta r_{t-i}^g$, crude oil price changes in previous periods $\sum \Delta r_{t-i}^b$, and the tendency of gasoline prices to return to their long-run equilibrium, as expressed by αu_{t-1} . The coefficient α takes negative values. This implies that when the variable r_t^g deviates from the long-run equilibrium relationship (1) in period $t-1$ (resulting to a non-zero error u_{t-1}), there is a tendency to return to the long-run equilibrium in period t . Essentially, when the errors u_t exceed their mean value in period $t-1$, r_t^g will tend to move downwards to reach the long-run equilibrium value in period t , whereas when errors are below their mean, r_t^g will tend to move upwards, to reach the long-run equilibrium value in period t . Equation (3) is the general form of the ECM and the term αu_{t-1} is called “error correction term”.

Engle and Granger’s ECM in its original form (3) – also known as symmetric ECM – is based on the following assumptions: (a) residuals have a zero mean; (b) residual values (either higher or lower than their mean) revert to their mean symmetrically, i.e. at the same speed ρ ; and (c) the dependent variable responds symmetrically to any deviation from

equilibrium. This implies that α , the dependent variable’s speed of adjustment to equilibrium, is the same, irrespective of whether residual values are negative (lower than their mean) or positive (higher than their mean).

The AECM

The hypothesis of the dependent variable’s symmetric adjustment to long-run equilibrium has been questioned in the economic literature. The AECM model divides errors into positive and negative (in other words, distinguishes between positive u_t^+ and negative u_t^- deviations of r_t^g from equilibrium) and estimates the following relationship:

$$\Delta r_t^g = \mu_0 + \sum_{i=1}^{k_1} \beta_{1,i} \Delta r_{t-i}^g + \sum_{i=0}^{k_2} \beta_{2,i} \Delta r_{t-i}^b + \alpha_1 u_{t-1}^- + \alpha_2 u_{t-1}^+ + e_t \quad (4)$$

where $\alpha_1 < 0$ and $\alpha_2 < 0$.

Specification (4) assumes that the adjustment speed is α_1 for negative deviations and α_2 for positive ones. A first indication of asymmetric adjustment comes up when the estimated values of α_1 and α_2 are not equal. The AECM specification allows for a statistical test for the symmetry hypothesis $H_0: \alpha_1 = \alpha_2$ (the assumption that coefficients are equal).

4.2 THRESHOLD AUTOREGRESSIVE (TAR) COINTEGRATION MODELS

The statistical validity of the AECM technique has been criticised in cases where asymmetric adjustment is detected. Balke and Fomby (1997) and Enders and Granger (1998) indicate that if the residuals’ adjustment to their mean value (the long-run equilibrium) is not symmetric, the D-F auxiliary equation (2) for cointegration tests is misspecified and could lead to misleading results. In other words, AECM-based conclusions are not unquestionable. To tackle this problem, Enders and Granger (1998) and Enders and Siklos (2001) propose the threshold autoregressive TAR-ECM technique. According to it, unit root tests also take into account the possibility that the residuals return to the long-run equilibrium

value at a different speed, depending on whether their value is higher or lower than a threshold value τ . The TAR-ECM assumes that the residuals adjust at a speed ρ_1 when their values are above the threshold value τ and at speed ρ_2 when their values are below τ . Enders and Siklos (2001) calculate the critical values for testing cointegration on these hypotheses and propose a Wald-type statistical test to determine whether the residuals' adjustment is symmetric or not.

The crucial point in the TAR methodology is to identify correctly the threshold value τ , for which the asymmetric adjustment is statistically significant.¹⁰ Enders and Siklos (2001) propose a consistent method to detect τ among all residual values resulting from the cointegration relationship.

ECM with asymmetric cointegration

When the existence of a threshold autoregressive cointegration is identified, errors can be discerned into those which take a value higher than τ and those which take a value lower than τ . In such a case, an AECM can be estimated as follows:

$$\Delta r_t^g = \mu_0 + \sum_{i=1}^{k_1} \beta_{1,i} \Delta r_{t-i}^g + \sum_{i=0}^{k_2} \beta_{2,i} \Delta r_{t-i}^b + \alpha_3 u_{t-1}^{\text{down}} + \alpha_4 u_{t-1}^{\text{up}} + e_t \quad (5)$$

where $\alpha_3 < 0$ and $\alpha_4 < 0$.

In (5), u_{t-1} deviation values are split into deviations over (u_{t-1}^{up}) and below (u_{t-1}^{down}) the threshold value τ . Thus, (5) provides the basis to test the hypothesis $\alpha_3 = \alpha_4$, which expresses the dependent variable's symmetric adjustment to equilibrium.

5 EMPIRICAL RESULTS

5.1 DATA

The study uses monthly observations covering the period January 2005-July 2012. Data on retail gasoline prices R_t^g are taken from the European Commission *Oil Bulletin*.¹¹ The

analysis focuses on the pre-tax¹² price series of the 95-octane unleaded gasoline, given that most cars in Greece use this type of fuel.¹³ The crude oil prices series, R_t^b , refers on data of Brent crude oil spot prices (considered to be the pricing benchmark in Europe) published in the US Energy Information Administration database. For comparability with retail prices, dollars per barrel are expressed in euro per litre, on the basis of a 158.987 litres/barrel rate.¹⁴ The total number of observations is 368.

5.2 STATIONARITY TESTS

The first step in the empirical work is to test the series r_t^b and r_t^g for unit roots. The D-F (Dickey-Fuller, 1979) and DF-GLS (Elliot *et al.*, 1996) tests are applied. The findings show that both series are $I(1)$.¹⁵

5.3 LONG-RUN RELATIONSHIP

The existence of a long-run relationship between the two series, of the form (1), is then examined. The results of the Engle-Granger cointegration tests (t-statistic and z-statistic) are presented in Table 1. The estimated long-run equilibrium relationship takes the form:

$$r_t^g = 0.1 + 0.7r_t^b + u_t \quad (6)$$

According to (6), the long-run oil price elasticity of domestic gasoline prices takes the value 0.7. This means that a 10% change (rise or fall) in crude oil prices causes a 7% change (increase

¹⁰ In its simplest version, the TAR model hypothesis is that $\tau = 0$. This means that positive and negative deviations from equilibrium are assumed to be corrected at different adjustment speeds. However, from a statistical point of view the $\tau = 0$ hypothesis could lead to unreliable conclusions (see Tong, 1983).

¹¹ Weekly prices of various fuel types are published in the *Oil Bulletin* since 2005. For transparency and information purposes, all EU Member States are required to report such prices both before and after tax in their respective retail markets.

¹² Indirect taxes comprise custom duties, fuel excise duties and VAT. As already mentioned, VAT is calculated on the sum of the final product price and the excise duties, thereby further increasing the final consumer price.

¹³ It represents 59% of total fuel consumption for transport in 2011 – SEEPE data.

¹⁴ Data on Brent crude oil spot prices are also available for periods before 2005, but the common period examined spans from January 2005 to July 2012.

¹⁵ The results are not presented here for space reasons, but are available on request.

Table 1 Long-run equilibrium estimation and cointegration tests

FMOLS estimation method		
Long-run equilibrium (1)		
γ_0	0.104**	(27.634)
γ_1	0.708**	(3.820)
– Adjusted R ²	0.927	
– Long-run variance	0.017	
Engle-Granger cointegration tests		
$H_0: \varrho=0$		
– Engle-Granger t-statistic	-8.565**	[0.000]
– Engle-Granger z-statistic	-122.541**	[0.000]

Notes: t-statistic values in parentheses; P-values in brackets.
 (**) denotes statistically significant at 5%.
 Critical values for cointegration tests provided by MacKinnon (1996).

or decrease, respectively) in retail gasoline prices – a finding which is in accordance with the finding in IOBE (2009) and Polemis (2011).

5.4 ERROR CORRECTION MODELS ACCORDING TO ENGLE-GRANGER

The ECM

The short-run dynamics of the price of gasoline are captured by an ECM of the form (3). Specification of the proposed model is based on the well-known “general to specific” methodology. The estimated model is presented in Table 2. The specification passes the relevant diagnostic tests. All explanatory variables are statistically significant. According to the model, changes in gasoline prices in the current period (week) are determined by (i) changes in gasoline prices one to three periods before and (ii) changes in oil prices one to two periods before, while (iii) the error correction term ensures return to the long-run equilibrium. The speed of adjustment to the long-run equilibrium takes the value $\alpha = -0.15$. This indicates that a 15% deviation of the retail gasoline price deviation from the long-run equilibrium (6) is corrected within one week, and full adjustment is completed in six weeks.

The AECM

The findings from the estimation of the AECM of the form (4) are also shown in Table 2. The short-run elasticities of the explanatory variables Δr_{t-1}^g , Δr_{t-2}^g , Δr_{t-1}^b , Δr_{t-2}^b are very close in value to those of the ECM. The coefficients α_1 and α_2 , which measure the asymmetric adjustment of r^g to long-run equilibrium, are statistically significant and are not equal to each other. Their values ($\alpha_1 = -0.14$ and $\alpha_2 = -0.19$) indicate that retail gasoline prices r^g move at a faster speed upwards when they are below their equilibrium value. However, this last finding is not supported by the Wald F-test (i.e. the symmetry hypothesis cannot be rejected). Given that the results of the AECM methodology have been shown to have low statistical power, the analysis proceeds with the estimation of the TAR-ECM model.

5.5 ASYMMETRIC THRESHOLD COINTEGRATION MODELS

The Consistent TAR-ECM (with τ threshold estimation)

The results of the TAR-ECM are presented in Table 3.¹⁶ They indicate a consistently estimated threshold value of $\tau = -0.056$. According to the results, the coefficients ϱ_1^+ and ϱ_2^- take different values ($\varrho_1^+ = -0.29$ and $\varrho_2^- = -0.50$) and turn out to be statistically significant. In addition, the $H_0: \varrho_1^+ = \varrho_2^- = 0$ hypothesis for the absence of threshold cointegration is rejected based on the Φ^* -statistic value. The results are in favour of the existence of a stable long-run relationship between world oil prices and retail gasoline prices. Moreover, the hypothesis of equal adjustment coefficients $\varrho_1^+ = \varrho_2^-$ is rejected based on the Wald test value ($F = 5.627$, $P\text{-value} = 0.018$). The coefficients reflect a faster upward adjustment of prices when they are below their long-run

¹⁶ A more comprehensive analysis used a TAR model with a predefined threshold $\tau = 0$ in parallel with the model with a consistent TAR. Under the statistical information criteria (AIC and SBC), the findings of the consistent TAR model (presented here) are more robust. The findings of the TAR model with $\tau = 0$ (not shown in this study) can be found in Bragoudakis (2012).

Table 2 Symmetric and asymmetric error correction models

		Symmetric ECM		Asymmetric ECM	
Constant	μ_0	0.001 (0.377)	[0.706]	-0.001 (-0.362)	[0.716]
$\Delta(r^s)_{t-1}$	$\beta_{1,1}$	0.212** (2.997)	[0.002]	0.213** (2.998)	[0.002]
$\Delta(r^s)_{t-3}$	$\beta_{1,3}$	0.115** (2.249)	[0.025]	0.117** (2.244)	[0.025]
$\Delta(r^b)_{t-1}$	$\beta_{2,1}$	0.180** (4.409)	[0.000]	0.177** (4.316)	[0.000]
$\Delta(r^b)_{t-2}$	$\beta_{2,2}$	0.147** (4.447)	[0.000]	0.145** (4.440)	[0.000]
u_{t-1}	a	-0.159** (-4.285)	[0.000]		
u_{t-1}^+	a_2			-0.140** (-2.780)	[0.005]
u_{t-1}^-	a_1			-0.193** (-3.379)	[0.000]
Adjusted R ²		0.487		0.487	
SSR		0.139		0.139	
DW		2.069		2.072	
F-statistic		70.310		58.605	
Wald F-statistic	$H_0: a_1 = a_2$			0.441	[0.506]

Notes: t-statistic values in parentheses; P-values in brackets.

(**) denotes statistically significant at 5%.

Optimal number of lags based on the AIC (1973) and SBC (1978) information criteria.

Table 3 Enders-Siklos TAR cointegration tests

		Enders-Siklos, t-MAX		P-value
	ϱ_1^+		-0.292 ** (-6.878)	[0.000]
	ϱ_2^-		-0.500 ** (-6.310)	[0.000]
		AIC	-3.685	
		SBC	-3.664	
		RSS	0.533	
Threshold cointegration test	$H_0: \varrho_1^+ = \varrho_2^- = 0$	Enders-Siklos Φ^*	40.944 **	[0.000]
Symmetry test	$H_0: \varrho_1^+ = \varrho_2^-$	F	5.627 **	[0.018]

Notes: t-statistic values in parentheses; P-values in brackets.

(**) denotes statistically significant at 5%.

Optimal number of lags based on the AIC (1973) and SBC (1978) information criteria.

Critical values for the threshold cointegration test provided by Enders and Siklos (2001) and Wane et al. (2004).

For the symmetry test the numbers of standard distribution of the F test are used on condition of the existence of TAR cointegration.

equilibrium value compared to their adjustment when they are above their equilibrium value.

The TAR model indicates that when the system deviations from the long-run equilibrium

(the long-run relationship) take values higher than the threshold τ , adjustment to equilibrium takes place slowly (at a speed of $\varrho_1^+ = -0.29$), whereas when the deviations take values lower than τ , adjustment to equilibrium is fast (at speed $\varrho_2^- = -0.50$).

Table 4 Asymmetric ECM with consistent TAR cointegration

ECM with TAR				
Constant	μ_0	-0.001	(-0.386)	[0.699]
$\Delta(r^g)_{t-1}$	$\beta_{1,1}$	0.221**	(5.085)	[0.000]
$\Delta(r^g)_{t-3}$	$\beta_{1,3}$	0.115**	(2.923)	[0.003]
$\Delta(r^b)_{t-1}$	$\beta_{2,1}$	0.175**	(6.285)	[0.000]
$\Delta(r^b)_{t-2}$	$\beta_{2,2}$	0.145**	(5.247)	[0.000]
u_{t-1}^{up}	α_4	-0.138**	(-5.011)	[0.000]
u_{t-1}^{down}	α_3	-0.247**	(-5.018)	[0.000]
Adjusted R ²		0.487		
SSR		0.139		
DW		2.072		
F-statistic		58.605		
Wald test for symmetry F-stat.	$H_0: \alpha_{up} = \alpha_{down}$	4.369**		[0.0373]

Notes: t-statistic values in parentheses; P-values in brackets.

(**) denotes statistically significant at 5%.

Optimal number of lags based on the AIC (1973) and SBC (1978) information criteria.

The null hypothesis test for symmetry uses the F standard distribution values.

The existence of asymmetric cointegration allows an asymmetric TAR-ECM of the form (5) to be estimated. The results are presented in Table 4. According to the results, changes in gasoline prices in the current period (week) are determined by: (a) gasoline price changes with three time lags; (b) oil prices changes with three time lags; and (c) the long-run equilibrium. The error correction terms are statistically significant, with different adjustment speeds, $\alpha_3 = -0.24$ and $\alpha_4 = -0.13$. The symmetry hypothesis cannot be accepted according to the relevant Wald test statistic. The null hypothesis on the equality of adjustment coefficients is rejected at a 5% level of significance ($F = 4.369$, $P\text{-value} = 0.037$). Thus, the results provide strong evidence of asymmetric adjustment of domestic prices to world crude oil prices.

6 CONCLUSIONS

Efficient pricing in the Greek market of gasoline is often the subject of public debate in Greece. The present paper tests for asymmetries in the domestic gasoline price adjustments to crude oil price changes for the period Jan-

uary 2005-July 2012. To this end: (1) the TAR cointegration methodology is applied and (2) all available and most recent data (which include data from the recent crisis period) are used. The long data sample and the fact it covers also the crisis period, ensure the reliability of the results in terms of economic significance and statistical inference.

The empirical analysis provides evidence that the adjustment of gasoline prices to oil price changes is asymmetric, in contrast to findings of previous studies which have applied other, less robust econometric techniques. Asymmetric adjustment implies a strategy, according to which market participants delay lowering the retail gasoline prices when crude oil prices fall, but rush to increase them when crude oil prices rise, in an effort to maximise profits. Such a strategy may be the result of non-competitive conditions in the structure of the fuel market in Greece.

Given that in Greece the gasoline market is segmented into a refining market, a wholesale market and a retail market, the cause of asymmetric adjustment probably lies in the struc-

ture and institutional framework of these three markets. Close monitoring of pricing at a microeconomic level (at the various marketing

stages) would be a first step towards identifying the sources of the problem and would lead to the relevant policy suggestions.

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THE SIZE AND STRUCTURE OF UNINSURED EMPLOYMENT

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I INTRODUCTION

The importance of the problem regarding uninsured (or undeclared) labour depends on the size and the dynamics of the phenomenon. High rates of uninsured, and hence unprotected labour, aside from entailing revenue losses for insurance funds and an unequal footing for enterprises in terms of competition, also constitute a major obstacle when it comes to planning and implementing an effective economic and social policy, given that certain key economic indicators used in such policy-making do not properly reflect reality, but instead draw a misleading picture. Presumably, the priorities and the measures required at various agencies in case of widespread and increasing uninsured labour are quite different from those needed when undeclared labour represents only a small and hardly controllable part of total employment. Moreover, high rates of uninsured labour may be sending out the perilous message that the country is corrupt, with extensive labour and insurance legislation transgressions, without any sanctions and with the society's tolerance. Therefore, systematic efforts are constantly needed, aimed not only at combatting uninsured labour, but also at its reliable and regular measurement and profiling, mainly by specialised independent and impartial research institutions that can safeguard their members' professional status regardless of their studies' findings. This last point must be the responsibility of the State, which should also define the necessary terms of reference of the studies, so as to ensure results as accurate and reliable as possible. Because, if the official policy implemented in order to fight undeclared labour is based on deliberate or mistaken estimations that have little to do with reality, the measures applied may end up being even more harmful than undeclared labour itself.

To plan an effective employment policy, apart from the overall size of uninsured labour, its

characteristics or its profile are also important. One type of policy is needed when undeclared labour is limited among unskilled workers active in the informal economy and in search of some (insured) job within the formal labour market; a different one when social security contribution-evasion is concentrated mainly on persons self-employed in the urban sector; and a third one when uninsured labour involves circumventions of the applicable tax and insurance legislation as a result of a rationalised choice of the parties involved. In this context, the international literature places more emphasis on the profile and the determinants of uninsured employment and the ensuing social security contribution-evasion. Thus, many theoretical approaches to uninsured labour have been put forward, extending from the view that the phenomenon is due to labour market dualism, with the uninsured being trapped in poorly-paid informal jobs and having very scarce opportunities to find well-paid insured employment (Fields, 2005), to the idea that uninsured labour constitutes the best possible choice for those active in it, given the labour market's employment opportunities and the limitations of the institutional framework in force (Maloney, 1999). Furthermore, other causes of uninsured labour proposed include the greater independence and flexibility it offers compared with dependent insured labour, as well as the social security contribution- and tax-evasion typically linked to it, which have a major effect upon net income (Lemieux *et al.*, 1994; Kanellopoulos, 2002).

Indicatively, several international organisations (International Labour Office, 2006; OECD, 2008), as well as the European Union (European Commission, 2007), consider the fight against undeclared employment a neces-

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sary precondition for a successful implementation of economic and social policy. In connection with this it is noted that, for those employed in it, uninsured labour discourages participation in training and skill development programmes, negatively affects working conditions and productivity, and as a rule entails meagre access to healthcare, unemployment and pension benefits. In parallel, the evasion of social insurance contributions (as well as taxes), in full or in part, reduces public revenue and leads to higher contributions asked from those already insured. This situation often evolves into a vicious circle of substandard services provided by the State and increased contributions paid by non-evaders – which encourages social insurance contribution-evasion even further. And when it comes to the main objective of any government policy against undeclared labour, the literature commonly recommends the inclusion of those employed in it into the insured labour market, so as to eliminate its multifaceted side-effects.

The present study starts with a presentation and assessment of the estimates regarding the size of uninsured labour in Greece, based on the operations of the Hellenic Labour Inspectorate (SEPE), as they frequently appear in the Greek press and are sometimes given credit even by officials responsible for employment issues (Section 2). These estimates, which put uninsured labour at levels as high as 30% of employment, translate into employment figures that can immediately be rejected as unrealistic. The argument that in recent years one in every three employed persons is uninsured, or, in other words, that more than a million uninsured people are employed in the country, can hardly be substantiated. Subsequently, the study attempts to estimate the size and structure of uninsured labour, using the method of comparison between the levels of the same aggregate variable (in this case employment) as derived from different unrelated sources of statistical data (Sections 3 and 4). It then attempts to map out the possible forms of uninsured labour, as well as to distinguish it from the authorities' failure to collect levied

social insurance contributions (Section 5). Finally, it sums up by drawing a number of conclusions and suggesting some policy guidelines for controlling uninsured labour (Section 6). It is believed that the results of the study can be useful in planning an effective policy against uninsured labour and rationally defining government policy priorities in related areas.

2 UNINSURED LABOUR ESTIMATES BASED ON THE SEPE OPERATIONS

In the absence of a universally accepted definition, uninsured (or undeclared) labour can be defined in principle as the number of people employed in legal economic activities but nevertheless not covered by the compulsory social insurance scheme, whereby no social insurance contributions are paid on their behalf and thus they have no access to its benefits (OECD, 2008; Perry *et al.*, 2007). In effect, it refers to employed persons unknown to the country's social insurance and inspection services – Social Insurance Institute (IKA), Manpower Employment Organisation (OAED), Hellenic Labour Inspectorate (SEPE) – typically deprived of labour law protection, and most likely the victims of exploitation, if not forced labour.

Some initial estimates regarding the number of uninsured workers can be derived from the results of the operations carried out by the competent state authority, SEPE, an evolution of the former labour inspection service and, according to the law, responsible for “investigating the workers' insurance coverage”. More specifically, in the context of intensified efforts to crack down on uninsured employment, since February 2010 regular on-site inspections have been carried out by mixed inspection teams formed by specialised members of the personnel of SEPE and the Special Insurance Inspection Service (EYPEA) of IKA, the results of which can lead to estimates of uninsured employment in Greece.

An overview of the operations carried out by these mixed inspection teams is published in

the Annual Reports of SEPE. The Annual Report for 2010 states that mixed SEPE and IKA (EYPEA) inspection teams have been carrying out regular inspections in search of instances of undeclared labour since February 2010. The relevant results are summarised for each month in Table 1. In 2010, these mixed inspection teams visited more than 27,500 enterprises, or else performed around 2,500 inspections per month. The enterprises inspected were found to employ 77,700 workers, 21,200 of whom were foreigners. A total of roughly 19,400 workers were not registered in the Special Book of Newly Hired Employees – i.e. were uninsured – with almost 6,700 of them being foreigners.

On the basis of these absolute figures, the SEPE Annual Report states verbatim that uninsured foreigners “*represent 31.54% of the total number of foreign workers*”. It also states that “*Greek nationals working uninsured correspond to 22.58% of all Greek nationals employed*”. Although the above report clarifies that these percentages refer only to “*the enterprises inspected*”, extensive use in the printed and electronic press has resulted in a false impression that they refer to all enterprises in Greece, and thus, by synecdoche, that one in every three workers in the country is uninsured. Similar, albeit undocumented arguments are supported by trade unionists of the Panhellenic Federation of Social Policy Organisations’ Staff Members (POPOKP), as well as by some services of IKA. In fact, it is said that with total employment before the current economic crisis neighbouring on 4.5 million people, uninsured workers must have been more than a million; therefore, if only half of these contribution-evaders were to be caught, IKA would be able to cover its long-standing deficits, and in general the social insurance problem would cease to exist. From a different perspective, other researchers have deemed that invoking a crackdown on contribution-evasion as a solution to the social insurance problem is just dodging the issue (Committee for the Examination of Long-Term Economic Policy, 1997). In any case, the above generous

calculations – aside from being a clear admission of failure by social partners (trade unions and employers) and the State as regards planning and implementing an effective social insurance policy – also lead to the odd conclusion that an aged country such as Greece, with its 4,552,000 workers insured for a main pension (according to the 2009 Social Budget) and its 1,000,000 “estimated” uninsured workers, has already achieved an amazing employment rate: 77% of the entire population of its productive age groups (according to the data of the country’s statistical authority), i.e. the highest employment rate among all EU countries and well above the Lisbon Treaty target of 70%.

The figures derived from the SEPE inspections, when carefully interpreted, draw a completely different picture. What they merely show is that the newly reorganised public services entrusted with tackling uninsured labour have identified on average 1,767 uninsured workers each month of 2010. As for the first half of 2011, the average number of uninsured persons identified each month by the same mixed inspection teams fell to 1,501. However, as inspections progressively declined more, each inspection revealed roughly one uninsured worker (see Table 2). Based on this experience, and given the fact that competent authorities had intensified inspections in the period examined, it is rather unlikely to see in the near future impressively higher numbers of uninsured workers identified by the country’s inspection authorities.

As stated in the SEPE Annual Reports, these on-site inspections in search of uninsured employment *are* justifiably *not random*, but specifically targeted either there where social inspectorate officials and the social partners’ representatives have reason to believe it is more likely to discover uninsured workers, or there where workers or trade unions have filed complaints about uninsured labour already taking place. Indicatively, the SEPE reports list the sectors thought to present high rates of uninsured labour: night clubs, bars and coffee-

Table I Number and results of SEPE/EYPEA inspections (2010)

Month	Number of enterprises inspected	Foreign workers	Greek national workers	Total workers	Registered insured workers			Not registered in the Book of Newly Hired		
					Foreigners	Greek nationals	Total insured workers	Foreigners	Greek nationals	Total uninsured workers
January	-									
February	2,805	1,869	5,860	7,729	1,174	4,445	5,619	695	1,415	2,110
March	3,320	1,632	6,219	7,851	998	4,705	5,703	634	1,514	2,148
April	2,759	1,872	5,757	7,629	1,178	4,359	5,537	694	1,398	2,092
May	2,573	2,136	6,045	8,181	1,335	4,850	6,185	801	1,195	1,996
June	2,822	2,585	6,200	8,785	1,943	4,863	6,806	642	1,337	1,979
July	2,951	3,104	6,046	9,150	2,231	4,685	6,916	873	1,361	2,234
August	2,409	2,555	5,083	7,638	1,916	3,866	5,782	639	1,217	1,856
September	2,934	2,704	5,881	8,585	1,966	4,578	6,544	738	1,303	2,041
October	2,505	1,235	4,090	5,325	791	3,090	3,881	444	1,000	1,444
November	624	446	1,452	1,898	276	1,244	1,520	170	208	378
December	1,836	1,061	3,834	4,895	704	3,034	3,738	357	800	1,157
Total	27,538	21,199	56,467	77,666	14,512	43,719	58,231	6,687	12,748	19,435
Average	2,503	1,927	5,133	7,061	1,319	3,974	5,294	608	1,159	1,767

Source: SEPE Annual Report for 2010.

shops, cleaning services, construction, catering services, accommodation, and security services. This list shows that inspections are carried out throughout the day. In this respect any generalisations regarding the entire population based only on the sample examined constitute a methodological error. Reliable estimates of the volume of uninsured labour based on administrative inspection data would initially require the selection of a random and preferably rotating sample of enterprises, on which to carry out in regular intervals thorough inspections as regards their degree of compliance with insurance legislation. The information gained by such a research effort would provide a credible estimate of the size and the extent of uninsured labour, proving to be quite useful for a more effective planning of uninsured employment detection operations. It would nevertheless entail higher costs in terms of both time and money, given that random inspections on the one hand need to be more thorough while on the other hand would prob-

ably identify fewer uninsured workers per inspection compared to today's targeted visits. This is why the latter are preferred worldwide, as the objective of such inspections is not so much to statistically estimate uninsured labour, but principally to combat and limit it. As a consequence, the targeted inspections carried out by SEPE can offer no reliable measurement of uninsured labour.

Another estimate of uninsured employment stems from the operations of SEPE, given that whenever inspections locate uninsured workers, SEPE inspectors are required to officially notify the competent services of IKA, in order for the latter to take proper action. This results in an alternative estimation of uninsured labour in Greece, via the number of cases of uninsured workers notified to IKA by SEPE, as presented in the latter's Annual Reports of recent years. During the inspections carried out in 2010, the Regional Services of the Social Labour Inspectorate of SEPE identified 1,804

Table 2 Number and results of SEPE/EYPEA inspections (2011)

Month	Number of enterprises inspected	Foreign workers	Greek national workers	Total of workers	Registered insured workers			Not registered in the Book of Newly Hired		
					Foreigners	Greek nationals	Total of insured workers	Foreigners	Greek nationals	Total of uninsured workers
January	1,791	1,326	3,943	5,269	967	3,087	4,054	359	856	1,215
February	1,331	1,613	3,425	5,038	957	2,455	3,412	656	970	1,626
March	1,377	1,551	3,132	4,683	896	2,433	3,329	655	699	1,354
April	1,096	1,220	2,588	3,808	615	1,859	2,474	605	729	1,334
May	1,490	1,662	3,890	5,552	1043	2,905	3,948	619	985	1,604
June	1,373	2,084	3,668	5,752	1,218	2,659	3,877	866	1,009	1,875
Average	1,410	1,576	3,441	5,017	949	2,566	3,516	627	875	1,501

Source: SEPE Press Release.

cases of uninsured workers, of which they notified IKA with a view to the imposition of relevant sanctions. In effect, given that the SEPE inspections in 2010 came close to 31,000 and the inspected workers (according to the same source) were around 260,800, SEPE estimates the rate of the uninsured at 0.69% of the inspected employment. In 2009, with 2,029 cases of notified uninsured workers, around 28,000 inspections and 348,700 inspected workers, the respective rate of the uninsured was 0.58% (SEPE Annual Report for 2009). As for 2008 and 2007, SEPE had notified IKA of respectively 2,127 and 1,875 cases of uninsured workers.

It must be noted that neither the inspections carried out by SEPE in the context of its own independent operations for monitoring compliance with labour law – which also includes combatting uninsured labour – are random. They are equally targeted, thus again making any generalisation of the above rates to total employment unsafe. In parallel, it should be stressed that the extremely low relevant rates, which would imply that the phenomenon of uninsured labour is practically insignificant in Greece, have to be seen merely as a typical by-product of SEPE operations, which aim at labour law enforcement in general and thus mainly focus on the payment of due wages,

potential cases of unwarranted layoffs, or the proper granting of paid leaves.

At the same time, it can hardly be convincingly argued that the above low performances by SEPE and IKA as regards identifying uninsured workers are due to a shortage of human resources available. According to the SEPE Annual Reports, its staff members who worked as Labour Relations Inspectors in 2011 were 360, i.e. slightly fewer than in previous years (376 in 2010 and 392 in 2009). However, already in agreement with the troika, the number of labour relations inspectors currently amounts to 535 (International Labour Office, 2011), which translates into one labour inspector for roughly 6,000 workers in the private sector, a ratio much higher than the minimum recommended by the International Labour Office (at least one labour inspector for every 10,000 workers in advanced economies and one for 20,000 in transition economies).

It is reasonable to expect that a high share of uninsured labour would involve foreign workers, many of whom come from third countries and, in lack of a residence permit, are considered illegal. In the case of foreigners legally residing in the country (having arrived from EU countries or from third countries but with a residence permit) and yet employed as uninsured

workers, SEPE imposes fines on their employers and dispatches a relevant notification to IKA for further action; whereas for illegal immigrants from third countries who work while uninsured, SEPE now levies a fine on their employers and at the same time notifies the competent regional authority for any other actions possibly required (deportation procedures). The SEPE Annual Reports of recent years show that during its own independent inspections SEPE annually identifies a few dozen cases of illegal employment of foreigners — a number which in fact tends to decrease over time — and imposes fines on the employers or files law suits (see Table 3). The authors of the Annual Reports, recognising that these figures have little to do with reality, monotonously reiterate in their commentary that: *“The number of transgressions detected is not directly associated with the size of the problem. To a certain extent, this fact is attributable to the large number of inspections carried out in enterprises active in sectors (such as retail trade, land transport, etc.) that do not exhibit high rates of illegal employment of foreign workers. Moreover, it must be noted that the identification of illegal employment of foreigners is a highly demanding task in terms of the documentation required for SEPE services to proceed to the imposition of sanctions”*. More reliable seem to be the data derived from the inspections carried out by the mixed SEPE and EYPEA teams since February 2010, showing that foreign uninsured workers amount to approximately 35-40% of all uninsured workers identified, which demonstrates — as expected — that the frequency of uninsured labour is clearly higher among foreigners than among Greek nationals. Nevertheless, as mentioned above, the estimate that almost one in every three foreign workers is uninsured is rather exaggerated.

In brief, it can be argued that the persistently small numbers of uninsured workers detected during the SEPE/EYPEA inspections for uninsured labour indicate that no vast armies of uninsured workers totally unknown to the competent state authorities exist; otherwise the inspection services would normally have dis-

Table 3 Sanctions on employers due to illegal employment of foreign workers

Year	Law suits filed	Fines levied
2002	14	21
2003	17	42
2004	16	99
2005	26	76
2006	8	17
2007	13	10
2008	16	0
2009	3	0
2010	4	17

Source: SEPE Annual Reports.

covered much higher numbers of undeclared workers. As for the intensified activities of the uninsured labour control services, they are not expected to bear in the future much more fruit than they have in recent years. Thus, the next step now would be to examine how many might the country's totally uninsured workers actually be, using a different method and information source.

3 UNINSURED EMPLOYMENT BASED ON LFS AND IKA DATA

The Labour Force Survey (LFS) carried out on a regular basis by the Hellenic Statistical Authority (ELSTAT) includes considerable information on the workers' insurance coverage. In more detail, each employed person is asked *“To which main insurance fund do you belong?”* and can opt for one of the following answers: (i) *one of the major insurance funds* (IKA, Farmers' Insurance Organisation (OGA), Civil Servants' Pension Scheme, Insurance Organisation for the Self-Employed (OAEE)); (ii) *some other insurance fund*; (iii) *none (uninsured)*; and finally (iv) *N/A*. The phrasing of the question does not invite the persons asked to specify whether on the day or in the week of the interview they are employed

as insured workers or not, but only to generally categorise the insurance organisation they belong to. In that sense, this question cannot be considered particularly personal or intrusive, i.e. one that could lead to inaccurate responses. Therefore, we believe that the LFS – alongside its reliable and commonly accepted estimates of employment and unemployment – provides equally reliable and self-inclusive estimates regarding the number of workers directly insured by each main insurance fund. There seems to be no serious reason for respondents to systematically answer this question untruthfully. One could nevertheless assume that some uninsured workers may state that they are insured, in order not to appear lagging, although in fact they are not registered with any insurance fund. To the extent that this may be true, being based on the respondents' statements the LFS would thus be overestimating the number of the insured and correspondingly underestimating the number of the uninsured. Overall however, its sum of insured and uninsured workers represents a reliable estimate of total employment. Although the LFS is a sample survey, one cannot validly question it to the point of arguing that total employment may be substantially higher than the one estimated in it. Already, the first indications from the country's 2011 Population Census point to a Greek population clearly smaller (by around 5%) than the one appearing in the LFS. Therefore, any deviation of total employment as per the LFS from actual figures would probably be upward (an overestimate) and not downward (an underestimate). These LFS features mean that an underestimated number of those who have no insurance according to their statement in the LFS would entail an overestimated number of insured workers and not an increasing rate of uninsured employment, since the sum of the two cannot be considered underestimated. The same can be supported with respect to those insured by the major insurance funds, and particularly IKA that interests us here.

Given these LFS features, the idea is to subsequently look at how many more are those

insured by IKA according to the LFS, relative to the number provided by the IKA services, which obviously record the precise number of workers actually insured by it. The excess number of IKA-insured workers, as derived from the LFS compared with the respective number given by IKA itself, can validly be considered to reflect the number of workers undeclared to IKA. If in a given labour market IKA has in its books 100 insured workers whereas some other unrelated source (in this case the LFS) estimates their number at 120, it is obvious that these 20 extra workers are undeclared to IKA. Thus, a first estimate of the number of those undeclared to (or uninsured by) IKA is this excess number, which simultaneously indicates how many more workers could IKA reasonably expect to count as potential future insured contributors. Table 4 shows the relevant estimate. Its first column presents on a quarterly basis (three-month average) the workers insured by IKA, as derived from the monthly Employment Bulletins published. The second column shows the number of IKA-insured workers in the respective quarters, as derived from the waves of the LFS carried out by ELSTAT. A first observation would be that the two columns are not only impressively similar, but also follow comparable seasonal paths and trends over time. The recent economic crisis has considerably reduced both variables, while both data sources also record lower employment in the first quarter of each year examined. These features support that the LFS data can be reliably used for further comparisons with those recorded by IKA. The second observation would be that the number of IKA-insured workers according to the LFS systematically exceeds the one observed in the administrative data of IKA. In 20 out of the 24 quarters examined, the LFS estimates those registered with IKA at a number higher than the one actually recorded by IKA itself, whereas in the remaining 4 quarters the higher number recorded by IKA is insignificant. In accordance with all the above, the positive differential of LFS data over IKA records, presented in column 3, can be used as a proxy of the number of workers who should have been included in the IKA books but are not, i.e. the workers unin-

Table 4 Rates of uninsured employment

	IKA-insured workers (thou- sands)	IKA-insured workers as per the LFS (thou- sands)	Excess of employment as per the LFS (thousands)	Percentage of the excess of employment as per the LFS	Uninsured workers as per the LFS (thou- sands)	Total of unin- sured workers (thousands)	Percentage of uninsured workers
Quarter	(1)	(2)	(3) = (2)-(1)	(4) = (3)/(1)	(5)	(6) = (3) + (5)	(7) = (6)/(1)*100
2006 Q1	1,814.7	1,919.6	104.9	5.8	138.6	243.5	13.4
Q2	1,918.5	1,936.7	18.1	0.9	143.3	161.4	8.4
Q3	1,965.5	1,963.6			144.7	144.7	7.4
Q4	1,951.7	1,946.1			148.9	148.9	7.6
2007 Q1	1,896.8	1,945.3	48.5	2.6	156.2	204.6	10.8
Q2	1,995.1	1,978.8			153.4	153.4	7.7
Q3	1,984.1	2,014.4	30.3	1.5	162.5	192.8	9.7
Q4	1,970.9	2,009.2	38.2	1.9	166.1	204.3	10.4
2008 Q1	1,903.5	1,996.8	93.3	4.9	166.1	259.3	13.6
Q2	2,039.4	2,036.7			170.5	170.5	8.4
Q3	1,987.6	2,032.7	45.1	2.3	167.1	212.3	10.7
Q4	1,977.5	2,018.6	41.1	2.1	174.0	215.2	10.9
2009 Q1	1,865.6	1,966.1	100.5	5.4	174.8	275.3	14.8
Q2	1,952.8	1,991.8	39.0	2.0	178.5	217.5	11.1
Q3	1,954.5	1,990.0	35.5	1.8	181.3	216.9	11.1
Q4	1,907.4	1,933.7	26.3	1.4	183.3	209.6	11.0
2010 Q1	1,817.3	1,890.2	72.9	4.0	176.6	249.5	13.7
Q2	1,874.3	1,923.1	48.9	2.6	175.6	224.5	12.0
Q3	1,839.5	1,911.7	72.2	3.9	180.9	253.1	13.8
Q4	1,792.7	1,832.4	39.7	2.2	172.4	212.1	11.8
2011 Q1	1,648.6	1,758.1	109.5	6.6	160.5	270.0	16.4
Q2	1,736.5	1,753.1	16.6	1.0	157.8	174.4	10.0
Q3	1,666.3	1,740.6	74.3	4.5	143.6	217.9	13.1
Q4	1,628.8	1,647.1	18.3	1.1	129.4	147.6	9.1
Average	1,878.7	1,961.9	53.7	2.9	165.7	219.4	11.7

Sources: IKA (column 1) and LFS (columns 2 and 5).

sured by IKA (expressed in column 4 as a percentage of the IKA-insured workers). Both the absolute figures (53,700 on average) and the percentages (2.9% on average) stand at rather low levels, indicating that IKA has very limited opportunities to include many new insured workers in its books as a result of a crackdown on uninsured employment.

Yet, IKA is the general social insurance organisation that covers all those working under

dependent labour contracts, except those still explicitly insured by other insurance funds. In that sense, calculations of the potential future IKA-insured contributors must also take into account — in addition to the excess of employment as per the LFS over the corresponding number of workers as per IKA — all those stating “uninsured” in the LFS, excluding only any uninsured employees working in the agricultural sector who should perhaps be insured by OGA. With this in mind, to arrive at a more

accurate estimation of those uninsured by IKA, the next columns of Table 4 also include those who stated having no insurance in the LFS. Although the numbers of the uninsured thus clearly rise, reaching on average 219,400 workers, or else 11.7% of the IKA-insured employment, they still negate the possibility of widespread undeclared labour. Undeclared labour, in the sense of workers employed but not registered with any insurance organisation (and in particular IKA), appears to be anything but extensive, with its average rate – probably for the entire period examined, albeit considerably increasing in recent years – merely rising to double digits. It should however be pointed out that 2011, along with a dramatic drop in employment rates, has also seen a reduction of those stating to be uninsured workers.

This evidently leads to the question of profiling those who stated having no insurance in the LFS. Categories with relatively high shares in the uninsured in 2010 include foreigners (almost 38%), young people aged up to 29 years (34%), assistants in the family business (20.4%), children of the household head (28.8%), as well as part-time workers (31%). These attributes imply that, for some, uninsured labour may be the result of a choice made based on a cost/benefit analysis; either because they consider insurance to be totally unnecessary, or because they can expect no additional benefit from direct insurance, as in the case of insured workers' spouses or young children, who are not directly insured but entitled to the typical social insurance benefits indirectly, through the insured head of the family business. On the other hand, there seem to be workers engaged in activities that marginally allow them to make ends meet (such as open-air market or itinerant merchants, salesmen or artists) for whom paying IKA's or even OAEE's high insurance contributions is practically impossible, or at least unaffordable, if they are to continue their current occupation, and thus are forced to work uninsured.

A valid criticism to these calculations would be the one concerning the tacit assumption that

the LFS fully records all foreigners from third countries who work in Greece without a residence and/or work permit, i.e. illegally. Although according to its specifications the LFS covers all household members that fall within its sample (regardless of whether they legally stay in the country or not), it is unlikely that illegal foreigners are indeed reliably represented in it. To the contrary, it would appear that the real number of illegal foreigners is much higher than the one derived from the LFS data: indicatively, the successive legalisation programmes recently held have attracted several hundred thousand illegal foreigners seeking legalisation (their lowest number, recorded during the latest programme in 2006, was nearly 200,000). Therefore, in calculating total uninsured employment, to those discussed above one must also add all illegal foreign workers unrecorded in the LFS. Their exact numbers unfortunately remain unknowable, although the country's economic crisis in recent years must have substantially reduced their ranks, while persistent evidence suggests that many of them see Greece not as a destination country, in which to find employment, but as a mid-way transit stop on their way to Western Europe. Earlier systematic studies of the volume of illegal immigrants in Greece, using alternative methodological approaches, estimate it at around 200,000 to 250,000 in the mid-2000s (Kanellopoulos, Gregou and Petralias, 2009; Lianos *et al.*, 2009; Zografakis, Kontis and Mitrakos, 2010). Assuming that this number holds equally today, and that their employment rate stands at roughly 60% of all illegal immigrants in Greece, then total uninsured employment in the country may be as high as 18% of IKA-insured employment, or approximately 9% of total employment.

4 SECTORAL BREAKDOWN OF UNINSURED EMPLOYMENT

It is interesting to look at how the uninsured workers calculated above are distributed across the various economic activity sectors. The data published by IKA regarding its insured work-

Table 5 Sectoral breakdown of estimated uninsured employment (2006)

Sector	IKA-insured workers (thousands)	IKA-insured workers as per the LFS (thousands)	Uninsured workers as per the LFS (thousands)	Total of uninsured workers (thousands)	Percentage of uninsured workers
Agriculture, livestock breeding, hunting	7.0	21.0	16.9	20.3	289.7
Fishing	2.4	2.7	0.4	0.5	18.8
Mining and quarrying	7.9	10.4	0.0	0.6	7.5
Manufacturing	357.6	385.4	14.8	21.5	6.0
Electricity, gas and water supply	15.6	10.1	0.1	0.1	0.4
Construction	253.6	285.4	11.3	19.0	7.5
Wholesale and retail trade	411.3	409.9	24.6	24.6	6.0
Hotels and restaurants	164.3	130.4	20.8	20.8	12.7
Transport, storage and communications	131.6	133.6	4.0	4.5	3.4
Financial intermediation	56.0	48.2	1.2	1.2	2.2
Real estate management	132.2	136.0	7.4	8.4	6.3
Public administration and defence	65.1	75.4	0.8	3.3	5.1
Education	91.5	96.1	9.3	10.4	11.4
Human health and social work activities	77.8	70.4	1.1	1.1	1.4
Other activities	103.4	82.9	7.8	7.8	7.5
Private households	21.4	43.0	23.4	28.7	134.2
Extra-territorial organisations	1.4	0.7	0.0	0.0	0.0
Unknown	12.5			0.0	0.0
Total	1,912.6	1,941.5	143.9	172.7	9.0

Sources: IKA and LFS.

ers broken down by (one-digit) sector of economic activity facilitates this endeavour, allowing a comparison with the number of the uninsured as estimated in the LFS. However, owing to the small number of workers in certain sectors and the significant sample errors this entails for the LFS, the relevant attempt is limited to annual estimates derived from the averages of the available data, taking into account the sectoral breakdown of uninsured employment as recorded in the LFS. Table 5 shows the average number of IKA-insured workers by economic activity sector for 2006, as published in the monthly Bulletins of IKA, as well as a corresponding estimate of their number for the same year, as derived from the LFS. The LFS estimate raises the total of IKA-insured workers to nearly 30,000 more than those actually

insured by IKA, a fact that suggests an equal volume of uninsured employment, concentrated mainly on construction, manufacturing and private households (although with respect to the latter the IKA data may be underestimated). Adding the number of those stating “uninsured” in the LFS to the total positive differential of IKA-insured employment according to the LFS over the actual one recorded by IKA, we arrive at an estimate of total uninsured labour, which in Table 5 appears also as a percentage of the insured recorded in the IKA Bulletins. The overall rate of the uninsured for 2006 is estimated at 9.0%, with quantitatively significant concentrations of uninsured labour appearing in private households (domestic assistants), trade, hotels and restaurants, manufacturing, construction, and agri-

Table 6 Sectoral breakdown of estimated uninsured employment (2010)

Sector	IKA-insured workers (thousands)	IKA-insured workers as per the LFS (thousands)	Uninsured workers as per the LFS (thousands)	Total of uninsured workers (thousands)	Percentage of uninsured workers
Agriculture, fishing	5.4	23.2	18.3	24.1	446.6
Mining and quarrying	7.0	7.2	0.3	0.3	4.6
Manufacturing	304.2	330.0	10.8	19.2	6.3
Electricity, gas, water supply, etc.	15.6	26.1	0.6	4.1	26.0
Construction	156.8	239.4	16.9	44.0	28.1
Wholesale and retail trade	421.0	436.5	33.2	38.3	9.1
Transport and storage	131.6	101.8	1.5	1.5	1.2
Accommodation and food service activities	178.6	150.1	21.9	21.9	12.3
Financial and insurance activities	74.4	51.2	1.2	1.2	1.6
Real estate management, etc.	145.5	126.5	8.2	8.2	5.6
Public administration, defence and social insurance	75.8	70.2	4.4	4.4	5.8
Education	98.7	87.6	6.6	6.6	6.7
Human health and social work activities	92.6	87.7	4.3	4.3	4.6
Other service activities	100.6	107.1	8.6	10.7	10.6
Households as employers	18.2	43.7	39.5	47.9	263.1
Extra-territorial organisations	1.3	1.0	0.1	0.1	5.7
Unknown	1.5			0.0	0.0
Total	1,828.9	1,889.4	176.4	236.8	12.9

Sources: IKA and LFS.

culture. In fact, in some specific sectors of a highly informal nature (households as employers or agriculture) the uninsured (domestic assistants or farmers) are estimated to be many more than the IKA-insured. In contrast, there seem to be no large numbers of uninsured workers in energy, banks, public administration, and health.

The same analysis was carried out for 2010 as well (see Table 6). However, given that as of 2008 the LFS uses the revised classification of economic activity sectors, comparison of its data with those of IKA (where sector classes have not been changed) necessitated an according adjustment of the sectors, thus in some cases making the comparisons less reliable. In general terms the results are similar to

those obtained for 2006, but with uninsured labour at considerably higher levels and IKA-insured employment at lower levels. For 2010, uninsured labour is estimated at 237,000, i.e. increased by nearly 65,000 workers, or else equal to 13% of IKA-insured employment at the time.

In 2010, as well as in 2006, from a quantitative perspective uninsured labour exhibits high concentrations on households as employers of domestic workers, construction, trade, hotels and restaurants, and agriculture.

Looking closer at the profile of those stating “uninsured” in the LFS we find among them a systematic relative prevalence of foreigners, household workers (domestic assistants),

workers employed part-time, young people aged up to 29 years, working children of the household head, as well as assistants in the family business. These characteristics indi-

cate that uninsured labour is hard to fully control. In contrast, a change in legislation could limit uninsured labour, by eliminating incentives for it.

Box

HOW MANY PENSIONS ARE PAID TO PEOPLE NO LONGER ALIVE?

On 20 June 2011, in order to tackle any instances of pensions collected in the name of deceased pensioners, the IKA Administration adopted a measure requiring *“the mandatory physical presence of IKA-ETAM pensioners at the Banks from which they collect their pension”* – i.e. effectively a census of pensioners in person. On 6 October 2011, in a press release with the title *“Completion of the census of IKA-ETAM main and supplementary pension beneficiaries”*, IKA reported that *“99,131 beneficiaries of main and/or supplementary pension, as well as 10,290 beneficiaries of supplementary pension, failed to participate in the census”*. In fact, it clarified that *“the total number of the uncensused is 109,421”*. As a result of this, the media (newspapers, radio stations, television channels) and the international press started talking about the existence of at least 100,000 cases of bogus pensions, which – aside from an obvious confirmation of widespread corruption in the country – once screened out would suddenly constitute a solution to IKA’s deficit problems.

On 25 November 2011, an IKA press release with the title *“Pensioners’ Census”* states that *“the Administration of IKA-ETAM announces that so far 20,907 pensioners remain uncensused, although the beneficiaries’ right to participate in the census at IKA local branches has not yet expired”*. Subsequently, the IKA-ETAM Action Plan for 2012, published in January 2012, notes that *“2011 saw the completion of the physical census of all IKA-ETAM pensioners, revealing more than 10,000 cases of pensions being paid to beneficiaries no longer alive”*. In August 2012, IKA reports that *“during the 2011 census, 7,500 beneficiaries did not come forward to participate in the census [...] around 2,500 cases of demised pensioners identified so far”*. Finally, a document submitted to Parliament in September 2012 states with respect to IKA that *“the pensions unaccounted for amount to 6,600. [...] roughly 2,500 involve pensioners who have passed away, and 2,250 of these pensions have been terminated due to the beneficiary’s death. [...] The Ministry clarifies that grounds for filing a law suit do not necessarily exist in all cases of uncensused deceased pensioners, as for instance in cases where the pension amounts were unduly credited after the beneficiary’s death and remained in their bank accounts”*. In view of all the above, the results of the latest census of IKA pensioners carried out in the summer of 2012 still remain unclear.

Although the continuation of payment of even one pension collected in the name of a deceased person (non beneficiary) constitutes a legal and moral issue, the phenomenon comes under a much more unfavourable light when it involves more than 100,000 deceased pensioners, as opposed to a few hundred cases that represent less than 0.1% of all IKA pensioners. With such low numbers in a totally unmonitored social insurance sector, and ignoring if the potential actual cases of transgression should come to the attention of public prosecutors and/or social workers, it is at least an overstatement to speak of a corrupted country.

5 OTHER FORMS OF UNINSURED LABOUR

So far the examination of uninsured (or undeclared) labour has focused on workers totally unknown to the country's insurance organisations, in the sense that they are not registered in the relevant books and thus on the one hand pay no contributions while on the other enjoy none of the institutionalised benefits the insurance funds provide. We suppose that such uninsured labour, albeit noteworthy, cannot be highly widespread. Yet, this does not mean that the country is free of problems associated with uninsured labour or the ensuing contribution-evasion. This is because effectively there are also other categories of workers, active in the production of legal goods or services, for which the insurance/tax obligations in force are nevertheless not fully applied. Below we look at these categories of uninsured employment, recording any existing relevant evidence.

One such category involves the workers not fully insured for the whole time of labour they supply, but only for the minimum time of work required so as to be entitled to the typical social insurance benefits. This category of partially insured workers includes those insured for fewer days or months than those they actually work per year. As social insurance benefits (e.g. pension amounts) do not increase in proportion to the number of days, months, or even years of insured work, some workers may choose to allow their employers to insure them for fewer days or months than the actual ones, so that they and their employers can then appropriate the corresponding contributions evaded. Indeed, in some cases full insurance entails the loss of certain benefits, such as the extraordinary one-off or periodically paid unemployment benefit for specific occupations or branches, which is not granted when the worker's insured day-wages in the previous period exceed a certain minimum, or when the necessary negative requirements are not met. A similar case is that of some immigrants from third countries who only seek IKA insurance for the minimum number of day-wages required to renew their residence permit, since

they deem the collection of an old-age pension from the respective Greek insurance organisation highly unlikely.

The level and the change in the number of partially insured workers are obviously affected by the institutional framework applicable each time, but at the same time also by the economic conjuncture and the conditions in each specific sector. The fact that workers in construction enterprises are systematically insured for fewer days per month (12.8 in August 2010 and 12.3 in March 2011) compared with those in other enterprises (23.7 in August 2010 and 22.3 in March 2011) is obviously related to weather conditions or developments in each sector and the individual enterprises involved, but may also be affected by the fact that when their insured days exceed a certain number, workers in such enterprises lose the right to the special unemployment allowance they receive practically every year from OAED. The same can be true for other specific occupations entitled to "special" unemployment allowances. These cases involve a partially uninsured labour of certain days per year, the adequate identification of which is rather difficult and costly for inspection authorities. A reform and rationalisation of the relevant insurance legislation would prove more effective.

Another category of uninsured or undeclared labour, characterised by many as "black" (i.e. under-the-table) labour, usually involves a second (uninsured) employment of workers who are fully insured as a result of their first or main employment and would have no practical benefit being insured for their second job as well. This obviously includes all those workers, mainly in the public sector, who in parallel with their main employment, occasionally or systematically engage in a second job, uninsured. As a rule, insurance in the second job offers for the worker no extra benefit in terms of pension, healthcare, unemployment protection, and the like. To the contrary, even when leaving bureaucratic formalities and procedures aside, it entails a cost for both workers, in the form of the contributions paid (and the cor-

responding income tax due), and employers, in the form of their respective contributions. This is why in several cases the second job remains uninsured and probably untaxed, or even illegal (when it is not allowed, or carried out without a permit, or incompatible with the first employment). The Greek colloquialism for income earned from such activities, fully concealed from the competent authorities, is “black” money. In principle, this type of employment may be encountered in a wide range of activities, mainly related to the provision of services, such as private tutoring offered by teachers working under a full-time contract in schools, book-keeping services provided outside normal working hours by accountants fully employed elsewhere, scientific work in research projects by a vast range of experts, work during the weekend by people employed under a standard weekday employment contract in positions such as waiters, parking valets, product promoters, leaflet distributors, peddlers, artists, delivery persons, taxi drivers, charity “volunteers”, etc. One could also include in this category some residents of rural areas who are insured with OGA and yet also work in parallel, without insurance, (mainly) in the construction sector or the tourism industry.

The volume of second employment depends on the economic conjuncture, as well as on the existing opportunities for such activities. The LFS includes questions referring to second employment, but the number of those who state having one is relatively small and decreasing in recent years. In the fourth quarter of 2011, only 88,000 people or 2.2% of all workers stated that they worked in more than one jobs, compared with 153,100 or 3.4% respectively in the fourth quarter of 2009. These relatively small numbers, along with the fact that they are concentrated in the traditional sectors of high uninsured labour (agriculture, trade, hotels, and education) cast some doubt on their reliability. Although the economic crisis seems to have drastically curtailed second employment rates and relevant anecdotal references are usually exaggerated, the level of second employment

must probably stand clearly higher than that appearing in the LFS. And as to the question of whether combatting contribution-evasion related to second employment could help improve the insurance organisations’ finances, no straightforward answer can be easily given. Perhaps a reorganisation of production and social insurance (one fund, closer linking of contributions and benefits, etc.) in a way that discourages multiple jobs would prove more effective in the medium term.

A special category of simultaneous double (or multiple) employment involves certain workers who —as a result of their professional capacity/occupation (e.g. physicians, lawyers, engineers, journalists, or research educational staff members of tertiary or higher education institutions)— are entitled to insurance both as employees for a dependent labour they supply, and at the same time as self-employed freelancers. This simultaneous double employment (and insurance) also leads to double main pensions, without the respective double compensatory contributions for full-time employment having necessarily been paid. If there was only one insurance fund for all workers, discussing such phenomena would lack any meaning.

A fourth category of uninsured labour that should be mentioned is undeclared labour by pensioners. A number of retired persons —either because they find the pension they receive insufficient, or for psychological reasons, or because they are still healthy and active— decide to continue working while also collecting their pension. On the other hand, securing entitlement to a full or even partial pension long before the age of 65 for men and 60 for women sometimes motivates the insured workers to an early retirement and continuation of employment in parallel with pension collection (Provopoulos, 1987). While all major insurance funds set institutional limitations to pensioners’ employment and provide for an at least partial suspension of pension payments, a widespread impression is that several pensioners working in the private sector

only declare a low income, or even totally conceal that they still work, in order to evade paying contributions and the corresponding income tax, and simultaneously avoid having their pension suspended. Effective administrative control of such cases by the major insurance funds (mainly IKA and the Civil Servants' Pension Scheme) is difficult and perhaps even economically useless. It seems that the volume of pensioners' labour decreases over time. This decrease has been more pronounced against the background of the current economic crisis, the recent increase of the minimum age limits required for retirement, as well as the stricter criteria applied to pensioners' employment under the insurance legislation passed in summer 2010. However, complete prohibition of pensioners' labour – aside from running contrary to the principles of the individual's economic liberty protected by international labour conventions – would be hard to enforce, and after the end of the current crisis may even prove to be economically unreasonable in an aged country such as Greece.

Another category of workers who evade contributions involves those who pay insurance contributions calculated on the basis of lower than their actual wages. As contributions to the insurance funds of salaried employees represent a percentage of their wages, a (legal or illegal) concealment of part of the latter entails lower contributions to social insurance. Several ways of extending additional payments to workers (mainly executives) without paying the corresponding social insurance contributions and/or income taxes have been recorded worldwide. The most typical way to conceal payment and evade contributions is to declare only the minimum insurable wages. Other legal ways include payments in kind, productivity bonuses, share options, legislatively introduced exemptions from additional contributions or the establishment of a ceiling of insurable wages, and wage collection concessions to a third party. As a special category one could also mention here the case of employees fully employed by one employer who also appear as freelancers assigned additional work by the

same (or another) employer. For the wages earned for this additional work, as self-employed workers they pay – usually to OAEE – social insurance contributions clearly lower than what would have been if added to their standard contributions, e.g. those to IKA. It should be noted that such a practice may drastically reduce the income tax paid as well. Again, if there was one single insurance fund, or at least a common method for calculating insurance contributions and benefits, the above discussion would lack any meaning.

Out of the total share of the uninsured in the LFS (around 4.4%), the highest rate of uninsured work (16%) concerns non-remunerated family members working in the family business/enterprise. These workers in many cases enjoy all typical social insurance benefits, being indirectly insured through the head of the family business. Assistants in the family business in the fourth quarter of 2011 were estimated at 209,000, equal to 5.3% of total employment, and highly concentrated on agriculture (43%), trade (25%) and hotels (14%), i.e. in sectors favouring informal production, while their majority (62.5%) involved women, most likely indirectly insured when they worked outside agriculture. In the fourth quarter of 2009, before the dramatic drop in employment rates, these non-remunerated assistants were estimated at 263,000 and represented 5.9% of total employment, while their profile described above had not changed substantially. Although the line between employment as a non-remunerated assistant in the family business and unemployment is frequently blurred, it is worth noting that while total employment fell by 12.2% in the period between the fourth quarter of 2009 and the fourth quarter of 2011, the number of assistants in the family business decreased by 20.5% in the same period, showing that the economic crisis has led to a relatively higher exit of non-remunerated family members, probably because of the lower cost entailed in terms of severance pay or compliance with legal regulations. Perhaps this also explains why uninsured labour has not recorded an impressive increase in the current deep economic crisis.

It must be borne in mind that the foregoing examination has dealt only with uninsured labour and the ensuing contribution-evasion, which obviously should not be confused with the social insurance organisations' failure to collect the declared and charged social insurance contributions. This failure refers to declared and insured labour, visible to and recognised by all interested parties, with respect to which there is late payment or even non-payment of the relevant certified contributions (Provopoulos, 1985). Collection of the contributions in arrears is attempted through administrative and coercive measures similar to those applicable to government taxes in arrears (enforcement of the Code for the Collection of Public Revenue – KEDE). Delayed payment of charged social insurance contributions to the insurance fund may be due to the employer's recalcitrance, indifference, self-interestedness and/or financial problems. However, the fact that the outstanding balance – i.e. the difference between certified and collected delayed contributions – has risen dramatically in the period of the current economic crisis points more to a difficulty on the part of employers to pay these contributions, rather than suggesting that they are consistent bad payers. Besides, it appears that some of the enterprises that still owe to insurance funds belong to or are controlled by the State. To the extent that failure to collect the due delayed contributions persists, forcing insurance organisations to bear the cost of granting the benefits provided for, the phenomenon would be a confirmation of the existing unequal terms of competition for enterprises and of the prevailing vicious circle of substandard services provided by loss-making insurance funds and increased burdens for those who regularly pay their insurance contributions.

6 CONCLUSIONS AND POLICY GUIDING PRINCIPLES

The foregoing analysis indicates that uninsured labour, defined as the number of workers unknown to the insurance funds, albeit note-

worthy, is not as widespread as alleged in public debates. A problem of high uninsured labour is observed in certain economic activity sectors (construction, hotels, trade) and occupations (domestic assistants), mainly due to institutional regulations that discourage full insurance of the workers active therein, as well as with respect to workers employed in more than one jobs (for all employments other than their main one), pensioners working in the private sector, and special sub-categories of workers.

Had uninsured labour been widespread, the results of the inspections carried out in the context of the coordinated efforts already being made by SEPE and IKA would have been richer in terms of both numbers and money saved, and would thus have helped narrow the insurance funds' deficits. Yet, the fact that the relevant figures have changed only slightly shows that any existing contribution-evasion problem is structural and the efforts required to curtail it will unavoidably be long-lasting. Comparisons between IKA and ELSTAT data on the insured lead to similar conclusions. Even a drastic reduction of contribution-evasion – a demanding development, with negative effects on total employment and output – would not lead to a considerable improvement of the insurance fund deficits.

Nevertheless, contribution-evasion remains a serious problem that creates conditions of unfair competition between the enterprises that insure their personnel and those that do not, as well as unjustifiable inequalities among workers. The principles guiding government policy against uninsured labour must be taking into account both its causes and its profile. Efforts to monitor and limit uninsured labour can only be successful if aimed at rationalising the insurance regulations and reforming the insurance organisations. Their final objective, also recommended by international organisations, must be to include uninsured labour into the insured labour market through the promotion of all necessary institutional changes – not to combat it. In connection with this, it should be noted that the High Level Mission

of the International Labour Office that visited Greece in November 2011 endorses the view that SEPE must prioritise issues such as ensuring the payment of wages and wage protection in general, the absence of discriminations, as well as other labour rights especially in the informal economy (International Labour Office, 2011).

The following general principles of policy can help in this inclusion of uninsured labour:

1. Reducing the cost of compliance with the social insurance legislation. In connection with this, it should be noted that high minimum insurable wages may deter both employers and workers from insured labour, redirecting them towards fully or partially uninsured labour. The recent reduction of minimum salaries and day-wages (by 22%), along with the anticipated reduction of employers' contributions (by 5%), could help strengthen compliance with the insurance legislation. Moreover, according to the legislation, minimum contributions to IKA for domestic assistants equal 50% of the contributions corresponding to an unskilled worker's minimum wages. The recently adopted "ergosimo" (labour wages and insurance coupon) for domestic assistants working for many employers in parallel facilitates the latter to a great extent, as they no longer need to have any contact with IKA. However, the effectiveness of the ergosimo measure needs to be further assessed, since in practice all procedures for its issuance and payment through banks are often carried out by the domestic assistants themselves (as well as any other workers employed occasionally), and not necessarily by their employers. On the other hand, the much more favourable treatment of the self-employed compared with employees in terms of insurance (and effectively also taxation) probably encourages false self-employment and the practically higher contribution- and tax-evasion related to it.

2. Increasing the incentives to comply with insurance legislation, for employers and workers alike. As for the former, it should be

noted that effective operation of the institutions in the formal sector of the economy (banks, courts, chambers, etc.) can encourage the transition of small enterprises operating in the underground economy into the formal one. Furthermore, a measure to be thoroughly examined is the administrative exclusion of enterprises and/or businessmen caught employing uninsured workers from public sector procurements and projects. As for the workers, it is self-evident that pension amounts and insurance (mainly unemployment) benefits designed in proportion to their contributions could discourage uninsured labour.

3. Simplifying and effectively enforcing the insurance, labour and tax legislation, since in many cases of workers uninsured labour is not a measure to ensure subsistence but a means to a conscious and deliberate evasion of contributions and taxes. Complex tax legislation (in effect social insurance contributions are taxes) increases the cost of compliance for taxpayers, as well as the cost of monitoring for the competent authorities, whereas any existing legal loopholes provide opportunities on the one hand for contribution-evasion and on the other hand for corrupt transactions between taxpayers and monitoring inspectors. The fewer the special provisions, the lower the rates of social insurance contributions, the fewer the exemptions, and the broader the insurance base, the higher the compliance with legislation. Repeated changes of the insurance legislation increase uncertainty and the administrative cost of its enforcement across the board. The compulsory use of the double-entry accounting system by self-employed freelancers, the payment of occasional personnel through bank accounts, as well as the use of consumption receipts to secure tax reductions, seem to help in insuring the staff and capturing the revenue of enterprises. For those required to pay social insurance contributions, the belief that the probability of inspection and imposition of considerable fines is high increases compliance as regards insurance obligations. Thus, a considerable number of well-trained, incor-

ruptible and scrupulous staff members of the insurance funds (international organisations propose a share of 30%), as well as of the tax authorities, must be engaged in monitoring and control activities, so as to ensure sufficient supervisory coverage. At the same time, an independent internal control and inspection service must be created in all insurance funds,

to prevent cases of misappropriation, fraud, or corruption. There is a need for coordination and information exchange among all supervisory authorities (in relation to taxes, contributions, labour law, illegal employment, tariffs, etc.), which will reduce the cost of identifying uninsured labour and improve the effectiveness of the resources used.

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REVIEWING THE PROPOSALS FOR COMMON BOND ISSUANCES BY THE EURO AREA SOVEREIGN STATES UNDER A LONG-TERM PERSPECTIVE

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*Without changing our patterns of thought,
we will not be able to solve the problems we created
with our current patterns of thought.*

Albert Einstein

I INTRODUCTION

The issuance of bonds, whose liabilities are to be shared jointly by euro area sovereign states, is widely regarded as a solution to the current euro area crisis; thus, the discussion has focused on their scope and the features of the various proposals. However, any relevant decision should take into account a longer-term perspective, as joint euro area bonds should constitute an optimal choice at any phase of the economic cycle. In this respect, it should be recalled that the issue of common bond issuances by European states was raised long before the current crisis emerged, and indeed even before the euro area was launched. As a result, looking beyond the current crisis conditions and placing the various proposals in a longer-term perspective may be more informative than a mere summary of their technical aspects; in this way, comparisons can be drawn and, consequently, the reader can derive useful conclusions.

It should be emphasised in parallel that strengthening the degree of economic and financial integration among euro area countries has constantly been a major concern of policy makers at European level. Especially today, integration firmly remains a prime objective of all European policies and, furthermore, lies at the core of the debate on common bond issuances in the euro area. More specifically, always with a view to increased economic integration, the actual path to be followed is hotly disputed between those calling for specific interventions directly targeted at enhancing it and those who see stronger integration as the natural outcome of synchronised economic policies in the euro area. The relevant debate is also evident in the various proposals for euro bonds.

Considering that different perceptions and policy approaches to the final target of full economic integration may be reflected in the technical features of each proposal, it becomes evident that, before choosing among the various proposals, decision makers should first agree on policy priorities. For example, under the criterion of scope duration, solutions focusing on the long-term impact may differ significantly from others targeted at better short-term results, as the latter depend heavily on the conditions prevalent each time, while the former require the adoption of a long-term strategy. To this end, the present analysis takes a longer-term perspective, shedding light on some possible consequences and extensions of different proposals, irrespective of current conditions, so as to highlight the broader context of the proposals' various features, beyond the current economic and financial conjuncture.

With this in mind, the next section aims at conceptualising the idea of joint bond issuances and its importance for the monetary union, as seen in the literature. Section 3 reviews some of the literature related to past proposals for establishing a fiscal union, while Section 4 reviews the proposals made for sharing liabilities among European states. Section 5 — departing from the usual template of a literature review — attempts to illustrate the possible effects of a regime switch in the process of European bond pricing due to the issuance of euro bonds. Section 6 summarises the results of the literature on this topic.

2 ARGUMENTS FOR A MONETARY AND FISCAL UNION IN EUROPE

From an economic point of view, Europe has a longer history as a united region than as a

fragmented one (see among others: Lopez, 1951;¹ Bordo and Jonung, 2002; Mundell, 2002; Dwyer and Lothian, 2004). After World War II, uniting Europe (the so-called *European project*) was seen as the best way to promote peace and prosperity in a continent devastated by war.² This was officially initiated in 1957 with the signing of the Treaty of Rome, which acknowledged that the economic field would constitute a pillar on which to found the European project. The long-term goal was, and still is, to build a common market place in which supply of and demand for goods and services from all over Europe would meet, while capital would be allocated to activities based on their efficiency, and not their national origins.

The European project has moved forward, navigating through several – sometimes intense – debates on the desired form of the union, ultimately leading to a convergence of opinions. For example, whether economic integration should precede monetary unification or not has been one of the most decisive issues for the future steps of the project. On this, the work of Mundell highlights two distinct strands of the literature: on the one side lies his theory of optimal currency areas, and on the other his work on European monetary union.

Assessing the different assumptions underlying his work on currency areas is quite informative. In Mundell (1961) results are based on the assumption of stationary expectations,³ and the outcome is that the exchange rate of a region complying with the requirements of the optimal currency area theory should be managed flexibly in order to better reflect macroeconomic developments. The second work (Mundell, 1973) assumes the existence of asymmetric responses to shocks that affect countries or regions, and concludes that the optimal way to respond to asymmetries stemming from financial markets is to peg currencies together. In this setting, the integration of capital markets plays a key role: “[...] *Rather than moving toward more flexibility in exchange rates within Europe the economic arguments suggest less flexibility and a closer*

integration of capital markets” (Mundell, 1973, p. 150).

Following through the two different policy settings, one notices that, in the first, fiscal union would certainly precede monetary union, as a step towards promoting economic integration prior to monetary unification, whereas in the second, fiscal union may come after monetary union. Thus, McKinnon (2002) states that European monetary integration, both under the EMS and monetary union, lies closer to Mundell’s work of 1973, than to his earlier one on optimal currency areas. The author, distinguishing between these two different works, argues that – rather than looking at the euro area as being based on optimal currency area theory – it would be more reasonable to acknowledge that it fits better the setting of Mundell’s (1973) work on the optimal response of a monetary area to asymmetric shocks.

On the same grounds, early on several authors (e.g. Obstfeld, 1998; de Grauwe, 1997) have criticised the current policy setting of the European monetary union. More recently, de Grauwe’s (2011) work focuses on the governance of European monetary union – the main argument being that the loss of control in the exercise of monetary policy, after the creation of EMU, unaccompanied by a synchronisation of other aspects of economic policy making, has made euro area sovereigns vulnerable to market-imposed bad equilibriums. The author concludes that this malady should be addressed by centralising national government budgets and, thus, forming a fiscal union, together with the monetary union.

¹ Lopez sees the monetary fragmentation of Europe as a result of the gradually declining trade and weakening finances of the Byzantine empire since the 10th century and the consequent emergence of rivalries among medieval western European states.

² Even before WWII, some saw bringing Europe together as the most prominent way for fostering peaceful and prosperous conditions. Earlier in the 20th century, the Pan-Europa Movement, promoted by von Coudenhove-Kalergi, had sounded the first call for a united Europe. Then, soon after WWII, Winston Churchill revived this proposal during his famous speech at the University of Zurich, promoting the idea of a “kind of union of the European states”.

³ The term ‘stationary expectations’ is used to delineate the economic aspect of stationarity, a condition for expectations to be regarded as rational in empirical specifications.

Additional arguments supporting the necessity of a fiscal union among euro area Member States can be found in Sargent (2012).⁴ In particular, drawing on both theoretical arguments and historical experience, the author points out the benefits that the USA gained when the Constitution was adopted in 1790, as opposed to the previous situation under the ‘Articles of the Confederation of the United States of America’ (1787), whereby the central government had very limited authority to collect taxes. Looked at from this point of view, the debt(s) of the states and of the Continental Congress were rightly priced very low before 1790 (i.e. at 15 per cent of a unit of account of the debt),⁵ since investors did not perceive the debtor’s repayment promise as credible. As soon as the Constitution and First Acts were ratified by Congress, the individual states’ debt was assumed (or alternatively ‘bailed out’) by the central government, and prices of federal bonds increased. Thus, A. Hamilton’s and G. Washington’s decision to create a federal Treasury (similar to a modern-day Ministry of Finance) that assumed the states’ previous debts, is seen by Sargent as a regime shift in US creditors’ expectations that led to higher prices for the newly-issued US debt, while easing in parallel the conditions for redeeming the undervalued debt issued by the states.

To this end, it is useful to highlight the role of expectations in public debt pricing that lies at the heart of this concept – a view formalised in Calvo’s (1988) seminal paper. Combining Sargent’s (2012) take on the effect the new institutional framework had on the formation of expectations of US creditors with that part of the empirical finance literature (among others, de Grauwe and Ji, 2012; Favero and Missale, 2012; Arghyrou and Kontonikas, 2011) that argues for the expectations-driven nature of the present crisis, the arsenal of euro bond proponents may be strengthened. In particular, from this point of view euro bonds may be seen as an efficient and credible way to strengthen investment confidence and reassure creditors about the euro area states’ ability to repay debts. Of course, a disadvantage of this perspective is that

at this stage the arguments on the way forward can only be theoretical in nature.

3 PERCEPTIONS ON JOINT FINANCING OF EURO AREA SOVEREIGNS’ BUDGETS

The process for economic and monetary unification was officially initiated in 1974, when the European Commission mandated a study of possible ways to accomplish the goal of economic unification in Europe. Thus, a study group worked on the design of the European Economic and Monetary Union, and produced a Report published in 1975 (European Communities, 1975). Interestingly, this group of academics and Commission officials highlighted three necessary conditions for forming an EMU: (i) the establishment of an integrated system of central banks; (ii) the existence and exercise of the European political power; and (iii) the existence of important funding capacities at the Community level.

It is also interesting to note the resemblance of the scope of the proposed “Exchange Stabilisation Fund – ESF”⁶ to the objectives assigned to the European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM). The proposed ESF mechanism was seen in the Report as responsible for preserving the long-run stability of the common European unit of account, valued according to the basket of national currencies that would comprise the initial portfolio of the Fund. More importantly, the ESF was foreseen to have the power to raise loans whose liabilities would burden all countries participating in the EMU; in this way, the ESF, in its capacity as a tool to stabilise the common currency, could finance Member States in case the latter faced irreversible crisis conditions.

⁴ Although outside the scope of the present note, it is worth highlighting here that the author provides a very interesting critique on equilibrium models based on past experiences.

⁵ The term ‘unit of account’ is used because at the time acceptable currencies varied. The dollar was adopted a little later, under the Articles and First Acts of the Constitution.

⁶ Report of the Study Group “Economic and Monetary Union 1980”, 1975, pp. 20–21.

Moreover, at that time central funding was seen as a mechanism to deal with cyclical economic conditions; such funding found favour among those that gave early support to the concept of a fiscal union in Europe. In particular, in the second report for the European Commission (European Communities, 1977) – this time dealing with the role of public finances in promoting economic integration in Europe – it is noted that dealing with cyclical features of the European economy that could distort the European project, would necessitate enhancing funding capacities at the Community level. The latter would lead to deeper European integration; indeed, intra-European transfers of funds were expected to strengthen the European integration process. In this respect, this second report was the first to raise the issue of a fiscal union. However, it was argued that the degree to which central funding would be provided would rely crucially on a political decision about the degree of federalism desired for the Union.

The degree of interconnectedness of the participating states was seen in the report as being associated with the size of central funding, at the Union level. In particular, by resorting to historical instances, the authors specify three degrees of federation related to the capacity for central funding from the Union as a ratio of the total Gross National Income (GNI).⁷ First, the “pre-federal integration stage”, in which the degree of funding would be limited to 2-2.5% of total GNI; then, the “small federal expenditure stage”, in which central funding would be as much as 7.5-10% of total GNI; and finally, a “federation in Europe stage”, in which central funding would cover more than 20-25% of GNI.

Although early proposals for a fiscal union in Europe deal with directing funds to individual national economies, there was also the issue of funding and the flow of funds from national economies to the Community. In this respect, the Report of 1977 emphasised the importance of raising tax revenue at the Community level – an issue also revived recently, in parallel with

proposals for common euro area bond issuances. Supporting this view, Bordo et al. (2011) review past examples of fiscal unions. Bordo (2012), commenting on his earlier work, stated that these historical cases make “[...] a strong case for a Eurobond to be serviced by taxes collected by a pan-European fiscal authority.” Finally, it should be underlined that studies and reports prior to the launch of the European Monetary Union viewed a fiscal union as a causal factor in increasing economic integration as well as a prerequisite for increased economic integration in Europe.

4 PROPOSALS FOR COMMON BOND ISSUANCES BY EURO AREA STATES

The first formal proposal for debt securities issued in common by euro area Member States is to be found in a report which largely coincided with the launch of the monetary union. In fact, in Giovannini (2000) – one of the reports prepared by the Giovannini Group for the European Commission⁸ – the idea of common bond issuances by euro area states is the main subject. The Report proposes four possible ways to deepen the euro area primary sovereign bond markets; i.e., at a minimum, interlinkages could be strengthened by synchronising the institutional framework and homogenising the technical aspects related to the functioning of these markets. The ultimate goal was to strengthen financial integration in euro area bond markets, and two of the proposals in the report make reference to central debt issuance, at the Community level, backed by joint guarantees from euro area sovereign states. To this end, it should be noted that the Giovannini Report argues that joint debt issuance by several euro area Member States would lead to a decrease of the average borrowing cost for euro area countries, while increasing the role of euro as a reserve currency.

⁷ It is worth highlighting here that the transfer of funds to the lower-income regions is stated in the report as the Union's main objective.

⁸ The Giovannini Group was mandated by the European Commission, in the early days of the euro area, to study possible ways to promote the integration of financial markets.

The success of the euro project for strengthening the degree of integration in euro area bond markets, underscored by benign market conditions,⁹ led to a situation that did not necessitate urgent action towards the introduction of a common bond issuance programme by euro area Member States. Recently, however, increasing the Community's capacity to allocate funds among Member States¹⁰ is once again receiving much interest, with the relevant literature focusing on bonds whose resulting liabilities will be jointly guaranteed by the euro area sovereign states. As a result, the process of federalising states' budgets can be seen as the underlying scope of different proposals to initiate a programme of issuing bonds or raising loans that would end in EMU countries partly sharing liabilities – something that in turn may be viewed just as a way of acquiring funds at the union level.

Relevant discussions re-emerged recently, as a consequence of the impact of the global financial crisis of 2007-2009 on macroeconomic conditions and public finances in euro area countries,¹¹ with several arguments (see, e.g., Bordo et al., 2011) supporting the view that a fiscal union could help alleviate pressures on individual economies. Thus, a number of authors have proposed various types of liability-sharing among euro area sovereign states, with the long-term goal of preserving the stability of the euro as a reserve currency. Achieving this goal, however, entails interim objectives, such as addressing the shocks to public finances faced by several euro area countries, supporting the functioning of the monetary policy transmission mechanism, and enhancing fiscal governance in the euro area.

Following the crisis, the first proposal for a joint bond issuance by euro area governments came from de Grauwe and Moesen (2009). In that early phase of the euro area crisis, these authors proposed, *inter alia*,¹² the issuance of euro-denominated bonds that would have the collective guarantee of euro area Member States. Their proposal was that the country weights of the joint guarantee scheme should

follow the share of participation in the capital of the European Investment Bank (EIB).¹³ The nominal interest rates to be paid by each government would be calculated on the basis of the market-based cost of the country-specific debt, while proceeds would then be channelled according to the weighting scheme as well. Consequently, the cost of debt would decrease for countries facing high market costs on their debts, while countries with funding difficulties would have indirect access to markets and investor confidence would gradually increase.

Another proposal that, if adopted, would lead to common bond issuances by euro area Member States was made by Hild et al. (2011); indeed, this would lead to a full substitution of existing sovereign bond issuances by one common euro area bond. Under this proposal, a Special Purpose Vehicle (SPV) would buy existing euro area sovereign bonds from the secondary market, and then issue debt securities covered (collateralised) by the receivables of the sovereign bonds. These SPV-issued debt securities would be separated in two tranches: a senior tranche, bearing a AAA-rating, would be default-immune and have seniority, while bondholders of the second tranche – most probably rated at the BBB level according to the authors – would only be paid once senior bondholders have been satisfied in full.

Delpla and Weizsäcker (2011) suggested that national entities should continue issuing their own debt securities, while bonds covering each member's public debt to a limit of 60% over their GDP could be issued centrally, by a euro area entity. Thereby, two bond categories would

⁹ Econometric findings of relevant studies (see, among others, Georgoutsos and Migiakis, 2012a) point to a cyclical nature of European sovereign bonds' interactions, associated with the stability conditions of the financial markets.

¹⁰ Currently, at the Community level, funds to be allocated are limited to amounts that are either transferred to it by Member States, originating in specific tax collection activities, or raised by issuing notes for specific purposes (i.e. Project Bonds, EFSF notes, EIB notes).

¹¹ On the origins of the crisis, see Gerlach et al. (2011), Gibson et al. (2012) and Mody and Sandri (2012), among others.

¹² For instance, they called for a more active role of the ECB in secondary bond markets; a proposal that was largely addressed with the Securities Markets Program.

¹³ Similar was also the proposal by Gros and Micossi (2009), on a common guarantee for financing a European financial stability fund.

exist, respectively named by the authors ‘Blue bonds’ (for the euro-wide debt issuance scheme) and ‘Red bonds’ (for the part of debt exceeding the 60% limit that would be issued by individual sovereigns). Moreover, the debt issued by the central euro area entity would have senior status,¹⁴ a fact that together with the limit set at 60% of the euro area GDP would most probably result in the creation of a new benchmark bond, enjoying top credit assessments (at AAA-level) and low yields. According to this proposal, the management of the bond issuance and market placement should be assigned to an independent ‘stability council’ that would enjoy an independence status equivalent to that of the ECB Executive Board.

In a Green Paper (European Commission, 2011), the Commission proposed the issuance of ‘Stability Bonds’ aimed at restoring stability in the euro area financial markets. Three options were offered for such Stability Bonds: (i) to fully replace national bond issuances; (ii) to only partially replace national bond issuances, whereby part of national debt would enjoy a joint guarantee of euro area sovereigns while the rest of the public debt would remain a national liability; and (iii) to partially replace national bond issuances, although the guarantee offered by each sovereign will only cover its share of debt. The main common advantage seen to stem from all three proposals is that the financing of public debts of euro area sovereigns would continue under any financial market conditions. The first option leads to a bond issuance program that would then assume debts of Member States, as in the case of the US federal bonds, while the second and the third options resemble more the aforementioned ‘Blue-Red bonds’ proposal and the bond issuance programmes for specific reasons which are already in place (e.g. EFSF bonds).

Finally, this review would be incomplete without referring to the proposal by the German Council of Economic Experts (2012) for a debt redemption fund. Although not formally consisting in a common bond issuance, this idea may also be viewed as a way to coordinate debt

management and synchronise policies on euro area countries’ sovereign debts. According to this proposal, euro area Member States would transfer part of their debt to a Redemption Fund, which would burden euro area budgets. However, it should be noted that this would not consist of common guarantees for this Fund, as each Member State would be responsible for repaying its own debt. The sovereign debt proportion transferred from Member States to the Fund would correspond to the part exceeding 60% of GDP. The Fund would redeem these debts directly for Member States, based on a joint guarantee, and then the transferred debt would have to be repaid by the country that issued it, within the next 25 years. The lack of joint and several liability would be evident in the case of repayments: the larger the debt transferred to the Fund, the larger the payments made by the Member States. Additionally, conditionality in terms of national debt brakes and binding consolidation plans would accompany the transfer of debts to the Fund.

5 ESTIMATING THE IMPACT OF JOINT BOND ISSUANCES BY EURO AREA SOVEREIGNS ON THE COST OF BORROWING

Currently, there is also an ongoing discussion regarding the impact of a euro bond issuance scheme on bonds of the euro area sovereign states. With several arguments in favour or against a joint issuance being based on its consequences for bond prices, those against it focus on the effect it would have on the cost of borrowing for low-yield countries.¹⁵ At this stage, the discussion can only resort to theoretical work and an analysis of historical examples. In an attempt to lift this constraint, this section focuses on findings from previous empirical literature for euro area sovereign

¹⁴ I.e. bondholders of this debt would have priority over any other creditor of the states underwriting the issuance, except the IMF.

¹⁵ Documented negative reactions to the issuance of euro bonds can be found, indicatively, in Issing (2009), as well as press articles (e.g. the statement made by J. Stark to the German newspaper *Handelsblatt* on 17 August 2011: <http://www.handelsblatt.com/politik/konjunktur/nachrichten/stark-warnt-vor-einfuehrung-von-euro-bonds/4513568.html>).

bonds and on theoretical aspects of the bond pricing literature.

The literature on bond pricing relates the return on bonds demanded by investors to several risk factors (see, e.g., Cochrane and Piazzesi, 2005).¹⁶ Based on recent empirical findings for euro area sovereign bond spreads (see, among others, de Grauwe and Ji, 2012; Favero and Missale, 2012; and Georgoutsos and Migiakis, 2013), two factors play a part in determining the potential price of a euro bond, irrespective of the actual issuance scheme chosen: averaging effects and the heterogeneity of the underlying determinants. By contrast, opponents of a common euro area bond issuance focus on the yield to be paid in such a scheme, based on simplistic averaging exercises – for example, calculating a simple average of the yields currently prevailing on separate sovereign bonds. The results of such an exercise are unlikely to encourage low-yielding countries to concede to a joint bond issuance, expecting that the resulting yield will be driven significantly higher due to the high yield paid by other euro area countries on their sovereign bond issuances.

However, this perspective fails to take into account at least two very important aspects: first, that the pricing of the sovereign bond yields is largely an expectations-driven process (see relevant references quoted in previous sections) and, second, that historical experience (see Sargent, 2012), as well as empirical evidence (e.g. Georgoutsos and Migiakis, 2012), both emphasise the likelihood that bond pricing will be subject to a regime switch. This is certainly what previous evidence suggests, both for the US and the euro area. To this end, one may argue that the final yield attached to the joint bond issuances by euro area Member States will be significantly lower than that implied by simply averaging individual sovereign bond yields.

To explore this further, we can start with the following relationships. First, we assume that the euro bond yield (R_t^Ω), at time t , is a simple

average of the euro area (denoted by the integer $X \in [1, N]$) sovereign bond yields (R_t^X), that prevail at the same time in the secondary bond market. This is illustrated in the following relationship:

$$R_t^\Omega = \frac{\sum_{X=1}^N k_X \cdot R_t^X}{N} \quad \Omega = \{1, 2, \dots, N\} \quad (1)$$

In relationship (1) above, k stands for a weighting factor (which may stem from the aforementioned features of some of the proposed schemes, or just resemble the Eurosystem's capital key). Then, in order to proceed with the estimation we decompose the sovereign bond yields into their constituents. Assuming, again for simplicity, that there are three main effects in the bond pricing process, the latter is formalised by relationship (2):

$$R_t^X = \alpha_1 \cdot R_{t-1}^X + \alpha_2 \cdot E(Z_t^X | t-1) + \alpha_3 \cdot E(\Omega_t | t-1) \quad (2)$$

As said, equation (2) represents the pricing process of the sovereign bonds based on three potential pricing components: R_{t-1}^X reflects the stylised fact (see Lanne, 2000; Ang and Bekaert, 2002) that bond yields are highly persistent processes (i.e. investors are significantly affected by previous bond yields in their decision to assign a yield at present time); $E(Z_t^X | t-1)$ is the vector of country-specific deterministic elements expected in time $t-1$ and realised at time t ; and, finally, $E(\Omega_t | t-1)$ illustrates the interactions among euro area Member States.

Next, by merging equations (2) and (1) we produce equation (3) and, subsequently, equation (4) below:

$$R_t^\Omega = \frac{\sum_{X=1}^N [k_X \cdot \alpha_1 \cdot R_{t-1}^X + k_X \cdot \alpha_2 \cdot E(Z_t^X | t-1) + k_X \cdot \alpha_3 \cdot E(\Omega_t | t-1)]}{N} \quad (3)$$

where $\Omega = \{1, 2, \dots, N\}$

¹⁶ Although outside the scope of this review, it is quite interesting to note here a variation of the relevant literature across time: in the 1990s the literature on the term structure of interest rates largely focused on inflation-related risks (e.g. Mishkin, 1991; Estrella and Hardouvelis, 1992), whereas the recent literature focuses more on credit risk effects.

By extracting the common components of the sovereign bond yields, we end up with:

$$R_t^\Omega = \frac{\sum_{X=1}^N [k_X \cdot \alpha_1 \cdot R_{t-1}^X + k_X \cdot \alpha_2 \cdot E(Z_t^X | t-1)]}{N} + \beta \cdot E(\Omega_t | t-1) \quad (4)$$

Equation (4) states that the price assigned to common euro area bond issuances will be determined by expected euro area aggregate values, previous sovereign bond yields and country-specific determinants, contained in vector Z . It is thus crucial to examine more thoroughly vector Z .

At this point, building on the currently developing empirical finance literature on euro area sovereign bond spreads (among others, de Grauwe and Ji, 2012; Georgoutsos and Migiakis, 2013), which owing to the crisis has recently attracted much interest from researchers and policy makers, vector Z is assumed to be significantly influenced by confidence-related elements. Specifically, we assume that vector Z contains two elements (i.e. $Z_t^X = \{M, B\}$): one related to the macroeconomic fundamentals of the country (e.g. growth, the public expenditure-to-revenue ratio), and another related to prevailing market perceptions (e.g. investor confidence, risk of default on public debt).

To this end, it should be noted that the formation of expectations on the components of vector Z (i.e. M and B) may pose several challenges, currently explored by the international literature, and particularly studies on economic activity behavioural phenomena.¹⁷ Specifically, by and large the macroeconomic elements taken into account by investors (contained in vector M) are usually observable, with the main risk involved being that of a modelling bias: academics, policy makers and market participants only have to deal with the properties of the data correctly, by choosing the appropriate modelling technique. By contrast, the financial factors contained in Z (i.e. vector B) are more prone to expectations-biases.

As argued by Semenov (2009), economic agents are characterised by periods of optimism and

pessimism, rather than by pure rationality;¹⁸ as a result, the perception of the modeller is crucial in the case of the financial factors in Z . This is due to the fact that these expectations are formed by probabilistic methods and these probabilities are prone to judgemental influences by the modeller. In the case of sovereign bonds, however, the following arguments found in Calvo (1988) and de Grauwe and Ji (2012), relating to perceived higher risks, may lead to increases in the yields formed in the secondary bond market, to increases in the cost of debt servicing and, subsequently, to the realisation of the risks.

On the other hand, this expectation-formation mechanism may be significantly affected after the euro bond is issued and thus lead to a regime switch in the pricing of the euro area sovereign bonds – an effect that was present in the case of the introduction of the euro as well (see Georgoutsos and Migiakis, 2013). In particular, after the decision for a joint bond issuance, the confidence-related risk factors of B may decline due to the stronger euro area cohesion and the resulting lower probability assigned to perceived risks (such as redenomination and credit risks), leading to a higher capacity to service the debt; i.e.,

$$B > B^E \quad (5)$$

where B is the price of the behavioural factors of vector Z before the issuance of a euro bond, and B^E the value of the risk factors related to financial markets' perceptions after the euro-bond issuance and the entailed introduction of new assumptions as regards underlying probabilities in the models. Consequently, it is expected that:

$$E(Z_t^X | t-1) > E(Z_t^X | t-1)^E \quad (6)$$

Then, substituting the sequence of equations (1)-(4), it is a straightforward result that:

¹⁷ This part of the literature investigates, rather than accepting, the rationality of expectations, thus touching upon market efficiency as well.

¹⁸ Here we refer to the rational expectations hypothesis (REH), incorporated in standard theories such as dynamic stochastic general equilibrium (DSGE) models and market efficiency theory.

$$R_t^{\Omega} > R_t^{\Omega,E} \quad (7)$$

This means that the yield required for the common bond issued by euro area sovereigns will be lower than the simple average assumed in equation (1), or any yield estimated based on perceptions on risks formed prior to the issuance of the euro bonds. In other words, the signal from a decision to issue common euro area bonds will produce a regime shift in euro area sovereign bond markets – like the one referred to in Sargent (2012) in connection with the federalisation of the American states’ debt in the late 18th century – related to the perception of the underlying risks. In this context, this regime shift, resulting from the more benign investor confidence, is expected to bring about stronger financial stability and increased liquidity conditions in the euro area bond markets. Last but not least, under the new process of expectations formation, speculation based on perceived risks would be made more difficult.

However, it is important to note that this result is based on the assumption that the issuance of the common euro area bond will be perceived by market participants as an action of permanent effects, thus producing a permanent reduction in uncertainty over the adverse scenarios analysed by probabilistic risk-management models. Consequently, the magnitude of the effect will depend crucially on other factors, such as the signalling of the political determination to push the European economic integration process forward.

Should the above arguments be correct, it is reasonable to expect that the separate sovereign bond yields will also benefit from a decline in the factors in *B*. Specifically, second moment effects may stem from the signalling of a new determination of the policy makers to push the European project forward to a new phase, associated with possible synergies and as a result of better prospects for growth and debt sustainability under the new regime. Notably, this effect may stem not only in the case of a full replacement of national bond issuances by euro-wide ones,

but also in the case(s) of a partial replacement of the decentralised public debt issuance scheme of the sovereign states by a centralised bond issuance program. However, the magnitude of this outcome relies significantly on which variant of the proposals is chosen.

Another possible effect that would result in joint bond yields being lower than the average of the current sovereign bond yields results from the heterogeneity of the determinants of the latter (see Georgoutsos and Migiakis, 2013). In this case, the macroeconomic component of *B* would reflect aggregate macroeconomic variables for the euro area; this would constitute a *de jure* anchoring of pricing factors for sovereign bonds, in the same way the introduction of the euro affected the yield curve of euro area government bonds (see Ehrmann et al., 2011). Specifically, currently there exist large differences in several macroeconomic figures across the euro area countries, which are a potential source of differences in sovereign bond yields. By contrast, the aggregated figures of the euro area are more reassuring on the probability of repayment of the initial debt, plus interest – a situation similar to the case of the United States before and after the federalisation of states’ debts. As a result, the final cost associated with a joint bond issuance from euro area Member States would resemble more the average of the sovereign bond yields, weighted according to the relative macroeconomic strength of the sovereigns. Given that states with more resilient fundamentals enjoy lower bond yields, such a weighted average would result in a lower weighted average bond yield for the joint bond issuance than that currently applicable.

6 CONCLUDING REMARKS

In our concluding remarks, it is worth noting some more general arguments to come out of the literature reviewed here.

Mundell (2002) expressed the view that, most of the time, Europe could be considered an

economically integrated region, and highlighted the fact that it was political disputes of non-democratic regimes that dominated Medieval Europe¹⁹ and eventually led to the fragmentation of the continent. Moreover, there is a wide and interesting literature – that also extends over a long period – from which it emerges that social consent and political willingness for closer economic ties historically has been a causal factor for higher degrees of integration (see, among others, Haberler, 1964; Neal, 1985 and 1987; O’ Rourke, 1999).

Finally, in the Report on “Economic and Monetary Union 1980”, published in 1975 by the Study Group of the (then) European Communities, it was noted that the degree of capital market integration had deteriorated between the 1960s and 1975. Even more interestingly, in

the same report the study group noted that: “[...] *The goodwill with which it [the idea of a united Europe] is generally received is usually accompanied by scepticism, because of the lack of political commitment by political leaders.*”²⁰ However, this scepticism has, so far, been addressed in the context of another principle governing the European project, summarised in a most prominent historical document by the phrase: “[...] *Europe will not be made all at once, or according to a single plan. It will be built through concrete achievements which first create a de facto solidarity*”.²¹

¹⁹ Particularly after Constantinople gradually lost its status as a dominant player in the economic activity of the western part of the Roman Empire after the 9th-10th century.

²⁰ Report of the Study Group “Economic and Monetary Union 1980”, 1975, p. 2.

²¹ The Schuman Declaration.

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WORKING PAPERS (APRIL - DECEMBER 2012)

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Heterogeneity of the determinants of euro-area sovereign bond spreads; what does it tell us about financial stability?

Working Paper No. 143

Dimitris A. Georgoutsos and Petros M. Migiakis

In this paper we assess the movements of euro area sovereign bond yield spreads vis-à-vis the German Bund as processes specified across different levels of volatility and subject to movements in asset prices and economic conditions. The determinants we use are grouped into domestic and euro-area aggregates, thus allowing us to derive results on their relative explanatory power for movements in spreads and compare

them across time and the spectrum of countries. We find that volatility influences the deterministic processes of the euro area sovereign spreads and that identical determinants have effects on spreads that vary considerably across countries. Furthermore, we find that economic sentiment indices are the most important determinants and their significance remains, to a large extent, even when controlling for the debt-to-GDP ratio.

A note on the effectiveness of price policy on tourist arrivals to Greece

Working Paper No. 144

Helen Gazopoulou

This paper aims at pointing out the adverse repercussions on the Greek travel industry resulting from the contradicting policy measures taken by the various governments due to the lack of a consistent strategy on tourism. The analysis takes as an example the reduction of the VAT from 11% down to 6.5% for hotel accommodation which has been followed by an increase of the VAT from 13% to 23% for cer-

tain categories of restaurant services. The paper concludes by underlining that the damage done is not so much the net negative impact of the two specific measures and their disappointing fiscal performance, as the adverse repercussions that they entail for the market through the confusion that they cause, thus discouraging both tourists as well as prospective foreign investors.

The effects of financial crisis on fiscal positions

Working Paper No. 145

Athanasios Tagkalakis

The recent financial crisis was characterized by the sizeable fiscal cost of banking sector bail out operations and the significant automatic and discretionary fiscal policy response to shrinking output, which have put increased pressure on public finances in many industrialized countries. This paper tries to evaluate the impact of financial crisis episodes on debt developments. The findings indicate that severe financial crisis episodes increase the stock of debt by 2.7%-4.0% of GDP, on average in the 20 OECD countries examined. In

countries with big financial sectors it ranges from 4.2%-5.3% of GDP and in countries with smaller financial sectors it is about 1.4%-1.7% of GDP. The primary balance and the cyclically adjusted fiscal policy stance ease by about 2.6% of GDP and 1.6% of potential GDP, respectively, in the event of a severe financial market crash. Expansionary fiscal interventions are more pronounced in countries with sizeable financial sectors. I find significant evidence that a financial market collapse paves the way for a subsequent deterioration in debt ratios.

Unemployment in Greece: evidence from Greek regions

Working Paper No. 146

Dimitrios Bakas and Evangelia Papapetrou

The purpose of the paper is to examine the nature of Greek unemployment allowing for cross-sectional dependence among Greek regions and for the presence of structural breaks. The paper contributes to the literature assessing the stochastic properties of Greek regional unemployment rates using recently developed and more powerful panel unit-root tests, such as the Lagrange Multiplier (LM) panel unit root test of Im et al. (2010), that

allow for level and trend breaks, heterogeneity and cross-sectional dependence in the panel. The results show that in all cases, after taking into account the fact that regional unemployment rates in Greece are subject to a structural break both in mean and the slope of the series, the null hypothesis of a unit root is not rejected, indicating that the Greek regional unemployment series are non-stationary with the presence of a structural break.

Building a financial conditions index for the euro area and selected euro area countries: what does it tell us about the crisis?

Working Paper No. 147

Eleni Angelopoulou, Hiona Balfoussia and Heather Gibson

In this paper we construct Financial Conditions Indices (FCIs) for the euro area, for the period 2003 to 2011, using a wide range of prices, quantities, spreads and survey data, grounded in the theoretical literature. One FCI includes monetary policy variables, while two versions of the FCI without monetary policy are also constructed. This enables us to study the impact of monetary policy on financial conditions – indeed, overall, we find evidence of monetary policy ‘leaning against the wind’. The FCIs constructed fit in well with a

narrative of financial conditions since the creation of the monetary union. FCIs for individual euro area countries are also provided, with a view to comparing financial conditions in core and periphery countries. There is evidence of significant divergence both before and during the crisis, which becomes less pronounced when monetary policy variables are included in the FCI. However, the impact of monetary policy on financial conditions appears not to be entirely symmetric across the euro area.

Consumer credit in an era of financial liberalisation: an overreaction to repressed demand?

Working Paper No. 148

Sophocles N. Brissimis, Eugenie N. Garganas and Stephen G. Hall

In this paper we empirically analyse the factors which determined consumer credit in Greece in the period before and after the financial liberalisation, while accounting for significant changes in structure due to the lifting of credit restrictions and the subsequent impressive boom of consumer loans. We use multivariate

cointegration techniques to estimate a vector error correction model (VECM) and identify separate demand and supply relationships for consumer loans. We introduce demand and supply-related shifts in parameters through the inclusion of appropriate dummy variables and trends in the long-run relationships. We partly

deviate from the typical Johansen procedure and estimate the model in two steps. We find that the theoretical exclusion and coefficient-size restrictions on the demand and supply cointegrating vectors are valid. Our results are

consistent with the operation of a bank lending channel in Greece. We also find that the supply side was mostly responsible for the acceleration of consumer loan growth following credit liberalisation.

The road to Ithaca: the Gold Standard, the euro and the origins of the Greek sovereign debt crisis

Working Paper No. 149

Harris Dellas and George S. Tavlas

The origins of the Greek sovereign debt crisis were the country's large fiscal and external imbalances. The key factor that abetted those imbalances was the absence of a short-to-medium term adjustment mechanism – due to perceptions of sovereign bailouts – in the euro-area that would have reduced members' external imbalances. This situation contrasts sharply with the adjustment mechanism under the classical gold standard. Under the gold standard, countries with external deficits

would experience losses of gold reserves, higher interest rates, lower money and credit growth, and reductions in wages and prices, which helped restore trade competitiveness. We draw two main conclusions. First, the durability of a monetary union is crucially dependent on the existence of a well-functioning adjustment mechanism. Second, adherence to a hard peg is no panacea and cannot be sustained without the support of credible fiscal institutions.

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