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An Econometric Estimation of Public Finances in Greece and its Effect on Society

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Abstract

On this paper is conducted a study on the procedure of Greece's public finances, using three indicators that reflect the future fiscal condition of this country and the impact that will have on society. The indicators we used are: Public Debt (as percentage of G.D.P.), Current Account Balance (as percentage of G.D.P.) and Indirect Taxes (as share of G.D.P.). The estimations were made with the use of econometric models for the period 2013 to 2017.Along with the estimation of Public Debt (as percentage of G.D.P.), we proceed to an estimation of primary surplus/deficit of the country. Afterwards we present estimated data related to unemployment, direct taxes and inflation, presenting the relationship with the indicators that were estimated. The case of Greece has all the background makings for a complete experiment, presenting an economy with a large public debt. A small economy like Greece which has a relatively small manufacturing and industrial sector and deep recession, should address the big problems of debt accumulation. To accomplish this, Greece will not avoid the solution of the lending and finding revenue through increased taxation. In the end we make some useful conclusions Greece's next day and prospect for a sustainable and competitive economy.

Keywords: Public debt, current account balance, indirect taxes, primary deficit, social impact, debt sustainability

1. Introduction

Greece is a self-contained case of study and conclusions. Firstly, the outlook for public finances was in very bad condition several years before the crisis. The reasons are too numerous and varied. One of the main reasons was the lack of courage shown by the political system of the country, serving the same guilds that nurtured. On the other hand another long-standing policy that was followed until 2009 was the falsification of balance sheets data that showed a completely different picture of the budget. The mild fiscal consolidations which were conduced for years led to the exactly opposite results. Since the year 2010 onwards, the picture is starting to change for the deficits and balance of payments which are decreased. But the policies that have been followed in order to succeed the reduction of fiscal deficit have resulted a continuous increase of debt. The causes are the failure of all the state's commitments to lenders due to inactivity and the

guilds, and because of the structure that the economy took in recent decades. Also another reason has to do with the systematic failure of states ability to tax with efficiency and fair manner. The Greece is not just another victim of the crisis but a victim of long false political choices. For thirty years the political class sky-rocketed the public debt through an ongoing wave of customer-voter recruitment in the public sector, ample wastefulness and corruption. Additionally, the Greek economy was experiencing a continuous drop in competitiveness across the countries of the European continent but also the rest of the world. The state-control closed economy combined with the cases of corruption and lack of political courage on the liberalization and fiscal consolidation made this country inaccessible to investments. In fact the crisis was the vehicle for this country which highlighted the economic, political and social pathogens. The fiscal consolidation which is taking place right now is not accompanied by an impending reform policies aiming to remove the state from the control of economic activity, reduction of high taxes and a series of privatizations in order to come growth. The sad is that these reforms are even more difficult to achieve the country is a recessionary trend. The unfortunate is that politicians are not difficult shared equally and painful measures and insist on exercising austerity policies that led to social injustice and turn the world towards the extremes. Policies such as cuts in public spending, reduction of wages and pensions, cuts in social spending and raising taxes made an impact in several countries the emergence of social pathogens. The efforts to reduce deficits and public debt may have produced results but social inequalities swell day by day.

2. The case of Greece

Greece is considered a developed country, having a high standard of living. It has been part of the euro monetary union since 2002 and it is an important economy of Europe. However Greece is a country with many problems that rotate around its high public debt and overall bad image of its financial. The crisis of 2008 brought on the surface the weaknesses of the Greek economy. In 2008, with the outbreak of the financial crisis, governments around the world pumped in their financial institutions massive amounts of money to prevent future problems of liquidity. The Greece wasn't the exception by giving 28-billion on its banking system. This policy has increased the accumulation of public debt by worsening the country's image. Greece was experiencing problems with its public debt long before the crisis. The crisis hit Greece from the second half of 2009. The reason was because on the one hand Greece is a "closed" economy and that resulted not to be affected directly by international developments. On the other hand the reason has to do with the evolution of the crisis from credit to debt crisis. In mid 2009 the markets started to examine the countries' ability to repay their obligations. As a result Greece, because of the terrible situation of its public finances considered the weakest link in the Eurozone. The reason this happened was because it was presented the real picture of public finances, after many years of falsifications. The fact that worsened the fiscal situation in Greece was numb dealing from the officers of both Greece and European Union. This stance led the country into a continuous barrage of credit downgrades. Rating agencies lowered the daily credibility of Greek bonds, leading to an increase in interest rates as well as rising fears of an impending default

In 2010 the country was in a very bad situation because the increase of interest rates was continuing. The government in order to appease the pressure from both the markets and the rest of the Eurozone, they took measures that included wage freezing, cuts and tax increases. These measures did not persuade the markets for the efficiency that would have on the reduction of fiscal deficit. The result was as time went on the interest rate to rising continuously. The

deterioration of the climate for Greece led the government to request the activation the newly established European Finance Support Fund (E.F.S.F.) By entering E.F.S.F., the country will borrow only from there, staying away from the markets with the commitment to impose an austerity package followed by a reform package in order to reduce the fiscal deficit and become a competitive country. The austerity measures brought disfavor to the lower social classes.

In 2011 it was evident that the targets could not be implemented. The great tax evasion, the large public sector (where there was no substantial effort reduction) and the continued production of deficits brought again the country forward to a stalemate. In July during the EU summit, it was decided the reduction of Greek debt with private sector involvement (P.S.I.) by 20%. In August of the same year was once again a divergence in goals (1.7 billion) of cost reduction and revenue growth. Once more the Greek government was forced to take fiscal measures collecting revenues from the taxpayers. In late October it was decided the ratification of a new loan agreement, which provided further lending to Greece by the E.F.S.F. the sum of 130 billion Euros and the Greek debt haircut, with the participation of the private sector to around 50%. The new loan agreement and the haircut were not ratified in 2011, due to political unrest. In 2012, the Greek parliament passed two austerity packages. Both were designed to reduce the country's fiscal deficit to honor its commitments at the agreed timetables.

In summary, the measures to tackle the crisis hit the middle and lower classes and a large number of people were led to the poverty line.

3. Theoretically Approach

In this analysis, it will be made an attempt to show the relationship between the public debt and the impact that has on society which has been affected by the economic crisis. The choice of indicators was done in order to present a comprehensive picture of recessionary path which the Greek economy has fallen. The current account balance was chosen to show the country's position on the international scene as it shows payments and debts to the markets. It is also an important barometer for the evaluation of the progress of the economy. Finally, a general assessment is being made of indirect taxes as a percentage of G.D.P. in order to study the contribution of taxpayers in the economy. The relationship between debt- to-G.D.P. ratio and society is immediate because when debt increases and the state do not produce surpluses the government will seek funds to repay debts from citizens through taxation. Below there will be a description for the following indicators: Public Debt (as percentage of G.D.P.), Current Account Balance (as percentage of G.D.P.) and Indirect Taxes (as share of G.D.P.)

3.1 Public Debt (as percentage of G.D.P.)

Public debt is the total debt of the general government (central government, regions, municipalities) of a country and it is expressed in monetary units as a percentage of G.D.P. Public debt is created when state expenditure (private and public) exceed the total production. Consequently the government, in order to be able to fulfill its obligations, primarily increases tax revenues and then borrows money by issuing and selling government bonds or proceeds in privatizations. Therefore the public debt is liabilities of the state, as a result of borrowing through various ways of refinancing. Public debt is divided into internal and external debt. In the first case, the creditors are citizens or various institutions (such as banks, several funds etc) of the

state, while in the second case is not. This distinction is important because in the latter case public debt is expressed in a different currency and hence in a different exchange rate.

The public debt ratio, expressed as a percentage of G.D.P. is a typical indicator that examines the sustainability of a country's economy. Domestic production has a primary role in the economy. If the growth rate is low or has a negative input (recession), the general population is the one who called first to pay back public spending through taxation and the state, borrows to repay its remaining obligations. As a result of this policy, public debt increases year to year. The state's obligation towards its creditors increases as debt increases. According to Maastricht Treaty, government spending on social welfare, health and pensions are not counted on government debt (implicit debt).There are two types of debt

1.   Net Debt
2.   Gross debt: is the total public debt that has not been repaid. This type of debt is expressed in the form of bonds, C.D.S., special deals, loans, insurances and pensions. In this case a country borrows the difference between gross debt and financial assets that government possesses.

Debt-to-G.D.P. ratio presents the solvency of the economy and country's consistency toward its creditors. The higher debt-to-G.D.P. ratio is, the lower is the probability of a country's ability to fulfill its obligations to its creditors.

The main mechanism that accumulates and creates debt is the sum of the primary deficit and the cost of current debt. From this relationship we can conclude that the secondary deficit is equal to public debt. A country's deficit is created by internal and external factors.

A consecutive production of deficits affects the public debt. The deficit is divided into primary deficit (total revenue-total costs) and interest and repayments (payments of state for debt per year).

Change in debt = primary deficit + interest and repayments

Primary deficit = deficit budget + influence of anti stabilizers.

The long-term goals that the government set is:

1.   Stabilizing the distortion of the economy (taxes and provision of social policy). Carlin and Soskice, (2005)
2.   Budget planning (definition of public finances) in order to remain sustainable debt levels. Carlin and Soskice, (2005)

As we've mentioned before, one of the forms of financing public investment of a state is borrowing. The consecutive borrowing combined with continued high deficits lead to increased debt. When government borrows to cover its needs the burden passes on taxpayers, who through taxes are required to pay indirectly interest and repayments and borrowed capital.

The relationship of Carling and Soskice, (2005) presents the refinancing of public debt through taxation, issuing bonds and printing money.

1.   The relationship between interest rate, growth rate, primary deficits and debt are crucial. Carlin and Soskice, (2005)

2.   When (r-gy)> 0, the interest rates are higher than the growth rate, the debt accumulates. Carlin and Soskice, (2005)

3.   When there is no primary surplus, d> 0 then the economy is forever indebted. Carlin and Soskice, (2005)

4.   When (r-gy) <0, the interest rates are lower than the growth rate, the country needs to reduce its debt. Carlin and Soskice, (2005)

If the government improves its deficit, the debt can be reduced.

3.2 Current Account Balance (as percentage of G.D.P.)

The account balance is the account of a state in which reported the total economic transactions (of the state) with the globe. It records the height and the evolution of economic transactions of a country with the rest of the world and shows the inflows and outflows of capital, meaning recorded receipts and payments that have been conducted by a country with the rest of the world in one year time horizon. The index of balance of payments is crucial to a country's economy as it affects the formation of the image of national income (supply and demand of local currency), national expenditure and position the economy of a country in the international scene. Therefore the index of current account balance bop shows the level of international competitiveness of a country.

The current account is given by the sum of the trade balance and the balance of elements unrecorded balance multiplied by 100%

CA = TB + income balance * 100%

This relationship presents: The economic power of the country compared to the rest of the world, how the result of surplus (or deficit) affect the variability of national income and presents data on the economic development of the country if it can sustain itself or require an external loan.

3.3 Indirect Taxes (as share of G.D.P.)

Indirect taxes are the financial obligations that citizens are requested to pay indirectly. The government uses this way to raise revenue. Ways of this form of taxation is VAT and real estate transfer tax. In the first case an individual is required to pay a percentage to the state for the purchase of a product or a service. The second case refers to people who want to transfer some assets belonging and required to pay a fee to the state for the completion of the transfer. The Ministry of Finance determines the VAT that products and services will have, depending on which the category classifies them. For example, the majority of products and services in Greece are classified in high scale taxation rate of 23%. Staple commodities classified in low taxation rates at a tax rate of 13% and 5%.

4. Results and Data Analysis

4.1 Public Debt (as percentage of G.D.P.)

The estimate was made for the Greek public debt includes the years 2013 to 2017. In this macro-econometric analysis the public debt of the country in 2013 to 2014 is increased while from 2014 and onwards it is indicated efforts to contain and fall the increasing rate of public debt. More extensively during the period 2013 to 2014 the public debt increased by 1.8 points (as percentage of G.D.P.). From 2014 and then, it starts declining and for the period 2014 to 2015 is indicated a decline of debt by 2.2 percentage points. The reduction in public debt continues and the next year having a decline for the period 2015-2016 by 2.8 units. Finally the period 2016-2017 the debt continues its downward path reaching 166.9% (as a percentage of G.D.P.). These data are listed in Table 1. Figure 1 illustrates a more detailed picture of the provision made for public debt as percentage of G.D.P.

Table 1

| Public Debt/G.D.P. ratio					
Year	2013	2014	2015	2016	2017
Public Debt/G.D.P.	171,3	173,1	170,9	168,1	166,9

Figure 1
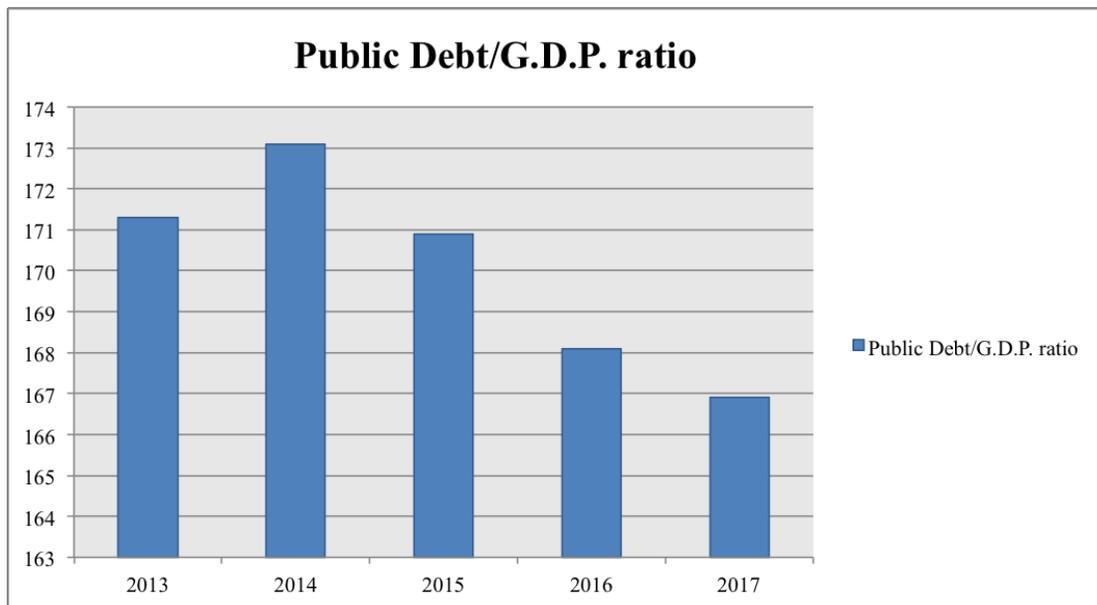
As mentioned before the estimate for the change in debt is directly related to the primary surplus/deficit, so there's been a presentation and an estimation of the change in the primary surplus/deficit of the Greek economy at the same time. According to Table 2 and Figure 2 below, Greece's primary deficit for the period 2013 to 2017 will have the following course.

Table 2

Primary Deficit (% G.D.P.)					
Year	2013	2014	2015	2016	2017
Primary Deficit (% G.D.P.)	-1,15	0,7	1,31	1,33	1,36

Figure 2
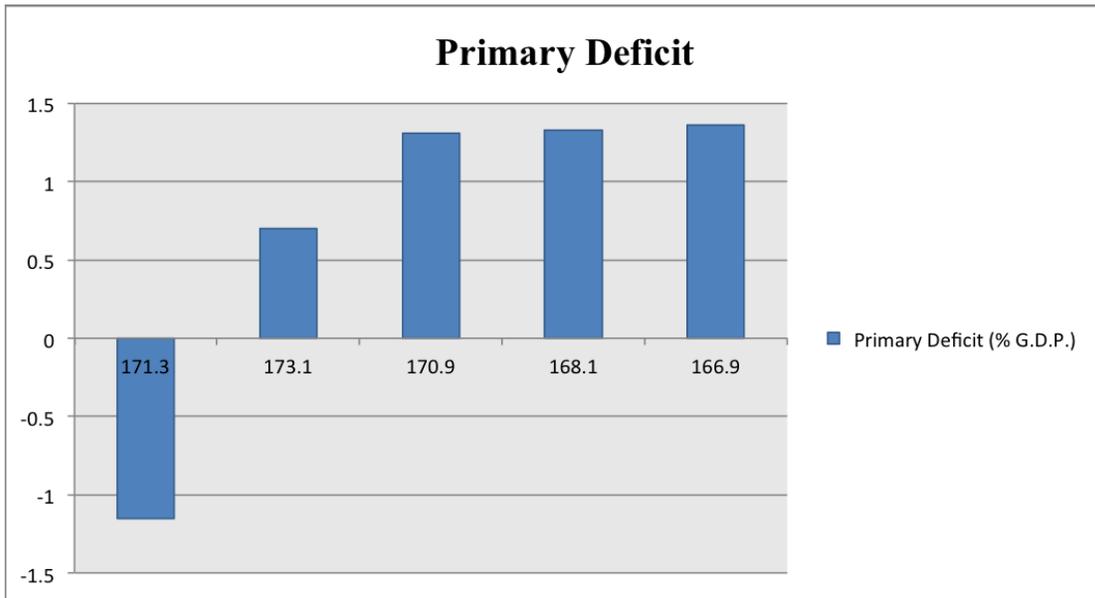
The production of deficit will continue for the 2013-2014 period where it is estimated that it will reach 1.15% (percentage of GDP). For the period until 2017, the Greece after many years will mark a primary surplus. In 2014 the surplus is expected to be at anemic rates of around 0.7%. In the coming years there will be an increase in the surplus connected with a stabilization in the rate. In 2015, primary surplus will be increased by 0.61%, reaching 1.31%. The years 2016 and 2017 are followed by an increase but (with lower pace) to the surplus estimated at 1.33% and 1.36% respectively. The production of primary surplus from 2014 and onwards is a very encouraging fact, because it reduces the pace of increasing the public debt at negative rates. From the estimated data we can conclude that the public debt of Greece remains in high levels, and thus it can be considered unsustainable[1]. Greece despite the debt reduction and the haircut of its public debt by private owners (P.S.I.) in 2012, has failed to create the prerequisite conditions for an economy able to meet its obligations. Taken as granted the fact that Greece entered in 2010 the E.F.S.F. with public debt close to 119.5% and comparing with the current data, Greece's public

debt is unsustainable. It is obvious that what needs to be done in the case of Greece is a great haircut debt, this time from the official holders of Greek bonds with a combination of a clause repayment which will be linked with the future growth/recessionary path that Greek economy will have.

4.2 Current Account Balance (as percentage of G.D.P.)

The estimation that was made for the current account balance covers the period from 2013 to 2017. Estimates for the current account helps to export useful conclusions about the course of the country. In this analysis is founded that Greece has a consistent but negative current account balance with few fluctuations, as shown in Table 3 and Figure 3.

Table 3

Current Account Balance (% G.D.P.)					
Year	2013	2014	2015	2016	2017
Current Account Balance (% G.D.P.)	-1,125	-1,1275	-1,1356	-1,139	-1,182

Figure 3
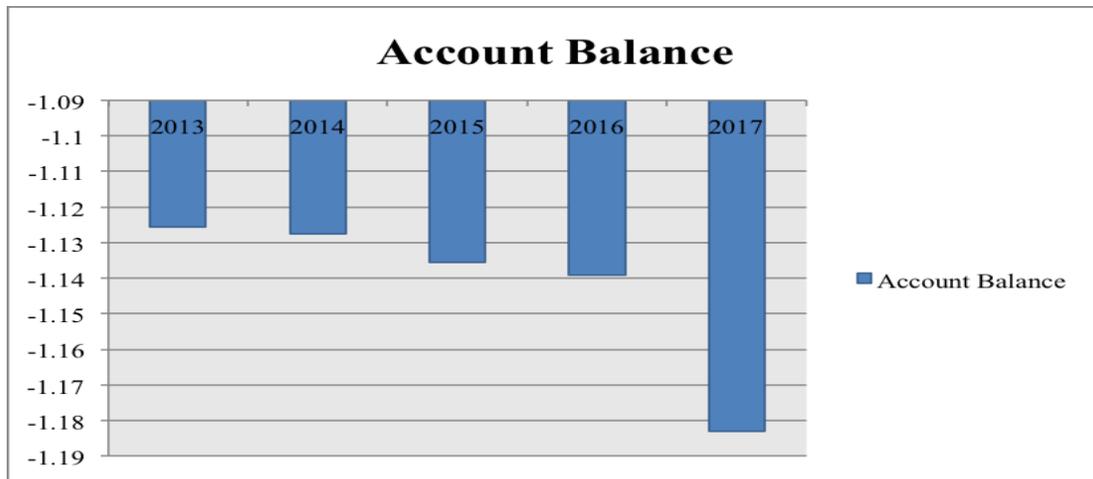
Despite the fact of recording negative account balance, it is worth noting that its levels are in a far better position, compared with previous years. From the starting period there is a decline in deficit of current account balance reaching 1.22% (as percentage of G.D.P.). In 2014 there's been a minimal increase in deficit by 0.0019%. This small deviation shows the steady progress that will have the indicator for the next years. During the years 2015 and 2016 the current account deficit increases by 0,011% compared to the previous period. For 2015, the deficit stands at 1.135% and 1.139% in 2016. In 2017 it is recorded an equally small increase of 0.043% (the largest in the examined time period) with the deficit standing at 1.18%. The estimated data show a successful effort to contain public expenditure at low levels. The current account balance shows the economic potential of the country and its place in the world. By reaching the reduction of

costs at very low levels increases the position of the country in international competition and showing the country's solvency to private equity. This decline to the current account deficit is very important showing the willingness of the government to cut public spending and equally to drop the deficit of current in a period where the economy is on a recession, trying to reclaim the lost confidence from the markets. Despite the impressive decline of 17.9% in 2008 to levels recorded close to 1%, is not sufficient to support that the country can be considered open to the inflow of foreign and domestic capital in the economy is viewed with mistrust. With these data and with the suspicion that exists upon the fiscal consolidation program, is needed more time for Greece to be considered a reliable economy once again.

4.3 Indirect Taxes (as share of G.D.P.)

The index of indirect taxes shows how much range of indirect taxation taxpayers have contributed and what share will have on (G.D.P.) Indirect taxes are the taxes required to pay on everyday basis mainly through their purchase of goods and services. In Table 4 is presented the estimation for indirect taxes as a percentage of G.D.P. for the period 2013-2017. As shown in Figure 6, the rate for 2013-2014 period is reduced by 0.2 percentage points.

Table 4

Indirect Taxes (% G.D.P.)					
Year	2013	2014	2015	2016	2017
Indirect Taxes (% G.D.P.)	12,4	12,2	12,1	12,1	12,5

Figure 4
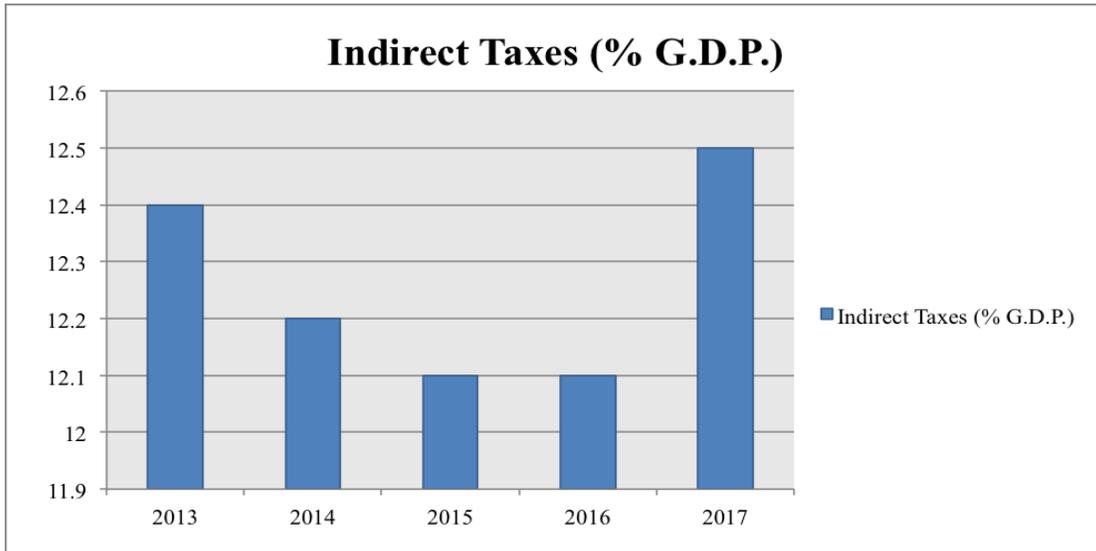
This reduction may be due to various external and internal factors[2]. This decline is primarily due to the increasing shrinking of incomes, the rise of unemployment and the inflationary trends. Because of this close relationship with indirect taxes, in this paper are presented estimates of unemployment, inflation and direct taxes (in order to show the shrinking of incomes). The Tables 5, 6 and 7 show the data of the three indicators and Figures 5, 6 and 7 illustrate the estimations from the International Monetary Fund and from Oxford Economics.

Table 5

Unemployment (%)					
Year	2013	2014	2015	2016	2017
Unemployment (%)	28,3	29,1	28,3	27,2	26,1

Source: Oxford Economics

Table 6

Inflation (%)					
Year	2013	2014	2015	2016	2017
Inflation (%)	-0,2	0	0,4	0,8	1,4

Source: Oxford Economics

Table 7

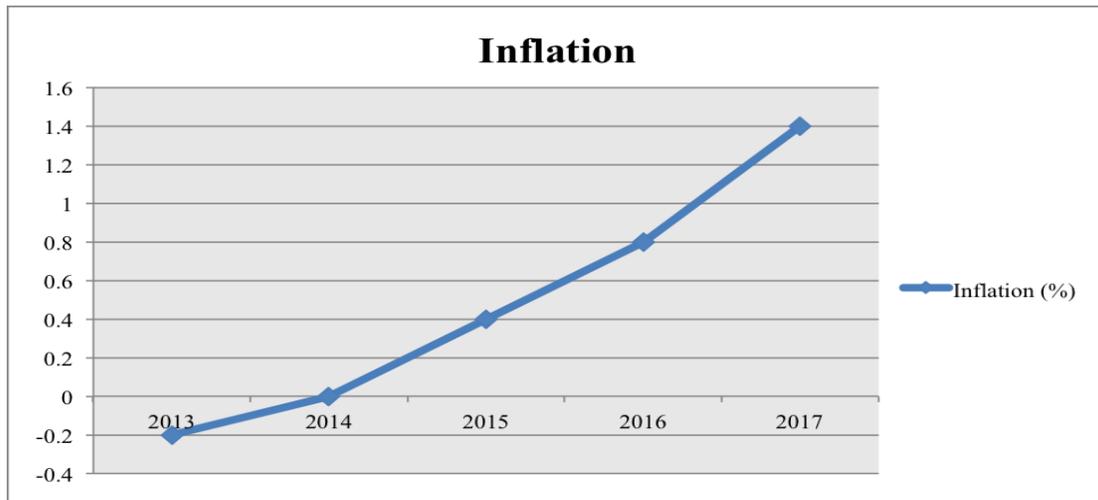| Direct Taxes (% G.D.P.)					
Year	2013	2014	2015	2016	2017
Direct Taxes (% G.D.P.)	10,2	10,1	9,8	9,4	9,4

Source: International Monetary Fund (I.M.F.)

Figure 5

Source: Oxford Economics

Figure 6

Inflation
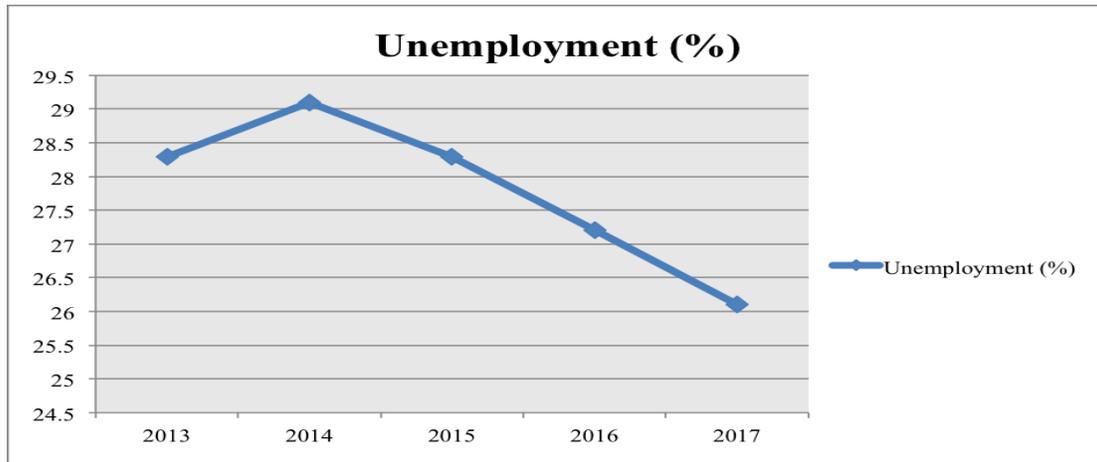
Source: Oxford Economics

Figure 7

Direct Taxes (% G.D.P.)
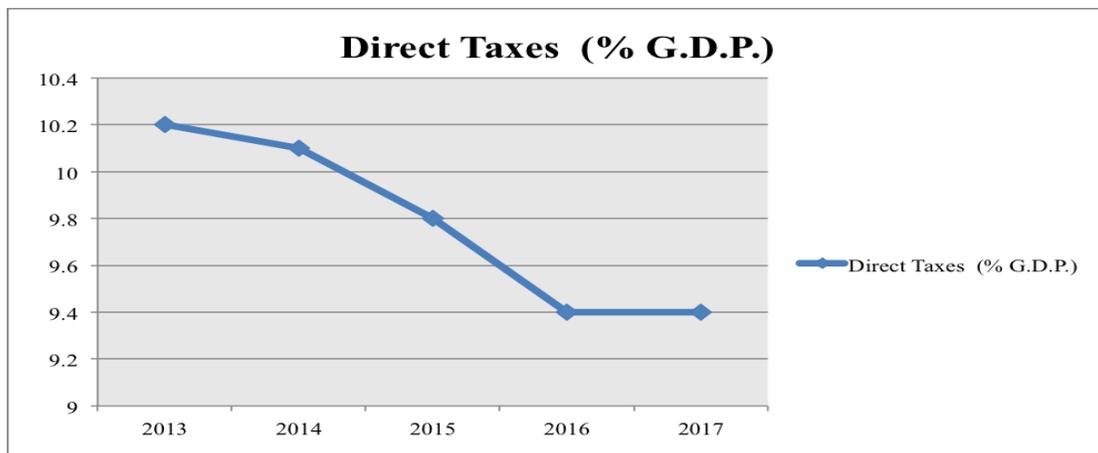
Source: International Monetary Fund (I.M.F.)

Unemployment is estimated that 2014 will reach its peak point reaching 29.1%. This year the unemployment rate is maintained at very high level and is one of the main reasons why inflation is so low, compared to the years before the crisis. The direct taxes for this year are falling. Reasons for the decline in direct taxes are many and varied. The most important are the reduction in disposable income, the expansion of people living below the poverty line (almost 30%) and tax evasion. While the majority of Greece's population has to contribute a large amount of their income to the state through taxation, there are some social groups that enjoy tax-reliefs. Some of these groups are the ship-owners lobby which they are not taxed and the Greek Church having its monastery properties immune from the taxation. Another important reason perhaps the most important is the tax evasion that existed before the crisis. The governments have not introduced the policies that could encourage the elimination. For this reason, tax levels are so low compared to the majority of developed countries. The period 2015-2014 indirect taxes are estimated to have a small decline of 0.1%. This small drop shows the continuation of the decline in tax collection

due to economic hardship combined with a drop in consumption. At the same period is noted a decrease in direct taxes. This decline obviously is due to the tax evasion which is considered to remain and the economic difficulties of citizens to pay taxes. At this point the forecast for the unemployment shows a drop of 0.8% compared with the previous period. While inflation increased by 0.4%, remaining at very low levels due to high unemployment. What is worth noting is that unemployment from 2015 and onwards declines, but still remains in very high level, which characterize the continuing recessionary course of the Greek economy. Inflation for the same period shows an increase because of the gradual decline in unemployment.

5. Econometric Methodology Indicators

It is difficult to choose the econometric models needed for the estimation of a country's economy. Greece is a special case of econometric analysis, because it might belong to the whole of the eurozone countries, but is very different from the other Member States in terms of economic, political and social recommendations. The problems which confronts for many years in the economic, political and social level make it a complex case concerning the assessment that will be done. Econometric types selected and applied to assess the country's finances is Public Debt (as percentage of G.D.P.), Current Account Balance (as percentage of G.D.P.) and Indirect Taxes (as share of G.D.P.)

The symbols used for the equations can be found on Table 8. Estimation results on the determinants of Greece's current account balance and indirect taxes can be found on Table 9.

Table 8

Data and Notation	
Δ,δ	Public Debt
I,ι	Nominal Interest Rate
H	Change in the Stock of Central Bank Liabilities
Δδ	Change in the Public Debt /G.D.P. ratio
ω	Primary Deficit
π	Inflation
η	Growth Rate
Θ,θ	Public Spending
Φ,φ	Taxes
αβ	Current Account Balance
ζ	Saving
ε	Investment
ει	Private Investment
εζ	Private Saving
κι	Public Investment
κζ	Public Saving
ρι	Real Exchange
δι	Fiscal Balance
αυ	Goods and Services
κρ	Crisis 2008 Dummy Varable
ερ	Euro Dummy Varable
εφ	Indirect Taxes (as share of G.D.P.)
N	Nominal G.D.P.
Y	Unemployment

Table 9

Estimation results on the determinants of Greece's Current Account Balance & Indirect Taxes	
ρι	-0,13 (0,9)
δι	0,27 (4,67)
ει	-0,78 (3,96)
αυ	0,26 (1,85)
κρ	0,04 (2,93)
ερ	-0,03 (3,34)
Y	0,612 (-4,323)
N	0,947 (7,275)
$Y_{\tau-1}$	-0.612 (-4,323)
$\epsilon\phi_{\tau-1}$	0,275 (1,343)
$N_{\tau-1}$	-0,2226 (0,521)
Adjusted R-Squared for (5)	0,46
Adjusted R-Squared for (6),(7)	0,67

Source: Eurobank EFG Research and authors' estimation and World Bank Research

5.1 Public Debt (as percentage of G.D.P.)

The method that's been used to forecast the public debt, is the standard model used for the estimates of public debt (as percentage of G.D.P.). This model is linear and includes the following type:

$$\Theta_\tau + I_\tau \Delta_{\tau-1} = \Phi_\tau + (\Delta_\tau - \Delta_{\tau-1}) + (H_\tau - H_{\tau-1}) \qquad (1)$$

This type, in order to be used for the estimation of the public debt as a percentage of G.D.P. evolves to the following equation:

$$\delta_\tau - \delta_{\tau-1} = \Delta\delta \; \delta_{\tau-1} + \omega_\tau$$

$$\Delta\delta = \iota_\tau \; \pi_\tau - \eta_\tau \qquad (2)$$

$$\omega_\tau = \theta_\tau - \phi_\tau$$

Taking as granted the willingness of the euro area Member States to keep Greece in the euro on the condition that Greece from its side will honor its commitments which arising from the memorandum, will borrow until 2021 with a fixed interest rate. Under these conditions it is said to be running a Ponzi scheme, having an inexhaustible source of borrowing by 2021.

5.2 Current Account Balance (As percentage of G.D.P.)

Greece is a country with many problems such as high public debt, production of deficits and many structural problems. The structural problems of this country require not only quick and short adaptation of the country to them but also their immediate redefinition of equilibrium of the country under the new structural changes. The model VECM of Johansen (1991, 1995) issues and presents the model structure errors. So the linear model of Johansen is suitable for the case of Greek economy because it make short term estimates of adaptation and long-term considerations for equilibrium and policy directly related to the estimated figures. Initially there is a presentation of national deposits that shows the difference between national savings and national investment. This relationship is reflected in the following linear equation.

$$\alpha\beta = \zeta - \varepsilon = (\varepsilon\zeta - \varepsilon\iota) + (\kappa\zeta - \kappa\iota) \qquad (3)$$

All variables are expressed as a percentage of G.D.P. The $\varepsilon\zeta$ is a complex variable that refers to a variety of variables within an economy. Some of these are: real exchange rate, private credit, public spending, private investment, real G.D.P. per capita, output gap, old age dependency ratio, goods and services, trade openness, fiscal balance, crude oil price. In this paper, has been used some variables from the above. Transforming equation (3) in a linear representation we have:

$$\alpha\beta_\tau = \beta_0 + \beta_1\rho\iota_\tau + \beta_2\delta\iota_\tau + \beta_3\varepsilon\iota_\tau + \beta_4\alpha\upsilon_\tau + ... + \beta_{v-1}\iota\rho_\tau + \beta_v\delta\iota_\tau + \varepsilon_\tau \qquad (4)$$

In type (4) among the selected variables, were added other two dummy variables, one for the crisis of 2008 and another for the entry of Greece to the Eurozone. Therefore we have:

$$\alpha\beta_\tau = -1 + 0.27\delta\iota_\tau - 0.130\rho\iota_\tau - 0.78\varepsilon\iota_\tau + 0{,}26\alpha\upsilon_\tau + \kappa\rho - \varepsilon\rho + \varepsilon_\tau \qquad (5)$$

In equation (5) the constants $b_0 \ldots b_n$ took prices of adjustment speed which was taken from World Bank and Eurobank. In Table (9) is given the speed of adjustment of the country for each variable that has been used.

5.3 Indirect Taxes

The methodology that was followed for the estimation of indirect taxes is similar to the model used by the Bank of Greece and is very close to the model DG-ECFIN of (Denis, 2006) to estimate the progress of Greek economy. Furthermore, it was used the co integration hypothesis of ECM's of the theorem of Engle-Granger that includes solutions for both long-term and short-term dynamics. For the assessment of indirect taxation, was used as ECM the unemployment as it is a huge problem for the Greek economy that will concern far in the future. The unemployment rates in the country are increasing year by year exponentially. In equation (6), unemployment has a negative sign because the bigger it is the more difficult is the repayment of indirect taxes due to the lack of financial resources.

$$\log (\varepsilon\varphi_\tau) = 1.903 + 0.947 \log N_\tau \tag{6}$$

Equation (7) shows the estimate of indirect taxation in relation with nominal G.D.P.

$$\Delta\log(\varepsilon\varphi_\tau) = 0.119 - 0.612(Y_{\tau-1}) + 0.275\Delta\log(\varepsilon\varphi_{\tau-1}) - 0.226\Delta\log(N_{\tau-1}) \tag{7}$$

arch= 307   prob=0.54   jb=1.08   prob=0.54   dw=1.77

6. Conclusions

From this survey, after recording the estimations for public debt, current account balance and indirect taxes, derives the following conclusions: Firstly all three sizes of the economy are interdependent and together compose the economic and social status of Greece. This is for the reason why high levels of public debt affects the account balance because a country with high public debt and a negative current account balance has to face external and internal challenges. The external challenges for Greece are to restore the lost confidence towards to the markets, so that the country can become an attractive place for investors and be able to convince for the sustainability of public debt via a scheduled structural reforms. The internal challenges are to combat the unemployment which is the largest social pathogen that sweeps the country and to drastically tackle tax evasion and corruption that chokes the health forces of the country. The most important thing for Greece is to be able to come to an agreement with its lenders to get payback clauses for the repayment of debts and interest when the economy will start to record growth. The primary objective that should be set by the governments when the economy is on a recessionary track, the main priority should be the economic growth and secondarily the reduction of public debt and fiscal deficit through austerity policies. This should be done because the ratio of growth and debt are inversely proportionate.

Notes

1. External factors are the rising of oil price, a rise in the prices of imported goods and the increase of goods in the primary sector. Internal factors are considered: reduce in consumption, rising unemployment, increasing inflation, poor consumer sentiment due to recession (increasing propensity to save).

2. Public debt is considered sustainable when a country has the ability through its revenues to fulfill its obligations to its creditors.

Reference

(2009): "Anchoring fiscal expectations", *NBER Working Papers*, no 15269.

Alogoskoufis, George, *Greece's Sovereign Debt Crisis: Retrospect and Prospect*, January 2012

Auerbach, A (2008): "Long-term objectives for government debt", University of California, Berkeley, mimeo.

Asteriou, D., Lalountas, D., Siriopoulos, C., *A Small Macro-econometric Model for Greece: Implications about the Sustainability of the Greek External Debt*

Barnes, S., Lawson, J. and Radziwill A. (2010) "Current Account Imbalances in the Euro Area: A Comparative Perspective," OECD Economics Department, Working Paper No. 826.

Barrell, R, I Hurst and S Kirby (2009): "How to pay for the crisis or macroeconomic implications of pension reform", *National Institute of Economic and Social Research*, no 333. Bank of Greece (March 2012) "Monetary Policy 2011-2012".

Berger, H., and Nitsch, V.,(2010) "The Euro's Effect on Trade Imbalances", IMF Working Paper WP/10/226.

Beusch, E., Döbeli, B., Fischer, A., and Yes¸in, P., (2013),"Merchanting and Current Account Balances", Swiss National Bank, Working Paper 2013-6.

Blanchard, O. (2006) "Current Account Deficits in Rich Countries," Mundell Fleming Lecture presented to the 7th Jacques Polak Annual Research Conference, Washington DC, November 9-10.

Brissimis, S., N., Hondroyiannis, G., Papazoglou, C., Tsaveas, N., T. and Vasardani M., A. (2010) "Current Account Determinants and External Sustainability in Periods of Structural Change," European Central Bank Working Paper 1243/ September 2010.

Callen, T., and Thimani, c.,(1997), "Empirical Determinants of Household Saving: Evidence from OECD Countries", IMF Working Paper, December 1997.

Ca' Zorzi, M. and Rubaszek, M., (2008) "On the Empirical Evidence of the Intertermporal Current Account Model for the Euro Area Countries,"

Cecchetti, S., Mohanty, M.,S., and Zampolli, F., (2010), "The future of public debt: prospects and implication", Monetary and Economic Department, B.I.S. Working Paper, No 300.

Christodoulakis, N. and S. Kalyvitis (2000), "The Effects of the Second Community Support Framework 1994-1999 on the Greek Economy", Journal of Policy Modeling, 22(5), pp. 611-624

Denis C., D. Grenouilleau, K. Mc Morrow and W. Röger (2006), "Calculating potential growth rates and output gaps, A revised production function approach", Directorate General for Economic and Financial Affairs, Number 247 March 2006.

European Central Bank, Working Paper 895.

Eyrau, L., and Weber, A.,(2013),"The Challenge of Debt Reduction during Fiscal Consolidation", IMF Working Paper, March 2013.

Gokhale, J (2009): "Measuring the unfunded obligations of European countries", *National Centre for Policy Analysis Policy Report*, no 319, January.

IMF (March 2012) "Greece: Request for Extended Arrangement Under the Extended Fund Facility—Staff Report; Staff Supplement; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Greece," Country Report No. 12/57.

Keppel, C., and Orthofer, A., "A macroeconomic forecasting model for Bulgaria", Introduction The Model Forecasting Results

Ladi, Stella, The Eurozone Crisis and Austerity Politics: A Trigger for Administrative Reform in Greece, April 2012

Laeven, L and F Valencia (2008): "Systemic banking crises: a new database", *IMF Working Papers*, 08/224.

Lee, J. and Chinn, M. (2006) "Current Account and Real Exchange Rate Dynamics in the G7 Countries," Journal of International Money and Finance, 25, 257-274.

Loyo, E (1999): "Tight money paradox on the loose: a fiscalist hyperinflation", J F Kennedy School of Government, Harvard University, June, mimeo.

Monokroussos, P., and Thomacos, D., (2012), *Can Greece be saved? Current Account, fiscal imbalances and competitiveness,* GreeSE Paper No.59 Hellenic Observatory Papers on Greece and Southeast Europe, June 2012

"Oxford Economics Global Model User Guide" Oxford Economics

Penalver, A., and Thwaites, G., (2006), "Fiscal rules for debt sustainability in emerging markets: the impact of volatility and default risk", Bank of England, Working Paper No. 307.

Prasopoulou, Elpida, *In quest for accountability in Greek public administration: The case of the Taxation Information System* (TAXIS), December 2011.

Sideris, D., and Zonzilos, N.,(2005), "The Greek Model Block of the European System of Central Banks Multi-Country Model", Bank of Greece, Working Paper.

Skouroliakou, Melina, *The Communication Factor in Greek Foreign Policy: An Analysis*, February 2012.

Supel, T., (1975),"How to use econometric models to forecast", Federal Reserve Bank of Minneapolis, report #12, November 1975.

*Tanner, E., and Samake, I., (2006), "*Probabilistic Sustainability of Public Debt: A Vector Autoregression Approach forBrazil, Mexico, and Turkey", IMF Working Paper, September 2006.

Tornell, A. and Lane, P., R., (1998) "Are Windfalls and Curse: A Non-Representative Agent Model of the Current Account." Journal of International Economics, 44, 83-112.

Woodford, M (1995): "Price level determination without control of a monetary aggregate", Carnegie-Rochester Conference Series on Public Policy, 43.