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ΔΡΑΣΤΗΡΙΟΤΗΤΑ: *DEBT CRISIS, FISCAL AUSTERITY AND THE FINANCIAL FRAGILITY AND INSTABILITY IN THE GREEK ECONOMY*

ΠΑΡΑΔΟΤΕΟ: ΑΝΑΚΟΙΝΩΣΗ ΙΙΙ

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Debt crisis, fiscal austerity and the financial fragility and instability in the Greek economy

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Abstract: Drawing on Minsky's theoretical framework, we critically assess the effectiveness of the currently implemented fiscal austerity measures in the Greek economy. We develop and apply two indexes that encapsulate the financial fragility in the public sector and the macroeconomy. The statistical evidence suggests that over the last 5-6 years prior to the onset of the crisis the public sector was situated in the ultra-ponzi area and the financial fragility of the Greek economy was steadily increasing, making the economy extremely vulnerable to potential shocks. We show that the fiscal austerity measures do not produce a substantial decline in the financial fragility of the public sector; they also set the stage for chronic financial instability in the economy. We call for a fundamental change in the policy mix currently implemented in the Greek economy.

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1. Introduction

On May 9 2010 the International Monetary Fund (IMF), the European Central Bank (ECB) and the European Commission (EC) signed with the Greek government the Memorandum of Economic and Financial Policies (MEFP hereafter). The purpose of the MEFP was to provide financial support to the Greek government on the condition that certain fiscal austerity measures were to be implemented. One and a half year after the signing of the MEFP the financial situation in the public sector remains problematic and the debt of the general government turns out to be unsustainable. In addition the Greek economy is experiencing financial instability: the rise in the rate of non-performing loans is remarkable, the GDP has dropped like a rock, the unemployment rate is worsening and the confidence in the public has collapsed.

The aim of this paper is to use as a basis a Minskyan framework of analysis to critically assess the effectiveness of the currently implemented policies in the Greek economy. In light of this objective, we initially develop two financial fragility indexes. The first pertains to the financial fragility of the government sector of a non-sovereign country; the second captures the financial fragility of the whole macroeconomy. These indexes are applied to the Greek economy for the period prior to the onset of the crisis. The statistical evidence illuminates that the Greek economy was suffering from increasing financial fragility when the MEFP started to be implemented. We then proceed to assess the impact of the MEFP on: i) the financial fragility of the public and the banking sector; ii) the financial instability of the economy. We contend that the fiscal austerity measures do not set the stage for a substantial improvement in the financial status of the public sector; moreover, they amplify the debt-deflation process in the economy.

The paper is organised as follows. Section 2 uses as a basis Minsky's framework to develop a financial fragility index for the government sector of a non-sovereign country. This index is applied to the Greek economy over the period 1988-2009. Section 3 puts forward a macroeconomic financial fragility index that pertains to both the private and the public sector of an economy. The index is estimated for the Greek economy over the period 2000-2009. In section 4 the impact of the currently implemented policies on the financial fragility of the government and the banking

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sector along with the financial instability of the economy is put under detailed scrutiny. By way of conclusion, section 5 calls for a fundamental change in the policy mix currently implemented in the Greek economy.

2. The financial fragility of the government sector

In Minsky's theoretical framework capitalism is conceptualized as an inherently unstable system whereby prolonged economic growth, euphoric expectations and institutional innovations can lead to increasing financial fragility, and eventually to financial instability. In Minsky's framework the Big Government has a prominent role to play in narrowing down the financial fragility of the economy, as well as in preventing a debt-deflation process and a widespread economic downturn.[1] Three are the main channels through which government can act as a stabilizer in the macroeconomy (see Minsky, 1986).[2] First, when the economy experiences a downward spiral the rise in consumption and investment expenditures of the government can place a floor to the aggregate demand and the profits of firms. Second, given that government's creditworthiness is beyond any doubt (Minsky, 1995, p. 206), its bonds have the capacity to play the role of a risk-free asset, thus promoting the stability of the financial system and preventing a deterioration in the expectations of the public.[3] Third, the government can function as an 'employer of last resort', providing work to those that cannot find one in the private sector, with substantial income and employment feedback effects (see Wray, 1998; Papadimitriou, 2008; Argitis and Michopoulou, 2011).

However, in a non-sovereign country, like Greece, these channels may not be operative. Greece and other eurozone countries do not have their own central bank and have relinquished their right for an autonomous fiscal policy.[4] Wray (2003, p. 11) argues that non-sovereign government spending depends on the acceptance of government bonds in the financial markets, which in turn relies on the assessment of the credit risk. If this risk is conceived to be high, then the financing of government expenditures can be put under pressure.

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[1] See e.g. Ferri and Minsky (1992) for the role of the government as a thwarting mechanism.
[2] See also Arestis and De Antoni (2009) and Tymoigne (2010b).
[3] See also Minsky and Adelman (1960).
[4] See Sawyer (2001), Wray (2003), Sardoni and Wray (2006) and Kelton and Wray (2009).

Therefore, in such kind of countries the concept of financial fragility becomes crucial not only for the private but also for the public sector. The reason is twofold. First, the government sector can also be the root cause of financial instability. The higher is the financial fragility of the government sector the higher is the likelihood that a shock will create problems in the ability of government to finance its expenditures. Second, if the economy is brought to a recession due to the poor performance of the private sector, a highly financially fragile public sector may not be able to intervene to produce a rise in demand and employment.

Minsky (1982, p. 33; 1992, p. 28) has pointed out that the financial fragility of the public sector can be categorized into hedge, speculative and ponzi according to its ability to repay its debt payment obligations.[5] Ferrari-Filho et al. (2010) have recently applied the Minskyan taxonomy of finance in hedge, speculative and ponzi to the public sector of Brazil. They define the financial fragility index of the general government as the ratio of the primary surplus to the sum of interest and amortization. More precisely, their index is as follows:

$$FG = \frac{Tr - Te}{Int + Amort} \qquad (1)$$

where Tr denotes the total government revenue, Te stands for the total primary government expenditure, $Amort$ is the amortization of the government debt and Int denotes the interest payments. As FG becomes lower, the financial fragility of the government sector increases. If $FG > 1$, the government sector is hedge: total revenue is larger than the sum of total primary expenditure, interest and amortization. If $1 > FG > 0$ the government sector is characterised as speculative: the primary budget surplus is unable to cover the sum of interest and amortization. Ponzi position corresponds to the case in which the public sector has a primary deficit ($FG < 0$).

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[5] Minsky (1986, p. 230) conceptualises financial fragility distinguishing among three types of financing positions. Hedge finance pertains to units whose expected cash inflows are more than sufficient to cover contractual commitments now and in the future. Speculative units have expected cash inflows that are unable to cover the cash payment commitments in the near term. These units fail to repay the amortization and need to turn to new finance in order to cover the financing gap. Ponzi units are similar to speculative ones. Their additional feature is that they cannot reimburse their interest obligations. Minsky (1986, p. 233) points out that the financial fragility of an economy is greater the greater the weight of speculative and ponzi units.

However, the above-mentioned index exhibits two shortcomings. First, if it is negative $(Tr < Te)$, the financial fragility of the public sector turns out to increase as the sum of interest and amortization $(Int + Amort)$ becomes smaller. This seems counterintuitive, as an increase in debt obligations of the government should decrease the index, portraying a rise in the financial fragility. Second, the implementation of Minsky's categorization requires a distinction between the situation in which the government sector is capable of financing its interest without new finance and the situation in which this is not the case. This is not taken explicitly into account in the index of Ferrari-Filho et al. (2010).

To deal with these two drawbacks, we put forward the following financial fragility index for the government sector of an economy:

$$FG' = \begin{cases} \dfrac{Tr - Te - Int}{Amort}, & \text{if } Tr - Te \geq Int \geq 0 \\[3em] \dfrac{Tr}{Te + Int + Amort} - 1, & \text{if } Tr - Te < Int \text{ and } Tr - Te \geq 0 \\[3em] \dfrac{Tr}{Te + Int + Amort} - 2, & \text{if } Tr - Te < 0 \end{cases} \tag{2}$$

where FG' is our proposed financial fragility index for the government sector. The minimum value of the index is equal to -2. The financial fragility of the public sector increases as the index takes lower values. If the index takes values above 1 the public sector is characterized as hedge. This indicates that the primary surpluses cover the debt obligations. Speculative public sector pertains to the situation in which the primary surpluses are larger than the interest but less than the sum of interest and amortization. Then the index takes values between 0 and 1. Ponzi public sector cannot repay even the interest and must resolve to new finance. In this case the index takes values below 0 and above -1. Finally, the public sector is characterized as ultra ponzi when the primary balance is negative: the index lies between -2 and -1. The public

sector must resort to new borrowing to finance both the debt obligations and the amount of total primary expenses that cannot be covered by total revenue.

The proposed financial fragility index for the government sector resolves the two above-mentioned problems in the index of Ferrari-Filho et al. (2010). In particular, once the financial fragility index takes negative values, it becomes more negative as the debt obligations increase. Second, if the primary balance does not cover the sum of interest and amortization of the public sector, there is a distinction between a situation in which it can cover the interest (the index takes values between 0 and 1) and the situation in which this is not possible (the index takes values between -1 and 0).[6]

We proceed to estimate the proposed index for the government sector of Greece.[7] Figure 1 clearly shows that over the period 1988-2009 the financial fragility of the government sector in Greece was situated either in the ponzi or in the ultra ponzi area. Most of the years under examination the Greek public sector was financing its debt obligations entirely through external finance since the total revenue were failing to cover total primary expenditures. More precisely, over the 1988-1993 and 2003-2009 time spans the public sector is characterized as ultra ponzi. Over the remaining years it is situated in the ponzi area since the government runs primary surpluses.
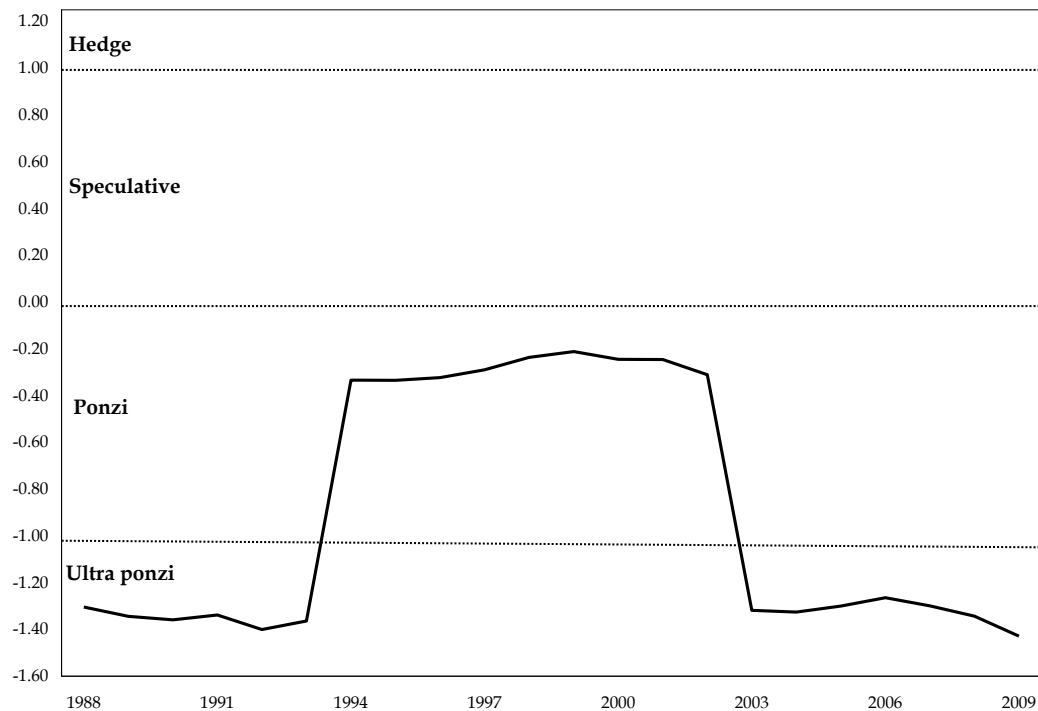
It is important to note that the index starts increasing since 1993, which implies that the financial fragility gradually decreases in the period before Greece enters the eurozone. The financial fragility index of the government sector attains its maximum value at the year 1999, when Greece was assessed regarding its capacity to be a member of the eurozone. However, since 2000 the financial fragility of the government sector starts growing and 6 years before the onset of the sovereign debt crisis the public sector is situated again in the ultra ponzi area. Notice that the interest payments do not seem to have any impact on the increasing financial fragility after

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[6] The proposed financial fragility index focuses on cash inflows and cash outflows from the operating activities of the public sector. This means that the index does not take directly into account the privatization receipts. However, the privatisation receipts have an indirect impact on our index. As they become larger, the sovereign debt declines (see e.g. European Commission 2011, p. 33). This brings down the interest and amortization for the subsequent years, thereby affecting indirectly the proposed index.

[7] See the appendix for the description of the data sources.

2001. More specifically, we observe that the interest payments in percent (%) of GDP were becoming steadily lower since 2001 (see figure 2). With the interest rate on Greek government bonds decreasing, interest payments as a percent (%) of GDP remained approximately below 5% since 2003.

Figure 1. Financial fragility index of the government sector, Greece, 1988–2009

Source: Eurostat, Bank of Greece and Hellenic Republic Ministry of Finance

At this point we should draw attention to the following issue. The figures for the financial fragility index over the period 1988-2000 are not directly comparable with the figures for the index over the 2001-2009 time span. The reason is straightforward: before 2001 Greece was a sovereign country. This implies that being ultra-ponzi after 2001 is a much more risky situation than being in this scheme in the years before the entrance to the eurozone. In a non-sovereign country a high level of financial fragility increases the likelihood that the country will not be capable at some point in time to have access to the bond market.

Figure 2. Interest and amortization in percent (%) of GDP, Greece, 1988-2009

Source: Eurostat, Bank of Greece and Hellenic Republic Ministry of Finance

Let us now briefly examine the underlying reasons that were conducive to the evolution of the financial fragility index of the government sector. Three are the main points. First, the amortization in percent (%) of GDP appears to correlate with the financial fragility index of the government. Figure 2 shows that the amortization was getting increasingly high since 2002 (with the exception of 2006) contributing to a large extent to the downward move of the index. Second, from Table 2 it turns out that total revenue in percent (%) of GDP in Greece was significantly lower than the average in the EU. In the period between 1995 and 2000 the total revenue gradually increased and got closer to the EU-15 magnitude. However, since the entrance to the eurozone there was a progressive slowdown of the total revenues. We get to the conclusion that the existence of low total revenues is potentially the main root cause of the rise in the financial fragility of the government sector.[8]

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[8] It is interesting to note that the main reason that total revenue of the Greek public sector was smaller in size than the average EU was due to tax evasion in Greece.

Table 1: Total government revenue, total government primary expenditure in percent (%) of GDP, Greece and EU-15, 1995-2009

	Total government revenue (*Tr*)		Total government primary expenditure (*Te*)	
	Greece	EU-15	Greece	EU-15
1995	36.7	45.2	34.5	47.2
1996	37.4	45.9	33.6	44.8
1997	39.0	45.9	35.6	43.7
1998	40.5	45.7	36.2	43.1
1999	41.3	46.1	37.0	43.1
2000	43.0	45.7	39.3	41.7
2001	40.9	45.1	38.8	42.8
2002	40.3	44.4	39.5	43.6
2003	39.0	44.4	39.8	44.4
2004	38.1	44.2	40.7	44.2
2005	38.6	44.7	39.3	44.3
2006	39.2	45.2	40.5	43.9
2007	40.0	45.2	41.9	43.2
2008	39.9	45.1	44.7	44.5
2009	37.3	44.5	47.6	48.6

Source: Eurostat, AMECO

Third, the picture for the total primary expenditure as a percent (%) of GDP is different. Over the most of the period under consideration, the total primary expenditures as a percent (%) of GDP was in Greece significantly lower than that of the EU respective magnitude. We observe that only in 2008 Greece had higher primary expenditure relative to the average in the EU. However, it must be noted that the primary expenditures followed an upward trend over the period 2007-2009. This suggests that over the last 2 years prior to the debt sovereign crisis, the decline in the fragility index was matched by a rise in total primary expenditures. Despite this recent increase, it can be argued that the main culprit of the increase in the financial fragility of the government sector over the period 2001 to 2009 was the existence of low total government revenues and high amortization; the contribution of the size of primary expenditures and of the interest payments of the government seems to have been much lower.

3. The financial fragility of the macroeconomy

In a non-sovereign country, like Greece, the financial fragility of the government sector is of paramount importance. Nonetheless, it provides only a part of the whole picture. An overall assessment requires the evaluation of the financial fragility of both the private and the public sector.

Using as a basis the Minskyan framework, various researchers have attempted to measure the financial fragility in the private sector of modern capitalist economies. As far as the household sector is concerned, Pollin (1990), Brown (2007) and Tymoigne (2007, 2010a) have measured households' financial fragility for the US economy, using the debt service ratio, which is equal to the ratio of households' debt obligations to their disposable income.[9] Financial fragility may arise as a result of the increase in interest payments, or in the shortage of income, or both.

There have also been some attempts to measure the financial fragility of the non-financial corporate sector. For example, Wolfson (1990, 1995) has argued that the financial fragility of the non-financial corporate sector can be portrayed by the ratio of net interest payments to gross capital income (before tax-profits plus depreciation plus net interest). The higher is this ratio the higher is the financial fragility of this sector. The fragility of the non-financial corporate sector can also be captured by applying the categorization of Minsky into hedge, speculative and ponzi units. Schroeder (2002, 2009) applies for the Thailand and the New Zealand economy Foley's (2003) version of hedge, speculative and ponzi categorization. Firms are considered hedge when the rate of profit is larger than the rate of accumulation plus the rate of interest. When the rate of accumulation is greater than the profit rate, firms are classified as speculative. Ponzi finance corresponds to the situation in which the interest rate is higher than the profit rate. Arza and Espanol (2008) make use of another type of Minskyan taxonomy to measure the financial fragility in the Argentinean firms. Hedge finance exists when the cash flows (operating net earnings plus depreciation) of the firms can cover the short term liabilities and interest payments. Speculative finance is the occasion in which the firms cannot repay the short term liabilities but they can cover the interest payments out of the cash inflows. Ponzi units cannot reimburse the sum of interest payments and short term liabilities.

As for the financial fragility of the banking sector, this has been estimated by Wolfson (1990, 1995) using the loan loss ratio (the ratio of net loan losses charge of less

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[9] A similar index that captures financial fragility is the financial obligation ratio (see e.g. Cynamon and Fazzari, 2008). Compared to the debt obligation ratio, the financial obligation ratio also includes in the households' obligations the automobile lease payments, the rental payments on tenant occupied property, the homeowners' insurance and the property tax payments.

recoveries to average loans outstanding) for the United States. An upward movement of the loan loss ratio is indicative of an increase in the financial fragility of the banking sector. Knutsen and Lie (2002) have also used the loan loss ratio to capture the financial fragility of the banks in Norway.

Nonetheless, a limitation of the above-mentioned works is that they do not consider the financial fragility of the whole private sector. Thus, they can at best provide only a limited picture of private sector's financial fragility. Minsky and Meyer (1972) have made a similar argument and have applied different indicators to measure the financial fragility of the private sector in the United States. Recently, Tymoigne (2011) has constructed financial fragility indexes for the whole private sector, namely households, non-financial corporate sector and financial business sector. The financial fragility is captured by both liquidity and solvency indexes. Tymoigne (2011) assesses the financial fragility index of each sector and includes, apart from the debt service ratio, the growth rate of outstanding total liabilities and net worth. As the growth rate of these variables increases, the index of each sector increases indicating accordingly the culminating financial fragility in the corresponding sector.

Tymoigne (2011) estimated the constructed index for the US economy, i.e. for a sovereign country. In this paper we intend to construct an index for a non-sovereign country. Thus, our approach constitutes a synthesis of Tymoigne's (2011) and Ferrari-Filho et al. (2010) theoretical considerations. We build a macroeconomic financial index that exhibits the following two features. First, it is applied to both the public and the private sector in order to capture the financial fragility of the whole economy. Second, liquidity and solvency indicators are used in order to construct a financial fragility index of each sector.

We first consider the liquidity index (L_i) for the three private sectors. This is the following:

$$L_i = \frac{Int_i}{Yd_i} \qquad (3)$$

where $i = H, NF, F$; the symbols *H*, *NF* and *F* correspond to household, non-financial corporate and financial sector, respectively; Int_i denotes the interest income paid by sector *i*; *Yd* is the gross disposable income before interest income paid for the household sector and the gross entrepreneurial income before interest income paid for the non-financial corporate and financial sector. The higher the value of the index, the larger the liquidity problems the corresponding sector is likely to face.

In order to build the liquidity index of the government sector we use an alternative definition equal to one minus the ratio of total revenue to the sum of interest, amortization and total primary expenditures. In other words, the liquidity index of the public sector is expressed by the following formula:

$$L_G = 1 - \frac{Tr}{Amort + Int + Te} \tag{4}$$

where L_G is the liquidity index of the government sector. The index indicates that an increase in total government revenue or a decrease in amortization, interest payments or primary expenditure decrease, *ceteris paribus*, the liquidity problems of the government sector making it less vulnerable to external shocks.

The solvency index is defined as the ratio of liabilities to assets under the condition that the assets are larger than the liabilities. If this condition does not hold, the solvency index is equal to one minus the ratio of assets to liabilities. In particular, the solvency index for both the private and the public sectors is calculated as follows:

$$S_i = \begin{cases} \dfrac{Liab_i}{As_i}, & \text{if } As_i \geq Liab_i \\[4mm] 1 - \dfrac{As_i}{Liab_i}, & \text{if } Liab_i > As_i \end{cases} \tag{5}$$

where $i = H, NF, F, G$; the symbol *G* corresponds to the government sector, S_i is the solvency index of sector *i*, As_i denotes the assets and $Liab_i$ denotes the liabilities of

the *i* sector. This index expresses the insolvency risk in each sector. When there is a decrease in the possession of assets relative to liabilities, the solvency index increases, pinpointing the higher insolvency risk.

Given the liquidity and solvency index, it is possible to determine the financial fragility index of each sector. The weight of each index in the financial fragility index is arbitrarily equal to 0.5. Accordingly, the financial fragility index of sector *i* is equal to:

$$F_i = 0.5L_i + 0.5S_i \tag{6}$$

where $i = H, NF, F, G$; F_i is the financial fragility index of sector *i*. An increase in the liquidity index or in the solvency index of each sector will push upwards its financial fragility index. To put it differently, the higher is the value of the index the greater the financial fragility of the sector. Higher financial fragility increases the probability of occurrence financial instability.

The macroeconomic financial fragility index (F_E) is defined as follows:

$$F_E = w_H F_H + w_{NF} F_{NF} + w_F F_F + w_G F_G \tag{7}$$

The weight of each index (w_i) is equal to the gross value added of each sector in percent of the total gross value added.[10]

For the purposes of our analysis, it is useful to also define the relative contribution (C_i) of each sector's financial fragility to the overall fragility. This is given by the following formula:

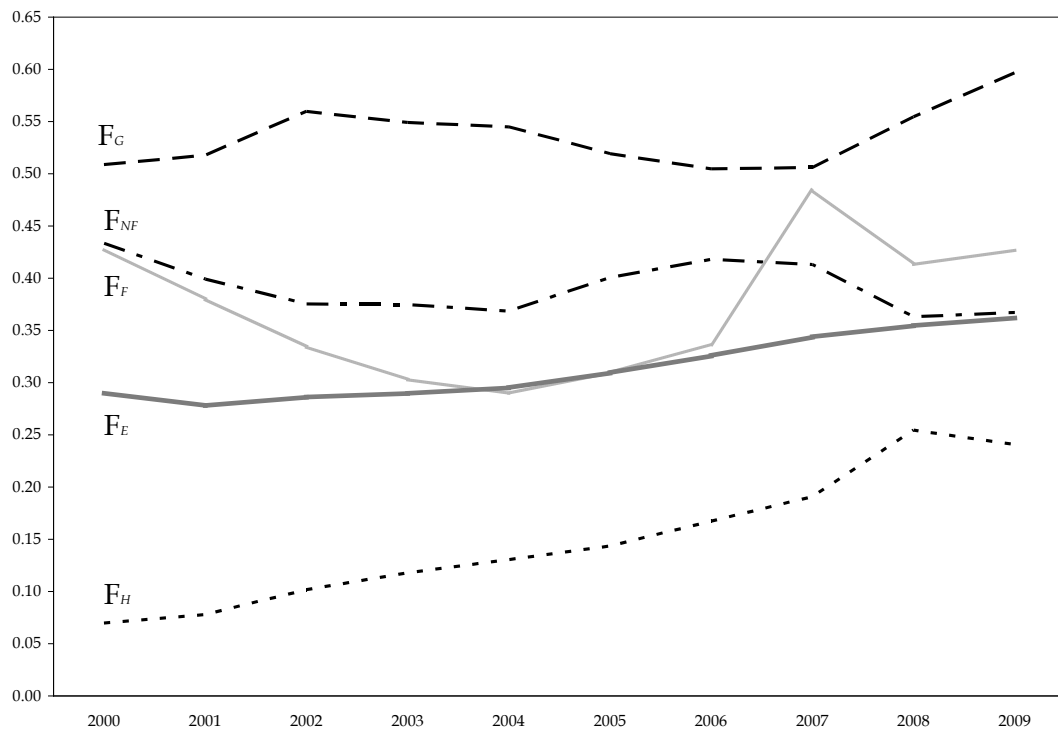$$C_i = \frac{w_i F_i}{F_E} \tag{8}$$

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[10] The gross value added of each sector is equal to the GDP of the economy minus taxes and plus subsidies on products.

When C_i increases, the contribution of the financial fragility of sector i to overall macroeconomic fragility becomes higher. This implies that there is a rise in the probability that an adverse shock in this sector will be the root cause of financial instability in the economy.

We move on to present the above-mentioned indexes for the Greek economy over the period 2000-2009. The results are reported in Figure 3. The following points can be made. First, the financial fragility of the government sector was growing within the 2000-2002 and 2007-2009 time spans. This is widely in line with the evolution of the index presented in section 2. The slight differences that can be observed within the 2003-2006 time span stem from the fact that there was an improvement in the solvency index, due to the rise in the shares and other equities acquired by the government sector. These slight differences do not alter the main inferences of the analysis: i) the financial fragility of the Greek government sector was steadily rising over the post-EMU period; ii) the government sector was the most financially fragile sector of the economy.

Second, there was a substantial deterioration in the financial fragility of households over the period 2000-2008. This mirrors the increase in both the solvency and liquidity indexes. The key driver of the rise in the financial fragility was the growing borrowing of households, which made higher their debt obligations and liabilities, relative to their disposable income and assets, respectively. In 2009 the financial fragility index dropped slightly as a result of the lower credit expansion due to the financial crisis. Although households' financial fragility is the lowest compared to the other sectors of the economy, the fact that it was steadily increasing prior to the onset of the crisis has made the household sector vulnerable to potential shocks. It is also noteworthy that such a shock is likely to have substantial implications for the private consumption of the economy.

Figure 3. Financial fragility indexes: government, households, non-financial corporations, financial sector and the macroeconomy, Greece, 2000–2009

Source: Eurostat, Bank of Greece and Hellenic Republic Ministry of Finance

Third, the financial fragility of the financial sector was declining over the period 2000-2004. This is basically associated with the improvement in the liquidity index as a result of the increasing profitability in this sector. After 2004 the index started shifting upwards: this was associated with the rise in the liabilities and the interest income paid by the financial sector. In 2008 the index decreased substantially, before increasing again in 2009. Fourth, there is no consistent pattern as far as the financial fragility of non-financial corporations is concerned. In general, the fragility of this sector did not change significantly over the period under consideration.

Fifth, the financial fragility of the macroeconomy was steadily increasing. The most important rise took place over the period 2004-2009: the index reached from nearly 0.29 in 2004 to more than 0.36 in 2009. This rise stemmed basically from the deterioration in the financial status of the government and households. In 2009 the financial fragility of the economy was at its peak. Therefore, the sovereign debt crisis that erupted in 2009 found the Greek economy in a highly financially fragile situation.

At this point it is useful to also have a look at the relative contribution of each sector to the overall financial fragility. As we have already elaborated, the financial fragility of each sector may affect the macroeconomic index differently. From Table 2 two main points can be inferred. First, the non-financial corporations had the most significant contribution to the determination of the overall financial fragility. The sum of the contributions of the non-financial corporate sector and the household sector lies between 0.77 and 0.81. On the other hand, the financial sector contributed at least to the determination of the macroeconomic fragility. However, the latter should be interpreted with caution: the value added of the financial sector is *a priori* small. Thus, a different way of constructing weights would potentially portray a higher contribution of the financial sector to overall fragility.

Table 2: Contribution of each sector to the macroeconomic financial fragility index, Greece, 2000–2009

	Non-financial corporations	General government	Financial corporations	Households
2000	0.57	0.25	0.08	0.10
2001	0.56	0.26	0.06	0.12
2002	0.51	0.29	0.05	0.15
2003	0.52	0.27	0.04	0.17
2004	0.50	0.27	0.05	0.18
2005	0.51	0.25	0.05	0.19
2006	0.50	0.24	0.05	0.21
2007	0.48	0.23	0.07	0.22
2008	0.41	0.25	0.06	0.28
2009	0.39	0.29	0.06	0.26

Source: Eurostat, Bank of Greece and Hellenic Republic Ministry of Finance

Second, we can observe that over the period 2000-2009 the contribution of the non-financial corporations was steadily decreasing; on the other hand, the contribution of the household sector to financial fragility was growing. Thus, the household sector became more important in the determination of the macroeconomic fragility. The contribution of the other two sectors remained almost unchanged.

To sum up, the above statistical evidence highlights that the growing financial fragility in the Greek economy over the last 5 years was mainly linked with the increasing fragility of households and the government. The financial fragility of the financial sector was also substantial, even though our index suggests that it did not contribute significantly to the rise in the overall financial fragility.

4. Fiscal austerity measures in the Greek economy: Are they effective?

In the spring of 2010 the government sector could not keep up financing its budget deficit through the sovereign bond markets, due to the excessive rise in the interest rate of the government bonds. On May 9 2010 the IMF, the ECB and the EC signed with the Greek government the MEFP. The purpose of MEFP was to provide financial support to the Greek government, on the condition that certain fiscal austerity measures were to be implemented.[11] The IMF and the European Commission were agreed to be responsible for observing the execution of the budgetary performance criteria[12], the structural fiscal reforms and the privatization of state-owned enterprises.

The fiscal measures included in the MEFP can be divided into two sides: the tax revenue side and the primary government expenditure side. At the tax revenue strand the measures targeted to increase the value added tax (VAT) rates in order to reduce the budget deficit by 1.2 billion euros. At the primary government expenditure side the main aim was to reduce the budget deficit by 4.5 billion euros via i) the decrease in public consumption and investment expenditures and ii) the decline in the wages of the public sector employees and in the pensions. It is important to point out that not all measures were identified in the initial agreement. A significant proportion of these measures were agreed to be identified in 2011.

In June 2011 the Greek government designed and voted in the Greek parliament the Medium Term Fiscal Strategy (MTFS hereafter).[13] Table 3 reports these measures and their quantitative effect on the budget deficit. The measures focus on the extra cut of wages in the public sector employees, the decline in primary expenditures (state operations expenditure, state transfers to local governments, extra-budgetary funds expense, social benefits, defense expenditure, healthcare and pharmaceutical expenditure) and the increase in taxes via a further rise in VAT. The distinguishing feature of the MTFS is the privatization program, the aim of which is to decrease the public debt by 50 billion euros over the period 2011-2015.

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[11] The MEFP was established under the law No. 3845/2010.

[12] The quantitative performance criteria are in terms of a ceiling of state budgetary primary spending, on overall stock of central government debt, on new central government guarantees and on non-accumulation of external debt payments arrears by the general government.

[13] The MTFS passed into law on July 1 2011.

Table 3: Privatization receipts and measures' effect on the budget deficit under the Medium Term Fiscal Strategy (MTFS), in million euros, Greece, 2011-2015

	2011	2012	2013	2014	2015
Privatization receipts	3,000	7,500	11,000	13,500	15,000
Total measures	6,115	7,566	4,374	4,932	3,964
Wage bill	770	600	448	306	71
Operational expenses	190	92	161	323	370
Extra-budgetary funds	540	150	200	200	150
State-owned enterprises		414	329	297	274
Defense expenditure			133	133	134
Health care and pharmaceutical spending	310	697	349	303	463
Social benefits	1,188	1,230	1,025	1,010	700
Investment spending	950	350	350	350	350
Other expenditure	150	355	345	350	305
Tax compliance			878	975	1,147
Tax policy	2,017	3,678	156	685	

Source: IMF (2011), European Commission (2011)

Table 4 shows the evolution of the main fiscal variables over the period 2011-2015, if all the aforementioned measures are to be implemented. At a first sight, the aim of MTFS is to eradicate the primary deficit and transform it into a primary surplus of 1.5% of GDP in 2012. The MTFS's target of decreasing deficit will be successful if the revenue remains at an almost constant level and primary expenditure gradually decreases. The MFTS' target is to increase the taxes on income and property and to cut wages in the public sector. According to the IMF's projections, the gross debt in percent (%) of GDP will keep rising till 2012 and will start to slow down since 2013.

Table 4: General government forecast under the Medium Term Fiscal Strategy (MTFS), in percent (%) of GDP, Greece, 2011-2015

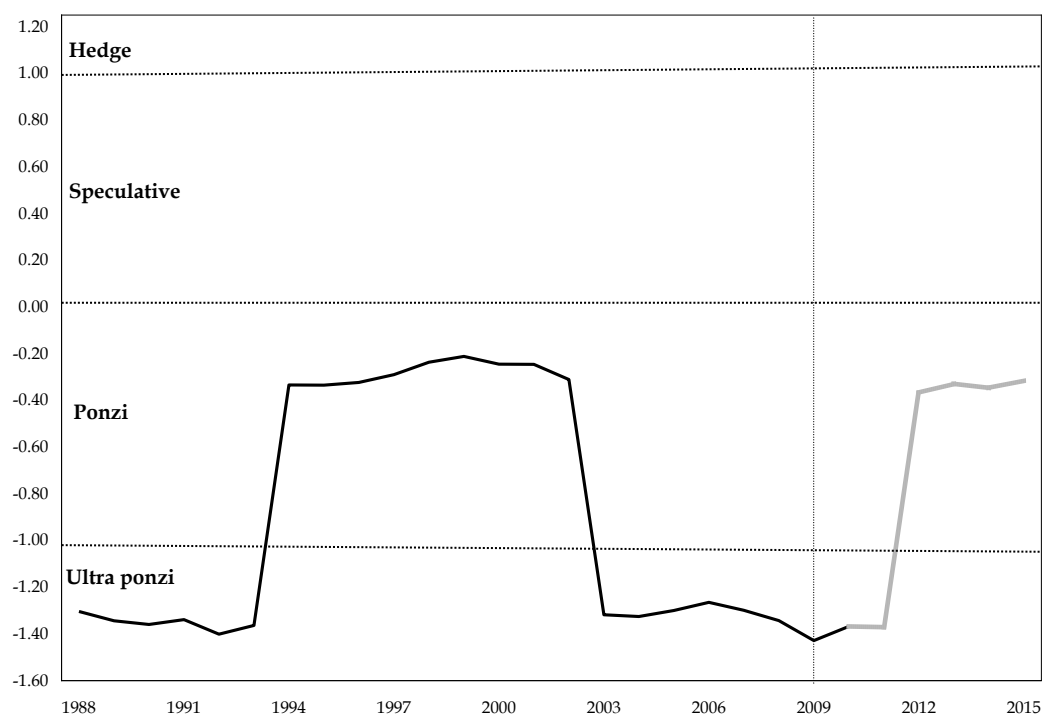|	2011	2012	2013	2014	2015
General government balance	-7,6	-6,5	-4,8	-2,6	-1,5
General government primary balance	-0,8	1,5	3,6	6,4	7,7
Total revenues	40,9	42,2	41,9	42,0	41,6
Taxes on income and property	7,4	7,9	7,9	8,2	8,4
Primary expenditure	41,7	40,8	38,3	35,6	33,9
Wages of the public sector	11,0	10,3	9,2	8,4	8,1
Interest	6,8	8,0	8,4	9,0	9,2
Gross debt	166,0	172,0	170,0	160,0	146,0

Source: IMF (2011)

The key issue is to what extent the above-mentioned measures are capable of decreasing the financial fragility of the public sector and bringing the recession to the end. Figure 4 plots the financial fragility index for the Greek government over the period 1988-2015. The public sector became in 2010 less financial fragile in

comparison to 2009. This picture of a decreasing financial fragility of the government is consistent with the implemented initial fiscal austerity measures of MEFP that brought down the total primary expenditure and increased the total revenue of the government. Nevertheless, the public sector remained in the ultra ponzi area along with increased debt obligations.

The data for the 2011-2015 time span rely on the forecasts of the IMF (2011). Given the hypothesis of a primary surplus in 2012 the public sector is expected to turn from the ultra-ponzi to the ponzi scheme.[14] However, three points are in order. First, despite this anticipated jump into the ponzi area no significant improvement is expected to occur after 2012. The underlying reason is that the interest and amortization amounts will remain extremely high over this period, preventing the index to move further upwards, despite the hypothesized continuous decline in the primary deficit.

Figure 4. Financial fragility index of the government sector, Greece, 1988–2015

Source: Eurostat, Bank of Greece, Hellenic Republic Ministry of Finance and IMF (2011)

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[14] Interestingly, the privatization flows are not enough for the public sector in order to jump into the speculative area.

Second, the macroeconomic scenario that is behind the IMF projections is extremely optimistic. Table 5 shows the hypotheses regarding the evolution of the GDP components over the period under consideration. We can observe that the key driver behind the rise in the GDP after 2012 is the private and external sectors. The formula is that the exports, private consumption and the private gross fixed capital formation will increase significantly and will contribute to the rise in the GDP. However, it is questionable whether Greece will reach a positive real growth rate of output given that the investor sentiment has collapsed. It is not by accident that this scenario has already overturned: the most recent estimates suggest that the GDP growth rate will be -2.5% in 2012 (see Hellenic Republic Ministry of Finance, 2011).
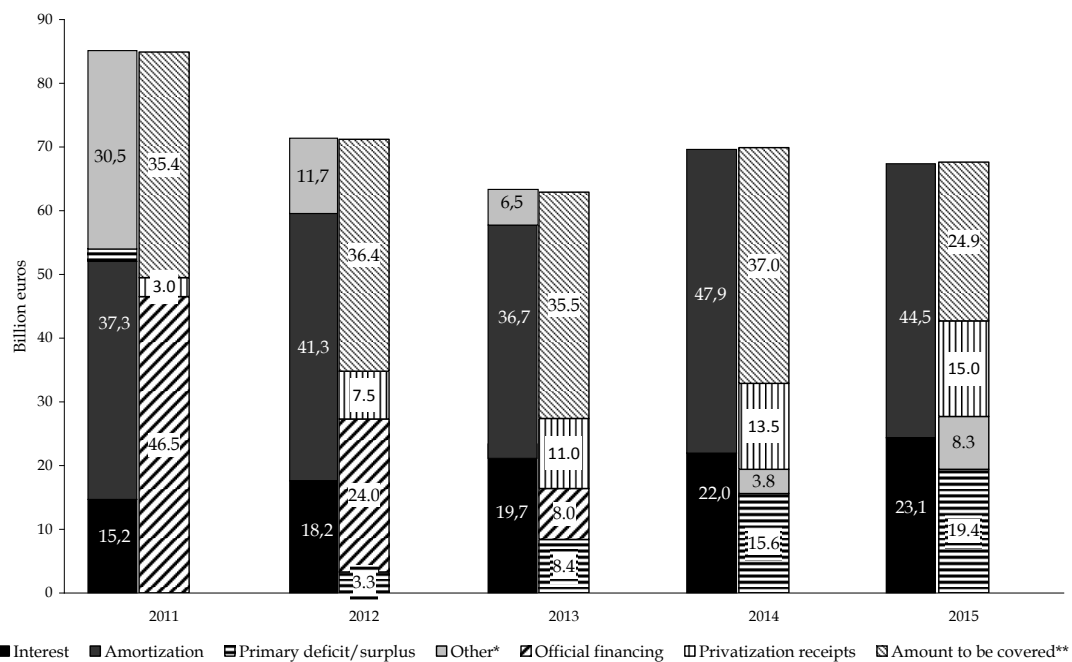
Table 5: Real GDP and components of nominal GDP under the Medium Term Fiscal Strategy (MTFS), in percentage (%) change, Greece, 2010-2015

	2010	2011	2012	2013	2014	2015
Real GDP	-4,5	-3,9	0,6	2,1	2,3	2,7
Nominal private consumption	-4,6	-4,9	-1,2	1,1	1,2	1,4
Nominal public consumption	-8,3	-8,4	-5,0	-1,0	-0,3	0,3
Nominal gross fixed capital formation	-16,5	-8,8	-1,5	2,7	4,0	5,0
Change in stocks (contribuiton)	1,6	0,1	0,0	0,0	0,0	0,0
Nominal exports of goods and services	3,8	6,4	6,7	6,5	6,6	6,8
Nominal imports of goods and services	-4,8	-4,2	-3,3	1,9	2,8	3,2

Source: IMF (2011)

Our third point rests on figure 5 which provides a more detailed consideration of the liquidity status of the public sector, showing the financing needs and the financing sources of the public sector over the period 2011-2015. On the left column of the figure there are the financing needs of the government sector due to interest payments, amortization, primary deficit (whenever it exists) and other amounts (bank assistance and stock-flow adjustments). On the right column the financing sources of the government sector are depicted: primary surplus (whenever it exists), official financing via the MEFP, privatization receipts and a remaining amount that is to be covered by a combination of voluntary private sector rollover, new funding from euro area member states and the assumed access to the bond market. Figure 5 clearly shows that despite the creation of budget primary surpluses, these amounts cannot cover more than 28 percent of the interest and amortization payments. This data allows us to argue that, even if the macroeconomic scenario turns out to be true, the improvement in the financial status of the public sector will not be substantial.

Figure 5. Financing needs and sources of the public sector, in billion euro, Greece, 2011-2015

Source: IMF (2011)

* Other amounts include bank assistance and stock-flow adjustments.

** Amount to be covered consists of voluntary private sector rollover, new funding from euro area member states and market access of the public sector.

We move on to consider the impact of the crisis and fiscal austerity measures on the financial fragility of the banking sector and the instability in the economy. Our analysis relies on table 5, which depicts the real GDP and its nominal components for the period 2010-2015, and on table 6 that presents some indicators for the banking sector over the period 2006-2015.

The financial fragility of the banking sector can be proxied by two ratios: i) the loans to deposits ratio[15] and ii) the ECB liquidity support to liabilities ratio. As these ratios become higher the financial fragility of the banking sector arguably increases. From table 6 we can see that in 2009 the loans to deposits ratio started going upwards. This increase is the outcome of lower deposits in the Greek banking sector, which in turn emanates from the decline in macroeconomic activity (which decreases the households' wealth) and the deterioration in expectations of households and firms. The banking sector has used as a substitute the liquidity of the ECB: the ratio of ECB

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[15] See Forman et al. (1984) for a theoretical proposition and Cozzi and Toporowski (2006) for an application in the Southeast Asian countries.

liquidity support to liabilities starts increasing in 2009. It is also noteworthy that the deposits relative to liabilities continue to decline in 2010 and 2011. Overall, the rise in uncertainty and the economic contraction have amplified the financial fragility in the banking sector.

Table 6. Banking sector indicators, 2006-2015

	Loans to deposits	ECB liquidity support to liabilities	Capital and reserves to liabilities	Deposits to liabilities	Rate of non performing loans*
2006	1.08	0.02	0.08	0.66	5.40
2007	1.07	0.02	0.07	0.64	4.50
2008	1.07	0.09	0.06	0.60	5.00
2009	1.11	0.10	0.08	0.57	7.70
2010	1.28	0.19	0.09	0.54	10.40
2011	1.41	0.22	0.10	0.51	11.50
2012	1.36	0.18	0.11	0.54	
2013	1.31	0.15	0.11	0.57	
2014	1.27	0.11	0.12	0.59	
2015	1.22	0.09	0.12	0.62	

Source: IMF (2011)

*The rate of non performing loans for 2011 is for Q1.

The IMF projections suggest that the fragility of the banking sector will be driven down in the period 2012-2015. This relies on the assumption that the deposits in the banking sector will increase and the ECB liquidity support will become smaller. However, given the increasing uncertainty in the Greek economy and the lower income of households (due to wage decreases and tax increases) it remains particularly questionable whether banks' deposits will increase to bring down their financial fragility.

The next issue is the impact of the implemented measures on the overall macroeconomic performance.[16] In section 3 we pointed out that before the onset of the crisis the Greek economy was experiencing growing financial fragility. Following Minsky, we can argue that the implementation of fiscal austerity measures in an economy which is financially fragile and has already entered in a deep recession is expected to have devastating effects on the overall macroeconomic performance. This is particularly clear if someone looks at the GDP growth in years 2010 and 2011. There is a substantial drop in the GDP, which stems from the brisk decline in the public consumption and investment expenditures. Simultaneously, the private

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[16] See also Papadimitriou et al. (2010).

expenditures do not seem to fill the gap in aggregate demand that has been created by the decrease in public expenditures.

This decline in the GDP has negative feedback effects on the financial instability of the economy. Table 6 shows the noteworthy rise in the rate of non-performing loans, which has risen from 7.70% in 2009 to 11.50% in 2011. Overall, the decrease in the wages of the public sector employees and in social benefits along with the increase in taxes lead to a shrinkage in income of household and a decline in their ability to meet payment commitments. These conditions put the grounds of an amplifying debt-deflation process.

5. Conclusions

In this paper, a Minskyan framework of analysis was used to assess the fiscal austerity measures in the Greek economy. Applying financial fragility indexes for the public sector and the macroeconomy we pinpointed the growing financial fragility in the Greek economy over the last 5-6 years prior to the onset of the crisis. We then used statistical evidence that relies on IMF's projections to evaluate the impact of the austerity measures on the financial fragility of the government and banking sectors, as well as on the financial instability of the economy. Our analysis casts considerable doubt on the effectiveness of the programme agreed by the IMF-ECB-EC and the Greek government. One and a half year after the implementation of fiscal austerity measures the Greek economy remains mired in a depression, without any prospect for a substantial improvement in the financial fragility of the government sector.

Our analysis calls for a fundamental change in the policy mix currently implemented in the Greek economy. Since the austerity measures amplify the financial instability in the economy, the pressure for adopting such kind of measures should be relieved. The target of decreasing the high budget deficit should be set on a medium-term basis rather than on a short-term one, paying particular attention to the decrease in tax evasion. The latter was shown to be the root cause of the rise in the financial fragility of the government sector in the period prior to the onset of the crisis. Furthermore, the emphasis should be placed on measures and policies that enhance economic growth and employment both in the short- and the medium-term.

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Appendix: Description of data sources

Definition	Period	Database
Total government revenue (Tr)	1988-2010	Eurostat
Total government primary expenditure (Te)		Eurostat
Interest payments of the government sector (Int)		Eurostat
Amortization of central government and social security funds ($Amort$)		General Directorate of the treasury and the budget public debt directorate, Hellenic Republic Ministry of Finance and Bulletin of conjectural indicators, Bank of Greece
Interest income paid of the i private sector (Int_i)	2000-2009	Eurostat
Income before interest payments of the i private sector (Yd_i)		Eurostat
Assets of the i sector (As_i)		Eurostat
Liabilities of the i sector ($Liab_i$)		Eurostat
Gross value added (w_i)		Eurostat
Total government revenue (Tr)	2011-2015	IMF (2011)
Total government primary expenditure (Te)		IMF (2011)
Interest payments of the government sector (Int)		IMF (2011)
Amortization of central government and social security funds ($Amort$)		IMF (2011)
Loans		IMF (2011)
Deposits		IMF (2011)
ECB liquidity support		IMF (2011)