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Government Debt and Nominal GDP in the Great Recession: All Intentional?

Filename: B_NomGDP

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Abstract *Among the costs of the Great Recession, the adoption of expansionary fiscal policies surely contributed to increase government debt. In the OECD area, however, the resulting jump in the Debt-to-GDP ratio was not only due to extra public spending, at least because such policies were not easily allowed in the Eurozone. A second reason is the occurrence in 2009 (and also later in some cases) of an unusual nominal recession, increasing the debt ratio whatever fiscal policy was pursued. This introduced in the ratio a new asymmetry since a higher fiscal numerator was no longer offset by a, normally rising, nominal GDP denominator. Using a simple accounting scheme, the sources of the debt ratio increase during the 2008-13 crisis years and those immediately before (2000-07) are evaluated, comparing the US and the UK data with those of the four biggest Eurozone countries. In general, deficits, inflation and real growth do not have the same weight before and during last crisis. Differences are also found for countries pursuing expansionary fiscal policies in hard times (US, UK and, partially, also Spain and France) and countries like Italy and, especially, Germany following more prudential lines: in the first case, because of the limited fiscal space and, in the second, because of an unconditional concern for stability.*

Keywords*: Sovereign Debt, Inflation, International Business Cycles (JEL: H63, E31, F44)*

1. Introduction

No size of government debt can be considered sustainable, unsustainable or simply large unless related to some benchmark which almost naturally refers to nominal GDP. Since in the postwar evidence a rising nominal GDP was the rule, the attention paid to the Debt-to-GDP ratio was basically confined to the numerator, given the confidence that inflation and real growth could somehow compensate.

Last crisis was, indeed, an exception: not only because of its depth and of the largest number of countries ever involved (Fiorito, 2013) but also because in 2009 it firstly displayed a *nominal* recession that affected ¾ of the OECD countries and the Eurozone (henceforth: EZ) periphery also later.[2] The coexistence of little (or even negative) growth rates with unusually low inflation increased the Debt-to-GDP ratio also through a low growing denominator, whatever fiscal policy was actually pursued. However relevant, this issue did not receive enough attention and in Europe was basically ignored in the EZ fiscal policy design, given the dominance of the inflation target despite prices recently rose well below the 2% threshold. The depth of the recession did activate instead an academic debate on the benefits of government spending (especially in bad times) versus the reasons of the previously avowed, prudential, views.

The implied multiplier disputes, however, basically rest on estimating the effects of *purchases* that in most of the OECD countries are about 1/5 of total outlays and it is dubious that the remaining 4/5 of government spending is

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[2] I will call here "Great Recession" the 2008-13 years, though in some cases (e.g. in the US) the crisis period was shorter and in others (e.g. Italy) longer. Finally, the word "debt" will always and only refer to the General Government Debt.

discretionary enough (Coricelli and Fiorito, 2013) to produce well defined multipliers. Thus, the high or low multipliers may rather reflect something else and this is probably why estimates differ so much in the literature[3].

To avoid such limits and problems, I shall address here the government debt issue in the most neutral way, i.e.

i) Using only a simple accounting scheme to disentangle between major sources of the recent Debt-to-GDP increase in an OECD sample.

ii) Avoiding a priori assumptions on the controversial linkages between fiscal policy and the aggregate economy.

iii) Comparing the about general crisis years (2008-13) with those immediately before (2000-07) to assess the country-specific impact of recession on the government Debt-to-GDP ratio.

Given the differences in the way each country faced the crisis, the sample includes the US and the UK on one side and the four biggest EZ economies (Germany, France, Italy and Spain) on the other to find what is similar and what differs among periods and countries as far as the debt ratio is concerned.

2. Arithmetic

The accounting scheme presented here is based on the arithmetic implied by the simplest government debt definition in order to decompose Debt-to-GDP % changes into a minimum number of independent sources. Needless to say, source independence is only a simplifying device to accommodate an intentionally neutral scheme, based on mere accounting rather than on causal relations among variables. Again for the sake of simplicity, maturity and debt holder composition are ignored[4] as also the standard distinction between primary and non-primary balances to avoid any implicit behavioral treatment.

 To start with, let me time-differentiate the debt-to-GDP ratio (B/Y), obtaining:

$$\frac{d}{dt}\left[\frac{B(t)}{Y(t)}\right] \quad = \quad \frac{\dot{B}(t)}{Y(t)} \quad - \left[\frac{B(t)}{Y(t)}\right]\frac{\dot{Y}(t)}{Y(t)} \tag{1}$$

where both General Government Debt (B) and GDP (Y) are nominal variables and where dots denote time

derivatives.

From Eq. (1) it appears that the ratio will fall if the first fraction $(\dot{B}(t)/Y(t))$ is smaller than the generally positive product $[B(t)/Y(t)] [\dot{Y}(t)/Y(t)]$. In discrete units, $(\dot{B}(t)/Y(t))$ is approximated by the government balance ratio, i.e. the deficit-to-GDP ratio D(t)/Y(t), henceforth simply denoted as 'deficit' if the balance is - as so frequently – negative[5].

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[3] Actually, the relevant literature is large and still growing (e.g. Ilzetzki, Mendoza and Vegh, 2012), though basically unable to reach fully shared results. This also makes useful surveys as those recently provided by Ramey (2011) and Parker (2011).
[4] Data on this are available for the Euro area in: Lojsch, Rodriguez-Vives and Slavik (2011).
[5] Deficit is here a shorthand way for defining the General Government Net Lending variable, when negative.

Actually, changes in the debt stock may differ – sometimes widely - from the corresponding deficit (surplus) measurement because debt flows are evaluated on a cash rather than on the accrual basis used in the (NIPA) national accounts.[6] An additional reason for a difference between the two variables is that debt cash flows stem also from government transactions on non-financial assets such as land, buildings and so forth.

In the right-hand side of Eq. 1 the second, composite, term is the product of the debt ratio in brackets times the logged GDP time derivative $(\dot{Y}(t)/Y(t))$, which in practice amounts to the nominal GDP percentage changes. In principle, nominal GDP changes can be either positive or negative, though in modern times nominal GDP contractions are very unusual[7]. Further, nominal GDP being the product $(Y = p*y)$ of the GDP deflator (p) times the GDP volume (y), the $(\dot{Y}(t)/Y(t))$ term can be split into its price and real growth components, yielding:

$$\frac{\dot{Y}(t)}{Y(t)} = \frac{\dot{p}(t)}{p(t)} + \frac{\dot{y}(t)}{y(t)} . \qquad (2)$$

Given (2), finite debt ratio changes in Eq. (1) can be approximated as:

$$\Delta b_t = d_t - b_{t-1}[\pi_t + \lambda_t] + e_t, \qquad (3)$$

where Δ is the first-difference operator and $d(t) = D(t)/Y(t)$ and $b(t) = B(t)/Y(t)$ are the Deficit (D) and the Debt-to-GDP ratios while $\pi(t) = \dot{p}(t))/p(t)$ and $\lambda(t) = \dot{y}(t)/y(t)$ denote the inflation (π) and the real GDP (y) growth (λ), respectively. Finally, the e_t variable combines all possible discrepancies in the approximation and should not be interpreted as a zero mean, white noise, residual.

Ignoring the e_t term, it is evident from Eq. (3) that for any deficit share the Debt/GDP equilibrium ratio (b*) falls/rises when the nominal GDP rises/falls, i.e. when inflation and/or real growth increase as the Oecd postwar data typically show:

$$b* = \frac{d}{[\pi + \lambda]} . \qquad (4)$$

Squaring Eq. (3) and ignoring cross terms that should be relevant in a less mechanical – i.e. wide-sense causal - approach, it is possible to evaluate empirically how Debt-to-GDP changes reflect in each period their independent components. The resulting $\Delta \beta_t^2$ variable obviously differs from actual Δb_t^2 changes because of the missing cross

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[6] The fiscal policy implications of the way of defining government deficit and debt were firstly outlined by Eisner and Pieper (1984).
[7] Great Recession provides a recent exception. However, even the more 'normal' real GDP contractions are few, involving only about 10% of all annual, postwar, OECD data (Fiorito, 2013) vis-à-vis *negative* cycles that involve by construction the 50% of cases.

terms and is obtained as in Eq. (5) by summing only the squared components, where $\pi^{\bullet}$ and $\lambda^{\bullet}$ are the inflation and the real growth variables, weighted as in Eq. (3) by the corresponding debt size[8].

Finally, the squared term e_t^2 is also considered in the empirical decomposition since e_t does not have to be zero in each period, at least because of the cash/accrual accounting difference[9]:

$$\Delta\beta_t^2 \quad = d_t^2 + \pi_t^{\bullet 2} + \lambda_t^{\bullet 2} + e_t^2. \tag{5}$$

As it is shown in Section 4, the $\Delta\beta_t^2$ changes can be decomposed into the portions belonging to the 'policy-induced' deficit ratio and those reflecting the growth of nominal income components that also have some policy dependence, though less direct and more difficult to be measured in a neutral way. Finally, it should not be ignored that the squared residual term e_t combines in an unknown way the adequacy of the approximation and a possible choice of postponing payments to comply with annual budget guidelines: often one of the reasons why cash and accrual balances usually differ (Robinson, 2009).

3. Last Crisis and Before

Given the problem at hand, the available data are few because of the annual frequency which, however, is still preferable evaluating NIPA government data in detail. Before reporting the debt shares as calculated via Eq. 5, let me present first for a few macroeconomic variables (Table 1) the cumulated losses hitting each country during the 2008-13 Great Recession[10], though for some countries (e.g. for the US) crisis was notably shorter. I also provide in Cols 6-7 of the same table some extra data on the rise of *private* debt before and during the crisis, given their importance for assessing the overall deleveraging in the same period (Buiter and Rahbari, 2011).

Table 1- Cumulated % changes for selected variables (2008-13) and for private debt/gdp ratios (2000-10)

Country	(1) Real GDP	(2) Nominal GDP	(3) Employment	(4) Gross Fixed Investment	(5) Govt Debt to GDP	(6) Inflation average 00-07 08-13		(7) Household Debt to GDP 2000 2010		(8) Nonfinancial Corporate Debt to GDP 2000 2010	
US	4.9	14.9	-1.3	-6.1	42.8	2.6	1.6	74	95	66	76
UK	-1.1	11.7	1.9	-14.4	62.1	2.2	2.1	75	106	93	126
Germany	4.1	10.3	4.8	-1.1	15.5	0.9	1.0	73	64	91	100
France	-0.3	8.1	0.8	-9.4	30.3	2.1	1.4	47	69	123	155
Italy	-8.7	0.5	-2.5	-28.7	28.4	2.4	1.6	30	53	96	128
Spain	-5.8	-1.0	-20.2	-53.2	55.1	4.1	0.8	54	91	133	193

Source: Cols 1-5 stem from the OECD *Economic Outlook 96* database. Here and in all Figures and Tables, government debt refers to Gross General Government Debt and its ratio to nominal GDP. Gross fixed investment is in volume; Cols (6) and (7) denote private debt ratios to nominal GDP (Source: Cecchetti, Mohanty and Zampolli, 2011).

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[8] In the discrete approximation, $\pi_t^{\bullet} = (B_{t-1}/Y_{t-1})*(\Delta p_t/p_{t-1})$ and $\lambda_t^{\bullet} = (B_{t-1}/Y_{t-1})*(\Delta y_t/y_{t-1})$.

[9] Differences can also persist in the average, especially for the few data points available here.

[10] This is also why here and in the other tables the sample ends in 2013 rather than in 2014 when the recovery starts.

A few comments on the 2008-13 crisis and its likely impact on government debt are summarized by the following eight points:

1. During the crisis, cumulated losses for real growth are generally wide (Table 1) but look impressive for Italy and Spain. Losses involve also such supply sources as employment and fixed investment.
2. Except for Germany and Spain, annual recession starts in 2008 reaching everywhere its peak in 2009. Afterwards, among the Oecd countries, Italy (2012-14) and Spain (2012-13) face a double-dip recession which occurs also in Greece (2010-13) and in Portugal (2011-13). The average 2008-13 growth in France is null, in Germany being modest. As a whole, the EZ real GDP growth widely weakens.
3. Yet, the real novelty of last crisis is the fall in *nominal* GDP that characterized 27 out of 34 OECD countries in 2009, affecting always Greece between 2009 and 2014, Japan in 2011, Portugal in 2011-12, Italy in 2012-13 and Spain between 2011 and 2013 (OECD, 2014).
4. In the 2000-07 period, the government debt ratio decreases (Tables 3.1-3.6) often and everywhere: three years in France and in the UK, four in Germany and in the US, six in Italy and always in Spain.
5. Figures below also show that the debt ratio rises everywhere after 2007: very strongly in the UK and in Spain, strongly in the US, almost strongly in France. Less in Germany and in Italy, though for different reasons. It must also be noticed that in about the same years (Table 1) also *private* debt-to-GDP ratio generally rises.
6. Despite inflation was not a concern before crisis, it was generally lower in the 2008-13 years, especially in Spain. This tendency holds also outside of the sample as the 2014 data and the 2015 forecasts (IMF, 2014; Oecd, 2014) indicate.
7. Regardless of the large government debt increase, 10-years bond yields decrease in the US, in the UK, in Germany and in France. The yield slightly rises in Spain only, showing once more that market perception of sovereign risk is, indeed, a complicated issue.
8. During the crisis, the 10-year government yield declines more than inflation does (Tables 3.1-3.6) and the *real* interest rate generally falls (US, UK, Germany, France). This does not hold in Italy and in Spain where the real rate rises[11].

Looking at the government debt graphs reported below, the Great Recession impact is apparently similar everywhere, especially if attention focuses on the timing rather than on the size of response.

Fig. 1: Debt to GDP Ratio (2000-2013)
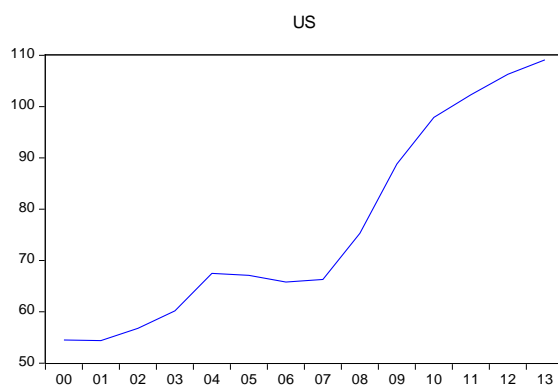
The similarities between the two Anglo-Saxon countries are clear in the figures and also on the basis of the Tables in the Appendix. This applies also to the *Sustainable Debt Index* (SDI) which is calculated in the Appendix as the difference between the real GDP growth and the real interest rate[12] in each country.

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[11] This evidence may also confirm some divide between the Northern-European 'core' and the Southern-European 'periphery' since, in the same period, the real rate rises also in Portugal and, especially, in Greece.

UK
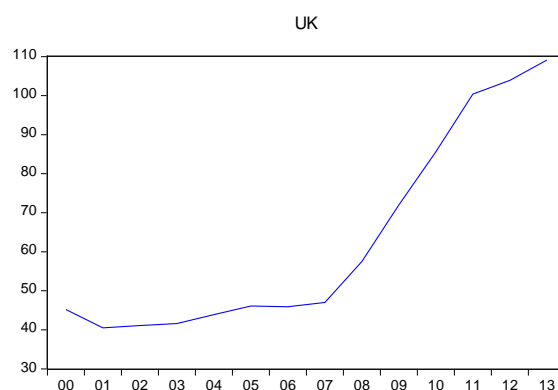
Considering the EZ countries, the Great Recession in general interrupts the convergence process measured on different variables by Estrada, Galì and Lopez-Salido (2013) and confirmed here also for the Debt-to-GDP ratio that falls everywhere before the crisis, strongly rising instead in the 2008-13 years.

There are, however, several differences to be noticed. In Germany (Fig. 3), since 2000 debt increase was of about 1/3 only, i.e. the smallest in the 2008-13 crisis years (Table 3.3). Moreover, while the slope increase is very steep between 2009 and the 2010 peak, the debt ratio is initially maintained and then slightly reduced. Accordingly, Germany's SDI index becomes positive after 2009, making the average 2008-13 index only just negative though smaller in absolute value than it was in the 2000-07 period.

This is an atypical result since Germany is here the only country for which the SDI index improves in the second part of the sample, though this occurs without obtaining a stable, positive, value as the one found here in the earlier years for the US, the UK and, especially, for Spain.

Fig. 3: Debt to GDP Ratio (2000-2013)
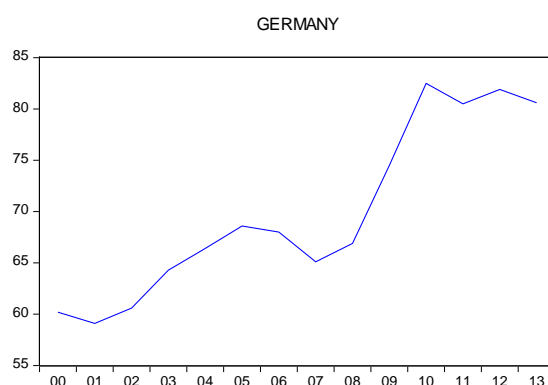
GERMANY

In France the debt ratio falls between 2006 and 2008 (Table 3.4) but the increase is more pronounced in the crisis years and its slope is not reduced at the end of the sample as in Germany. Overall, in the first period the SDI index is better than in Germany though the comparison reverses in the 2008-13 period in which France displays an average, null, real GDP growth.

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[12] Obviously, stability requires a positive number.

FRANCE
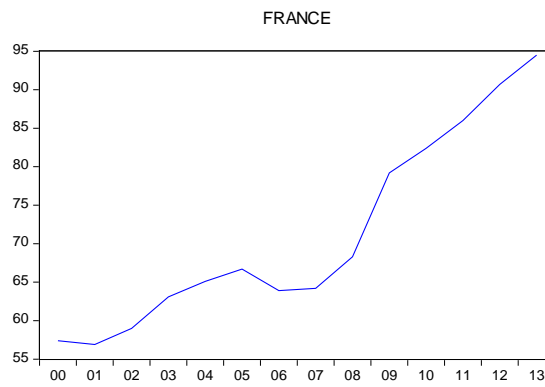
Italy's case (Table 3.5) is peculiar, being here the only country in which the government debt ratio was *already* large   in the first part of the sample. Yet, the effort of reducing the ratio in the pre-crisis period was frustrated in the recession years by a nominal GDP growth which on the average was about null, being even *negative* in three years as it also happened in Spain. As a result, the Debt-to-GDP ratio strongly rises in 2009 (Fig. 5), then attenuating -though maintaining - its growth because a *nominal* recession was cutting the denominator. A side consequence is that, except for 2000, the SDI index is always negative and also displaying a worse average value in the 2008-13 years.

Fig. 5: Debt to GDP Ratio (2000-2013)

ITALY
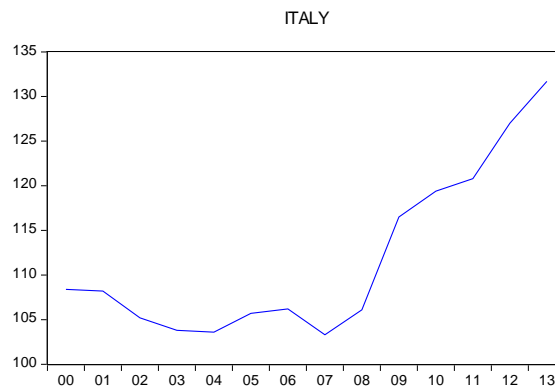
Conversely, Spain is here the country in which the debt ratio decreased more in the 2000-07 period (Table 3.6) to rise even more in the crisis years as Fig. 6 shows in the most impressive way. Actually, the graph for Spain displays a peculiar V-shaped pattern which is also reflected in the *always* positive SDI index in the first part of the sample and in the *always* negative SDI value in the second: in no other case here the debt ratio first decreased and then increased so rapidly, highlighting how the Great Recession created a problem that was missing before.

Fig. 6: Debt to GDP Ratio (2000-2013)

SPAIN
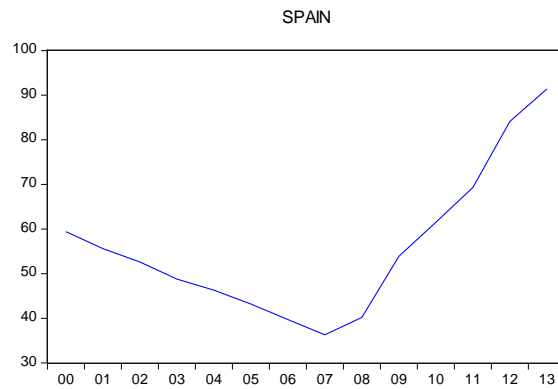
4. Sources of the Debt-to-GDP Increase

Previous graphs and the data in the Appendix provide only descriptive information that cannot assess the importance of every source behind Debt-to-GDP % changes. This task is made available here, using the methodology described in Section 2 to calculate the weight of each component in all countries and years.

In presenting results based on independent sources, an extra cautionary note is needed since the calculated weights refer - as in equation (5) - to the squared Debt-to-GDP differences but originate in each year from total changes that can be not only small or large but also positive or negative, i.e. from types of adjustment that should be interpreted accordingly. This is why Tables 2.1-2.6 include as a memo in the last column the positive or negative debt ratio changes in each year and in the average of each sub-period.

United States

The major result in the following Table 2.1 is that the estimated Deficit/GDP share almost *doubles* in the 2008-13 years in which the average Debt-to-GDP ratio, about constant before, rises more than 50% (Table 3.1) with respect to the 2000-07 data. Thus, in the 2008-13 period the average deficit contribution to the debt increase jumps from the 47% of the earlier years to a massive 87%, also characterized by a much smaller volatility.

Looking at annual episodes, the deficit weight is very large in 2002 and 2003 when the debt ratio starts to increase after previous contractions, clearly interrupted by the 2001 events and consequences. However, it is only during the Great Recession that the deficit weight systematically rises (Table 2.1) because of enduring counter-cyclical policies that are gradually reduced since 2013 (Table 3.1) as soon as a stable recovery is perceived.

This pattern of the deficit contribution apparently supports the view that discretionary fiscal policy and government spending - particularly in the US - basically work as a *temporary* device to be used even heavily in bad times and to be quickly abandoned when no longer required. Thus, the depth and duration of last crisis made only deeper and lengthier the fiscal interventions with respect to previous post-war episodes.

Government balances in the US seem then to behave in a clear counter-cyclical way which here is also visible in the UK response (Table 2.2) to the Great Recession. In the US, however, the deficit weight not only rises more when recession peaks but is also faster in decreasing once recovery is achieved.

Table 2.1 – % Contributions to Government Debt-to-GDP Changes*

US	(1) Deficit/GDP	(2) GDP deflator growth	(3) Real GDP growth	(4) Other	*To remember:* Debt to GDP % changes
2000	21	18	57	4	-6.0
2001	10	43	10	37	-0.1
2002	89	5	5	1	2.4
2003	84	5	7	4	3.4
2004	27	4	6	63	7.3
2005	52	25	21	2	-0.4
2006	36	37	25	2	-1.3
2007	59	26	11	4	0.5
Average 2000-07	47.2 (.61)	20.4 (.74)	17.7 (.98)	14.6 (1.57)	0.7 (5.33)
2008	73	4	--	23	9.0
2009	96	--	4	--	13.5
2010	95	1	3	1	9.1
2011	90	4	3	3	4.4
2012	90	4	6	-	4.0
2013	79	7	11	3	2.8
Average 2008-13	87.2 (.11)	3.3 (.76)	4.5 (.82)	5.0 (1.8)	7.1 (0.57)

*Pearson's coefficient of variation in parenthesis, here and in the companion tables.

Similarly to the other countries, in the 2008-13 period US nominal GDP growth (Table 3.1) deeply diminishes and this is reflected in the Table 2.1, calculating debt generating sources. Namely, the share of the average GDP deflator is strongly reduced with respect to previous 2000-07 years in which nominal GDP denominator accounts for about 40% of the overall debt ratio changes: a figure falling about five times in the next 2008-13 period! This happens because, similarly to the inflation share, also the weight of the real GDP changes almost disappears in the second part of the sample, then contributing to the prevalence of the deficit portion. Finally, as implied by its definition, the residual component (**Other**) has some role in a few cases only, i.e. in 2001 and even more in 2004.

As stated before, in the 2008-13 years results are mostly based on the dominant deficit share (Table 3.1) that makes about irrelevant nominal GDP components, *per se* and also when compared to the 2000-07 evidence. All of this seems to suggest that such a strongly rising deficit share was possibly driven by policy *discretion*, basically requiring a temporary, deliberate, adjustment (Coricelli-Fiorito, *cit*.) to large, negative, shocks.

United Kingdom

The results of debt decomposition in the UK (Table 2.2) are milder but roughly similar to those found for the US despite that in the UK the deficit weight rises much less in last period. Further, in the crisis years the deficit share is also less smooth than in the US, apparently combining standard patterns and sudden policy shifts. Accordingly, the deficit weight strongly rises in the 2009 recession peak, decreases in the next two years to increase again in 2012 and 2013 when real GDP growth is still low.

The price component of the debt ratio changes is also reduced during the crisis although in the UK – as also in Germany - average inflation is about the same in the two periods. In the 2008-13 years real GDP share strongly diminishes because of a stagnation lasting more than in the US: namely, the average real growth in the second period is slightly negative (Table 3.2) as a result of the 2008-9 contraction, followed by a weaker recovery phase.[13]

Combining the above-mentioned price and real growth performance, it is not surprising that nominal GDP does not really account for the debt ratio increase. Actually, the greater ratio in the 2008-13 years reflects also the major role exerted in the UK, with respect to the US, by the variable (**Other)** that here summarizes all remaining, unknown, sources behind Debt-to-GDP % changes.

Table 2.2 – % Contributions to Government Debt-to-GDP Changes

UK	(1) Deficit/GDP	(2) GDP deflator Growth	(3) Real GDP growth	(4) Other	*To remember:* Debt to GDP % Changes
2000	42	--	13	45	-2.2
2001	5	9	26	60	-4.7
2002	65	15	15	5	0.6
2003	78	6	14	2	0.5
2004	75	8	9	8	2.3
2005	71	8	10	11	2.2
2006	67	19	14	--	-0.2
2007	60	8	22	10	1.1
Average 2000-07	57.9 (.42)	9.1 (.63)	15.4 (.38)	17.6 (1.26)	0 --
2008	35	3	--	62	10.5
2009	92	--	4	4	14.5
2010	65	3	1	31	13.6
2011	39	2	--	59	14.8
2012	92	4	--	4	3.5
2013	90	7	2	1	5.2
Average 2008-13	68.8 (.39)	3.2 (.72)	1.2 (1.3)	26.8 (1.1)	10.3 (0.48)

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[13] Recent post-sample evidence is, however, more encouraging.

Germany

In the crisis years also in Germany the Debt-to-GDP ratio rose but its increase was lower than elsewhere, moving from about 65% in 2007 to about 80% in 2013 (Table 3.3). In this respect, it should also be noted that this relative success is not due to a great macroeconomic performance since real GDP, after absorbing the strong 2009 shock, was characterized by a rather modest (0.7%) average growth.

Germany's debt decomposition is, indeed, peculiar since here is the *only* case in which the deficit share was bigger in the first period when the country had actually to face large unification and modernization costs. Thus, in the 2000-07 years, the deficit weight was providing almost the 60% of the debt ratio changes, widely exceeding nominal GDP share. In particular, the deficit share was higher between 2002 and 2005 when Germany did not comply with the 3% Maastricht rule (Table 3.3) to sustain the recently unified economy: this happened, however, implementing reforms that proved to be useful afterwards. Thus, the debt increase in the 2008-13 years is scarcely related to the deficit weight which in the following Table 2.3 is much *smaller* (12%) than it was before (58%)!

Another peculiar result is that the *largest* portion of the 2008-13 debt changes belongs to the residual component (**Other**) which, again, is difficult to interpret unless further details are provided. Finally, as far as the nominal GDP is concerned, the real GDP share remains the same in the two periods while the inflation weight increases in the second, mostly because of the anomalous 2013 result.

Table 2.3 – % Contributions to Government Debt-to-GDP Changes

Germany	(1) Deficit/GDP	(2) GDP deflator Growth	(3) Real GDP growth	(4) Other	*To remember:* Debt to GDP % changes
2000	19	2	46	33	-1.2
2001	55	4	6	35	-1.1
2002	85	4	--	11	1.5
2003	97	3	--	--	3.7
2004	82	9	4	5	2.1
2005	97	1	2	--	2.2
2006	27	1	68	4	-0.6
2007	--	17	76	7	-2.9
Average 2000-07	57.7 (.66)	5.1 (1.06)	25.2 (1.3)	11.9 (1.18)	0.5 (4.83)
2008	--	4	3	93	1.8
2009	37	3	45	15	7.6
2010	21	1	11	67	8.0
2011	8	6	84	2	-2.0
2012	--	9	4	87	1.4
2013	4	84	9	3	-1.3
Average 2008-13	11.7 (1.25)	17.8 (1.83)	26.0 (1.25)	44.5 (.96)	2.6 (1.67)

As a whole, debt decomposition in Germany displays a counter-cyclical orientation only in the 2000-07 years, while during the 2008-13 period the macroeconomic policy was apparently addressed at containing inflation and a debt ratio increase that was smaller than elsewhere and even declining (Table 3.3) after the 2010 peak.

France

In France the Debt-to-GDP ratio was acceptable according to Maastricht standards in the 2000-07 period in which also the SDI index was about stable, being on the average close to zero. Unlike Germany, however, in the 2008-13 period the French deficit ratio increased because of a more countercyclical fiscal policy that, however, did not succeed in stimulating expansion (Table 3.4). Finally, as in other cases, also in France the nominal GDP weight falls in the recession years since both inflation and real growth shares are strongly reduced.

Actually, debt decomposition shows in the following Table 2.4 that adjustment in France is more straightforward than in Germany since in the 2008-13 years the debt ratio increase almost parallels the deficit ratio increase as implied by fiscal policies trying – not always successfully - to help the economy in difficult times. Thus, the dominance of the deficit weight is large, not occasional, and holding for about all years: not only between 2009 and 2013 but also in the earlier 2000-07 period in which debt changes were – as in general here - much smaller and even negative in three cases.

Table 2.4 – % Contributions to Government Debt-to-GDP Changes

France	(1) Deficit/GDP	(2) GDP deflator Growth	(3) Real GDP growth	(4) Other	*To remember:* Debt to GDP % changes
2000	27	12	60	1	-1.5
2001	50	29	21	--	-0.5
2002	81	13	2	4	2.1
2003	79	6	1	14	4.1
2004	76	7	12	5	2.0
2005	61	12	9	18	1.6
2006	39	16	20	25	-2.8
2007	60	22	16	2	0.3
Average 2000-07	59.1 (.33)	14.6 (.53)	17.6 (1.06)	8.6 (1.07)	0.7 (3.36)
2008	58	14	--	28	4.1
2009	89	--	7	4	10.9
2010	90	1	3	6	3.2
2011	88	4	6	2	3.6
2012	92	5	--	3	4.7
2013	89	8	--	3	3.8
Average 2008-13	84.3 (.15)	5.3 (.96)	2.7 (1.2)	7.7 (1.3)	5.0 (.58)

As already reported, however, in France real GDP growth was missing in the crisis years while inflation was – as in most cases here - lower than in the 2000-07 period. Thus, nominal GDP was unable in the 2008-13 phase to

compensate for the expanding debt numerator. This also explains why the deficit component became so large after 2008, given also the small weight found for the residual component (**Other**): another difference with respect to Germany.

Italy

Among the countries in the sample, Italy has a special position not only for having the highest debt ratio in the 2008-13 years but also for exceeding the symbolic 100% threshold even *before* the big crisis began. This probably explains why in the first period an effort was made (Fig 5) to slightly reduce the debt ratio that, in the second, increased *less* than in all the other countries with the exception of Germany.

This high-debt heritage certainly reduced the available fiscal space (Ostry et al., 2010), severely limiting the possibility of contrasting the Great Recession within the EZ framework. As a result, almost no fiscal discretionary intervention seems to be introduced in the 2008-13 years, characterized not only - as in most OECD countries - by a negative real growth in 2009 (Table 2.5) but also by a *nominal* recession in the 2012-13 biennium[14].

The large inherited debt hence determined a severely constrained fiscal policy which may also explain the apparent paradox that Italy is here, along with Germany, the only country running a *primary surplus* (Tables 3.3 and 3.5) in most of the crisis years.[15] Further, the deficit size increased in the 2008-13 period less than elsewhere because of the EZ surveillance and, presumably, because of Italy's reluctance to be formally involved - as Spain, among the countries here - in an excess deficit procedure (EDP).

Despite that, Italy's debt ratio was, however, rising in the crisis years also because - among the denominator components - low inflation did not offset real GDP contractions in three out of the six possible cases. However, the deficit weight on debt formation increased only slightly in the recession period because the jump occurring in 2010 and 2011 was compensated by a lower share afterwards. Moreover, Italy is also the country in which real growth component still matters in the 2008-13 years (Table 2.5), though this paradoxically happens because the average GDP growth *falls* in real terms (Table 3.5) and is about *constant* in nominal terms: hence, the debt-to-GDP ratio *rises* despite government deficit is broadly in line with the EZ 3% rule!

Overall, the impression is not only of a limited counter-cyclicality of fiscal policy because of the large debt burden but also of a lagging policy response with respect to the other EU countries which clearly appears confronting the 2009 shock. This probably reflects the limits of fiscal automatism, given the inhibited possibility of facing exceptional (or at least unusual) events as recessions are.

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[14] The same happened in Spain where, however, post-sample evidence shows a deeper and faster recovery.

[15] Actually, a primary surplus occurs in Italy also in the 2000-07 period.

<div align="center">**Table 2.5 – % Contributions to Government Debt-to-GDP Changes**</div>

Italy	(1) Deficit/GDP	(2) GDP deflator Growth	(3) Real GDP growth	(4) Other	*To remember:* Debt to GDP % changes
2000	3	19	74	4	-4.8
2001	26	27	10	37	-0.2
2002	35	49	1	15	-3.0
2003	48	42	--	10	-1.4
2004	59	28	12	1	-0.2
2005	80	14	5	1	2.1
2006	52	14	26	8	0.5
2007	22	55	22	1	-2.9
Average 2000-07	40.6 (.59)	31.0 (.51)	18.7 (1.29)	9.6 (1.27)	-1.2 (1.80)
2008	41	38	9	12	2.8
2009	41	7	49	3	10.4
2010	78	1	17	4	2.9
2011	83	15	2	--	1.4
2012	32	15	32	21	6.2
2013	46	18	27	9	4.7
Average 2008-13	53.5 (.40)	15.7 (.80)	22.7 (.75)	8.2 (.93)	4.7 (.68)

Spain

For different reasons also Spain is a special case, being here the country in which the difference between the two periods is largest and the recession cost apparently highest (Table 1): also in the light of a rising real interest rate, falling instead (Tables 3.1-3.6) in all the other cases with the exception of Italy. Further, the debt ratio shows in Spain (Fig. 6) a peculiar V-shaped pattern, reflecting in the first part of the sample not only a low but also a *decreasing* Debt-to-GDP ratio. This process was reversed in the 2008-13 years (Table 3.6) in which the debt ratio almost doubled, blending more than elsewhere strong deficits, long recession and a sharply declining inflation.

The debt sources for Spain are shown in the following Table 2.6: the deficit weight, slightly exceeding the 10% in the 2000-07 period, jumps to 95% in the crisis years, becoming in practice the only relevant source of the debt ratio increase. This change even exceeds the one found for the US whose discretionary policy was not subject to the currency union discipline, holding instead for Spain under special surveillance clauses.

Moreover, in the 2008-13 period nominal GDP components become less important as a result of an inflation even lower than in Germany and of a negative real growth in four out of the relevant six years and then on the average as well. Finally, residual factors (**Other**) are negligible, confirming again that in Spain most of the debt ratio increase originated from the large deficit increase.

Table **2.6 – % Contributions to Government Debt-to-GDP Changes**

Spain	(1) Deficit/GDP ratio	(2) GDP deflator Growth	(3) Real GDP growth	(4) Other	*To remember:* Debt to GDP % changes
2000	6	29	54	11	-3.0
2001	4	54	41	--	-3.8
2002	3	69	25	3	-3.0
2003	1	65	34	--	-3.8
2004	--	53	34	13	-2.5
2005	13	35	22	30	-3.1
2006	31	18	17	34	-3.5
2007	41	20	22	17	-3.4
Average 2000-07	12.4 (1.23)	42.9 (.47)	31.1 (.39)	13.5 (.96)	-3.3 (0.14)
2008	94	4	--	2	3.9
2009	97	--	2	1	13.7
2010	96	--	--	4	7.6
2011	99	--	--	1	7.8
2012	90	--	1	9	14.8
2013	95	1	4	--	7.3
Average 2008-13	95.2 (.03)	0.8 (2.0)	1.2 (1.33)	2.8 (4.75)	9.2 (0.46)

5. Conclusions

This paper evaluates for several OECD countries the sources of government debt increase during the Great Recession *vis-a'-vis* the years immediately before. This is done adopting a purposely neutral approach, based on a simple accounting scheme decomposing annual Debt-to-GDP % changes into their numerator (deficit, discrepancies) and denominator (inflation, real growth), independent components.

Such a simple choice is basically made for two reasons: the first is avoiding controversial (and often inconclusive) debates on the way in which the Government Debt-to-GDP ratio reflects/affects the aggregate economy before assessing first major stylized facts of its formation. The second reason is instead related to the obvious – tough often neglected – recognition that a rising Debt-to-GDP ratio cannot depend on the fiscal numerator only. In particular, the role of the GDP denominator clearly rises in recession times and especially when recession is also *nominal* as recent evidence, atypically, shows.

The sample is based on annual data for six OECD countries during the Great Recession (2008-13) and the preceding 2000-07 years to evaluate if and how last crisis affected the Government Debt-to-GDP ratio. The selected countries are the US and the UK on one side and the four biggest EZ economies (Germany, France, Italy and Spain), together amounting to about ¾ of the EZ area GDP but often individually labeled as belonging to its 'core' (Germany, France) and to the Mediterranean 'periphery' (Italy, Spain). In this vein, the EZ frame also matters for the choice of the pre-crisis years in which the common European currency was already adopted along with the deficit rule and the attention, in any case, paid to government debt size.

Looking at the Debt-to-GDP graphs in Section 3, the Great Recession impact is apparently similar everywhere if the attention focuses on the timing rather than on the size and nature of the debt response. Conversely, disentangling in Section 4 between the sources of the Debt-to-GDP increase, the evidence shows that these sources were more or less large in the 2008-13 years but not always/only stemming from *deliberate* policies: actually, our results indicate that there was also – with the exception of Germany – a general reduction of the nominal GDP weight, due to the concurrent mix of low inflation and low or even negative real growth. In the crisis years, this mix made debt ratio changes more *asymmetric* than they were before since the fiscal numerator increase was no longer compensated by a denominator, almost naturally rising in both inflation and real GDP components. Thus, the Debt-to-GDP increase cannot be ascribed only to an excess of fiscal activism in critical times.

Further, in the crisis years debt decomposition shows that the deficit share rises – though differently – in all countries but Germany, where it was instead dominating in the 2000-07 period. Thus, during the Great Recession, changes in debt and deficit go together in all cases but Germany and – to a lesser extent – Italy, i.e. in the only two countries exhibiting for different reasons a *primary surplus* in the crisis years.

In countries displaying instead a more standard counter-cyclical policy, changes in the debt ratio numerator prevail in the 2008-13 crisis years and the exit from crisis seems also starting before. This typically applies to the US economy if compared with the generally lagging EZ inertia. Prevailing deficit weights are also found in the UK and in Spain, a country subject to the EZ discipline but also to the possibility of postponing to 2016 the required correction. Conversely, in the remaining EZ area considered here, France could be placed into an intermediate position between Italy and Spain, though in France a moderate fiscal stabilization occurred also before.

Basically, decomposing by source the Debt-to-GDP % changes, three are the fiscal responses to the Great Recession that our results indicate:

1. There is a specific German response aiming at minimizing fiscal adjustment, probably because the crucial one occurred in the years *before* when the country had to face unification costs and reform programs that proved to be useful afterwards. While making reforms in good rather than in bad times seems reasonable *per se*, the cost of this strategy was, however, a modest real growth since the international recession occurred anyway.

2. As far as the other EZ countries are concerned, they actually differ but can be grouped for convenience to show fiscal policies ranging from debt-induced discipline (Italy) to several degrees of accommodation (Spain, France), allowed by the EZ rules. Yet, in all cases the 2009-13 debt ratio changes reflect an increasing deficit weight which is huge in Spain, big in France and moderate in Italy because of its debt-constrained fiscal policy.

3. The last response involves the US and, partially, the UK: here, the only two cases where the Great Recession induced debt changes reflecting a temporary, counter-cyclical, policy that neatly differs from the EZ mix of common inertia and ad hoc heterogeneity.

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Appendix

Table 3.1 – Government Debt % Changes and Sources

United States	(1) Debt to GDP Changes	(2) GDP Deflator Changes	(3) Real GDP Changes	(4) Nominal GDP Changes	(5) Debt to GDP	(6) Deficit to GDP	(7) Primary Deficit to GDP	(8) Govt Bond Yields	(9) = (8)-(2) Real Rate	(10) = (3) – (9) Sustainable Debt Index
2000	-6.0	2.3	4.1	6.4	54.5	-1.5	3.9	6.0	3.7	0.4
2001	-0.1	2.3	1.1	3.4	54.4	0.6	1.6	5.0	2.7	-1.6
2002	2.4	1.7	1.8	3.5	56.8	4.0	2.0	4.6	2.9	-1.1
2003	3.4	2.2	2.5	4.7	60.2	5.0	3.1	4.0	1.8	0.7
2004	7.3	2.9	3.5	6.4	67.5	4.4	2.7	4.3	1.4	2.1
2005	-0.4	3.4	3.1	6.5	67.1	3.3	1.4	4.3	0.9	2.2
2006	-1.3	3.3	2.7	6.0	65.8	2.2.	0.3	4.8	1.5	1.2
2007	0.5	2.9	1.9	4.9	66.3	2.9	1.0	4.6	1.7	0.2
Average 2000-07	0.7 (5.33)	2.6 (0.23)	2.6 (0.38)	5.2 (0.25)	61.6 (0.09)	2.6 (0.82)	2.0 (0.59)	4.7 (0.13)	2.1 (0.45)	0.5 (2.66)
2008	9.0	2.2	-0.3	1.9	75.3	6.6	4.8	3.7	1.5	-1.8
2009	13.5	0.9	-3.1	-2.2	88.8	11.9	11.6	3.3	2.4	-5.5
2010	9.1	1.3	2.4	3.8	97.9	11.4	9.3	3.2	1.9	0.5
2011	4.4	2.1	1.8	4.0	102.3	10.2	7.9	2.8	0.7	1.1
2012	4.0	1.8	2.2	4.0	106.3	8.7	6.4	1.8	0	2.2
2013	2.8	1.5	1.9	3.4	109.1	5.4	4.6	1.9	0.4	1.5
Average 2008-13	7.1 (0.57)	1.6 (0.30)	0.8 (2.63)	2.5 (0.98)	96.6 (0.13)	9.0 (0.29)	7.4 (0.37)	2.8 (0.28)	1.1 (0.81)	0.3 (8.6)

Source: Oecd *Economic Outlook* database; Gross Debt, deficits and components refer to General Government. All changes are in % units and ratios to GDP are for nominal variables;Bond yields (10y maturity);Volatility in parenthesis is Pearson's coefficient of variation, positive also when referring to a negative mean.

Table 3.2 – Government Debt % Changes and Sources

United Kingdom	(1) Debt to GDP Changes	(2) GDP Deflator Changes	(3) Real GDP Changes	(4) Nominal GDP Changes	(5) Debt to GDP	(6) Deficit to GDP	(7) Primary Deficit to GDP	(8) Govt Bond Yields	(9) = (8)-(2) Real Rate	(10) = (3) – (9) Sustainable Debt Index
2000	-2.2	0.7	4.2	4.9	45.2	-3.7	-6.1	5.3	4.6	-0.4
2001	-4.7	1.7	2.9	4.6	40.5	-0.6	-2.7	4.9	3.2	-0.3
2002	0.6	2.4	2.4	4.8	41.1	2.0	0.2	4.9	2.5	-0.1
2003	0.5	2.6	3.8	6.4	41.6	3.7	1.9	4.5	1.9	1.9
2004	2.3	2.7	2.9	5.6	43.9	3.5	1.8	4.9	2.2	0.7
2005	2.2	2.4	2.8	5.2	46.1	3.2	1.4	4.4	2.0	0.8
2006	-0.2	3.0	2.6	5.6	45.9	2.6	0.9	4.5	1.5	1.1
2007	1.1	2.2	3.6	5.9	47.0	2.7	0.9	5.0	2.8	0.8
Average 2000-07	-0.05 --	2.2 (0.33)	3.1 (0.20)	5.4 (0.11)	43.9 (0.06)	1.7 (1.53)	-0.2 (13.1)	4.8 (0.06)	2.6 (0.38)	0.6 (1.8)
2008	10.5	3.0	-1.0	2.0	57.5	4.9	3.5	4.6	1.6	-2.6
2009	14.5	1.3	-4.0	-2.7	72.0	10.8	9.9	3.6	2.3	-6.3
2010	13.6	2.8	1.8	4.6	85.6	10.0	7.6	3.6	0.8	1.0
2011	14.8	2.3	1.0	3.4	100.4	7.9	5.1	3.1	0.8	0.2
2012	3.5	1.4	0.3	1.7	103.9	6.5	6.1	1.9	0.5	-0.2
2013	5.2	1.9	0.8	2.7	109.1	7.1	5.0	1.9	0.0	0.8
Average 2008-13	10.3 (0.48)	2.1 (0.33)	-0.2 (11.4)	1.9 (1.28)	88.1 (0.23)	7.9 (0.28)	6.2 (0.36)	3.1 (0.33)	1.0 (0.82)	1.2 (2.38)

Table 3.3 - Government Debt % Changes and Sources

Germany	(1) Debt to GDP Changes	(2) GDP deflator changes	(3) Real GDP Changes	(4) Nominal GDP Changes	(5) Debt to GDP	(6) Deficit to GDP	(7) Primary Deficit to GDP	(8) Govt Bond Yields	(9) = (8) - (2) Real Interest Rate	(10) = (3) – (9) SDI (Sustainable Debt Index)
2000	-1.2	-0.7	3.3	2.6	60.2	-1.3	-3.9	5.3	6.0	-2.7
2001	-1.1	1.2	1.6	2.8	59.1	2.8	0.5	4.8	3.6	-2.0
2002	1.5	1.4	0	1.5	60.6	3.6	1.3	4.8	3.4	-3.4
2003	3.7	1.2	-0.4	0.7	64.3	4.0	1.5	4.1	2.9	-3.3
2004	2.1	1.1	0.7	1.8	66.4	3.8	1.3	4.0	2.9	-2.2
2005	2.2	0.7	0.8	1.5	68.6	3.3	0.9	3.4	2.7	-1.9
2006	-0.6	0.4	3.9	4.2	68.0	1.7	0.8	3.8	3.4	0.5
2007	-2.9	1.6	3.4	5.1	65.1	-0.2	2.7	4.2	2.6	0.8
Average 2000-07	0.5 (4.83)	0.9 (0.85)	1.7 (1.00)	2.5 (0.59)	64.0 (0.06)	2.2 (0.90)	0.6 (3.1)	4.3 (0.14)	3.4 (0.32)	-1.8 (0.9)
2008	1.8	0.8	0.8	1.6	66.9	0.1	-2.3	4.0	3.2	-2.4
2009	7.6	1.2	-5.1	-4.0	74.5	3.1	0.8	3.2	2.0	-7.1
2010	8.0	0.9	4.0	5.0	82.5	4.2	2.0	2.7	1.8	2.2
2011	-2.0	0.8	3.1	3.9	80.5	0.8	-1.2	2.6	1.8	1.3
2012	1.4	1.3	0.9	2.2	81.9	-0.2	-2.4	1.5	0.2	0.7
2013	-1.3	1.2	0.4	1.6	80.6	0.2	-1.8	1.4	0.2	0.2
Average 2008-13	2.6 (1.67)	1.0 (0.22)	0.7 (4.65)	1.7 (1.81)	77.8 (0.08)	1.4 (1.34)	-0.8 (2.2)	2.6 (0.39)	1.5 (0.75)	0.8 (4.0)

Table 3.4 – Government Debt % Changes and Sources

France	(1) Debt to GDP Changes	(2) GDP Deflator Changes	(3) Real GDP Changes	(4) Nominal GDP Changes	(5) Debt to GDP	(6) Deficit to GDP	(7) Primary Deficit to GDP	(8) Govt Bond Yields	(9) = (8) – (2) Real Interest Rate	(10) = (3) – (9) SDI (Sustainable Debt Index)
2000	-1.5	1.7	3.8	5.5	57.4	1.5	-1.1	5.4	3.7	0.1
2001	-0.5	2.1	1.8	3.9	56.9	1.6	-1.0	4.9	2.8	-1.0
2002	2.1	2.3	0.9	3.2	59.0	3.2	0.6	4.9	2.6	-1.7
2003	4.1	2.0	0.9	2.9	63.1	4.1	1.5	4.1	2.1	-1.2
2004	2.0	1.7	2.3	4.0	65.1	3.6	1.0	4.1	2.4	-0.1
2005	1.6	2.0	1.8	3.8	66.7	3.0	0.5	3.4	1.4	0.4
2006	-2.8	2.3	2.6	4.9	63.9	2.4	0	3.8	1.5	1.1
2007	0.3	2.6	2.2	4.9	64.2	2.7	0.3	4.3	1.7	0.5
Average 2000-07	0.7 (3.36)	2.1 (0.15)	2.0 (0.46)	4.1 (0.22)	62.0 (0.06)	2.8 (0.33)	0.2 (4.0)	4.4 (0.15)	2.3 (0.34)	-0.2 (4.1)
2008	4.1	2.5	-0.2	2.4	68.3	3.3	0.7	4.2	1.7	-1.9
2009	10.9	0.7	-3.1	-2.4	79.2	7.6	5.4	3.6	2.9	-6.0
2010	3.2	1.1	1.6	2.6	82.4	7.1	4.8	3.1	2.0	-0.4
2011	3.6	1.3	1.7	3.1	86.0	5.3	2.7	3.3	2.0	-0.3
2012	4.7	1.3	0.0	1.4	90.7	4.9	2.2	2.5	1.2	-1.2
2013	3.8	1.3	-0.3	1.0	94.5	4.0	1.4	2.0	0.7	1.0
Average 2008-13	5.0 (0.58)	1.4 (0.44)	0.0 (--)	1.3 (1.48)	83.5 (0.11)	5.4 (0.32)	2.9 (0.65)	3.1 (0.25)	1.7 (0.43)	1.8 (1.2)

Table 3.5 - Government Debt % Changes and Sources

Italy	(1) Debt to GDP Changes	(2) GDP Deflator Changes	(3) Real GDP Changes	(4) Nominal GDP Changes	(5) Debt to GDP	(6) Deficit to GDP	(7) Primary Deficit to GDP	(8) Govt Bond Yields	(9) = (8) - (2) Real Interest Rate	(10)= (3) – (9) SDI (Sustainable Debt Index)
2000	-4.8	2.0	3.9	5.9	108.4	0.9	-5.1	5.6	3.6	0.3
2001	-0.2	2.9	1.8	4.7	108.2	3.1	-2.8	5.2	2.3	-0.5
2002	-3.0	3.3	0.4	3.7	105.2	3.0	-2.2	5.0	1.7	-1.3
2003	-1.4	3.1	0.0	3.1	103.8	3.5	-1.3	4.3	1.2	-1.2
2004	-0.2	2.4	1.6	4.0	103.6	3.6	-1.1	4.3	1.9	-0.3
2005	2.1	1.8	1.1	2.9	105.7	4.5	0	3.6	1.8	-0.7
2006	0.5	1.7	2.3	4.0	106.2	3.4	-1.0	4.0	2.3	0
2007	-2.9	2.4	1.5	4.0	103.3	1.6	-3.1	4.5	2.1	-0.6
Average 2000-07	-1.2 (1.80)	2.4 (0.25)	1.6 (0.76)	4.0 (0.23)	105.5 (0.02)	2.9 (0.39)	-2.1 (0.77)	4.6 (0.14)	2.1 (0.33)	-0.5 (1.0)
2008	2.8	2.5	-1.2	1.3	106.1	2.7	-2.2	4.7	2.2	-3.4
2009	10.4	2.1	-5.5	-3.5	116.5	5.4	1.0	4.3	2.2	-7.7
2010	2.9	0.4	1.7	2.1	119.4	4.3	0	4.0	3.6	-1.9
2011	1.4	1.3	0.5	1.8	120.8	3.7	-1.0	5.4	4.1	-3.6
2012	6.2	1.6	-2.4	-0.8	127.0	2.9	-2.3	5.5	3.9	-6.3
2013	4.7	1.5	-1.8	-0.4	131.7	3.0	-2.7	4.2	2.7	-4.5
Average 2008-13	4.7 (0.15)	1.6 (0.46)	-1.4 (1.72)	0.1 (25.4)	120.2 (0.07)	3.7 (0.28)	-1.2 (1.22)	4.7 (0.14)	3.1 (0.27)	4.6 (0.46)

Table 3.6 – Government Debt % Changes and Sources

Spain	(1) Debt to GDP Changes	(2) GDP Deflator Changes	(3) Real GDP Changes	(4) Nominal GDP Changes	(5) Debt to GDP	(6) Deficit to GDP	(7) Primary Deficit to GDP	(8) Govt Bond Yields	(9) = (8) - (2) Real Interest Rate	(10) = (3) – (9) SDI (Sustainable Debt Index)
2000	-3.0	3.7	5.0	8.7	59.4	1.0	-2.0	5.5	1.8	3.2
2001	-3.8	4.3	3.7	8.0	55.6	0.7	-2.1	5.1	0.8	2.9
2002	-3.0	4.5	2.7	7.2	52.6	0.5	-2.1	5.0	0.5	2.2
2003	-3.8	4.3	3.1	7.4	48.8	0.2	-1.7	4.1	-0.2	3.3
2004	-2.5	4.1	3.3	7.4	46.3	0.1	-1.7	4.1	0	3.3
2005	-3.1	4.5	3.6	8.1	43.2	-1.3	-2.8	3.4	-1.1	4.7
2006	-3.5	4.3	4.1	8.4	39.7	-2.4	-3.7	3.8	-0.5	4.6
2007	-3.4	3.3	3.5	6.9	36.3	-1.9	-3.0	4.3	1.0	2.5
Average 2000-07	-3.3 (0.14)	4.1 (0.10)	3.6 (0.19)	7.8 (0.08)	47.7 (0.17)	-0.4 (3.33)	-2.4 (0.39)	4.4 (0.16)	0.3 (3.21)	3.3 (0.27)
2008	3.9	2.4	0.9	3.3	40.2	4.5	3.4	4.4	2.0	-1.1
2009	13.7	0.1	-3.7	-3.7	53.9	11.2	9.9	4.0	3.9	-7.6
2010	7.6	0.4	-0.3	0.1	61.5	9.7	8.3	4.2	3.8	-4.1
2011	7.8	1.0	0.4	1.4	69.3	9.4	7.5	5.4	4.4	-4.8
2012	14.8	0.3	-1.4	-1.1	84.1	10.6	7.9	5.8	5.5	-6.9
2013	7.3	0.7	-1.7	-1.0	91.4	6.9	3.5	4.9	4.2	-5.9
Average 2008-13	9.2 (0.46)	0.8 (1.03)	-1.0 (1.73)	-0.2 (14.3)	66.7 (0.29)	8.7 (0.29)	6.7 (0.40)	4.8 (0.15)	4.0 (0.29)	5.1 (0.46)