

Research Reports

SUSTAINABILITY OF FISCAL POLICY IN THE EU-15

ANTÓNIO AFONSO*

Fiscal sustainability is a recurrent topic that countries ponder with some regularity. At the beginning of the 1920s, when writing about France's public debt problem, Keynes (1923, p. 24) mentioned the need for the French government to conduct a sustainable fiscal policy in order to satisfy its budget constraint. Keynes stated that the absence of sustainability would be evident when "the state's contractual liabilities (...) have reached an excessive proportion of the national income". In modern terms, there is a problem of sustainability when government revenues are not sufficient to keep on financing the costs associated with the new issuance of public debt or, in Keynes's words, when "it has become clear that the claims of the bond-holders are more than the tax payers can support" (p. 55).

In the last two decades several developed countries have experienced difficulties coping with budget deficits, and accordingly economists are examining the issue more closely. This is an important topic both in terms of economics and public policy. The issue is paramount notably for the euro area since equilibrium growth paths and the single monetary policy need to be supported by adequate and sound fiscal policy.

Furthermore, the treaties governing the European Union impose the practical necessity of sustainable public accounts. For instance, it is possible to assess sustainable public finances in terms of compliance with the budgetary requirements of the European Monetary Union, i.e. avoiding excessive deficits, keeping debt levels below the 60 percent of GDP reference value, and respecting the "close to balance or in surplus" requirement of the Stability and Growth Pact (SGP). From a forward-looking perspective, one may also notice that the SGP imposes commitments on member states for budgetary positions in the medium-term. Therefore, sustainability could be de facto ensured, provided budget balances respect a "close to balance or in surplus" target.

* ISEG/UTL – Technical University of Lisbon, Department of Economics, aafonso@iseg.utl.pt, and European Central Bank, antonio.afonso@ecb.int. The opinions expressed herein are those of the author and do not necessarily reflect those of the ECB or the eurosystem.

The issue of sustainability

Fiscal policy sustainability is sometimes associated with the financial solvency of the government. In practice, however, what the empirical literature ends up testing is whether both public expenditures and government revenues will continue to display their historical growth patterns in the future. If a given fiscal policy turns out to be unsustainable, it has to change in order to guarantee that the future primary balances are consistent with government budget constraint, essentially the relation between government assets and liabilities in any period in time.

Theoretically any value for the budget deficit would be possible if the government could raise its liabilities without limit. Obviously, that is not feasible since the government is faced with the possibility that, at some point, the public may refuse to buy more government debt or demand too high an interest rate on it. It also is worth noticing that the hypothesis of fiscal policy sustainability is related to the condition that the trajectory of the main macroeconomic variables is not affected by the choice between the issuance of public debt and the increase in taxation. Under certain conditions, it would be irrelevant how the deficits are financed, implying the assumption of the Ricardian Equivalence hypothesis, as stated already in the early nineteenth century by David Ricardo (1820).¹

In more technical terms, a sustainable fiscal policy should ensure that the present value of the stock of public debt goes to zero in infinity. This would mean that the present value of the existing stock of public debt will be identical to the present value of future primary surpluses. In other words, it implies imposing the absence of Ponzi games and the fulfilment of the so-called intertemporal budget constraint.² Faced with this condition, governments will have to achieve future primary surpluses whose present value adds up to the current value of the stock of public debt. Put still another way, public debt in real terms cannot increase indefinitely at a growth rate beyond the real interest rate, and the government cannot play Ponzi games forever.³

¹ In a related context, governments can also be labelled "Ricardian" if they behave in a fiscally disciplined way. See Afonso (2005b) for a related discussion and empirical evidence for the EU.

² In the 1920s, Charles Ponzi swindled several Boston investors, offering them high returns, which in the beginning he would pay with the money collected from new investors. Needless to say, Ponzi ended up being arrested when he no longer was able to pay his debts. He died a poor man.

³ McCallum (1984) discusses this as a necessary condition to get an optimal trajectory for the stock of debt.

How to assess the sustainability of fiscal policy

A common practice in the literature is to investigate past fiscal data to see if government debt follows a stationary process or to establish if there is co-integration between government revenues and government expenditures, that is, if revenues and expenditures move closely together in an almost one-to-one relationship.⁴

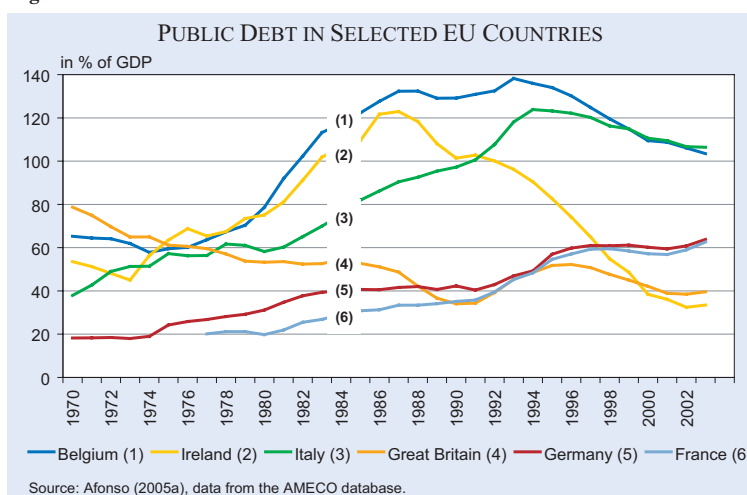
Therefore the procedure to assess the sustainability of the intertemporal government budget constraint involves testing the following co-integration regression between revenues, R , and spending, G : $R_t = a + bG_t + u_t$. Several conclusions may then be established:⁵

- i) When there is no co-integration, the fiscal deficit is not sustainable,
- ii) When there is co-integration with $b=1$, the deficit is sustainable,
- iii) When there is co-integration, with $b < 1$, government expenditures grow faster than government revenues, and the deficit may not be sustainable.⁶

Some stylised fiscal facts in the EU-15

It seems relevant to mention some stylised facts on government debt developments for the EU-15 countries.⁷ Between the beginning of the 1970s and the end of the 1990s the debt-to-GDP ratio exhibited an increasing trend for most countries throughout the period. For instance, general government debt increased in Italy from 37.9 percent of GDP in 1970, to 110.6 percent of GDP in 2000. In Germany the debt-

Figure 1



to-GDP ratio was 18.2 percent in 1970 and went beyond the 60 percent level in 1997. According to European Commission data, in 2003 three countries still had a debt-to-GDP ratio above 100 percent (Italy, Belgium and Greece), while in three other countries the debt ratio was higher than 60 percent (Austria, Germany and France).

In the period 1970–2003 the highest debt-to-GDP ratios were reported in Italy and Belgium (the country with the highest debt-to-GDP ratio in that period), and their high debt service payments induced substantial budget deficits despite primary budget surpluses. A reversal of that general trend is noticeable only at the end of the 1990s, as the several “more indebted” countries tried to fulfil or at least come closer to the Maastricht debt criterion.

The consequences of choosing different fiscal policies may be exemplified by looking, for instance, at the public debt paths of some of the EU countries, as depicted in Figure 1. For instance, the adding-up of successive and significant budget deficits in Italy and in Belgium had a clearly identifiable impact on government debt, with the debt-to-GDP ratio rising steadily until the middle of the 1990s. Germany and France also exhibited a slowly growing debt ratio throughout the 1980s and 1990s. On the other hand, the debt ratio in the UK followed an overall downward path, while Ireland changed from being a high debt country in the 1980s to a “less indebted” country in the 1990s.

With regard to government expenditures and revenues, the main conclusion seems to be that the burden of public expenditures and revenues on GDP has increased since the 1970s in almost every coun-

⁴ Assuming that government revenues and expenditures are non-stationary variables and that their first differences are stationary variables, this implies that both series in levels are integrated of order one. Therefore, these two variables should be co-integrated with co-integration vector (1, -1) to ensure stationarity. See Hamilton and Flavin (1986), Trehan and Walsh (1991), and Hakkio and Rush (1991).

⁵ See Afonso (2005a), for a more detailed technical presentation.

⁶ Hakkio and Rush (1991) demonstrate that if G and R are non-stationary variables in levels, the condition $0 < b < 1$ is a sufficient condition for the budget constraint to hold. However, when revenues and expenditures are expressed as a percentage of GDP or in per capita terms, it is necessary to have $b = 1$ in order for the trajectory of the debt to GDP not to diverge in an infinite horizon. Quintos (1995) and Ahmed and Rogers (1995) further discuss the necessary conditions for sustainability in terms of the order of integration of public debt.

⁷ Notice that only explicit government debt is considered. Indeed, implicit debt is outside the scope of the analysis since methods for computing it, notably future pension-related liabilities, are far from consensual in the literature and are quite dependent on the assumed hypothesis.

try. Another stylised fact is that between 1970 and 2003, the ratio of government expenditures to GDP, for most countries, exhibited a higher growth rate than the ratio of government revenues to GDP. This conclusion holds for all countries except for Belgium, Ireland and Italy. This increase in total expenditures must be seen against a background where governments gradually tried to focus economic policy towards a better fulfilment of the usually defined “Musgravian” goals: macroeconomic stabilisation, income redistribution and more efficient resource allocation. In fact, it was during the 1970s and 1980s that most industrialised countries increased the coverage of social programmes, such as unemployment insurance.

Fiscal sustainability in the EU-15: evidence from government debt

Afonso (2005a) applied unit root tests to the stock of real public debt for the period 1970–2003, also taking into account the fact that there may be structural breaks in the debt series. For instance, this could be the case for Germany due to reunification in 1990. Therefore, following a recursive approach, the null hypothesis that the debt series has a unit root can be tested against the alternative of stationarity with structural change at some unknown break date chosen endogenously. Table 1 summarises results for the existence of stationarity in the debt series, alongside with the detected break dates.

The results allow for the rejection of the unit root hypothesis, therefore the existence of sustainability may be possible for Austria, Finland, Germany, Sweden and the UK, using the overall results of both reported tests. However, in general there is not much evidence against the unit-root hypothesis for most of the debt series in the EU-15 countries; in other words the sustainability hypothesis is mostly not supported.

Interestingly, most of the breaks reported in Table 1 seem to cluster in the 1990s and more specifically in the first half of the decade, notably Austria in 1991/92, Finland in 1990/91 and Germany in 1993/94. One can also mention that, for instance, in Finland the debt-to-GDP ratio increased by more than threefold between 1990 and 1992 (while there was a severe recession in 1991/92). On the other hand, the estimated break date for Germany occurs only in 1993.

One should also notice that the number of observations used is only 33 at most, and the accuracy problems of unit root tests with small samples are well known. However, the alternative approach of using quarterly data would constrain the time period, so that it is usually preferable to use a longer sample of annual data instead of more observations along a smaller time span. Furthermore, the rejection of the stationarity hypothesis does not mean that public accounts are not sustainable. Indeed, the stationarity of the variation of the stock of public debt is a sufficient condition, and stationarity rejection does not necessarily imply the absence of sustainability in the government accounts.⁸

Table 1
Test results for sustainability in general government debt

Country	Period	Zivot and Andrews test		Perron test	
		Break date	Sustainability	Break date	Sustainability
Austria	1970–2003	1992	Yes	1991	No
Belgium	1970–2003	1991	No	1988	No
Denmark	1971–2003	1993	No	1989	No
Finland	1970–2003	1991	Yes	1990	Yes
France	1977–2003	1988	No	1988	No
Germany	1970–2003	1994	No	1993	Yes
Greece	1970–2003	1978	No	1991	No
Ireland	1970–2003	1985	No	1984	No
Italy	1970–2003	1991	No	1990	No
Luxembourg	1970–2003	1986	No	2000	No
Netherlands	1975–2003	1991	No	1986	No
Portugal	1973–2003	1984	No	1991	No
Spain	1970–2003	1992	No	1991	No
Sweden	1970–2003	1997	No	1999	Yes
United Kingdom	1970–2003	1987	Yes	1986	Yes

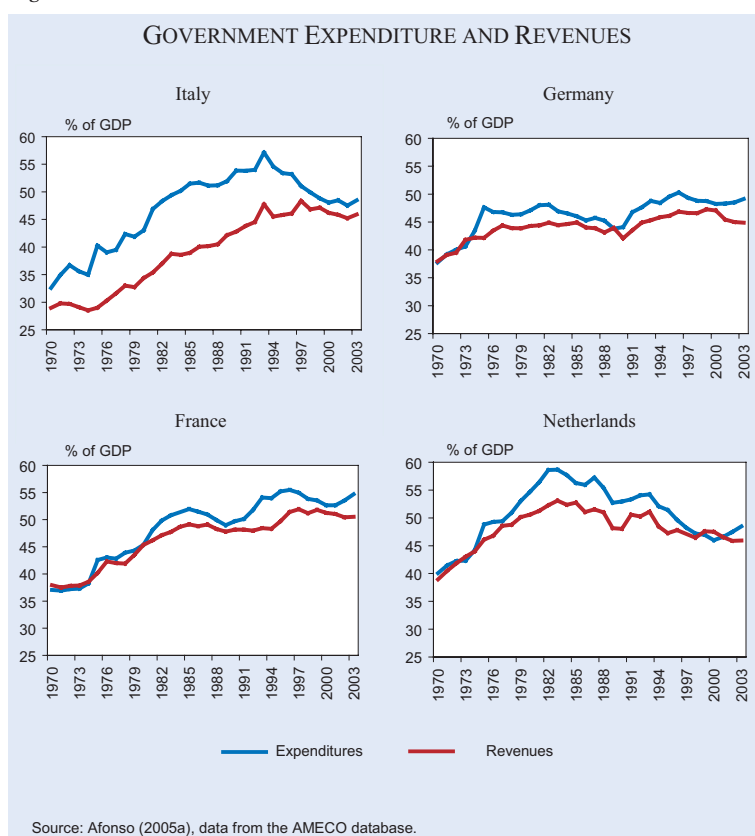
Source: Afonso (2005a).

Fiscal sustainability in the EU-15: evidence from total revenues and expenditures

Visual inspection of the revenue and expenditure time series for a given country may provide an early clue regarding fiscal sustainability. This is exemplified in Figure 2, which depicts government expenditures and revenues, as a percentage of GDP, for Italy, Germany, France and the Netherlands. One suspects in advance that Italy and France may not pass the sustainability tests.

⁸ See Trehan and Walsh (1991).

Figure 2



ways less than one. As a matter of fact, for each one percentage point of GDP increase in public expenditures, for instance, in the Netherlands and in Germany, public revenues only increase respectively by 0.634 and 0.521 percentage points of GDP. Notice that these two countries are the ones where the estimated coefficient b in the co-integrating relationship has the highest absolute value. For the other countries where a significant co-integration relation was found, b is much lower in absolute value.

In other words, for the period 1970–2003, government expenditures in the above-mentioned countries exhibited a higher growth rate than public revenues, challenging therefore the hypothesis of fiscal policy sustainability. These results suggest that fiscal policy may not have

been sustainable for most countries, with the possible exceptions of Germany and the Netherlands.

Table 2 reports the results of co-integration tests performed with the government revenues and expenditures as a percentage of GDP (only for the cases where there is a significant co-integrating relation).

According to such results, it seems possible to reject the hypothesis of fiscal policy sustainability for the majority of the countries. Indeed, only for Austria, Germany, Finland, Netherlands and Portugal is there a significant co-integration relationship between revenue and expenditure. However, even then the estimated coefficients for expenditures, where government revenues are the dependent variable, are all

Conclusion

The fiscal policy sustainability issue was discussed in this note, using the government budget constraint as the key element of the analysis for the EU-15. Formally, such constraint requires that all future net tax revenues (i.e. tax revenues less transfers of current and all future generations measured in present value terms) are enough to cover the present value of future government consumption and to service the existing stock of government debt.

With few exceptions, EU-15 governments might have sustainability problems, although debt-to-GDP ratios showed signs of stabilising at the end of the 1990s. Using government expenditures and revenues as a percentage of GDP, a co-integration relation was identified for Austria, Germany, Finland, the Netherlands and Portugal. However, the estimated coefficients for expenditures in the co-integration equations for those countries, where public revenue is the dependent variable, are less than one.

Table 2

Co-integration of government revenues and expenditures (dependent variable: revenues)

Country	Co-integration relation	
	Engle-Granger	Johansen
Austria	[1 -0.380]***	[1 -0.418]**
Germany	[1 -0.521]**	[1 -0.629]**
Finland	[1 -0.343]**	[1 -0.368]*
Netherlands	[1 -0.634]**	[1 -0.665]**
Portugal	[1 -0.205]***	[1 -0.174]***

Notes: The symbols *, ** and *** denote statistical significance at the 10%, 5%, and 1% level, respectively. Only co-integrating relations with at least a 10% significance level are reported.

Source: Afonso (2005a).

Overall, the reported results are comparable with the ones from some of the existing cross-country literature and might be considered “unpleasant” from a policy-maker’s point of view.⁹ A small number of countries seems to emerge as less likely to exhibit sustainability problems, namely Germany, the Netherlands, Finland and Austria. Of these, Germany and the Netherlands almost always appear less likely to have sustainability problems. The results presented also show that even for these two countries the absolute value of the relevant estimated coefficient in the co-integration relation is quite below unity, implying that their fiscal positions may not be sustainable.

Therefore, the aforementioned countries face the problem of having a higher growth rate for expenditures than the growth rate of revenues. In other words, if fiscal policy were to be conducted in the future as it was in the past, there could be some problems ahead, even for this set of countries that started, early in the 1990s, to make efforts in order to meet strict budgetary criteria. This problem may even become more critical in the light of available projections for the EU15 countries, concerning future public financial responsibilities. As a matter of fact, the EC (2001) reported that ageing populations could lead to increased expenditure on public pensions by between 3 and 5 percentage points of GDP in most member states, with larger increases in several countries. Moreover, fiscal developments during the period 2001–2003 in several EU15 countries do not seem reassuring in terms of sustainability of public finances.

Since population shifts towards older societies is an entirely new phenomenon, it cannot be considered in econometric results based exclusively on past data. This does not constitute a general criticism against purely econometric methods of measuring fiscal sustainability but is instead an argument for expanding the database. Indeed, implicit public pension liabilities, as part of a country’s global fiscal imbalance, have to be understood as future borrowing requirements, not fully embedded in the public fiscal figures, leading therefore to added sustainability problems.¹⁰

Finally, these results, as most of the results reported in the literature, are obtained without considering additional sources of government revenues, for instance privatisation revenues. Information on privatisation revenues is not easily available for the EU-15 coun-

tries. Additionally, government assets (wealth) should be taken into account to make judgements about the sustainability of public finances (even though data are mostly lacking).

References

- Afonso, A. (2005a), “Fiscal Sustainability: the Unpleasant European Case”, *FinanzArchiv* 61 (1), 19–44.
- Afonso, A. (2005b), “Ricardian Fiscal Regimes in the European Union”, European Central Bank, Working Paper no. 558.
- Ahmed, S. and J. Rogers (1995), “Government Budget Deficits and Trade Deficits. Are Present Value Constraints Satisfied in Long-term Data?” *Journal of Monetary Economics* 36 (2), 351–74.
- European Commission (2001), “The Impact of Ageing Populations on Public Pension Systems”, *European Economy, Reports and Studies* 4.
- EPC (2003), “The Impact of Ageing Populations on Public Finances: Overview of Analysis Carried out at EU Level and Proposals for a Future Work Programme”, Economic Policy Committee, EPC/ECFIN/435/03, October.
- Hakkio, G. and M. Rush (1991), “Is the Budget Deficit ‘Too Large?’” *Economic Inquiry* 29 (3), 429–45.
- Hamilton, J. and M. Flavin (1986), “On the Limitations of Government Borrowing: A Framework for Empirical Testing”, *American Economic Review* 76 (4), 808–16.
- Keynes, J. (1923), *A Tract on Monetary Reform, vol. 4, The Collected Writings of John Maynard Keynes*, Macmillan (1971).
- McCallum, B. (1984), “Are Bond-Financed Deficits Inflationary? A Ricardian Analysis”, *Journal of Political Economy*, 92(1), 123–35.
- Quintos, C. (1995), “Sustainability of the Deficit Process with Structural Shifts,” *Journal of Business & Economic Statistics*, 13(4), 409–17.
- Ricardo, D. (1820), *Funding System*, in P. Sraffa, ed., *The Works and Correspondence of David Ricardo*, vol. 4, 1951, Cambridge University Press, Cambridge.
- Trehan, B. and C. Walsh (1991), “Testing Intertemporal Budget Constraints: Theory and Applications to U.S. Federal Budget and Current Account Deficits”, *Journal of Money, Credit, and Banking*, 23 (2), 206–23.

⁹ Afonso (2005a) surveys existing results.

¹⁰ For a review of this topic see, for instance, EC (2001) and EPC (2003).