

# Fiscal Adjustments in Europe and Ricardian Equivalence<sup>\*</sup>

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## 1. Introduction

The outcomes of fiscal policies undertaken in some European countries in the 1980s and early 1990s have been the object of several studies, usually underlying the 'non-Keynesian' responses of economic agents (see for instance Giavazzi and Pagano 1990 and 1996; Giavazzi and Miceli 1993). This work tries to extend the analysis to the European countries and to the 1990s to confront the so called 'Ricardian' and 'expectations view' hypotheses with the more traditional ones. This is also motivated by the interest in the effects of fiscal contractions deriving from the Maastricht Treaty requirements.

According to the 'Ricardian' equivalence hypothesis, an increase in government deficit deriving from a tax cut today leaves permanent income unaffected since it means higher taxes tomorrow; therefore, the increase in government deficit is not accompanied by a change in private consumption, but by an increase in savings.

The explicit introduction of the intertemporal government budget constraint and of individuals' expectations about its fulfilling also characterizes the so called 'expectations view', that, in this sense, can be said to stem from the ultrarationality hypothesis.

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The 'expectations view', however, provides a further step in this direction proposing that, since changes in permanent income depends on expectations, a tax cut may even imply a lower level of consumption if the *level* of the debt/GDP ratio is high and people think that the day of the repayment is close (Dalamagas 1993, Sutherland 1997).

As for government expenditure, it has been argued that a decrease perceived to be persistent implies expectations of lower future taxes and therefore of a higher disposable permanent income (Giavazzi and Pagano 1990). Therefore, a decrease in government expenditure would imply a decrease in government deficit accompanied by an increase in private consumption.

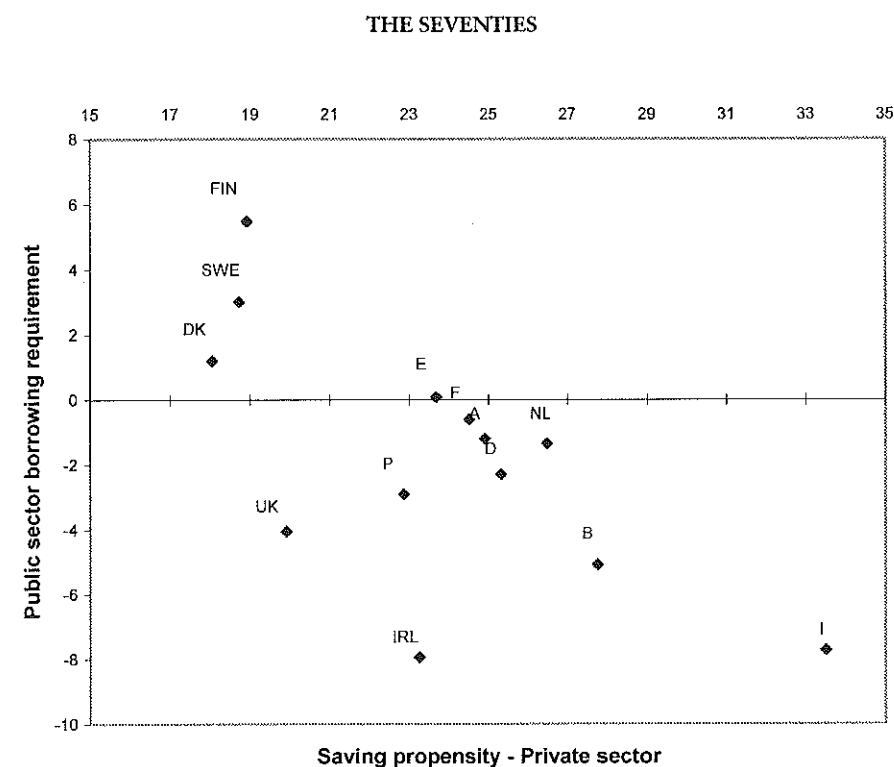
Alternatively, this result has been connected to a decrease in government expenditure which makes the debt/GDP ratio sustainable (Giavazzi and Miceli 1993).

In what follows we make a first attempt to test these views for the European countries over the period that goes from the early 1970s to the mid 1990s.

In particular, we look at the relationship between the propensity to save out of disposable income of the private sector and the government deficit. The data, as summarized in Figures 1 and 2, reveal that the propensity to save changed in several European countries between the 1970s and the 1990s, tendentially declining in countries where it was relatively high and viceversa, while government deficit increased in all of them (the plots refer to average values for each country in the period under consideration). More particularly, the negative relationship between the propensity to save and the budget deficit which existed in the 1970s as shown in Figure 1 appears to break down in the 1990s (Figure 2). We therefore attempt to study the factors behind this change (note that we compare the two periods for the same countries, also in the regressions of the next Section).

Before doing that, however, it must be pointed out that the connection between a deficit today-a tax increase tomorrow and consumption behaviour is not always what people could rationally expect. In fact, if GDP is growing at a rate which is higher than the interest rate, a decrease in taxes or an increase in government expenditure today does not imply a tax increase tomorrow (Domar 1944). The growth rate of the economy and the level of the interest rate seem therefore to be important 'circumstances' in order to assess the effects of a deficit increase on private demand.

FIGURE 1

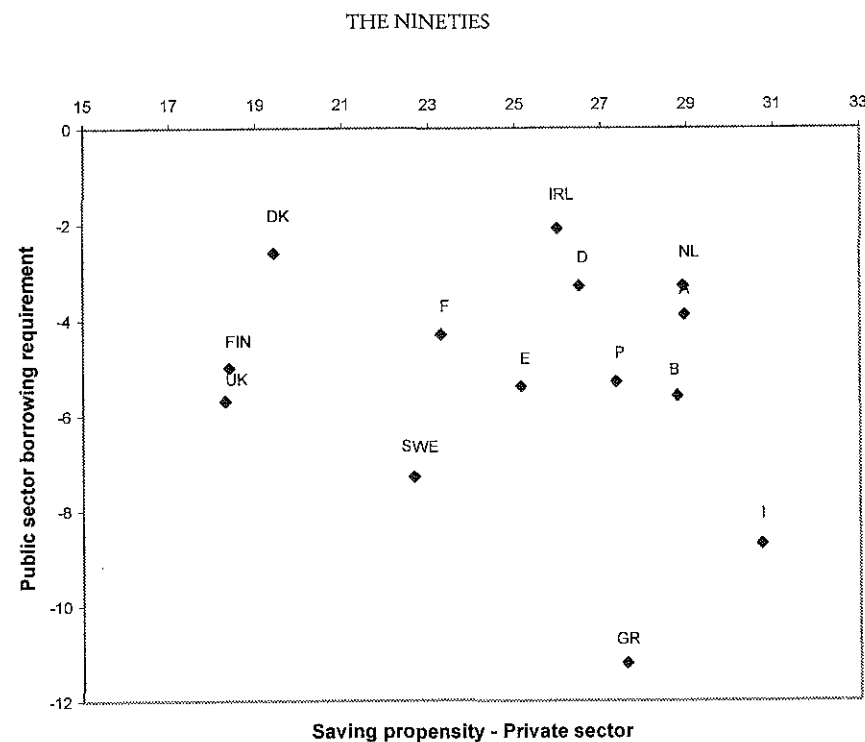


Source: authors' calculations on OECD data, 1997.

Moreover, wealth effects deriving from the influence of government deficit changes on the interest rate should also be taken into account (e.g., a decrease in deficit implying a lower interest rate and a higher value of wealth could determine an increase in private consumption not depending on expectations of lower taxes tomorrow).

Another problem to be considered is the difference between nominal and real deficit, due to the inflation tax: the higher the inflation rate and the debt level are, the higher this difference is.

FIGURE 2



Source: authors' calculations on OECD data, 1997.

## 2. A test of the Ricardian equivalence hypothesis

The 'Ricardian' view implies that consumers do not respond to a deficit-financed cut in taxes by increasing consumption; this is because lower taxes and a higher deficit today imply higher taxes tomorrow. Consumers must therefore save the entire tax reduction to increase bequests for their heirs. The change in government deficit must thus be matched by a concomitant increase in consumers' savings.

We test this hypothesis for 14 European countries (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, the Netherlands, Austria, Portugal, Finland, Sweden, United Kingdom) in the 1990s.

First we consider the relationship between savings of the private sector (percentage of GDP at market prices) and general government deficit (net lending/borrowing as percentage of GDP at market prices), the GDP growth rate (annual percentage changes) and the unemployment rate (percentage of civilian labour force - source: European Commission 1997). We take private savings and calculate the differential between the actual and the average percentage value over the period 1990-97 ( $TS$ ); this variable is regressed against the gap between the actual and the average GDP growth rate ( $TGDP$ ), the differential between the actual and the average government surplus ( $TB$ ) and the differential between the actual and the average unemployment rate ( $TU$ ).

Panel regressions for the 14 countries over the period 1990-97 (annual data) yield:

$$\begin{aligned}
 TS = & -0.51 TB + 0.43 TGDP + C & (1) \\
 \text{s.e.} & (0.05) & (0.06) \\
 \text{t.s.} & (-10.30) & (6.91) \\
 \text{adj. R squared:} & 0.55
 \end{aligned}$$

$$\begin{aligned}
 TS = & -0.39 TB + 0.21 TU + C & (2) \\
 \text{s.e.} & (0.06) & (0.07) \\
 \text{t.s.} & (-6.14) & (3.03) \\
 \text{adj. R squared:} & 0.41
 \end{aligned}$$

where  $C$  - the constant - is insignificant in both regressions.

The results show that, though increases in government deficit are positively correlated with increases in private savings, the relationship is not of a one to one type and also the GDP growth rate and the unemployment rate are highly significant in explaining savings.

In order to separate the effects of changes in disposable income from those of changes in the propensity to save (out of a given disposable income), we derive a measure of the propensity to save by divi-

ding gross private savings as percentage of GDP by the ratio between national disposable income and GDP (data source: OECD 1997).

We thus regress the propensity to save (*tps*) against general government deficit as percentage of GDP (*tbal*), the unemployment rate (*tun*) and the GDP growth rate (*tgr*) for the period 1990-95 by means of a panel regression for the 14 countries:

$$\begin{aligned} tps &= -0.54 tbal & (3) \\ \text{s.e.} & (0.10) \\ \text{t.s.} & (-5.01) \\ \text{adj. R squared:} & 0.18 \end{aligned}$$

$$\begin{aligned} tps &= 0.65 tgr & (4) \\ \text{s.e.} & (0.17) \\ \text{t.s.} & (3.90) \\ \text{adj. R squared:} & 0.10 \end{aligned}$$

$$\begin{aligned} tps &= 0.65 tgr - 0.63 tbal - 0.15 tun + 21.44 & (5) \\ \text{s.e.} & (0.14) \quad (0.10) \quad (0.07) \quad (0.89) \\ \text{t.s.} & (4.59) \quad (-6.45) \quad (-2.02) \quad (23.85) \end{aligned}$$

The results confirm that changes in government savings are not exactly matched by changes in private savings. The influence of the growth rate of GDP shows that different hypotheses on the behaviour of private demand in response to changes in government deficit cannot be ruled out.

In particular, an increase in GDP growth can be translated into higher savings according to the Modigliani and Brumberg (1954) consumption function.

Also, the discrepancy between the change in government deficit and that in savings might be explained by the presence of uncertainty with respect to future income and, as a consequence, of precautionary savings (Barsky, Mankiw and Zeldes 1986). According to this theory, even a 'Ricardian' consumer may exhibit a 'Keynesian' response if a deficit increase results from a decrease in taxes which, rather than being lump-sum, take the form of income taxes. Then, since a tax cut today means a certain wealth increase, while a future tax increase is contingent upon the level of future income, which is uncertain, the propensity to consume out of a tax cut combined with a future inco-

me tax increase might well be closer to what is predicted by the 'Keynesian' view. A precautionary motive can also be connected to the increase in savings experienced in some countries in the 1993 recession, which can be explained as the result of a fall in consumers' confidence.

Moreover, the distinction between the effects of discretionary changes in government deficit and those deriving from the operation of automatic stabilization mechanisms can help explain the regressions results. According to the 'Ricardian' hypothesis, a discretionary increase in the deficit should cause a one to one increase in private savings; according to the 'Keynesian' view, instead, the effect on savings should be smaller than one. In the case of an automatic increase in deficit, the 'Keynesian' view predicts a decrease in savings. The coefficient of government surplus in the savings equation can thus derive from Keynesian or Modigliani and Brumberg types of effect.

Figure 3 shows the reactions of the propensity to save during two different recessions, namely those that hit Europe in the 1970s (series 1) and in the 1990s (series two). For each episode we consider a period of five years (1973-77 and 1991-95 respectively), with the third year being that of lower growth.

The pictures reveal differences between countries and, for the same country, also between periods. In some cases the propensity to save decreases, signalling a 'Keynesian' response, while in others the opposite reaction takes place.

These differences can be explained by various factors. First, the recession of the 1970s was in some way a new situation after several years of expansion, while that of the 1990s was the third experience after the 1975 and 1981 ones. Moreover, in the 1990s, given the Maastricht constraint, a decrease in government deficit did not necessarily involve a decrease in taxes, at least in the near future. It must also be considered that, in those years, several countries were projecting or introducing reforms of the pension systems: expectations of lower future pensions, and therefore of a lower life-time wealth, might have concurred with the climate of decreasing consumers' confidence induced by the economic recession to the increase in savings (see, for instance, the case of Sweden). Another possible explanation can be the difference in the levels of and changes in households' indebtedness.

It is of course possible to assume different forecasts, e.g. that, given a fall in the interest rates and in the debt service costs as a reward for entering the Monetary Union, governments might be able to re-

duce taxes in the future; or that pension reforms would not result in a decrease in future payments. However, these assumptions seem less realistic than the former (see IMF 1993 and following issues for reports on the characteristics of pension reforms, fiscal adjustments towards Monetary Union and consumers' responses).

While in this Section we look at aspects that might be common to the European countries, in the following we will consider some particular explanations for a few 'parade examples'.

Another difference between the two periods and between the countries is found in the relevance of the adjusted wage share (*tws* below). The role of this variable depends upon the fact that our savings variable refers to the private sector as a whole, thus comprising both families and firms. In the latter category there is the corporate sector, which firms characterized by a higher degree of profit retention. In countries where the corporate sector is more developed (e.g. UK and Germany), an increase in the wage share tends to lower the propensity to save of the private sector.

As for the differences between the two periods, the regression results for 11 countries, excluding Greece, Spain and Portugal because of the unavailability of the relevant data, show that the relevance of the wage share falls substantially in the 1990s, presumably because of the rise in wages during the two decades:

$$\begin{aligned} tps &= -0.64 \text{ tws} & (6) \\ \text{s.e.} & (0.11) \\ \text{t.s.} & (-6.01) \\ \text{adj. R squared: } & 0.36 \end{aligned}$$

$$\begin{aligned} tps &= -0.68 \text{ tws} - 0.48 \text{ tbal} & (7) \\ \text{s.e.} & (0.08) \quad (0.08) \\ \text{t.s.} & (-8.32) \quad (-5.94) \\ \text{adj. R squared: } & 0.63, \end{aligned}$$

where *tws* = adjusted wage share.

Overall, there is a significant difference in the influence of the deficit on the propensity to save in the 1970s and in the 1990s, as shown also in Figures 1 and 2: a negative relationship emerges in the

first period, while it is much less clear in the second one. In fact the explanatory power of the regressions falls substantially in the 1990s.

Given that we are considering relatively short periods, it can be that the relationship between savings and government deficit we have found mainly derives from the national accounting identity:

$$S = I + \text{Def} + (X - M),$$

given that, in the short run, there is a very close relationship between investment and net exports.

To avoid this problem, we first consider the cross-country average values for the propensity to save (*tpsm*) and the government surplus (*tbalm*) and run again two panel regressions for the 1970s and the 1990s, yielding respectively:

$$\begin{aligned} tpsm &= 22.26 - 0.77 \text{ tbalm} & (8) \\ \text{s.e.} & (1.20) \quad (0.27) \\ \text{t.s.} & (18.50) \quad (-2.83) \\ \text{adj. R squared: } & 0.41 \end{aligned}$$

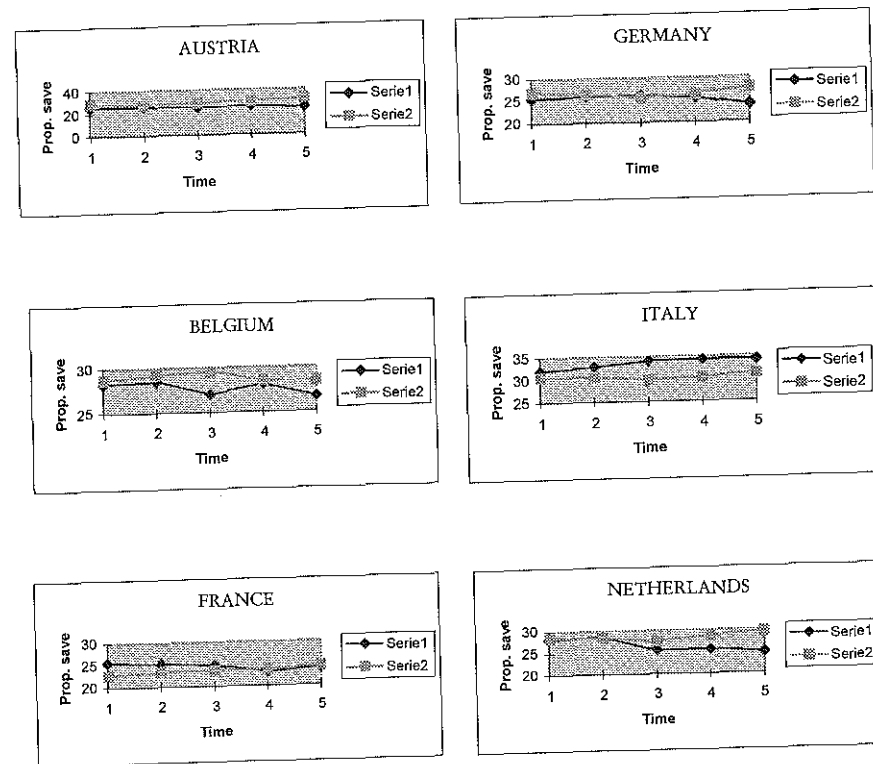
$$\begin{aligned} tpsm &= 22.51 - 0.52 \text{ tbalm} & (9) \\ \text{s.e.} & (2.33) \quad (0.40) \\ \text{t.s.} & (9.67) \quad (-1.30) \\ \text{adj. R squared: } & 0.05 \end{aligned}$$

The results confirm the loosening of the relationship in the 1990s.

Overall, the explanatory power of regressions 3 and 9 is rather limited and there is a good reason for this, namely that the countries under investigation can be divided into two groups, one exhibiting a U-shaped behaviour of the savings ratio and another one exhibiting a steadily increasing one (see Figure 3). The hope to find an explanatory variable which can increase the significance of the regressions is probably rather low. Therefore we turn to an analysis of single countries.

First, we consider the four European major countries; in the next Section, we turn to an analysis of some favourite examples of the literature, i.e. Denmark, Ireland and Sweden.

FIGURE 3



We consider time series data for the period 1973-1995 for Germany, France, United Kingdom and Italy. For the latter country we correct the propensity to save and the government surplus for inflation, given the relevance of this phenomenon during a relevant part of the period.

We run three regressions: one for the whole period, and one for each subperiod 1973-83 and 1984-95.

The results are shown in Tables 1 (Germany), 2 (France), 3 (United Kingdom) and 4 (Italy), with evident differences among countries and periods that are compatible with the previous analysis.

As one would expect after the above analysis, the Chow tests show the presence of structural changes from one period to the other one.

TABLE 1

	Constant	Growth	Wage share	Surplus	$\bar{R}^2$	Chow test
Propensity to save	60.41 (7.64)	0.06 (0.44)	-0.48 (-4.44)	-0.01 (-0.05)	0.53	1.27
	14.80 (0.54)	0.05 (0.31)	0.14 (0.37)	0.005 (0.02)	0.02	
	62.57 (1.93)	0.31 (0.96)	-0.53 (-1.12)	0.14 (0.32)	0.28	
First differences	25.44 (25.71)	0.34 (1.82)	0.37 (25.17)	0.02 (0.09)	0.09	8.07
	25.45 (37.30)	0.01 (0.10)	0.34 (54.71)	0.01 (0.09)	-0.24	
	25.72 (21.14)	0.56 (2.38)	0.39 (19.80)	0.02 (0.06)	0.25	
GERMANY					0.44	18.20
					0.008	
					0.31	
First differences					0.13	0.29
					0.01	
					0.03	
GERMANY					0.14	0.46
					0.07	
					0.13	
First differences					0.20	0.22
					0.26	
					0.15	

TABLE 2

## FRANCE

Propensity to save	Constant	Growth	Wage share	Surplus	$\bar{R}^2$	Chow test
1973-1995	28.04 (3.74)	0.23 (1.01)	-0.07 (-0.73)	0.09 (0.39)	0.02	5.86
1973-1983	64.98 (2.80)	0.14 (0.40)	-0.56 (-1.81)	-0.15 (-0.32)	0.29	
1984-1995	42.24 (11.99)	0.12 (1.38)	-0.29 (-6.10)	-0.19 (-2.20)	0.86	
	22.58 (26.97)	0.30 (1.46)		-0.005 (-0.02)	0.04	2.58
	23.12 (15.62)	0.36 (0.98)		0.21 (0.45)	0.09	
	20.89 (25.14)	0.29 (1.64)		-0.42 (-2.52)	0.29	
			0.32 (35.79)	-0.18 (-0.79)	0.01	3.46
			0.33 (31.01)	0.82 (1.79)	0.001	
			0.30 (21.02)	-0.51 (-1.78)	0.01	
First differences	-0.26 (-1.32)	0.10 (0.83)	-0.48 (-2.60)	-0.52 (-2.75)	0.32	0.49
	-0.39 (-0.90)	0.12 (0.52)	-0.39 (-1.00)	-0.67 (-1.90)	0.12	
	-0.20 (-0.66)	0.08 (0.64)	-0.51 (-1.68)	-0.28 (-1.23)	0.13	
	-0.14 (-0.63)	0.21 (1.69)		-0.44 (-2.04)	0.12	1.46
	-0.55 (-1.35)	0.21 (0.96)		-0.44 (-2.04)	0.12	
	0.20 (0.99)	0.15 (1.21)		-0.16 (-0.67)	-0.04	
			-0.48 (-2.85)	-0.39 (-2.32)	0.36	0.64
			-0.59 (-1.84)	-0.55 (-1.89)	0.29	
			-0.40 (-2.46)	-0.16 (-0.88)	0.27	

TABLE 3

## UNITED KINGDOM

Propensity to save	Constant	Growth	Wage share	Surplus	$\bar{R}^2$	Chow test
1973-1995	106.67 (4.32)	-0.34 (-1.52)	-1.19 (-3.61)	-0.60 (-2.99)	0.47	5.10
1973-1983	101.59 (3.74)	-0.26 (-1.21)	-1.15 (-2.94)	-1.40 (-1.51)	0.42	
1984-1995	142.92 (3.58)	-0.53 (-1.42)	-1.69 (-3.19)	-0.47 (-3.42)	0.75	
	17.45 (15.35)	0.2 (1.33)		-0.056 (-2.23)	0.15	4.36
	22.12 (5.57)	0.18 (0.82)		0.29 (0.29)	0.09	
	15.52 (15.02)	0.54 (2.39)		-0.57 (-3.01)	0.49	
			0.24 (15.59)	-0.52 (-1.8)	-0.018	3.05
			0.32 (4.66)	0.55 (0.42)	0.43	
			0.23 (15.42)	-0.050 (-1.90)	0.05	
First differences	-0.09 (-0.39)	0.11 (0.99)	-0.43 (-2.08)	-0.74 (-4.29)	0.58	1.02
	0.10 (0.23)	0.14 (0.87)	-0.47 (-1.45)	-1.18 (-2.07)	0.48	
	-0.20 (-0.91)	-0.36 (-1.43)	-1.08 (-2.55)	-0.69 (-4.95)	0.71	
	-0.05 (-0.20)	0.27 (3.20)		-0.066 (-3.59)	0.50	0.45
	0.20 (0.44)	0.30 (2.51)		-0.76 (-1.44)	0.40	
	-0.24 (-0.88)	0.18 (1.09)		-0.65 (-3.71)	0.55	
			-0.057 (-4.01)	-0.77 (-4.59)	0.60	1.31
			-0.67 (-3.20)	-1.35 (-2.74)	0.56	
			-0.58 (-2.47)	-0.65 (-4.35)	0.72	

TABLE 4

## ITALY

Propensity to save	Constant	Growth	Wage share	Surplus	$\bar{R}^2$	Chow test
1973-1995	5.58 (0.46)	0.27 (2.29)	0.29 (1.73)	-0.32 (-3.11)	0.26	2.46
1973-1983	34.54 (1.12)	0.15 (1.13)	-0.09 (-0.22)	-0.57 (-2.64)	0.29	
1984-1995	9.26 (0.70)	0.68 (3.14)	0.21 (1.13)	-0.55 (-2.51)	0.54	
	26.56 (63.99)	0.19 (1.66)		-0.20 (-2.49)	0.18	4.39
	27.74 (54.32)	0.16 (1.44)		-0.56 (-2.84)	0.38	
	24.11 (25.24)	0.59 (2.89)		-0.57 (-2.54)	0.53	
First differences			0.14 (0.82)	-0.20 (-2.06)	0.10	0.48
	-0.08 (-0.46)	0.12 (1.6)	0.38 (47.65)	-0.33 (-1.60)	0.14	
	0.12 (0.43)	0.12 (1.30)	0.36 (28.68)	-0.55 (-1.68)	0.10	
	-0.25 (-1.02)	0.30 (1.45)		-0.42 (-3.44)	0.60	
	-0.04 (-0.27)	0.15 (2.63)	-0.11 (-0.60)	-0.56 (-7.20)	0.71	1.17
	0.12 (0.48)	0.16 (2.21)	-0.21 (-0.54)	-0.64 (-5.08)	0.79	
	-0.20 (-0.96)	0.37 (2.52)	-0.12 (-0.45)	-0.42 (-3.66)	0.64	
			-0.27 (-1.85)	-0.51 (-6.70)	0.69	0.25
			-0.63 (-5.10)	-0.51 (-1.74)	0.78	
			-0.26 (-1.35)	-0.41 (-3.05)	0.58	

## 3. The 'German' view

The 'German' view owes its name to a piece of advice of the German Council of Economic Experts, that in 1981 proposed fiscal consolidation in order to boost private demand and fight the recession. According to the 'German' view, if fiscal consolidation is brought about through a cut in government expenditure which is perceived to be persistent, this would signal a future reduction in taxes, meaning a higher disposable permanent income. This would boost consumption and therefore have an expansionary effect on aggregate demand and output.

Giavazzi and Pagano (1990) apply this theoretical framework to explain the effects of two episodes of fiscal contraction, one undertaken in Denmark in 1982 and the other one in Ireland in 1987. They find an unexpectedly high increase in private consumption in the years following the fiscal contraction, which reveals itself through very high forecast errors deriving from the dynamic estimation of a consumption function of the Hayashi (1982) type. This is interpreted as an effect of the expectations of future lower taxes and therefore higher disposable income deriving from the government expenditure cut.

In Giavazzi and Pagano (1996) the same analysis is applied to the Swedish fiscal expansion of the early 1990s; this time the authors find a large negative forecast error in the dynamic estimation of different specifications of the consumption function and interpret this outcome as an effect of a large downward revision of permanent disposable income deriving from the expectations of future higher taxes.

However, the interpretation of the 'consumption puzzle' found in these studies is a partial one. As far as the Danish case is concerned, the increase in consumption can be reconducted to the large fall in the interest rate experienced in the same years of the fiscal contraction.

As for Ireland, the fiscal contraction took place in a period of rapid expansion of foreign demand and decrease in the interest rates, circumstance which sustained aggregate demand.

A similar analysis can be conducted for the Swedish experience. Because of a severe recession, public finances worsened dramatically in the early 1990s: the general government surplus of 4.2% of GDP turned to a deficit of 12.3% in 1993, while the debt/GDP ratio increa-



sed from 44% in 1990 to 78% in 1994; the increase in deficit was not only due to the operation of automatic stabilizers, which are very effective in Sweden, but also to discretionary operations: the cyclically adjusted budget surplus of 1% of GDP in 1990 turned into a deficit of 8.6% in 1993.

To test the 'German' view, we consider the Hall (1978) consumption function, with consumption being explained by a constant and its one period lagged value. The error term of this equation has the property of being correlated with the surprise in permanent income. According to the 'German' view, the Swedish fiscal expansion should have determined a revision in the path of future taxes. This revision can be considered to be proportional to the current unanticipated change in government expenditure. Calling taxes  $T$ , government expenditure  $G$  and the stock of debt  $B$ , the intertemporal budget constraint faced by the government is:

$$\sum_{s=t}^{\infty} \frac{T_s}{(1+\delta)^{s-t}} = B_{s-1} + \sum_{s=t}^{\infty} \frac{G_s}{(1+\delta)^{s-t}} \quad (10)$$

Given equation 10, the surprise in the path of future taxes is equivalent to that in the path of future government expenditure. This surprise is the present value of the revision in expected  $G$ . This is proportional to the current unanticipated change in  $G$  if  $G$  follows an autoregressive process and the discounted value of  $G$  is linear in present and future values (for this line of reasoning, applied to the income process, see Flavin 1981).

One can therefore construct the surprise in  $G$  and add it as an explanatory variable to the consumption function and see whether it helps explain consumption. To do this, we make a VAR process with two lags for government expenditure and deficit for the period 1977-94 (sources: OECD and IMF); the fitted values of  $G$  derived from this process correspond to the expected values of government expenditure, while the residuals correspond to the surprise (*resg* below).

Then we make the following regression, where  $C_t$  is private consumption (source: OECD):

$$\log C_{t+1} = b_0 + b_1 \log C_t + b_2 \log \text{resg}_{t+1} + u_{t+1} \quad (11)$$

obtaining

$$\begin{aligned} \log C_{t+1} &= 0.65 + 0.92 \log C_t + 0.86E-03 \log \text{resg}_{t+1} & (12) \\ \text{s.e.} & \quad 0.71 \quad 0.09 \quad 0.18E-02 \\ \text{t.s.} & \quad 0.92 \quad 10.26 \quad 0.46 \\ \text{p.v.} & \quad 0.379 \quad 0.000 \quad 0.650 \\ \text{adj. R squared:} & \quad 0.87 \\ \text{Durbin's h:} & \quad 1.88 \\ \text{Chow test:} & \quad 2.08 \\ \text{White het. test:} & \quad 7.07. \end{aligned}$$

The surprise in  $G$ , equivalent to that in  $T$ , therefore, does not help explain private consumption and, at least in these specifications of the consumption function and the processes generating  $G$  and  $T$ , the 'German' view does not seem to be supported by the data.

In the case of Denmark, the explanation of the 'puzzle' can be reconducted to the unexpected change in the interest rates. In fact, if the expected real interest rate ( $r^e$ ) is included in the consumption function, the 'puzzle' vanishes and the remaining (very low) forecast errors can be further explained by the surprise in the expected real interest rate (*resr*) rather than by the surprise in taxes (De Bonis 1996):

$$\log C_{t+1} = b_0 + b_1 \log C_t + b_2 \log (1+r_{t+1}^e) + b_3 \log (1+\text{resr}_{t+1}) + v_{t+1} \quad (13)$$

The expected real interest rate and the surprise are derived again from a VAR for inflation, long and short-run interest rates for the period 1970-92. The expected real interest rate is the difference between the fitted values for the long-run interest rate and the inflation rate, while the surprise is the difference between the residuals of those variables.

Estimation of equation (13) for the period 1970-83 yields (all coefficients are significant at least at the 10% level):

$$\log C_{t+1} = b_0 + 0.77 \log C_t - 0.04 \log (1+r_{t+1}^e) - 0.77 \log (1+\text{resr}_{t+1}) \quad (14)$$

adj. R squared: 0.71.

Computation of the forecast errors (defined as percentage of the forecasts: actual value minus fitted value multiplied by 100 over fitted value) for the period 1984-87 yields: 0.18, 1.38, 2.62, 0.06, which are

quite smaller than those found in Giavazzi and Pagano (1990). The surprise in taxes, again, does not help reducing the forecast errors.

As for Ireland, the 'puzzle' is eliminated by estimation of a consumption function which includes the surprise in the exchange rate (*rescamb*) and the surprise in the inflation rate (*resinfl*) (De Bonis 1997):

$$\log C_{t+1} = b_0 + b_1 \log C_t + b_2 \log (1 + \text{rescamb}_{t+1}) + b_3 \log (1 + \text{resinfl}_{t+1}) + w_{t+1} \quad (15)$$

The surprises are derived from a VAR for long-run interest rate, short-run interest rate, inflation rate and effective exchange rate for the period 1977-93. Estimation of equation 15 for the period 1978-93 (annual data; source: OECD *Analytical Database*) by OLS yields (the coefficients are all significant at least at the 10% level):

$$\log C_{t+1} = 4.10 + 0.70 \log C_t + 0.03 \log (1 + \text{rescamb}_{t+1}) + 0.085 \log (1 + \text{resinfl}_{t+1}) \quad (16)$$

adj. R squared: 0.74

Durbin's h: 1.60

Chow test: 1.50

White het. test: 4.11.

Combining the results obtained in the analyses of the three experiences, the main conclusion one can draw is that, as for fiscal contractions, they are associated to an increase in private consumption if they take place in situations of high growth and low interest rates, circumstances which support aggregate demand. As for the decline in consumption associated to a fiscal contraction, it does not appear to derive from an expected future increase in taxes; the results do not contrast with a 'traditional' interpretation according to which the recession was so severe that consumption fell in spite of the fiscal support to aggregate demand.

As for the branch of the 'expectations view' which focusses on the aspect of the debt/GDP ratio sustainability, it presents in some way the same problems as the 'German' view: is a fiscal contraction successful if it stabilizes the debt/GDP ratio, therefore inducing expectations of lower taxes and an increase in consumption which boosts output? Or is a fiscal contraction successful if it is undertaken

in a period of high growth, when income is increasing and private demand is sustained by this 'exogenous' circumstance?

The observations concerning the European countries (source: European Commission 1997) do not always support the hypothesis of a correlation between consolidation and consumption growth; in many cases, in fact, consumption increases one or two years after the debt/GDP ratio has become stable, which actually happens in periods of relatively high growth.

#### 4. The effects of fiscal adjustments and the country size

The assumptions that an increase in government deficit today means an increase in future taxes, which underlies the 'Ricardian' and the 'expectations' views, abstracts from the influence of income growth and of the rate of interest, as shown above. Therefore, changes in private consumption which can be reconducted to changes in these variables cannot straightforwardly be connected to concomitant changes in deficit and expectations about future taxes.

To extend the analysis undertaken in Section 3 to other European countries, we look at the behaviour of the GDP growth rate, the changes in the ratios of government primary expenditure to GDP, taxes to GDP, primary balance to GDP, consumption to GDP, investment to GDP, exports to GDP and government consumption to GDP in the period 1982-89 for the EUR 12 countries (we do not consider Austria, Finland and Sweden for these years).

To have an overlook, we first consider the average values of these variables over the period, in order to see whether the differentials between each country rate of growth and the EUR 12 average can be reconducted to differences in their paths.

What seems to emerge is that, even with some exceptions, as far as *small* countries are concerned, a cut in government expenditure seems to be associated to a positive rate of growth differential and to an increase in the export to GDP ratio accompanied by a decrease in the ratios of the domestic demand components to GDP (source: European Commission, *European Economy*, various issues).

This is particularly true for Ireland and Luxembourg. Belgium and the Netherlands, which grow less than the average, are characterized by an improvement in the primary balance which is lower than the European average, with the exports to GDP ratio growing very little. In Denmark government expenditure decreases and taxes increase, but the export growth is very low and the GDP growth rate is lower than the European average. In Greece, where government primary expenditure increases, the GDP growth rate differential is negative. In Portugal, instead, taxes increase, as well as exports and government consumption, and the growth rate is higher than the European average.

As for the larger countries, the United Kingdom and Spain exhibit a growth rate which is higher than the average. Both of them have a government balance change which is positive but lower than average and a declining exports to GDP ratio. The two countries differ in the way they have constructed their fiscal operations: the United Kingdom has decreased both the taxes to GDP and the government expenditure to GDP ratios, while Spain has increased them (however, it must be noted that the latter started from ratios much lower than average). The remaining three big countries grow less than average and are all characterized by small changes in the taxes to GDP and government primary expenditure to GDP ratios. More particularly, in Germany the taxes to GDP and government primary balance to GDP ratios decrease, the exports to GDP ratio increases while the domestic components of aggregate demand decrease. In Italy both taxes and government primary expenditure increase, the shares of private and government consumption in aggregate demand increase while those of exports and investment decrease. In France taxes increase and government primary expenditure decreases, the exports share increases while those of the domestic components decrease.

In the variety of combinations, one conclusion can be drawn: a fiscal contraction is associated to a positive growth rate differential in small countries when exports increase. The size of the country makes a difference since the higher the share of exports in aggregate demand, circumstance often associated to a small country size, the larger the effect of an increase in export on GDP (see above Germany for a counterexample).

The question that arises at this point is whether a fiscal adjustment improves growth if it is undertaken in a period of increa-

sing international competitiveness and foreign demand, or a fiscal contraction somehow determines the increase in exports. Some suggestions for the second direction of causality are reviewed in Alesina and Perotti (1995): if fiscal policy determines a fall in wage government consumption or in relative unit labour costs, it can determine a depreciation of the nominal exchange rate; thus competitiveness is increased, exports increase and so does GDP.

We have therefore tried to check the difference existing among countries with respect to their size (or, better, the degree of openness: Spain is here considered as a small country) analysing the relationships between the GDP growth rate differential between each country and the average and consumption changes, which we regress against the changes in the ratios of government primary expenditure to GDP, of government primary balance to GDP, of government balance to GDP, and of exports to GDP.

To summarize, the results (available upon request) indicate the presence of a negative correlation between an increase in government expenditure on the one side and the growth rate differential and the change in consumption on the other side; the opposite is true for improvements in government balance; moreover, the change in exports is positively correlated with consumption changes and GDP growth rate differentials.

Is there a difference between large and small countries? In order to see this, we have run the regressions separately for the large countries (Germany, Italy, United Kingdom and France) and the small ones (Spain, Belgium, Denmark, Greece, Ireland, Luxembourg, the Netherlands, Portugal).

Even if changes in government primary expenditure are still negatively correlated with the GDP growth rate differentials, the coefficient is no longer significant for large countries; moreover a difference emerges as for the effects of a change in government balance: this is positively correlated with growth and consumption in the small countries, but is negatively correlated with the GDP growth differentials in the large ones (even if the significance level is quite low). Moreover, in the latter growth rate differentials and exports changes are no longer positively correlated.

This is not in contrast with the hypothesis that small countries can benefit from fiscal consolidation when this is associated to an increase in exports.

We have then extended the analysis to the first half of the 1990s (we consider now the EUR 15 countries, i.e. also the - small countries - Austria, Finland and Sweden). The regression results for the period 1982-94 for all countries pooled together show, in particular, that the effect of a change in government primary balance on consumption is no longer positive for big countries. In order to explain the results, we have looked at the differences between the 1980s and the 1990s.

The main differences in the results of the period 1990-94 with respect to the 1982-89 one, as far as the pooled regressions are concerned, is that government primary expenditure is no longer negatively correlated to consumption changes and the positive effect of an improvement in primary balance is largely reduced. As for the separated regressions, we see that government expenditure is now positively correlated to changes in consumption and growth rate differentials in the large countries and only to consumption in the small ones; improvements in government primary balance are negatively correlated to consumption changes both in small and large countries.

These results show that a higher government deficit level in a recession is perceived in a different way from a higher deficit level in a normal growth period. Explanations of this behaviour can be reconducted to the discussion of Section 2.

The 1990s are characterized, with respect to the previous period, by the 1992-93 recession and by the constraint imposed onto public finances by the requirements of the Maastricht Treaty. In such a situation, it seems that fiscal expansion did help support private demand and fiscal adjustment did not involve expectations of lower future taxes.

## 5. Conclusions

While in the traditional Keynesian vision consumption is a function of current disposable income (and wealth), in the Ricardian and expectations views, instead, it depends on permanent disposable income, and current deficits are equivalent to future tax payments.

Even if after the contributions made by Modigliani and Friedman it is largely accepted that consumption decisions depend upon long-term perspectives, it is not unconditionally true that rational

consumers consider a deficit today as equal to future taxes: under less than full employment conditions, a government deficit due to the working of automatic stabilizers or anticyclical policies does not imply an increase in the fiscal burden if people expect as a result an increase in future income.

Moreover, the ultrarationality hypothesis has itself been the object of several critiques, hitting upon the assumptions on which it is based; namely: *a*) the existence of offsprings; *b*) the operating of bequests; *c*) perfect capital markets; *d*) lump-sum taxes.

One can add the unpredictability of future fiscal policies and the uncertainty of future incomes.

Whether the ultrarationality hypothesis hold or not is, at the end, a matter subject to empirical tests. In this paper we have shown how consumers in the European countries did not seem to react to budgetary policies, and fiscal contractions in particular, in a way which is fully compatible with it.

Specifically, the Maastricht constraint, pension reforms and changes in the credit market (especially to consumers) have been relevant factors.

This is somehow confirmed by the prevision of our 'model' for the years 1996 and 1997 in the case of Italy. Table 5 shows the values of the growth rate, the adjusted wage share and the government surplus (adjusted for current inflation) for this country in the two years.

TABLE 5

ITALY				
	1996		1997	
Growth rate (first difference)	0.7	(-2.2)	1.5	(0.8)
Adjusted wage share (first difference)	66.6	(-0.1)	67.8	(1.2)
Adjusted government surplus (first difference)	-1.75	(-0.5)	-0.25	(1.5)
Estimated propensity to save - absolute value				
1973-1995	25.26		26.52	
1984-1995	24.25		24.65	
Estimated propensity to save - first difference				
1973-1995	-0.053		-0.956	
1984-1995	-0.688		-0.784	

Using the parameters estimated for Italy in Section 2 (see Table 4), we calculate the forecasted values of the propensity to save for the years 1996 and 1997; we use the equation including all the explanatory variables (constant, growth rate, adjusted wage share, adjusted government surplus), both in the absolute value and first difference versions. Of course, we consider only the 1973-95 and 1984-95 estimation periods. The estimates are also reported in Table 5.

The results show a slight tendency towards a reduction of the propensity to save (the value for 1995 was 26.61). This has been pointed out also in the last annual report of the Bank of Italy: the values of the average propensity to save of the private sector (defined as the ratio between gross savings, net of pension funds variations and gross disposable income of the private sector) are 27.8 for 1996 and 25.00 for 1997 (partially estimated), after a value of 28.4 for 1995. When income is corrected for expected (past) inflation, these values drop to 24.7 (25.1) and 22.7 (23.1).

Our estimates differ from those of the Bank of Italy, especially for 1997, showing a smaller decrease in the propensity to save (when calculated by means of first differences; the value is substantially unchanged when estimated by means of absolute values). One could therefore say that our results underestimate the effect of the decrease in government deficit.

However, the increase in consumption can be reconducted to the increase in labour income experienced in 1997. Moreover, our forecasts cannot take into account the jump in the consumption for vehicles that took place in response to the 1997 government incentives (*rottamazione*). Actually, when this component of consumption is left out, the Bank of Italy estimates an almost unchanged value of the propensity to save.

This shows that, even with a decrease in government deficit, the propensity to save seems to react more to other factors. In particular, the Bank of Italy refers to a persistent degree of consumers' uncertainty about the evolution of their own expenditure capacity, as reflected by the ISCO consumers' confidence index.

As a conclusion of this analysis, we would like to point to a piece of evidence and to an open question.

As for the first one, the results we obtained show the presence of a change in consumers' behaviour with respect to government deficit, as it appears by comparing the responses during the 1970s and the

1990s. An explanation of this difference can be found in the perception of the constraints imposed by the Maastricht Treaty and in the reforms of the pension systems that characterized the 1990s (see Section 2): a decrease in the deficit was no longer associated to expectations of an increase in future wealth even for 'Ricardian' consumers.

The question that remains open is to which extent changes in savings induced by policy operations must be connected to expectations of a particular future variable, namely taxes, or to actual changes in variables, e.g. interest rates – the changes of the latter in some way 'materializing' the former.

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