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Fiscal Consolidation in Europe: Pre- and Post-Maastricht

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Fiscal Consolidation in Europe: Pre- and Post-Maastricht

by

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FISCAL CONSOLIDATION IN EUROPE:
PRE- AND POST-MAASTRICHT*

Abstract:

Based on a panel data model this paper investigates whether the effects of fiscal policy on national saving in Europe have changed after the Maastricht Treaty came into force. Recently Giavazzi, Jappelli and Pagano (2000) found evidence that national saving responds nonlinearly to fiscal policy when a large and persistent consolidation is undertaken. I show that their finding is not robust, one reason being that the structural budget deficit is not a time-invariant criterion for identifying episodes of large and persistent fiscal impulses. This paper proposes and analyses an alternative definition of a fiscal consolidation episode: the post-Maastricht period.

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CONTENTS

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1. Introduction

Fiscal consolidation has been on the agenda of policy makers around the world for most of the past decade. In a number of countries budgetary trends were judged to be unsustainable in the mid-80s. Among those countries that undertook a rigorous turnaround in fiscal policy at that time were Denmark and Ireland. Surprisingly, fiscal contraction did not entail an economic downturn in these countries. In both cases, the decline in public expenditure was more than offset by the strong rise in private consumption and investment. This observation was at odds with mainstream economic beliefs concerning the short-run economic effects of fiscal policy, and subsequently a large body of literature has evolved trying to find a rationale for the seemingly "perverse" effects of fiscal consolidation. A seminal contribution to the field was made by Giavazzi and Pagano (1990) who advanced the hypothesis that expectational effects were responsible for the positive outcome. According to this view, fiscal consolidation can lead to improved expectations about long-term growth and be followed by an increase rather than a reduction in current private-sector spending.

However, the profession has not yet reached a consensus on the effects of fiscal consolidation. This is no surprise since there is also strong disagreement among economists about the macroeconomic impact of fiscal policy during "normal" times. In a recent survey, Elmendorf and Mankiw (1999) report that the issue whether budget deficits have Keynesian, neoclassical or Ricardian effects on the economy[1] has not yet been settled. An empirical selection of the appropriate school is difficult since the theories have observationally equivalent implications in some respects. For instance, the Keynesian and the neoclassical view agree that fiscal consolidation leads to an increase in national saving whereas Ricardian Equivalence predicts that national saving is not affected.[2] The literature on the effects of fiscal consolidation adds to this uncertainty by claiming that – under certain circumstances – the

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[1]   For an exposition of these alternative views see Barro (1989), Bernheim (1989) and Eisner (1989).

[2]   If and only if, fiscal consolidation is achieved by an increase in non-distorting taxes, taking the path of government expenditure as given.

impact of budget deficits on national saving (and other macroeconomic variables) can be reversed.

The literature analyzing fiscal consolidation episodes can be divided into two major branches. The first, building on the work of Alesina and Perotti (1995, 1996), concentrates on the factors affecting the success and failure of fiscal contractions. A successful consolidation is defined in terms of reaching the goal of a permanent reduction in the government debt - GDP ratio. Recently, Heylen and Everaert (2000) have tested the most frequently cited hypotheses explaining the outcome of fiscal consolidations: first, the composition of the program, second, its size and persistence, third, the level and growth rate of public debt, fourth, the international macroeconomic environment and, fifth, exchange rate developments. Their results give support to all of these factors, apart from the size and persistence hypothesis which I will submit to extensive testing in the following. While having the merit of testing a variety of determinants in a single framework their conclusions have to be regarded with some caution as Heylen and Everaert do not take account of the time-series dimension of the data in their regressions.[3]

The second branch of the literature distinguishes itself by measuring the success of fiscal consolidations in terms of macroeconomic rather than fiscal outcomes. In a recent paper, Giavazzi, Jappelli and Pagano (2000)[4] have investigated the relationship between fiscal policy and national saving. Reviewing the main theoretical contributions, they conclude that this relationship may be nonlinear under certain circumstances. In a broad sense, the non-linearity arises from the influence of fiscal policy on private-sector expectations. In an environment where private agents feel that an unchanged policy stance is unsustainable and will sooner or later lead to economic disruptions, the implementation of a fiscal consolidation program can drastically improve the private sector's assessment of future income developments. Two propositions emerge from the theoretical literature: On the one hand, the analyses of Blanchard (1990), Sutherland (1997) and Perotti (1999) imply that the *government debt - GDP ratio* is the variable affecting private-sector expectations. Whenever the debt ratio is either near a critical value or grows at a rapid pace, a fiscal consolidation program does not lead to a rise in national saving: the private sector reacts to improved long-term prospects by dissaving more than the government saves. On the other hand, nonlinear fiscal policy effects may depend on the

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[3] The same caveat applies to the empirical work of Alesina and Ardagna (1998).

[4] Building on earlier works by Giavazzi and Pagano (1990, 1996) estimating the effects of fiscal consolidation (and expansion) on private consumption.

size and persistence of the fiscal impulse, as illustrated by Drazen (1990). In a situation of unsustainable fiscal policy the private sector will only revise its expectations if the government gives a clear signal that it will permanently alter its course towards sound public finances. In their paper, Giavazzi, Jappelli and Pagano (hence GJP) test both hypotheses in a panel data model, finding overwhelming support for the size and persistence proposition.

Figure 1: Cyclically-adjusted Budget Balance and Output Gap for the European Union
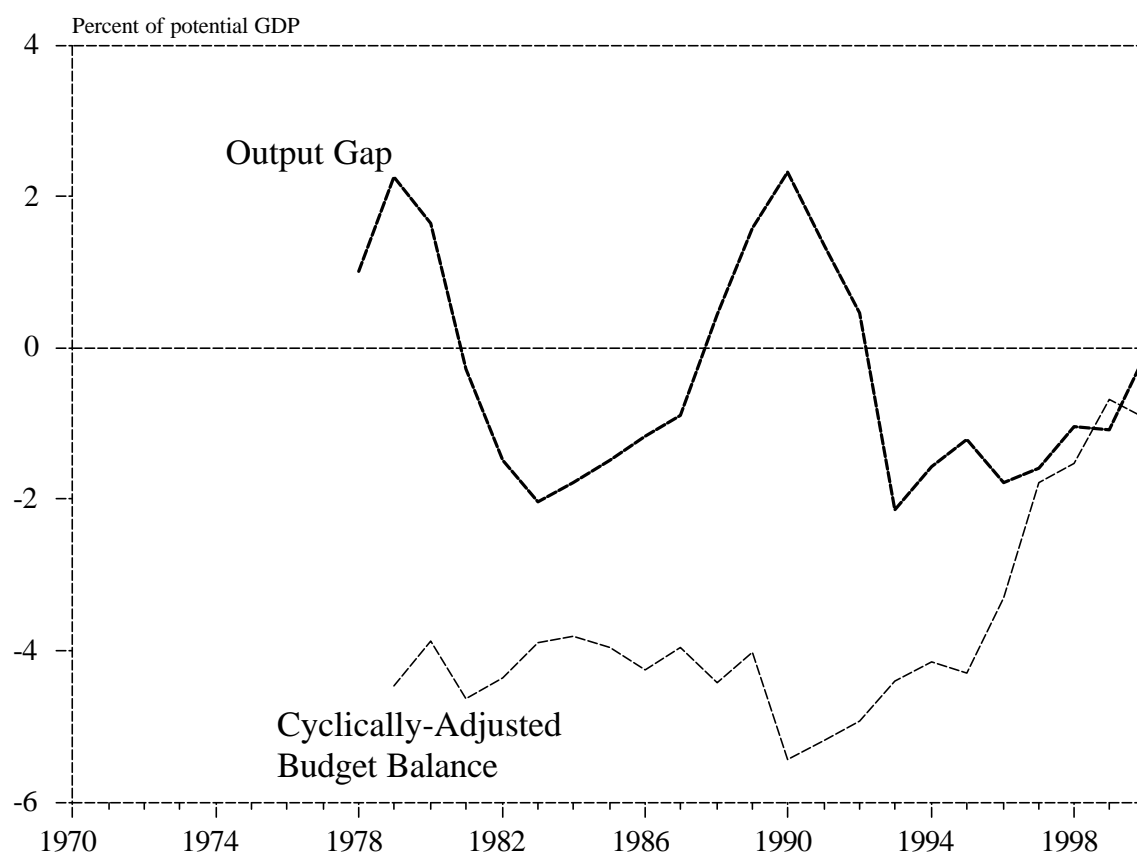
Source: OECD (2000a)

The GJP analysis serves as a starting point for the present paper for the following reason. Their results are of paramount importance for policy makers in the European Union. As can be seen in figure 1 European governments have gradually reduced budget deficits in the 1990s. Still, most countries have refrained from drastic consolidation measures because they did not want to dampen economic growth that was already sluggish – during most of the 1990s the output gap as calculated by the OECD was negative. In contrast, the results reported in GJP should encourage European governments to intensify their efforts on the road to a balanced budget. Such action, they argue, could lead to stronger growth even in the short-run. However, it has to be asked whether their estimation results are robust since this is the precondition for

useful policy advice. This question is addressed in the empirical application: I estimate national saving regressions for a panel of 14 EU countries[5] along the lines of GJP.

It is shown that their finding of a nonlinear relationship between fiscal policy and national saving might be spurious. This is due to two problems: (i) Panel data models do not allow for cross-country heterogeneity apart from a country-specific intercept. I find evidence for the proposition made by Haque, Pesaran and Sharma (2000) that the statistical significance of nonlinear effects in panel regressions could be spurious due to systematic slope heterogeneity. (ii) The work of GJP and many other applied studies share a common problem: the identification of fiscal policy episodes. Usually, a large change in the cyclically-adjusted budget balance over two years is defined as a strong and persistent fiscal impulse.[6] Apart from the ad hoc character of this definition, this measure suffers from the extensive revisions of structural budget balances in the course of time.[7] In the remainder of the fourth section of this paper, I try to remedy the second problem and propose an alternative definition of a fiscal consolidation episode. In 1992, the year in which the Maastricht Treaty was signed, most countries in the European Union did not comply with the fiscal convergence criteria. If – which has been controversially discussed – European governments credibly committed to fiscal discipline at that time, the years from 1993 to the present can be regarded as a persistent fiscal consolidation episode.[8] Using this definition of a fiscal consolidation episode, the panel regressions are re-estimated. Again, I find no evidence for nonlinear effects of fiscal policy. However, individual-country regressions imply that a non-linearity might be present in some cases. All in all, the results indicate that the case for non-linear or non-Keynesian effects of fiscal policy is less stringent than claimed by parts of the literature.

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[5] Luxembourg is not included due to data (non)availability.

[6] See, for example, OECD (1996) and GJP (2000).

[7] The structural budget balance is not only affected by revisions of the underlying net lending series, but also by the re-estimation of potential output. An example can highlight the point: Whereas the OECD (1996: 34) reported a cyclically-adjusted budget surplus of 0.5 per cent (in relation to potential GDP) for Australia for the year 1982, four years later (OECD 2000a) it reported a structural deficit of 3.6 per cent for the same country and year.

[8] Figure 2 (appendix) shows indeed that budget deficits have considerably decreased throughout Europe in the 1990s.

2.   Episodes of Fiscal Contraction and Expansion

This section lays the ground for the subsequent empirical examination of the hypothesis that the effects of large and persistent fiscal impulses are opposed in sign from those of moderate fiscal impulses. In the literature, it is a common procedure to identify episodes of strong fiscal contraction and expansion with large and durable changes in the structural budget balance. Following GJP (2000: 1268) I define a 'large and persistent fiscal impulse' as a change in the general government cyclically-adjusted budget balance equivalent to at least 1.5 percentage points of potential GDP per year over a two-year period.[9] This ensures that the results of this paper are directly comparable to theirs. Table 1 reports the episodes identified by GJP as well as the episodes I obtained using their definition of large and persistent fiscal expansions and contractions.

An inspection of the table reveals that while GJP recovered 30 expansion and 51 consolidation episodes, I only obtain 7 and 6, respectively. A minor part of this divergence can be attributed to different data availability. For some countries, the OECD has omitted earlier data since the year of data collection (1997) by GJP due to revisions of national accounts. For instance, I could not account for the very prominent fiscal consolidation episode of Denmark in the mid-80s because the OECD (2000a) does not publish data on the structural budget balance before 1987 for this country anymore. Still, the largest part of deviation seems to be explained by data revisions. As was argued in the last section, structural balances are affected by revisions of unadjusted budget balances and of potential output. Probably some of GJP's significant fiscal impulses were only slightly above the 1.5 per-cent margin and are below it when considering more recent data.[10] Furthermore, even in those cases where my episodes correspond to those of GJP there is no perfect coincidence. Although there are some clear-cut

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[9]   Other authors make use of similar definitions: the OECD (1996) identifies fiscal consolidation episodes with an increase in the structural budget surplus by at least 3 per cent over two years, Heylen and Everaert (2000) with an increase by 2 per cent over two years. Giavazzi and Pagano (1996) look at changes in structural deficits over time horizons of one to four years, while Alesina and Ardagna (1998) consider improvements in the primary structural balance.

[10]   Using a similar definition of consolidation episodes, the OECD (1996: 34) identifies 12 cases of significant fiscal contraction in EU countries. It is thus very probable that it is impossible to obtain identical episodes unless one uses not only the same data source (here: OECD databases) but also exactly the same publication. Consequently, the identification of episodes is not time-invariant.

Table 1: Episodes of Large and Persistent Fiscal Contractions and Expansions[a]

| | Own[b] | GJP[c] | Fiscal expansions | | Fiscal contractions | |
	Sample period		Own[b]	GJP[c]	Own[b]	GJP[c]
Germany	70–00	70–96		74–75, 89–91		71–72, 76–77, 81–83, 92–94
France	74–00	72–96		77–78, 81–82		72–73, 79–80, 83–84, 95–96
United Kingdom	87–00	70–96	92–93	72–74, 83–84, 91–93	97–98	70–71, 79–82, 89–90, 94–96
Italy	70–00	72–96		74–75, 78–79, 84–85		72–73, 76–77, 82–83, 92–96
Spain	70–00	70–96		81–82, 89–90		86–87, 91–93, 95–96
Netherlands	74–00	74–96		76–80		74–75, 81–83, 87–88, 90–92
Belgium	74–00	74–96	80–81	79–80	93–94	74–75, 81–87, 92–94
Sweden	84–00	83–96	91–93	90–93	86–87, 96–98	83–84, 86–88, 94–96
Austria	74–00	74–96	75–76	93–94		74–75, 77–78, 80–81, 83–85, 95–96
Denmark	88–00	81–96		81–82, 87–90		83–86
Finland	79–00	73–96		77–80, 82–83, 86–87, 90–92		73–76, 84–85, 88–89, 93–96
Greece	75–00	75–96	84–85,88–89	80–81, 84–85, 88–89	96–97	75–76, 82–83, 86–87, 90–96
Portugal	70–00	70–96	74–76	72–76, 80–81, 89–90		70–71, 82–86, 91–92, 94–95
Ireland	77–00	77–96		89–90, 94–95	88–89	77–78, 82–84, 86–88, 91–92
Number of Episodes			7	30	6	51

[a]A large and persistent fiscal contraction (expansion) episode is defined as a period in which the cyclically-adjusted budget balance (in percent of potential GDP) increases (decreases) by at least 1.5 percentage points per year over a two-year period. — [b]Own calculations based on OECD (2000a) figures on cyclically-adjusted budget balances.— [c]Giavazzi, Jappelli and Pagano (2000), table A.2, pp. 1286—1287.

episodes of large and persistent fiscal impulses, the exact dating of these episodes is far from being uncontroversial. Abstracting from these problems for a moment, the empirical analysis of GJP will be re-conducted in section 4.2 in order to check for robustness of their results. Both sets of episodes will be considered in turn to avoid premature rejection of the evidence reported in GJP (2000).

The strong sensitivity of this identification procedure already casts doubt on any results relying on these episodes. To avoid this source of uncertainty, an alternative concept will be analyzed in section 4.2: I propose to view the post-Maastricht period starting in 1993 as a fiscal consolidation episode. Indeed budget deficits have considerably decreased since that time throughout the European Union. However, for the expectations effects of fiscal consolidation to materialize it is necessary that the commitment of governments implied by the Maastricht Treaty was judged credible by the private sector ex ante. Unfortunately, the credibility assumption cannot be tested on historical data. It can only be established ex post that all countries made considerable efforts in order to qualify for European Monetary Union. While this caveat has to be kept in mind, the definition of the post-Maastricht era as a consolidation episode has the attractive feature of being time-invariant.

3.   The Empirical Model

In this section, the empirical framework employed in section 4 is presented. Following the strategy of GJP (2000), I estimate single-equation fixed-effects models for a panel of 14 EU countries for the years 1970 to 2000.[11] The national saving rate (as a percentage of potential output) is chosen as the dependent variable. As GJP point out this allows one to relate the estimation results directly to the Ricardian equivalence proposition. While standard neoclassical theory predicts that national saving should respond positively to increases in taxes and negatively to increases in government spending, Ricardian equivalence implies that, for a given path of government expenditure, changes in (non-distorting) taxes and transfers have no effect on overall saving. Furthermore, if the 'size and persistence' hypothesis is correct the effects of fiscal policy on national saving mentioned for the neoclassical view should be dampened or even reversed during episodes of large and persistent fiscal impulses. This hypothesis will be tested in section 4.

The following fixed-effects panel data model will be estimated:

$$[1] \qquad \frac{S_t}{Y_t^*} = \alpha_{oi} + \alpha_1 \frac{S_{t-1}}{Y_{t-1}^*} + \alpha_2 \frac{Y_t - Y_t^*}{Y_t^*} + \alpha_3 r_t + \beta_1 \frac{T_t}{Y_t^*} + \beta_2 d_t \frac{T_t}{Y_t^*} + \gamma_1 \frac{G_t}{Y_t^*} + \gamma_2 d_t \frac{G_t}{Y_t^*} + u_{it},$$

where S is national saving, Y^* potential output, $(Y-Y^*)/Y^*$ the output gap, r the real short-term interest rate, T net taxes and G government spending.[12] All variables apart from the real interest rate are scaled by potential GDP to avoid problems of heteroscedasticity. The slope coefficients are assumed to be the same across countries, and u_{it} are random shocks assumed to be distributed independently and identically with zero mean and a constant variance. The country-specific constants α_{0i} (the fixed effects) are the only source of heterogeneity in this framework. Note that the tax and spending variable appear twice on the right-hand side of equation [1]. Both variables are interacted with a dummy variable d which captures the episodes of large and persistent fiscal impulses reported in table 1. Equation [1] is estimated applying the instrumental variables estimator to account for the potential endogeneity of the

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[11]   GJP (2000) estimate their models using panel data comprising 18 OECD countries for the years 1970 to 1996.

[12]   See Appendix for a description of the variables used in the empirical application.

interest rate and net taxes. The first is instrumented with its lagged value, the latter with the cyclically-adjusted budget balance.

As Haque, Pesaran and Sharma (2000) demonstrate the disregard of cross-country heterogeneity in panel regressions can lead to spurious results concerning the nonlinear effects of the independent variables. This point is illustrated in Figure 3 drawn from their paper. As can easily be seen, estimation of a panel data model will exhibit strong non-linearities, even though the country-specific relationship between variables Y and X is linear. In order to avoid spurious inference, I supplement the panel regressions with country-specific estimates of equation [1]. Moreover, I report the mean group estimator advocated by Haque, Pesaran and Sharma (2000) which is calculated as the arithmetic average of country-specific coefficients.

Figure 3: Fixed-effects Regression under Heterogeneous Slopes
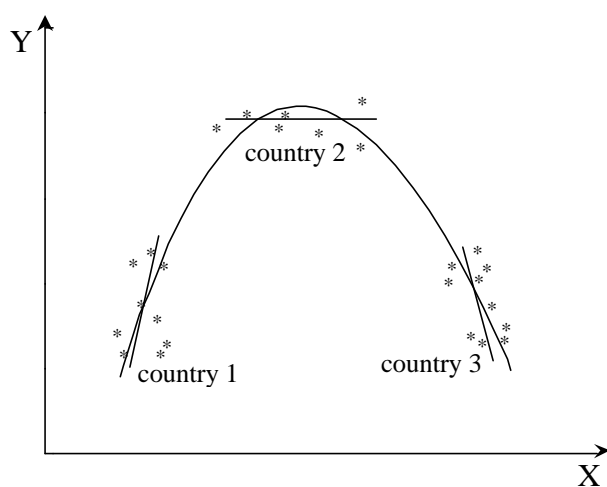
Source: Haque, Pesaran and Sharma (2000), p.62.

4. Empirical Results

4.1 The Effects of Large and Persistent Fiscal Impulses: the GJP Approach

In this section the fixed-effects regressions reported in GJP (2000: 1274) are re-estimated. Table 2 presents the results for the panel of 14 European Union countries. The first column reports the estimates of a benchmark regression where the effects of fiscal policy are restricted to be linear. As can be seen the national saving rate depends positively on its lagged values and the output gap, while the effect of real short-term interest rates is statistically insignificant. National saving responds positively to an increase in net taxes and negatively to a rise in government spending, in line with the predictions of mainstream macroeconomic theory. The statistically significant coefficient of net taxes seems to contradict the Ricardian equivalence proposition.[13]

The remaining columns of table 2 report the estimates of regressions testing for the stability of the relationship between fiscal policy and national saving. Columns (2) to (4) allow for nonlinear effects of fiscal policy by interacting net taxes and government spending with an interaction dummy variable capturing either large fiscal impulses or large consolidations or large expansions (columns labeled "own" in table 1). Indeed, some of the interaction terms are statistically significant and conform to the theoretical prediction of the expectations view since the effects of fiscal policy are dampened. Interestingly, nonlinear effects of fiscal policy can only be detected for large and persistent expansions, not for consolidation episodes. During strong fiscal expansions the effects of taxation on national saving are even reversed. As half of the coefficients of the interaction terms are insignificant, the regression was re-run with the episodes of large fiscal impulses identified by GJP (columns labeled "GJP" in table 1). The results in column (5) of table 2 show significant nonlinear effects for both net taxes and for government spending. Yet, these effects are considerably lower than those reported by GJP (2000: 1274).

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[13] GJP (2000) interpret this as evidence against Ricardian equivalence. However, one has to keep in mind that net taxes are mainly composed of distorting taxes.

Table 2: The Effects of Fiscal Policy on National Saving: Panel Estimates[a]

	(1)[b]	(2)[c]	(3)[d]	(4)[e]	(5)[f]
Lagged national saving rate	0.618 (17.987)	0.606 (17.086)	0.603 (16.845)	0.620 (17.383)	0.475 (11.273)
Output gap	0.251 (5.861)	0.242 (5.616)	0.251 (5.783)	0.232 (5.380)	0.268 (5.774)
Real short-term interest rate	0.049 (1.516)	0.047 (1.443)	0.057 (1.748)	0.033 (0.992)	0.064 (1.917)
Net taxes	0.160 (3.798)	0.170 (3.835)	0.163 (3.814)	0.158 (3.549)	0.389 (3.901)
– and large change in surplus		**–0.145** (–2.002)			**–0.166** (–2.276)
– and large increase in surplus			0.052 (0.376)		
– and large decrease in surplus				**–0.310** (–3.121)	
Government spending	–0.557 (–10.005)	–0.585 (–10.230)	–0.583 (–10.149)	–0.558 (–9.619)	–0.790 (–9.456)
– and large change in surplus		0.077 (1.381)			**0.128** (2.136)
– and large increase in surplus			–0.066 (–0.557)		
– and large decrease in surplus				**0.176** (2.562)	
Adjusted R^2	0.889	0.889	0.887	0.890	0.872

[a]Fixed-effects estimation of equation [1]. Sample period is 1970 to 2000. t-values are reported in parentheses. Statistically significant estimates (at the 95 per cent level) of the interacted fiscal variables are shown in bold. — [b]Benchmark regression. None of the fiscal variables is interacted with the dummy variables. — [c]In this regression, the fiscal variables are interacted with a dummy variable capturing episodes of large and persistent fiscal impulses regardless of their direction. — [d]In this regression, the fiscal variables are interacted with a dummy variable capturing episodes of large and persistent fiscal contractions. — [e]In this regression, the fiscal variables are interacted with a dummy variable capturing episodes of large and persistent fiscal expansions.— [f]In this regression, the fiscal variables are interacted with the dummy variable reported in Giavazzi, Jappelli and Pagano (2000): 1286–1287, capturing episodes of large and persistent fiscal impulses. Here, the sample period is 1970 to 1996.

It is not clear whether these findings should be interpreted as evidence in favor of the expectations view on the effects of large fiscal impulses. The statistically significant nonlinear effects reported in table 2 could be due to neglected cross-country heterogeneity. In order to check for this possibility equation [1] was estimated for each of the 14 individual countries.

12

The results are reported in table 3. The dummy variable capturing episodes of large and persistent fiscal impulses corresponds exactly to the one used by GJP in their paper. As can be seen, there is overwhelming evidence of slope heterogeneity across individual countries. Furthermore, not a single country exibits statistically significant nonlinear effects of fiscal policy.[14, 15] The mean group estimator reported in the last row of table 3 corroborates this finding.

In an additional regression – not reported here[16] – equation [1] was estimated with an alternative set of interacted fiscal variables. The dummy variables used for interaction capture the large and persistent fiscal impulses reported in table 1, columns „Own". Again there was no evidence for nonlinear effects of fiscal policy.

These results cast doubt on the validity of the evidence presented in GJP (2000). Their finding of nonlinear effects of fiscal poliy on national saving is very probably due to neglected slope heterogeneity. In addition, the identification of fiscal episodes is ambiguous, as was pointed out earlier. All in all, it seems as though this approach cannot provide robust results.

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[14] For Austria, the interacted tax and spending variables are significant at the 10 percent level. In the case of Ireland, the interacted spending variable is significant at the 10 percent level.

[15] In addition, for the panel regressions shown in columns (2) to (4) individual-country regressions were run in order to check if the detected non-linearities were spurious. The results of this exercise do not differ qualitatively from those reported in Table 3. The interacted fiscal variables were not significant for any country, regardless of whether large fiscal impulses, consolidations or expansions were considered. Detailed results are available from the author upon request.

[16] Detailed results are available from the author on request.

Table 3: The Effects of Large and Persistent Fiscal Impulses: Country-Specific Estimates[a]

	Constant	Lagged saving	Output gap	Interest rate	Net taxes	and large fiscal impulse	Government spending	and large fiscal impulse
Germany	38.36	0.34	0.54	−0.17	0.51	−0.08	−1.43	0.08
	(6.66)	(3.97)	(4.75)	(−1.42)	(2.91)	(−0.34)	(−5.16)	(0.35)
France	56.58	0.06	0.83	0.10	−0.37	−0.05	−1.06	0.02
	(3.96)	(0.48)	(4.16)	(0.43)	(−1.74)	(−0.20)	(−2.37)	(0.11)
United Kingdom	13.42	0.42	0.59	0.08	−0.61	0.35	0.37	−0.35
	(0.67)	(0.60)	(1.60)	(0.24)	(−1.18)	(1.43)	(0.44)	(−1.43)
Italy	37.47	0.39	0.56	0.19	0.04	0.34	−1.33	−0.20
	(5.52)	(1.44)	(4.25)	(0.98)	(0.12)	(0.78)	(−3.34)	(−0.68)
Spain	50.25	−0.85	1.26	−0.67	0.42	−0.50	−0.63	0.42
	(1.92)	(−0.46)	(1.16)	(−0.39)	(0.16)	(−0.46)	(−0.71)	(0.45)
Netherlands	64.37	−0.10	0.79	−0.28	−1.70	1.34	0.01	−0.99
	(3.57)	(−0.41)	(2.59)	(−1.22)	(−1.42)	(1.35)	(0.01)	(−1.37)
Belgium	37.12	0.03	0.87	−0.44	0.42	−0.12	−0.82	0.08
	(3.35)	(0.11)	(2.90)	(−1.31)	(1.05)	(−0.26)	(−2.30)	(0.26)
Sweden	34.64	0.03	1.13	−0.03	−0.21	−0.08	−0.23	0.06
	(1.74)	(0.07)	(2.26)	(−0.09)	(−0.53)	(−0.25)	(−0.38)	(0.19)
Austria	2.83	0.30	0.65	−0.19	−0.59	1.17	1.18	−1.03
	(0.18)	(1.72)	(4.31)	(−1.94)	(−0.81)	(1.81)	(1.30)	(−1.87)
Denmark	33.14	0.47	0.74	0.23	0.13	−0.35	−0.87	0.36
	(1.26)	(1.21)	(1.91)	(0.64)	(0.22)	(−0.65)	(−0.82)	(0.71)
Finland	50.18	−0.10	1.07	0.16	0.50	−0.77	−1.44	0.82
	(7.37)	(−0.79)	(3.61)	(0.62)	(1.21)	(−1.87)	(−3.00)	(1.72)
Greece	33.02	−0.25	0.89	−1.10	0.28	−0.26	−0.66	0.07
	(0.56)	(−0.18)	(0.87)	(−0.68)	(0.27)	(−0.29)	(−0.41)	(0.16)
Portugal	30.14	0.20	0.37	0.02	2.13	−0.81	−2.38	0.15
	(0.79)	(0.47)	(0.37)	(0.02)	(0.56)	(−0.33)	(−1.38)	(0.09)
Ireland	31.98	0.63	0.11	−0.19	0.09	−0.77	−1.23	0.56
	(1.50)	(2.15)	(0.50)	(−0.60)	(0.06)	(−1.59)	(−2.78)	(1.87)
Mean Group	36.68	0.11	0.74	−0.16	0.07	−0.04	−0.75	0.00
	(2.30)	(1.41)	(2.43)	(−1.68)	(1.65)	(−1.51)	(−0.87)	(0.98)

[a]Estimation of equation [1] for individual countries. Sample period is 1970 to 1996 in general, shorter for some countries due to data (non-)availability. t-values are reported in parentheses. Definition of the "large and persistent fiscal impulse" variable according to Giavazzi, Jappelli and Pagano (2000). See their table A.2: 1286–1287 for details or table 1, columns „GJP", in this paper.

4.2   The Effects of Fiscal Policy on National Saving: Pre- and Post-Maastricht

In this section, I re-estimate the panel regressions using an alternative definition of fiscal consolidation episodes. The post-Maastricht period starting in 1993 is defined as a common consolidation episode for the 14 EU countries considered in this paper. Table 4 reports the estimation results. In a first regression a dummy, taking the value 1 between 1993 and 2000, was incorporated. As can be seen this variable is statistically significant which is an indication of a structural break. In a second regression (column 2 of table 4), it was checked whether this can be attributed to changing fiscal policy effects. For this purpose the tax and spending variables were interacted with the post-Maastricht dummy. The results show that there is no evidence for nonlinear effects. Rather the dynamics of national saving seem to have changed in the 1990s: in an additional regression – not reported here[17] – all independent variables were interacted with the dummy variable. Only the coefficient of interacted lagged national saving was statistically significant, with a positive sign. This suggests that the long-run effects of saving determinants may have increased in the 1990s.

Table 4: The Effects of Fiscal Policy Pre- and Post-Maastricht: Panel Estimates[a]

	(1)[b]	(2)[c]
Lagged national saving rate	0.630	0.630
	(18.315)	(18.243)
Output gap	0.286	0.285
	(6.385)	(6.402)
Real short-term interest rate	0.035	0.028
	(1.121)	(0.841)
Net taxes	0.123	0.150
	(2.797)	(3.008)
– post-Maastricht		–0.063
		(–1.035)
Government spending	–0.526	–0.537
	(–9.405)	(–9.495)
– post-Maastricht		0.071
		(1.379)
Post-Maastricht dummy	**0.453**	
	(2.474)	
Adjusted R^2	0.891	0.889

[a]Fixed-effects estimation of equation [1]. Sample period is 1970 to 2000. T-values are reported in parentheses. Statistically significant estimates (at the 95 per cent level) of the interacted variables and the post-Maastricht dummy are shown in bold. — [b]Benchmark regression. A "post-Maastricht" dummy variable is included as additional regressor which takes the value 1 from 1993 on. — [c]In this regression, the fiscal variables are interacted with the "post-Maastricht" dummy variable which takes the value 1 from 1993 on.

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[17]   Detailed results are available from the author on request.

The results of country-specific regressions are summarized in table 5. Again the estimates show considerable variation across countries pointing to the inappropriateness of the slope homogeneity assumption underlying the panel estimates. In most cases, the coefficients of the variables capturing nonlinear effects of taxation are statistically insignificant. These conclusions are confirmed by the mean group estimates reported in the last row of table 5. Interestingly, non-linearities show up in some prominent cases. The effects of fiscal policy on national saving seem to have been (partially) reversed in Germany, Greece and Italy after 1993. Remember that Greece and Italy are both characterized by high government debt - GDP ratios. While exhibiting a comparatively low debt ratio Germany experienced a period of rapidly growing debt in the aftermath of unification.

These findings seem to support the theoretical models of Drazen (1990) and Perotti (1999), both predicting that nonlinear effects are related to a critical situation or evolution of government debt. This conclusion might be premature, however. Most of the coefficients reported in table 5 are poorly estimated pointing to misspecification. Further research has to reconsider the case for nonlinear effects of fiscal policy in models with richer dynamics.

Unfortunately, high-frequency data on fiscal policy are not available for most EU countries so that it is impossible to estimate higher-order autoregressive distributed lag models. Altogether, the results suggest that the finding of non-linear effects of fiscal policy reported in GJP (2000) is not robust. However, they do not imply that non-linearities in the relationship between fiscal policy and macroeconomic variables do not exist. Rather they indicate that panel data models imposing slope homogeneity across countries may not be the appropriate method to address this question. Further research will have to investigate whether non-linear effects of fiscal policy exist for individual countries.

Table 5: The Effects of Fiscal Policy Pre- and Post-Maastricht: Country-specific Estimates[a]

	Constant	Lagged saving	Output gap	Interest rate	Net taxes	Post-Maastricht	Government spending	Post-Maastricht
Germany	34.9767	0.3438	0.5082	–0.1131	0.4695	**–0.8868**	–1.2574	**0.7164**
	(6.6857)	(4.3634)	(4.7539)	(–1.0332)	(3.2009)	(–2.4520)	(–6.9248)	(2.3389)
France	63.0119	0.0587	0.7228	0.2430	–0.0700	0.0502	–1.6240	0.0116
	(7.4480)	(0.5930)	(5.8353)	(2.9218)	(–0.3866)	(0.2719)	(–5.9885)	(0.0693)
United Kingdom	3.1087	0.7115	0.9344	–0.3725	–0.6725	0.4502	0.7111	–0.3655
	(0.1428)	(1.1245)	(1.6035)	(–0.4402)	(–0.9539)	(0.7142)	(0.5984)	(–0.7045)
Italy	44.3119	0.1596	0.4561	0.0843	0.4240	**–0.5691**	–1.6317	**0.3814**
	(9.8518)	(1.0768)	(4.5879)	(0.7726)	(1.7207)	(–2.1659)	(–5.0504)	(2.0853)
Spain	44.9273	–0.5810	1.1116	–0.5678	–0.0835	–0.0697	–0.2586	0.0449
	(3.8156)	(–0.6580)	(2.5054)	(–0.5122)	(–0.0485)	(–0.0362)	(–0.5599)	(0.0326)
Netherlands	61.1202	0.0193	0.6840	–0.3233	–0.0743	–0.2586	–1.1623	0.1289
	(5.5939)	(0.1344)	(3.2242)	(–2.1688)	(–0.1190)	(–0.4839)	(–3.2463)	(0.3229)
Belgium	47.0138	–0.4376	1.8282	–1.1171	0.0241	–0.5074	–0.4669	0.5742
	(1.6194)	(–0.5029)	(1.1636)	(–0.8123)	(0.0288)	(–1.0621)	(–1.0085)	(1.2845)
Sweden	0.2462	0.0244	0.3796	0.7289	0.5163	–0.2913	0.1061	0.3636
	(0.0034)	(0.0564)	(0.2687)	(0.3772)	(0.3198)	(–0.3360)	(0.1162)	(0.3913)
Austria	24.0687	0.2623	0.6202	–0.1237	0.3137	–0.3185	–0.5111	0.2348
	(1.5379)	(1.8825)	(5.3651)	(–1.1730)	(1.2571)	(–0.7808)	(–0.7082)	(0.6686)
Denmark	72.5864	0.4311	0.7006	0.1391	0.5686	–0.6164	–2.7050	0.5995
	(2.6675)	(0.9555)	(2.3070)	(0.5014)	(1.0578)	(–0.9372)	(–1.5530)	(0.9182)
Finland	42.4626	–0.0585	0.7427	0.0478	0.2062	0.0606	–0.8163	0.0291
	(13.3457)	(–0.5780)	(5.4293)	(0.3577)	(0.9506)	(0.8863)	(–9.0793)	(0.4448)
Greece	–8.8290	0.4404	0.1356	–0.0757	1.2005	**–1.2403**	0.5183	**0.4331**
	(–0.8788)	(2.2655)	(0.4124)	(–0.1953)	(3.4035)	(–3.4662)	(1.5537)	(2.7318)
Portugal	37.9117	0.1224	0.6630	0.4696	0.3964	0.4543	–1.4712	–0.3324
	(1.1033)	(0.7575)	(0.8337)	(0.8495)	(0.2490)	(0.1579)	(–2.0477)	(–0.1707)
Ireland	54.4639	0.7473	0.1068	–0.5017	–1.5411	0.9220	–1.2837	–0.7291
	(1.9681)	(1.1179)	(0.2438)	(–0.6348)	(–0.9316)	(0.7673)	(–2.3120)	(–0.9128)
Mean Group	37.2415	0.1602	0.6853	–0.1058	0.1198	–0.2015	–0.8466	0.1493
	(1.5158)	(0.4249)	(1.6036)	(-0.2289)	(0.1864)	(-0.3528)	(-0.9071)	(0.3625)

[a]This regression estimates the same equation as in table 4, column 2, for individual countries. Sample period is 1970–2000 in general, shorter for some countries due to data (non-)availability. T–values are reported in parentheses. Statistically significant estimates (at the 95 per cent level) of the interacted variables and the post-Maastricht dummy are shown in bold.

5.   Conclusion

This paper reconsidered the case for a nonlinear relationship between fiscal policy and national saving for a panel of European Union countries. Unlike Giavazzi, Jappelli and Pagano (2000) I could hardly find any support for the hypothesis that the effects of fiscal consolidation are reversed whenever the fiscal impulse is large and persistent. Two factors seem to be responsible for the non-robustness of their results: (i) The definition of fiscal consolidation episodes is not time-invariant due to frequent revisions of cyclically-adjusted budget balances. Empirical applications employing the same methodology at different points in time can lead to diametrically opposed conclusions. (ii) I find strong evidence for the proposition of Haque, Pesaran and Sharma (2000) who argue that highly significant, nonlinear effects for some determinants of national saving in panel data models may be spurious due to neglected cross-country heterogeneity.

In the second part of the empirical application I tried to remedy the first of the above mentioned problems by proposing an alternative, time-invariant definition of fiscal consolidation episodes. When in 1992 the governments of European Union member states signed the Maastricht Treaty, they committed to sound public finances which in most cases implied reductions in public deficits in the run-up to monetary union. While the credibility of this commitment can be — and has extensively been — questioned, the attractive time-invariance property of this consolidation measure has been employed in order to re-assess the case for nonlinear effects of fiscal policy. Notwithstanding, the panel results do not favor this hypothesis. Yet, nonlinear effects could be detected in – admittedly crude – individual-country regressions, interestingly for countries with a high government debt – GDP ratio (Greece and Italy) or with rapidly rising debt (Germany).

This last result indicates that the analysis of individual-country experiences is a fruitful area of future empirical research. Of course, this comes at a cost. Results obtained for a specific country can not safely be generalized to other countries. In principle, general results could be expected from the estimation of panel data models. Nonetheless, valid inference about nonlinear effects necessitates a high degree of homogeneity across countries, a condition that obviously was not met by the panel analyzed in this study. In the recent past, the influence of fiscal policy on key macroeconomic variables in individual countries has been increasingly

18

addressed in the structural VAR framework[18]. Most interesting regarding the question posed in this paper is the analysis of Neumann (2000) who has examined the case for nonlinear effects of fiscal policy in Germany employing a VAR model with time-varying coefficients. His results indicate that – as claimed by Alesina and Perotti (1995) – nonlinear effects can be related to the composition of fiscal consolidation programs rather than to their size and persistence. It should be borne in mind, however, that the economic profession is still far from a consensus about the appropriate way to identify (fiscal and monetary) policy effects in structural VAR models[19].

All in all, the results indicate that the case for expansionary or non-Keynesian short-run effects of fiscal contractions is at most weak, contradicting the evidence presented in Giavazzi, Jappelli and Pagano (2000). These findings may be important for policy making in EMU member states: in the present situation a number of countries have to decide whether to reduce budget deficits gradually or to make a single strong consolidation effort in order to comply with the medium-run provisions of the Stability and Growth Pact. A need for additional time-series evidence on the effects of fiscal consolidation in individual countries arises in order to be able to give sound policy advice. However, the lack of high-frequency data on key fiscal variables for most European countries makes it difficult to capture the dynamic effects of fiscal policy.

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[18] See Blanchard and Perotti (1999), Fatás and Mihov (2000) and Mountford and Uhlig (2000) for example.

[19] For insightful treatments of the identification problem in the analysis of (fiscal) policy effects see Sims (1988) and Miller and Roberds (1992).

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Appendix

Definition of Variables

All data are drawn from the OECD Statistical Compendium, No. 2/2000. For most of the variables the data source is the OECD Fiscal Positions and Business Cycles database. The nominal short-term interest rate and real private consumption are drawn from the OECD Economic Outlook. Public sector data refer to the general government.

Table 6: Variables, Data Sources and Data Transformations

Variable	Symbol	OECD code	Calculation
Real private consumption		CPV	
Private consumption deflator		PCP	
Nominal private consumption	C		CPV*PCP/100
Nominal government consumption		CG	
Nominal government investment		IG	
Nominal government spending	G		CG+IG
Nominal GDP	Y	GDP	
Nominal national saving	S		GDP-CG-C
Nominal short-term interest rate		IRS	
Real short-term interest rate	r		IRS-$(PCP_t/PCP_{t-1}-1)$*100
Nominal government savings		SAVG	
Taxes net of transfers	T		SAVG+CG
Nominal potential output	Y*	GDPTR	
Cyclically-adjusted budget surplus (in per cent of potential GDP)		NLGQA	

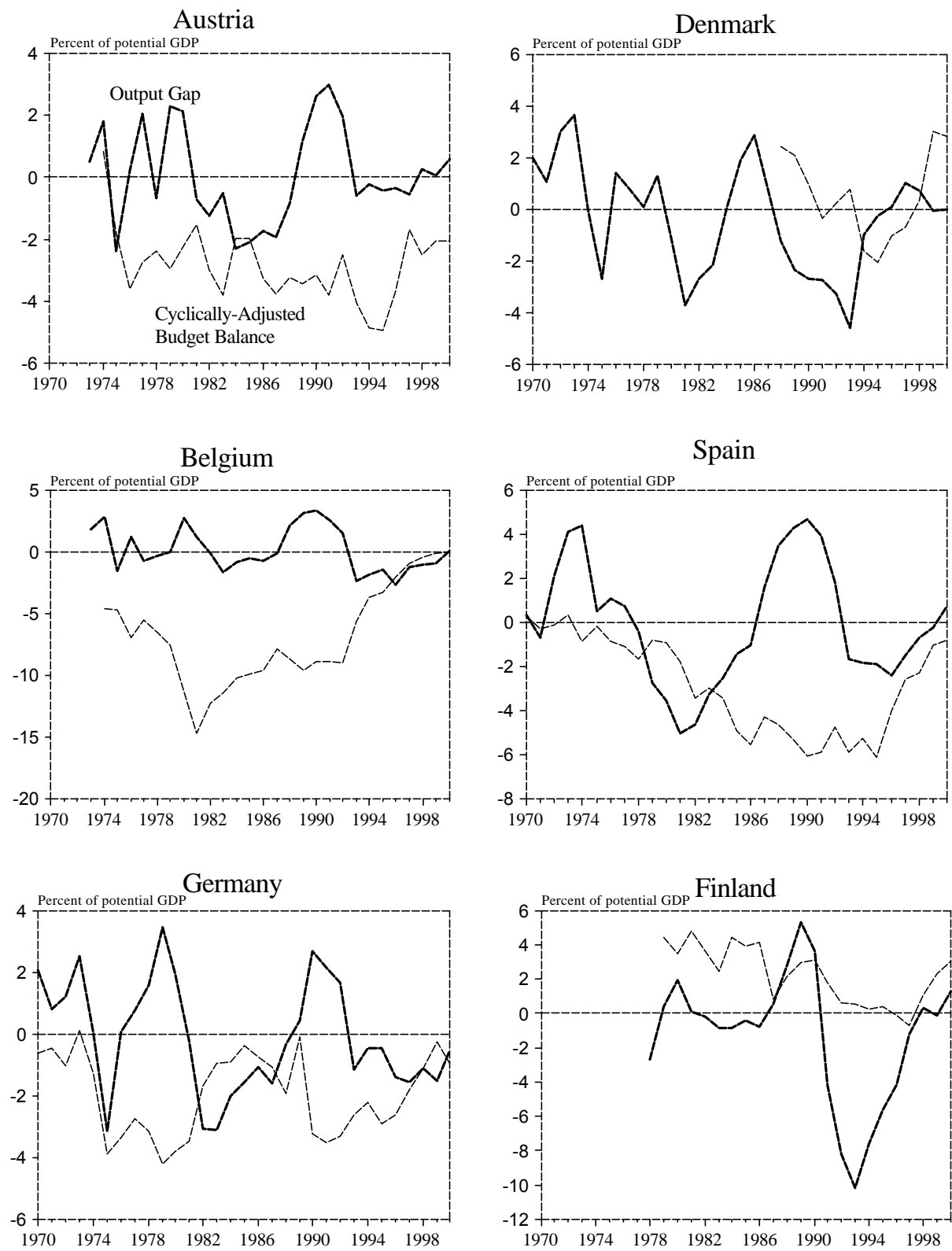*Figure 2*: Cyclically-adjusted Budget Balance and Output Gap for 14 EU Countries
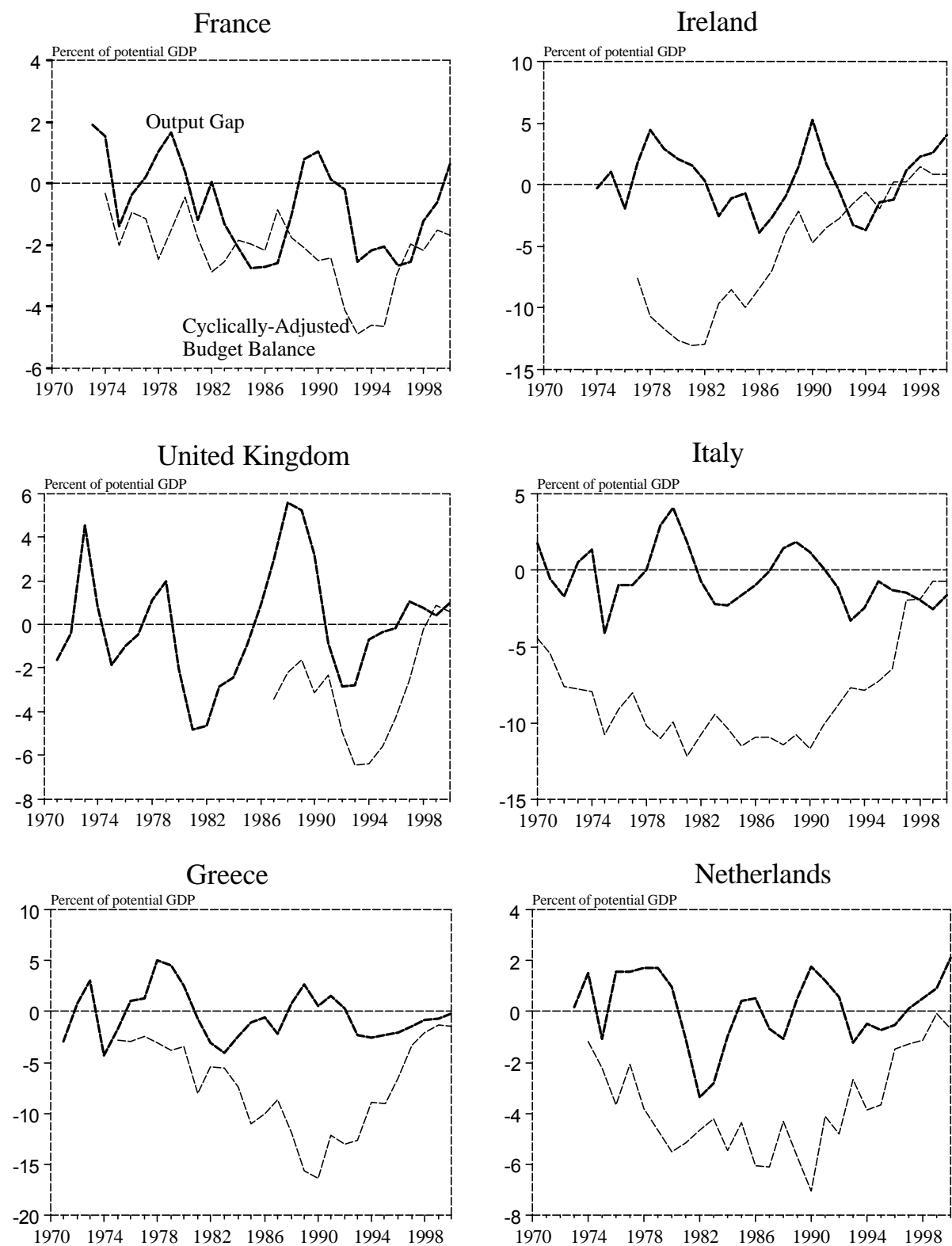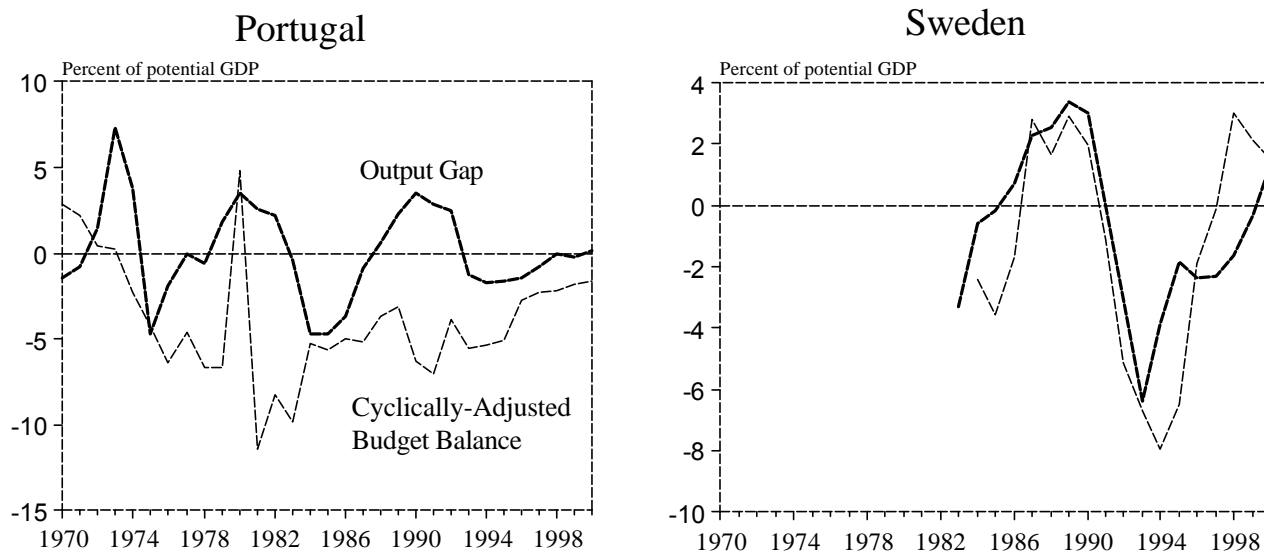
Figure 2: (continued)

France

Ireland

United Kingdom

Italy

Greece

Netherlands

Figure 2: (continued)

Portugal

Percent of potential GDP

Output Gap

Cyclically-Adjusted
Budget Balance

Sweden

Percent of potential GDP

Source: OECD (2000a)