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Convergence of fiscal policies in the euro area

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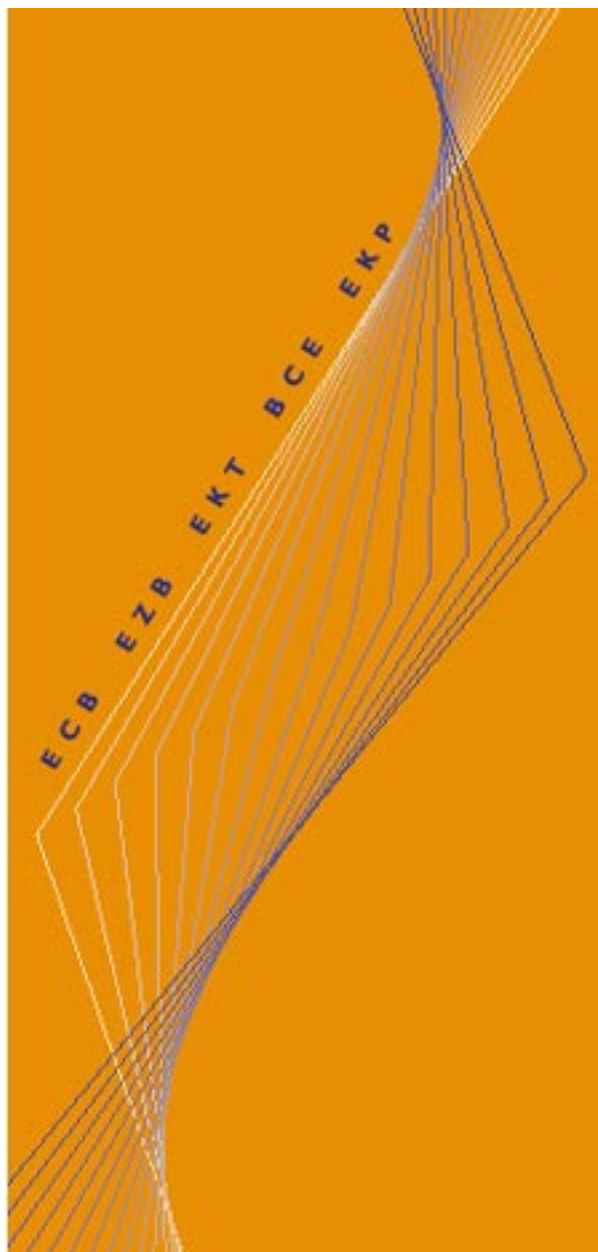
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WORKING PAPER NO. 20

**CONVERGENCE OF FISCAL
POLICIES IN THE EURO AREA**

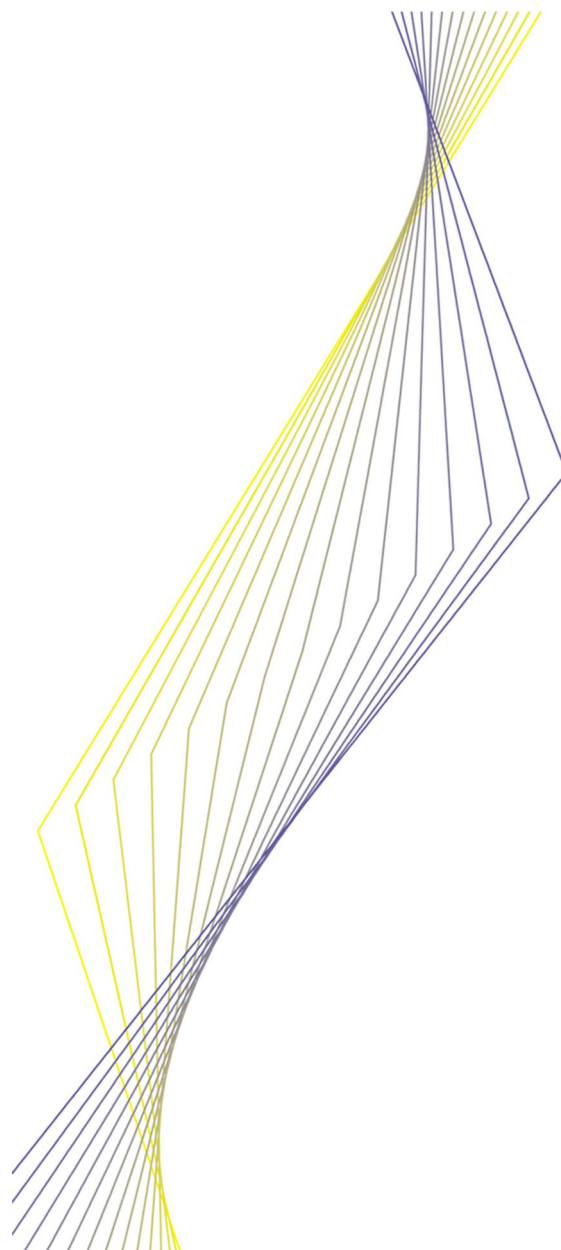
**BY OLIVIER DE BANDT AND
FRANCESCO PAOLO MONGELLI**

MAY 2000



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BY OLIVIER DE BANDT AND
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Abstract

This paper aims at determining whether economic, financial and monetary integration on the one hand, and institutional factors on the other, may have led to gradual convergence in key fiscal variables across the euro area over the recent period, bringing fiscal positions closer together. The Maastricht convergence criteria have facilitated this process but we investigate here whether the structural factors bringing fiscal positions closer together have been a feature of European integration starting already in the 1970s. The alternative scenario is that the euro zone is still characterised by largely idiosyncratic national fiscal policies.

Over the 1970-1998 period we run contemporaneous cross-correlation, dispersion and cointegration tests using annual data for government net lending, and total current revenue and expenditure to uncover common trends, as measures of fiscal convergence. We also investigate whether the short term fiscal position in a given country shares both a common *euro area component* and *national features* (i.e., idiosyncratic national cycles) using a dynamic factor analysis on quarterly data for the four largest euro area countries since 1985. We find convincing evidence that for euro area countries cross-correlation has increased steadily over the sample period and that fiscal dispersion has been declining at a sustained pace among all countries in the sample. There is evidence of cointegration across the euro area for several countries on the basis of total current revenue, and also for total current expenditure. However, when the series are corrected for the business cycle, cointegration is only accepted for net lending. There is clearly common fiscal cycles for net lending across the euro area that do not only express common business cycles. However, while countries have followed more similar policies in the 1990s in particular during the run-up to EMU, the timing of fiscal adjustment differed across countries. In addition, idiosyncratic components still contribute to a significant share of the variability of individual countries.

JEL Classification: H60, E61 and C22

Key Words: *fiscal policy, euro area, convergence, cointegration, dynamic factor analysis*

I Introduction

In the transition to the European Monetary Union (EMU), a lot of emphasis has been given to monetary convergence and the definition of the common monetary policy. Fiscal policy has also been put under closer scrutiny and a natural question is, therefore, whether the “euro-area fiscal position” now has a clear empirical content and significance. This paper aims at determining whether economic, financial and monetary integration on the one hand, and institutional factors on the other, have led to convergence in key fiscal variables across the euro area. The Maastricht convergence criteria have facilitated this process but we investigate here whether the structural forces bringing fiscal positions closer together have been a feature of European integration starting already in the 1970s. The alternative scenario is that the euro zone is still characterised by largely idiosyncratic national fiscal policies.

There are several empirical investigations examining the extent to which Europe is becoming more integrated and whether economic developments are becoming more correlated. Artis and Zhang (1995 and 1997) find evidence that business cycles are becoming more synchronous across Europe. Rose (1999) and Frenkel and Rose (1997) find evidence of deepening in trade intensity across most European countries. Artis and Zhang (1998) find increasing linkage of interest rates within EMS countries. Angeloni and Dedola (1999) provide evidence that the monetary policy rules pursued by the central banks of the countries which subsequently adopted the euro have converged in the run up to EMU. Bayoumi and Eichengreen (1995), Eichengreen and Bayoumi (1997), Krugman (1993), OECD (1999) and several other authors have also contributed empirically to this debate (albeit with a different focus as their main question is whether Europe is an optimum currency area).

Against this background, there is instead remarkably little systematic investigation concerning convergence of key fiscal variables. The main explanation for this gap, that we intend to close in part, may lie in the fact, that, any research on budgetary policy is plagued by the fact that fiscal policy is in part exogenous and in part endogenous to the business cycle: by studying fiscal variables, one would also capture the correlation between business cycles across countries. Hence, it is not trivial to distinguish between results due to discretionary public finance actions and results due to the behaviour of the economy. We attempt to reduce this problem by using cyclically adjusted variables where possible. The approach adopted here is close in spirit to the various contributions of Artis and Zhang, and Frenkel and Rose.

It is useful at this stage to clarify how we define convergence.¹ Given a fiscal variable F_t^i in country i , and F_t^j in country j and following Hall et al. (1992 and 1993) and Fuss (1999) the two variables are *converging* if the following two complementary conditions are satisfied:

$$\lim_{t \rightarrow \infty} E(F_t^i - F_t^j) = a \quad \text{and} \quad \lim_{t \rightarrow \infty} \text{Var}(F_t^i - bF_t^j - a) = \sigma^2$$

the first condition requires that the expectation of their difference tends to a constant value a that is small in relative terms (but not necessarily zero), i.e., the variables need not converge completely to a common value. The second condition is that the variance of their relationship also tends to decline reaching a constant value. We check the latter condition by investigation if the dispersion of these variables declines, or at least does not grow over time. As noticed by

¹ Other definitions of convergence are possible. For example, the Maastricht Treaty convergence criteria are different from the definition of convergence adopted here. They were cast instead in terms of critical thresholds for the deficit and debt targets — as well as bands for a set of reference financial variables. In this case convergence is achieved when these threshold targets, or bands, are met (or in the case of the debt-ratio have the potential to be met over time). Such a definition of convergence has the appeal of being unequivocal, but does not consider the dynamics of convergence.

Hall and Fuss, the second condition is also equivalent to cointegration that aims at detecting common trends across countries on key fiscal indicators. In the paper, it turns out that fiscal variables, measured as ratio to GDP, are not mean-reverting and are therefore non-stationary for the sample we consider, so that cointegration is tested here by means of Equilibrium Correction Model (ECM) and Johansen cointegration. If $b=1$, the two variables are said to have converged, or to exhibit comovements, while the variables are converging if $a > 0$ and $b < 1$, or if $a < 0$ and $b > 1$.²

It is necessary to qualify such a statement since the convergence process may not be continuous and countries that are converging in the first part of sample may have effectively converged by the end of the sample period. In such a case of time-varying trends, cointegration would be rejected for the whole period, but accepted on sub-samples. However, running recursive cointegration tests appears difficult with annual fiscal data and quarterly fiscal data are not yet available for all countries in the euro area (and only from 1985 for the largest countries). Hence, our options are somewhat limited, and we can only test whether countries are converging for the whole sample period. On the other hand, we can gain some partial insight by investigating fiscal cycles.

The main contribution of this paper is to seek evidence of gradual convergence in key fiscal variables from different angles and applying different types of tests and technique. We run cross correlation, dispersion and cointegration tests using annual data for government net lending, and total current revenue and expenditure to uncover common trends, as measures of fiscal convergence. We then concentrate on the largest countries in the euro area that provide reliable quarterly data and examine whether the short term fiscal position in a given country shares both *euro area components* and *national features*.³ If the euro area fiscal position has an empirical content one should therefore observe that the common component explains a larger part of the variance of individual countries than the idiosyncratic or national components. Such a signal extraction problem can be conveniently solved using the Kalman Filter.

Convergence of fiscal policies seems a reasonable hypothesis for different reasons: first, the euro area countries have strived to comply with the Maastricht convergence criteria and now are committed to comply with the Stability and Growth Pact; second, budgetary developments trail economic developments which are becoming increasingly synchronized in the euro area (Artis and Zhang, and Frenkel and Rose); third, EU countries have initiated a tax harmonisation process, which is being fostered by a market-based convergence of tax structures in response to competitive pressures, as well as, by institutional factors (Mongelli (1997 and 1999) and references therein); fourth, the Exchange Rate Mechanism (ERM) of the European Monetary System exercised a “disciplinary” effect on participating countries; and fifth in the future euro area fiscal policies need to be supportive of the objectives of low and stable inflation.

At the same time one must be cautious when applying these concepts to key fiscal indicators, as euro area governments have historically played different economic and financial roles in the economy. For example, some countries have relied on more widespread welfare systems, built more generous social safety nets (e.g., unemployment benefit payments), and kept larger sections of their economic system under public sector control than others. This has in turn required the

2 Formally, the series have converged and exhibit comovement – or move in a synchronous manner up to a constant a (following some authors) – if the expectation and the variance of their difference is constant, and not necessarily zero:

$$E(F_t^i - F_t^j) = a \quad \text{and} \quad \text{Var}(F_t^i - F_t^j - a) = \sigma^2$$

3 This approach is linked to the analysis of cointegration since the common component may be either a common trend, as in the case of cointegration (see Harvey, 1989) or a common cycle, if one focuses on stationary variables.

setting up of very different national fiscal structures. Political economy elements were also among the factors contributing to different budgetary performances (see Buti, Franco and Ongena (1997 and 1998) and references therein). In addition, the underlying European economies are not yet perfectly integrated. Hence, national fiscal policies of most member countries may not exhibit comovements because the shocks hitting them may have still been largely idiosyncratic, or euro area countries may have responded differently to common shocks (see, inter alia, Bini Smaghi and Vori (1990), Bayoumi and Eichengreen, 1993, and Bruneau and De Bandt, 1999).

The paper is organised as follows. Section 2 provides a description of the data and their univariate time series properties. Section 3 presents several stylised facts on fiscal policies in the euro area countries using cross correlation indices on cycles and dispersion indicators on the levels of the variables. These preliminary findings are then completed in the following sections. Section 4 presents the results of cointegration tests between fiscal indicators across countries. Section 5 discusses the results of dynamic factor models, in order to assess the relative importance of common versus idiosyncratic shocks. Section 6 concludes.

2 Data sources and unit root properties

We focus here on three fiscal variables that present complementary facets of fiscal policy: net lending of the government (NLG), which is a “summary variable” expressing the balance between all components of the budget, total current revenue (REV), and total current expenditure (EXP). While net lending is the most scrutinised fiscal variable – jointly with public debt that is not discussed here – the other variables are more likely to capture long lasting fiscal co-movements and eventually gradual convergence of national fiscal policies and structures.⁴ All variables are expressed as ratio to GDP, which is a natural normalisation in order to correct, at least partly, for real and nominal trends in the series. In the remaining of the paper we will only refer to NLG, REV, and EXP as the corresponding ratio to GDP. For the cointegration analysis we also use the cyclically adjusted NLG, REV and EXP ratios to secure that we are not capturing only the effect of real economic convergence. These variables are denoted as NLGQ, REVQ and EXPQ. Due to the unit elasticity of revenues to GDP, the behaviour of our REV variable is very close to the one of REVQ. This is not true for government expenditures⁵.

A crucial aspect of this paper is that the average developments of each variable across the euro area are taken as a benchmark. In particular, PPP adjusted GDP values in 1995 are used to compute such weighted averages. We investigate the comovement and gradual convergence in fiscal policies – or the lack thereof – with respect to the euro area average for the following three groups of countries:

1. **euro area countries**, a group including Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain;
2. **non-euro area EU countries**, a group including the United Kingdom, Sweden and Greece; and
3. **other selected OECD countries**, a group including the US, Japan and Canada.

4 Another important variable is government net capital expenditure (CAP), which is the complement to the three other variables, since $NLG=REV-EXP-CAP$. In order to save space, its evolution is not investigated here, but can be inferred from the three variables discussed in the paper.

5 Fluctuations in REV, as ratio to GDP, express changes in the tax burden, while movements in EXP are affected by its denominator due to the low elasticity of expenditures to GDP. The elasticity of government net lending to GDP is therefore, by construction, intermediate between that of REV and EXP.

The latter two groups of countries constitute a sort of “control group”. All in all, 16 countries are considered in this paper. Luxembourg and Denmark are excluded from the sample because comparable data are not available for all variables.

We use here two types of data sets. The first data set, based on OECD annual data from the June 1999 Economic Outlook database, are used because they provide consistent data for all the 16 countries in the sample for the 1970-1998 period. Figures A.1, A.2 and A.3 in the appendix present the basic data. To illustrate the widening and/or narrowing of fiscal dispersion, each country variable is plotted against the euro area average. The figures show that European countries have been characterised by some convergence in the 1970s and until the early 1980s, while following the second oil shock they have tended to diverge. They have, however, tended to resume converging since the mid- to late 1980s, albeit with significant differences.

The second data set contains quarterly data, but only for a limited number of countries, namely Germany, Spain, France and Italy for the period 1985.Q1 to 1997.Q4. The source is the OECD Fiscal Policy and Business Cycle database for Germany and France,⁶ and National Central Banks data for Spain and Italy. Quarterly data of a comparable quality was not available for the other euro area countries. The quarterly data are consistent with the annual.

Before proceeding we need to briefly discuss the univariate time series properties of the data as this will have a bearing on the specifications and interpretations of all the tests. Two types of tests are performed. The first test is the Augmented Dickey-Fuller (ADF) unit root test, where the null hypothesis is that the series have a unit root (the results of the unit root and stationarity tests are available upon request). This test indicates that most fiscal variables seem to have a unit root, i.e., they are $I(1)$. Further testing indicates no higher order of integration (i.e., there is no evidence that the series are $I(2)$ with only a few isolated exceptions).

We also perform the Kwiatowski, Phillips, Schmidt and Shin (KPSS) stationarity tests, for which the null hypothesis is that the series are stationary. These tests indicate that, overall, these series seem to be stationary for most countries, a result conflicting with the findings of the ADF tests. In the case of NLG, we tend, however, to consider that KPSS provides the appropriate null, since the government budget balance is an adjustment variable, which, from a theoretical standpoint, is expected to be $I(0)$.

There are diverse explanations for this apparent divergence between ADF and KPSS tests. First, the power of both tests is low due to the small size of the sample consisting of only 29 annual or 52 quarterly observations per variable. Second, most series are likely to have breaks due to the changes in policies that occurred in the sample period in most countries. All in all, it is commonly perceived that ADF tests are more powerful than KPSS tests: hence, we are more inclined to accept the hypothesis that the series have a unit root over the sample which we are considering.⁷

Similar results, as for the ADF tests on annual data, are found on quarterly data (for the period 1985.Q1–1997.Q4), with the exception of the general government public deficit, which is stationary in Germany, while it may be taken as trend-stationary in France for the period under review. It is more clearly $I(1)$ in Italy, due to the major changes introduced in the country’s fiscal policy in the 1990s. It might have been $I(2)$, but another hypothesis, more realistic in our view, is that the series were actually subject to regime shifts, i.e. that they were characterised by periods

⁶ These quarterly data were kindly made available from the OECD for this project (in the case of France they are similar to the national account figures from INSEE).

⁷ However, we also know that under normal circumstances fiscal variables do not meander around without boundaries as they are in fact bound by the government budget constraints.

of sharp increase or decrease. We pursue this hypothesis in Section 5 by studying the effect of the introduction of “broken trends” (in particular to accommodate sudden shifts of the variables in most countries at the end of the 1980’s and in the early 1990’s). In addition, a deterministic trend is sometimes weakly significant on top of the existence of a unit root (the level of the series is therefore, in that case, the sum of a deterministic and a stochastic trend). This will be reflected in the design of cointegration tests.

In summary, the view emerging from the above tests is that for the whole sample period NLG is non-stationary using annual data, while it is stationary (sometimes with a drift) for quarterly data on the period 1985.Q1 to 1997.Q4. For both types of data, EXP and REV seem to be non-stationary. However, given the small sample size and the limitations of the tests, we cannot completely exclude that in several countries the variables that we found to be non-stationary also include a deterministic component. For example, the European process of economic and financial integration might have fostered increasingly higher expenditure (and also revenue) in those countries with fewer public infrastructures, a smaller provision of public goods, and an initially lower standard of living (i.e., a public finance “catching-up” effect).

3 Stylised facts of fiscal policy

Our first approach to fiscal convergence among countries in the euro area is based on simple descriptive tests. We compute first the contemporaneous cross-correlation between fiscal indicators and then indicators of fiscal dispersion.

3.1 Indicators of cross-correlation

Our starting point is to calculate contemporaneous cross-correlation across fiscal variables as in Artis and Zhang (1997) in the context of their study on EU business cycles synchronisation. This correlation tests measure the strength of the linear association between the selected fiscal variables for each of the countries in the sample against the corresponding euro area weighted average (using PPP adjusted GDP values in 1995). For euro area countries, the country is excluded from the euro area average against which the correlation is computed in order to reduce the bias that could be more significant for the larger economies. For the non-euro area countries, i.e. the two “control groups” (respectively UK, Sweden and Greece, and the US, Japan, and Canada), correlation is computed between these countries, on the one hand, and the whole euro area, on the other hand.

Because the variables investigated seem to be non-stationary over the sample period we cannot simply compute the correlation of the basic ratios to GDP as there would be an upward bias in the correlation coefficient. Therefore, we concentrate on fiscal cycles. We calculate therefore the correlation in first differences of the basic ratios to GDP (to correct for the I(1) problem) and the correlation of cyclical differences with respect to trends to gauge the extent to which national fiscal policies were altered with respect to underlying fiscal trends. The latter are calculated as follows: for a given fiscal variable F_{it} in country i (e.g. government current expenditures), the trend is defined as \tilde{F}_{it} , after smoothing with the Hodrick-Prescott (HP) filter (using $\lambda = 100$ in this case). To reduce the end-point problem we used forecasts based on the OECD June 1999 Economic Outlook. As in Artis and Zhang (1998) the cycle for all variables, except government net lending (NLG), is defined as the ratio to the HP filtered

8 However, we also know that, under normal circumstances fiscal variables do not meander around without boundaries as they are bound by the budget constraints.

series: $c_{it} = (F_{it} - \tilde{F}_{it}) / \tilde{F}_{it}$. For NLG cyclical differences are obtained by subtracting current observations from the trend because the presumed trend should gravitate toward zero.⁹

There are very few qualitative differences between the correlation indicators in first differences, that are available upon request, and those in cyclical differences, shown here in Table I. We also distinguish between sub-periods in order to assess some additional elements about the changes in fiscal co-movement over time. We follow Angeloni and Dedola (1999) in distinguishing between:

1. the “**pre-ERM**” sub-period from 1970 to 1978;
2. the “**soft-ERM**” sub-period from 1979 to 1985;
3. the “**hard-ERM**” sub-period from 1986 to 1992; and
4. the “**pre-EMU**” sub-period from 1993 to 1998.

Due to the small sample size of our data set, the confidence interval of cross-correlation in such short sub-periods is effectively quite large (see unit standard deviation at the bottom of each table).¹² Hence, these values must be interpreted with a great deal of circumspection and taken as simple indications of changes. In order to reduce the confidence interval we also split the sample period in two longer sub-periods: 1970-1985 and 1986-1998.

Concerning government net lending (NLG), the euro area average correlation exhibits a significant and steady decline during 1970–1992 (from 0.63 in 1970–1978—which is significantly different from zero— to 0.44 in 1979–1985, and 0.43 in 1986–1992) rebounding robustly only in the last sub-period (to 0.79 in 1993–1998). Correlation for the countries in the other two groups displays a more erratic path but also posts some significant increases in the last sub-periods. Overall, during 1986–1998 the correlation in the “non-euro area” and the “others” is in most cases higher than for the euro area countries.

For total current revenue (REV) three remarks can be made. First, correlation across the euro area rises over time, albeit unevenly but remaining below the correlation in NLG and EXP. Second, during 1986–1998 the correlation coefficients are not significantly different from 0 for the euro area as a whole. In particular, the correlation between France and Germany and other euro area countries turns insignificant in the 1993–1998 period, while it is negative for Belgium. Third, during 1986–1998 in almost all “non-euro area” countries the correlation with the euro area weighted average declines and turns negative in most cases (e.g. the UK, which had a significant positive correlation with the euro area during 1970–85 is negatively correlated during 1986–98), or becomes insignificant.

The correlation across indicators of current expenditure (EXP) is in most cases the highest among the three fiscal variables being considered over the whole sample period. Three developments stand out. The first one is that the correlation among euro area countries is clearly on an upward trend,¹¹ in particular because Spain becomes more correlated with the euro area during the 1986–1998 period. The second development is that the dispersion in correlation between euro area countries is also the most even among the variables considered (i.e., it shows the smallest gap between the highest and the lowest correlation values). The third is that there is

⁹ In the line of our previous remarks, deviation from trend in REV express discretionary changes in tax policies. For NLG and EXP, there is a mixture of effects from the business cycle and fiscal policy. However, due to the lack of consensus in the literature on the proper way to compute cyclically adjusted variables, we focus, in this section, on “headline” fiscal indicators. OECD cyclically adjusted fiscal indicators will only be investigated in Section 4, and we provide ways to correct, at least partially, for the euro area business cycle in Section 5.

¹⁰ These indicative standard deviations are obtained as $SD = 1/\sqrt{n}$ and under the assumption that these variables are normally distributed and not allowing for higher orders of dependence. The true standard deviations are likely to be larger.

¹¹ When the two sub-periods 1970-1985 and 1986-1998 are compared, this is clear for the cyclical variations, while it is difficult to reject the null hypothesis of constant average coefficient of correlation for the indicators in first difference.

a remarkably high correlation of the UK and the US with the euro area average (during the whole sample period), Canada (during 1986 and 1998), and Sweden (in the last sub-period).

In summary, the correlation in fiscal developments across the euro area is not always very high, and in several cases it does not exceed that for several countries in the control groups, but it is in most cases positive. Furthermore, it has generally increased steadily over the sample period, and more consistently during the 1993-98 sub-period (but often also during 1986-98). Interestingly, the correlation in cyclical differences for the euro area during 1986-1998 are generally higher than the correlation in first differences and often even the correlation in levels (both of which are not shown here). Instead, the correlation of several other countries in the control groups exhibit swings across variables (e.g., during 1986-98 both the UK and the US displayed very high positive correlation with the euro area for NLG and EXP, but negative correlation for REV).

These preliminary findings support the hypothesis that convergence in terms of contemporaneous linear association is developing within the euro area. To understand if also the underlying longer-term evolution of these selected fiscal variables is moving closer together we will turn to the analysis of dispersion below, as well as, the cointegration tests in Section 4. The correlation coefficients are of course affected by real convergence in terms of business cycles (in particular for NLG and EXP). In Section 5, we will return to this issue and try to correct for business cycle movements.

3.2 Indicators of Fiscal Dispersion

The second approach to obtain stylised facts is to compute standard deviations and coefficients of variation (i.e. standard deviation normalised by the mean) of each fiscal variable across countries. Fiscal variables are now taken as ratios to GDP, so that we measure the dispersion of such ratios across countries. The benchmark for countries in the euro area, as well as, in the “control group” is the euro area average. Formally, note that F_{it}^j is the value of the fiscal indicator i ($i = 1, \dots, 4$) in country j and at date t . Define Z as one of the group of countries under study (i.e., euro-area countries, non-euro area EU countries, and other selected OECD countries). The average level of the fiscal indicator i in the group Z (which includes $n(Z)$ countries), is computed as $m^Z(t) = \frac{1}{n(Z)} \sum_{j \in Z} F_{it}^j$. The *standard deviation to the euro area* is the sum of the squared differences between the value of the indicator in each country and the euro area average is $m^Z(t) = \frac{1}{n(Z)} \sum_{j \in Z} (F_{it}^j - m^{euro}(F_{it}^j))^2$. The *coefficient of variation to the euro area* is simply $\sigma^Z(F_{it}) / m^Z(F_{it})$. In the case of NLG, we present only the standard deviation since the average is usually close to zero. Notice that we use, at this stage, unweighted sums in order to capture the dispersion across national entities and to avoid giving too much weight to the larger countries. One additional reason for using unweighted averages is that weighted averages for the countries in the control groups would have had very little economic sense: what meaning would the GDP weighted fiscal dispersion for the US, Japan, and Canada have? In Sections 3 and 4, we introduce PPP-weighted aggregates of the euro-zone.

In Figure 1 we plot the *standard deviation* $\sigma^Z(F_{it})$ and the *coefficient of variations to the euro area* for all three groups of countries. All charts clearly illustrate a sharper decline in fiscal dispersion among the euro area countries than in the other two groups.¹² The decline in fiscal dispersion is

¹² We check this result by also plotting the “usual” indicators of standard deviation and coefficient of variation. In comparison to the indicators presented here, the reference used for the control groups is the mean of the group instead of the euro area average. These charts, that are not shown but are available upon request, confirm that fiscal dispersion declined more significantly across euro area countries.

more distinguishable for euro area countries in the case of current revenue and current expenditure, and particularly after the onset of the Exchange Rate Mechanism of the EMS (i.e., supporting the “disciplinary effect” argument). In particular, there is a more significant decline in fiscal dispersion across the euro area for current revenue (the coefficient of variation declined from about 0.15 during 1970–1974 to 0.065 during 1992–1998) than for current expenditure (that in terms of coefficient of variation declined from about 0.13 during 1970–1974 to 0.07 during 1992–1998). In the case of government net lending, but also of current revenue, the decline in dispersion sets on in the early 1980s but is interrupted in 1985 and 1989–1990 by some unevenness in fiscal adjustments among euro area countries and the aftermath of a cyclical deterioration respectively.

In summary, the decline in fiscal dispersion indicates a strong support particularly for the condition for convergence requiring that the variance of the relationship between selected variables should decline toward, possibly, a constant value (or at least not grow over time). We turn now to the more formal tests of convergence on trends and cycles.

4 Cointegration tests of convergence

As we saw in Section 2, the fiscal variables that we are using can be characterised as non-stationary I(1) variables over the sample period under consideration. The hypothesis that we are testing here is whether, at the international level, countries have jointly deviated from budget balance, or have all returned simultaneously to equilibrium over a period of time, i.e., whether fiscal indicators are cointegrated. As for the correlation indicators, we test pairwise cointegration, running these tests on two variables at a time, e.g., a fiscal variable for a specific country and the euro area average of the other countries for the same variable. For the countries outside the euro area we simply compare the country to the euro area average. In addition, for all the variables we run the tests on cyclically adjusted indicators in order to control for the existence of common business cycles across the countries in the sample (but such data are only available since 1974 and unfortunately not for all countries), and for simple ratios-to-GDP of the variables.

Two types of cointegration tests are now presented. They are the Equilibrium Correction Model (ECM) cointegration test – that is also known as the error correction model – and the Johansen cointegration test.¹³ In Tables 2, 3, and 4 we show the results of the tests using cyclically adjusted variables, while in Tables A.1, A.2, and A.3 in the annex we show the tests using the simple ratios to GDP.

4.1 ECM and Johansen cointegration tests

The ECM tests, that we discuss first, are based on a two-step procedure, using the approach proposed by Kremers *et al.* (1992). The results are in Columns 1 (“Model”) through 7 of Tables 2, 3, and 4. Let us consider a country j and an indicator i (e.g., NLG). First the long run equilibrium is estimated on the basis of an unrestricted model in distributed lag form, which is solved numerically. Two specifications are investigated depending whether a deterministic trend is included or not in the regression:

$$(4.1.a) \quad \alpha_0(L)F_{it}^j = \alpha_1 + \alpha_2(L)F_{it}^{j,euro} + \beta t + z_{it}^j \quad \text{or}$$

$$(4.1.b) \quad \alpha_0(L)F_{it}^j = \alpha_1 + \alpha_2(L)F_{it}^{j,euro} + z_{it}^j$$

¹³ We also ran the Engle Granger cointegration tests with and without a time trend. As the results do not add much to the information from the ECM and the Johansen tests we do not show these additional tests t are, however, available on request.

Column I in the table indicates the model that was selected to estimate the long run equilibrium (i.e., a for eq. 4.1.a or b for eq. 4.1.b), the selection procedure is based on the significance of the coefficient on the trend, using a Student t-test on b. F_{it}^j is, as before, a given fiscal indicator in country j, while $F_{it}^{j,euro}$ is the corresponding fiscal indicator for the euro area (a weighted average excluding country j). The latter variable is assumed to be *weakly exogeneous* for the long run parameters a, which means that fiscal policy in country i does not affect, in the long run, fiscal policy in the other countries.¹⁴ Note that the $\alpha(L)$'s are polynomials of the lag operator. Applying a third order autoregressive lag model to our annual data,¹⁵ we use the lagged residual $z_{i,t-1}^j$ as equilibrium correction term in the following ECM:

$$(4.1.c) \quad \Delta F_{it}^j = \delta_0 + \delta_1 \Delta F_{it-1}^j + \delta_2 \Delta F_{it}^{j,euro} + \delta_3 \Delta F_{it-1}^{j,euro} - \gamma z_{it-1}^j + \varepsilon_{it}^j$$

The ECM test is based on g, or its t-ratio. The critical values for this two-step test are given by McKinnon (1992). The country results for the t-ratio appear in column "ECM." We also provide the value of the DF test on the residual $z_{i,t-1}^j$ (column "DF"). The "slope" coefficient corresponds to $\alpha_2(1)/\alpha_0(1)$ in the long-run equation (4.1.).

The *Johansen cointegration tests*, is based on a bivariate VAR structure on $(F_{it}^j, F_{it}^{j,euro})$. Johansen (1991) recommends a sequential testing procedure for which one starts with the strictest specification for the null hypothesis, i.e., Hypothesis 1 below (zero cointegration relation) moving to looser specifications with more cointegrating relations, i.e., Hypothesis 3. We restrict ourselves here to testing only three competing hypothesis (excluding the hypothesis with quadratic time trends and the most restrictive hypothesis of no intercept either in the cointegrating equation nor in the associated VAR). Following Johansen (1995) the hypothesis that we test for are (see Column "Hypothesis"):

Hypothesis 1: Intercept (but no trend) in the cointegrating equation and no intercept in the associated VAR. This is the most restrictive among our three hypothesis. It postulates that the variables have no linear trend and the only deterministic component is the intercept in the cointegrating relation. This is assumption $H^*(r)$ in Johansen (1995).

Hypothesis 2: Intercept (but no trend) in the cointegrating equation and trend in the associated VAR. This hypothesis postulates that the variables have linear trends but the cointegration relations have no trends. This is assumption $H_1(r)$ in Johansen (1995).

Hypothesis 3: Intercept and trend in the cointegrating equation, and no trend in the associated VAR. This is the less restrictive among our three hypothesis. It postulates that the cointegration space has a linear trend, which means that we allow for "trend stationary" variables, and the trend stationarity can either be for a single variable or an equilibrium relation. This is assumption $H^*(r)$ in Johansen (1995).

On the basis of the stationarity tests discussed in Section 2 we would prefer Hypothesis 1 for all three variables. However, we cannot completely exclude that in several countries these variables may also be affected by a deterministic trend, as the European process of economic and financial integration has fostered increasingly higher expenditure, and revenue, in those countries with fewer public infrastructures, and a smaller initial provision of public goods. This "catch-up" effect may not completely emerge from the data but could be better captured, if present, by Hypothesis 2 and 3.

¹⁴ In practice, this implies that the equation for $\Delta F_{it}^{j,euro}$ is not necessary for the estimation of the long-run parameters.

¹⁵ We chose three lags as a reasonable compromise between a large number of lags and sufficient degree of freedom. The results are however robust to the number of lags.

In the right hand part of Table 2, 3 and 4, we report the trace and the lambda max tests for the first model where the null of no cointegration is rejected at the 10% level. The relevant critical values are based on Osterwald-Lenum (1992) using the small sample correction of the maximum likelihood estimators proposed by Cheung and Lai (1993). Regarding the number of lags, we tried to minimise the bias induced by overparameterization (Lutkepohl, 1999) by choosing one lag in the model in first difference (hence, two lags in level). Such a choice is found to be optimal on the basis of an Akaike test on an OLS regression of F_{it}^j on lags of F_{it}^{euro} , as well as F_{it}^{euro} on lags of F_{it}^j . Furthermore, it must be noted that we accept the hypothesis of one cointegration equation either when the L-Trace test rejects the null of rank=0, or when the L-Max test rejects the null of r=0.

4.2 Results of the cointegration tests

Tables 2, 3 and 4 for the cyclically adjusted variables (as well as tables A1, A2 and A3 in the annex) provide some evidence in favour of cointegration. In several cases this evidence depends on the type of indicator considered. To simplify the comparisons, in each table the results are summarised in the first column with the name of the country: one star (*) indicates that there is significant evidence of cointegration either from the ECM or from the Johansen test; two stars (**) mean that both tests converge to conclude to the existence of cointegration.

4.2.1 Government net lending (NLG)

In the case of NLG, we find limited cointegration for both the ECM and the Johansen tests. Cointegration is accepted for a few small countries in the euro area such as Austria and Portugal on a cyclically adjusted basis (Table 2) and Spain (Table A1).¹⁶ This is consistent with the visual inspection of Figures A.1. Surprisingly, Sweden also turned out to be cointegrated with the euro area, although the Swedish budget balance varies more widely (the slope coefficient is equal to 1.77). According to the Johansen test, cointegration is also accepted for the US after introduction of a trend.

All in all there is no overwhelming evidence of cointegration for NLG. There are several possible explanations for this result. One is that the NLG is a catch-all term and the countries in the sample have adopted rather different fiscal strategies also in response to exogenous shocks. Another possible explanation is that countries in the sample have started their fiscal adjustment at different points in time. The impact of the changes in the Italian deficit during the last part of the sample is a case in point. Given the relatively high weight of Italy (20.3%), the significant downward adjustment of the deficit of that country introduces a trend in the euro area average against which the countries are compared. Since most countries did not implement such a drastic and concentrated policy, the hypothesis of cointegration is not supported by the data.

4.2.2 Government current receipts (REV)

There is more evidence of cointegration in the case of current government receipts (REV), including Austria, Germany, Ireland, Italy, the Netherlands, and Portugal. As expected, the comparison of Table 3 and Table A.2 in the annex, does not reveal significant differences between the cyclically adjusted current receipt variable (REVQ) and the unadjusted REV, with the exception of the switch between Ireland (that is cointegrated in cyclically adjusted terms but not in terms of ratio to GDP) and Italy (that is cointegrated in terms of ratio to GDP but not in cyclically adjusted terms).¹⁷ For Austria and Portugal the distribution of the coefficients in the

¹⁶ In the case of Portugal, such a result may be driven by an unexplained spike in the cyclically adjusted balance for 1980.

¹⁷ Owing to the unit elasticity of government receipts to GDP in most countries. See also Section 3 for details.

long run model are not standard (although the estimator is super-convergent), but they are illustrative of the underlying dynamics.¹⁸ During the period, both countries were converging to the euro area: Portugal was converging from below the euro area (“catching-up” process) and Austria from above. Table 3 reveals that the intercept for Portugal is negative, while the slope is close to one and the deterministic trend is positive. Germany was also converging from above the euro area average with a positive intercept and a slope coefficient smaller than one (see introduction for the explanation of convergence patterns). Italy was converging from below at very high speed with a slope coefficient of 3 (in Table A2). On the other hand, the Netherlands is found to be cointegrated with the euro area but with a negative slope coefficient, contradicting convergence. Canada exhibits evidence of international convergence in terms of cyclically adjusted variables, with a positive intercept but a slope coefficient positive but smaller than one, but not for the non corrected variables.

4.2.3 Government current expenditure (EXP)

In the case of government expenditure (EXP), Table 4 indicates that Austria, France, Italy, Portugal and Spain are found to be cointegrated with their euro area counterpart. Austria, France and Spain were converging from above (with positive intercepts of respectively 10.37, 7.37 and 18.49 percentage point) and slope coefficients below one (i.e., respectively 0.79, 0.91 and 0.46).¹⁹ Italy was converging fast from below and a slope coefficient of 1.51. Portugal is converging in terms of Johansen cointegration in Table 4. It has a negative intercept, a slope well below one but a positive trend for the ECM test. This country is clearly converging from below in terms of non-cyclically adjusted series (Table A3). Germany is also found to be converging in terms of non-cyclically adjusted series, although Figure A.3 reveals that current disbursements as percentage of GDP which was above the euro area average from 1970 to 1984, and dipped below the euro average in the second part of the sample period. The existence of a converging trend is accepted for Finland only in terms non-cyclically adjusted series since the intercept is very high and the slope coefficient is negative, but low in absolute values. Figure A.3 reveals that EXP in that country experienced sharp movement in the 1990s.

In summary, what do the above cointegration tests tell us? They provide evidence supportive of the convergence conditions in terms of cointegration as laid out in the introduction. This seems to hold particularly for current revenue and expenditure, and especially for small countries like Austria and Portugal. The more modest evidence of cointegration for government net lending may be the result of differences in timing and speed in the fiscal adjustment process initiated in the mid- to late 1980s in each country. In addition, failure to detect a stable cointegration relation may be due to shifts in the cointegrating vector as some countries may have finally converged at the end of the sample. But annual data are not sufficient to make proper statistical inference on the second half of the sample. Quarterly data may therefore be more useful, as shown in Section 5.

¹⁸ A fully modified estimator of Saikhonen or Philipps/Loretan (1992) type would be necessary.

¹⁹ It is not possible to use the long run estimate from the ECM test to assess the form of convergence. In the case of France such a result holds, although one can observe a divergence at the end of the sample (stability of the ratio of expend.-to-GDP in France and reduction in the euro area).

5 Dynamic factor index model for the euro area fiscal policy position

An extension of the tests presented so far is to consider whether euro area countries share not only common trends but also common cycles. The intuition is the following. If fiscal policy in the euro area has, to a certain extent converged, as examined in the previous sections, it should exhibit some common patterns. It is therefore sensible to test whether the fiscal stance in a given country includes both euro area components and national features.

In comparison with the preceding approach, we focus here on the stationary components. We use here quarterly data on the period 1985.Q1 to 1997.Q4 for Germany, Spain, France and Italy. This is the only sample period for which consistent quarterly data are available for all four largest economies in the euro area. We are therefore considering a shorter sample period (the last twelve years, as opposed to the last twenty five years). A possible advantage of shorter time series is that the tests focus on a period in which positive interactions and spillovers of fiscal policies may be more significant. On the other hand, a difficult issue that we faced throughout the paper is the unit root properties of the series. Since we consider a shorter sample, we are not able to assess the long run properties of the series. In order to get stationary series, and consistently with our economic prior, we assume that the series are actually stationary but experienced temporary shocks shifting upwards or downwards the level of the variables for a short period. We correct those regime shifts using broken trends in order to get stationary variables.²⁰

We investigate here two specifications. In the first one, i.e. Model 1, all four countries are compared together with equal weight, while in the second one, Model 2, each individual country is compared to the PPP weighted average of the other 3 countries.

In order to uncover both the common and the idiosyncratic (i.e. country specific) components in our key fiscal indicators across countries, we decompose fiscal data following the method introduced by Stock-Watson (1991) to model coincident economic indicator, as well as by Kuttner and Sbordone (1997) and Clark (1998) to study the dynamics of the US labour market. Such a method provides an estimate of the relative variance of the two types of shocks. In particular, the relative importance of common shock allows to assess the degree of fiscal convergence. For that purpose, we assume that fiscal variables can be decomposed into two components: aggregate (euro area-wide) shocks and national (idiosyncratic) shocks.

Formally, we assume that there exists a common shock C_t which impacts on national fiscal variables. Each variable F_{it}^j is also affected by idiosyncratic shocks χ_{it}^j and we posit that:

$$(5.1.) \quad F_{it}^j = \alpha^j C_t + \chi_{it}^j$$

for $j = 1, \dots, n$, where n is the total number of countries ($n=4$ in the first variant). The vector α^j is called the vector of factor loadings on the common shock. Both types of shocks are the unobserved state variables of the system, noted as a $n+1$ -dimensional vector $S_t = (C_t, \chi_{1t}, \dots, \chi_{nt})'$. All variables are measured as deviations from the unconditional mean.

We apply the Kalman filter to the system made of the state variables and the observation equations (see Table 5). The common shock is assumed to follow an AR(2) process and the idiosyncratic shock an AR(1):

20 On the period 1985.Q1-1997.Q4, most series exhibit a sharp increase in the late 1980s/early 1990s. NLG: Italy exhibit a very significant upward trend; REV: 1994-1996 for France, 1990-1992 for Spain, 1989-1992 (increase) and 1992-1995 (slowdown) for Italy; EXP: 1991-1992 for Germany, 1991-1993 for France, 1990-1991 for Spain and 1988-1992 for Italy.

$$(5.2) \quad C_t = \beta_1 C_{t-1} + \beta_2 C_{t-2} + \omega_t$$

$$(5.3.) \quad \chi_t^j = \gamma^j \chi_{t-1}^j + \varepsilon_t^j$$

$D_t = (\omega_t, \varepsilon_{1t}, \dots, \varepsilon_{nt})'$ are the innovations to the state variables. The innovations are assumed to be orthogonal: $E(DD') = \text{diag}(\sigma_\omega^2, \underline{\sigma}_\varepsilon^2)$, with $\text{diag}(\underline{\sigma}_\varepsilon^2)$ the variance-covariance matrix of the innovations on the idiosyncratic shocks. The observation equations are $F_t = AS_t$, where $A = [(a_1, a_2, \dots, a_n)', Id_n]$. Finally, the system is correctly identified if the standard deviation of the common shock is known, and we chose $\sigma_\omega = 1$, which is a pure normalisation.²¹

It is possible to compute the contribution of the common shock to the variance of the observed variables. This is a measure of convergence. For that purpose, note that, given the assumed orthogonality between the innovations on the common and the idiosyncratic shocks, the variance of a given fiscal indicator is:

$$(5.4.) \quad \text{Var}(F_t^j) = (\alpha^j)^2 \text{Var}(C_t) + \text{Var}(\chi_t^j) = [\alpha^j / (1 - \beta_1 - \beta_2)]^2 + [\sigma^j / (1 - \gamma^j)]^2$$

The specification used in the second variant, i.e. Model 2, is to determine which countries are closely associated with the euro area aggregate (Table 6). In that case, the dynamic factor model is reduced to $n=2$.

5.1 Common cyclical components across the largest euro area countries

The first experiment considers the four largest euro area countries and decomposes their dynamics between common and idiosyncratic shocks. For NLG, Table 5 reports rather satisfactory results, since the factor loadings on the common shock are significant for all four countries: Germany (with a coefficient of 0.27), France (0.56) and Italy (0.32) and Spain (0.23). The common shock follows a stationary AR(2) process for which the first lag is significant (see the b coefficients). The idiosyncratic components also has a well behaved (i.e. stationary) AR(1) structure, where the g coefficients are significant in all countries but France. The magnitude of the standard deviation of the innovation to the national component (the s coefficients) is similar to the one of the common component: as compared to the reference value of one for the common component, we find 1.06 in Germany, 0.47 in France, 0.77 in Italy and 0.83 in Spain. The large adjustment in the Italian public finances explain the particular path followed by that country with a larger weight of the idiosyncratic component (which is quite persistent with an AR term of 0.87). Table 7 reveals that the common shock contribute to most of the variance of NLG for France, but only 45% in Italy and 48% in Spain. Notice that that results are quite robust since the s coefficients are accurately measured (and their standard deviation is quite small). On the other hand the standard deviation is relatively higher for the a and g coefficients.

One caveat is that we may uncover the effect of the euro area business cycle, given the sensitiveness of the fiscal deficit to the business cycle, as observed in Section 4. However, it appears that, when controlling for the euro-area business cycle, there is still evidence of comovements in government net lending.²² This is apparent from the top chart of Figure 2, where

21 We do not address the issue of extracting the mean of the common shock and our normalisation is therefore consistent with Stock-Watson (1991). This is different from the identification chosen by Le Bihan and Sédillot (1999), which in another context, set the α^j 's to be equal to 1 in order to constrain the unconditional mean of the state variable (core inflation, in their case) to have the same mean as actual inflation. Such an identification assumption would be necessary if we wanted to derive an indicator of the level of the euro area fiscal stance and not only of its cyclical changes.

22 To control for the euro area business cycle, we computed a weighted average of GDP in the four countries under review (using PPP weights). Deviation from the HP filter trend was taken as an indicator of the short term (or cyclical) component of the euro area GDP. We first regressed net government lending for each country on this indicator, which did exhibit significant coefficients in France and Spain. Then, we applied the same procedure as described for Model 1 to the residuals of the first-step regressions.

we plot the fiscal indicator for each country and the implied common factor (in bold line).²³ It also appears that the common state variable is highly correlated with the observed value for NLG in France, while the indicator for Spain is much more volatile and the one for Germany exhibits divergences during a few sub-periods.²⁴

Regarding REV and EXP, there is some evidence of comovements. France again plays a significant role in the dynamics of the common shock on REV, which contributes to 48% of total variance for the observed variable, but almost zero for the other countries. Regarding EXP, there is evidence of comovement between France and Italy: the factor loading on the common shock is significant. The common shock, which mixes features of these two countries, contributes to 7% of the variance in France and 23% in Italy. The point estimate for Spain (37%) should be seen in relation to its high standard error. Looking at Figure 2, it is difficult to interpret the common shock (middle and bottom charts).

All in all, this sub-section indicates that the four largest euro area countries share common cycles for the ratio of public deficit to GDP, as well as between France and the Italian cycle for EXP. There is apparently less comovement between the four countries for REV.

5.2 Common cycles with euro area indicators

Our second experiment is designed to compare each individual country to the weighted aggregate of the three other countries. In the following, we refer to the latter indicator as « euro ». As indicated before we consider bivariate models and investigate whether there is a common component between the two variables.

As indicated in Table 6, we get similar results to those in Table 5. For the NLG indicators,²⁵ the French and Italian models are supported by the data (the factor loadings are statistically significant), indicating the existence of common cycle between these two countries and the euro area. The contribution of the common shock to the variance of the country *and* the euro aggregate is above 70% in France and Italy (Table 7). This confirms the findings of the previous Section. For REV and EXP it appears difficult to uncover common components for a given country and its euro area counterpart. In Table 6, the common factor expresses only one of the two variables, not both. This is confirmed by the decomposition of variance.

In summary, the Kalman Filter allows to uncover common components across fiscal policies in core euro countries. However, this is more significant regarding government net lending, which exhibit common cycles across countries. For revenues and expenditures, there is very little evidence of common cycles. Regarding the interpretation of the results, one should stress, that while we uncovered common factors, there is also evidence that, in the case of net lending, the common shock does not simply reflect the euro area business cycle, but refers to a common fiscal policy.²⁶ Although the method is different from the indicators of cross-correlation presented in Section 3, since we do not account for the trend in a similar way, it is possible to note that the results are quite consistent for NLG and REV (evidence of comovements in the first case, whereas some countries may diverge for the latter variable, so that we tend to reject common fiscal cycles for REV).

23 The country indicators for NLG are the residuals from the first-step regression described in the preceding footnote, while in the case of REV and EXP they are just the centered indicators.

24 Note that the variability of the common shock derives from the assumption made on σ_{ω} . The model actually identifies $(\alpha^i)^2 \text{Var}(C_t)$, so that reducing the variance of C_t amounts to increasing α^i , as indicated in equation (5.4).

25 In order to correct for the effect of the trend in Italy, all NLG variables (and in particular the euro area aggregates) are corrected for their deterministic trend. The only exception is Germany.

26 As already discussed, the ratio of current revenue to GDP is, by construction, and due to the unit elasticity of revenues, corrected for the effect of the business cycle.

6 Conclusion

This paper set out to assess whether the euro area is characterised by some convergence in fiscal policies by examining the correlation, dispersion and cointegration of government net lending, total current revenue, and total current expenditure: three variables that are affected by the European process of integration.

The contemporaneous cross-correlation for all three variables is not always very high but is generally positive. Furthermore, it has generally increased steadily over the sample period, and particularly in the latter part. In addition, the dispersion in cross-correlation among euro area countries is also gradually declining over time above all for government net lending and total current expenditure. We also find convincing evidence that fiscal dispersion has been declining for all three variables at a sustained pace among all countries in the sample, but particularly among euro area countries.

Using annual data we find some evidence of cointegration across the euro area for total current revenue and also – but less significantly – for total current expenditure. Cointegration on the revenue side is consistent with the process of tax harmonisation in several areas most exposed to competition, the gradual synchronisation of fiscal policies also in response to more synchronised business cycles, and in the latter part of the sample period with the fulfilment of the Maastricht convergence criteria. The limited cointegration on the expenditure side can be explained, amongst others, with a catch up process in several low expenditure countries. Less cointegration, is found instead for government net lending. This does not necessarily indicate a lack of convergence that is detectable from the raw data and is underpinned by the indicators of fiscal dispersion. It may instead result from differences in timing and speed in the fiscal adjustment process in each country. All in all, these findings are significant also because the sample period that we investigate is characterised by many far-reaching economic and institutional changes, and also shifts in the thrust of fiscal policy across each country.

Empirical work using higher frequency (i.e., quarterly) public finance data is greatly constrained by the lack of consistent and reliable data. We needed to restrict ourselves to examining only the four largest euro area countries and starting in 1985. However, the investigated variables did not behave in the same way. Government net lending, which was at the centre of the rush to EMU and among the most scrutinised variables, share common cyclical factors across countries: i.e., they were interlinked. On the other hand, cycles in revenues and expenditures are rarely interlinked.

The above tests, jointly interpreted, tend to indicate that although fiscal policy in euro area countries has significantly converged, country-specific components still contribute to a significant share of the variability of the aggregate. Furthermore, additional investigation is needed for the sub-components of these variables that could be more affected by the ongoing economic and financial changes. On the other hand, we have not accounted for different levels in public indebtedness that may be reducing the ability (or opportunities) for further fiscal convergence in flow variables in some countries.

In our analysis we controlled for the effects of increasing synchronisation in business cycles to the extent possible. However, this could not be systematic, in particular because there is, as yet, no consensus regarding the proper way to compute cyclically adjusted indicators and to model jointly the economy and budgetary policy. This is an area though in which further research is needed.

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Tables and charts

Table I

Contemporaneous Correlations in Cyclical Differences with respect to Euro Area Average, 1970–1998¹

	(a) Correlations of Net Lending, Government (NLG)								
	1970-98	1970-78	1979-85	1970-78	1979-85	1970-85	1986-92	1993-98	1986-98
Austria	0.538	0.579	0.310	0.579	0.310	0.494	-0.146	0.895	0.599
Belgium	0.446	0.132	0.677	0.132	0.677	0.303	0.699	0.706	0.713
Finland	0.298	-0.266	0.195	-0.266	0.195	-0.185	0.642	0.894	0.762
France	0.749	0.851	0.703	0.851	0.703	0.759	0.535	0.921	0.794
Germany	0.535	0.835	0.139	0.835	0.139	0.593	0.392	0.573	0.506
Ireland (1977-98)	0.578	0.000	0.453	0.000	0.453	0.443	0.724	0.812	0.658
Italy	0.573	0.641	0.481	0.641	0.481	0.579	0.582	0.874	0.605
Netherlands	0.424	0.619	0.462	0.619	0.462	0.539	-0.203	0.795	0.248
Portugal	0.570	0.708	0.779	0.708	0.779	0.558	0.609	0.880	0.785
Spain	0.525	0.007	0.657	0.007	0.657	0.235	0.316	0.943	0.793
Euro Area	0.573	0.634	0.443	0.634	0.443	0.554	0.427	0.786	0.623
<i>Weighted Average</i>									
United Kingdom	0.616	0.300	-0.296	0.300	-0.296	0.183	0.841	0.962	0.917
Sweden	0.552	-0.258	0.584	-0.258	0.584	0.039	0.763	0.874	0.863
Denmark	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greece (1975-98)	0.755	0.000	0.651	0.000	0.651	0.692	-0.335	0.938	0.237
United States	0.715	0.844	0.409	0.844	0.409	0.706	0.831	0.933	0.762
Japan	0.501	0.487	-0.110	0.487	-0.110	0.364	0.345	0.813	0.677
Canada	0.606	0.598	0.088	0.598	0.088	0.391	0.766	0.957	0.803
	(b) Correlations of Total Current Revenues (REV)								
	1970-98	1970-78	1979-85	1970-78	1979-85	1970-85	1986-92	1993-98	1986-98
Austria	0.247	-0.521	-0.297	-0.521	-0.297	-0.253	0.754	0.924	0.832
Belgium	0.433	0.502	0.183	0.502	0.183	0.463	0.374	-0.770	0.365
Finland	0.134	0.468	0.361	0.468	0.361	0.122	0.268	0.673	0.300
France	0.247	0.227	0.793	0.227	0.793	0.463	-0.029	-0.239	-0.020
Germany	-0.047	-0.559	0.473	-0.559	0.473	-0.339	0.587	-0.228	0.277
Ireland (1977-98)	0.626	0.000	0.969	0.000	0.969	0.961	0.415	0.428	0.431
Italy	0.329	-0.106	0.766	-0.106	0.766	0.209	0.222	0.937	0.539
Netherlands	0.562	-0.092	0.787	-0.092	0.787	0.397	0.557	0.964	0.685
Portugal	0.636	0.873	0.675	0.873	0.675	0.756	0.695	0.553	0.528
Spain	0.287	0.461	-0.118	0.461	-0.118	0.312	0.401	0.777	0.330
Euro Area	0.214	-0.069	0.530	-0.069	0.530	0.132	0.353	0.231	0.324
<i>Weighted Average</i>									
United Kingdom	0.158	0.162	0.857	0.162	0.857	0.472	-0.542	-0.781	-0.624
Sweden	-0.112	0.703	-0.128	0.703	-0.128	0.334	-0.759	-0.214	-0.561
Greece	0.444	0.623	0.395	0.623	0.395	0.495	0.460	-0.895	0.000
United States	-0.271	-0.394	-0.178	-0.394	-0.178	-0.201	-0.236	-0.560	-0.389
Japan	-0.376	-0.480	0.195	-0.480	0.195	-0.184	-0.556	-0.383	-0.640
Canada	-0.027	-0.617	0.600	-0.617	0.600	-0.052	0.179	0.469	0.032
<i>Standard Deviation (+/-)</i>	0.186	0.333	0.378	0.333	0.378	0.250	0.378	0.408	0.277
	(c) Correlations of Total Current Expenditures (EXP)								
	1970-98	1970-78	1979-85	1970-78	1979-85	1970-85	1986-92	1993-98	1986-98
Austria	0.626	0.728	0.012	0.728	0.012	0.556	0.455	0.778	0.740
Belgium	0.810	0.702	0.962	0.702	0.962	0.768	0.893	0.979	0.895
Finland	0.758	0.776	0.499	0.776	0.499	0.541	0.910	0.870	0.922
France	0.737	0.602	0.784	0.602	0.784	0.672	0.730	0.652	0.820
Germany	0.497	0.181	0.744	0.181	0.744	0.270	0.810	0.526	0.795
Ireland (1977-98)	0.697	0.000	0.850	0.000	0.850	0.696	0.778	0.917	0.679
Italy	0.475	0.061	0.961	0.061	0.961	0.329	0.473	0.751	0.662
Netherlands	0.786	0.949	0.710	0.949	0.710	0.842	0.806	0.801	0.738
Portugal	0.607	0.680	0.301	0.680	0.301	0.558	0.826	0.878	0.820
Spain	0.476	0.026	0.202	0.026	0.202	0.115	0.883	0.965	0.932
Euro Area	0.581	0.328	0.710	0.328	0.710	0.426	0.724	0.701	0.785
<i>Weighted Average</i>									
United Kingdom	0.794	0.478	0.867	0.478	0.867	0.634	0.976	0.852	0.943
Sweden	-0.113	-0.210	-0.599	-0.210	-0.599	-0.446	0.342	0.915	0.262
Denmark	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greece	0.108	0.246	-0.617	0.246	-0.617	-0.236	0.858	0.416	0.000
United States	0.705	0.656	0.826	0.656	0.826	0.714	0.912	0.950	0.822
Japan	0.524	0.850	0.785	0.850	0.785	0.791	0.145	-0.585	0.143
Canada	0.284	-0.369	-0.216	-0.369	-0.216	-0.239	0.889	0.967	0.871
<i>Standard Deviation (+/-)</i>	0.186	0.333	0.378	0.333	0.378	0.250	0.378	0.408	0.277

Sources: OECD June 1999 Economic Outlook (EO) and authors' calculations.

¹ Correlations with respect to euro area weighted averages (PPP adjusted GDP values in 1995). For euro area countries the country is excluded from the average against which the correlation is computed and weights are re-scaled. Comparable data for Denmark and Luxembourg were not available. Cyclical differences are obtained by subtracting current observations from the trend obtained by applying the Hodrick Prescott filter with $\lambda = 100$.

Table 3**ECM and Johansen Cointegration Tests, Total Current Revenue Cyclically Adjusted (REVQ), 1974–1998***(see footnotes and explanations on Table 2)*

	ECM Cointegration Test ¹							Johansen Cointegration Test ²			
	Model	Intercept	Trend	Slope	ECM	DW	DF	Hypothesis ³	L-Trace ^{4, 5}	L- λ -Max ^{4, 5}	
									r = 0	r = 1	
Austria**	b	22.44		0.55	-3,65*	1.81	-3.07	1	26,15*	14.07	12.08
Belgium		NA	NA	NA	NA	NA	NA		NA	NA	NA
Finland		NA	NA	NA	NA	NA	NA		NA	NA	NA
France	b	25.03		0.57	-2.83	1.85	-2.80	1	18.27	15.3	2.97
Germany*	b	40.04		0.11	-2.70	2.14	-2.57	2	16,7*	11.68	5,02*
Ireland*	a	-73.69	-1.07	3.01	-3.01	2.29	-1.89	1	19.67	12.83	6.84
Italy	b	-22.96		1.64	-1.05	2.14	-0.97	1	20.14	14.43	5.71
Netherlands**	a	-27.18	-0.99	2.23	-4,47***	1.84	-3.53	1	22,88*	16,58*	6.29
Portugal**	a	-13.39	0.41	0.91	-6,2***	1.96	-3.42	3	36,02*	27,06*	3.96
Spain	a	-22.91	0.17	1.26	-1.49	1.79	-1.50	1	19.58	14.29	5.29
United Kingdom		NA	NA	NA	NA	NA	NA		NA	NA	NA
Sweden		NA	NA	NA	NA	NA	NA		NA	NA	NA
Greece	a	23.06	0.73	-0.11	-1.99	1.97	-1.98	1	15.88	12.21	3.67
USA	b	20.48		0.28	-1.06	1.34	-1.78	1	17.3	14.41	2.89
Japan	b	68.98		-0.79	-2.07	2.33	-4.69	2	16,38*	13,53*	2.84
Canada*	b	5.74		0.81	-1.88	1.76	-1.99	1	22,56*	17,64*	4.92

Source: OECD and authors' calculations.

Table 4**ECM and Johansen Cointegration Tests, Total Current Expenditure Cyclically Adjusted (EXPQ), 1974–1998***(see footnotes and explanations on Table 2)*

	ECM Cointegration Test ¹						Johansen Cointegration Test ²				
	Model	Intercept	Trend	Slope	ECM	DW	DF	Hypoth. ³	L. Trace ^{4, 5}	L. -Max ^{4, 5}	
									r = 0	r = 1	
Austria**	2	10.37		0.79	-3,76*	2.04	-3.55	1	26,54*	18,66*	7.88
Belgium		NA	NA	NA	NA	NA	NA		NA	NA	NA
Finland		NA	NA	NA	NA	NA	NA	1	NA	NA	NA
France*	2	7.37		0.91	-1.78	1.77	-0.81	1	23,19*	20,53*	2.66
Germany	2	32.84		0.25	-2.68	2.13	-2.26	1	17.89	13.53	4.36
Ireland	2	148.52		-2.46	-2.03	2.09	-2.56		NA	NA	NA
Italy*	2	-21.85		1.51	-1.39	1.98	-1.50	1	21,46*	19,68*	1.78
Netherlands	2	262.69		-5.04	-2.17	1.87	-2.94	1	18.75	11.29	7.46
Portugal**	1	-4.13	0.51	0.66	-4,17*	1.81	-1.85	3	28,64*	18.72	9.92
Spain*	2	18.49		0.46	-1.14	2.17	-3.48	1	21,64*	16.61	5.03
United Kingdom		NA	NA	NA	NA	NA	NA		NA	NA	NA
Sweden		NA	NA	NA	NA	NA	NA		NA	NA	NA
Greece	2	-17.19		1.26	-2.95	1.85	-1.36	1	23,16*	11.73	11,43*
USA	1	1.63	-0.30	0.84	-2.33	2.10	-0.92	1	14.16	11.49	2.67
Japan	2	3.13		0.53	-2.51	2.26	-1.94		NA	NA	NA
Canada	2	-2.93		1.08	-2.01	2.09	-1.39	1	17.90	12.77	5.13

Source: OECD and authors' calculations.

Table 5**Model 1: Four Largest Euro Area Countries, 1985:1–1997:4^{1,2}***(see footnotes and explanations on Table 2)*

	Net Lending, Gov. (NLG)		Total Current Revenue (YRG)		Total Current Expenditure (YPG)	
	Level ³		Level ⁴		Level ⁴	
	Coeff.	(Standard Error)	Coeff.	(Standard Error)	Coeff.	(Standard Error)
Common Shock (C_t)						
Factor Loading						
α (GER)	0.27**	(0.12)	0.08	(0.07)	0.04	(0.04)
α (FRA)	0.56***	(0.15)	0.34***	(0.13)	0.24***	(0.09)
α (ITA)	0.32*	(0.19)	-0.11	(0.12)	0.41***	(0.13)
α (SPA)	0.23*	(0.13)	0.02	(0.06)	-0.38	(0.40)
Coeff. of AR(2) Process						
β_1	0.83***	(0.33)	0.03	(0.28)	0.20	(0.24)
β_2	0.11**	(0.32)	0.50	(0.27)	0.51***	(0.19)
Idiosyncratic Shock (\mathcal{X}_t)						
Coeff. of AR(1) Process						
γ (GER)	0.53**	(0.12)	0.81***	(0.08)	0.93**	(0.06)
γ (FRA)	-0.14	(0.26)	0.59***	(0.25)	0.87**	(0.07)
γ (ITA)	0.87***	(0.11)	0.29**	(0.14)	0.74***	(0.12)
γ (SPA)	0.79**	(0.10)	0.90***	(0.06)	-0.05	(0.40)
Standard Deviations						
σ (GER)	1.06***	(0.11)	0.59***	(0.06)	0.25***	(0.02)
σ (FRA)	0.47***	(0.12)	0.31**	(0.12)	0.40***	(0.07)
σ (ITA)	0.77***	(0.10)	0.77	(0.08)	0.67***	(0.11)
σ (SPA)	0.83***	(0.09)	0.54**	(0.05)	1.80***	(0.21)

Sources: OECD Fiscal Policy and Business Cycle Database, Central Banks of Italy and Spain, and authors' calculations.

¹ Kalman filter estimates of model where the state variables are the common shock and the four idiosyncratic components, the vector of observation equations is made of the fiscal indicator for the four countries (see section 6.1). The * means significant at 10 percent level, ** at 5 percent level and *** at 1 percent level.² 1985:1–1997:4 is the only sample period for which quarterly data are available for all four largest economies in the euro area.³ Based on the evidence of stationarity (for NLG) or the possibility that the series may be not stationary but cointegrated (for YPG and YRG).⁴ Based on the possibility that YPG and YRG are not stationary, the series are corrected for deterministic trends on subperiods (usually the period 1988–1991).

Table 6**Model 2: National Components versus Euro Area Factor, 1985:1 – 1997:4¹**

	Common factor				Idiosyncratic components			
	Factor loadings		AR(2) coefficients		AR(1) coefficients		Standard deviation	
	$\alpha(j)$	α (euro)	$\beta 1$	$\beta 2$	$\delta(j)$	δ (euro)	$\sigma(j)$	σ (euro)
Net Lending, Government (NLG)²								
GER	0.51	0.22	0.29	0,5*	0,68***	0,74***	0,94***	0,83***
<i>(standard error)</i>	0.22	0.21	0.32	0.28	0.15	0.11	0.18	0.10
FRA	0,81***	0,32**	0,54**	0,33***	0,82***	0,52***	0.01	0,78***
<i>(standard error)</i>	0.08	0.10	0.14	0.14	0.16	0.13	0.50	0.08
ITA	0,83***	0.32***	0,7**	0.20	0.89***	0,53***	0.01	0.76**
<i>(standard error)</i>	0.08	0.10	0.14	0.15	0.38	0.12	0.23	0.07
SPA	0.23	0.42	0.44	0.43	0.82***	0,85***	0,81***	0.51***
<i>(standard error)</i>	0.27	0.32	0.66	0.57	0.11	0.20	0.10	0.20
Current Revenues (YRG)³								
GER	0.06	0.27**	0.08	0.48*	0.82***	0.79***	0.59***	0.39
<i>(standard error)</i>	0.08	0.13	0.44	0.28	0.08	0.11	0.06	0.08
FRA	-0.05	-0.02	-1.60***	-0.73	0.56	0.57***	0.42***	0.46
<i>(standard error)</i>	0.00	0.02	0.50	0.44	0.15	0.12	0.06	0.05
ITA	-0.03	0.34*	0.02	0.14	0.30**	0.44	0.78***	0.23
<i>(standard error)</i>	0.13	0.21	0.34	0.22	0.14	0.33	0.08	0.28
SPA	-0.05	-0.12	0.14	0.39	0.90***	0.73***	0.52***	0.27
<i>(standard error)</i>	0.11	0.10	0.68	0.42	0.06	0.12	0.05	0.05
Current Expenditures (YPG)³								
GER	0.06	0.30*	0.02	0.42*	0.80***	0.65***	0.53***	0.44***
<i>(standard error)</i>	0.07	0.18	0.42	0.29	0.09	0.15	0.05	0.12
FRA	0.04	0.38**	0.28	0.50**	0.82***	0.86***	0.50***	0,33*
<i>(standard error)</i>	0.07	0.18	0.31	0.21	0.08	0.11	0.05	0.17
ITA	0.92***	0.05	0.61**	0.24	0.94	0.89***	0.01	0,56***
<i>(standard error)</i>	0.09	0.08	0.15	0.94	1.50	0.07	0.01	0.06
SPA	0.57***	0.03	0.79***	0.11	0.86***	0.55***	0.10	0,39***
<i>(standard error)</i>	0.06	0.04	0.14	0.14	0.14	(0.12)	0.5	0.04

Sources: OECD Fiscal Policy and Business Cycle Database, Central Banks of Italy and Spain, and authors' calculations.

¹ Kalman Filter estimates of bivariate models where the state vector includes the common shock and the 2 idiosyncratic components (the country under study and the euro area aggregate excluding that country), and the observation vector is made of the fiscal indicator for the country under study and the euro area aggregate excluding that country (see section 6.2). * means that the coefficient is significant at the 10% level. ** at 5% and *** at 1%.

² NLG in level assuming the variables are stationary (only Italian figures are corrected for their trend).

³ YRG and YPG are taken in level, after correction for the deterministic trends appearing in 1988–1991.

Table 7**Contribution of Common Shocks to Total Variance of Fiscal Indicator, 1985:1 – 1997:4¹***(Percent of total: 1=100%)*

Model 1²						
	Net Lending, Gov. (NLG)		Total Current Revenue (YRG)		Total Current Expenditure (YPG)	
GER	0.80		0.00		0.00	
FRA	1.00		0.48		0.07	
ITA	0.45		0.04		0.23	
ESP	0.48		0.00		0.37	

Model 2³						
	Net Lending, Gov. (NLG)		Total Current Revenue (YRG)		Total Current Expenditure (YPG)	
	Country	Euro	Country	Euro	Country	Euro
GER	0.41	0.10	0.00	0.10	0.00	0.15
FRA	1.00	0.70	0.00	0.00	0.00	0.35
ITA	1.00	0.80	0.00	0.49	1.00	0.00
ESP	0.13	0.47	0.00	0.06	0.98	0.11

Sources: OECD Fiscal Policy and Business Cycle Database, Central Banks of Italy and Spain, and authors' calculations.

¹ On the basis of the decomposition of variance between the common shock and the idiosyncratic shocks from tables 5 and 6.² Model with the four largest euro area countries.³ Model where each country is compared to the weighted sum of the three other countries.

Table A2**ECM and Johansen Cointegration Tests, Total Current Revenue (REV), 1970–1998***(see footnotes and explanation in Table 2)*

	ECM Cointegration Test ¹							Johansen Cointegration Test ²			
	Model	Intercept	Trend	Slope	ECM	DW	DF	Hypothesis ³	L-Trace ^{4,5}	L-Max ^{4,5}	
										r = 0	r = 1
Austria**	a	2.73	-0,17	1.07	-4,92***	2.03	-3.79	1	25,21*	15.46	9.75
Belgium	b	33.53		0.31	-2.36	2.30	-1.52	1	14.77	9.59	5.18
Finland	a	44.36	0.65	-0.22	-3.17	2.08	-2.34	1	16.57	10.84	5.73
France	b	7.62		0.95	-2.61	2.04	-1.51	1	19.28	15.08	4.2
Germany**	b	37.42		0.14	-3,63**	2.38	-2.29	1	24,05*	12.76	11.28
Ireland	a	-75.89	-1.10	3.07	-2.78	2.28	-2.01	1	18.44	10.93	7.51
Italy*	b	-90.68		3.08	-2.42	2.01	-1.03	1	23,28*	14.14	9.14
Netherlands**	b	114.08		-1.72	-3,57*	2.24	-0.79	1	23,66*	13.19	10.46
Portugal**	a	-14.48	0.36	0.96	-4,61***	1.97	-3.94	1	25,77*	17.86	7.91
Spain	b	-35.62		1.63	-1.88	2.02	-0.77	1	17.35	11.37	5.99
United Kingdom		NA	NA	NA	NA	NA	NA		NA	NA	NA
Sweden	b	15.45		1.01	-2,44	2.10	-2.34	1	16.87	10.55	6.32
Greece	a	31.96	0.74	-0.31	-2.65	2.15	-2.70	1	15.3	11	4.3
USA	b	20.76		0.27	-2.14	2.04	-2.20	1	21,15*	15.43	5.71
Japan	a	-98.88	-1.83	3.88	-3.42	2.17	-1.23	1	15.68	11.7	3.98
Canada*	a	35.11	0.33	-0.01	-3,65*	184	-2.59	1	13.54	8.99	4.56

Source: OECD and authors' calculations.

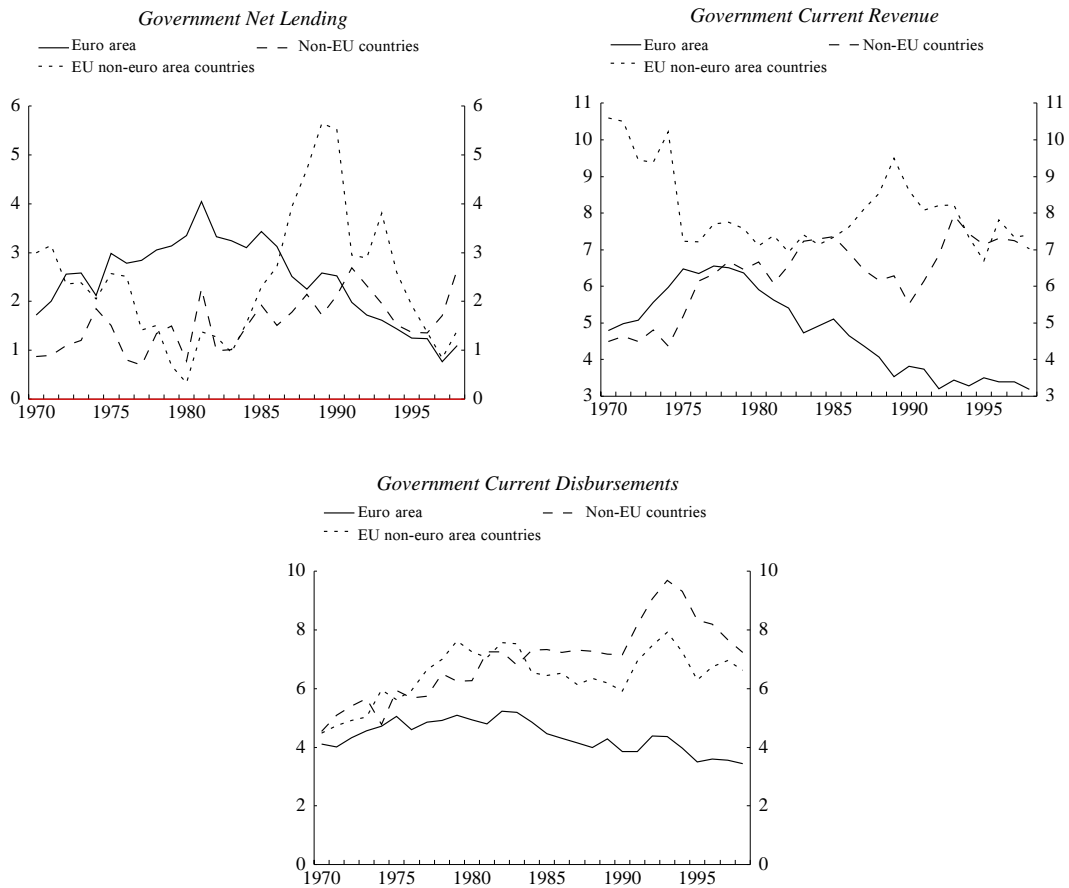
Table A3**ECM and Johansen Cointegration Tests, Total Current Expenditure (EXP), 1970–1998***(see footnotes and explanation in Table 2)*

	ECM Cointegration Test ¹						Johansen Cointegration Test ²				
	Model	Intercept	Trend	Slope	ECM	DW	DF	Hypothesis ³	L-Trace ^{4,5}	L-Max ^{4,5}	
										r = 0	r = 1
Austria*	b	1.94		0.96	-3,04*	2.42	-2.39	1	16.44	9.03	7.41
Belgium	b	41.08		0.22	-1.67	2.24	-2.08	1	14.39	9.70	4.69
Finland*	a	29.28	1.36	-0.27	-4,51**	1.65	-2.51	1	16.68	10.82	5.86
France	b	-11.8		1.35	-2.64	1.67	-2.73	1	13.97	12.17	1.80
Germany*	b	22.96		0.46	-3,18*	2.09	-2.38	1	16.33	11.69	4.64
Ireland	a	-37.29	-1.81	2.52	-3.24	2.12	-1.95	1	12.91	7.99	4.92
Italy	b	-6.75		1.20	-1.96	1.83	-1.10	1	15.49	12.17	3.32
Netherlands	b	-80.1		3.14	2.04	1.77	-0.79	1	14.70	9.27	5.43
Portugal*	a	-17.67	0.24	1.09	-4,07**	1.99	-3.73	1	17.78	9.78	8.00
Spain	b	-29.25		1.45	-2.34	2.10	-1.13	1	16.89	11.14	5.75
United Kingdom		NA	NA	NA	NA	NA	NA	1	NA	NA	NA
Sweden	b	-7.63		1.49	-2.09	2.22	-2.13	1	15.23	8.91	6.32
Greece	a	-29.55	0.74	1.53	-3.38	1.96	-1.63	1	15.39	8.32	7.07
USA	b	18.44		0.33	-2.61	1.96	-2.13	1	19.81	12.15	7.66
Japan	a	-4.28	-1.83	0.69	-1.82	1.91	-1.55	1	13.01	10.10	2.91
Canada	a	2.82	0.33	0.96	-2.28	2.13	-1.69	1	18.12	10.94	7.18

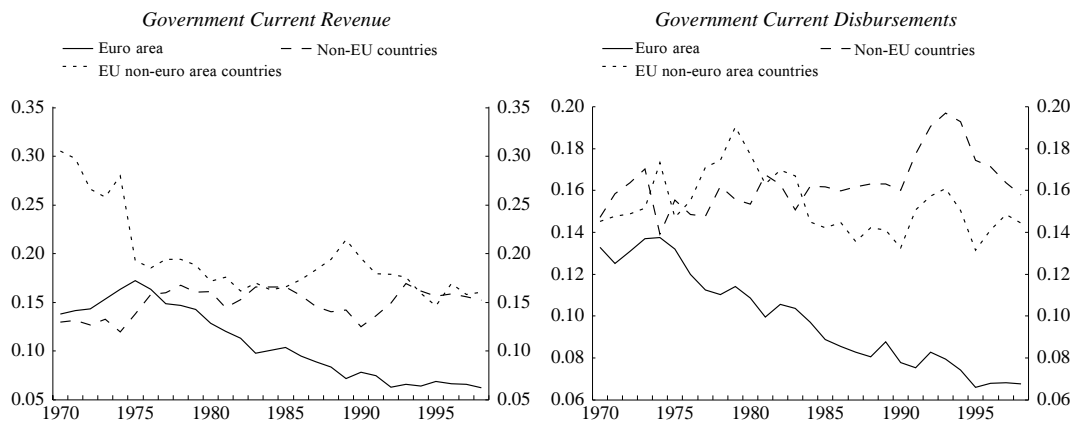
Source: OECD and authors' calculations.

Figure I

Selected Indicators of Fiscal Dispersion, 1970–1998
Standard Deviation with respect to the Euro Area



Coefficient of Variations with respect to the Euro Area



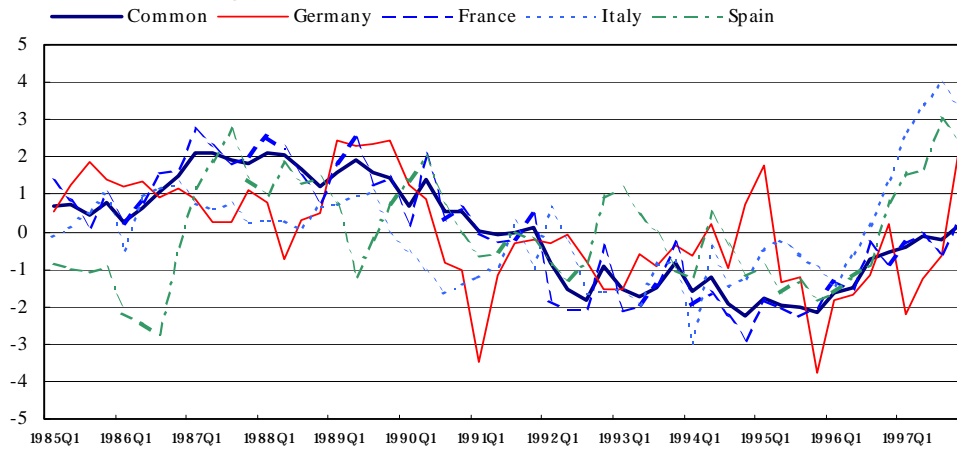
Source: OECD June 1999 Economic Outlook and authors' calculations.

Note: Average standard deviation and coefficient of variation (i.e., the standard deviation normalised by the mean) with respect to euro area average for three groups of countries: euro area countries (excluding Luxembourg for which comparable data were not available); EU non-euro area countries (i.e., the UK, Sweden and Greece but excluding Denmark for which comparable data were not available); and some selected non-EU countries (i.e. the US, Japan and Canada). Simple unweighted averages are shown. Euro area averages for euro area countries exclude the specific country for which the indicator of fiscal dispersion is calculated.

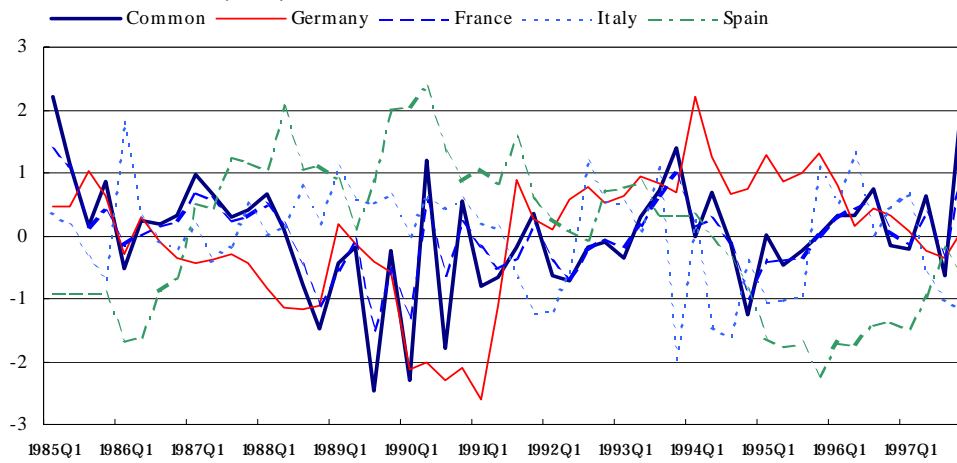
Figure 2

Common Cyclical Positions in Selected Euro Area Countries, 1985Q1–1997Q4

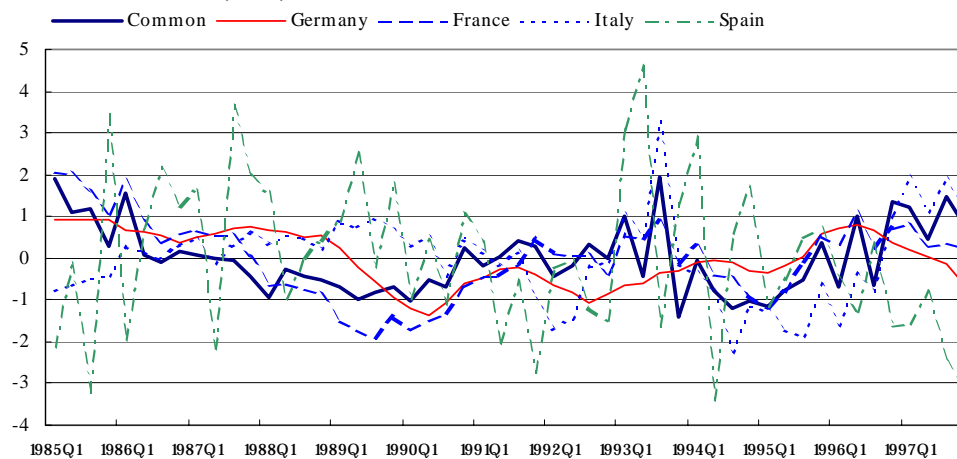
Government Net Lending (NLG)



Total Current Revenue (REV)



Total Current Revenue (REV)

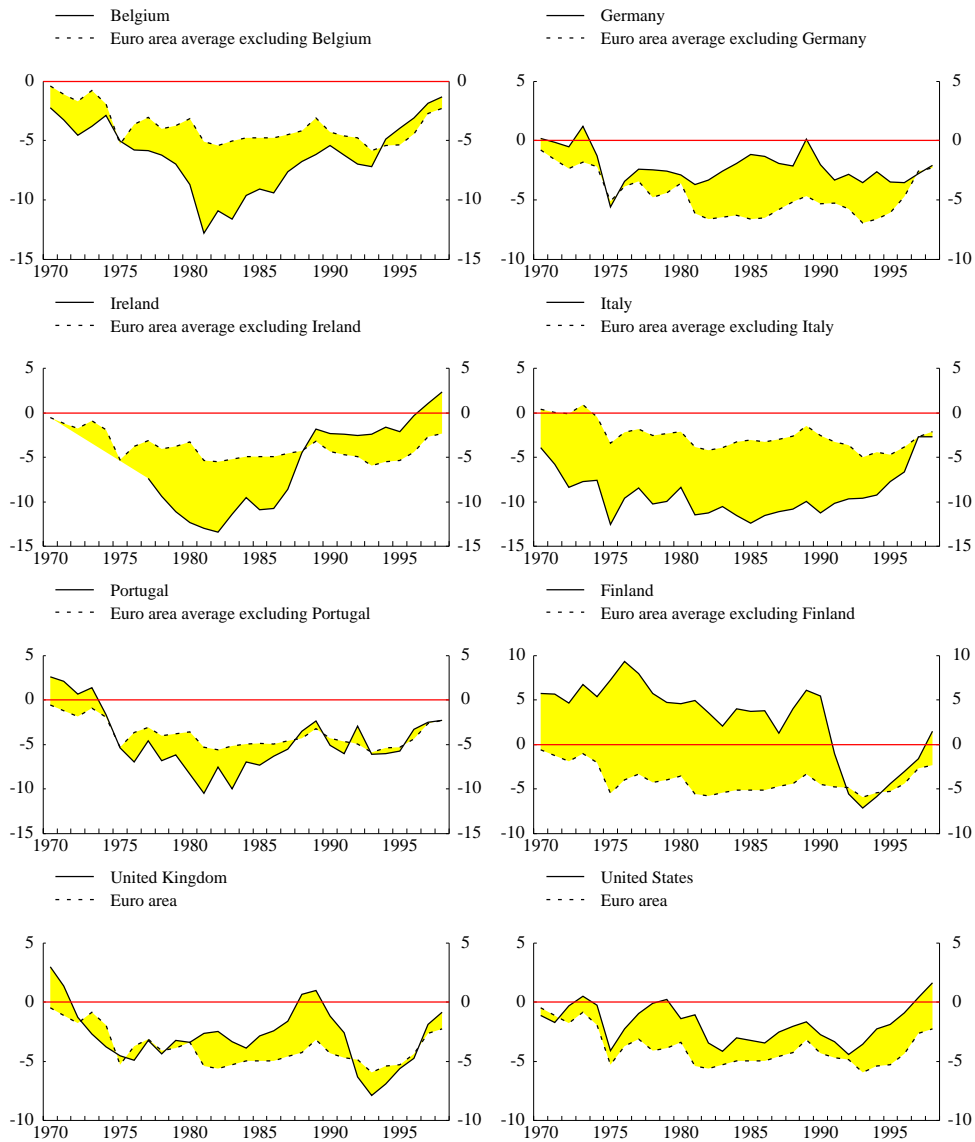


Sources: OECD Fiscal Policy and Business Cycle Database, Central Banks of Italy and Spain, and authors' calculations.

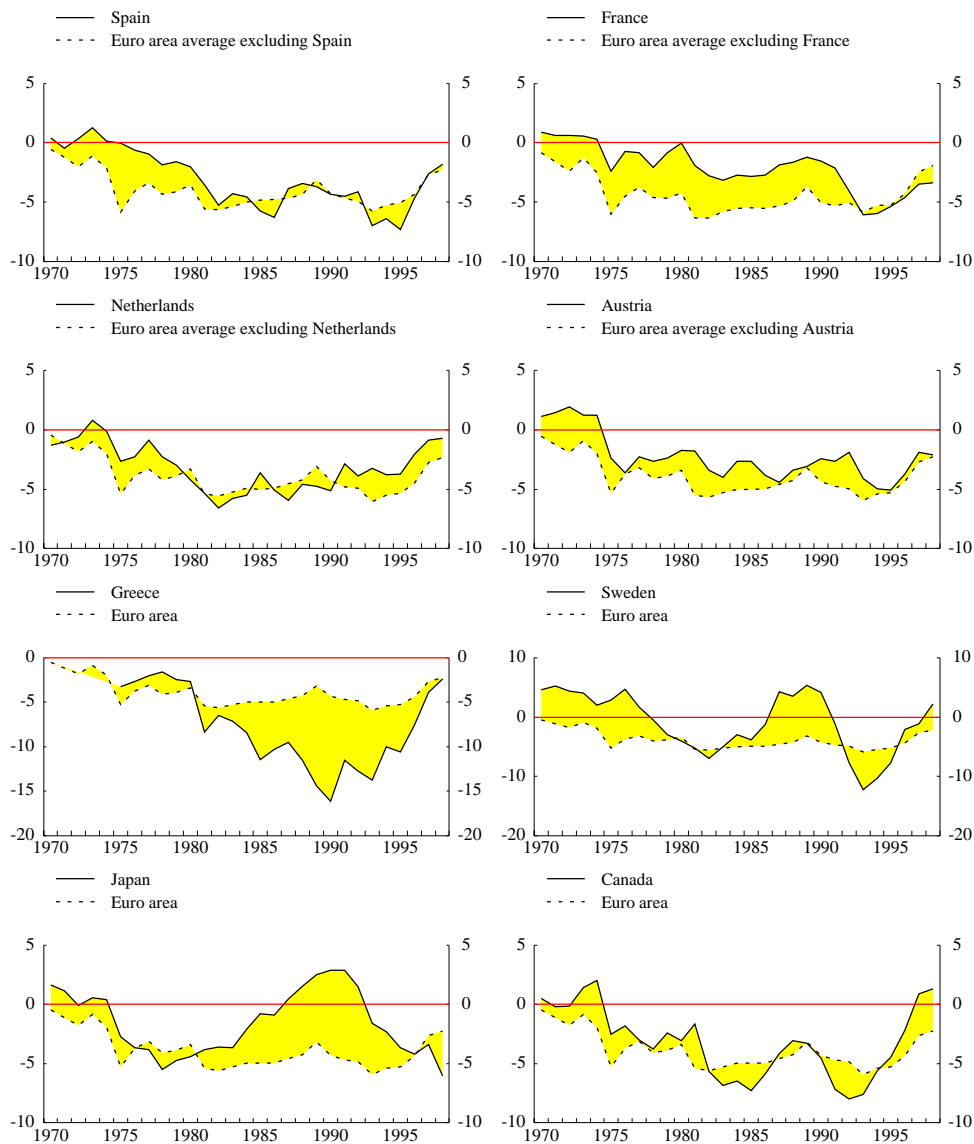
Figures A.1

Government Net Lending – Country Developments versus Euro Area Average, 1970–1998

(as percentage of GDP)



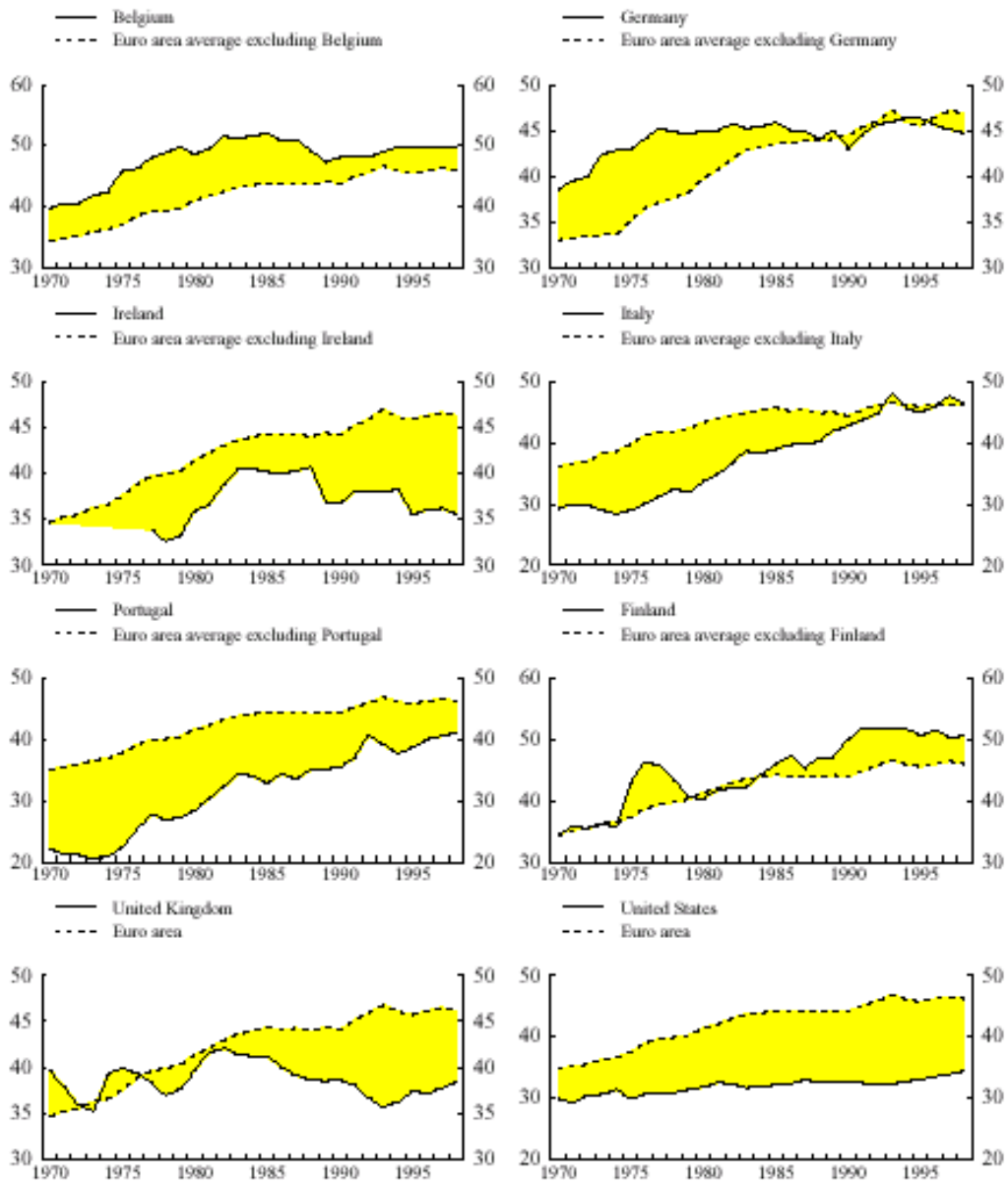
Source: OECD June 1999 Economic Outlook and authors' calculations.



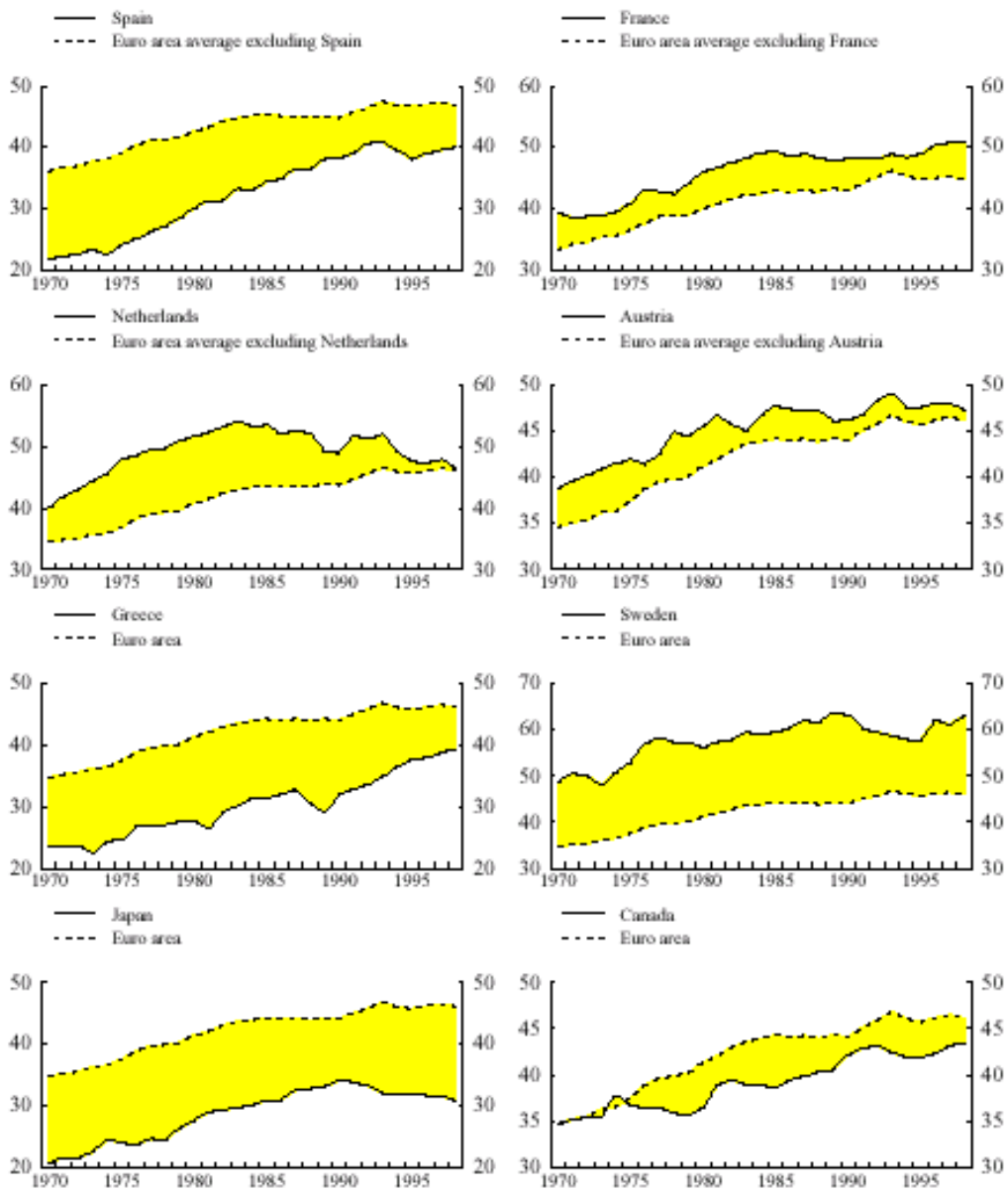
Source: OECD June 1999 Economic Outlook and authors' calculations.

Figures A.2

Government Current Receipts – Country Developments versus Euro Area Average, 1970–1998
(as percentage of GDP)



Source: OECD June 1999 Economic Outlook and authors' calculations.

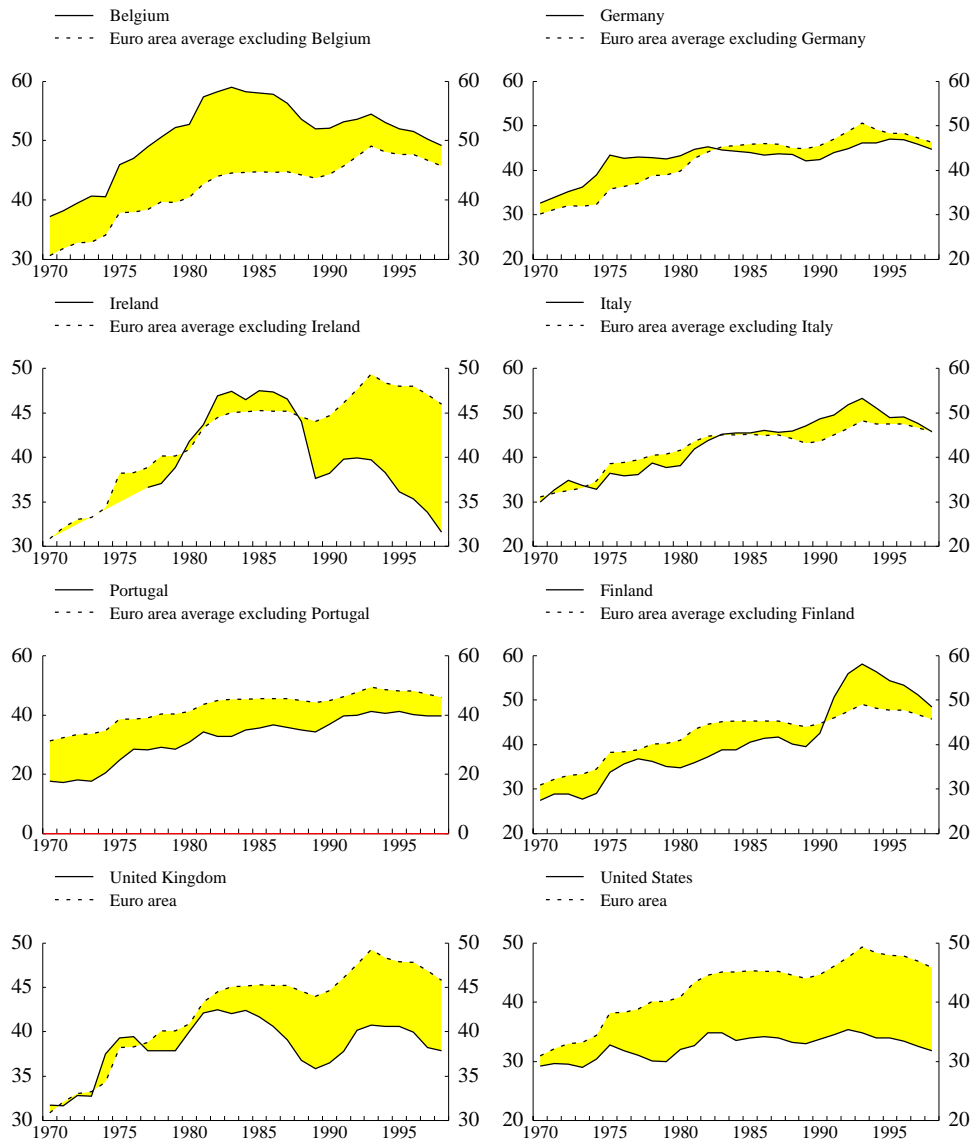


Source: OECD June 1999 Economic Outlook and authors' calculations.

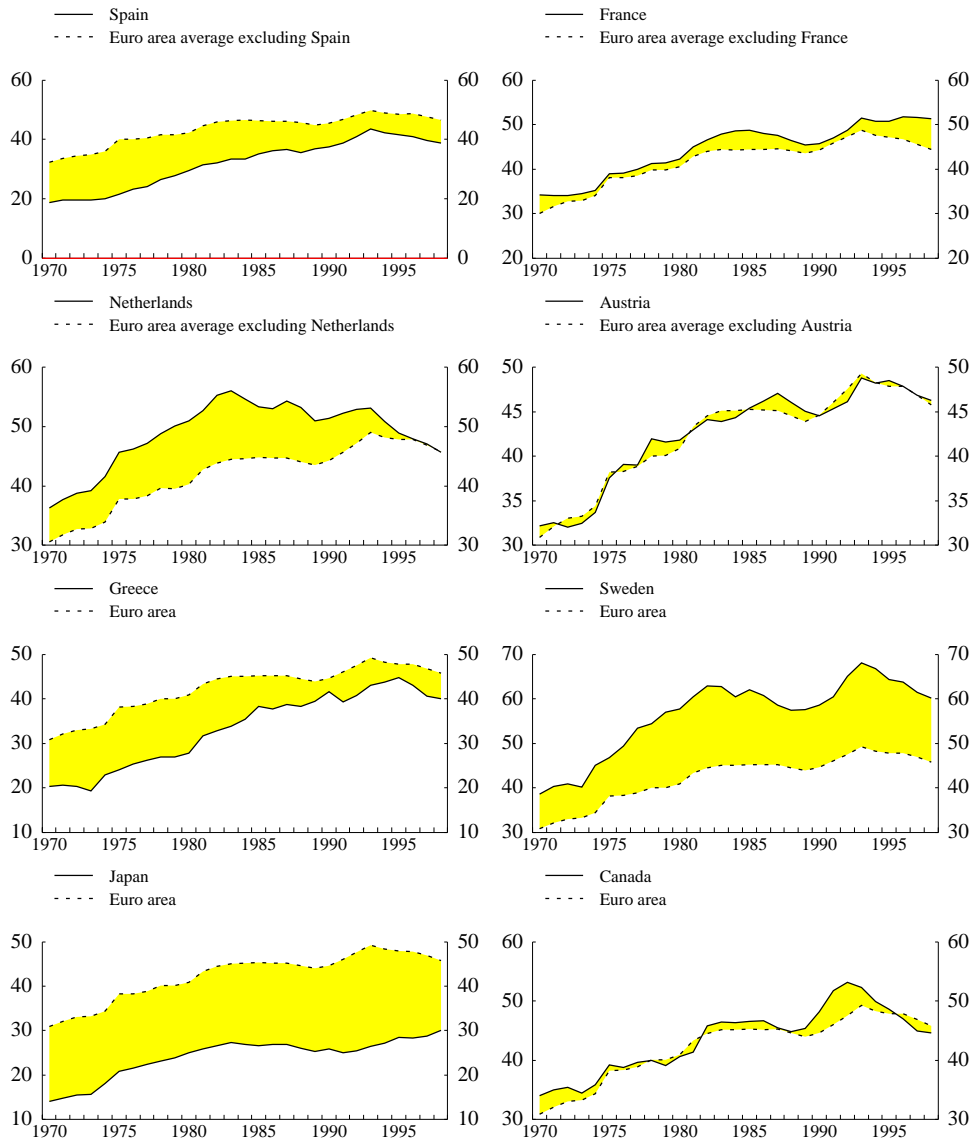
Figures A.3

Government Current Disbursements – Country Developments versus Euro Area Average, 1970–1998

(as percentage of GDP)



Source: OECD June 1999 Economic Outlook and authors' calculations.



Source: OECD June 1999 Economic Outlook and authors' calculations.

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