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SOME STYLIZED FACTS ON NON-SYSTEMATIC FISCAL POLICY IN THE EURO AREA

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ABSTRACT

Some Stylized Facts on Non-Systematic Fiscal Policy in the Euro Area*

We derive a set of stylized facts on the effects of non-systematic fiscal policy in the four largest countries of the Euro area, and discuss their implications for the fiscal policy coordination debate, for the effectiveness of fiscal shocks in stabilizing the economies, and for the interaction of fiscal and monetary policy. We find relevant differences across countries in the effects of non-systematic fiscal policy, and substantial uncertainty about the size of these effects, which casts doubts on the possibility of a fiscal coordination. Moreover, expenditure shocks are usually rather ineffective in increasing output growth or reducing its volatility, and can require deficit financing. Tax policies also appear to have minor effects on output, and tax cuts could also require deficit financing. Finally, fiscal shocks appear to have an impact on interest rates, either direct or through the output gap and inflation while, in general, the effects of monetary policy on disbursements and receipts seem to be minor.

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1. Introduction

The increased centralisation of monetary policy across the world, into currency boards or through dollarisation, or by the pooling of monetary policy as in the Euro area, has reawakened interest in fiscal policy and in the role of fiscal policy in stimulating economic activity.

The systematic part of fiscal policy in the form of plans for government expenditure and taxes, and the implications that this has for future taxation, should have largely been internalised into saving and investment decisions. The non-systematic or unanticipated part of fiscal policy is that which has more relevance to short term fluctuations and to the use of fiscal policy at the level of individual countries when monetary policy is centralised in the ECB, within the confines of the Stability and Growth Programme.

This paper provides a set of stylized facts on the effects of non-systematic fiscal policy in the four largest countries of the Euro area, using small-scale econometric models estimated on a country by country basis for a rather long time span. The stylized facts are then used to shed light on the fiscal policy coordination debate, on the effectiveness of fiscal policy in stabilizing the economies, and on the interaction of fiscal and monetary policy.

There emerge differences across countries in the effects of non-systematic fiscal policy, and substantial uncertainty about the size of these effects, which casts doubts on the possibility of a fiscal coordination, or at least complicates its implementation. The presence of spillovers across countries, another justification for a coordinated fiscal policy, is also uncertain, and their size turns out to be small. On the other hand, non-systematic fiscal policy can be considered as a tool to smooth the consequences of idiosyncratic shocks, so that coordination is less needed than in the case of systematic fiscal policy.

Expenditure shocks are found to be rather ineffective in increasing output, possibly with the exception of government investment, and, since they are not accompanied by tax increases that balance the budget, they can require deficit financing. Tax policies also appear to have minor effects on output, and tax cuts could also require deficit financing because of the sluggish reaction of expenditures. There are minor

differences between more discretional policies, such as government consumption, and automatic stabilizers, such as social benefits. Moreover, non-systematic expenditures and taxes appear to have only minor effects on the output gap volatility. Notice, though, that these findings do not preclude a stabilization role for systematic fiscal policy.

As far as the interaction with monetary policy is concerned, fiscal policy shocks appear to have an impact on interest rates, either direct or trough the output gap and inflation, and the exclusion of fiscal variables can bias in a few cases the evaluation of the effects of monetary policy shocks. Instead, in general, the effects of monetary policy on disbursements and receipts seem to be minor.

The paper is organized as follows. Section 2 provides a brief review of the recent related literature. Section 3 describes the dataset and develops the econometric methodology. Section 4 evaluates the effects of non-systematic fiscal policy on the output gap, inflation, and the interest rate. Section 5 considers the impact of non-systematic monetary policy, and compares the results when the fiscal variables are excluded from the VAR, as it is common in the monetary VAR literature. Section 6 focuses on the effects of the macroeconomic variables on the fiscal and monetary variables. Section 7 analyzes the presence of spillovers across countries. Section 8 considers the effects of fiscal policy on private consumption and investment, disaggregates receipts and disbursements into several components, and evaluates the role of the government debt. Section 9 concludes.

2. Literature review

There have been few attempts to derive stylized facts on the effects of non-systematic fiscal policy in the Euro area using small-scale models, while similar analyses are available for monetary policy, see e.g. Favero and Marcellino (2001), and there are some studies for the US, e.g. Blanchard and Perotti (1999), Fatas and Mihov (2001a, 2001b) or Mountford and Uhlig (2002). Most of the available evidence is based on simulations from large-scale structural models, which differ substantially on the extent of the effects of

fiscal policy, mainly because of different hypotheses on the percentage of financially constrained consumers in the economy.[1]

Two recent attempts to bridge the gap are Favero (2002) and Perotti (2002). The former develops a small scale structural model, and dynamically simulates it by setting to zero the fiscal shocks to compare the behavior of the output gap and inflation with the benchmark case where the shocks are not set to zero. The difference measures the effects of non-systematic fiscal policy. Perotti (2002) exploits and extends the methodology in Blanchard and Perotti (1999), which is based on the computation of dynamic responses to fiscal shocks using structural VARs, combined with external information on the effects of macroeconomic variables on fiscal variables. Even though these papers represent important developments in this field, they can suffer from (different) identification problems, discussed in more detail in the next section. Following Perotti (2002), we adopt a structural VAR approach, but the choice of the variables under analysis allows a better identification of the fiscal shocks, without relying on external information.

It is worth discussing briefly what we mean by fiscal shocks and how we identify them, more details are provided in the next section, since there is no consensus on this in the literature, see e.g.. Perotti (2002). Some authors, such as Burnside et al. (2001) and Ramey and Shapiro (1999) identify deviations of fiscal policy from its normal path by using dummy variables that capture specific episodes such as the Korean war or the Reagan fiscal expansion. Others identify fiscal shocks starting from the residuals of VARs or simultaneous equation models, e.g. Perotti (2002), Mountford and Uhlig (2002), Favero (2002), Fatas and Mihov (2001a, 2001b). Within this approach, different procedures are implemented to identify the mapping from the residuals to the shocks. In particular, Mountford and Uhlig (2002) impose sign restrictions on the impulse responses, rather than contemporaneous restrictions as in the other papers mentioned above. Our methodology belongs to this second approach, and we use standard structural VAR identification techniques, to stress the point that the main issue is the choice of the variables to be jointly modeled in the VAR, and the restrictions imposed.

[1] These simulations were presented at the CEPR-ZEI conference on Empirical models of the Euro Economy, held in Bonn in June 2002, and are contained in preliminary and confidential reports of the main international organizations.

A few caveats are also in order to interpret correctly our results. First, there is an implicit hypothesis that the fiscal shock exerts its effects when it is implemented rather than when it is announced. This led Mountford and Uhlig (2002) to use the sign restriction identification scheme, but this can only in part address the issue. If there are announcement effects, these will be hardly captured by the VAR. Second, there are several problems with data collection, in particular for Europe. Perotti (2002) carefully collected a quarterly dataset without interpolating yearly values, but Germany is the only country in the Euro area in his data set. We use half-yearly OECD data, as in Favero (2002), which are comparable across countries but whose quality is dubious since some series are interpolated. We also focus first on aggregate expenditures and receipts and then disaggregate them, to have a measure of the overall effect on non-systematic fiscal policy but also to evaluate whether particular taxes or disbursements have different effects, see e.g. Alesina and Perotti (1995). Third, we stress that we focus on non-systematic fiscal policy, and that the effects of systematic policy could be rather different, see e.g. Baldacci et al. (2001), while Hemming et al. (2000) provide a comprehensive survey. Fourth, we focus on the effects of fiscal variables on key macroeconomic variables, and vice versa, but there can be other welfare effects of fiscal policy, e.g. on income distribution or quality of life that are not captured. Fifth, both Favero (2002) and Perotti (2002) found substantially different effects after the '70s so that we focus on the period 1981-2001 to avoid a serious bias in the results. The drawback of this choice is that the limited number of observations is reflected in substantial uncertainty on the estimated effects. This problem is exacerbated by the identification procedure that requires the estimation of a large number of parameters. Finally, it is difficult to capture within our linear VAR framework non-linear effects of fiscal policy related to specific episodes, such as those arising from re-establishing credibility or solvency, see e.g. Giavazzi and Pagano (1990, 1996), Giavazzi et al. (2000) and Perotti (1999), but some results can be interpreted along these lines.

3. The variables and the econometric methodology

In this section we briefly describe the variables under analysis for France, Germany, Italy and Spain, and discuss the identification scheme adopted in the structural VARs for the joint analysis of fiscal and monetary shocks.

The starting point of the analysis is a VAR that includes the output gap (measured as the deviation of real GDP from its HP-filtered values) divided by GDP (y); the CPI inflation rate (p); a row material price inflation rate (cp); the log of the nominal exchange rate with respect to the Deutsche Mark, or to the US Dollar for Germany (e); a short term foreign interest rate, the German one, or the US one for Germany (i*); and the home short term interest rate, as a proxy for the policy rate (i). This is a rather standard choice of variables in monetary VARs, see e.g. Favero and Marcellino (2001). We then add the ratios of total receipts and disbursements to GDP to the dataset (t and g, respectively). We are here interested in an evaluation of the global effects of fiscal shocks, a more disaggregate analysis is presented in Section 8.

The data source is the OECD, as in Favero (2002), and the frequency is half-yearly. This choice contrasts with the standard adoption of monthly data for the analysis of monetary policy. It is dictated first by data availability, and second by the fact that in most countries the major fiscal decisions are taken once a year, and possibly revised once. Perotti (2002) constructs a quarterly dataset, but Germany is the only country within the Euro area for which such data are available. As far as monetary shocks are concerned, the main interest is in a comparison with the results from VARs without fiscal variables.

For all countries the sample under analysis is 1981:1-2001:2. Though for some countries longer series are available, as mentioned before, Favero (2002) and Perotti (2002) found a clear indication of different effects of fiscal policy after the '70s, and monetary policy was also in general rather different. The eight variables under analysis are modeled by a VAR with 2 lags and a constant for all countries, which in general provides a proper statistical model.

As far as the identification of the structural shocks (e) starting from the VAR residuals (u) is concerned, the scheme in equation (1) below is adopted as a starting point. The tax to GDP ratio can depend on contemporaneous values of gap and inflation. The

disbursements to GDP ratio is related to contemporaneous values of the output gap and of the interest rate. The output gap can be affected by contemporaneous taxes and disbursements, and the same holds for inflation that can also depend on the gap. Raw material price inflation and the foreign interest rate are instead modeled as exogenous, and do not react contemporaneously to other variables. The exchange rate is influenced by t, g, y, p and cp. The home interest rate depends on all these variables plus the exchange rate and the foreign interest rate, so that this equation can be considered as an extended version of the Taylor rule. Finally, we allow for a contemporaneous effect of e_t on e_g, and similar results are obtained by reversing the causal direction, a robustness noted also in Perotti (2002).

$$\begin{bmatrix} 1 & 0 & \alpha_{\mathrm{ty}} & \alpha_{\mathrm{tp}} & 0 & 0 & 0 & 0 \\ 0 & 1 & \alpha_{\mathrm{gy}} & 0 & 0 & 0 & 0 & \alpha_{\mathrm{gi}} \\ \alpha_{\mathrm{yt}} & \alpha_{\mathrm{yg}} & 1 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{\mathrm{pt}} & \alpha_{\mathrm{pg}} & \alpha_{\mathrm{py}} & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ \alpha_{\mathrm{et}} & \alpha_{\mathrm{eg}} & \alpha_{\mathrm{ey}} & \alpha_{\mathrm{ep}} & \alpha_{\mathrm{ecp}} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ \alpha_{\mathrm{it}} & \alpha_{\mathrm{ig}} & \alpha_{\mathrm{iy}} & \alpha_{\mathrm{ip}} & \alpha_{\mathrm{icp}} & \alpha_{\mathrm{ie}} & \alpha_{\mathrm{ii*}} & 1 \end{bmatrix} \begin{bmatrix} u_t \\ u_g \\ u_y \\ u_p \\ u_{cp} \\ u_e \\ u_{i*} \\ u_i \end{bmatrix} =$$

$$\begin{bmatrix} \beta_{tt} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \beta_{gt} & \beta_{gg} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_{yy} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_{pp} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_{cpcp} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_{ee} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \beta_{i*i*} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \beta_{ii} \end{bmatrix} \begin{bmatrix} e_t \\ e_g \\ e_y \\ e_p \\ e_{cp} \\ e_e \\ e_{i*} \\ e_i \end{bmatrix} \qquad (1)$$

Notice that the structural fiscal shocks can be also interpreted as the deviation from a fiscal rule that relates the behavior of the fiscal variables to contemporaneous values of the output gap, inflation and interest rate, to their own lags (to allow for partial adjustment and hysteris), and to the lags of the other variables in the VAR (to allow for

delayed reactions). See, e.g., Ballabriga and Martinez-Mongay (2002) for a discussion of fiscal and monetary rules in the Euro area.

The identification procedures more similar to the above scheme are those proposed by Favero (2002) and Perotti (2002), but there are some important differences. In particular, Favero assumes, in our notation, that α_{yt} and α_{yg} are equal to zero. While this seems a reasonable assumption because of the commonly hypothesized delays in the effects of fiscal policy, in Perotti (2002) these parameters are estimated and found to be significantly different from zero in several cases.

Perotti (2002), on the other hand, extends a procedure proposed in Blanchard and Perotti (1999) to estimate the parameters α_{ty}, α_{tp}, α_{ti}, α_{gy}, α_{gp}, α_{gi} as elasticities using external information. While such a procedure was uncontroversial in Blanchard and Perotti, it is unclear whether it is suited in this more general context, since, for example, now α_{ty} measures the contemporaneous reaction of t to y conditional not only upon lagged values of the variables but also upon contemporaneous values of p and i, which can be hardly considered as constant in the data used to compute the elasticities. Moreover, Perotti's choice of modeling the log of GDP and of the price level makes the identification of the interest rate shock problematic, since the latter is usually supposed to react to the output gap and inflation.

Our proposed identification scheme addresses both issues. With respect to Perotti (2002), we also use additional information to estimate the parameters that relate t and g to other variables, but this is accomplished by including within the same framework two exogenous variables, cp and i*. Finally, since the restrictions over-identify the model, they can be formally tested.

The main drawback of the suggested identification scheme is that many parameters have to be estimated, which can create numerical accuracy problems in samples as small as ours. We have tried several different starting values for the parameters to make sure that the optimization algorithm converged to a global and not to a local optimum, and checked the robustness of the resulting impulse response functions.

4. The effects of fiscal shocks

In this section we evaluate the effects of a shock to the government disbursements (e_g) or receipts (e_t) in the four countries under analysis. In the first subsection we discuss the dynamic responses of the variables of interest to fiscal shocks. In the second subsection we conduct a counterfactual experiment. We dynamically simulate the model setting to zero the fiscal shocks, as in Favero (2002), and compare the actual and the simulated behavior of the macroeconomic variables to evaluate whether non-systematic fiscal policy managed to stabilize the economies.

4.1 The dynamic response of the economy to fiscal shocks

The estimated counterparts of equation (1) are reported in Table 1, and four main comments are in order. First, the over-identifying restrictions implied by equation (1) are rejected by the data. This turns out to be due to some significant coefficients in the commodity price and foreign interest rate equations. Once the proper zero restrictions are relaxed, the same identification scheme is accepted for France and Germany, with only some minor differences for Italy and Spain. Second, the restriction of no contemporaneous effects of fiscal shocks on the output gap and inflation ($\alpha_{yt} = \alpha_{yg} = 0$) is accepted for all countries, indicating at least a six month delay for fiscal policy to manifest its effects. Moreover, the coefficient β_{gt} is small and not significant in all countries, indicating no coordination in tax and expenditure shocks, which can create deficit problems. Third, α_{ty} and α_{gy} are smaller in Germany than in the other countries, and the estimates of the other coefficients related to the contemporaneous effects of taxes and expenditures are also rather varied, though in many cases the estimated standard errors are large, reflecting a substantial uncertainty. Finally, when a contemporaneous effect of the interest rate on output, inflation and the exchange rate is allowed for, it turns out to be not significant and the responses do not change substantially.

It is worth mentioning that the size of the resulting structural fiscal shocks is rather small, about 2% of total expenditures or receipts. No major outliers are evident, with the exception of a large expenditure shock in Germany corresponding to the unification, and the behavior in the ‘80s and ‘90s is rather similar. These characteristics of the shocks, besides confirming the goodness of the VAR as a statistical model for the

data, suggest that the Maastricht Treaty and the Stability and Growth Pact mainly influenced the systematic component of fiscal policy, which is a positive finding.

The relevant impulse response functions generated by the VAR models identified as in Table 1 are gathered in figures 1-4. Those pertinent to this section are reported in the first two columns of each figure.

As far as the expenditure shock is concerned, four main comments are in order. First, its effects on the output gap are very limited in all countries, except Germany where the response is positive and significant. Second, inflation increases significantly in France, which also leads to an increase in the interest rate (a non significant increase takes place also in Italy and Spain). The reaction of inflation in the other countries is instead limited and not statistically significant. Third, in all countries the expenditure shock is very persistent, so that what was likely intended as a temporary deviation becomes close to a permanent shock. Finally, the reaction of taxes is delayed, and not sufficient to balance the budget. Overall, this picture casts serious doubts on the stabilization role of fiscal policy implemented trough expenditure shocks, whose effects on output appear to be limited, while they could lead to an increase in inflation and require deficit financing.

Let us now make three comments on the effects of a (positive) tax shock. First, the output gap decreases, as predicted by Keynesian theory, in Germany only. In the other countries the effects are very limited, but positive and significant in Italy, perhaps as a consequence of the improvement in the government deficit and more generally in fiscal solvency, see e.g. Giavazzi and Pagano (1990, 1996). An alternative explanation for the positive effects of a tax shock could be that, since it is actually a revenue shock, it can be due either to an increase in the tax rate or to an increase in the tax base, and the latter is positively correlated with the output gap. Yet, if this were the case, an increase in the output gap should be also associated with higher revenues, while this does not appear to be the case, as we will see in more details in Section 6.

Second, the consequences of the tax shock on inflation are in general limited, as well as those on the interest rate, though it significantly decreases in France and increases in Spain. The latter effect is explained by an associated increase in the price of raw materials, which appears to lead Spanish inflation.

Third, in all countries, a tax shock is associated with only a limited increase in expenditures, so that overall the deficit is reduced.

In summary, the effects of fiscal shocks are rather different across countries and surrounded by considerable uncertainty. Yet, a consistent pattern is that expenditure and tax shocks have limited stabilization effects, a result in line with Perotti (2002), but tax shocks can play a role in deficit reduction while expenditure shocks may require deficit financing. Monetary policy seems to react to non-systematic changes in fiscal variables in a few circumstances, but the main effects appear to be through the impact of fiscal policy on output and inflation.

4.2 Assessing the in-sample effects of fiscal shocks

To provide further evidence on the effects of non-systematic fiscal policy, we simulated the structural VAR models setting to zero the fiscal shocks and to their realized values all the other shocks. Thus, a comparison of the actual and simulated behavior of the macroeconomic variables provides an indication of the in-sample effects of non-systematic fiscal policy.

The results are reported in the first two rows of each panel in Table 2. Fiscal policy shocks appear to have a negative effect on the average output gap in all countries except Italy. In other words, the output gap improves without fiscal shocks. Moreover, its standard deviation is reduced by non-systematic fiscal policy only for France and Spain. The effects on the levels of inflation and the interest rate are minor, with a slight generalized increase in the standard deviation of these variables.

To evaluate whether there are differences between discretionary policy and automatic stabilizers, we have repeated the same exercise using, respectively, government consumption and social benefits instead of total expenditures. The results are reported in the remaining rows of Table 2. The major interesting finding is that social benefits slightly improve the output gap in Germany, but at the cost of a higher inflation and interest rates. Moreover, except in Germany, the output gap volatility increases more without government consumption than without social benefits.

In summary, this analysis suggests that non-systematic fiscal policy played in general only a minor role in stabilizing the four largest economies of the Euro area over the period 1981-2001, with a limited impact also on inflation and the interest rate.

5. The effects of monetary shocks

The responses of the variables of interest to a monetary (i.e. interest rate) shock are reported in the last column of figures 1-4. We are interested first in the effects of the shock on fiscal variables, and then in a comparison of the responses of output and inflation with those obtained from a VAR without the fiscal variables (but using otherwise the same identification scheme). The latter are reported in Figure 5.

The fiscal variables appear to react very little to the monetary shock in all countries. Instead, the inclusion of the fiscal variables in the VAR appears to exert an important role in a few cases to evaluate the impact of a monetary shock on macroeconomic variables. Specifically, in a VAR without fiscal variables estimated for Germany, a higher interest rate seems to lead to higher inflation and, with a delay, to higher output, a result that contrasts with the traditional wisdom and was also found with monthly data in Favero and Marcellino (2001). Yet, both reactions become very small and have the proper sign when the fiscal variables are included in the VAR, compare Figures 5 and 1.

In summary, including fiscal variables in monetary VARs can lead to a better assessment of the effects of monetary shocks, at the cost though of having to use lower frequency data, while in general the reaction of fiscal variables to non-systematic monetary policy appears to be limited.

6. The effects of macroeconomic variables

The effects of shocks to the output gap and inflation on the other variables are reported in the 3rd and 4th columns of figures 1-4.

A higher unexpected output gap is associated in all countries with higher inflation, and in turn with higher interest rates, in agreement with a Taylor rule type of explanation of monetary policy. Expenditures decrease in all countries, and then increase. Receipts follow a similar pattern.

As far as an inflation shock is concerned, it leads to an increase in interest rates in all countries, except Spain where the effect is slightly negative and it is also associated with a non significant decrease in the output gap. In Germany the output gap reacts instead positively, while it is virtually unaffected in Italy and France. In all countries the impact effect on the fiscal variables is very limited, with the exception of Germany and Spain where there is a delayed reduction in receipts.

In summary, the response of fiscal and monetary variables to unexpected changes in the output gap and inflation is rather similar across the four countries, though with some differences in the magnitude of the effects.

7. Cross-country spillovers

To evaluate whether non-systematic fiscal policy generates significant spillovers across countries, we estimate 6-variable VARs that include the output gap, expenditures and receipts (all as ratios to GDP) for Germany and the same variables for, in turn, France, Italy, and Spain. Thus, we focus on spillovers from and to Germany.

We use a Choleski decomposition to identify the structural shocks, with the variables in the order above. Thus, the main assumptions we make are that there is no contemporaneous feedback of foreign variables on Germany, and that the output gap is not contemporaneously affected by home fiscal policy, which is substantially in line with the identification in the larger VARs.

Figure 6 reports the relevant responses, namely those of the French, Italian, and Spanish output gap and fiscal variables to shocks in the corresponding German variables. We do not report the responses of German variables to foreign shocks since, for all the three countries, they are small and not statistically significant.

A positive output shock in Germany has a positive and significant effect in all countries, marginally so for Spain. Fiscal variables in turn react, and the general pattern is a slight reduction in expenditures, accompanied by a similar reduction in receipts, a result similar to what we obtained before in the case of a home output shock.

German fiscal shocks, instead, appear to have a limited direct effect on foreign variables, the responses are rather small and not significant, possibly with the exception of an increase in German expenditures on France (French expenditures and receipts react

positively and significantly). This limited effect is also confirmed by the fact that the coefficients that relate German fiscal shocks to home variables in the Choleski decomposition are in general not statistically different from zero.

The results we obtained so far should be interpreted with care because the analysis in the previous sections suggests that there could be an omitted variable bias. To address this issue, and provide more information on the usefulness of non-systematic fiscal policy coordination, we adopt an alternative approach. We simulate the 8-variable VARs in Section 4, substituting each country fiscal shocks with the German ones, in order to mimic the effects of an extreme form of policy coordination.

The results are summarized in Table 3. Substituting home for German fiscal shocks improves the average output gap for Spain only, at the cost of a slightly higher volatility and of a mild increase in inflation and the interest rate. The decrease of the output gap is rather marked in Italy, and is accompanied by higher inflation and interest rates, while the effects in France are minor for all the three variables.

In the last part of Table 3 we also report the correlation between the German and the other countries structural fiscal shocks. The figures are all rather small, the largest value is 0.29 for the German-Spanish expenditure shocks, and even negative values are obtained in a few cases. Similar figures are obtained with the VARs residuals. Hence, the coordination in non-systematic fiscal policy appears to be very low, and the results we obtained in this section on the size of the fiscal spillovers and the low efficacy of following German policy cast further doubts on the usefulness of a closer coordination.

8. Further results

In this section we address three issues. First, are there any differences in the effects of the fiscal shocks on private consumption and investment? Second, are there any types of taxes or expenditures that are more effective stabilization tools? Third, does the level of public debt play a role in determining the consequences of non-systematic fiscal policy?

8.1 Disaggregating y

Figure 7 reports the responses to shocks to taxes and expenditures on consumption and investment for Italy, France and Spain (the variables are not available over the full

sample for Germany). The responses are obtained from VARs similar to those of section 4, substituting the output gap with consumption or investment (as a ratio to GDP).

Tax shocks have the strongest effects in Italy, with a comparable increase of consumption and investment, confirming the previous finding. Expenditure shocks have instead no or negative effects in all countries, with the exception of consumption in Italy, likely related to the wealth effects induced by higher interest rate payments.

Overall these results confirm and are in agreement with what was detected about the effects of fiscal policy using the output gap, and no particular differences in the reaction of consumption and investment to non-systematic fiscal policy emerge.

8.2 Disaggregating t and g

We now disaggregate the receipts into revenues from taxes on business (t_b) and on households (t_h), from indirect taxes (t_ind), and from social contributions (t_soc). Similarly, we consider separately three components of disbursements: government consumption (g_c), investment (g_i), and social benefits (g_soc). Since g_c and g_soc are usually considered as examples of, respectively, discretionary policy and automatic stabilizers, we can evaluate whether there are major differences in the effects of these two types of non-systematic policy.

In figures 8-11 we report, for each country, the responses of the output gap and inflation to shocks to each of these fiscal variables. The responses are obtained from VARs similar to those of section 4, substituting in turn each aggregate fiscal variable with one of its components (as a ratio to GDP).

The main results are the following. Taxes on business or households do not appear to have a significant negative effect on output, except in Germany, or a positive effect on prices. Indirect taxes and social contributions lead instead to a generalized mild increase in inflation, but the output gap decreases in Germany only, and only in the case of social contributions.

The results on expenditures are also rather varied. Government consumption has a small or even negative effect on output in all countries except Italy. Government investment instead has a positive but delayed effect on the gap, except in Germany where the impact is also positive. The results for social benefits are more mixed, but in general

positive, possibly with some delay. The consequences on inflation are usually positive but minor and not statistically significant.

To conclude, it may be worth recalling once more that here we are measuring the effects of the non-systematic components of fiscal policy, so that the level of each of the taxes or expenditures we have considered could generate additional effects on the output gap or inflation. It is also remarkable and relevant for policy making that there are several differences across countries in the effects of fiscal policy. One possible explanation is that we are using different identification schemes (though this is due to rejection of the same transmission mechanism by the data). Yet, the differences are still present in the case of Germany and France, for which exactly the same identification scheme is applied.

8.3 The role of the debt

The presence of a high level of public debt can affect both the conduct of fiscal (and monetary) policy and its effects on the economy, see e.g. Sargent and Wallace (1981), Perotti (1999). Moreover, the criteria in the Maastricht treaty and in the Stability and Growth pact have imposed binding constraints on some countries, such as Italy. Hence, we now evaluate whether the inclusion of the debt to GDP ratio in the VAR affects any of the results we obtained in Section 3.

From figure 12, the effects of receipts and disbursements are virtually the same, and, from figure 13, also the consequences of macroeconomic shocks on fiscal variables are basically unaltered with respect to the case without the debt variable in the VAR.

Overall these findings indicate that, though the debt to GDP ratio can have a relevant role in the determination of the impact of systematic fiscal policy, see e.g. Giavazzi et al. (2000), its contribution in explaining the sources and the effects of non-systematic fiscal policy is minor.

9. Conclusions

This paper provides a set of stylized facts on the effects of non-systematic fiscal policy in the four largest countries of the Euro area, and discusses their policy implications.

A remarkable and policy relevant finding is that there emerge several differences across countries in the effects of fiscal shocks, which cannot be attributed to the econometric methodology (and also cast serious doubts on analyses based on panel data).

This makes non-systematic fiscal policy coordination difficult to be implemented, and the absence of direct spillovers across countries further limits its scope. A thorough examination of the source of these cross-country differences is beyond the scope of this paper, since it requires a careful institutional analysis, but can be an interesting topic for future research.

With reference to the effects of fiscal policy shocks, the overall picture that comes out is that expenditure policies are rather ineffective in reducing the output gap or its volatility, possibly with the exception of government investment, and can require deficit financing. Tax shocks appear to be rather ineffective too in reducing business cycle fluctuations, but could be used to reduce the government deficit when needed. These findings suggest that systematic fiscal policy should be also in charge of fiscal stabilization, and whether and to what extent it can achieve this goal is an interesting topic for future research.

Moreover, non-systematic fiscal policy appears to have an impact on interest rates, either direct or trough the output gap and inflation, and the exclusion of fiscal variables can bias in a few cases the evaluation of the effects of monetary shocks. Instead, in general, the effects of monetary policy on overall disbursements and receipts appear to be minor.

A final caveat is that this analysis covers a period when the fiscal conditions of the countries changed considerably, in particular in the '90s after the signing of the Maastricht treaty and of the Stability and Growth pact. The question then is whether the enhanced fiscal discipline, combined with a single currency, can be expected to change substantially the results we obtained. For example, the requirement of a close to balanced budget can force the governments to improve the efficacy of government expenditure by carefully selecting its composition or changing the decision and implementation process. Or the pressing comments of the European Central Bank on those high debt countries that could create problems for the stability of the Euro could convince them to create stronger links between taxes and expenditures. But the recent experience has shown that it takes time for the governments to accept the stricter rules imposed by the monetary union, so that the results we derived could provide a good guide also for the near future.

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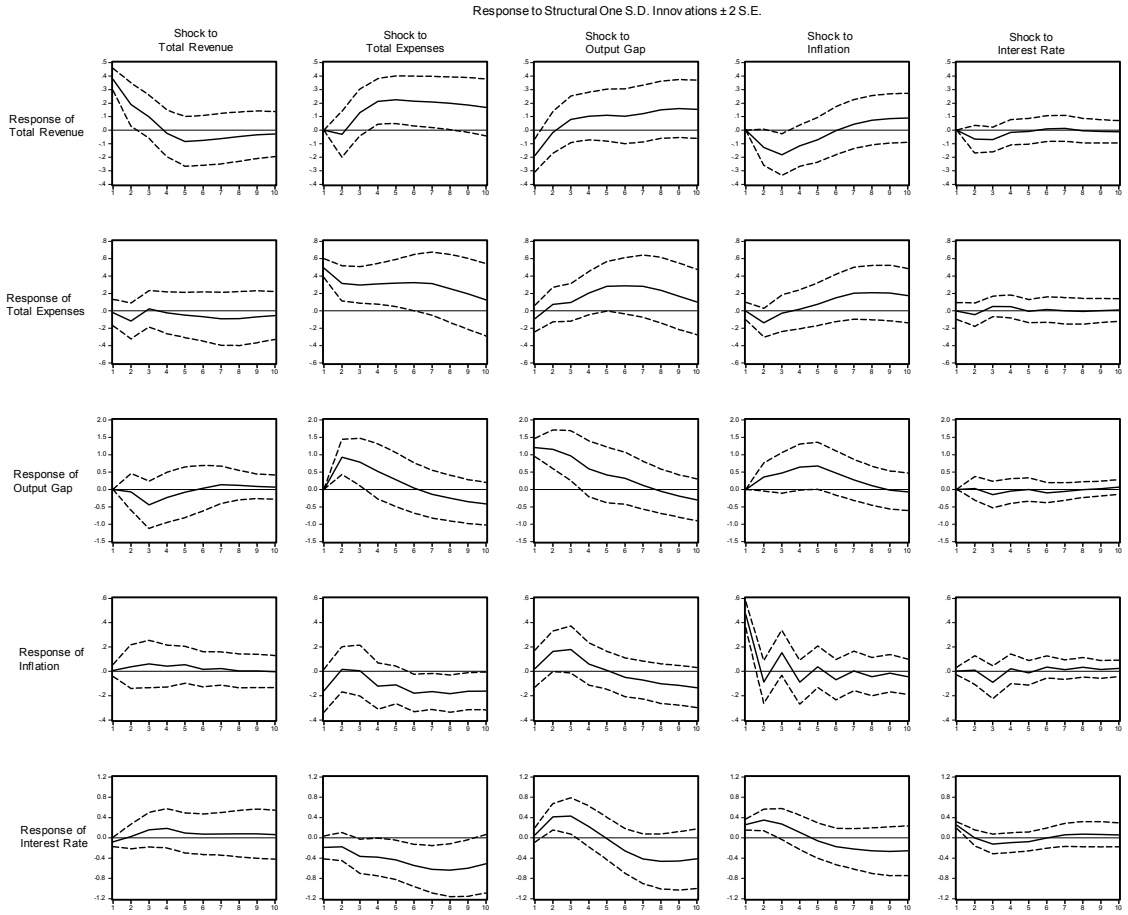
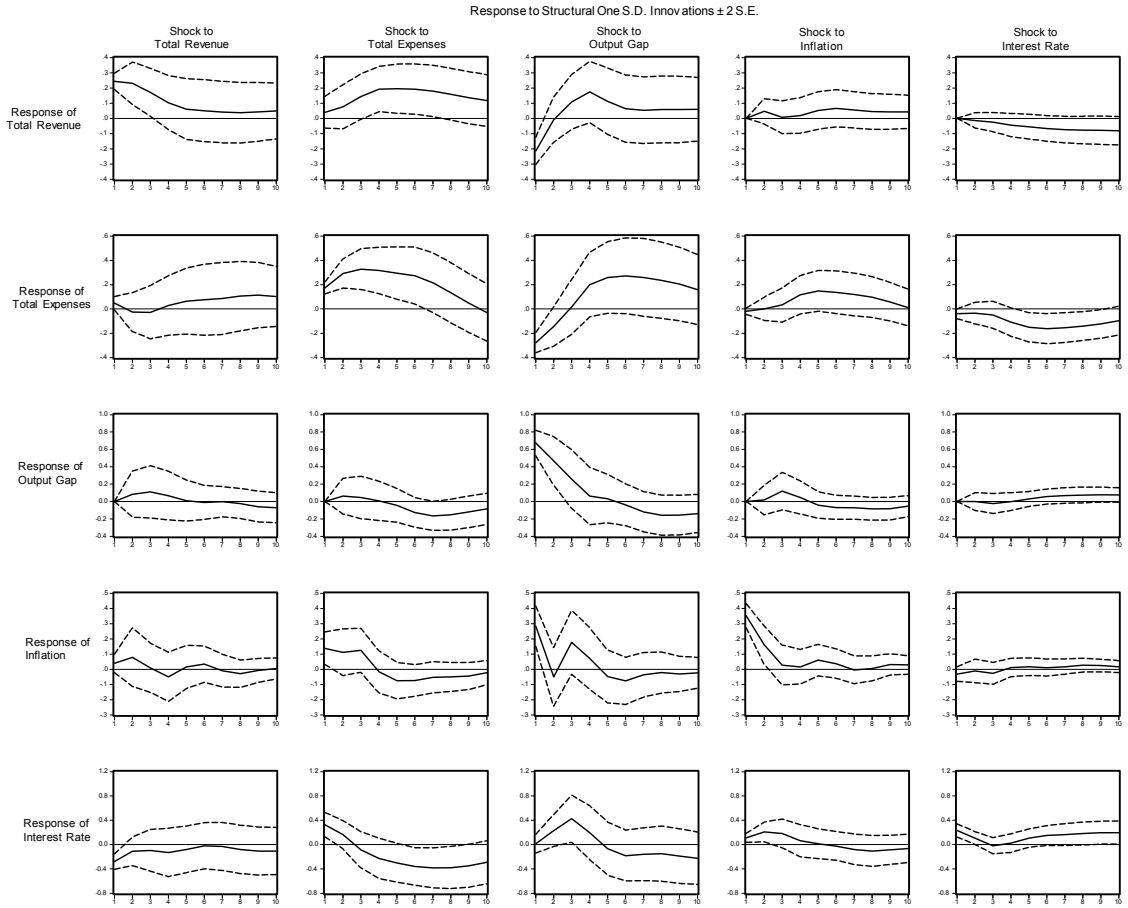
Figure 1: The base case VAR for Germany.



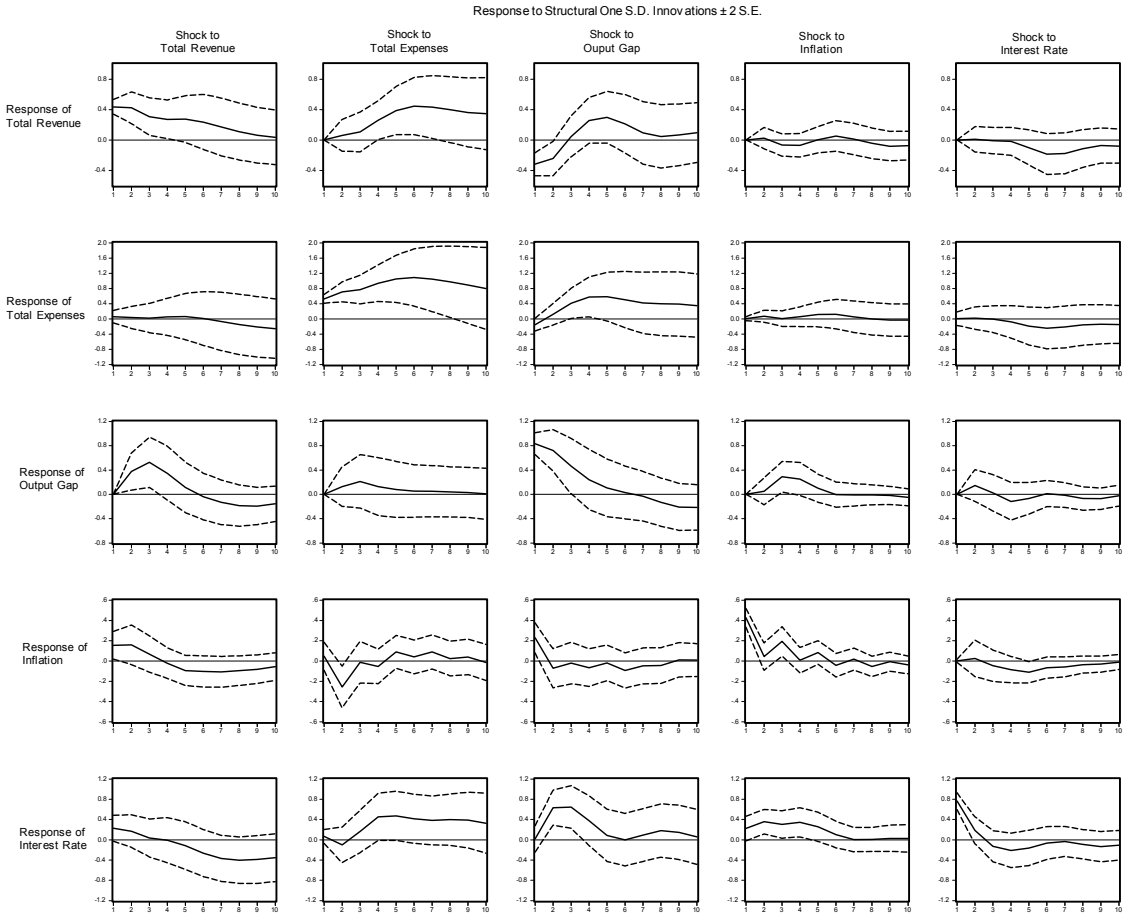
The base case VAR is made up of eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the US dollar, the US short-term interest rate and the country's short term interest rate) and is estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of only five of the eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, interest rate) to each shock.

Figure 2: The base case VAR for France.



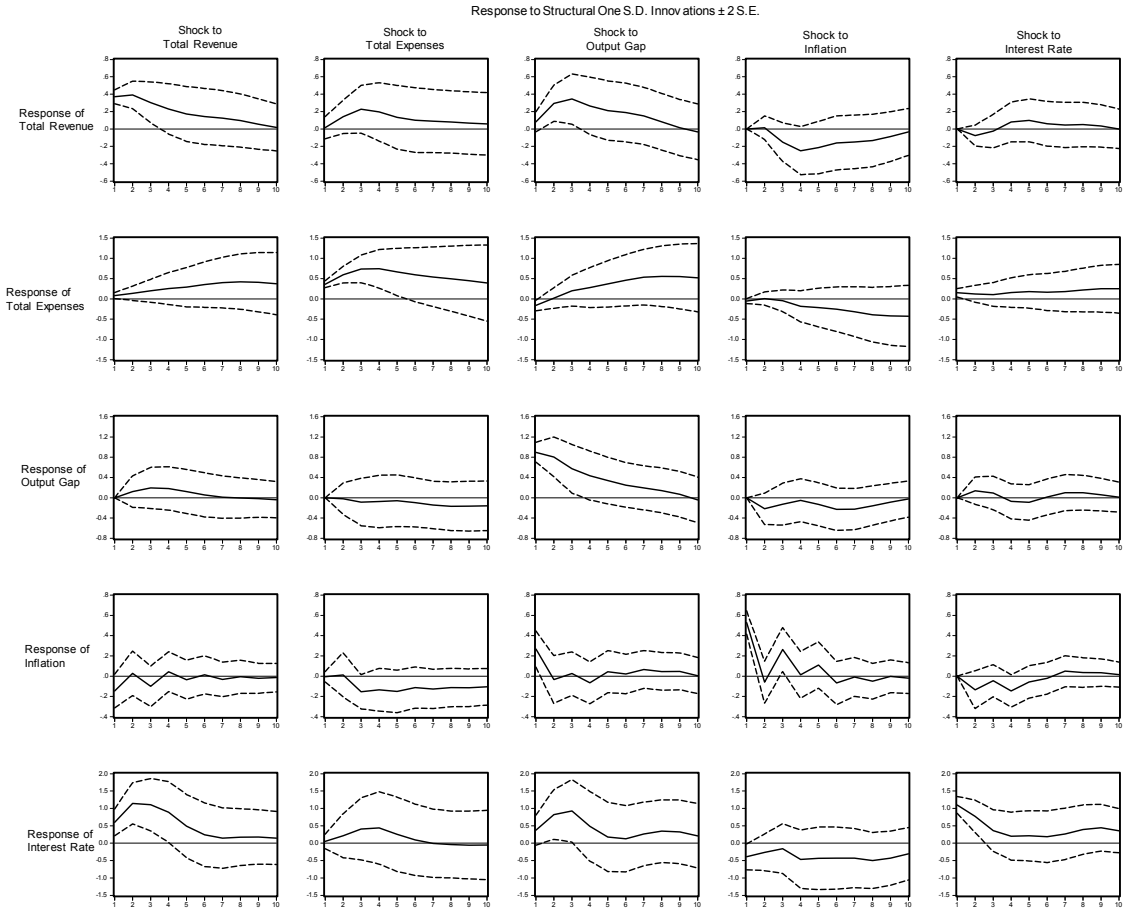
The base case VAR is made up of eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and is estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of only five of the eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, interest rate) to each shock.

Figure 3: The base case VAR for Italy.



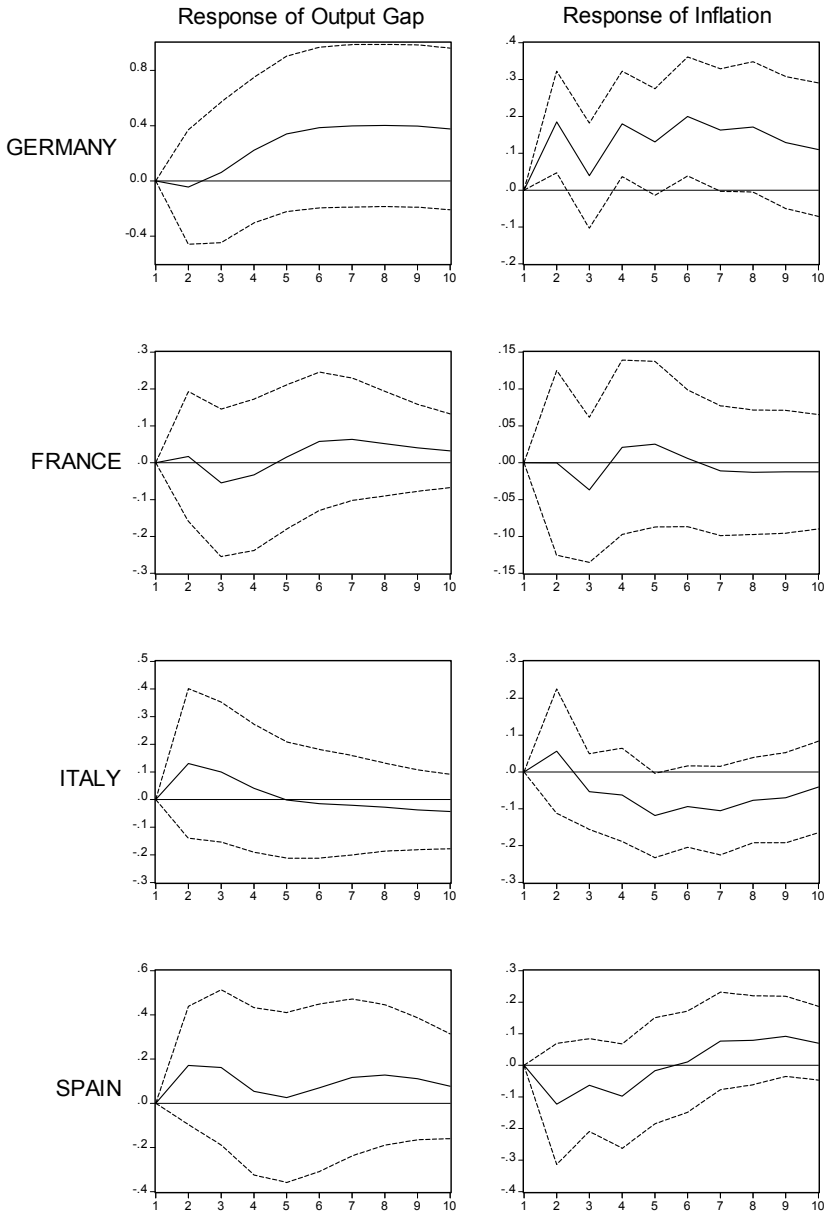
The base case VAR is made up of eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with Mark, the German short-term interest rate and the country's short term interest rate) and is estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of only five of the eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, interest rate) to each shock.

Figure 4: The base case VAR for Spain.



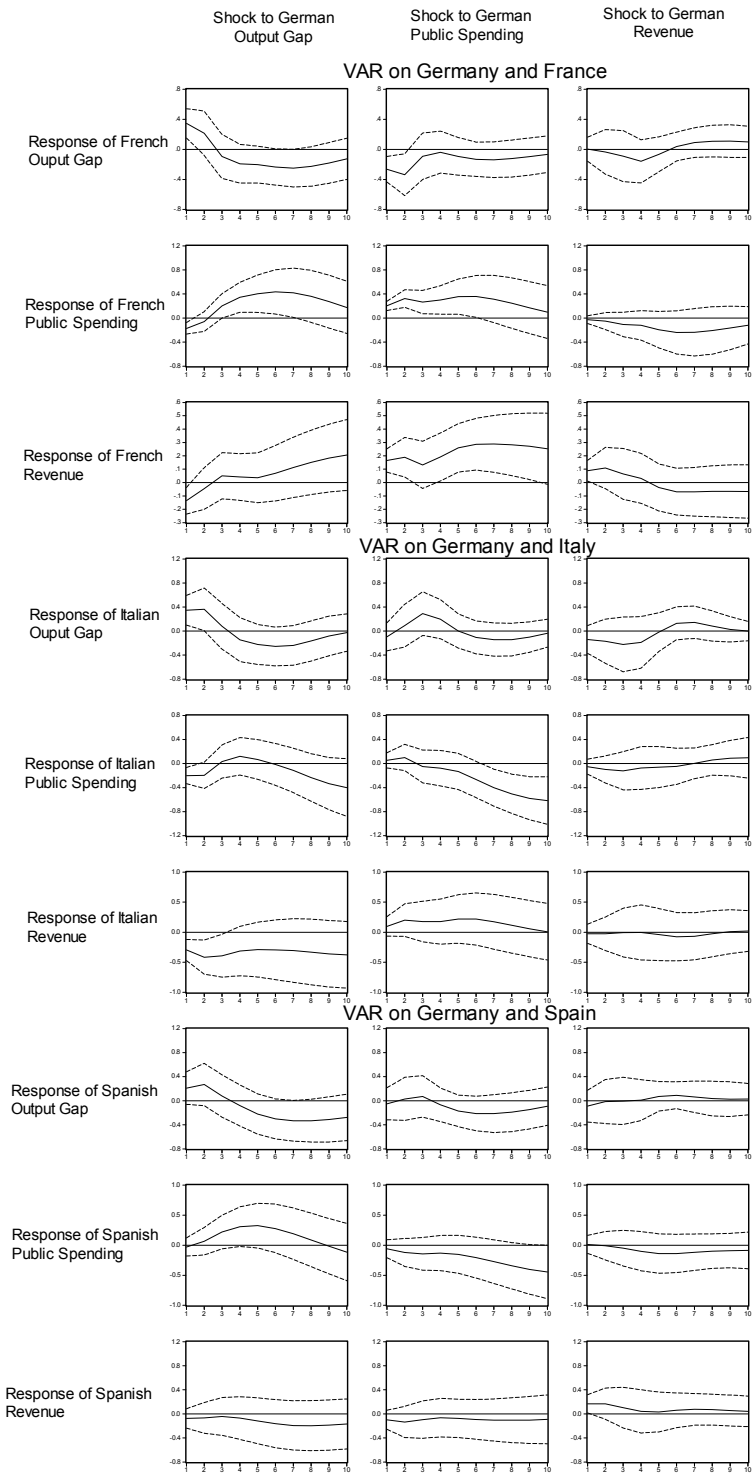
The base case VAR is made up of eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with Mark, the German short-term interest rate and the country's short term interest rate) and is estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of only five of the eight variables (total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, interest rate) to each shock.

Figure 5: Effects of an interest rate shock in the monetary VAR.



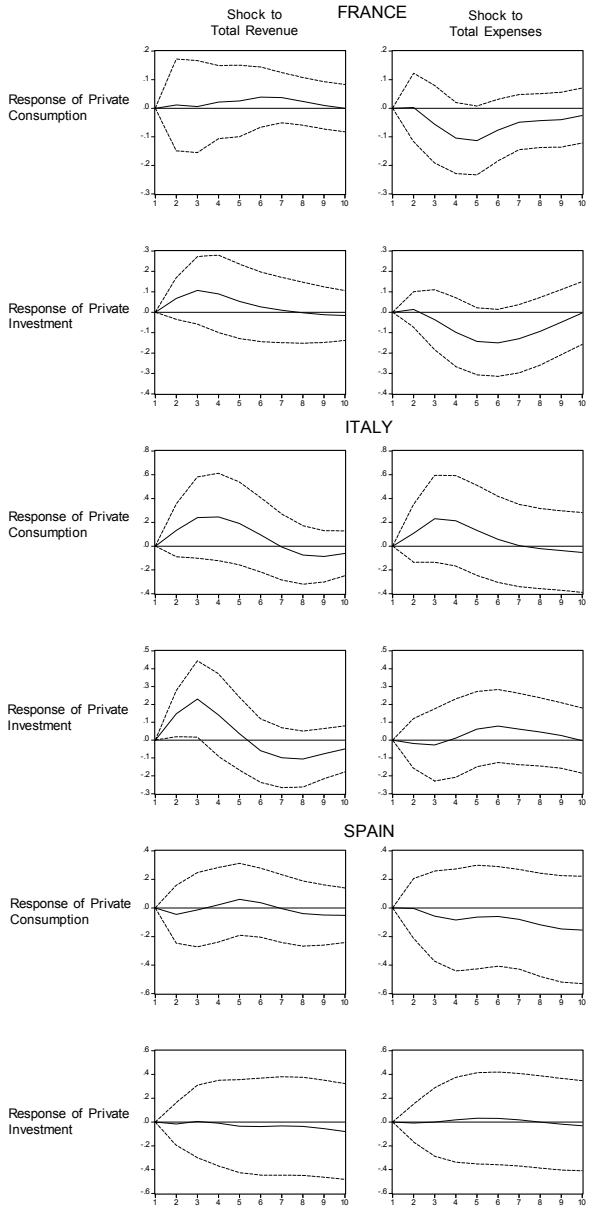
The figure contains the responses together with the 95% confidence bands of output gap/GDP and commodity price inflation to a shock to the interest rate in the monetary VAR.
The monetary VAR is made up of six variables, the ones in the base case except for the fiscal variables.

Figure 6: Spillover effects.



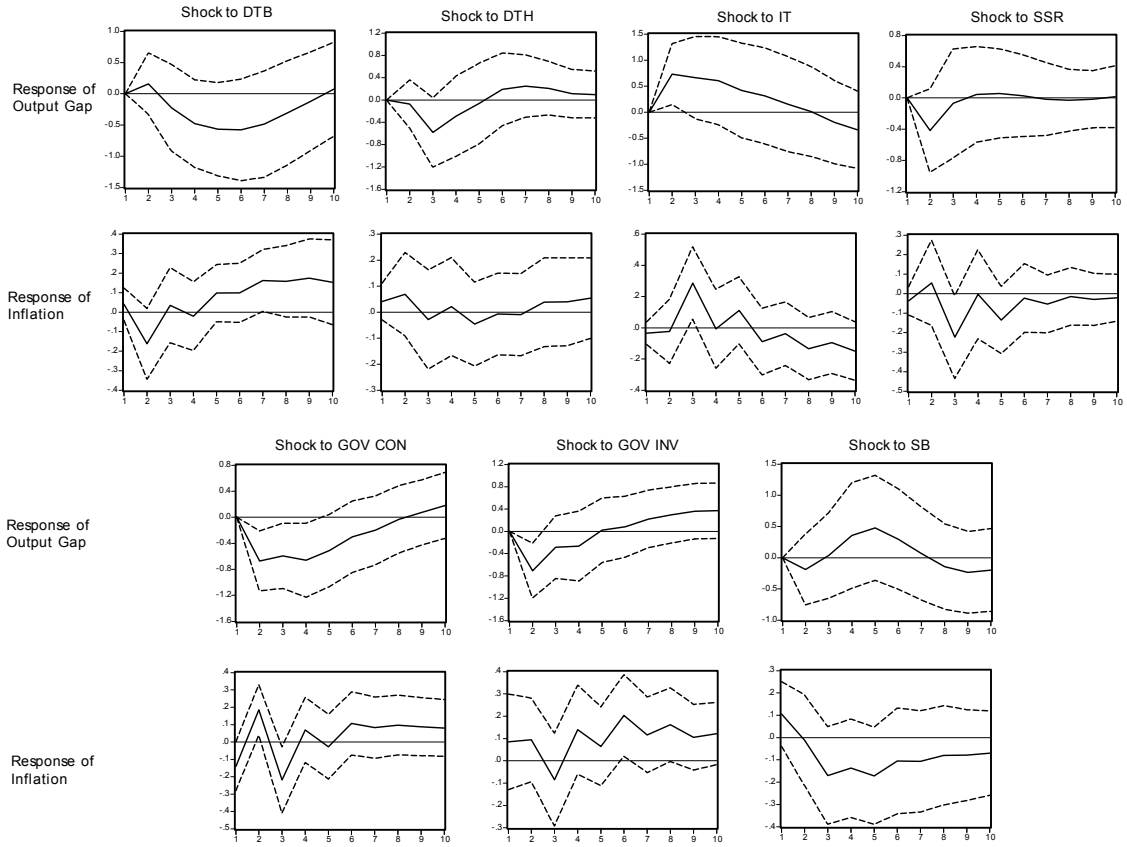
VARs on Germany and France, Germany and Italy and Germany and Spain with ouput gap, public spending and revenue for each country.

Figure 7: Response of private consumption and private investment to a shock to fiscal variables.



The VARs are made up of eight variables (total revenue/GDP, expenditure/GDP, private consumption/GDP or private investment/GDP, commodity price inflation, commodity price index, the exchange rate with Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of private consumption/GDP and private investment/GDP to shocks to total revenue/GDP and total expenses/GDP.

Figure 8: VARs with disaggregated taxes and expenses for Germany.



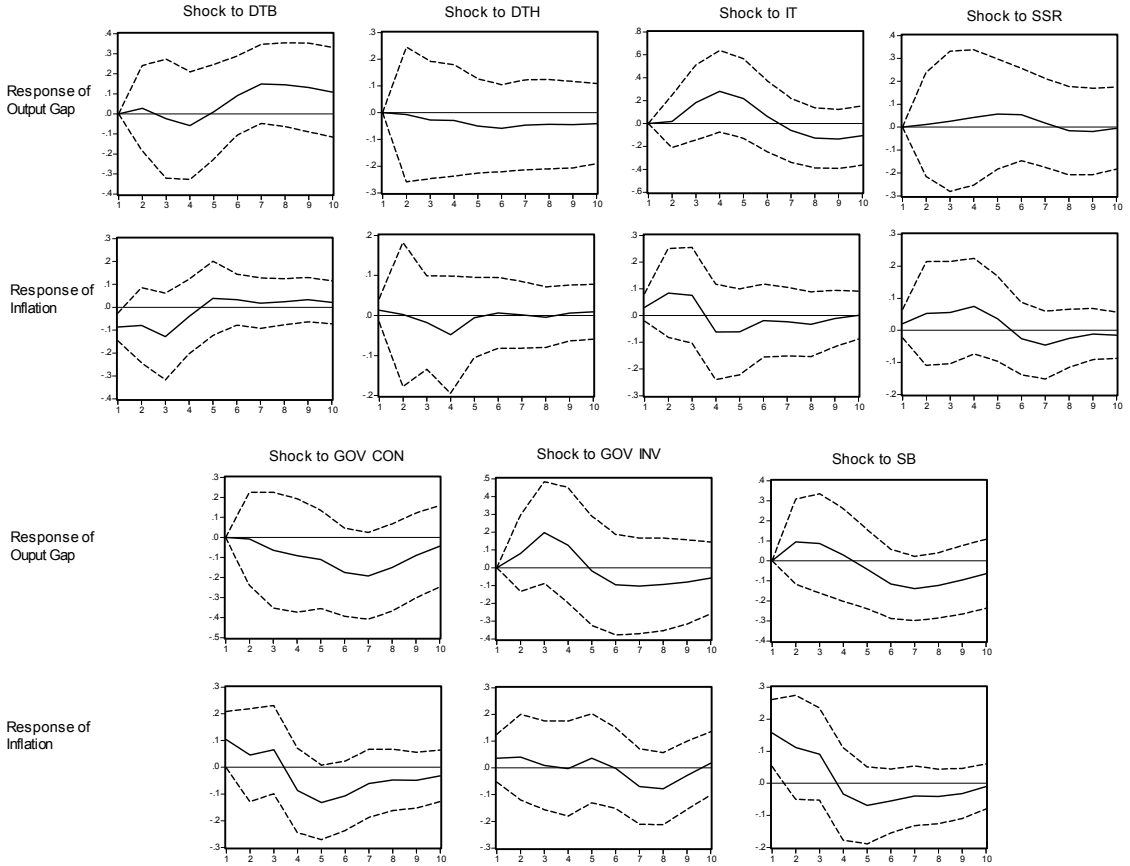
DTB = direct taxes from businesses, DTH = direct taxes from households, IT = indirect taxes, SSR = social security contributions received, GOV CON = government consumption, GOV INV = government investment, SB = social benefit payments.

The VARs with disaggregated taxes are made up of eight variables (one of total revenue/GDP's components, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with US dollar, the US short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The VARs with disaggregated expenses are made up of eight variables (total revenue/GDP, one of total expenditure/GDP's components, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with US dollar, the US short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The figure contains the responses and the 95% confidence bands of output gap/GDP and commodity price inflation to a shock each component of total revenue and total expenses.

Figure 9: VARs with disaggregated taxes and expenses for France.



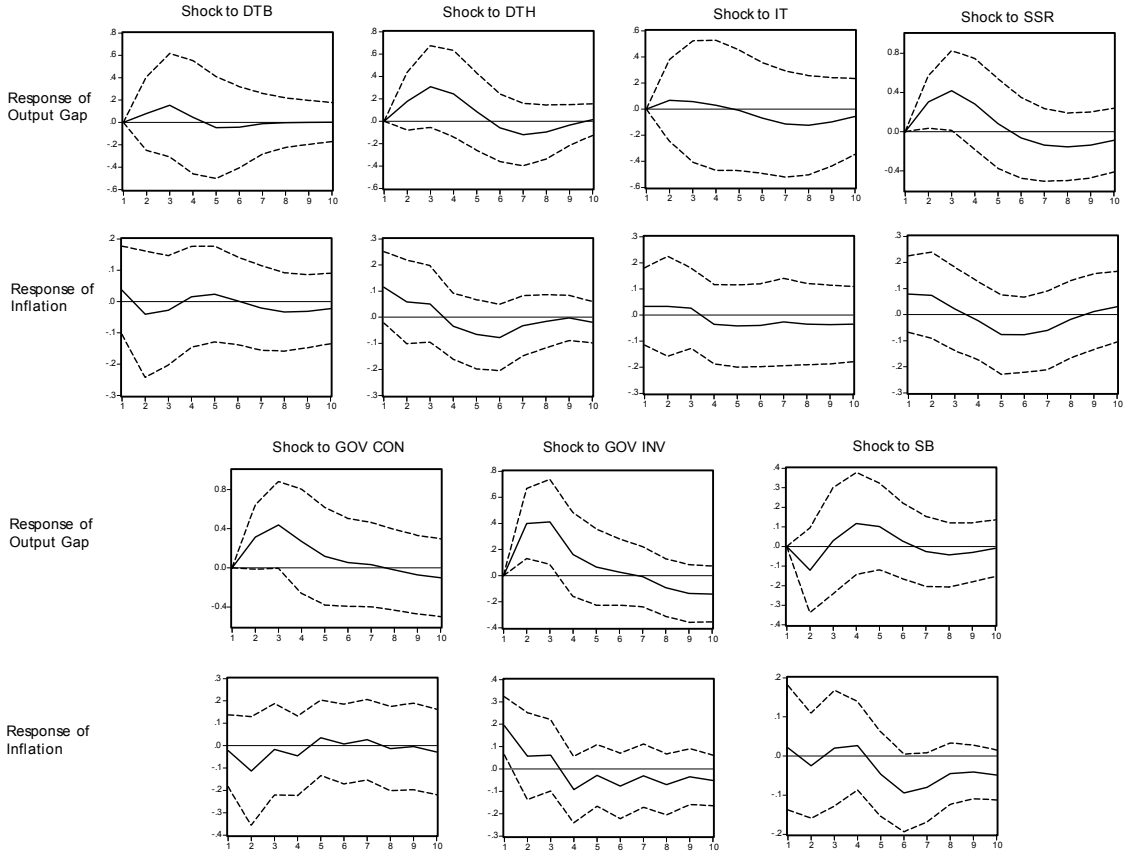
DTB = direct taxes from businesses, DTH = direct taxes from households, IT = indirect taxes, SSR = social security contributions received, GOV CON = government consumption, GOV INV = government investment, SB = social benefit payments.

The VARs with disaggregated taxes are made up of eight variables (one of total revenue/GDP's components, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The VARs with disaggregated expenses are made up of eight variables (total revenue/GDP, one of total expenditure/GDP's components, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The figure contains the responses and the 95% confidence bands of output gap/GDP and commodity price inflation to a shock each component of total revenue and total expenses.

Figure 10: VARs with disaggregated taxes and expenses for Italy.



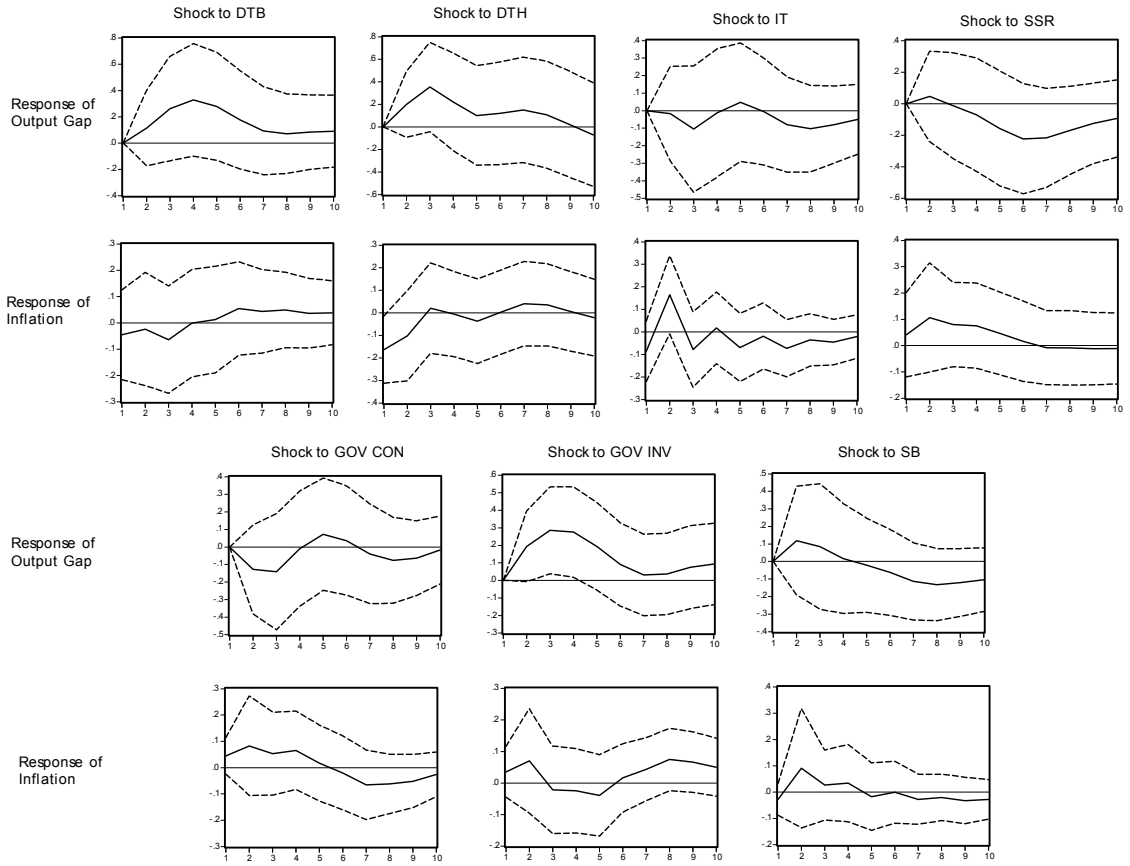
DTB = direct taxes from businesses, DTH = direct taxes from households, IT = indirect taxes, SSR = social security contributions received, GOV CON = government consumption, GOV INV = government investment, SB = social benefit payments.

The VARs with disaggregated taxes are made up of eight variables (one of total revenue/GDP's components, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The VARs with disaggregated expenses are made up of eight variables (total revenue/GDP, one of total expenditure/GDP's components, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The figure contains the responses and the 95% confidence bands of output gap/GDP and commodity price inflation to a shock each component of total revenue and total expenses.

Figure 11: VARs with disaggregated taxes and expenses for Spain.



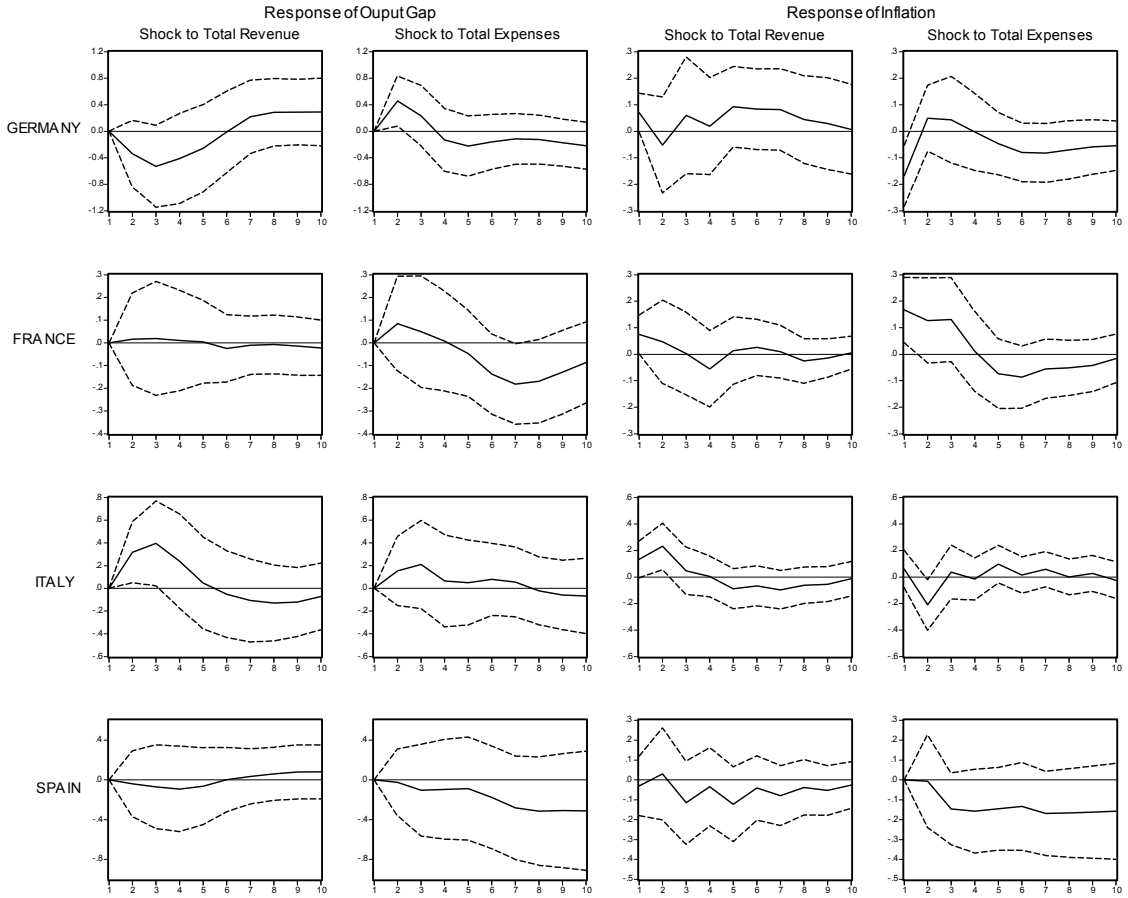
DTB = direct taxes from businesses, DTH = direct taxes from households, IT = indirect taxes, SSR = social security contributions received, GOV CON = government consumption, GOV INV = government investment, SB = social benefit payments.

The VARs with disaggregated taxes are made up of eight variables (one of total revenue/GDP's components, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

The VARs with disaggregated expenses are made up of eight variables (total revenue/GDP, one of total expenditure/GDP's components, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with the Mark, the German short-term interest rate and the country's short term interest rate) and are estimated on 1981:01-2001:02.

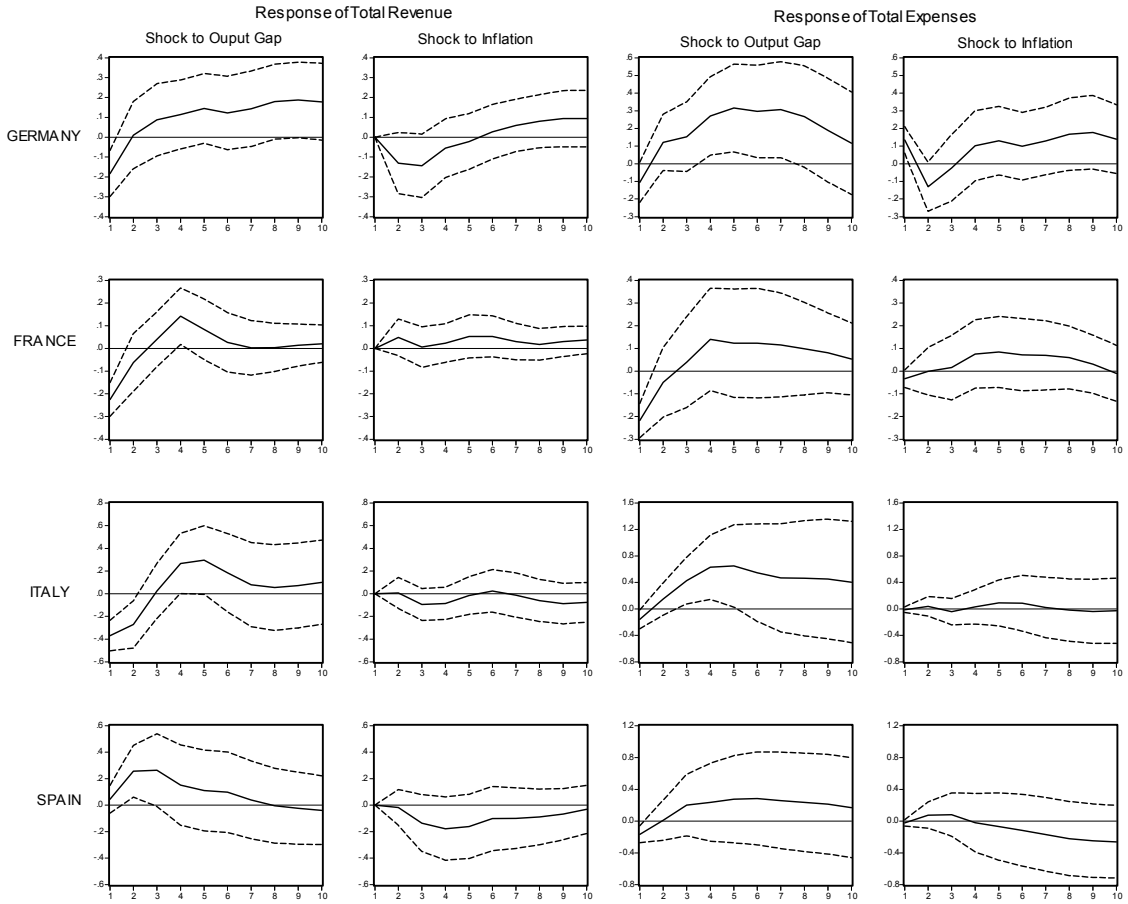
The figure contains the responses and the 95% confidence bands of output gap/GDP and commodity price inflation to a shock each component of total revenue and total expenses.

Figure 12: VARs with debt/GDP: response of output gap/GDP and inflation to a shock to fiscal variables.



The VAR with debt is made up of nine variables: debt/GDP, total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with Mark (for all countries except for the German VAR, for which the exchange rate with the US dollar is used) , the German short-term interest rate (except for the German VAR, for which the US short term interest rate is used) and the country's short term interest rate and is estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of output gap/GDP and inflation to a shock to total revenue and to total expenses.

Figure 13: VARs with debt/GDP: response of fiscal variables to a shock to the output gap/GDP and inflation.



The VAR with debt is made up of nine variables: debt/GDP, total revenue/GDP, expenditure/GDP, output gap/GDP, commodity price inflation, commodity price index, the exchange rate with Mark (for all countries except for the German VAR, for which the exchange rate with the US dollar is used) , the German short-term interest rate (except for the German VAR, for which the US short term interest rate is used) and the country's short term interest rate and is estimated on 1981:01-2001:02.
The figure contains the responses and the 95% confidence bands of total revenue and total expenses to a shock to output gap/GDP and inflation.

Table 1: Structural VAR estimates

Germany:

A

1	0	0,15 (0,05)	0	0	0	0	0
0	1	0,07 (0,06)	0	0	0	0	0,01 (0,19)
0	0	1	0	0	0	0	0
0	0,33 (0,17)	0,05 (0,06)	1	0	0	0	0
0	2,31 (2,19)	-0,29 (0,73)	0	1	0	0	0
0	0	0	-0,04 (0,02)	0	1	0	0
0	0	0	0	0	0,21 (2,75)	1	0
0,24 (0,09)	0,33 (0,09)	0	-0,51 (0,09)	0,05 (0,01)	-1,16 (0,61)	-0,33 (0,03)	1

B

0,38 (0,04)	0	0	0	0	0	0	0
0,02 (0,08)	0,49 (0,06)	0	0	0	0	0	0
0	0	1,20 (0,13)	0	0	0	0	0
0	0	0	0,46 (0,05)	0	0	0	0
0	0	0	0	5,58 (0,61)	0	0	0
0	0	0	0	0	0,06 (0,01)	0	0
0	0	0	0	0	0	1,17 (0,13)	0
0	0	0	0	0	0	0	0,25 (0,03)

France:

A

1	0	0,32 (0,06)	0	0	0	0	0
0	1	0,41 (0,05)	0	0	0	0	0,17 (0,12)
0	0	1	0	0	0	0	0
0	-0,80 (0,33)	-0,75 (0,16)	1	0	0	0	0
0	-11,61 (3,74)	-6,21 (1,84)	0	1	0	0	0
0	0	0	0,01 (0,01)	0	1	0	0
0	0	0	0	0	15,27 (7,95)	1	0
1,58 (0,24)	-1,68 (0,27)	0	-0,36 (0,13)	-0,02 (0,01)	-2,74 (5,41)	-0,71 (0,10)	1

B

0,24 (0,03)	0	0	0	0	0	0	0
0,04 (0,05)	0,23 (0,05)	0	0	0	0	0	0
0	0	0,67 (0,07)	0	0	0	0	0
0	0	0	0,37 (0,04)	0	0	0	0
0	0	0	0	4,40 (0,48)	0	0	0
0	0	0	0	0	0,01 (0,01)	0	0
0	0	0	0	0	0	0,52 (0,06)	0
0	0	0	0	0	0	0	0,32 (0,04)

Italy:

A

1	0	0,381 (0,080)	0	0	0	0	0
0	1	0,183 (0,097)	0	0	0	0	-0.004 (0.116)
0	0	1	0	0	0	0	0
-0,344 (0,151)	-0,087 (0,131)	-0,420 (0,099)	1	0	0	0	0
0	0	0	0	1	0	0	0
-0,032 (0,008)	0	-0,005 (0,006)	0,001 (0,008)	0	1	0	0
0	-0,656 (0,132)	-0,258 (0,086)	0	0,088 (0,013)	0	1	0
-0,097 (0,334)	0	0,056 (0,212)	-0,529 (0,275)	0	-6,886 (5,229)	-0.122 (0,180)	1

B

0,436 (0,047)	0	0	0	0	0	0	0
0,055 (0,085)	0,522 (0,057)	0	0	0	0	0	0
0	0	0,832 (0,090)	0	0	0	0	0
0	0	0	0,425 (0,046)	0	0	0	0
0	0	0	0	5,217 (0,569)	0	0	0
0	0	0	0	0	0,022 (0,002)	0	0
0	0	0	0	0	0	0,448 (0,048)	0
0	0	0	0	0	0	0	0,761 (0,083)

Spain:

A

1	0	-0,09 (0,06)	0	0	0	0	0
0	1	0,24 (0,06)	0	0	0	0	-0,13 (0,04)
0	0	1	0	0	0	0	0
0,39 (0,22))	0	-0,33 (0,09)	1	0	0	0	0
-3,88 (1,87)	2,76 (1,63)	0	0	1	0	0	0
0	0	0,01 (0,00)	0,01 (0,01))	0	1	0	0
0	0	-0,18 (0,07)	-0,24 (0,11)	0,03 (0,01)	15,83 (2,05)	1	0
-1,40 (0,47)	0	-0,31 (0,23)	0,99 (0,33)	0	-7,42 (9,01)	-0,93 (0,42)	1

B

0,37 (0,04)	0	0	0	0	0	0	0
0,01 (0,06)	0,36 (0,04)	0	0	0	0	0	0
0	0	0,90 (0,10)	0	0	0	0	0
0	0	0	0,53 (0,06)	0	0	0	0
0	0	0	0	4,55 (0,50)	0	0	0
0	0	0	0	0	0,03 (0,01)	0	0
0	0	0	0	0	0	0,37 (0,04)	0
0	0	0	0	0	0	0	1,08 (0,12)

Estimated A and B matrices in Au=Be, as in equation (1) in the text, with standard errors in parentheses.

Table 2: Mean and standard deviation of actual and simulated series.

		Germany		France		Italy		Spain	
		mean	*sd*	*mean*	*sd*	*mean*	*sd*	*mean*	*sd*
Output Gap	*(actual)*	-0.2407	2.8167	0.1098	1.1888	0.1022	1.3027	-0.2949	1.5629
	(base)	-0.2135	2.5650	0.1742	1.5489	0.0287	1.3565	-0.2733	1.7978
	(gov con)	-0.2299	2.4098	-0.1272	1.9217	0.0411	1.3409	-0.2171	1.9732
	(soc ben)	-0.2557	2.8326	0.1249	1.3692	0.0705	1.2358	-0.1169	1.4954
Inflation	*(actual)*	1.2347	0.9635	1.8446	1.6798	3.0470	2.1083	3.0478	1.7899
	(base)	1.2339	0.9263	1.9351	1.7003	3.1218	2.0122	3.0112	1.6363
	(gov con)	1.2370	0.8992	1.6347	1.7913	3.0903	2.0497	2.8066	1.9869
	(soc ben)	1.1148	0.9989	1.8945	1.6858	3.0673	2.0938	3.3296	1.6391
Interest r.	*(actual)*	5.9257	2.4962	8.1512	3.6383	11.3304	4.9669	11.1043	4.8841
	(base)	5.9361	2.2330	8.9889	3.1972	11.1974	4.8695	11.0456	5.3162
	(gov con)	5.9571	2.2944	5.8596	5.8816	11.3385	4.7993	11.3204	5.6622
	(soc ben)	5.5048	2.6038	8.8894	4.0230	11.3690	4.8356	11.2975	4.0296

(actual) = actual series; (base) = series simulated by setting to zero the fiscal shocks in the base case scenario; (gov con) = series simulated by setting to zero the government consumption/GDP shock and the shock to total revenue/GDP in VAR with government consumption/GDP instead of total expenditures/GDP; (soc. ben) = series simulated by setting to zero the shock to social benefits/GDP and the shock to total revenue/GDP in VAR with social benefits/GDP instead of total expenditures/GDP.

Table 3: Mean and standard deviation of actual and simulated series (German fiscal shock).

		France		Italy		Spain	
		mean	*sd*	*mean*	*sd*	*mean*	*sd*
Output Gap	*(actual)*	0.1098	1.1888	0.1022	1.3027	-0.2949	1.5629
	(simulated)	0.0858	1.5831	0.0528	1.2018	-0.1464	1.6371
Inflation	*(actual)*	1.8446	1.6798	3.0470	2.1083	3.0478	1.7899
	(simulated)	1.8252	1.7880	3.1690	1.9932	3.2134	1.6902
Interest r.	*(actual)*	8.1512	3.6383	11.3304	4.9669	11.1043	4.8841
	(simulated)	8.1587	4.4920	11.3590	4.7164	11.2967	4.3993
	(corr_s G)	0.1486		0.0339		0.2918	
	(corr_s T)	-0.1166		-0.2582		-0.1517	

(actual) = actual series; (simulated) = series simulated using Germany fiscal shocks instead of country specific shocks; (corr_s G) and (corr_s T) = correlation among each country structural fiscal shocks (G total government expenditure, T total government revenues) and Germany structural fiscal shocks;