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Problems of fiscal consolidation and policy coordination

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ABSTRACT

This paper deals with problems of fiscal consolidation and policy coordination within the European Monetary Union. In the first place, it investigates the potential problems which are caused by cross-country differences in key fiscal parameters and the asymmetric nature of these parameters. In the light of these findings, the pros and cons of policy coordination is evaluated using some alternative multi-country estimates as a point of reference. The empirical results clearly show that policy coordination within the EMU context is difficult because of these large country differences and asymmetries in the transmission mechanisms of fiscal policy. Even so, it is shown that policy coordination clearly pays off.

JEL Classification: H62, E61, E63

Keywords: Fiscal policy, policy coordination, government deficit, EMU

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1 Introduction

Fiscal policy faces a number of challenges in the EU. In the first place there are longer run pressures from ageing and from the competition by countries such as China, with low wage rates and managed exchange rates. Second, the nature of the economic cycle tends to mean that downturns are more effective in shaking out labor than upturns of the same size are in (re)employing it. Finally, recent financial crisis has shown the vulnerability of the fiscal position of several EU/EMU countries due to problems of banking crises, loss of competitiveness in the foreign trade and overall ability of controlling public expenditures and revenues. Even such issues as the "grey" economy have shown to be of much practice importance.

In this environment, we require up-to-date estimates of the effectiveness of fiscal policy in different countries and especially we require data on possible asymmetries in relevant policy parameters. As for the size of the multipliers, we have quite a lot of estimates which at least roughly point to the same direction, cf. e.g. Blanchard and Perotti (2002), Romer and Romer (2010) Coenen et al (2010), Freeman et al (2009), Barro and Redlick (2011) and finally Giavazzi and Pagano (1990) and Guajardo (2011). Of these, Romer and Romer (2010), on the one hand, and Giavazzi and Pagano represent the extreme values while the others come close to one in the short run and converge to zero in the long run. It is more difficult to say whether the multiplier are time-invariant (or more generally, invariant in terms of other characteristics of the country, say in terms of the exchange rate arrangement, openness of the country, composition of changes in taxes and spending and so on). As for the time invariance, the basic question is, are the fiscal multipliers the same in booms and depressions. Already now, we quite a lot of evidence that says that the multipliers are not constant, cf. e.g. Auerbach and Gorodnichenko (2012) that find striking differences between boom and bust values. Ilzetzki et al (2011) and Corsetti (2012) provide new evidence on other violations of invariance especially in terms of exchange rate arrangements, level of debt and financial crises. It is also evident that composition of taxes and spending makes a lot difference (Alesina and Perotti (1997) as well the way in which the fiscal actions are carried out (gradual or once-for-all changes in relevant policy parameters; cf. e.g. Broadbent and Daly (2010)). Finally, political economy considerations should not be ignored (cf. e.g. Alessina et al (1998)).

Another issue which still largely unexplored concerns policy coordination: how much difference does it make if certain type of policies is pursued in several countries instead of a single country? Of course we know something about the consequences of policy coordination (see e.g. Branson et al (1990), Ganzoneri and Minford (1988), Kehoe (1987/1988) Oudiz and Sachs (1984), Rogoff (1985) and Viren (2001) for some key references) but we know relative little of the empirical facts. This is mainly due to the fact it is so easy to derive proper estimates of magnitude of coordination effects. Basically we need a multi-country model for that purpose. Unfortunately,

relatively few models are available for such purpose. In this study we try contribute to the solution of this problem by using (in addition to a multi-country structural model) a set of reduced form models that also include cross-country dependencies.
Thus far, the EU does not attempted fiscal coordination in a strict sense of the word – there has been no directives to the member states telling them how fiscal policy is to be set as part of some annual 'plan' - but there is what the European Commission (2002) describes as 'weak co-ordination' through the Broad Economic Policy Guidelines (BEPG). Second there is a set of rules on how budgetary balances may be set, laid out in the SGP (described by the European Commission (2002) as 'strong co-ordination'). While the BEPG has not had any legal force and rely on peer pressure for their achievement, the SGP has in principle had some coercive powers, although despite breaches no penalties have as yet been imposed. The new 2011 treaty (European Union (2011)) on stability, coordination and governance would mean a clear change in the level of coordination and potentially full convergence of fiscal policies.

In analyzing the size of multipliers, their differences across countries and their possible asymmetries we use several alternative tools. In the first place we use relatively simple three-variable VAR models. Then we use NiGEM multi-country model both to the estimate the multipliers and to scrutinize the effects of policy coordination. As an alternative to that we use the recent IMF model (IMF (2010) that is also used in Goldman Sachs (2011) using the data from Devries et al (2011). To examine the asymmetry issue, we also estimate a set simple nonlinear (threshold) models for main fiscal variable from the data set of EU countries (using the same approach as in Mayes and Viren (2011)).

The structure of paper is quite straightforward. In section 2, we first scrutinize the VAR estimations results mainly to quantify the cross-country differences and possible cyclical asymmetries (2.1), then we make use of the NiGEM model to examine the dependence of multipliers on country size and coordination (2.2), then we use the IMF model to compare different consolidation strategies and also to scrutinize the asymmetry and coordination effects (2.3) and finally, use the simple structural equations for different fiscal variables to test for the asymmetry (invariance) property. Some concluding remarks follow in last section 3.

2 Analyses of asymmetry and coordination effects

2.1 VAR results

To get started, we specify and estimate a simple VAR model. To idea is not so much to get new estimates but to get an idea of the nature and magnitude of cross-country differences in focal policy transmission mechanisms. For that purpose, we

estimated a three-variable VAR with output growth, the real interest rate and the deficit/GDP ratio (for motivation of the model, see e.g. Viren (2000)). Impulse responses were computed by the Cholesky decomposition (using the above-mentioned variable ordering). The average IRF values for 10 periods are presented in Figure 1 below (our estimates are based on annual data from EU15 countries for 1971-2011 the period. We estimate the models for each single country and for the pooled cross-country data (restricting the coefficients to be equal). To give some idea of the respective impulse response functions in the case of panel data we report here (Figure 2) only the key values for output growth, deficits and real interest rates.
By and large, the estimated IRF's make sense indicating that fiscal contraction does indeed reduce output substantially even though the multiplier appears to be below one. On the other hand, (a one percentage point shock to) GDP growth increases the surplus - GDP ratio by more than half per cent in the short run.
It is interesting to compare the IRF's over countries especially because they appear to be enormously different for certain variables. This is especially true for the effect of government surplus/deficit on GDP growth. The average value of correlation coefficients is practically zero (more precisely, 0.011). A bit higher values are obtained with the correlations in terms of output growth vs. real interest rate (0.145) and government deficit (ratio) vs. real interest rate (0.269) but only with the impulse responses of government deficit in terms of output growth there appears to be a reasonable amount of similarity (average value of IRF correlations is 0.779). Needless to say, but the results indicate that the transmission mechanisms of fiscal policy are indeed enormously different reflecting deeper differences in fiscal institution, fiscal rules and the structure of economy which also becomes evident by scrutinizing the respective times series and their moments.

As for size of the fiscal multipliers they appear to be relatively small and time-variant. In this respect they come quite close to those in Corsetti et al (2012) who even summarize their evidence in saying that "ouput multipliers are virtually zero in out basline" (p. 533). Thus if we estimate the value form the panel data representation for positive output growth $\Delta y > 0$ subsample of the data the maximum value of the cumulative response (multiplier) is only 0.11. But if the scrutinize the negative values for output growth, $\Delta y < 0$, the corresponding maximum value of the multiplier goes up to 1.18 which obviously comes close to the "standard" value. Anyway, the important result is the clear rejection of the parameter invariance property.

2.2 NiGEM model simulations

To assess the importance of policy coordination for policy effectiveness we used the NiGEM multi-country model to compare the effects of different fiscal policy actions in the single country setting and in the case of collective policy action (see the

National Institute (1999)).[1] In the simulations public consumption was first increased in all EU countries in an un-coordinated way (i.e. country-by-country) and then in the second stage increased by exactly same amount in all countries.

In all cases the coordinated fiscal expansion produces almost twice as much an increase in output as an uncoordinated fiscal expansion (see Figures 3 and 4). As expected, we arrive at the result that with uncoordinated policies small countries are able to achieve relatively little (mainly because of import leakage).

The multiplier values reveal that in an uncoordinated case fiscal policy effects for the small countries are mainly around 0.5. For large countries, the values exceed unity but not by very much. The average value for all countries is 0.72 (with four lags) and 0.63 (with eight lags), 0.85 being the average maximum value. In the case of coordinated policies, there is not much difference between small and large countries. Thus, the average value is 1.25 (with four lags) and 1.17 (with eight lags), 1.46 being again the average maximum value. This represents an improvement for all countries but a major one for the smaller countries. The multiplier values (in the coordination case) are, in fact, quite close to the old values obtained by Cohen and Follette (1999) with the US FRB/US macroeconomic model.[2] By and large they agree with the more recent DSGE model prediction (see Coenen et al (2010) and Freeman et al (2009)) The Coenen et al (2010) paper compares the results with different models while the Freeman et al (2009) paper rather compares results for countries using the IMF multi-country model.

The values are a bit higher than the original SVAR values obtained by Blanchard and Perotti (1999), which are about one. More recent analyses by Ilzetzki et al (2009) with data from 45 countries provide values which clearly encompass our predictions (their multiplier values are very different for closed and open economies as well as fixed and flexible exchange rates countries). The multiplier values in the uncoordinated case are, of course very low (suggesting that the marginal propensity to spend out of income is very low and the income elasticity of imports is very high) but also in the case of coordinated fiscal policies the multipliers are not terribly high although they obviously still facilitate fiscal policies. Note also that the in the case of uncoordinated policies, the output effect diminishes more rapidly than in the case of coordinated policies.

The effect of an increase in public consumption on government deficits is almost equally clear). Deficits increase but because output also increases the effect on the deficit/GDP ratio differs from the pure deficit effect. The values for various countries

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[1] In evaluating the effects of fiscal policy, an obvious analytical framework is provided by (structural) VAR models (see Blanchard and Perotti (2002), Dalsgaard and De Serres (1999) and Viren (2000) and Ilzetzki et al (2009)). Because we concentrate here on the policy coordination problem, structural multicountry models are, however, more convenient.

[2] The Cohen and Follette (1999) value with US data (with four lags) was 1.23 which may be compared with our average EMU10 value of 1.25. When the tax rates were set to zero in the FRB/US model the multiplier increased to 1.35 which indicates how much (or, in fact, little) automatic stabilisers will affect on the multiplier. An interesting thing is that the multiplier value of 1.25 implies a relatively low value of the marginal propensity to consume. Assuming the average tax rate to be 0.4 we end up with a marginal propensity to consume to be about 0.3 only (or, 0.4 if we account for imports).

are surprisingly different, reflecting the differences in the output effects. In other respects, it is rather difficult to say why the country results are so different (the size of the country and the size of the public sector do not seem to explain the size of the output and deficit effects).

As pointed out earlier, gains from coordination seem to be much larger for small countries (Figure 6) while large countries might manage without coordination because of the relatively high multiplier values (Figure 5). This is, of course, well in accordance with the text-book analysis of fiscal policies (the same result is also obtained by Ilzetzki et al (2009)). This country-size relationship obviously creates different incentives for small and large countries in participating cooperative policy efforts and gives interesting political economy implications for fiscal policies.

So far, we have considered public consumption only but the picture for direct taxes is very similar (see Figure 7 for Finland that is used here as a representative example). Coordination makes a lot of difference in terms of output effects but the results are less clear for the deficit/GDP ratio. The problem stems from the output effects. When taxes are increased, output and income decrease, which eliminates part of tax revenues and – ceteris paribus – increases the deficit/GDP ratio because of lower output. If taxes (i.e. tax rates) are increased (by one per cent) in all EMU member countries at the same time, Finland's GDP would fall by almost half a per cent and that would also lead to a smaller surplus/GDP ratio .

When dealing with fiscal policy simulation, an obvious question is what happens to interest rates. The answer provided by the NiGEM model is 'not very much'. Thus, imposing the inflation targeting assumption for monetary policy produces only a five basis point increase in long rates in the case of coordinated policies. In the case of uncoordinated policies, the result is practically zero. This latter result is obviously in sharp contrast with all theorizing on credibility and peso effects (but not necessarily with empirical evidence; see e.g. Alesina et al. (1992)). The problem is that (with all models) it is quite difficult to account for direct expectations and portfolio effects. This weakness may also be quite crucial with regard to the assessment of policy coordination effects within EU.

The implication of these results is interesting. On the one hand it shows that it is the small countries that have most to gain from policy coordination. However, one can reverse the argument and point out that the others have the least to lose if it is small countries that do not coordinate well. Historically coordination among the EU countries has been fairly weak except among the countries tracking the deutschemark. There will therefore have to be quite a considerable change in behavior if this is to occur in future. The (old and new) SGP may have only a limited effect on this as limiting the size of deficits is only part of the problem. Indeed it is only when fiscal policy is not coordinated that this is likely to be a problem as such anomalies occur mainly when small countries experience asymmetric shocks.

2.3 Results with the IMF 2010 model

Now, turn to the IMF model which is basically a simple reduced form equation where the dependent variable is output growth and the right-hand-side variables consist of fixed country and time effects as well lagged output growth and fiscal consolidation indicators that have be constructed separately for tax-based consolidation program, spending-cuts-based programs and combined consolidation programs (see IMF (2010)). All of these are expressed in terms of GDP. This model has been estimated by several authors and institutes (e.g. the Goldman & Sachs (2012)) using (basically) OECD data for 1979-2009. Thus, (disregarding the country subscripts) we can write the equation into the following from:

$$\Delta y_t = a_0 + a_1\Delta y_{t-1} + a_2\Delta y_{t-2} + a_3 Fiscal_t + a_4 Fiscal_{t-1} + a_5 Fiscal_{t-2} + \textit{fixed time and cross-section effects} + u_t \quad (1)$$

where y indicates log GDP, and Fiscal = size of fiscal consolidation, either in the form of taxes, spending cuts, or total, all in terms of GDP. Here, the set of equations are estimated from cross-country panel data setting all country coefficients equal.

The equations have been re-estimated also in this study and the corresponding impulse responses are illustrated in Figure 8. As pointed out in the introduction, the most controversial result comes quite clear from this set of impulse response functions: taxes hurt much more than spending cuts. Thus, the GDP losses are very small with spending cuts but increases in taxes lowers GDP more than one-to-one basis. Obviously, there are several reasons for striking result starting from different monetary policy effects, and extending to labor markets, importance of foreign trade and so on (cf. Alessina and Ardagna (2010/2012) and Alessina et al (2012). Here we are not, however, interested in challenging the basic results but extending to the case to an open-economy setting where several countries pursue (in a coordinated manner) similar fiscal policies and, even further, to the case where the cyclical asymmetries are allowed to affect the parameters.

Equation (1) as such does not allow for analyzing the effects of policy coordination because the fixed effects structure in fact assumes foreign output exogenous. The nature of these effects comes clear when we compare the estimated fixed time effects with the World GDP (not exactly the World GDP but the combined sum of sample countries' GDP), see Figure 9. Of course, World GDP is not exogenous but equals to the sample countries GDP, hence we may respectively the basic model (2) so that it take the form (2):

$$\Delta y_t = a_0 + a_1\Delta y_{t-1} + a_2\Delta y_{t-2} + a_3\Delta y_{W,t-1} + a_4 Fiscal_t + a_5 Fiscal_{t-1} + \textit{fixed effects} + u_t$$

$$\textit{with } y_{W,t-1} = \sum b_i y_{it-1} \quad (2)$$

where the b_i's are country weights. The estimation results for equations (1) and (2) are reported in Table 1. The tax simulation is repeated in Figure 10 and a comparison of tax and spending simulations (impulse response functions) is reported in Figure 11.

The results in terms of "spending cuts" versus "tax increases" do basically remain the same as in the original simulation.[3] The interesting feature in the results is however the outcome for policy coordination. Quite clearly, policy coordination pays off; the long-run impact of consolidation is slightly more than two times bigger in the case of coordinated policies –whether or not tax or spending-cut policies are pursued. In this respect, the results come quite close to the NiGEM model results.

What about asymmetry? We tried to get an answer by using a simple threshold model structure where we allowed two regimes for the fiscal consolidation effort depending on whether GDP is increasing or decreasing (Table 2). The result of the test is strikingly clear. In "normal times" consolidation hurts very little while in economic depression, the costs are very high. In fact, the coefficients of the linear "Fiscal" terms are not even statistically significant which also reflects the fact that in "good times" fiscal consolidation may not become overwhelmingly costly. Although the empirical evidence on asymmetry is not very compelling it nevertheless points to the same direction as e.g. Auerbach and Gorodnichenko (2012) and other analyses in this paper.

2.4 Threshold model estimates

Our final attempt to measure the cyclical sensitiveness of fiscal policy parameters is to estimate rather simple deficit equations from cross-country data. Here we deal with several alternative definitions using the common specification

$$def_t/y_t = b_0 + b_1 def_{t-1}/y_{t-1} + b_2 \Delta y_t^- + b_3 \Delta y_t^+ + b_4 r_t + b_5 D_{t-1}/y_{t-1} + u_t \qquad (3)$$

where def refers to the measure of the general government balance (positive values are surpluses and negative or deficits), D refers to (general) government debt, y to GDP, r the real interest rate (government bond yield minus inflation) and u an error term and Δ denotes a growth rate (in short, $g = \Delta y$). Equation (1) is a straightforward example of a threshold model, where, in this case, the threshold is applied to the growth rate. Thus superscript -/+ denotes whether the growth rate is below or above the threshold (normally zero), Δy^+ includes only the above threshold values and Δy^- only the on and below threshold values. This equation is estimated from data for EU15 countries for the period 1971-2011. The basic results for different definitions of deficits as well as expenditures and revenues are reported Tables 3 and 4. In Table 3,

[3] Notice, however, that the numerical values change somewhat when we use model (2) instead if (1). Other variations of the model or simulation procedure did not make noticeable difference. Thus, gradual consolidations (instead of one-for-all consolidations) or different weighting patterns produced basically the same results.

there is the comparison between linear and nonlinear models with the deficit equation, while Table 4 provides coefficient estimates of the output growth variable for all different fiscal variables. Finally, Figure 12 gives some idea of the differences between individual countries in terms of these coefficient estimates.

The three deficit measures, shown in Table 4, are cyclically adjusted net lending, cyclically adjusted net lending less interest payments and the cyclical component of net lending, all in relation to (trend) GDP according to the Commission of the EU. These three cover the range of concepts one might want to address. The cyclically adjusted deficit gives an idea of the overall stance of fiscal policy, although the appropriate cyclical adjustment is difficult to achieve. It can be computed after the event but the policy stance is a forward looking concept that depends on the forecast of what the trend is likely to be over the medium term – something that can often be seriously erroneous. We use a well-established definition rather than entering the debate, especially since it is this definition that is used in the official EU discussions about the stance of policy. Similarly, while interest payments are a function of the overall stance, they too vary over the course of the cycle with the fluctuations in interest rates and outstanding debt.

The main implications of the results in the tables may be summarized in the following way: fiscal policy seems to respond to business cycles quite considerably. Thus, the deficit elasticities with respect to output growth appear to be around 0.4 - 0.6 for a one-year horizon. But what is perhaps more important, there appears to be strong evidence of asymmetric cyclical behavior in government deficits. The output effects on deficits clearly differ depending on the business cycle regime: they appear to be much strong in depressions (output falling) than in booms. The hypothesis of equal coefficients for these regimes can be rejected quite clearly.[4] The rejection also clearly shows in Figure 12 that illustrates the country-specific nonlinear coefficients of the output variable for the government deficit/GDP ratio. This combination of asymmetry and large cross-country differences impose serious challenges to common policy, as well as policy coordination. Policy cannot be based only on the mean values of the cross-country data; also the whole distribution of country values has to be taken into account! Needless to say, this makes all coordination efforts very tedious because simple certainty equivalence rules cannot be used any more (for more details, see Mayes and Viren (2011)).

The different cyclical effects show up in both revenues and expenditures. Revenues seem to be more sensitive to output growth in depressions than in booms. Thus, when output grows, the revenue/trend output ratio remains more or less constant, while in depressions it decreases quite markedly. Expenditures seem to increase in depressions and decrease in booms. This probably reflects changes in government transfers (e.g. unemployment benefits). The direct effect of interest rates on deficits can be clearly discerned. The effect is particularly strong with net lending but it also shows in

[4] The (possibly nonzero) threshold estimated by the maximum likelihood procedure was close to zero so the results using it are not reported.

primary deficits. The net lending effect obviously follows form the direct interest expense effect while the primary deficit effect has now obvious explanation. More interestingly, the effect of government debt also turns out to be both significant and of 'correct' sign and magnitude. Larger debt leads to some correction in the form of lower deficits.

We do however have to be rather cautious in interpreting these results, as the reverse impact of the fiscal balance on output has not been taken into account in estimation on the grounds that it occurs with a lag (while the effect of growth on the deficit is contemporaneous). Omission to expectations effects constitutes another caveat

3 Concluding remarks

The sources of asymmetry within the euro economy set some clear challenges for fiscal policy. Downward pressures on the economy create greater problems; at least fiscal consolidations seem to enormously costly. Policy needs to be asymmetric itself in order to counteract them. Put very simply, downside threats require much stronger policy reactions.

Small and large countries are clearly in a different position in terms of common policies. In fiscal policies, large countries have always an advantage because of larger multiplier while small countries may only achieve such values with coordinated policies. This does not, of course, mean that policy coordination would simple be matter of country size: clearly other country characteristics and political economy issues matter as well.

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Table 1 Estimation results with cross-country data 1978-2009

	1	*2*	*3*	*4*	*5*	*6*
Δy_{-1}	.509	.479	.487	.558	.498	.482
	(7.83)	(7.57)	(7.81)	(7.53)	(7.81)	(7.62)
Δy_{-2}	-.122	-.073	-.086	-.238	-.099	-.089
	(1.46)	(1.30)	(1.50)	(3.94)	(1.70)	(1.59)
Fiscal	-.337	-.632	-.298	-.557	-245	-.618
	(1.86)	(3.18)	(2.86)	(2.25)	(1.55)	(3.11)
$Fiscal_{-1}$	-.016	-.456	-.166	-.062	.082	-.419
	(0.54)	(2.00)	(1.24)	(0.24)	(0.58)	(1.87)
$Fiscal_{-2}$	.223	.130	.235			
	(2.04)	(0.69)	(2.05)			
$world_{-1}$				.378	.403	.402
				(3.51)	(1.62)	(1.62)
R^2	0.706	0.689	0.686	0.370	0.352	0.346
SEE	1.332	1.363	1.372	1.883	1.393	1.365
DW	1.95	1.96	1.95	1.76	1.93	1.58
Fiscal	spend	tax	total	tax	spend	tax
fixed ef.	ct+tt	ct+tt	ct+tt	ct	ct+tr	ct+tr

ct indicates fixed cross-section effect and tt fixed time effect, tr in turn indicates random time effect. World is the growth rates of World GDP. Numbers inside parentheses are t-ratios. The dependent variable is the growth rate of GDP. In constructing the World variable we used GDP weighs although equal weights did make a dramatic difference.

Table 2 Simple test of linearity with the IMF model

	7	*8*
Δy_{-1}	.475	.465
	(7.50)	(7.48)
Δy_{-2}	-.085	-.065
	(1.46)	(1.16)
Fiscal	-.064	-.256
	(0.52)	(1.36)
(D|Δy<0)*Fiscal	-.647	-1.428
	(1.81)	(3.04)
R^2	0.680	0.695
SEE	1.382	1.348
DW	1.95	1.97
Fiscal	spend	tax
fixed effects	ct+tt	ct+tt

D|Δy<0 equals 1 if output growth is negative.

Table 3 Evidence of Changing Fiscal Behavior

Dep.var	Δy		*lagged def/y*	*debt$_{-1}$*	*rr*	*R^2/ SEE*	*DW J-stat*	*Estimator*
def/y	0.464		0.744	0.028	-0.106	0.789	2.00	GLS
	(8.22)		(7.48)	(5.10)	(2.52)	2.032		
def/y *)	0.396		0.797	0.029	-0.142	0.851	2.03	OLS
	(6.69)		(16.61)	(4.62)	(3.06)	1.661		
def/y **)	0.643		0.578	0.006	0.115	0.741	2.29	OLS
	(9.56)		(3.36)	(0.38)	(0.75)	2.340		
exp/y	-0.579		0.815	-0.017	0.121	0.932	2.11	OLS
	(12.06)		(13.55)	(2.13)	(3.22)	1.850		
rev/y	-0.091		0.867	-0.003	0.050	0.976	1.64	OLS
	(3.02)		(38.11)	(0.80)	(2.18)	1.111		
	$\Delta y \vert \Delta y < 0$	$\Delta y \vert \Delta y < 0$						
def/y	0.741	0.327	0.750	0.025	-0.104	0.792	2.06	OLS
	(5.34)	(2.90)	(7.98)	(4.21)	(2.52)	2.017		
def/y *)	0.983	0.265	0.795	0.028	-0.141	0.856	2.09	OLS
	(4.76)	(3.74)	(16.94)	(4.42)	(3.11)	1.636		
def/y	0.776	0.405	0.536	0.060	-0.257	..		GMM
	(11.21)	(8.03)	(4.22)	(3.40)	(2.12)	2.683	30.9	

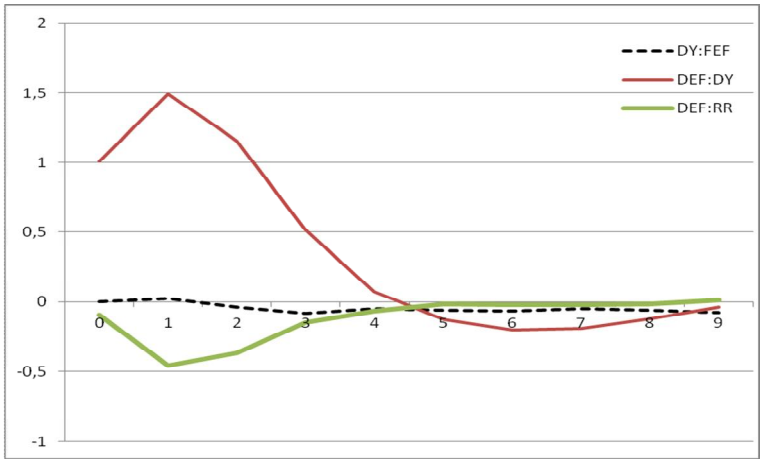
def denotes net lending (thus positive values represent surpluses), g denotes the growth rate of GDP, exp denotes government expenditures and rev government revenues (all are expressed in relation to GDP). debt denotes general government debt in relation to GDP and rr the real interest rate (in terms of government bond yields). OLS denotes panel least squares (with fixed cross-section effects) estimator, GMM the Arellano-Bond GMM estimator with first differences. The sample period is 1971-2011 expect when *) the sample period is 1971-1998 and **) the sample period is 1999-2011. Data source: the AMECO data base

Table 2 The output growth coefficients with different fiscal variables

Dependent variable	$\Delta y < 0$	$\Delta y > 0$
def: cyclically adjusted	0.329	0.042
	(2.06)	(0.36)
def: cyclically adjusted, excluding interest expenses	0.409	0.024
	(2.38)	(0.22)
def: cyclical component	0.403	0.359
	(10.34)	(16.11)
exp: cyclically adjusted	-0.578	-0.425
	(3.77)	(3.27)
exp: cyclically adjusted excluding interest expenses	-0.637	-0.397
	(3.89)	(3.40)
exp: cyclical component	-0.058	-0.046
	(4.30)	(9.39)
rev: cyclically adjusted ca	-0.251	-0.444
	(3.17)	(3.89)
rev: cyclical component	0.343	0.314
	(12.05)	(17.03)

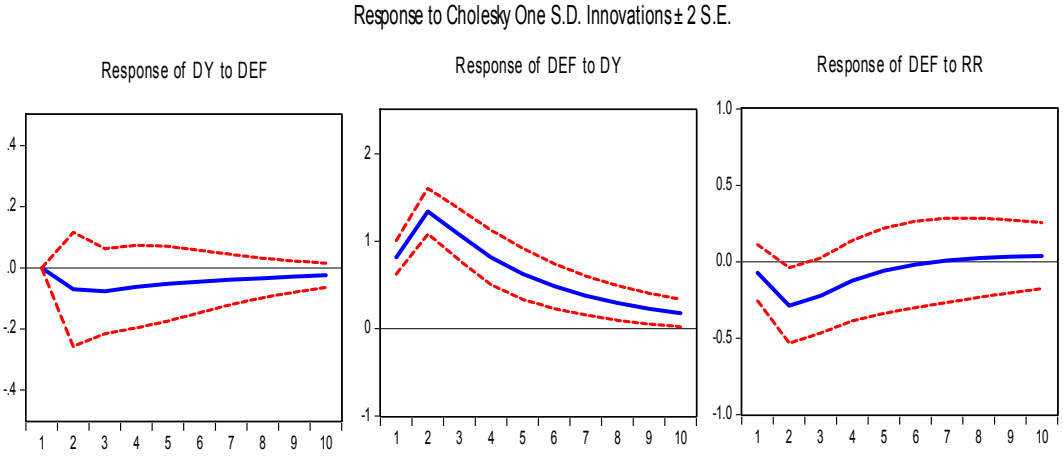
Notation is the same as in Table 3. Estimation period is in all cases 1971-2011 and the estimates are OLS estimates.

Figure 1 Average impulse responses from a 3-variable VAR model



The data consist of 15 EU countries and cover years 1971-2011. DEF denotes the government surplus/GDP ratio.

Figure 2 Selected impulse responses from panel data



These are derived from a three-variable VAR (the same as in Figure 1) but estimated from cross-country panel data and restricting the coefficients to be equal,

Figure 3 Maximum effects of a one per cent increase in public consumption on GDP with and without policy coordination

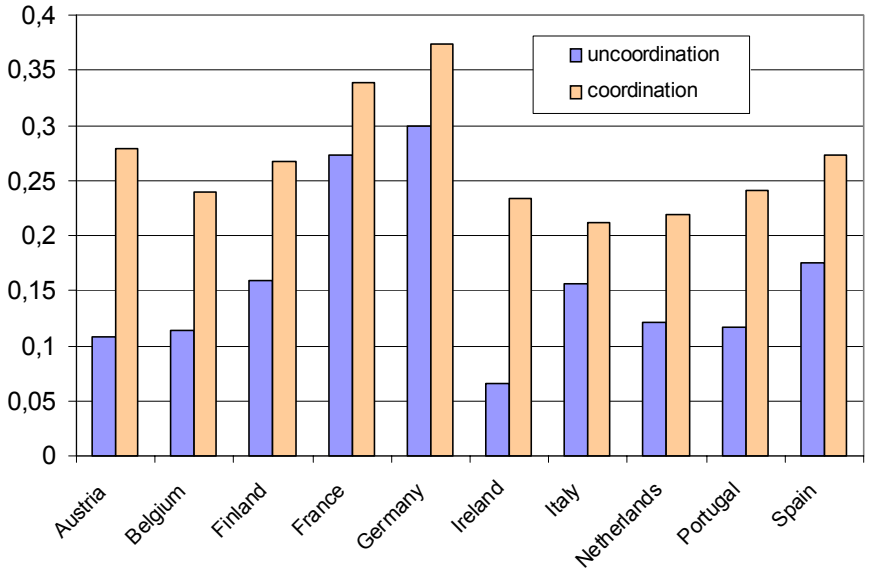


Figure 4 Long-run effect of a one per cent increase in public consumption on government surplus/GDP with and without policy coordination

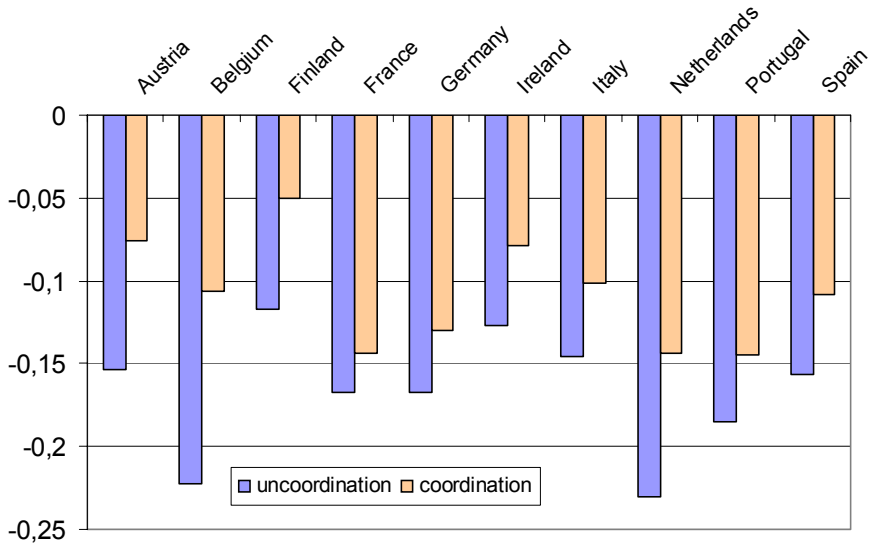
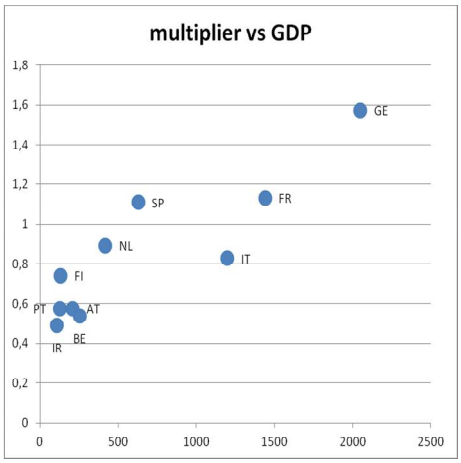
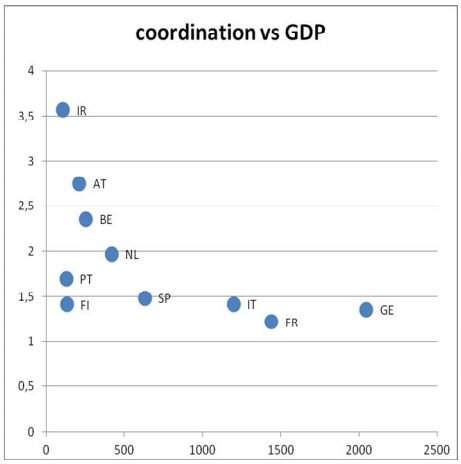


Figure 5 Country-size and effectiveness of fiscal policy



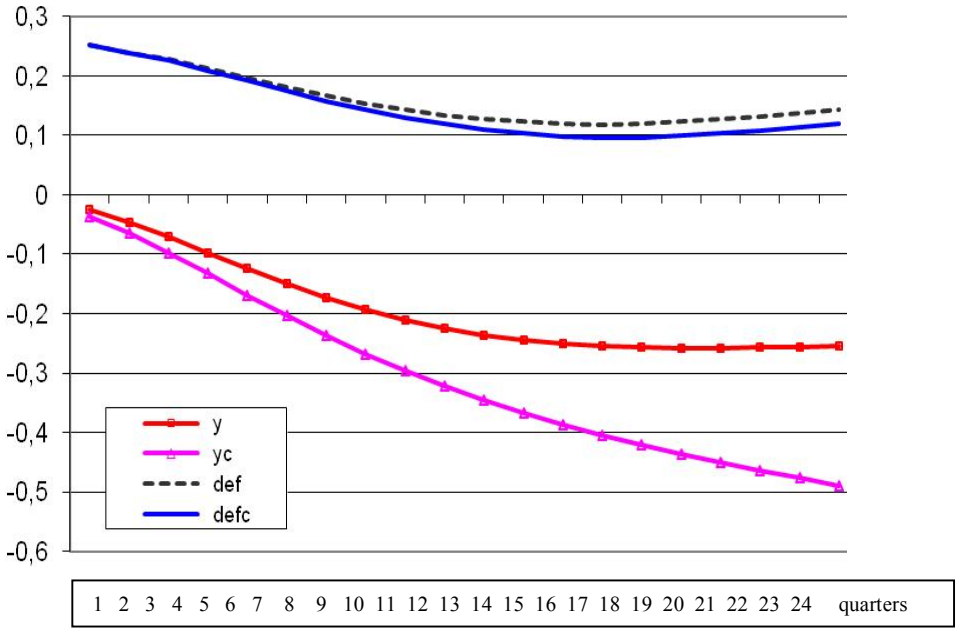
The values at the y-axis represent short run (4 quarters) multipliers. GDP values are derived for year 2000.

Figure 6 Country-size and benefits of coordination



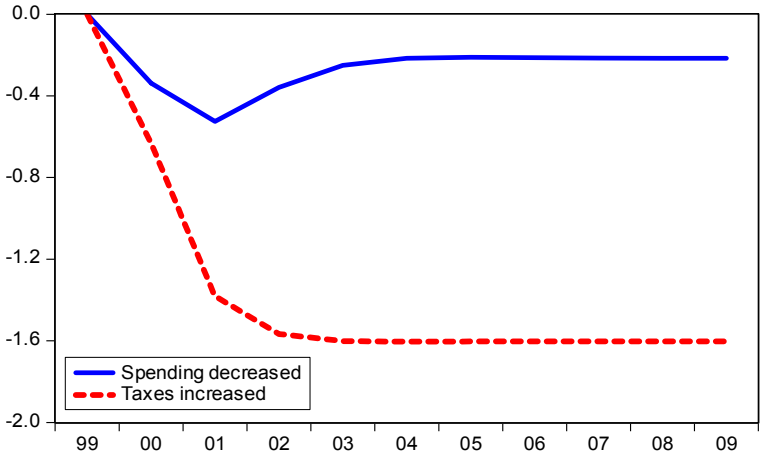
Coordination vs GDP indicates the ratio between the multiplier with coordinated fiscal policies and the multiplier in the uncoordinated case.

Figure 7 Effect of an increase in direct taxes on GDP and government surplus/GDP



y and yc indicate the effects of directs taxes on output without and policy coordination. Def and Defc are corresponding government surplus/GDP effects.

Figure 8 Simulation experiment with the IMF 2010 model



Simulations are based on equation (1)

Figure 9 World GDP vs the fixed time effect from equation (1)

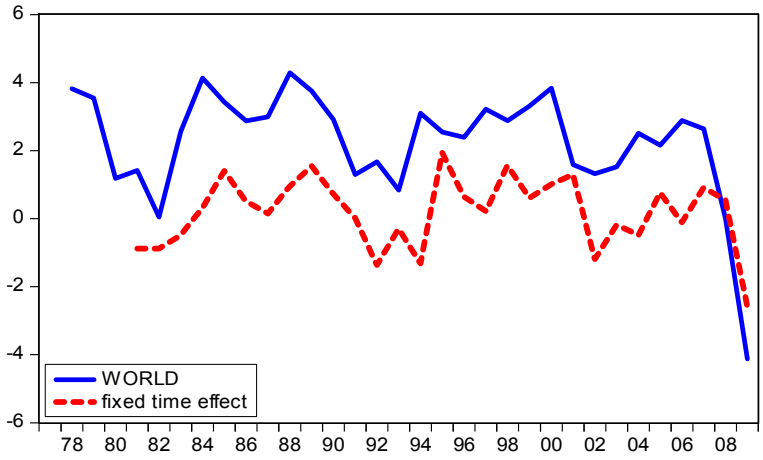
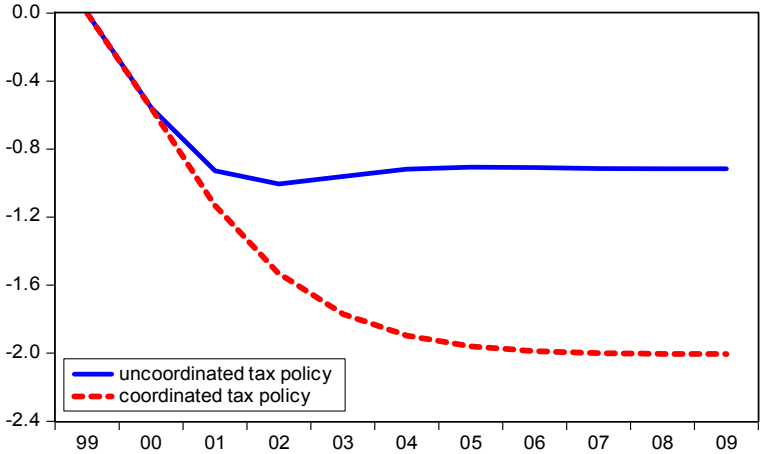
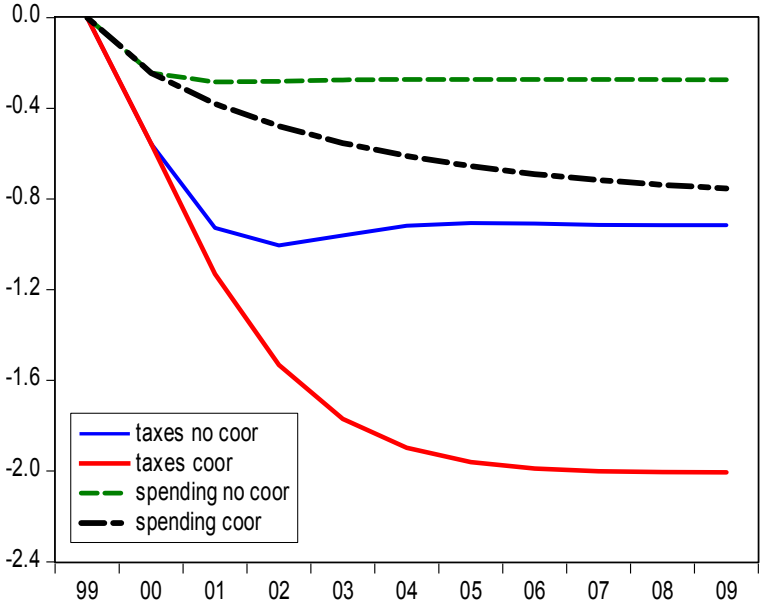


Figure 10 Effect of policy coordination



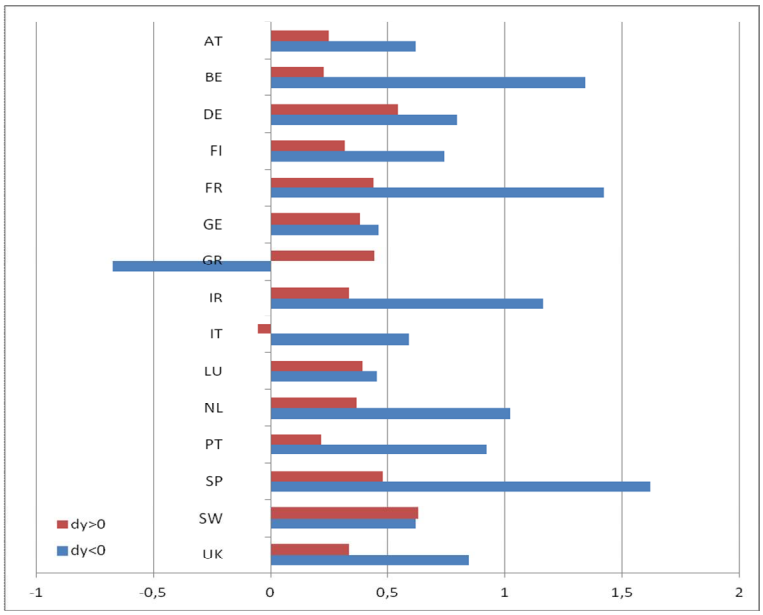
This is based on simulations with equation (2) without time effects

Figure 11 Effect of fiscal policy coordination



This is based on simulations with equation (2) with random time effects

Figure 12 Country-specific nonlinear coefficients of output growth



These are estimates from equation (3) for government deficit/GDP for individual countries.

The **Aboa Centre for Economics (ACE)** is a joint initiative of the economics departments of the Turku School of Economics at the University of Turku and the School of Business and Economics at Åbo Akademi University. ACE was founded in 1998. The aim of the Centre is to coordinate research and education related to economics.

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