13 June 2007

Fiscal Policies and Business Cycles in an Enlarged Euro Area

Karsten Staehr*
Visiting researcher, Ph.D.

Research Department
Bank of Estonia
Estonia pst 13
15095 Tallinn
Estonia

Tel: +372 668 0716
Fax: +372 631 1240
E-mail: karsten.staehr@epbe.ee

Abstract: This paper compares the cyclical properties of fiscal policies across the 12 original eurozone countries and the future members from Central and Eastern Europe. For the sample period 1995-2005, the fiscal balance exhibits less inertia and is more counter-cyclical in Central and Eastern European countries than in members of the eurozone. The main differences arise from the revenue side. Differences in the formation of fiscal policy between current and future eurozone countries decrease over time. Both autonomous and counter-cyclical fiscal policies have little or no effect on cyclical variability in the eurozone countries, while such policies appear to be effective in Central and Eastern European countries.

JEL classifications: E62, E63, E32

Keywords: Fiscal policy determinants, fiscal policy effects, eurozone expansion

* The author would like to thank two anonymous referees of *Economcs Systems*, David Mayes, Egle Tafenau and colleagues at the Estonian Central Bank for useful comments and suggestions. The author also benefited from comments by the discussant, Evzen Kocenda, and other workshop participants at the CESifo workshop "Euro-Area Enlargement" held 24 November 2006. All remaining errors and omissions are the responsibility of the author. The views expressed are those of the author and do not represent the official views of the Bank of Estonia.

1. Introduction

The 12 countries that became members of the European Union on, respectively, 1 May 2004 and 1 January 2007 have committed themselves to joining the European Monetary Union (EMU) in due course. This will bring countries that have recently emerged from central planning and widespread economic repression into the EMU. This paper seeks to advance our understanding of fiscal policies in these countries and shed light on possible differences between the original 12 members of the eurozone and the future members from Central and Eastern Europe.[1]

The conduct of fiscal policy has been one of the most contentious issues in the operation of the EMU. Fiscal policy issues are also likely to play a major role in future years as new EU members join the eurozone. The question is therefore which fiscal policy challenges transition countries are going to experience before and after entering the eurozone and, correspondingly, which challenges can the eurozone expect. While the formation and effectiveness of fiscal policies have been well researched for the 15 "old" EU countries, relatively few studies have considered these issues for the new EU members, and no studies have used econometric methods to compare fiscal policies across the existing and future members of the eurozone.

This paper builds on a panel dataset with a large number of variables from 27 EU members across 11 years. The main line of inquiry is to examine possible differences in the functioning of fiscal policies across the existing eurozone members and the countries that will join the eurozone in the coming years. Two key questions are addressed. First, are the *cyclical properties* of fiscal policy different across the existing and future eurozone members? Are policies counter-cyclical, a-cyclical or pro-cyclical, and how do they differ across these groups of countries? Second, what are the *effects* of fiscal policies on economic fluctuations in the eurozone and for the future members? Do fiscal policies reduce economic fluctuations, aggravate fluctuations or are they largely ineffective?

The first question relates to the fulfilment of the deficit requirement of the Maastricht criteria stating that the deficit cannot exceed 3% of GDP except in extraordinary circumstances. The criterion is also present in the Stability and Growth Pact (SGP), which applies to countries inside the European Monetary Union. If fiscal policies are strongly counter-cyclical, the risk of breaking the 3% limit may be large during downturns. In other words, strong counter-cyclicality may pose a serious challenge when a country is seeking EMU membership, but possibly also after having achieved membership.

The second question relates to the prevalence of cyclical output fluctuations for EMU members. A country that has joined the eurozone cannot pursue monetary or exchange rate policies independently in case an asymmetric shock affects the economy adversely. In this situation, fiscal policy becomes the main policy tool for stabilising output fluctuations. As an introduction to the SGP, the European Commission (2006) states: "[I]t was also recognised that the loss of the exchange rate instrument in EMU would imply a greater role for automatic fiscal stabilisers at national level to help economies adjust to asymmetric shocks".

The scope of macroeconomic stabilisation is important for assessing what constitutes an optimal currency area (OCA) and whether the 12 original members of the EMU constitute such

[1] Slovenia joined the EMU on 1 January 2007 and thus became the first country from Central and Eastern Europe to enter the eurozone. In this paper, Slovenia is included in the group of future eurozone members as data for the empirical analysis is only available until 2005.

an area. The theory on optimal currency areas outlines conditions under which countries participating in a currency union would not experience excessive output and employment instability when subject to asymmetric shocks. It is common to point to labour and capital mobility, price and wage flexibility and the mechanism for fiscal transfers across the member countries (Baldwin & Wyplosz 2004). It is important to emphasise that the economies of countries participating in a currency union will adapt to the changed macroeconomic conditions; this implies that the degree of fulfilment of the OCA criteria is endogenously determined (Frankel & Rose 1998).

As stated, asymmetric shocks might be of less importance if the fiscal policy is countercyclical and effective in reducing output and employment fluctuations (Ardy *et al.* 2006, Ch. 2).[2] A fiscal policy reducing real economic variability needs not involve inter-constituency transfers, but rather the intertemporal reallocation of government spending and taxation within each country.

There is extensive literature discussing whether the expanded European Union constitutes an optimal currency area and, in particular, whether the business cycles across the member countries are converging; see, for example, Korhonen (2003) and Frenkel & Nickel (2005). The importance of fiscal policies in the EMU and the effect of the SGP on fiscal policy and economic fluctuations have been widely discussed; see, for example, Wyplosz (2002), Ballabriga & Martinez-Mongay (2003), Fatas & Mihov (2003b), Annett & Jaeger (2004), Ardy *et al.* (2006) and Buti & Sapir (2006).

Relatively little has been written on fiscal policy challenges stemming from the expansion of the eurozone to include the former transition countries of Central and Eastern Europe.[3] This applies in particular to the formation of fiscal policy and its effects across an expanded eurozone. Nuti (2006) discusses fiscal policy in the new EU member states and argues that the Maastricht criteria and the SGP represent undue constraints on these rapidly developing countries. Berger *et al.* (2007) argue that the differences in the overall fiscal stance of the Central European accession countries can be explained by the bargaining position of the countries vis-à-vis the other EU countries with respect to the fulfilment of the Maastricht criteria. Afonso *et al.* (2005) analyse cases of fiscal consolidation in the CEE countries and seek to determine factors leading to a permanent improvement of the fiscal balance. Kattai & Lewis (2005) estimate fiscal policy reactions for individual countries in Central and Eastern Europe.

The issues analysed in this paper are important for new EU countries seeking to join the EMU in the future. The issues are, however, also important in their own right, i.e. even if the countries do not become eurozone members in the immediate future. Several issues are noteworthy.

First, the improvement of the management of fiscal policy and its integration with other policies require that fiscal policy formation be analysed and evaluated. It is of particular interest to understand the economic and political factors affecting, respectively, the cyclical properties of fiscal policy and the prevalence of autonomous or non-systematic discretionary fiscal pol-

[2] Ardy *et al.* (2006, Ch. 2) list three different areas from which tensions can arise if a common macroeconomic policy is sought, i.e. that policymakers have different preferences, that countries are hit by different shocks and that the effect of shocks and policy instruments vary across countries.

[3] Budina & van Wijnbergen (1997) present a study of fiscal policy in Central and Eastern Europe during the early transition phase.

icy.[4] Recent empirical studies include Roubini & Sachs (1989), Alesina & Perotti (1995, 1997) and Fatas & Mihov (2003a); none of these consider the post-communist transition economies in any detail.

Second, the effectiveness of fiscal policy in stabilising cyclical fluctuations in output and employment is important in so far as fluctuations affect social welfare. Theory provides a range of hypotheses to be tested, e.g. the Keynesian fiscal multiplier, the Ricardian equivalence hypothesis and tax smoothing across the cycle (Romer 2005, chs. 5, 7, 11). Empirically, the joint endogeneity of fiscal policy and output performance necessitates the use of challenging methods to ensure identification, e.g. natural experiments, VAR-models or various forms of instrumental variables estimation.[5] The studies reach rather conflicting results with respect to the effect of fiscal policy, presumably because they use different definitions for fiscal policy variable(s) and consider different countries and time horizons.

Third, there is an increasing body of evidence suggesting that macroeconomic stability can contribute to higher long-term growth; see e.g. Fischer (1993) and Fatas & Mihov (2005). Aghion & Howitt (2006) argue that short-term output volatility leads to a lower trend growth rate in countries with less developed financial markets: in a neo-Schumpeterian growth setting, economic fluctuations lead to too many firm exits if capital and insurance markets are imperfect. The upshot is that policies reducing economic fluctuations may also enhance growth. This claim is supported by empirical evidence assessing growth in 17 OECD countries over the period 1965-2001.

The remainder of this paper is structured as follows. Section 2 provides a brief overview of fiscal policies in Western and Eastern Europe since the early 1990s. Section 3 assesses factors determining the fiscal policy reactions in, respectively, the current and future eurozone members. Section 4 considers the effect of fiscal policy measures on output fluctuations. Finally, Section 5 summarises and discusses some policy implications.

2. Fiscal policies in current and future eurozone countries

The two regions in Europe faced different fiscal policy challenges during the eventful years following the reunification of Germany, the political integration of Western Europe and the emergence of Eastern European countries as market-based democracies. This section reviews briefly the fiscal policy developments in Europe since 1990.

Our sample comprises a total of 27 European countries: the 12 eurozone countries, the three old EU countries outside the eurozone (Denmark, Sweden and the UK), the 10 new EU member countries from Central and Eastern Europe, as well as Malta and Cyprus.[6] The applicant countries Croatia, Macedonia and Turkey are not included in the sample.

The statistical analysis relies mainly on data from Eurostat (see Appendix A for detailed variable descriptions and sources). There are some missing observations especially for the transi-

[4] Changes in autonomous (or non-systematic discretionary) fiscal policy are changes that cannot be explained by cyclical developments in the economy or other easily observable factors (Gali & Perotti 2003).
[5] Important studies considering the effect of automatic stabilisers, counter-cyclical fiscal policies and/or other forms of fiscal policies include Aschauer (1985) and more recently Cohen & Follette (2000), Fatas & Mihov (2001), Blanchard & Perotti (2002), Perotti (2005), Caldara & Kamps (2006) and Bayomi & Sgheri (2006).
[6] Some data series for Malta and Cyprus are quite volatile and often available for short time periods only.

tion countries in the early years of the sample and for Malta and Cyprus. Attempts to extend the data series backwards have been unsuccessful. We tried to include data on government finances from the Government Financial Statistics of the IMF and from the Transition Reports of the EBRD, but both the level and the dynamics of the series generally differ markedly from the Eurostat data. Overall, the data series from Eurostat is reckoned to be consistent across countries and of acceptable quality.

The Maastricht Treaty, signed in February 1992, constitutes the legal foundation for deeper cooperation within the (relabelled) European Union. A cornerstone was the establishment of the European Monetary Union with a shared currency and a common monetary policy (Wyplosz 2006, Buti & Sapir 2006). The Maastricht Treaty spelled out a set of convergence criteria, which all prospective member countries – in principle – had to fulfil before being admitted.[7] The Maastricht criteria involved requirements on inflation, long-term interest rates and exchange rate stability. In addition, two of the criteria constitute restrictions on government finances, i.e. that the general government deficit cannot exceed 3% of GDP, save in exceptional circumstances, and that the government gross debt stays within 60% of GDP or has been approaching the 60% ceiling at a satisfactory pace.

The Stability and Growth Pact requires that the countries participating in the EMU maintain fiscal coefficients within the limits of the Maastricht Treaty. The SGP was decided in December 1996 and stipulated that a country breaching the 3% deficit ceiling would be subject to an excessive deficit procedure unless one or more "relevant factors" explained the deficit. A revised SGP from March 2005 makes the rules concerning the use of the excessive deficit procedure more flexible.

The 1990s became a period where governments in most EU countries strived to satisfy particularly the fiscal criteria of the Maastricht Treaty. In May 1998, the heads of the EU countries came to the decision that 11 countries satisfied the criteria, and the euro was launched on 1 January 1999 followed by euro-denominated banknotes and coins on 1 January 2002. In June 2000, the accession of Greece to the EMU was approved as from 1 January 2001. The downturn in the European economies after the bursting of the tech bubble in 2000-01 strained government finances, especially in the large, core EMU countries.

The countries in Central and Eastern Europe faced numerous challenges in the 1990s. Most of them gained or regained independence and had to build up new national government finance systems. The transition to a market economy and the deep recessions in the early 1990s strained budget balances (Budina & van Wijnbergen 1997). A number of CEE countries experienced financial crises. For many CEE countries the Russian crisis in the fall of 1998 led to a significant trade contraction, financial instability and growth setbacks.

Table 1 shows the annual GDP growth (GY) for three groups of countries. The *Eurozone 12* group comprises the 11 countries that became EMU members in 1999 and Greece, which entered in 2001. The group *Denmark, Sweden & UK* consists of the three old EU members that did not join the EMU. The *CEE10* group is made up of the 10 countries from Central and Eastern Europe that joined the EU in May 2004 and January 2007. The different growth experiences across the old and new EU members become particularly apparent after 1999, when growth stagnated in the groups of Western European countries (Eurozone 12 and Denmark, Sweden & UK, while it accelerated in the group of CEE10 countries.

[7] It is clear, however, that one-off measures, short-term asset transfers and "creative bookkeeping" enabled a number of especially Southern European countries to meet the Maastricht criteria (Nuti 2006).

Table 1. Annual GDP growth as a percent (GY), unweighted averages for country groups, 1995-2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Eurozone 12	5.5	2.7	4.2	4.1	4.4	4.8	2.4	1.9	1.6	2.7	2.1
Denmark, Sweden & UK	3.3	2.3	2.9	3.0	3.4	3.9	1.3	1.5	1.6	2.9	2.5
CEE10[a)]	3.0	2.8	4.6	4.1	2.1	4.6	4.5	4.5	5.2	6.2	6.3

[a)] No data available for the Czech Republic and Bulgaria for 1995 and for Romania for 1995-98.
Source: Eurostat (2006), own calculations.

Table 2 shows the general budget balance as a percent of gross domestic product (BAL) for the three groups of countries. The average budget balance for the period 1995-2005 (or available sample years) is -2.2% of GDP for the eurozone countries, 0% for Denmark, Sweden & UK and -2.8% for the 10 new EU members from Central and Eastern Europe. There are considerable differences across the countries within each group, cf. the country-specific data reported in Appendix B.

Table 2. General government balance as a percentage of GDP (BAL), unweighted averages for country groups, 1995-2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Eurozone 12[a)]	-4.4	-3.5	-1.7	-1.0	-0.4	0.8	-0.5	-1.2	-1.8	-1.8	-1.6
Denmark, Sweden & UK	-5.3	-3.0	-1.1	0.7	2.0	3.5	1.9	-0.2	-0.7	0.4	1.4
CEE10[b)]	..	..	-2.9	-2.9	-3.5	-3.3	-3.0	-3.4	-2.6	-1.9	-1.8

[a)] No data available for Spain for 1995-96.
[b)] No data available for Latvia and Hungary for 1997-98 and for Bulgaria and Romania for 2005.
Source: Eurostat (2006), own calculations.

For the eurozone countries, the years before the turn of the century comprised a period of rapid fiscal consolidation. It is noteworthy, however, that the group of EU countries not participating in the EMU underwent a similar consolidation during the same period.[8] The fiscal position has deteriorated in both EMU and non-EMU countries since the turn of the century, and 2000 remains the only year in the sample in which the EMU countries on average attained a positive budget balance.

Fiscal policies in the Central and Eastern European countries have generally led to larger deficits than experienced in the eurozone countries and the group comprising Denmark, Sweden and the UK. The Visegrad countries have pursued policies that in some years have led to substantial headline deficits. Fiscal policies in the Baltic States and Bulgaria have been restrained by the fixed exchange rate policies pursued in these countries (Mueller *et al.* 2002, Grigonyte 2003).

Table 3 shows that the general government debt stock as a percentage of GDP (DEBT) fell in the eurozone countries until 2002, but has remained stable since . The average debt burden in the new EU countries from Central and Eastern Europe is less than half the level in the old EU countries. In spite of substantial deficits, the government debt burden in the region has remained stable partly as a result of relatively rapid GDP growth.

[8] This sheds some doubt on the widely asserted claim that although the Maastricht criteria may be somewhat arbitrary, the criteria contributed to an increased focus on prudence and economic stability in fiscal policy-making (Buti & Sapir 2006, Afxentiou 2000). Still, individual countries, such as Italy and Greece, did exhibit a substantial fiscal consolidation during the 1990s.

Table 3. Government consolidated gross debt as a percentage of GDP (DEBT), unweighted averages for country groups, 1995-2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005[a)]
Eurozone 12	74.8	74.4	71.6	68.5	67.0	64.8	63.7	61.9	61.7	61.5	61.6
Denmark, Sweden & UK	73.1	72.6	69.7	66.6	64.6	61.6	60.4	58.6	58.4	58.2	57.9
CEE10[b)]	..	..	29.2	25.4	28.6	28.6	29.4	29.7	30.5	30.0	28.8

[a)] Estimates by Eurostat.
[b)] No data available for Latvia and Slovenia for 1995-98 and for Bulgaria and Romania for 2005.
Source: Eurostat (2006), own calculations.

One main conclusion follows from the descriptive review in this section, namely that the Eurozone 12 countries and the new EU members – when taken as groups – have experienced very different fiscal policy trends and business cycles since 1995. It is also clear that there is substantial variation across the countries in the two groups. These considerations lead to the question whether the different developments are also reflected in the way fiscal policy is formed and functions in the two groups.

3. The cyclical reaction of fiscal policy

This section analyses how different factors have affected fiscal policy variables in the original 12 eurozone countries and the 10 new EU countries from Central and Eastern Europe. We estimate fiscal policy reaction functions, which explain the fiscal policy stance by policy inertia, economic fluctuations and different variables reflecting debt-servicing requirements. A number of recent studies estimate similar fiscal policy rules to ascertain, e.g. the cyclicality of fiscal policies (Fatas & Mihov 2001, Gali & Perotti 2003, Ballabriga & Martinez-Mongay 2003 and Wyplosz 2006).

The main objective is to assess whether the reaction functions of the CEE countries differ from those of the eurozone countries. The short time dimension of the sample necessitates the use of panel data estimation. Estimations of reaction functions for each country would lead to unreliable results. We estimate separate coefficients for, respectively, the eurozone countries and the CEE countries and then compare the results across the two groups of countries. An essentially similar approach is used in Gali & Perotti (2003) and Wyplosz (2006) to assess changes over time.

The choice of the two groups is based on a number of factors. First, as described in Section 2, the countries within each of the two groups have faced a number of similar challenges (EMU qualification and SGP vs. post-transition adjustment). Second, the economic structure varies markedly across the two groups (high-income service economies vs. lower-income manufacturing economies). Third, the operation of the EMU implies that the common monetary policy has throughout most of the sample period been determined in co-operation between the 12 original eurozone countries, while the stabilisation policies in the CEE countries have not been constrained by similar institutional arrangements. Ultimately, the appropriateness of the choice of groups rests on empirical testing – a point that will be returned to below.

3.1 Inertia and cyclicality

Table 4 shows estimated reaction functions for the general government balance as a percentage of GDP under different assumptions and using different estimation techniques. The government balance is assumed to depend on its lagged value, the cyclical stance and the debt stock. Such hypothesised behaviour can be deducted from a simple utility of the government, cf. also similar behavioural assumptions in Fatas & Mihov (2001), Gali & Perotti (2003) and Ballabriga & Martinez-Mongay (2003). For each estimation the dependent variable is indicated below the column number in row two.

Table 4. Budget balance reaction functions

	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)
	BAL	**BAL**	**BAL**	**BAL**	**BAL**
BAL(-1)·*West*	0.606***	0.725***	0.621***	0.586***	0.596***
	(0.141)	*(0.052)*	*(0.080)*	*(0.136)*	*(0.145)*
BAL(-1)·*East*	0.099	0.084*	0.177**	0.099	0.244*
	(0.131)	*(0.092)*	*(0.072)*	*(0.116)*	*(0.137)*
GY·*West*	0.218**	0.189*	0.193***	0.268**	..
	(0.093)	*(0.104)*	*(0.059)*	*(0.123)*	
GY·*East*	0.622***	0.593***	0.457***	0.496***	..
	(0.146)	*(0.135)*	*(0.103)*	*(0.149)*	
GYP·*West*	..	..	..	..	0.231**
					(0.090)
GYP·*East*	..	..	..	..	0.363***
					(0.059)
DEBT(-1)·*West*	-0.013	0.0090	-0.011	0.027	0.056
	(0.022)	*(0.028)*	*(0.0089)*	*(0.032)*	*(0.024)*
DEBT(-1)·*East*	0.014	0.034	-0.0073	0.025	0.110**
	(0.030)	*(0.027)*	*(0.023)*	*(0.031)*	*(0.052)*
Country dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	No	Yes	Yes	Yes
Method	GMM-AB[a)]	GMM-AB[a)]	OLS/FE	GMM-AB[a)]	GMM-AB[b)]
Time sample	95-05	95-05	95-05	95-05	95-05
No. of countries	22	22	22	27	22
No. of obs.	194	194	205	239	188

Notes: White's period robust standard errors are shown in brackets below the coefficient estimates. A post-positioned ***, ** or * indicates that the null hypothesis of the coefficient being 0 is rejected at, respectively, the 1%, 5% and 10% level of confidence.
[a)] The level instruments are BAL(-2), GY(-2) and DEBT(-2). The time-differenced instruments are output growth in the USA, output growth in Russia, real oil price growth, and the real Fed funds interest rate. The instruments are included separately for the West and East country groups. If included in the regression, the year dummies are also used as level instruments.
[b)] The instruments are as in a) except that GY(-2) is replaced by GYP(-2).

Column (4.1) shows the results when BAL, the general government balance as a percentage of GDP, is regressed on the one year lagged government balance (BAL(-1)), the contemporaneous percentage change in output (GY), and the one year lagged debt stock as a percentage of GDP (DEBT(-1)) as well as country- and time-specific dummies. The separate effects of the explanatory variables for the two groups of countries are traced by interacting the explanatory variables with country group dummies. In specific, each of the explanatory variables is multiplied by the dummy variables *West* and *East.* The dummy *West* is equal to 1 for the Eu-

rozone 12 countries and otherwise 0; the dummy *East* is equal to 1 for the 10 Central and Eastern European countries and otherwise 0.[9]

The estimations include GY as a proxy for the cyclical stance. Clearly, the countries in the sample have different "natural rates" or trend growth rates, and it might thus have been useful to include the deviation from trend growth instead of the actual growth rate in the regressions. Different methods for estimating the trend growth rate give differing and often inaccurate results and are only known precisely with a very long lag (Hallett *et al.* 2007). Thus, with only 11 years of annual data, it is reasonable to use the average growth rate during the period to approximate the trend growth rate. This assumption implies that changes in the output growth rate should be interpreted as *changes* in the output gap.[10] The assumption of a constant trend growth rate during the 11 years of the sample necessitates the use of country fixed effects (or equivalent) in all estimations.

OLS estimation of dynamic panels with a lagged endogenous variable as an explanatory variable generally leads to inconsistent coefficient estimates, even when cross-section fixed effects are used (Green 2000, Ch. 14; Arellano 2003, chs. 7-8). Instead, we employ the Difference GMM Arellano-Bond one-step estimator (GMM-AB). The methodology implies that the regression is time-differenced in order to remove cross-section specific effects and the differenced regression is then estimated using GMM with appropriately lagged *levels* of the endogenous variable and non-exogenous explanatory variables as instruments (together with other suitable instruments). The Arellano-Bond estimator is consistent, but its small sample properties hinges crucially on the characteristics of the sample (Judson & Owen 1999).

The specific choice of instruments for the differenced equation requires careful consideration (Murray 2006). The lagged budget balance is instrumented using the two periods lagged level. The explanatory variable GY (contemporaneous output growth) may be affected by fiscal policy, which would lead GY to be correlated with the residual. Additionally, the GDP level is used to scale both the fiscal balance and the change in GDP. GY is therefore instrumented using its two periods lagged level as an instrument. The differencing of the debt variable and the scaling with the GDP imply that the pre-determined debt stock should also be instrumented; its two period lagged level is chosen as an instrument. To increase efficiency, the number of level instruments can be increased, as additional predetermined values are available for the later years of the estimation sample. We have, however, chosen to abstain from using such dynamic instrumentation, primarily because a simple lag structure of the instruments makes it easier to retain the same instruments across different sub-divisions of the sample (country groups, time periods). "Outside instruments" are included in the form of output growth in the USA, output growth in Russia, real oil price growth, and the real Fed funds interest rate.[11] These variables are likely to affect the cyclical position in the individual countries in the sample, while having no direct on the fiscal policy stance. The instruments are included separately

[9] The panel estimation for column (4.1) is thus: $BAL = \alpha_1 \cdot BAL(-1) \cdot West + \alpha_2 \cdot BAL(-1) \cdot East + \alpha_3 \cdot GY \cdot West + \alpha_4 \cdot GY \cdot East + \alpha_5 \cdot DEBT(-1) \cdot West + \alpha_6 \cdot DEBT(-1) \cdot East + \Sigma \beta_i \cdot$ country dummy $+ \Sigma \gamma_j \cdot$ time dummy + error term, where Greek letter denote coefficients that are to be estimated.

[10] Some experiments using output gaps published by the IMF (World Economic Outlook Database) for some eurozone countries yielded mixed results. For some countries the results were essentially unchanged if GY were replaced by the change in the output gap, while for others (especially Germany) the difference was noticeable.

[11] The Russian GDP growth is included as a number of the East European countries in the sample have substantial trade with the country. The Baltic States were, for instance, severely affected by the Russian crisis that commenced in 1998.

for the group of Western European countries (*West*) and the group of Central and Eastern European countries (*East*).[12]

The baseline estimation in (4.1) suggests that the eurozone countries and the future member countries exhibit very different fiscal policy reaction functions: a Wald test at the 5%-level rejects the joint null hypothesis that the coefficients to BAL(-1)·*West* and BAL(-1)·*East*, to GY·*West* and GY·*East* and to DEBT(-1)·*West* and DEBT(-1)·*East* are pair-wise equal. In other words, the coefficients to the explanatory variables of the eurozone countries differ significantly from the coefficients of the CEE countries.

The budget balance in the old eurozone countries exhibits substantial inertia, while this is much less prevalent in the future eurozone members from Central and Eastern Europe. A Wald test at the 5%-level rejects the null hypothesis that the coefficients to BAL(-1)·*West* and BAL(-1)·*East* are identical.

The sensitivity of the budget balance to output shocks also differs markedly across the two groups of European countries. The coefficients to GY·*West* and GY·*East* are both positive and significant at the 5%-level, but the former coefficient is much smaller than the latter. In the sample period, fiscal policies in the CEE countries have on average been more counter-cyclical (or reactive) than in the eurozone countries. In the CEE countries, a 1%-point fall in output growth has on average been associated with a 0.5%-point deterioration of the budget balance (expressed as a percentage of GDP). The results for the eurozone countries are broadly in line with earlier studies (Ballabriga & Martinez-Mongay 2003, Wyplosz 2006). This suggests that the results for the CEE are reliable although no directly comparable studies exist for these countries.

The coefficients for the lagged debt stock are not significantly different from zero for any of the two country groups.[13] The insignificant coefficients to the debt stock are partly the result of multicollinearity between the explanatory variables, in particular between the lagged dependent variable and the lagged debt stock. The correlation coefficient between the lagged budget balance and the lagged debt stock is -0.546 for the eurozone 12 countries and -0.206 for the CEE 10 countries. A higher debt stock, which leads to higher interest payments, affects the overall balance in two ways: the extra interest payments lead directly to a deterioration of the overall balance, but this might bring about a compensatory change in the primary balance. These issues are addressed in more detail below.

The results presented in (4.1) are robust to changes in the specification and in estimation methods. Column (4.2) shows that the results are largely unchanged when the year dummies are removed. In (4.3), the Arellano-Bond GMM estimation method is replaced by ordinary OLS with country and year fixed effects (OLS/FE).[14] The estimation method apparently

[12] We generally refrain from testing directly the statistical validity of the instruments. First, the instruments have been chosen based on economic reasoning and with a view to facilitate comparison across different specifications. Second, the standard tests for overidentifying restrictions have very limited or no power in dynamic panels of dimensions like the current. The Sargan *J*-statistic for the model in (4.1) is 62.04, which is relatively high. Even substantial changes in the instrumentation have very little impact on the estimation results.

[13] Removing the insignificant debt variable from the specification does not affect the estimation results in any discernable way. We retain the debt variable in most of specifications in this paper as issues related to debt and debt servicing are of interest, cf. also subsection 3.2.

[14] OLS fixed effects estimation is chosen, as GY is the fiscal stance measure and trend growth varies across countries. It also implies that the results are comparable to those of the Arellano-Bond GMM estimations in

makes little qualitative difference in this case. We also experimented with different instrumentation configurations and found that the choice of instruments affects the results to only a small extent. Column (4.4) shows the results when the three old EU members, Denmark, Sweden, the UK, as well as Malta and Cyprus are added to the *West* group of countries. The changes are small.

The estimations in (4.1), (4.2) and (4.4) use instrumental variables to eliminate or reduce a possible simultaneity bias stemming from "reverse causality", i.e. from fiscal policies affecting the output growth rate. Column (4.5) shows the results when the overall output growth rate GY is replaced by the growth rate of private sector output (GYP). Private sector output is not directly affected by government spending and taxation, but only indirectly via the derived effects on private sector activity. Clearly, this does not eliminate possible endogeneity and GYP is therefore instrumented as before. The introduction of GYP into the fiscal balance reaction function results in very little change for eurozone countries, but the coefficient to GYP·*East* is only 2/3 of the size of the estimate to GY·*East* in (4.1). The counter-cyclicality of fiscal policies for the CEE countries appears to be less pronounced when private sector growth is used instead of total output growth.[15] This may partly reflect the fact that GYP exhibits more variability than GY. The implausibly large coefficient to DEBT(-1) for the CEE countries is related to the lower estimate for GYP for this group of countries; the two explanatory variables are correlated with a correlation coefficient equal to 0.52.

We also examined the consequences of using a measure for the *level* of the output gap (instead of the *change* as proxied by GY). Retaining the assumption of constant trend growth equal to average growth, the output gap level was calculated as accumulated changes in output gaps during the period 1995-2005. (This measure is clearly subject to an "endpoint problem".) The qualitative results were as before (not shown), although the difference between the coefficients to the cyclical measure across the eurozone and the CEE countries were smaller than found in (4.1).

The choice of country groups was discussed above. The estimation of reaction curves for each country gives relatively few significant coefficients and any inference is generally unreliable. Instead, each of the two country groups was divided into two subgroups. The eurozone countries were divided into southern eurozone countries (Portugal, Spain, Italy and Greece) and the remainder. The CEE countries were divided into the Baltic States (Estonia, Latvia and Lithuania) and the remainder. Regression (4.1) was then repeated with separate coefficients for BAL(-1), GY and DEBT(-1) for each of the four country groups. The results (not shown) indicate that the division into two main groups, the eurozone countries and the CEE countries, is indeed sensible. By means of example, the estimated coefficient for BAL(-1) is 0.74 for the northern, and 0.57 for the southern eurozone countries, while it is 0.22 for the Baltic States and 0.12 for the remaining CEE countries.[16] A Chow test indicates that restricting the coefficients so they are identical across the two subgroups cannot be rejected at the 1% level.

(4.1)-(4.2). Furthermore, a Hausman test rejects the null hypotheses that the individual effects are uncorrelated with the other explanatory variables in the model.

[15] This result may be an indirect indication that counter-cyclical policies are most effective in the CEE countries. This result is indeed confirmed in Section 4.

[16] The only exception is an implausibly large coefficient for DEBT(-1) for the Baltic States. The small size of the subgroup and the very low debt levels make us discount this result as a statistical aberration.

3.2 Debt and interest payments

The estimations in Table 4 generally suggest that the debt stock has little or no effect on the overall budget balance. A possible explanation is that while a higher debt stock leads to higher interest payments that directly strain the budget, it also provides incentives to tighten fiscal policy. These two effects may outweigh each other, a view which is supported by the estimations presented in this subsection.

In Table 5, column (5.1) is repeated from (4.1) in Table 4 in order to ease comparisons with the following results. Column (5.2) shows the result when interest payments are added to regression (4.1), i.e. the overall budget balance is regressed on its lagged value, output growth, the lagged debt stock and the interest payments. Neither the lagged debt stock nor interest payments attain significant coefficients. As before, there is substantial correlation between the explanatory variables. For instance, the correlation coefficient between BAL(-1) and INTR(-1) is -0.584 for the eurozone 12 countries and -0.264 for the CEE 10 countries.

Table 5. Budget balance reaction functions – debt and interest payments

	(5.1)	(5.2)	(5.3)	(5.4)
	BAL	**BAL**	**PrBAL**	**PrBAL**
BAL(-1)·*West*	0.606***	0.588***	..	..
	(0.141)	*(0.156)*		
BAL(-1)·*East*	0.099	0.023	..	..
	(0.131)	*(0.101)*		
PrBAL(-1)·*West*	..	..	0.503***	0.547***
			(0.146)	*(0.127)*
PrBAL(-1)·*East*	..	..	0.129	0.120
			(0.122)	*(0.121)*
GY·*West*	0.218**	0.156*	0.085	0.125
	(0.093)	*(0.086)*	*(0.105)*	*(0.076)*
GY·*East*	0.622***	0.532***	0.655***	0.525***
	(0.146)	*(0.142)*	*(0.120)*	*(0.106)*
DEBT(-1)·*West*	-0.013	-0.012	0.041	-0.0065
	(0.022)	*(0.020)*	*(0.040)*	*(0.017)*
DEBT(-1)·*East*	0.014	0.058	0.041	0.053
	(0.030)	*(0.051)*	*(0.047)*	*(0.038)*
INTR·*West*	..	-0.028	..	0.393**
		(0.142)		*(0.197)*
INTR·*East*	..	-0.213	..	0.287
		(0.371)		*(0.404)*
Country dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Method	GMM-AB[a)]	GMM-AB[b)]	GMM-AB[c)]	GMM-AB[d)]
Time sample	95-05	95-05	95-05	95-05
No. of countries	22	22	22	22
No. of obs.	194	189	186	186

Notes: White's period robust standard errors are shown in brackets below the coefficient estimates. A post-positioned ***, ** or * indicates that the null hypothesis of the coefficient being 0 is rejected at, respectively, the 1%, 5% and 10% level of confidence.

[a)] The level instruments are BAL(-2), GY(-2) and DEBT(-2). The time-differenced instruments are output growth in the USA, output growth in Russia, real oil price growth, and the real Fed funds interest rate. The instruments are included separately for the West and East country groups. Year dummies are also used as level instruments.

[b)] As in a) but INTR(-2) is added as level instrument.

[c)] As in a) but BAL(-2) is replaced by PrBAL(-2).

[d)] As in b) but BAL(-2) is replaced by PrBAL(-2).

To assess the relative importance of direct and indirect effects on the fiscal balance from debt and interest payments, we estimated policy reaction functions explaining the *primary* budget balance as a percentage of GDP (PrBAL). Column (5.3) shows the results for when the primary balance is regressed on the lagged primary balance, economic growth and lagged debt stock. The results with respect to inertia and cyclicality are qualitatively unchanged. The coefficient for the debt stock is insignificant for both the eurozone and the CEE countries.[17]

Column (5.4) shows the results for when the actual interest payment as a percentage of GDP (INTR) is added as a regressor in the primary balance reaction function. The debt stock is still without importance.[18] The coefficient for the interest payments is significant at the 5% level for the eurozone countries, while it remains insignificant for the CEE countries. The coefficient estimate for INTR is around 0.4, implying that if interest payments increase by 1%-point of GDP, then the primary balance is strengthened by 0.4%-points of GDP. In other words, higher interest payments are only partly translated into an improved primary balance in eurozone countries. The coefficient for INTR is insignificant for the CEE countries, arguably reflecting that the debt stock and hence interest payments are relatively small there.

The estimations presented in Table 5 show that the primary balance does not react to debt accumulation, but to the obligations of servicing the debt and then only significantly so for the eurozone countries. The headline budget balance appears to be unaffected by debt accumulation and interest payments. This lack of feedback suggests that there are no direct mechanisms ensuring convergence towards low levels of government debt.

3.3 Sample split and structural change

The time sample used hitherto is 11 years (and shorter in some cases where the data is lacking). The relatively short sample period has the advantage of making major fiscal policy regime changes less likely within the sample. Still, during the period from 1995 to 2005 a number of events took place making it relevant to check for possible structural breaks along the time dimension. For the eurozone countries, the introduction of the euro may have affected domestic fiscal policies. For the CEE countries, the Russian crisis in the fall of 1998 was an important event that affected their economies in numerous ways.

It should be noted that splitting the sample into two or more subsamples across the time dimension leaves very few observations in each subsample. This applies in particular to the CEE 10 countries in the early part of the sample where many data points are missing. This also means that we have not found it expedient to determine possible breakpoints endogenously as such test would exhibit very limited power.[19] To assess whether the formation of fiscal policy changed during the period 1995-2005, we have straightforwardly split the sample into two sub-periods, i.e. 1995-2000 and 2001-2005. The small sample sizes suggest that the results should be interpreted with caution.

---

[17] Although the estimated coefficients are insignificant, the point estimates of around 4% appear reasonable. Ballabriga & Martinez-Mongay (2003) and Wyplosz (2006), who use longer samples extending back to the 1980s, find that the debt stock has a positive impact on the primary balance.

[18] For the eurozone 12 countries the correlation coefficient is -0.259 between PrBAL(-1) and INTR(-1), and 0.188 between PrBAL(-1) and DEBT(-1). For the CEE 10 countries, the correlation coefficient is 0.374 between PrBAL(-1) and INTR(-1), and 0.351 between PrBAL(-1) and DEBT(-1).

[19] Some preliminary investigation has shown that no breakpoint is statistically significant, i.e. based on *statistical inference* no breakpoint exists. The analysis in the text is therefore based on *ex ante economic arguments* for suspecting a breakpoint around the turn of the century.

For each sub-period the fiscal balance reaction function is estimated both with and without the debt stock; the latter option preserves precious degrees of freedom. The results are shown in Table 6. Column (6.1) repeats (4.1) from Table 4, i.e. the regression for the *full sample*. The estimation in column (6.2) corresponds to the one in (6.1) but excludes the debt variable.

Table 6. Budget balance reaction functions – sample split and structural change

	(6.1)	(6.2)	(6.3)	(6.4)	(6.5)	(6.6)
	BAL	**BAL**	**BAL**	**BAL**	**BAL**	**BAL**
BAL(-1)·*West*	0.606***	0.609***	0.539***	0.571***	0.705***	0.645***
	(0.141)	*(0.148)*	*(0.117)*	*(0.135)*	*(0.211)*	*(0.215)*
BAL(-1)·*East*	0.099	0.103	0.071	0.022	-0.012	0.031
	(0.131)	*(0.128)*	*(0.305)*	*(0.268)*	*(0.159)*	*(0.154)*
GY·*West*	0.218**	0.206**	0.025	0.026	0.771***	0.692***
	(0.093)	*(0.087)*	*(0.068)*	*(0.068)*	*(0.276)*	*(0.239)*
GY·*East*	0.622***	0.620***	0.204	0.229	0.751**	0.728**
	(0.146)	*(0.130)*	*(0.265)*	*(0.254)*	*(0.334)*	*(0.290)*
DEBT(-1)·*West*	-0.013	..	-0.013	..	-0.013	..
	(0.022)		*(0.022)*		*(0.022)*	
DEBT(-1)·*East*	0.014	..	0.014	..	0.014	..
	(0.030)		*(0.030)*		*(0.030)*	
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Method	GMM-AB[a)]	GMM-AB[a)]	GMM-AB[a)]	GMM-AB[a)]	GMM-AB[a)]	GMM-AB[a)]
Time sample	95-05	95-05	95-00	95-00	01-05	00-05
No. of countries	22	22	22	22	22	22
No. of obs.	194	194	86	86	108	108

Notes: White's period robust standard errors are shown in brackets below the coefficient estimates. A post-positioned ***, ** or * indicates that the null hypothesis of the coefficient being 0 is rejected at, respectively, the 1%, 5% and 10% level of confidence.
[a)] The level instruments are BAL(-2), GY(-2) and DEBT(-2). The time-differenced instruments are output growth in the USA, output growth in Russia, real oil price growth, and the real Fed funds interest rate. The instruments are included separately for the West and East country groups. If included in the regression, the year dummies are also used as level instruments.

When comparing (6.3)-(6.6) with (6.1)-(6.2), it becomes clear that it is difficult to obtain satisfactory estimation results for the fiscal balance reactions when the two sub-samples are estimated separately. The number of available observations is very small and this encumbers formal empirical testing. It is apparent, however, that the coefficient for the lagged budget balance BAL(-1) remains larger for the eurozone 12 countries than for the CEE 10 countries in both sub-samples. This suggests that the policy inertia for the entire sample from 1995 to 2005 remains more pronounced in the group of eurozone countries than in the group of new EU members from Central and Eastern Europe.

The coefficients for the economic cycle in the two groups of countries are imprecisely estimated. Still, while the coefficient for GY·*West* is insignificant and close to zero in the first sub-period, it is sizeable and significant in the second sub-period. This would suggest that while in the second half of the 1990s fiscal policy was a-cyclical in the eurozone countries, it became counter-cyclical in the years after the turn of the century. This result is basically in line with Wyplosz (2006) who finds that fiscal policies have become more counter-cyclical in

the eurozone countries since the formation of the EMU.[20] The reason for this change is not immediately clear. One possibility is that the countries seeking to qualify for EMU membership abstained from pursuing counter-cyclical fiscal policies. After having secured membership, the policy priorities shifted towards cyclical accommodation.

The tentative overall result is that while the eurozone 12 countries have retained more fiscal inertia than the CEE 10 countries, the degree of counter-cyclicality increased after the turn of the century leaving little difference across the two country groups within this area of fiscal policy. These results are based on splitting the sample in 2001, but qualitatively similar results are attained if the sample is split in 2002 or 2003. All the results on structural breaks are, however, based on very few observations and must be re-examined when more data points become available.

3.4 Expenditure and revenue reactions

We now proceed to estimate separate fiscal policy reaction functions for general government expenditure and revenue as a percentage of GDP. The expenditure and revenue are modelled as functions of their lagged values, output growth and the lagged debt stock, Mayes & Viren (2005). The results are shown in Table 7.

Turning first to the general government expenditure as a percentage of GDP, it follows from (7.1) that the expenditure reaction function exhibits only slightly more inertia in the current eurozone countries than in future members. Expenditure are counter-cyclical in the sense that an output increase does not lead to a proportional increase in expenditure; the counter-cyclicality is more pronounced in the CEE countries than in the Eurozone 12 countries, although the difference is not statistically significant. The debt variable enters significantly for the CEE countries, but the result stems mainly from Slovakia, which pursued a stop-go fiscal policy in parts of the sample period. Removing Slovakia from the sample would make the coefficient for DEBT(-1)·*West* insignificant without affecting the other results qualitatively.

The revenue reaction function is shown in (7.2). Revenue as a percentage of GDP exhibits substantial inertia for both the eurozone and the CEE countries. The estimated coefficient for GY·*West* is negative and estimated precisely. This indicates that revenue is pro-cyclical in the sense that higher growth is associated with *lower* revenue as a percentage of GDP. This result may be surprising as the bulk of revenue stems from taxes; for the progressive parts of the tax system, the tax intake as a percentage of GDP would increase when GDP increases. Mayes & Viren (2005), using data from the old EU members, find that government revenue are more responsive to decreasing than to increasing growth rates; recessions lead to lower government revenue, while booms do not lead to corresponding increases in government revenue. (This would be the result if policymakers cut tax rates in booms when tax revenue would otherwise increase.) The coefficient for output growth is positive, but insignificant for the CEE countries. A Wald test confirms that the coefficients for GY·*West* and GY·*East* are significantly different at the 5% level.

[20] Gali & Perotti (2003) also find that fiscal policies have become more counter-cyclical in the post-Maastricht period.

Table 7. Expenditure and revenue reaction functions

	(7.1)	(7.2)	(7.3)	(7.4)
	EXP	**REV**	**REV**	**REV**
EXP(-1)·*West*	0.500**	..	..	..
	(0.238)			
EXP(-1)·*East*	0.459***	..	..	..
	(0.083)			
REV(-1)·*West*	..	0.742***	0.622***	0.965**
		(0.124)	*(0.188)*	*(0.337)*
REV(-1)·*East*	..	0.652***	-0.197	0.443***
		(0.062)	*(0.235)*	*(0.099)*
GY·*West*	-0.290*	-0.222**	-0.299***	-0.185
	(0.151)	*(0.104)*	*(0.077)*	*(0.321)*
GY·*East*	-0.422***	0.328	0.230	-0.202
	(0.095)	*(0.223)*	*(0.184)*	*(0.238)*
DEBT(-1)·*West*	-0.0059	-0.0091	-0.040	0.016
	(0.042)	*(0.027)*	*(0.047)*	*(0.106)*
DEBT(-1)·*East*	-0.278***	-0.253	-0.647***	-0.040
	(0.094)	*(0.129)*	*(0.112)*	*(0.146)*
Country dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Method	GMM-AB[a)]	GMM-AB[b)]	GMM-AB[b)]	GMM-AB[b)]
Time sample	95-05	95-05	95-00	01-05
No. of countries	21	21	18	21
No. of obs.	183	183	82	101

Notes: White's period robust standard errors are shown in brackets below the coefficient estimates. A post-positioned ***, ** or * indicates that the null hypothesis of the coefficient being 0 is rejected at, respectively, the 1%, 5% and 10% level of confidence.
[a)] The level instruments are EXP(-2), GY(-2) and DEBT(-2). The time-differenced instruments are output growth in the USA, output growth in Russia, real oil price growth, and the real Fed funds interest rate. The instruments are included separately for the West and East country groups. Year dummies are also used as level instruments.
[b)] The instruments are as in a) with EXP(-2) replaced by REV(-2).

These results give further insights into the results for the budget balance found previously and in particular into the variations in the responsiveness of the budget balance to output shocks in the two country groups. For the CEE countries, a positive growth shock decreases expenditure and increases revenue as a percentage of GDP (although the effect on revenue is imprecisely estimated). The net or aggregate effect on the budget balance is a marked improvement. For the eurozone countries, a negative output shock decreases expenditure, but also *decreases* revenue as a percentage of GDP. The net effect on the budget balance as a percentage of GDP is therefore muted as found in, for instance, (4.1). In other words, the lack of counter-cyclicality in the budget balance in the eurozone countries stems from the revenue side, not the expenditure side.

Columns (7.3) and (7.4) show the results when the sample period is divided into two sub-periods. The estimations show that for the eurozone countries the negative effect of output growth on revenue as a percentage of GDP is strongest for the early part of the sample, i.e. the period before and immediately after the introduction of the euro. This finding corresponds with the observed changes in the budget balance reaction function reported in Table 6.

4. The impact of fiscal policy on output variability

This section considers how different measures of fiscal policy affect output variability in the sample countries and also whether there are differences across current and future eurozone members. A major objective of fiscal policy is to stabilise the business cycle and, in particular, to alleviate downturns and consequent unemployment problems (Romer 2006, Ch. 11). A number of empirical studies have also suggested that lower business cycle variability is associated with higher trend growth in the economy (Ramey & Ramey 1995, Fatas & Mihov 2005, Aghion & Marinescu 2006).

When seeking to explain the effect of fiscal policy on the business cycle, the challenge is to deal adequately with the endogeneity problem, i.e. to identify respectively the effects of economic fluctuations on fiscal policy and the effects of fiscal policy on the cycle. We employ a modelling procedure from e.g. Fatas & Mihov (2001, 2003a) and Koskela & Viren (2003), where a measure of output *variability* is explained by a various measures of fiscal policy while controlling for other factors affecting output variability. By using the time dimension of the sample to construct the measures of output variability and fiscal policy, the regression analysis explaining output variability is cross-sectional.

In this section, Denmark, Sweden, United Kingdom, Malta and Cyprus are included in the analysis as part of the *West* group. The main reason for this is the otherwise small number of observations in the cross-section estimations; the additional observations improve the efficiency of the estimations. We found in (4.4) in Table 4 that inclusion of these five non-euro (and non-transition) countries into the *West* group did not alter the budget reaction functions markedly.

The variable to be explained is SDGYP, the standard deviation of private sector output growth taken across the years 1995-2005. By using private sector output instead of total output, the effect of a possible endogeneity bias will be reduced. We employ a total of four different country-specific fiscal policy measures. Two of these are averages of statistical variables and do not require much explanation. EBAL is the average general government budget balance over the period 1995-2005. EREV is the average general government revenue intake over the period 1995-2005.

In Section 3, we estimated fiscal policy reaction functions and interpreted the estimated coefficient(s) to the output growth rate as a measure of the cyclicality (or reactivity) of fiscal policy; cf. also Fatas & Mihov (2001). In particular, Tables 4 and 5 reported estimated reaction functions for the *budget balance*. In this case, a positive coefficient for the output term is taken to mean that fiscal policy is counter-cyclical – the larger the coefficient, the more counter-cyclical the policy. Thus, the estimated coefficients for the output growth term can be interpreted as a measure of the *degree* of fiscal balance counter-cyclicality.[21] It followed from Tables 4 and 5 that the budget balance on average was more counter-cyclical for the CEE countries than for the eurozone countries.

To derive a country-specific measure of the counter-cyclicality of the fiscal balance, we use our panel dataset to estimate a budget balance reaction function along the lines of the regressions in Table 4, but with country-specific coefficients for GY. The coefficient for the lagged

[21] The coefficient partly captures the effect on the budget balance resulting from automatic stabilisers, i.e. the effect on the fiscal balance resulting from cyclical changes while keeping policy (e.g. tax rates and unemployment replacement rates) unchanged *and* the effect of policy changes induced by the cyclical stance.

balance is estimated separately for non-transition and the CEE countries, while the debt term is suppressed in order to retain as many degrees of freedom as possible.[22]

The estimation is undertaken using the Arellano-Bond GMM methodology with the instruments being the levels of the lagged endogenous variable treated separately for Western and Eastern Europe, the two periods lagged and differenced GY for each country and the time dummies. Evidently, the large number of coefficients implies that some of the coefficients are imprecisely estimated. Still, the coefficients estimated for the lagged budget balance resemble those estimated in (4.4). Likewise, the averages of the coefficients for GY for non-transition and CEE countries are broadly in line with the values found in (4.4). The two (numerically) largest negative coefficients are found for Spain and Greece. The variable CCF (Counter-Cyclical Fiscal policy) comprises the estimated coefficients for GY for the 27 countries in the sample. The average of CCF across the 27 EU countries is 0.38 and the standard deviation is 0.71. The average of CCF is 0.19 for the 17 West European EU countries and 0.51 for the 10 CEE countries; these averages correspond well to the estimated coefficients for GY·*West* and GY·*East*, respectively, in (4.4).

Finally, a measure of the non-systematic component of fiscal policy is included. We follow Fatas & Mihov (2003a) and define the non-systematic or autonomous part of the fiscal balance as the part that cannot be predicted given the cyclical movements or easily observable control variables.[23] The autonomous fiscal balance can thus be derived as the difference between the actual budget balance and the budget balance predicted by a reaction function.[24] In particular, the variable SDAF comprises the standard deviation of the residuals from (4.4) for each country over the period 1995-2005. The variable SDAF is our measure of autonomous fiscal policy. A low SDAF indicates that the fiscal balance has been close to the expected fiscal policy reaction and, hence, the measure of autonomous policymaking is small. A large SDAF indicates that the fiscal balance has been greatly influenced by autonomous policy changes. The average of SDAF across the 27 countries in the sample is 1.58 and the standard deviation is 0.85.

Besides the fiscal policy variables, a number of control variables are included. First, the overall size of the economy is captured by the purchasing power parity adjusted GDP of each country averaged across the period 1995-2005. Second, the openness of the economy is proxied by the squared export share averaged over the period 1995-2005. Variables capturing size and openness are also used in e.g. Fatas & Mihov (2001, 2003a) and Koskela & Viren (2003) and are generally found to have a great deal of explanatory power.

Table 8 shows the (cross-sectional) results when the standard deviation of private output growth (SDGYP) is regressed on control variables and variables reflecting the fiscal policy stance. All explanatory variables are included separately for western EU countries (*West*) and

[22] We have experimented with other ways of estimating the cyclicality term, e.g. estimating equations separately for each country and estimating the panel using fixed-effects OLS. Although there are substantial differences in the individual country estimates, the different sets of counter-cyclical policy coefficients are strongly correlated.

[23] Fatas & Mihov (2003a) label the variable "discretionary fiscal policy", while Gali & Perotti (2003) use the term "non-systematic discretionary fiscal policy" to emphasise that the variable solely captures the non-systematic component of fiscal policy.

[24] The autonomous fiscal policy component could alternatively have been derived as the difference between the actual budget balance and the cyclically adjusted balance as published by e.g. the OECD, IMF or EU. This method is not applicable here as historical data on the cyclically adjusted fiscal balance is not available for CEE countries. Furthermore, reliable estimates of the cyclically adjusted balance are only available with a very long lag (Buti & Sapir 2006, Hallett *et al.* 2007).

the CEE countries (*East*). The possible endogeneity of several of the explanatory variables and the fact that SDAF and CCF have been derived from an initial regression suggest that the estimations should be undertaken using instrumental variables. However, the very small sample size and the lack of obvious instruments entail that we predominantly employ OLS estimation and only use IV estimation for robustness checks. All results should be interpreted with caution because of the possible endogeneity problems and the limited degrees of freedom.

Table 8. Region-specific determinants of variability of private sector output growth

	(8.1)	(8.2)	(8.3)	(8.4)	(8.5)	(8.6)
	SDGYP	**SDGYP**	**SDGYP**	**SDGYP**	**SDGYP**	**SDGYP**
EBAL·*West*	-0.093	..	..		-0.040	..
	(0.066)				*(0.070)*	
EBAL·*East*	0.529***	..	..		-0.169	..
	(0.092)				*(0.098)*	
SDAF·*West*	..	0.488**	..	..	0.406	0.467*
		(0.213)			*(0.336)*	*(0.256)*
SDAF·*East*	..	-0.142	..	..	1.030***	1.094***
		(0.582)			*(0.168)*	*(0.173)*
CCF·*West*	..	..	0.116	..	0.205	0.187
			(0.219)		*(0.258)*	*(0.239)*
CCF·*East*	..	..	-1.931***	..	-2.798***	-2.525***
			(0.547)		*(0.431)*	*(0.528)*
EREV·*West*	..	..	..	-0.027	-0.032	-0.035
				(0.024)	*(0.030)*	*(0.028)*
EREV·*East*	..	..	..	-0.310***	-0.323***	-0.286***
				(0.059)	*(0.025)*	*(0.025)*
Size·*West*	-0.133***	-0.117**	-0.143**	-0.139***	-0.151*	-0.147*
	(0.040)	*(0.046)*	*(0.052)*	*(0.042)*	*(0.079)*	*(0.076)*
Size·*East*	-0.514	-1.392	-1.722	0.480	-1.135***	-1.054**
	(0.932)	*(0.837)*	*(0.651)*	*(0.588)*	*(0.254)*	*(0.356)*
Openness ·*West*	1.717***	1.302***	1.452***	1.344***	1.103**	0.979**
	(0.298)	*(0.248)*	*(0.289)*	*(0.350)*	*(0.492)*	*(0.440)*
Openness·*East*	-1.616	-2.905	0.314	3.498**	3.960***	2.978***
	(3.105)	*(5.797)*	*(4.637)*	*(1.810)*	*(0.918)*	*(0.475)*
Constant·*West*	1.744***	1.209**	1.985***	3.346**	2.868	3.035*
	(0.303)	*(0.530)*	*(0.285)*	*(1.310)*	*(1.667)*	*(1.625)*
Constant·*East*	5.624***	5.212**	5.120***	15.39***	15.95***	14.87***
	(1.445)	*(1.877)*	*(1.877)*	*(2.719)*	*(0.878)*	*(0.976)*
Method	OLS	OLS	OLS	OLS	OLS	OLS
No. of countries	27	27	27	26	26	26
R^2	0.63	0.51	0.65	0.80	0.93	0.93

Notes: White's heteroskedastic robust standard errors are shown in brackets below the coefficient estimates. A post-positioned ***, ** or * indicates that the null hypothesis of the coefficient being 0 is rejected at, respectively, the 1%, 5% and 10% level of confidence.

The very small sample impels us to start by including the fiscal policy variables separately and only subsequently to enter the various fiscal policy measures simultaneously. Column (8.1) shows the results when the average budget balance EBAL is brought in along with the control variables. The coefficient to the average budget balance is insignificant for the western EU countries, but significant and positive for the CEE countries. Taken literally, a larger

average deficit is associated with lower private sector output volatility in the latter countries. The result, however, does not survive the inclusion of other measures of fiscal policy, cf. below.[25]

Column (8.2) shows the results when the autonomous policy SDAF variable is included as the only fiscal policy variable. Non-systematic or autonomous fiscal policy increases the variability of private output growth in Western EU countries. Although the result may be surprising, it is in accordance with the findings in Fatas & Mihov (2003a), where the robustness of the finding is thoroughly examined and confirmed to apply also to the high-income OECD countries. Autonomous fiscal policy appears to have no influence on growth in the CEE countries.

It follows from (8.3) that the variable capturing the degree of counter-cyclical fiscal policy (CCF) enters significantly and with the expected negative sign for the CEE countries, but appears to be unimportant for Western EU countries. The coefficient estimate is possibly be biased, as countries that are subject to large output fluctuations may choose to pursue more counter-cyclical policies (Rodrik 1998, Fatas & Mihov 2003a). We have tried to instrument CCF using per capita income, import share and the average population size (the latter chosen as population size might affect the policy making process). The result was qualitatively unchanged although the parameters are generally less precisely estimated. The chosen instruments are, however, hardly ideal.

The coefficient for the average revenue intake (EREV) is negative for both Western European and CEE countries, although it is only significant for the CEE countries, cf. (8.4). A negative relationship between government size and output variability is a recurrent result in the empirical literature; similar findings using other datasets are reported in e.g. Cohen & Follette (2000), Fatas & Mihov (2001) and Koskela & Viren (2003).

Column (8.5) shows the results of the estimation of private sector output variability when all four fiscal policy variables are included. The budget balance is now insignificant for both regions. Autonomous fiscal shocks lead to higher private sector output variability, although the estimated coefficient is only significant for the CEE countries. Counter-cyclical fiscal policy reduces output variability for the CEE countries, while the coefficient is insignificant for the western EU countries. A large government sector appears to reduce variability for the CEE countries, but not for the western country group. The control variables have the same signs are frequently found in the empirical literature.

The fiscal policy variables are correlated and we have therefore tried to eliminate the average fiscal balance from the setup. The result is shown in column (8.6) and it is clear that the main conclusion from is retained: fiscal policy variables have no statistically discernable effects on private sector growth variability in the western EU countries, but appear to have statistically significant effects in the CEE countries.

We now briefly discuss the size of the estimated fiscal policy parameters in (8.6). The standard deviation of SDAF for the CEE countries is 1.05. Thus, increasing SDAF by one standard deviation leads to an increase in the standard deviation of private growth by 1.1 percentage points in these countries. The standard deviation of the counter-cyclical policy measure CCF is 0.63 for the CEE countries, and increasing CCF by this quantity leads to a reduction in the standard deviation of private growth by 1.6 percentage points. Finally, increasing the av-

[25] Replacing EBAL by the primary budget balance leads to qualitatively the same results (not shown).

erage government revenue by 1 percentage point leads a 0.3 percentage point reduction in the CEE countries. These results bear witness that fiscal policy measures are important in both statistical and economic terms in the new EU countries from Central and Eastern Europe. It should be underscored, however, that there is much more unexplained variability in the CEE countries than in the western EU countries: the point estimates to the constant term is 3.0 for the western EU countries, but 14.9 for the CEE countries.

The estimation in (8.6) is undertaken on a very small sample and the results should be taken as indicative. Robustness checks with the inclusion of dummies for specific countries do not alter the results qualitatively. We have also sought to instrument the three fiscal policy variables using the same instruments as before, i.e. per capita income, import share and the average population size. The results are qualitatively unchanged albeit with some loss in efficiency.

5. Final comments

This paper has compared the formation and effectiveness of fiscal policy in the current and future eurozone members. Considering the formation of fiscal policy, empirical analyses indicate that the average fiscal policy reaction of the 10 CEE countries is markedly different from the fiscal reaction in the 12 eurozone countries. The results can be summarised in the following numbered points:

i) The overall budget position is on average worse in the CEE countries than in the eurozone countries. Whether the pursuit of a debt-financed fiscal expansion is appropriate or not in high-growth economies such as CEE countries is an unresolved issue.

ii) The fiscal balance exhibits much less inertia in the CEE countries than in the eurozone countries. It is easier to adjust the budget balance in the CEE countries than in the eurozone.[26]

iii) The fiscal balance is more counter-cyclical in the CEE countries than in the eurozone countries; the difference is significant both in statistical and economic terms. This suggests that – given the same degree of output volatility – the CEE countries experience more cyclicality in the budget than the eurozone countries.

iv) The primary balance strengthens in the eurozone countries when the interest payments increase, while a similar result cannot be found for the CEE countries.

v) For both the eurozone countries and the CEE countries, the overall budget balance is not affected by the public debt stock or interest payments. The finding that there are no direct mechanisms ensuring convergence toward lower levels of government debt suggests that the deficit ceiling of SGP is prudent.

vi) The main difference in fiscal policy reaction in the eurozone and CEE countries stems from the revenue intake. The eurozone countries have pursued pro-cyclical revenue policies, while the CEE countries have raised revenue in a counter- or a-cyclical revenue way.

[26] The large degree of inertia in the eurozone 12 countries seems to be a mirror image of the fact that many of these countries have sustained substantial deficits for long periods of time without the national policymakers being willing to correct these imbalances even when risking reprimands and fines for breaching the 3% ceiling of the SGP (see also Annett & Jaeger 2004). The limited or non-existent inertia in the CEE countries may partly be the result of the relatively economic high in these countries facilitating fiscal adjustment, but could also reflect fluctuating revenues (some privatisations, foreign aid) and expenditures (bank consolidation).

vii) The differences between the eurozone and CEE countries may have waned over time. In particular, fiscal policy in the eurozone appears to have become more counter-cyclical after the turn of the century.

Turning now to the effectiveness of fiscal policy, the results are based on cross-section estimations with only 26 or 27 observations. A number of econometric complications imply that the results should be considered preliminary:

viii) Autonomous or non-systematic discretionary fiscal policies aggravate economic fluctuations in both the eurozone countries and – and more pronouncedly – in the CEE countries.

ix) Counter-cyclical fiscal policy decreases private growth variability in the CEE countries, but appears unimportant in the western EU countries.

x) Government size is a more important factor explaining growth variability in the CEE countries. The average budget balance emerges as unimportant for both groups of countries.

In conclusion, in spite of the Central and Eastern European countries having run substantial deficits since the mid-1990s, their overall fiscal policy appears to be more "agile" and counter-cyclical than that of Western Europe. Furthermore, counter-cyclical fiscal policies have likely reduced growth fluctuations. The Central and Eastern European economies are small, open and exposed to a multitude of shocks, but have still managed to attain a reasonable degree of macroeconomic stability.

The conclusions above are all framed by the short sample on which the analyses are based. The lack of data points dictated that the analyses were kept simple and parsimonious. Only 11 or fewer annual data points for each country meant that the empirical analysis could not be undertaken on an individual country level, but had to rely on panel data estimations. The joint determination of economic output fluctuations and fiscal stance necessitated the use of instrumentation. As usual, the results obtained will be no better than the quality of the instruments used.

Turning finally to the future accession of the Central and Eastern European countries to the EMU, there are several policy implications in this paper. First, the agile fiscal policy reactions suggest that although several of the CEE countries have or have had substantial deficits, they should not face very large problems moving their budgets towards a more sustainable position, allowing them to satisfy the Maastricht criteria on government deficits. Second, the high degree of counter-cyclicality in budget balance implies that it will be much easier for the CEE countries to satisfy the deficit criterion during booms than recessions.

Third, the relative effectiveness of counter-cyclical fiscal policy and, more broadly, government intervention in the CEE countries, may suggest that the lack of monetary autonomy after accession to the EMU will not bring about an unduly large increase in output volatility. Fiscal policies can help dampen cyclical movements from asymmetric shocks. Fourth, an active counter-cyclical fiscal policy may lead to substantial fluctuations in the budget balance across the economic cycle, which increases the risk of breaking the Stability and Growth Pact. Developments in years to come will tell whether these anticipations and concerns prove justified.

References

Afonso, Antonio, Christiane Nickel & Philipp Rother (2005): "Fiscal Consolidations in the Central and Eastern European Countries", European Central Bank, Working Paper, no. 473.

Afxentiou, Panos (2000): "Convergence, the Maastricht Criteria, and Their Benefits", *Brown Journal of World Affairs*, vol. 7, no. 1, pp. 245-254.

Aghion, Philippe & Ioana Marinescu (2006): "Cyclical Budgetary Policy and Economic Growth: What Do We Learn from OECD Panel Data?", mimeo, Harvard University, http://www.economics.harvard.edu/faculty/aghion/papers/Cyclical_Budgetary_Policy.pdf.

Aghion, Philippe & Peter Howitt (2006): "Appropriate Growth Policy: A Unifying Framework", *Journal of the European Economic Association*, vol. 4, no. 2-3, pp. 269-314.

Alesina, Alberto & Roberto Perotti (1995): "Fiscal Expansions and Adjustments in OECD Countries", *Economic Policy*, vol. 10, no. 21, pp. 205-248.

Alesina, Alberto & Roberto Perotti (1997): "Fiscal Adjustments in OECD Countries: Composition and Macroeconomic Effects," *Staff Papers* (International Monetary Fund), vol. 44, no. 2, pp. 210-248.

Annett, Anthony & Albert Jaeger (2004): "Europe's Quest for Fiscal Discipline", *Finance & Development* (International Monetary Fund), June, pp. 22-25.

Ardy, Brian, Iain Begg, Dermot Hodson & Imelda Maher & David Mayes (2006): *Adjusting to EMU*, Palgrave-Macmillan.

Arellano, Manuel (2003): *Panel Data Econometrics*, Oxford University Press.

Aschauer, David Alan (1985): "Fiscal Policy and Aggregate Demand", *American Economic Review*, vol. 75, no. 1, pp. 117-127.

Baldwin, Richard & Charles Wyplosz (2004): *The Economics of European Integration*, New York: McGraw Hill.

Ballabriga, Fernando & Carlos Martiniez-Mongay (2003): "Has EMU Shifted Monetary and Fiscal Policies", in Buti, Marco (ed.): *Monetary and Fiscal Policies in EMU. Interactions and Coordination*, Cambridge University Press, pp. 246-272.

Bayoumi, Tamim & Silvia Sgherri (2006): "Mr Ricardo's Great Adventure: Estimating Fiscal Multipliers in a Truly Intertemporal Model", Centre for Economic Policy Research, CEPR Discussion Paper, no. 5839.

Berger, Helge, George Kopits & Istvan Szekely (2007): "Fiscal Indulgence in Central Europe: Loss of the External Anchor?", *Scottish Journal of Political Economy*, vol. 54, no. 1, pp. 118-37.

Blanchard, Olivier & Roberto Perotti (2002): "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", *Quarterly Journal of Economics*, vol. 117, no. 4, pp. 1329-1368.

Bowsher, Clive (2002): "On Testing Overidentifying Restrictions in Dynamic Data Models", *Economics Letters*, vol. 77, no. 2, pp. 211-220.

Budina, Nina & Sweder van Wijnbergen (1997): "Fiscal Policies in Eastern Europe", *Oxford Review of Economic Policy*, vol. 13, no. 2, pp. 47-64.

Buti, Marco & Andre Sapir (2006): "Fiscal Policy in Europe: The Past and Future of EMU Rules from the Perspective of Musgrave and Buchanan", Centre for Economic Policy Research, CEPR Discussion Paper, no. 5830.

Caldara, Dario & Christophe Kamps (2006): "What do we know about the effects of fiscal policy shocks? A VAR-based comparative analysis", Computing in Economics and Finance 2006 (Society for Computational Economics), Working Paper, no. 257, http://ideas.repec.org/p/sce/scecfa/257.html

Cohen, Darrel & Glenn Follette (2000): "The Automatic Fiscal Stabilizers: Quietly Doing Their Thing", *FRBNY Economic Policy Review*, April, pp. 35-68.

European Commission (2006): "The Stability and Growth Pact", website with links to legal texts, http://ec.europa.eu/economy_finance/about/activities/sgp/sgp_en.htm.

Eurostat (2006): "Statistics in Focus", http://ec.europa.eu/eurostat/. (Data downloaded 1 August 2006.)

Fatas, Antonio & Ilian Mihov (2001): "Fiscal Policy and Business Cycles: An Empirical Investigation", http://faculty.insead.edu/fatas/myc.pdf. (Also published in Spanish in *Moneda y Credito*, vol. 118.)

Fatas, Antonio & Ilian Mihov (2003a): "The Case for Restricting Fiscal Policy Discretion", *Quarterly Journal of Economics*, vol. 118, no. 4, pp. 1419-1447.

Fatas, Antonio & Ilian Mihov (2003b): "On restricting fiscal policy in EMU", *Oxford Review of Economic Policy*, vol. 19, no. 1, pp. 112-131.

Fatas, Antonio & Ilian Mihov (2005): "Policy Volatility, Institutions and Economic Growth", Centre for Economic Policy Research, CEPR Discussion Paper, no. 5388.

Fischer, Stanley (1993): "The Role of Macroeconomic Factors in Growth", *Journal of Monetary Economics*, vol. 32, no. 3, pp. 485-512.

Frankel, Jeffrey & Andrew Rose (1998): "The Endogeneity of the Optimum Currency Area Criteria", *Economic Journal*, vol. 108, no. 449, pp. 1009-1025.

Frenkel, Michael & Christiane Nickel (2005): "How Symmetric Are the Shocks and the Shock Adjustment Dynamics between the Euro Area and Central and Eastern European Countries?", *Journal of Common Market Studies*, vol. 43, no. 1, pp. 53-74.

Gali, Jordi & Roberto Perotti (2003): "Fiscal policy and monetary integration in Europe", *Economic Policy*, vol. 18, no. 37, pp. 533-572.

Green, William (2000): *Econometric Analysis*, Prentice Hall, 4th ed.

Grigonyte, Dalia (2003): "Impact of Currency Boards on Fiscal Policy in Central and Eastern European Countries", *Economics of Planning*, vol. 36, no. 2, pp. 111-133.

Hallett, Andrew, Rasmus Kattai & John Lewis (2007): "Early Warning or Just Wise After the Event? The Problem of Using Cyclically Adjusted Budget Deficits for Fiscal Surveillance", Bank of Estonia, Working Paper, no. 2/2007.

Judson, Ruth & Ann Owen (1999): "Estimating Dynamic Panel Data Models: A Practical Guide for Macroeconomists', *Economic Letters*, vol. 65, no. 1, pp. 9-15.

Kattai, Rasmus & John Lewis (2005): "Hooverism, Hyperstabilisation or Halfway-House? Describing Fiscal Policy in Central and Eastern European EU Countries", *Baltic Journal of Economics*, vol. 6, no. 1.

Korhonen, Iikka (2003): "Some empirical tests on the integration of economic activity between the euro area and the accession countries", *Economics of Transition*, vol. 11, no. 1, pp. 177-196.

Koskela, Erkki & Matti Viren (2003): "Government Size and Output Volatility: New International Evidence", University of Helsinki, Department of Economics, Discussion Paper, no. 569.

Mayes, David & Matti Viren (2005): "The SGP and The ECB: An Exercise in Asymmetry", paper for the conference "Economic Consequences of European Monetary Integration", University of Victoria, 18-19 August, www.sinica.edu.tw/econ/activities/past/20050927.pdf.

Mueller, Johannes, Christian Beddies, Robert Burgess, Vitali Kramarenko & Joannes Mongardini (2002): "The Baltic Countries: Medium-Term Fiscal Issues Related to EU and NATO Accession", *Occasional Paper* (International Monetary Fund), no. 213.

Murray, Michael (2006): "Avoiding Invalid Instruments and Coping with Weak Instruments", *Journal of Economic Perspectives*, vol. 20, no. 4, pp. 111-132.

Nuti, Mario (2006): "Alternative Fiscal Rules for the New EU Member States", TIGER Working Paper (Warsaw), no. 84.

Perotti, Roberto (2005): "Estimating the Effects of Fiscal Policy in OECD Countries", CEPR Discussion Paper, no. 4842.

Ramey, Garey & Valerie Ramey (1995): "Cross-Country Evidence on the link between volatility and growth", *American Economic Review*, vol. 85, no. 5, pp. 1138-1151.

Rodrik, Dani (1998): "Why do More Open Economies Have Bigger Governments?", *Journal of Political Economy*, vol. 106, no. 5, pp. 997-1032.

Romer, David (2005): *Advanced Macroeconomics*, McGraw-Hill, 3rd rev. ed.

Romer, David (2005): *Advanced Macroeconomics*, McGraw-Hill.

Roubini, Nouriel & Jeffery Sachs (1989): "Political and Economic Determinants of Budget Deficits in the Industrial Democracies", *European Economic Review*, vol. 33, no. 5, pp. 903-938.

Wyplosz, Charles (2002): "Fiscal Policy: Institutions vs. Rules", The Graduate Institute of International Studies, Geneva, HEI Working Paper, no. 03/2002.

Wyplosz, Charles (2006): "European Monetary Union: The Dark Sides of a Major Success", *Economic Policy*, vol. 21, no. 46, pp. 207-261.

[All web links valid 2 May 2007.]

Appendix A

The source of all variables is Eurostat (2006). The data was downloaded on 1 August 2006.

Variables varying over time and across countries

BAL	=	General government budget balance, percent of GDP.
DEBT	=	General government debt, percent of GDP.
East	=	Dummy equal to 0 for the eurozone countries, the EU15 countries or the EU15 plus Malta and Cyprus (depending on context); 1 for the countries in Central and Eastern Europe.
EXP	=	General government expenditure, percent of GDP.
GY	=	Growth of GDP, percent year-to-year.
GYP	=	Growth of private sector GDP, percent year-to-year.
INTR	=	General government interest payments, percent of GDP.
PrBAL	=	General government primary budget balance, calculated as PrBAL = BAL + INTR.
REV	=	General government (tax and non-tax) revenue, percent of GDP.
West	=	Dummy equal to 1 for the eurozone countries, the EU15 countries or the EU15 plus Malta and Cyprus (depending on context); 0 for the countries in Central and Eastern Europe.

Variables varying over time (used as "outside instruments" in GMM-AB estimations)

Output growth in Russia	=	Growth of GDP, percent year-to-year. Source: *Transition Report 2005: Business in Transition*, European Bank for Reconstruction and Development. Macroeconomic indicators, http://www.ebrd.com/pubs/econo/6520.htm.
Output growth in the USA	=	Growth of GDP, percent year-to-year.
Real Fed funds interest rate	=	Average annual Federal Funds rate minus US consumer price inflation. Sources: http://www.federalreserve.gov/releases/h15/data.htm; IMF, International Financial Statistics (CD-rom).
Real oil price growth	=	Growth of oil price (average of three widely traded oil types) in US dollars deflated by US consumer price index. Source: IMF, International Financial Statistics (CD-rom).

Variables varying across countries

CCF	=	Degree of Counter-Cyclicality of Fiscal balance. The country-specific CCF coefficients are obtained from a panel estimation explaining BAL by its lagged value and GY; the country-specific coefficient to GY is CCF.
EBAL	=	Average of BAL across 1995-2005.
EREV	=	Average of REV across 1995-2005.
Openness	=	*Squared* value of average of export as a share of GDP across 1995-2005.
SDAF	=	Measure of autonomous policy "aggressiveness"; standard deviation of residual from (4.4) across 1995-2005.
SDGYP	=	Standard deviation of private sector output growth across 1995-2005.
Size	=	Product of the following two variables, i.e. the index of relative Purchasing Power Parity adjusted GDP per capita (EU25 = 100) averaged across the years 1995-2005 and the average population across 1995-2005 in *billions*.

Appendix B

Table B.1. The general government budget balance in 27 European countries, % of GDP

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005[a)]	Avg.[b)]
Belgium	-4.3	-3.8	-2.0	-0.7	-0.4	0.2	0.6	0.0	0.1	0.0	0.1	-0.9
Bulgaria	..	..	-0.3	1.7	0.4	-0.5	1.4	-0.2	0.6	1.3	..	0.6
Czech Republic	..	..	-2.5	-5.0	-3.6	-3.7	-5.9	-6.8	-6.6	-2.9	-2.6	-4.4
Denmark	-3.1	-1.9	-0.5	0.2	2.4	1.7	2.6	1.2	1.0	2.7	4.9	1.0
Germany	-3.3	-3.4	-2.7	-2.2	-1.5	1.3	-2.9	-3.7	-4.0	-3.7	-3.3	-2.7
Estonia	..	..	1.9	-0.3	-3.7	-0.6	0.3	1.0	2.4	1.5	1.6	0.5
Greece	-10.2	-7.4	-4.0	-2.5	-1.8	-4.1	-6.1	-4.9	-5.8	-6.9	-4.5	-5.3
Spain	..	-4.9	-3.2	-3.0	-1.2	-0.9	-0.5	-0.3	0.0	-0.1	1.1	-1.3
France	-5.5	-4.1	-3.0	-2.7	-1.8	-1.4	-1.6	-3.2	-4.2	-3.7	-2.9	-3.1
Ireland	-2.1	-0.1	1.1	2.4	2.4	4.4	0.8	-0.4	0.2	1.5	1.0	1.0
Italy	-7.6	-7.1	-2.7	-2.8	-1.7	-0.6	-3.2	-2.9	-3.4	-3.4	-4.1	-3.6
Cyprus	..	..	..	-4.3	-4.5	-2.4	-2.3	-4.5	-6.3	-4.1	-2.4	-3.9
Latvia	..	..	..	-0.6	-4.9	-2.8	-2.1	-2.3	-1.2	-0.9	0.2	-1.8
Lithuania	..	..	-1.1	-3.0	-5.6	-2.5	-2.0	-1.4	-1.2	-1.5	-0.5	-2.1
Luxembourg	2.1	1.9	3.2	3.2	3.7	6.0	6.1	2.0	0.2	-1.1	-1.9	2.3
Hungary	..	..	-6.8	-8.0	-5.6	-3.0	-3.5	-8.4	-6.4	-5.4	-6.1	-5.9
Malta	..	..	-10.7	-10.8	-7.6	-6.2	-6.6	-5.6	-10.2	-5.1	-3.3	-7.3
Netherlands	-4.2	-1.8	-1.1	-0.8	0.7	2.2	-0.2	-2.0	-3.1	-1.9	-0.3	-1.1
Austria	-5.6	-3.9	-1.8	-2.3	-2.2	-1.5	0.1	-0.5	-1.5	-1.1	-1.5	-2.0
Poland	..	..	-4.0	-2.1	-1.4	-0.7	-3.7	-3.2	-4.7	-3.9	-2.5	-2.9
Portugal	-4.5	-4.0	-3.0	-2.6	-2.8	-2.8	-4.2	-2.9	-2.9	-3.2	-6.0	-3.5
Romania	..	..	-4.5	-4.4	-2.1	-3.8	-3.5	-2.0	-2.0	-1.4	..	-3.0
Slovenia	..	..	..	-2.2	-2.1	-3.5	-3.9	-2.7	-2.8	-2.3	-1.8	-2.7
Slovakia	..	..	-5.5	-4.7	-6.4	-12.3	-6.6	-7.7	-3.7	-3.0	-2.9	-5.9
Finland	-3.7	-3.2	-1.5	1.5	2.2	7.1	5.2	4.1	2.5	2.3	2.6	1.7
Sweden	-7.0	-2.7	-0.9	1.8	2.5	5.1	2.5	-0.2	0.1	1.8	2.9	0.5
United Kingdom	-5.7	-4.3	-2.0	0.2	1.0	3.8	0.7	-1.6	-3.3	-3.3	-3.6	-1.6
EU15[c]	..	..	..	-1.6	-0.7	1.0	-1.2	-2.2	-2.9	-2.6	-2.3	-1.6
EU25[c]	..	..	..	-1.7	-0.8	0.8	-1.3	-2.3	-3.0	-2.6	-2.3	-1.7

[a)] Estimates by Eurostat.
[b)] Average over 1995-2005 (or available sample).
[c] GDP weighted averages (Bulgaria and Romania are not included in EU25).
Source: Eurostat (2006).