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EMU enlargement and government debt*

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Abstract

The continued debate on even the softened Stability and Growth Pact (SGP) highlights that the question of public debt in the European Monetary Union (EMU) needs further scrutiny. Both political economy models for emerging market sovereign debt and exchange rate regimes, as well as models on common pool and debt spillover problems in a monetary union point to an upward drift of public debt for countries joining EMU. In turn, this could lead to the expectation that, the more countries join EMU, the more pressure on an already battered SGP will develop.
However, such models and first empirical research tend to focus only on the behaviour of governments – that is, the demand side on the market for government debt. Factors determining the supply side of government debt – i.e. capital markets – are most of the time left out of the analysis. This paper tries to fill this gap by analysing empirically the effects of both public debt demand and supply factors on the budget balances in the EMU candidate countries of Central and Eastern Europe (CEE) as well as in EMU and other OECD countries from 1994 to 2005.
The results suggest that, although demand factors seem to have played a more important role than supply factors, some evidence for market conditions limiting new debt is found. More interestingly, despite the SGP disappointment, membership of EMU, as well as the time of the convergence to EMU, so far appears to coincide with more positive budget balances. Since most of the SGP literature assumes that EMU will cause a bias for higher debt due to spillover effects between EMU member countries, this could warrant a different theoretical approach to the impact of monetary unions on government debt..

JEL classification: F33, G15, H62, H63
Key words: monetary union, fiscal stability, government debt, EMU enlargement

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I. Introduction

The Stability and Growth Pact (SGP) is widely seen as having lost its disciplining effect despite its reform and in particular due to repeated budget deficits in excess of 3% of gross domestic product (GDP) of Germany, Italy and France. In 2004, the EU was joined by ten new members, of which already six also came under the scrutiny of the EU Commission excessive deficit procedure.[1] Is the EU heading for continued fiscal profligacy and eventual unsustainability of their public finances? Are the new EU members as bad, or even worse in their fiscal performance, causing an already embattered SGP to receive its final blow? If this were the case, a major reason could be the role that the institution of the European Monetary Union (EMU) plays in the development of government debt, since the new EU members automatically signed on to EMU candidacy. Similar to the convergence of the existing EMU members and their fiscal reaction to the Maastricht criteria before 1999, the government debt of the new EU members may be already affected (see Appendix charts 1 and 2).

The focus in this paper will be on the budget balance developments of the eight new EU members of the countries from Central and Eastern Europe (CEE), including experiences with the old EU members and major non-EU economies of the time from 1994 to 2005. Apart from EU entry and the transition process for the CEE countries, there were the profound institutional changes of the convergence for European Monetary Union (EMU) with its binding Maastricht fiscal criteria to qualify for EMU entry, and, for most incumbent EU members, the impact of membership of EMU itself.

The latter two institutional changes, together with other determinants of budget balances known from the literature will be analysed using a pooled regression analysis with fixed effects for 30 countries. These other determinants are variables chosen with the insight that budget balances are, ultimately, the outcome of both credit demand from governments and credit supply from capital markets. It is in particular the latter side which is often neglected by empirical and theoretical studies on how government budgets and debt dynamics can be explained. As such, if markets work properly, they might tolerate, say, budget deficits even in excess of SGP thresholds.

This paper is structured as follows. After a short review of the empirical literature and a discussion of theoretical determinants of government budgets, an empirical model is proposed. This model is similar in nature to those used in the empirical literature for the analysis of annual budget data, such as by Heinemann (2000), Berger, Kopits and Székely (2004), Hallerberg, Strauch and von Hagen (2006) or Wyplosz (2006). The results are then discussed and connected with the theoretical considerations, followed by a conclusion.

[1] The current fiscal status of all EU members can be checked on the EU Commission´s special website http://ec.europa.eu/economy_finance/about/activities/sgp/natnot_en.htm

II. A short overview of the related empirical literature

Various studies exist that try to assess the EMU impact on government debt despite the few data available so far. Heinemann (2000) finds in an early empirical study on the impact of EMU on primary balances that the convergence period had a significant, positive impact on the balances. More recently, though, fiscal balances in the EU analysed in detail by Hughes Hallett, Lewis and von Hagen (2003), as well as by Hughes Hallett and Lewis (2005) provide a different picture. Most notably, they identify with a probit model on fiscal consolidation probabilities some sort of "consolidation fatigue", i.e. a slackening of the fiscal stance of the old EU members after EMU entry. On the other hand, Ballabriga and Martinez-Mongay (2005) find that EU country primary balances are reacting in a way to accumulated gross debt that public finances should still be sustainable. They also find some sort of Maastricht effect (i.e. the start of the EMU convergence process with its criteria from 1993 onwards), but they jugde it as overall positive for the sustainability of primary balances, that is the part of the budget balance without interest payments. Wyplosz (2006) puts into question an EMU-related "consolidation fatigue", pinpointing an OECD-wide profligate trend in the late 1990s. He even finds evidence of some improvement for fiscal discipline in EMU members, linking it to a success of the SGP to dampen procyclical fiscal policies.

Concerning public debt in CEE, authors concentrate more on different themes when discussing either the exchange rate or fiscal policies. The fiscal policy research focus here is most of the time on either the suitability of the Maastricht fiscal criteria for the CEE countries, or the relatively short time period of a market economy and respective fiscal policies, as well as the differences to the incumbent EU members.[2] These theoretical findings have led some researchers to empirically investigate whether fiscal policy insights from industrial countries (OECD and EU) can be also transferred to CEE. Afonso, Nickel and Rother (2006) find that as for industrial countries, in the CEE expenditure-based fiscal consolidations tend to have more chances of success than revenue-based consolidations. Schneider and Zápal (2005) build on the framework developed by Hughes Hallet, Lewis and von Hagen (2003) and highlight the important role that a rather high real growth in the CEE countries has played to keep already persistent budget deficits from ballooning. However, similar to Hughes Hallet, Lewis and von Hagen (2003), they would argue such growth-based budget balance support to be rather unstable and list various negative public expenditure trends in those countries.

More studies on the impact of an exchange rate regime on government debt come from experiences with emerging markets (also owing to larger and longer data samples with many exchange rate regime changes available). Here, for instance, Tornell and Velasco (1995 and 1998) found some evidence that

[2] Buiter and Grafe (2004) give an overview of structural differences of CEE. Several studies focus on the fiscal impact of EU entry (for instance, Backé, 2002). While most expect postive net transfers to the CEE countries in the longer run, there will likely be more costs than transfers for the CEE countries during the first years of EU entry (Orbán and Szapary, 2004). Overall, empirical studies on the fiscal performance of CEE countries caution against applying the same fiscal rules for EMU. Either there are some structural differences warranting different budget and debt thresholds, or the additional burden of joining the EU has to be accounted for.

not all fixed exchange rate regimes are helping to stabilise fiscal balances – on the contrary, they seem to more often than not lead to rising government debt.[3] However, the evidence seems to be mixed also for Emerging Markets, since different results have been found so far for CEE countries. In one of the few studies so far that link CEE government debt and the choice of the exchange rate regime, Grigonyté (2003) empirically checks CEE countries for the impact of the exchange rate regime choice on the fiscal performance. She finds that currency boards induce more fiscal discipline than all other regimes, but also that simple pegs provide less discipline than flexible regimes. Berger, Kopits and Székely (2004) look for any deviation in the CEE fiscal policies from what could be expected from the standard empirical factors influencing deficits and debt. They find that a political-economic bargaining position prior to EMU entry seems to tilt the larger CEE countries more to profligate policies, whereas the smaller countries are more conservative since they lack a bargaining position.

III. Theoretical factors determining government debt-making outside and inside EMU

There is a large number of theoretical approaches explaining why budget balances and the dynamics of government debt could differ between countries[4]. To provide a basis for the following empirical analysis, the existing theories are classified within four categories and are briefly presented in this section. First, the macroeconomic factors that influence a budget balance: real growth, inflation and the interest paid on outstanding government debt. Second, both the economic and political economic reasons for debt-making by governments, or rather the demand for debt, are presented. Third, the role of markets – i.e. the supply of capital for the government debt demand is described. Finally, a fourth area of approach can be found in the institutional changes brought by EMU: the common central bank, the Maastricht criteria and the SGP, alongside their theoretic reasoning. Special circumstances that may pertain to the CEE countries (possibly owing to the emerging market status and transition experience) are outlined whereever applicable.

1. Macroeconomic environment

Real growth and inflation (combined: nominal growth) influence the budget balance and accumulated government debt through a number of channels. Depending on the revenue and expenditure structure of a government, a rise in real growth and/or inflation could mean both higher revenues and expenditure, affecting default probability (Alesina et al., 1992). Then there is the effect that a change in these factors has on the denominator of the typical relative representation of the extent of debt; that is as a percent of (nominal) gross domestic product (GDP). Accumulated gross debt, of course, can be relatively reduced by nominal growth, since a government (through its control of a central bank) can

[3] Tornell and Velacso (1995, 1998) provide a political economic theory to explain this phenomenon found in research on Africa and Latin America. See also below in the theoretical discussion on page 7-8.
[4] Even the corresponding key literature is too large to quote here. Blankart (2003) provides a good overview.

boost inflation, whereas raising real growth in the short run is only achievable by deficit spending in conditions of weak domestic demand (see also the next category). However, EMU and the European Central Bank (ECB) would put the inflation option out of (individual) national reach. This may in times of deteriorating real growth (and in the case of revenues declining faster than mandatory expenditures like public wages) still lead to a real devaluation of goverment debt, as the default risk rises.

Several special factors for CEE countries come to mind. As for real growth, CEE countries can be expected to converge to the incumbent EU (as was the experience with the Southern EU expansion), likely even more than in other Emerging Marekts due to deepened economic integration. So they should show higher growth rates and may afford higher deficits to keep debt to GDP stable. Losoncz (2004) also points out the problem of likely large clandestine economies of CEE countries, entailing an upside estimation bias of fiscal balances as % of GDP. Finally, the structural Balassa-Samuelson effect may lead to higher CEE inflation.

Note that the interest rate paid on government debt may also be considered a macroeconomic factor, or at least closely tracking the overall interest rate conditions in the respective economy. Institutional changes like a monetary union may lead to overall lower interest rates as the exchange rate risk vanishes, in turn boosting real growth. This kind of "convergence gain" may be particularly important for countries with weak domestic monetary institutions prior to EMU entry, such as emerging markets and the CEE countries. In total, the theoretical and empirical literature on the optimum currency areas (OCA) may provide an answer whether to expect a higher GDP growth, lower inflation and lower interest rate for a country joining a monetary union. Currently, the discussion seems to be in favour of a positive impact on the macroeconomic environment for EMU.[5]

Formally, the interaction of growth, inflation and the interest rate with government debt can be expressed as[6]

$$(1) \qquad d_{t+1} = \frac{1+i_t}{1+y_t} d - \frac{p_t}{1+y_t}$$

with d the ratio of gross government debt to GDP (for the periods t and $t+1$ repectively), i the interest paid on existing government debt[7], y the nominal growth rate and p the primary budget balance. A government wishing to keep its gross debt to GDP ratio constant over time needs to balance nominal

[5] See De Grauwe (2003) for an overview of the theoretical discussion. Mongelli and Vega (2006) provide an overview of recent empirical findings.

[6] This representation is based on the method used in Sachverständigenrat (2003, No. 793). Its implications, as well as a similar structure of the theoretical impact of European Monetary Union on government debt, is discussed in more detail in Paulus (2005).

[7] This is not the same as the market interest rate for any maturity or particular security of issued government debt, such as the often used 10-year-government bond benchmark yield. It is the aggregate interest rate on all outstanding government debt.

growth and the interest paid, i.e. only needs to consider the macroeconomic environment. As such, for $d_{t+1}=d_t$, p_t can be simplified to

$$(2) \qquad p_t = (i_t - y_t)d$$

Of course, a government may not wish all the time to keep debt constant, which is why there are various other reasons for debt demand, as well as factors of debt supply limiting new government debt.

2. Demand for government debt

This category can be broadly subdivided into demand for economic reasons (following the socially optimal tasks of a government for allocating, stabilising and redistributing purposes) and political economic reasons (where the government follows its own utility maximisation that differs from that of its voters and citizens).[8]

Public investment (if used to provide public goods that have to be financed in advance and are developed over several periods) is a reason for debt demand, as is the motivation to smoothe tax income in the case of high macroeconomic volatility. If business cycle demand problems are correctly identified and procyclality is avoided, fiscal policy may also play a role to stabilise the economy. This may be even more needed (and/or used for political economic reasons) in EMU, as monetary policy to cater for the domestic business cycle is beyond the reach of national needs. Automatic stabilisers like social security systems reacting to changes in the unemployment will likely also affect the decision for new government debt. Another potential channel for EMU effects on the balance would be increased tax competition (increasing the need for debt to cushion the structural tax system changes), but this may be counterbalanced by the real growth and state revenue gains that countries joining EMU hope for. Finally, redistribution may reflect voters´ preferences as outlined in the Wagner law: with higher per capita income, the demand for public goods and redistribution may rise. This would result in higher state expenditure – not necessarily higher debt. But at this point, political economic reasons may be considered: often debt-making is considered easier to implement by politicians than raising taxes on the road to higher government services.

For instance, elections in democracies may lead to higher budget deficits to buy voters´ support.[9] Apart from elections, budgets may be distorted due to compromises that are often the result of proporational voting systems. Governments may also want to raise their utility with prestige projects and higher overall government consumption. Additionally, they may wish to tie the hands of the opposition and force it to a different policy by leaving it a large pile of debt once it is elected out of

[8] The factors of government debt demand presented here are similar to, but somewhat broader than attempts in the literature to find simple fiscal policy reaction functions similar to monetary policy reaction functions like the Taylor rule. For instance, Galí and Perotti (2003) model the primary budget balance as a function of the output gap, gross debt and the lagged primary budget balance.

[9] See Alesina and Perotti (1995) for an overview of the political economic reasons for deficits.

office. This behaviour may also be a direct consequence of lack of responsibility for government expenditure by officials and politicians.

Institutions at a national level play a major role to tackle these kind of problems, often referred to as common pool problems.[10] If government revenue and the ability to raise debt is seen as a common pool of resources, changing governments will all have an incentive to use as much as possible from such resources for their own purposes, leading to a debt bias. EMU changes common pool problems into two directions for governments: inflation is no longer availble to devalue debt, but on the other hand they may free ride on inflation externalities caused to the whole of EMU by their debt-making (see in more detail below in the fourth category).

Whether CEE countries are more prone to political economic factors is open for debate. Their rather high rates of public investment, for instance, may either lead to higher growth potential and less budget deficits in the future, or they are merely a form of creative accounting to hide transfers to pressure groups. The need for re-destribution may be higher, also thwarted by more fractured parliaments and less transparent fiscal procedures.[11] On the other hand, governments with problems in establishing functioning fiscal institutions may be more dependent on and watched more closely by international financial markets, which directly leads to the next category.

3. Supply of government debt: the role of capital markets

As outlined in the introduction, the supply side of government debt is often overlooked in the empirical and theoretical literature. One of the rare exceptions is provided, for instance, by Eichengreen and Wyplosz (1998). Heinemann (2000) analyses the primary balance reaction to various factors. He uses dummies for the impact of major capital account liberalisations and restrictions, for which, however, he finds only weak significance of disciplining the primary balance. Most studies on the market reaction to government debt try to prove some sort of “market discipline” through measuring the appropriateness of public debt interest rate moves with variations of the default probability of a government.[12]

The role of the credit supply can be briefly desribed as follows: rational markets would expect their credit to be paid back in the future and would allow new debt only if they saw sustainability not at

[10] See von Hagen (2003) for an overview of the related literature and description of the main problems. Unfortunately, institutions are hard to measure or to compare across countries. Von Hagen (2006) provides a recent description to capturing national fiscal institutions in indices.
[11] This fear was recently voiced in more detail by a study by the Zentrum für Europäische Wirtschaftsforschung. Download: ftp://ftp.zew.de/pub/zew-docs/gutachten/Kurzfassung-englisch20060505FHE.pdf.
[12] See, for example, Ardagna, Caselli and Lane (2004) for market reactions to government debt in OECD countries

risk. As such, even rising deficits could mean no risk for fiscal sustainability.[13] Governments could surprisingly refuse to pay, and thus choose to default on their debt, but this would close the door to future new debt.

However, can markets be counted on to function properly? The answer is probably found in how developed they are to avoid problems of distorted competition, unstable banking relationships (and possible bank runs and corresponding false incentives for higher debt than economically sustainable). An overview of the possible shortcomings of financial markets to discipline government debt demand is given in Paulus (2006). The sudden stops phenomenon for emerging market debt (Calvo, Izquierdo and Talvi (2003) highlights also the importance of sudden shifts in creditor expectations.

The evidence of the impact of EMU on the ability of markets to discipline governments is mixed. Bernoth, von Hagen and Schuknecht (2004) cannot exclude that in EMU markets anticipate some bailout problems (outlined below in the fourth category), whereas Heppke-Falk and Hüfner (2004) empirically show an increase in disciplining strength of markets after the start of EMU, possibly owing to improved financial integration. For the CEE countries, institutions for sound banking and financial market conditions are by now already almost on the level of the old EU members (ERBD, 2005). There is also an increasing share of foreign banks (much higher than in the old EU), which may lead to more disciplining of CEE government debt demand.

Overall, countries with higher dependency on international ties (trade, capital flows) may be expected to be disciplined harder. Similarly, markets would look to past episodes of credit problems. Reinhart, Rogoff and Savastano (2003) show that default history matters strongly, introducing a concept of "debt intolerance". However, there are only very few default events for EU and CEE countries in post-war history (the time before that is considered here as too different to matter for today´s investors).[14] As such, the only indication for a tolerance of debt is the level of existing government debt. The tolerance for debt is also linked to GDP volatility by Catao and Kapur (2006) [15], which may be more appropriate to use for this analysis on recent fiscal balances in EMU and CEE countries than government revenue and expenditure data. CEE fiscal revenue volatility is much higher than that of the incumbent EU members (Coricelli, 2005, p. 16), although Mendoza and Oviedo (2004) show that the volatility of CEE government revenue is again comparatively low vis-à-vis other emerging markets. However, Coricelli (2005, p. 15) illustrates with the example of Estonia (which currently has less public debt in % of GDP than Luxembourg) that due to the volatility of its public revenues (in part owed to strong dependence on the Russian business cycle), markets may only tolerate public debt

[13] Note that this does not mean an institution to limit debt demand like the SGP is unnecessary. Even if markets could eventually be counted on to discipline governments, in the meantime severe re-distributive effects could result which would greatly distort the utility maximisation of the voters.

[14] Actually, only Poland had a government debt crisis (in the 1980s, extending to 1993). This means likely no impact of default history on the time period analysed in this paper.

[15] This could well lead to the reason why markets accept a huge public debt and continued deficits from a country like Japan, whereas they may be less tolerant to allow more debt to small countries like Estonia (see also example by Coricelli (2005, p. 3).

levels close to 20% of GDP as sustainable. Still, GDP volatility has come down over the last years for CEE countries, which could well mean a higher new debt tolerance of markets.

Markets would also evaluate the history of the government´s acceptance of inflation and outright exchange rate devaluation. Another major element is general market conditions. If monetary policies around the world lead to low international liquidity available for investing purposes, even highly rated government debtors may find it difficult to finance new deficits.

4. Institutional factors

Basically, the theoretical arguments on the potentially negative impact of the monetary union on government debt run als follows.[16] If an EMU member increases its debt, it would worsen fiscal conditions for the other EMU members, via

(1) soaking up credit supply, increasing interest rates for every one else. However, this is an effect that is present in all exchange rate regimes and merely signals a market reaction appropriate for all markets (i.e. increasing demand leading c.p. to higher prices). The behaviour of one EMU member may also reflect badly on the credit rating of others if markets consider them similar, leading to a contagion effect like an overall deprecation of the Euro. However, once again this is also the case outside EMU, as is illustrated by the contagion crises in emerging markets over the last years.[17] As such, more of a concern is

(2) the problem of externalities in interaction with financial markets (the creditors) and the union central bank, that is the ECB. An EMU member increasing its debt may run into a debt crisis. This crisis in turn could adversely affect the financial system of EMU, necessitating a bailout by the ECB, regardless of no-bailout rules in the EU treaties. The problem is that the ECB has the primary goal of price stability – which cannot be reached if EMU is in financial turmoil and banks (often the main creditors of government debt) are severely impaired in transmitting monetary impulses from the ECB to the EMU economy. This in turn would be anticipated by markets which, in the certainty of an ECB supporting ailing debt of an EMU government, would tolerate more debt demand.[18]

This kind of potentially negative impact of EMU may be accompanied by a new incentive structure of governments in their decision of joining an exchange rate system as outlined by Tornell and Velasco (1998). They argue that it may be entirely possible for governments to exit an exchange rate system after reaping the benefits of increased trust by markets. If markets do not anticipate such a behaviour,

[16] Von Hagen (2003) gives a good overview of the fiscal problems associated with the new fiscal/monetary policy interactions in EMU. Beetsma and Uhlig (1999) provide a theoretical model of how EMU leads to rising debt of its member states due to strategic considerations.

[17] Of course, one may argue that the introduction of the Euro leads to increased economic similarity of the EMU countries as suggested by the endogenous theory of optimum currency areas.

[18] For a more detailed description see also Paulus (2006). Note that, of course, in the event of an ECB bailout investors will not receive back their original credit completely – but already a partial sharing of the costs of the default is enough to create distortions.

governments would, as such, be able to push the political and economic costs of devaluation into the future (when they exit the fixed exchange rate regime). However, leaving a monetary union is much more difficult than abandoning a fixed exchange rate. Such behaviour would in any case be impossible to prove empirically, since no country left EMU yet.[19]

The institutional response of the architects of EMU – regardless of the above theoretical approaches being valid or not – had been to establish the Maastricht criteria, as well as the SGP. Since these fiscal rules are established at an international level, they cannot be enforced with executive power of any kind, but will rather exert pressure either through potential loss of a benefit (failing to qualify for EMU if a government hopes to gain from such an EMU entry)[20], or political pressure (loss of reputation for a government failing to comply with the SGP). In the empirical studies mentioned above the notion seems to be supported that the Maastricht criteria relying more on the first factor to discipline were successful to keep budget balances in check, whereas the SGP more relying on the second factor has failed. Therefore, it seems that the negative theoretic influence of the monetary institution of a monetary union on government debt prevails in EMU, which will now be discussed empirically.

IV. The empirical model

Since the fiscal policy experience of the CEE countries is limited to the time since the early 1990s and data is mostly only available on an annual basis, a pooling regression technique is applied, using level and dummy data for 30 countries, covering the time period from 1994-2005.[21] Apart from the eight CEE countries, the 12 EMU members, as well all other OECD economies excepting Norway, Denmark, Turkey and Mexico are used to receive a large enough representative sample.[22] This roughly ascertains that half of the observations depict countries with flexible exchange rate regimes, while the other half is influenced by EMU (either through membership or convergence). Data sources are Eurostat, the European Bank for Reconstruction and Development (ERBD), OCED, the AMECO

[19] Finally, it is interesting to note that in recent emerging market literature, the exchange rate regime in its effect on government debt is seen more as secondary to other fiscal institutions (Calvo and Mishkin, 2003).
[20] See also Chart 3 in the appendix which tracks the budget balance performance of EMU candidates (of old EU and CEE countries) relative to the OECD average. There seem to be slightly higher budget balances once inside the EMU convergence phase dominated by the Maastricht criteria than in other OECD countries during the respective time periods.
[21] Some CEE data are available for the earlier 1990s. However, these data were troubled by hyperinflation, especially in the baltic states, and consequently, while still leaving the main results intact, distorted the linear estimations. Further research may include finding appropriate non-linear estimations for that period, since in CEE countries, inflation at that time helped to reduce the debt/GDP ratio, or at least to limit it to the upside. For the budget balances considered here, though, inflation has less of an impact.
[22] Denmark was excluded due to its special exchange rate arrangement. It cannot be considered as EMU member or even converging, but neither is it completely independent of EMU. Norway has a unique government budget position due to its high oil income which dominates the budget vis-à-vis the factors used here. Mexico and Turkey were excluded due to data limitations.

database of the EU Commission, and the International Monetary Fund (World Economic Outlook Database and International Financial Statistics)[23].

The empirical model used is most similar to those used in Heinemann (2000), as well as Berger, Kopits and Székely (2004) who run pooled least squares regressions with fixed effects to measure the impact of various factors on budget balances (although only the latter also do regressions on the overall budget balance). Since the stock of government debt was greatly distorted at the outset of the independent fiscal policies in the CEE countries, the analysis will be limited to the budget balances, and not extended to gross government debt as dependent variable.

The empirical model can be written as

$$(3)\ Y_{it} = \alpha + + \beta M_{it} + \eta Y_{i,t-1} + \mu X_{it} + \delta_i + \varepsilon_{it}$$

with Y_{it} as the dependent variable, M_{it} as the dummy variables for the monetary institution (monetary union, converging to monetary union, flexible exchange rate), X_{it} as a *k*-vector of regressors, and *i* and *t* denoting the country and time dummies, respectively. The coefficient α is the overall constant, the coefficients β, η, μ pertain to the effect the lagged dependent variable[24] and the different independent variables are estimated to have on *Y*. δ_i are the cross-section effects, while ε_{it} specifies the overall error term for the 30 countries observed over the time period 1994 to 2005. In the estimation, the fixed effects are confined to the countries, while no time dummies are introduced.[25]

An overview of the variables used, their source, plus the expected sign of the regression coefficents are provided in table 1 in the appendix. Broadly speaking, in these data specifications and based on the theoretic considerations above, demand factors should lead to lower budget balances with rising values (excepting the lagged GDP growth which should have positive sign), while supply factors should increase the budget balance with rising values. There is a base model (reflecting equation (2) above) with GDP, inflation, the interest rate paid on existing government debt outstanding, as well as the dummies on either EMU membership or convergence to EMU and the lagged dependent variable. This base model is extended by all other dependent variables individually. Additionally, a model including

[23] In some rare cases, as for instance public investment for Slovenia in the early-mid 1990s, national data are used to complement the international databases.

[24] The use of the lagged independent variables in fixed effects regressions or panel data analysis is not without complications, due to autoregressive biases. The usual way to correct this would be either a within group estimator to caclulate deviations from the means of each country-specific data. However, for limited time periods this method is not advisable (Bond, 2002, p. 4-5). Another method would be a dynamic panel analysis where differencing the data would deal with autoregressive effects (for instance, Arellano and Bond, 1991). However, as also noted by Hallerberg, Strauch and von Hagen (2006, p. 16, for their use of budget indexes), when using non-differenciable data, as is the case here with dummies for the presence of EMU effects, the analysis would be greatly impaired.

[25] Time-specific fixed effects are most often only useful in panel analysis of data with dinstinctly different points in time.

all independent variables is estimated. To analyse the impact of EMU and the convergence time on the individual independent variables, interactive dummy regressions conclude the regression output.

1. The dependent variable

As is fairly widespread in the empirical literature (see above in the overview section), the primary balance will be also used here to depict the effects of annual new government debt outcomes from government demand and capital market supply. There are, however, two reasons to also look at the headline budget balance as the dependent variable, and not only the primary balance. First, the supply side may be more likely to appreciate the efforts done on the whole budget (including interest payments). Since in this case the analysis will be limited to a one-equation pooled estimation, the dependent variable should be one that is important both for the demand side (the governments) and the supply side (the creditors). Second, both the demand and supply side should allow for unexpected interest rate movements as well as be prudent about the development of the economy in their decisions to demand or tolerate new debt. Note that an improving primary balance due to expenditure cuts may not be honoured by markets with lower spreads, if 1) the general environment for credit is deteriorating and 2) if the structure of the debt of that country is deeply hurt by adverse interest rate movements and 3) growth is turning down, maybe due to a neighbour country´s recession etc. The point is that various factors determining the debt path are outside a government´s direct control (as illustrated by a primary balance), and should – as is the case for private companies and households in their financial planning – be accounted for by a prudent government.[26]

2. The independent variables

Here, apart from dummies for EMU membership and the convergence time to EMU[27] as well as the budget balances lagged by one year, 16 independent variables were chosen to control for the three categories outlined in the theoretical considerations above.[28]

Representing the macroeconomic environment, the real GDP growth rate was introduced, as well as inflation proxied by an annual GDP deflator. Rising GDP and inflation should lead to rising government revenue and higher balances, with inflation possibly limiting the upside drift to budget balances in the presence of strong government trade unions leading also to higher government

[26] Note that privatisation proceeds are part of the budget balance and likely had a large impact on budget balances especially for CEE countries. However, due to lack of data they are not yet included in the regressions.
[27] This is usually started with the sample start (1994) for the EMU countries, and 2003 (the de facto year of acceptance into the EU) for the CEE countries. Due to its euro currency board, Estonia is considered as EMU-converging already since the sample start (1994) as well.
[28] A dummy for the CEE countries to capture any transition-related effect was found not significant. Neither was a dummy to check for similarities between the CEE experience and that of Spain, Portugal and Greece – countries that also endured a transition from centrally planned to market economy before joining the EU (a similar idea was introduced by Schneider and Zápal, 2005, pp. 23-24. See also figure 4 in the appendix).

expenditure. The devaluing (and relative debt-reducing) effect of inflation is likely to be not as visible in the annual budget balance as in the gross government debt.[29]

Then, the indicators for debt demand are chosen. Public investment should be considered (as % of GDP)[30], as well as unemployment (as % of total workforce), since governments (of the sample countries with social security systems) have to automatically pay higher transfers if the unemployment rises. A factor that could represent the inclination of governments to use fiscal policy as an anticyclical stabiliser will be proxied by the real GDP growth rate lagged by a year to account for the time fiscal impulses need.[31] To illustrate the effect rising income may have in the demand for government services, per capita GDP is also included in the regression. In order to quantify the political economic influence on budget balances an election dummy is used.[32] To approximate potential political economic effects in a democracy leading to compromises, common pool problems and higher deficits, the population size is included.[33] Openness (defined as import and exports as % of GDP) may be considered a factor both for the demand and the supply side of new government debt. On the demand side, it is also an indicator of how likely governments will occasionally have to compensate their voters for losses in structural changes and economic volatility (more likely in open economies[34]). On the government debt supply side, it can be considered an indicator of how open the economy is to the rest of the world also on the current account. That is, how much external finance influence is potentially exerted on debt-making which would point to the opposite direction for its effect on the budget balance.

Finally, there a several control variables to separate an EMU and convergence effect from the supply factors for new government debt. Foremost, an aggregate interest rate of all government debt is derived from the interest payments (as % of GDP) multiplied with gross government debt (% of GDP),

[29] A dummy for the Russian crisis in 1998 was also tried, with no additional insights, possibly since the GDP data already capture this exceptional impact on budget balances (see also chart 2 in the appendix for the possible influence of that crisis on the budget dynamics in CEE countries). Results are available from the author upon request. Basically, the value for this dummy can be assumed 1 for the CEE countries in 1999 (following Lewis, 2005), and 0 otherwise.

[30] Akitoby and Stratmann, 2005, p. 1: "...the fiscal deficit can be a misleading indicator. For example, if the fiscal deficit increases because of the public investment activities that promise high returns in the future, in the short runs spreads may decrease." Likewise, Buiter and Grafe (2004, pp. 84-85) highlight the impact of public investment that would, after reaching infrastructure levels of incumbent EU members, revert to lower ratios, resulting in higher primary balances.

[31] Note that many studies use the output gap to measure the reaction of fiscal policy to variations in the business cycle. However, not for all CEE countries such data are available in a consistently estimated manner. Additionally, the voter pressure on a government may be greater with a more visible decline in real growth, rather than an output gap which is not perceived by the general public.

[32] There are also indices of centralisation or fiscal institutions that take higher values in the case of, for example, more deficit-biased decentralised governments or a weak position of the finance minister. These are not used here due to data constraints. For instance, Gleich (2003) has calculated some such indicators for CEE countries, although not for all countries of the sample used in this paper. Von Hagen (2006) recently calculated indices for EU countries and Japan.

[33] The country-specific fiscal institutions possibly are reflected in the fixed effect outcomes that are not explicitly considered here.

[34] Conversely, it may be argued that the more open an economy is, the more able it is to smoothen its business cycle (compared to a situation of autarky).

to match the term *i* of the equations (1) and (2) from the theoretical discussion above.[35] This variable is included in the base model, with government interest payments (% of GDP) for the headline budget balance regressions. Then there is the role of already accumulated gross government debt, as % of GDP.[36] Then, creditors are possibly interested in the inflation record (proxied by 10-year moving averages of the inflation rates) and the government revenue volatility (proxied by 10-year moving averages of the standard deviation of real GDP growth rates)[37]. In the literature on market discipline of government debt (as in Bernoth, von Hagen and Schuknecht, 2004), also a debt service variable is used (as defined by interest payments divided by government income), which is therefore also included here. Finally, the general world liquidity conditions will likely determine what kind of overall risk inclination international investors will have. The liquidity constraint is expressed as the average three-month real interest rate of the countries with the most influential monetary policy: US, EMU, UK and Japan, weighted by GDP.[38] With rising world real interest rates, governments will find deficits less easy to finance, resulting in higher budget balances. All of these debt supply constraints should see budget balances rise as constraints increase in intensity.

3. Results of the estimations

The estimations yield the following results (see also tables 2-4 in the appendix).[39] Since there were signs of heteroskedasticity (performing the usual White tests), both a least squares as well as an estimated generalised least squares (EGLS) technique with cross-section weights were used. Coefficients are adjusted using a White period heteroskedasticity-consistent estimation. The results are mainly similar both in the least squares and EGLS output.

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[35] Market interest rates of the same years are not used: such interest rates are a market reaction to the budget balance and debt, and, from this viewpoint, not a constraint placed by markets. It is a result of the independent variables and jointly determined with it.

[36] Net government debt (i.e. debt minus the government´s assets) may be more appropriate, but creditors are likely to be more interested in the gross debt since it may be difficult for countries running into debt service problems to liquidate part of their assets (mostly poperty) without losses. Similarly, implicit debt is assumed to play no role, yet, in annual budgets, both from demand and from supply side. Government debt is raised most often up to a maturity of 10 years, during which time demographic changes are not yet considered so severe. Buiter and Grafe (2004) present some thoughts on unfunded pension liabilities in CEE countries whose demographic development is seen even less advantegeous than for current EMU countries. For the CEE countries form 1994-1997, gross debt data are based on own estimations using the GDP, inflation and budget data available for those years, as well as the 1998 debt data.

[37] Ten years often relfect the benchmark long government bond maturity of the countries analysed. Note that for the CEE countries, the inflation record and GDP volatility data used are based on sucessively less years when going back as far as 1993. The planned economy state before that time likely is disregarded by investors.

[38] Others, like Bernoth, von Hagen and Schuknecht (2004) use the spread between US treasuries and investment grade rated US corporates as a proxy for risk aversion of international investors. Due to data constraints, a world real interest rate proxy is considered here.

[39] Tables 2 and 3 refer to the primary balance estimation, table 4 to the budget balance estimation. Since the EMU interaction variables showed almost identical results, only the results for the primary balance are shown in table 3. The regressions and appropriate tests were run using the EViews 5.1 software. A Hausman test for correlated random effects found the country-specific fixed effects model specification superior to a random effects model.

Taken at face value, the surprising result is that not only the dummy for the convergence period is positive and significant (confirming Heinemann, 2000), but also that the dummy for EMU membership shows significant, positive signs. In the various estimations and controlling for other factors, EMU members and candidates in the time from 1994-2005 seem to show roughly 1-2% better budget balances than those countries without any EMU-related impact.

In the base model, all variables were found significant and with the "correct" signs, except for inflation which was not found significant in the primary balance estimations, and weakly significant in the headline budget balance estimations (but not the model with all dependent variables). The major difference between the specifications for the primary balance and the headline budget balance is the inclusion of budget interest payments (% of GDP) for the headline budget balance calculations. For interest payments, the dominating influence (with corresponding significant negative coefficent) seems to be its role as part of the budget (similar to public investment) – so if it rises, the budget balance will be also depresssed, although it does show up with a positive significant coefficient in the headline budget balance EGLS estimation with all variables.

As for the demand factors, individually, there were only significantly negative coefficients on public investment (often approaching a 1:1 effect on primary budget balances), unemployment (in the headline budget estimation only), population and, the election dummy (albeit only with weak significance for the primary balance estimation). Concerning public investment/GDP, CEE countries have invested more over the last years than incumbent EU members. Consequently, their recent deficits look somewhat less threatening (see also chart 4 in the appendix), provided the data on public investment do not contain hidden subsidies similar in effect to transfers. However, the larger CEE countries still show deficits driven by public consumption expenditure. Bigger populations in line with more frequent negative budget balances confirm the big country bias for debt also found in other studies, but this likely only faintly echoes the detailed analyses on budget institutions and their influence on national debt. As for the subdued role of national elections in primary balances (in the base model expanded only by the election dummy), it may be noted that CEE political economy and election dummies were found to be not significant for 2001-2003 by Schneider and Zapál (2005).

In the regression containing all dependent variables, the unemployment rate also turns out to be significant and with the expected sign, while the election dummy becomes more significant. Unexpectedly, there is a weakly significant positive coefficient for the per capita GDP effect on the primary budget balance (but not the headline budget balance). However, this may in part be explained by the negative budget balances in the low per capita GDP countries of CEE, which only compared to the OECD countries of the sample have lower per capita GDP, but still show rising debt with rising per capita GDP. Elsewhere, contrary to Wyplosz (2006), no significant evidence of less procyclality is

found with the proxy of lagged real GDP growth, neither in the interactive dummies distinguishing between EMU and non-EMU effects.[40]

Regarding the supply factors, there was much less evidence of the projected effects. The interest rate obviously has a disciplining effect, both at the national levels (as expressed by interest on existing outstanding government debt), as well as on the international level (as expressed by the liquidity constraint; that is the aggregate real 3-month interest rates, although not in the individual regression). Additionally, there was some evidence of governments in economically open countries aiming for higher primary balances (but the coefficient in the headline budget balance EGLS estimation with all variables was insignificant). The little evidence for supply factors influencing the budget balance would support the subdued role capital market factors so far played in the assessment of reasons for government debt. Capital markets in the literature so far have been found to show a non-linear reaction to changes in the fundamental soundness of government policies and macroeconomic environment (cf. Ardagna, Caselli and Lane, 2004). Possibly, the linear regression may not have caught such a relationship, or merely reflecting deteriorating supply situations with deteriorating budget balances and vice-versa (as indicated by the significant negative sign on the debt and debt service coefficients in the headline budget balance estimation). Simple squared supply variables, however, were also found to be insignificant. Periods of debt instability have been near non-existant in the countries and the short time period of the sample, so that the indicators used may have had no chance to show their disciplining effect in annual budget balances of countries of either highest credit rating (OECD) or with improving credit ratings (CEE) over the sample period.

In regressions using interactive variables of the EMU and convergence dummies with the individual other independent variables, only sparse evidence was found that these variables have experienced some change in the way they influence the budget balances. For example, in this specification, there was no evidence of a change in the way GDP or the interest rate influences the budget (i.e. no indications of benefits from EMU to macroeconomic factors when compared to other OECD countries). On the demand side, only the election dummy showed a different slope in the primary balance specification, showing a more profound negative impact in those countries that are part of EMU. This would possibly hint that once inside EMU, unresolved domestic fiscal institutional problems could become more severe. On the supply side, the significant (even negative) signs for inflation record (primary balance estimations), liquidity constraint, and GDP volatility (primary balance least squares estimation) in the convergence period are an oddity and may reflect that in this time, the budget balances were allowed by markets to be more negative despite high volatility, high inflation record and restrictive global monetary policy, likely reflecting other factors not yet included

[40] It has to be noted that Wyplosz (2006) uses more sophisticated methods focused on the cyclicality of budget balances in his regressions. A weakly significant effect of anticyclical behaviour was found in the individual EGLS estimation of the headline budget balance.

in this analysis.[41] The most striking outcome of the interactive variables is that the openness factor seems to have been more pronounced for open (most often small) countries in the converging time, i.e. when qualifying for EMU, markets force governments in such countries to have even higher primary balances to increase credibility. This effect is more significant for the headline balance estimation, which also shows that open economies show more positive budget balances once inside EMU.

There are a number of caveats for interpreting the regression results, though.

Apart from the limited time period plagued by heteroskedasticity, there was some evidence of autocorrelation,[42] although a large number of regressors and countries can help to stabilise the regression output even in the presence of autocorrelation. With such a large number of independent variables, multicollinearity can, on the other hand, also be an issue. Many data are expressed as a % of GDP (public investment, the lagged budget balance, openness, interest payments and gross debt), and thus linked to real GDP and inflation. The inflation record (mostly quite stable for industrial countries) may be connected to the current year´s inflation, the per capita income could be connected to both GDP and the population data, GDP volatility to GDP, and the debt service to both debt and the interest rate. Using cross correlations of the data, however, there were no indications of correlations in excess of 80-90%, which would as rule of thumb be suspicious of multicollinearties (cf. Griffiths, Hill and Judge, 1993, p. 435). Furthermore, the typical symptoms of multicollinearity, a high R^2 but few or no significant independent variables, are likewise not present. As another point, the use of dummies may miss changes in the disciplining effect of a monetary union. It will be difficult, for instance, for a dummy to reflect the dynamics of budget balances for the time the dummy is included (Hughes Hallett and Lewis, 2005). However, since the time period of EMU is still rather limited, it is already difficult to obtain robust comparisons to countries outside EMU. It should be impossible, at this point, to discern statistically meaningful different EMU disciplining extents during the EMU period.

Overall, the regressions almost unanimously point to countries in EMU and in EMU convergence process as showing significantly and positively different budget balances than other OECD countries not linked to EMU, after controlling for the usual independent effects. The results appear robust in

[41] This may have to do with the way capital markets were regulated in the old EU countries in the EMU prior to and in their convergence time, or in the CEE countries in the sample period. If, for instance, governments force domestic capital markets to hold a certain amount of government debt, markets will be impaired in their ability to discipline governments.

[42] The autocorrelations were not found significant for one year lags with the appropriate method used in the presence of lagged dependent variables as regressors, as proposed by Pindyck and Rubinfeld (1998, p. 169). This is also the reason why at this point, instrument variable approaches were not used yet to correct for potential endogeneities of some independent variables with the budget balance data. However, there was evidence of two-year autocorrelation of residuals. The reason may in part be found due to some data series found to be non-stationary with the Augmented Dickey-Fuller test (per capita GDP, GDP volatiliy, interest payments, liqudity constraint and debt service). Omitting these variables did not change the results, though.

spite of the statistical shortcomings mentioned above, although certainly not all factors that determine budget balances have been identified and included, yet.[43]

4. Institutional effects of EMU on government debt: renewed considerations

Given the ex ante-qualifying aspect of the Maastricht criteria, it is hardly surprising that the convergence dummy was found positively significant in this sample.[44] At this point, however, it may be appropriate to point out that the EMU dummy variable shows – if not higher significance – bigger impact on budget balances than the convergence dummy. This would somewhat run counter to the intuition that with an almost dissolved SGP (hardly credible to begin with), the EMU period should exert less discipline than the convergence period when goverments have strong incentives to stick to the Maastricht criteria only to qualify for EMU entry. As such, the institution of monetary union with a more independent European Central Bank (ECB) may have so far more of a stabilising effect, and less of a debt bias than was feared by the architects of the SGP. There is likely a severe impact on government debt of the profound institutional change of switching from a flexible exchange rate regime to a monetary union like EMU. But why should this impact be positive instead of negative?

The answer may be found when considering the again the dilemma of the ECB faced with the inevitability of a bailout. If EMU at the same time impacts positively on the ability of capital markets to discipline debt (as for instance hinted by Heppke-Falk and Hüfner, 2004) and if the systemic risk declines in EMU due to a larger money market (Paulus, 2006), then it is straightforward to conclude that with EMU, the ECB may find itself much less often in a situation where the default of even a big government debtor could lead to a system-wide financial crisis. In turn, if governments as well as capital markets foresee this kind of mechanism, it could well make them more hesitant to bet strategically on an ECB bailout.[45]

Of course, at this early point in EMU, some of the other factors of demand and supply somehow impacted by EMU may exert more of an influence. Similarly, it may be too early yet to truly judge whether strategic considerations in EMU override the political economic factors (like elections) already present at a national level. On the other hand, since there is some evidence of disciplining capital markets, governments may have evidenced more caution in the unique monetary institution of EMU, as they realise that without monetary authority, their default risk may be overly sensitively

[43] CEE country fixed effects showed negative signs in the majority of the estimations, including the base model and the model with all independent variables (in the latter case excepting Poland and, for the primary balance, Estonia). This may point to some transition-related factors in those countries pushing down budget balances down in excess of the factors specified in the estimations. Cointegration analysis and/or different structural models may be required in further research to test more the robustness of the results.

[44] Note that the results by Heinemann (2000) may be slightly different since the experience of the CEE countries at that time was not included yet.

[45] An assessment of whether the free-riding payoff exceeds the risk associated with better-functioning capital markets needs a closer game theory analysis which is intended for a future paper.

assessed by world capital markets. This would also be in line with the findings that open economies become even more fiscally prudent than outside EMU.

V. Conclusion

It is possibly still too early to tell from an empirical investigation exactly what kind of impact EMU has on the government debt of its member states. However, the above analysis showing generally more positive budget balances during the EMU phase at least should also caution against both the theories predicting rising government debt in EMU and the more pessimistic first empirical assessment of "consolidation fatigue" and apparent relaxing of fiscal stances in the hope for an eventual larger community bailout. It is true that the large countries in EMU (Germany, Italy and France) have shown higher deficits of late, but, controlling for various other reasons for new government debt, is their behaviour truly different from countries outside of EMU?[46] Conversely, many other, smaller EMU members have shown even budget surplusses in their EMU phase. Relative to total EMU debt, of course the debt behaviour of the three largest EMU members plays a bigger role for EMU as a whole, but the question asked in this paper is whether in general, EMU has shown to have negative impact on government debt for individual countries or not.

Likewise, the picture is mixed for the CEE countries (cf. Berger, Kopits and Székely, 2004, or Lewis, 2005). Already before convergence, the governments of the baltic states and Slovenia have shown less debt-making than the governments of the larger countries Poland, Czech Republic, Hungary and Slovakia. Here again, the public investment explain part of the different debt paths, but it is too early to attribute some EMU effect as the culprit. On the contrary, Slovenia is the first to join EMU of the CEE states (in 2007) and the baltic states all have extreme fixed exchange rate arrangements, which could even be taken as further evidence that the currency regime may have an impact on government debt.

The empirical analysis has also found that only few supply side restraints were found significant in their influence on budget balances. This supports the approach used in earlier studies that concentrated rather on the demand factors for government debt. Further research into supply-side indicators may still be promising, though, for example the role of banks as supplier of government credit.[47] Demand-side indicators could possibly be enriched by indices of fiscal institutions.

[46] The better formulation, based on the positive picture of EMU for government in the empiric analysis, could rather be: in spite of the benign effect of EMU, the governments of Germany, France and Italy succumbed to the usual political-economic reasons for higher debt, as well as slower growth than in the rest of EMU.

[47] This could greatly help assess the risk of bailout in EMU. Over the sample period, EMU banks seem to have reduced their holdings of government debt, spreading the individual default risk on the one hand, but increasing contagion links in the EMU banking sector on the other hand (see also chart 5 in the appendix).

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Appendix

Table 1: Overview of variables used in regression

Variable	**Source**	***Predicted Coefficient Sign***
Dependent Variable		
Budget balances as % of GDP (primary and with interest payments)	*Eurostat, AMECO, ERBD, OECD*	
Explanatory Variables		
Monetary Regime Dummies		
EMU dummy; 1=EMU member		*Negative*
Convergence dummy; 1=EMU candidate		*Positive*
Lagged dependent variable (1 year)		*Positive*
Macroeconomic Environment		
Real GDP growth in %	*IMF (WEO)*	*Positive*
Inflation as measured by GDP deflator in %	*IMF (WEO)*	*Positive*
Demand Factors of new government debt		
Public Investment, % of GDP	*Eurostat, ERBD, OECD*	*Negative*
Per capita income (in USD, PPP)	*IMF (WEO)*	*Negative*
Unemployment rate in %	*OECD, ERBD*	*Negative*
Population in Millions	*IMF (IFS)*	*Negative*
Election Dummy; 1=Parliamentary elections*	*Wikipedia*	*Negative*
Lagged real GDP growth (one year) in %	*IMF (WEO)*	*Positive*
Supply Factors of new government debt		
Interest paid on gross government debt in %**	*Eurostat, ERBD, AMECO, OECD*	*Positive*
Interest payments, % of GDP	*Eurostat, ERBD, AMECO*	*Positive****
Gross government debt, % of GDP	*Eurostat, ERBD, OECD*	*Positive*
Openness (Imports and Exports as % of GDP)**	*IMF (WEO), IMF (IFS)*	*Positive*
Inflation record (moving avg of last 10 year consumer price inflation)**	*IMF (WEO)*	*Positive*
GDP volatility (real GDP growth rate standard deviations, 10-year moving averages)**	*IMF (WEO)*	*Positive*
Debt service (interest payments as % of government expenditure)**	*Eurostat, ERBD, AMECO, OECD*	*Positive*
Liquidity (real 3-month interest rates of US, EMU, Japan and UK in %, GDP weighted average)**	*IMF (WEO)*	*Positive*

**French presidential elections also included*

***own dalculations based on indicated sources*

****Note that for the budget balance, the coefficient could also be negative since interest payments depress the main budget*

Table 2: Primary Balance regression results

Dependent variable: annual primary budget balance in per cent of GDP
Sample 1994-2005, annual data, 356 (unbalanced) observations of 30 countries
Pooled OLS fixed effects with White period standard errors & covariance (d.f. corrected)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
EMU membership dummy	**2.175** **	**2.275** ***	**1.984** **	**1.949** **	**2.142** **	**2.135** **	**2.132** **	**2.175** ***	**2.188** **	**2.005** **	**1.741** **	**2.175** **	**2.512** ***	**1.985** ***
	0.871	*0.814*	*0.826*	*0.814*	*0.876*	*0.879*	*0.878*	*0.839*	*0.872*	*0.942*	*0.081*	*0.873*	*0.905*	*0.622*
EMU convergence dummy	**1.395** ***	**1.483** ***	**1.355** ***	**1.385** ***	**1.358** ***	**1.361** ***	**1.383** ***	**1.395** ***	**1.398** ***	**1.253** **	**0.964** **	**1.385** **	**1.583** ***	**1.587** ***
	0.511	*0.488*	*0.493*	*0.523*	*0.517*	*0.515*	*0.510*	*0.535*	*0.510*	*0.596*	*0.485*	*0.612*	*0.538*	*0.476*
Primary budget balance (lagged 1 year)	**0.416** ***	**0.383** ***	**0.413** ***	**0.402** ***	**0.414** ***	**0.412** ***	**0.405** ***	**0.416** ***	**0.414** ***	**0.413** ***	**0.410** ***	**0.415** ***	**0.412** ***	**0.325** ***
	0.112	*0.114*	*0.111*	*0.106*	*0.112*	*0.112*	*0.113*	*0.113*	*0.111*	*0.111*	*0.113*	*0.111*	*0.112*	*0.106*
Real GDP growth rate	**0.218** ***	**0.215** ***	**0.218** ***	**0.194** ***	**0.216** ***	**0.216** ***	**0.204** ***	**0.218** ***	**0.223** ***	**0.208** ***	**0.211** ***	**0.218** ***	**0.208** ***	**0.151** **
	0.059	*0.057*	*0.058*	*0.055*	*0.059*	*0.058*	*0.061*	*0.060*	*0.059*	*0.058*	*0.058*	*0.058*	*0.061*	*0.060*
Inflation	**0.032**	**0.052** **	**0.034**	**0.029**	**0.033**	**0.031**	**0.041**	**0.032**	**0.033**	**0.052**	**0.036**	**0.031**	**0.027**	**0.051**
	0.026	*0.024*	*0.027*	*0.025*	*0.026*	*0.026*	*0.027*	*0.026*	*0.026*	*0.044*	*0.028*	*0.027*	*0.027*	*0.048*
Interest paid on existing government debt	**0.453** ***	**0.439** ***	**0.472** ***	**0.466** ***	**0.440** ***	**0.455** ***	**0.445** ***	**0.453** ***	**0.457** ***	**0.442** ***	**0.472** ***	**0.447** ***	**0.420** ***	**0.460** **
	0.125	*0.116*	*0.133*	*0.127*	*0.127*	*0.124*	*0.045*	*0.127*	*0.125*	*0.126*	*0.125*	*0.187*	*0.133*	*0.200*
Public Investment (% of GDP)		**-0.910** ***												**-1.232** ***
		0.297												*0.283*
Per capita GDP (in 10,000 USD, PPP)			**0.275**											**0.939** *
			0.393											*0.530*
Unemployment rate				**-0.106**										**-0.183** *
				0.066										*0.094*
Population (millions)					**-0.060** ***									**-0.063** ***
					0.019									*0.022*
Election Dummy						**-0.251**								**-0.214**
						0.179								*0.133*
Lagged real GDP growth rate (1 year)							**0.045**							**-0.033**
							0.041							*0.061*
Gross Government Debt (% of GDP)								**0.000**						**-0.001** *
								0.012						*0.018*
Openness (% of GDP)									**0.047**					**0.065** *
									0.044					*0.037*
Inflation record										**-0.004**				**0.000**
										0.005				*0.010*
GDP volatility											**-0.114**			**-0.105**
											0.080			*0.131*
Debt service (interest payments/gov. exp.)												**0.005**		**-0.023**
												0.067		*0.072*
Liquidity constraint													**0.136**	**0.466** **
													0.125	*0.188*
Constant	**-3.901** ***	**-1.073**	**-4.600** ***	**-2.961** ***	**-1.860**	**-3.818** ***	**-3.966** ***	**-3.902** ***	**-4.382** ***	**-3.713** ***	**-3.462** ***	**-3.898** ***	**-3.990** ***	**0.942**
	1.031	*1.523*	*1.569*	*0.926*	*1.441*	*1.041*	*1.040*	*0.798*	*1.222*	*1.091*	*1.005*	*1.063*	*1.050*	*2.256*
Adjusted R square	0.657	0.673	0.657	0.660	0.658	0.658	0.657	0.656	0.657	0.658	0.658	0.656	0.658	0.686
Standard error of regression	1.815	1.773	1.816	1.809	1.814	1.814	1.816	1.818	1.816	1.815	1.814	1.818	1.814	1.738

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Table 2 (continued)

Dependent variable: annual primary budget balance in per cent of GDP
Sample 1994-2005, annual data, 356 (unbalanced) observations of 30 countries
Pooled EGLS (cross-section weighted) fixed effects with White period standard errors & covariance (d.f. corrected)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
EMU membership dummy	**1.373** ***	**1.547** ***	**1.296** ***	**1.088** ***	**1.328** ***	**1.299** ***	**1.314** ***	**1.399** ***	**1.394** ***	**1.344** ***	**1.201** **	**1.366** ***	**1.694** ***	**1.363** ***
	0.376	*0.329*	*0.385*	*0.374*	*0.373*	*0.381*	*0.375*	*0.377*	*0.375*	*0.409*	*0.480*	*0.379*	*0.453*	*0.455*
EMU convergence dummy	**1.022** ***	**1.187** ***	**0.999** ***	**0.892** ***	**0.976** ***	**0.976** ***	**0.988** ***	**1.024** ***	**1.028** ***	**1.004** ***	**0.857** **	**0.989** ***	**1.212** ***	**1.249** ***
	0.222	*0.191*	*0.224*	*0.242*	*0.223*	*0.229*	*0.238*	*0.221*	*0.223*	*0.254*	*0.343*	*0.218*	*0.278*	*0.399*
Primary budget balance (lagged 1 year)	**0.570** ***	**0.550** ***	**0.567** ***	**0.552** ***	**0.570** ***	**0.569** ***	**0.552** ***	**0.573** ***	**0.566** ***	**0.570** ***	**0.568** ***	**0.571** ***	**0.565** ***	**0.470** ***
	0.056	*0.054*	*0.056*	*0.057*	*0.056*	*0.056*	*0.057*	*0.058*	*0.056*	*0.057*	*0.057*	*0.058*	*0.056*	*0.055*
Real GDP growth rate	**0.291** ***	**0.273** ***	**0.294** ***	**0.277** ***	**0.292** ***	**0.290** ***	**0.276** ***	**0.289** ***	**0.298** ***	**0.291** ***	**0.291** ***	**0.291** ***	**0.274** ***	**0.213** ***
	0.037	*0.041*	*0.038*	*0.037*	*0.038*	*0.036*	*0.036*	*0.037*	*0.034*	*0.038*	*0.037*	*0.037*	*0.041*	*0.043*
Inflation	**0.014**	**0.030**	**0.016**	**0.013**	**0.014**	**0.012**	**0.032**	**0.013**	**0.016**	**0.015**	**0.015**	**0.014**	**0.008**	**0.006**
	0.018	*0.020*	*0.019*	*0.021*	*0.018*	*0.018*	*0.024*	*0.018*	*0.018*	*0.026*	*0.018*	*0.018*	*0.019*	*0.039*
Interest paid on existing government debt	**0.319** ***	**0.323** ***	**0.331** ***	**0.333** ***	**0.301** ***	**0.319** ***	**0.312** ***	**0.320** ***	**0.325** ***	**0.312** ***	**0.317** ***	**0.298** ***	**0.285** ***	**0.313** **
	0.091	*0.079*	*0.097*	*0.092*	*0.092*	*0.090*	*0.093*	*0.090*	*0.091*	*0.092*	*0.088*	*0.118*	*0.092*	*0.139*
Public Investment (% of GDP)		**-0.760** ***												**-1.197** ***
		0.151												*0.155*
Per capita GDP (in 10,000 USD, PPP)			**0.122**											**0.490** *
			0.249											*0.290*
Unemployment rate				**-0.101**										**-0.211** ***
				0.070										*0.073*
Population (millions)					**-0.058** ***									**-0.042** ***
					0.016									*0.015*
Election Dummy						**-0.278** *								**-2.710** **
						0.154								*0.129*
Lagged real GDP growth rate (1 year)							**0.064**							**-0.005**
							0.039							*0.046*
Gross government debt (% of GDP)								**0.003**						**-0.007**
								0.004						*0.010*
Openness (% of GDP)									**0.040** *					**0.049** **
									0.021					*0.023*
Inflation record										**0.000**				**0.003**
										0.003				*0.008*
GDP volatility											**-0.031**			**-0.037**
											0.052			*0.109*
Debt service (interest payments/gov. exp.)												**0.015**		**0.014**
												0.390		*0.053*
Liquidity constraint													**0.136**	**0.344** ***
													0.088	*0.124*
Constant	**-3.128** ***	**-0.856**	**-3.460** ***	**-2.228** ***	**-1.120**	**-3.014** ***	**-3.265** ***	**-3.285** ***	**-3.557** ***	**-3.071** ***	**-2.945** ***	**-3.107** ***	**-3.169**	**2.351**
	0.663	*0.787*	*1.035*	*0.843*	*1.015*	*0.648*	*0.688*	*0.676*	*0.768*	*0.690*	*0.770*	*0.670*	*0.683*	*1.674*
Adjusted R square	0.781	0.790	0.781	0.785	0.782	0.784	0.786	0.781	0.783	0.780	0.779	0.781	0.783	0.810
Standard error of regression	1.746	1.699	1.747	1.741	1.743	1.743	1.747	1.748	1.748	1.743	1.742	1.748	1.747	1.663

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Table 3 Primary Balance Impact of EMU and Convergence on individual variables

Dependent variable: annual primary budget balance in per cent of GDP
Sample 1994-2005, annual data, 356 (unbalanced) observations of 30 countries
Pooled OLS fixed effects with White period standard errors & covariance (d.f. corrected)
Demand factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMU membership dummy	**1.554**	**2.158**	**2.682 ***	**3.012 *****	**2.511 ****	**2.320 ****	**1.801 ****
	0.988	*1.890*	*1.379*	*1.156*	*1.012*	*0.916*	*0.838*
EMU convergence dummy	**0.809**	**1.242**	**0.480**	**2.659 ****	**1.644 *****	**1.472 ****	**1.192 ****
	0.684	*1.607*	*1.116*	*1.081*	*0.569*	*0.578*	*0.516*
Primary budget balance (lagged 1 year)	**0.411 *****	**0.382 *****	**0.408 *****	**0.407 *****	**0.412 *****	**0.415 *****	**0.407 *****
	0.113	*0.115*	*0.111*	*0.109*	*0.114*	*0.110*	*0.112*
Real GDP growth rate	**0.162 ****	**0.216 *****	**0.211 *****	**0.203 *****	**0.212 *****	**0.215 *****	**0.199 *****
	0.079	*0.055*	*0.058*	*0.054*	*0.062*	*0.058*	*0.066*
Real GDP growth rate * EMU	**0.147**						
	0.123						
Real GDP growth rate * Convergence	**0.121**						
	0.088						
Inflation	**0.034**	**0.052 ****	**0.039**	**0.026**	**0.031**	**0.032**	**0.038**
	0.027	*0.024*	*0.027*	*0.027*	*0.025*	*0.026*	*0.027*
Interest paid on existing government debt	**0.450 *****	**0.439 *****	**0.508 *****	**0.467 *****	**0.441 *****	**0.456 *****	**0.447 *****
	0.124	*0.115*	*0.138*	*0.127*	*0.126*	*0.125*	*0.128*
Public Investment (% of GDP)		**-0.930 ***					
		0.504					
Public Investment * EMU		**0.033**					
		0.570					
Public Investment * Convergence		**0.075**					
		0.530					
Per capita GDP (in 10,000 USD, PPP)			**0.498**				
			0.563				
Per capita GDP * EMU			**-0.111**				
			0.554				
Per capita * Convergence			**0.609**				
			0.710				
Unemployment rate				**-0.046**			
				0.095			
Unemployment rate * EMU				**-0.100**			
				0.154			
Unemployment rate* Conergence				**-0.113**			
				0.110			
Population (millions)					**-0.059 *****		
					0.019		
Population * EMU					**-0.031**		
					0.019		
Popluation * Convergence					**-0.028 ***		
					0.016		
Election Dummy						**0.025**	
						0.307	
Election Dummy * EMU						**-0.756 ***	
						0.434	
Election Dummy * Convergence						**-0.426**	
						0.466	
Lagged real GDP growth (1 year)							**0.015**
							0.044
Lagged GDP * EMU							**0.113**
							0.111
Lagged GDP* Convergence							**0.063**
							0.075
Constant	**-3.623 *****	**-1.003**	**-5.444 *****	**-3.604 *****	**-1.707**	**-3.903 *****	**-3.851 *****
	1.090	*1.997*	*1.858*	*0.772*	*1.432*	*1.071*	*1.022*
Adjusted R square	0.657	0.671	0.658	0.660	0.656	0.658	0.656
Standard error of regression	1.816	1.778	1.813	1.810	1.818	1.814	1.818

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Table 3 (continued)
Dependent variable: annual primary budget balance in per cent of GDP
Sample 1994-2005, annual data, 356 (unbalanced) observations of 30 countries
Pooled OLS fixed effects with White period standard errors & covariance (d.f. corrected)
Supply factors

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
EMU membership dummy	**-0.274**	**3.214 *** **	**-0.447**	**2.423 ** **	**1.239**	**2.827 ** **	**-0.172**
	1.454	*1.180*	*0.747*	*1.151*	*1.005*	*1.231*	*0.910*
EMU convergence dummy	**2.450**	**1.661 *** **	**-1.796**	**1.265 ** **	**1.622 * **	**1.490 ** **	**1.529 *** **
	1.592	*0.571*	*1.111*	*0.627*	*0.594*	*0.662*	*0.516*
Primary budget balance (lagged 1 year)	**0.402 *** **	**0.412 *** **	**0.401 *** **	**0.412 *** **	**0.404 *** **	**0.414 *** **	**0.402 *** **
	0.114	*0.112*	*0.116*	*0.112*	*0.111*	*0.111*	*0.113*
Real GDP growth rate	**0.193 *** **	**0.223 *** **	**0.201 *** **	**0.211 *** **	**0.214 *** **	**0.224 *** **	**0.176 *** **
	0.062	*0.060*	*0.062*	*0.057*	*0.057*	*0.060*	*0.059*
Inflation	**0.029**	**0.031**	**0.030**	**0.051**	**0.041**	**0.032**	**0.039**
	0.026	*0.026*	*0.025*	*0.045*	*0.029*	*0.026*	*0.029*
Interest paid on existing government debt	**0.468 *** **	**0.444**	**0.475 *** **	**0.437 *** **	**0.472 *** **	**0.461 ** **	**0.400 *** **
	0.150	*0.128*	*0.128*	*0.126*	*0.128*	*0.194*	*0.133*
Interest * EMU	**0.456 ** **						
	0.220						
Interest * Convergence	**-0.181**						
	0.219						
Gross government debt (% of GDP)		**0.003**					
		0.015					
Debt * EMU		**-0.023**					
		0.021					
Debt * Convergence		**-0.009**					
		0.017					
Openness (% of GDP)			**0.044**				
			0.047				
Openness * EMU			**2.141 * **				
			1.273				
Openness * Convergence			**3.181 *** **				
			1.132				
Inflation record				**-0.004**			
				0.006			
Inflation record * EMU				**-0.158**			
				0.238			
Inflation record * Convergence				**-0.001**			
				0.003			
GDP volatility					**-0.090**		
					0.073		
GDP volatility * EMU					**0.393**		
					0.349		
GDP volatility * Convergence					**-0.243 *** **		
					0.092		
Debt service (interest payments/gov. exp.)						**-0.002**	
						0.086	
Debt service * EMU						**-0.105**	
						0.100	
Debt service * Convergence						**-0.017**	
						0.060	
Liquidity constraint							**0.099**
							0.165
Liquidity constraint * EMU							**0.411**
							0.252
Liquidity constraint * Convergence							**-0.817 *** **
							0.201
Constant	**-3.809 *** **	**-3.785 *** **	**-3.928 *** **	**-3.698 *** **	**-3.594 *** **	**-3.924 *** **	**-2.772 *** **
	1.128	*0.831*	*1.161*	*1.105*	*1.039*	*1.073*	*1.032*
Adjusted R square	0.660	0.656	0.661	0.656	0.660	0.656	0.665
Standard error of regression	1.809	1.818	1.806	1.820	1.807	1.821	1.795

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Table 3 (continued)

Dependent variable: annual primary budget balance in per cent of GDP
Sample 1994-2005, annual data, 356 (unbalanced) observations of 30 countries
Pooled EGLS (cross-section weighted) fixed effects with White period standard errors & covariance (d.f. corrected)
Demand factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMU membership dummy	**1.217 ****	**1.743 ****	**1.419 ****	**2.445 ****	**1.404 *****	**1.488 *****	**1.293 *****
	0.570	*0.790*	*0.689*	*0.993*	*0.981*	*0.398*	*0.425*
EMU convergence dummy	**0.996 ****	**1.862 ****	**-0.249**	**2.288 *****	**0.981 *****	**1.102 *****	**1.008 *****
	0.429	*0.725*	*0.723*	*0.865*	*0.261*	*0.261*	*0.264*
Primary budget balance (lagged 1 year)	**0.568 *****	**0.548 *****	**0.564 *****	**0.563 *****	**0.569 *****	**0.568 *****	**0.553 *****
	0.057	*0.054*	*0.058*	*0.058*	*0.057*	*0.056*	*0.058*
Real GDP growth rate	**0.283 *****	**0.269 *****	**0.297 *****	**0.285 *****	**0.293 *****	**0.290 *****	**0.275 *****
	0.052	*0.041*	*0.037*	*0.036*	*0.039*	*0.036*	*0.039*
Real GDP growth rate * EMU	**0.045**						
	0.096						
Real GDP growth rate * Convergence	**0.002**						
	0.066						
Inflation	**0.011**	**0.030**	**0.022**	**0.007**	**0.015**	**0.012**	**0.030**
	0.018	*0.019*	*0.019*	*0.020*	*0.018*	*0.018*	*0.024*
Interest paid on existing government debt	**0.312 *****	**0.326 *****	**0.358 *****	**0.325 *****	**0.300 *****	**0.330 *****	**0.309 *****
	0.091	*0.079*	*0.102*	*0.089*	*0.094*	*0.094*	*0.095*
Public Investment (% of GDP)		**-0.701 *****					
		0.251					
Public Investment * EMU		**-0.063**					
		0.284					
Public Investment * Convergence		**-0.230**					
		0.257					
Per capita GDP (in 10,000 USD, PPP)			**0.173**				
			0.336				
Per capita GDP * EMU			**0.181**				
			0.570				
Per capita * Convergence			**0.847 ***				
			0.466				
Unemployment rate				**-0.016**			
				0.085			
Unemployment rate * EMU				**-0.160**			
				0.102			
Unemployment rate* Conergence				**-0.145 ***			
				0.082			
Population (millions)					**-0.057 *****		
					0.015		
Population * EMU					**-0.003**		
					0.029		
Popluation * Convergence					**-0.001**		
					0.028		
Election Dummy						**-0.001**	
						0.189	
Election Dummy * EMU						**-0.673 ****	
						0.335	
Election Dummy * Convergence						**-0.397**	
						0.352	
Lagged real GDP growth (1 year)							**0.065**
							0.049
Lagged GDP * EMU							**0.016**
							0.101
Lagged GDP* Convergence							**-0.003**
							0.059
Constant	**-3.031 *****	**-1.029**	**-4.021 *****	**-2.917 *****	**-1.130**	**-3.168 *****	**-3.253 *****
	0.722	*0.900*	*1.237*	*1.010*	*1.147*	*0.691*	*0.720*
Adjusted R square	0.779	0.788	0.784	0.786	0.779	0.784	0.784
Standard error of regression	1.745	1.701	1.742	1.739	1.745	1.744	1.748

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Table 3 (continued)
Dependent variable: annual primary budget balance in per cent of GDP
Sample 1994-2005, annual data, 356 (unbalanced) observations of 30 countries
Pooled EGLS (cross-section weighted) fixed effects with White period standard errors & covariance (d.f. corrected)
Supply factors

	(7)	(8)	9)	(10)	(11)	(11)	(12)
EMU membership dummy	**-0.371**	**2.189 *** **	**-0.114**	**1.514 ** **	**1.107**	**1.787 *** **	**-0.756**
	1.129	*0.699*	*1.561*	*0.613*	*0.727*	*0.647*	*0.479*
EMU convergence dummy	**1.619**	**1.113 *** **	**-0.979**	**1.186 *** **	**1.428 *** **	**1.033 *** **	**1.212 *** **
	1.042	*0.296*	*1.406*	*0.202*	*0.398*	*0.309*	*0.297*
Primary budget balance (lagged 1 year)	**0.550**	**0.573 *** **	**0.554 *** **	**0.571 *** **	**0.561 *** **	**0.571 *** **	**0.551 *** **
	0.061	*0.059*	*0.059*	*0.057*	*0.058*	*0.057*	*0.058*
Real GDP growth rate	**0.270 *** **	**0.293 *** **	**0.284 *** **	**0.291 *** **	**0.300 *** **	**0.295 *** **	**0.265 *** **
	0.039	*0.038*	*0.035*	*0.038*	*0.038*	*0.037*	*0.038*
Inflation	**0.011**	**0.014**	**0.016**	**0.016**	**0.024**	**0.014**	**0.024**
	0.018	*0.018*	*0.018*	*0.026*	*0.018*	*0.018*	*0.017*
Interest paid on existing government debt	**0.328 *** **	**0.317 *** **	**0.331 *** **	**0.310 *** **	**0.323 *** **	**0.312 ** **	**0.257 *** **
	0.116	*0.089*	*0.094*	*0.094*	*0.091*	*0.123*	*0.091*
Interest * EMU	**0.335 ***						
	0.195						
Interest * Convergence	**-0.102**						
	0.161						
Gross government debt (% of GDP)		**0.004**					
		0.004					
Debt * EMU		**-0.015**					
		0.011					
Debt * Convergence		**-0.003**					
		0.006					
Openness (% of GDP)			**0.039 ***				
			0.029				
Openness * EMU			**1.300**				
			1.422				
Openness * Convergence			**2.134**				
			1.420				
Inflation record				**0.001**			
				0.002			
Inflation record * EMU				**-0.006**			
				0.190			
Inflation record * Convergence				**-0.004 *** **			
				0.001			
GDP volatility					**-0.009**		
					0.044		
GDP volatility * EMU					**0.172**		
					0.280		
GDP volatility * Convergence					**-0.213**		
					0.001		
Debt service (interest payments/gov. exp.)						**0.010**	
						0.046	
Debt service * EMU						**-0.059**	
						0.069	
Debt service * Convergence						**-0.004**	
						0.045	
Liquidity constraint							**0.145**
							0.119
Liquidity constraint * EMU							**0.182**
							0.164
Liquidity constraint * Convergence							**-0.843 *** **
							0.169
Constant	**-3.037 *** **	**-3.274 *** **	**-3.313 *** **	**-3.156 *** **	**-3.144 *** **	**-3.175 *** **	**-2.074 *** **
	0.811	*0.660*	*0.863*	*0.682*	*0.805*	*0.685*	*0.660*
Adjusted R square	0.791	0.777	0.778	0.777	0.782	0.775	0.789
Standard error of regression	1.749	1.745	1.737	1.744	1.734	1.750	1.726

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Table 4: Budget balance regression results

Dependent variable: annual budget balance in per cent of GDP
Sample 1994-2005, annual data, 360 (balanced) observations of 30 countries
Pooled OLS fixed effects with White period standard errors & covariance (d.f. corrected)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
EMU membership dummy	**1.216 ****	**1.308 *****	**1.287 ****	**1.038 ***	**1.200 ****	**1.157 ****	**1.204 ****	**1.177 ****	**1.225 ****	**1.235 ****	**1.250 ****	**1.207 ****	**1.695 *****	**1.562 *****
	0.521	*0.427*	*0.570*	*0.563*	*1.523*	*0.512*	*0.522*	*0.514*	*0.525*	*0.534*	*0.560*	*0.515*	*0.584*	*0.562*
EMU convergence dummy	**0.962 ****	**1.099 *****	**0.983 ****	**0.880 ****	**0.943 ****	**0.907 ****	**0.954 ****	**0.933 ****	**0.964 ****	**0.978 ****	**0.994 ****	**0.962 ****	**1.244 *****	**1.418 *****
	0.388	*0.290*	*0.399*	*0.436*	*0.390*	*0.375*	*0.386*	*0.382*	*0.390*	*0.402*	*0.420*	*0.388*	*0.414*	*0.467*
Primary budget balance (lagged 1 year)	**0.635 *****	**0.623 *****	**0.637 *****	**0.603 *****	**0.635 *****	**0.633 *****	**0.626 *****	**0.625 *****	**0.632 *****	**0.636 *****	**0.636 *****	**0.633 *****	**0.632 *****	**0.524 *****
	0.049	*0.041*	*0.051*	*0.051*	*0.049*	*0.050*	*0.049*	*0.052*	*0.050*	*0.051*	*0.051*	*0.052*	*0.050*	*0.050*
Real GDP growth rate	**0.269 *****	**0.270 *****	**0.269 *****	**0.255 *****	**0.268 *****	**0.267 *****	**0.259 *****	**0.274 *****	**0.274 *****	**0.270 *****	**0.270 *****	**0.269 *****	**0.256 *****	**0.250 *****
	0.036	*0.041*	*0.036*	*0.033*	*0.036*	*0.035*	*0.036*	*0.035*	*0.035*	*0.037*	*0.035*	*0.035*	*0.038*	*0.042*
Inflation	**0.030 ***	**0.046 *****	**0.029 ***	**0.019**	**0.031 ****	**0.028 ***	**0.037 ****	**0.029 ****	**0.031 ****	**0.028**	**0.030 ***	**0.029 ***	**0.024**	**0.011**
	0.015	*0.002*	*0.015*	*0.014*	*0.015*	*0.016*	*0.016*	*0.015*	*0.015*	*0.019*	*0.016*	*0.016*	*0.016*	*0.020*
Interest paid on existing government debt	**0.171 ***	**0.215 ****	**0.167 ***	**0.168 ***	**0.169 ***	**0.172**	**0.169 ***	**0.137**	**0.176 ***	**0.170 ***	**0.169**	**0.171 ***	**0.156**	**0.150**
	0.101	*0.106*	*0.100*	*0.095*	*0.100*	*0.105*	*0.101*	*0.101*	*0.104*	*0.101*	*0.103*	*0.100*	*0.098*	*0.092*
Interest payments (% of GDP)	**-0.203 ***	**-0.294 *****	**-0.206 ***	**-0.172**	**-0.214 ****	**-0.201 ***	**-0.209 ***	**-0.137**	**-0.211 ***	**-0.200 ***	**-0.202 ***	**-0.131**	**-0.230 ****	**0.364**
	0.107	*0.109*	*0.108*	*0.105*	*0.106*	*0.113*	*0.109*	*0.121*	*0.110*	*0.108*	*0.111*	*0.264*	*0.107*	*0.383*
Public Investment (% of GDP)		**-0.851 *****												**-1.217 *****
		0.160												*0.175*
Per capita GDP (in 10,000 USD, PPP)			**0.093**											**0.199**
			0.307											*0.345*
Unemployment rate				**-0.107 *****										**-0.173 *****
				0.041										*0.060*
Population (millions)					**-0.053 *****									**-0.047 *****
					0.012									*0.016*
Election Dummy						**-0.363 ****								**-0.290 ****
						0.167								*0.123*
Lagged real GDP growth rate (1 year)							**0.032**							**-0.010**
							0.041							*0.047*
Gross Government Debt (% of GDP)								**-0.012**						**-0.025 *****
								0.012						*0.007*
Openness (% of GDP)									**0.039 ****					**0.066 ****
									0.015					*0.029*
Inflation record										**0.001**				**0.002**
										0.002				*0.004*
GDP volatility											**0.008**			**0.014**
											0.051			*0.104*
Debt service (interest payments/gov. exp.)												**-0.035**		**-0.265**
												0.128		*0.169*
Liquidity constraint													**0.173 ***	**0.259 ***
													0.100	*0.145*
Constant	**-2.461 *****	**0.068**	**-2.233 ****	**-1.595 ****	**-0.687**	**-2.345 *****	**-2.540 *****	**-1.861 ****	**-2.850 *****	**-2.477 *****	**-2.494 *****	**-2.427 *****	**-2.677 *****	**4.163 ****
	0.633	*0.770*	*0.953*	*0.677*	*0.821*	*0.642*	*0.672*	*0.834*	*0.740*	*0.649*	*0.655*	*0.630*	*0.645*	*1.782*
Adjusted R square	0.822	0.836	0.821	0.824	0.822	0.824	0.822	0.822	0.822	0.821	0.821	0.821	0.824	0.851
Standard error of regression	1.346	1.293	1.348	1.337	1.344	1.338	1.346	1.345	1.346	1.348	1.348	1.348	1.339	1.233

****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

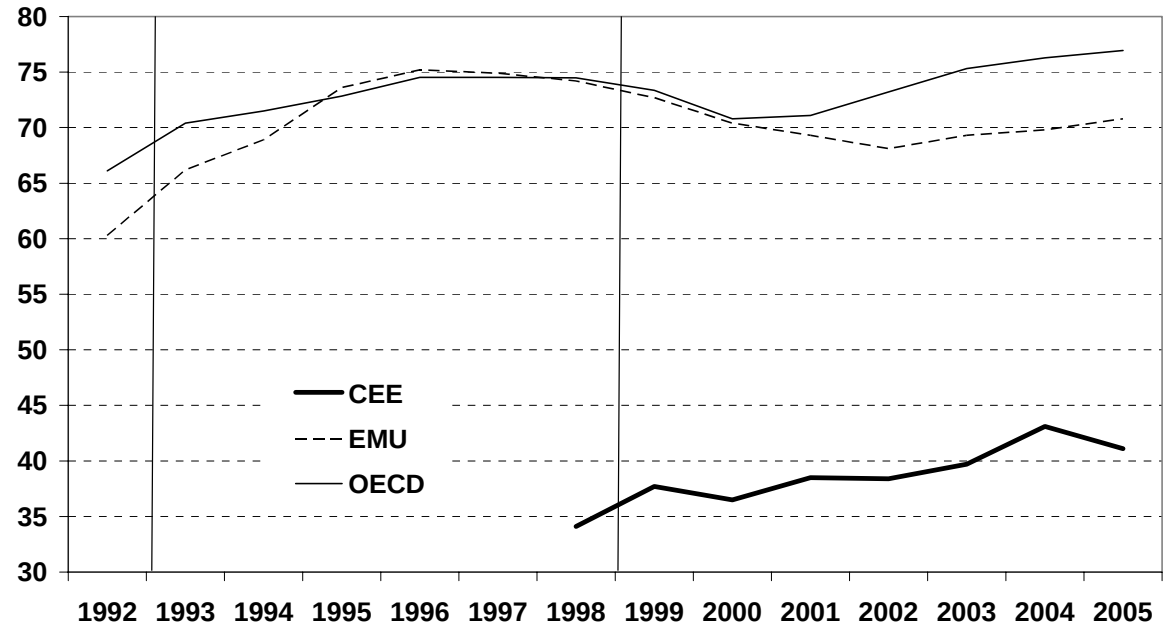
Table 4 (continued)

Dependent variable: annual budget balance in per cent of GDP
Sample 1994-2005, annual data, 360 (balanced) observations of 30 countries
Pooled EGLS (cross-section weighted) fixed effects with White period standard errors & covariance (d.f. corrected)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
EMU membership dummy	**0.821** ***	**1.071** ***	**0.852** **	**0.627** *	**0.792** **	**0.788** **	**0.834** ***	**0.792** ***	**0.836** ***	**0.833** **	**0.856** **	**0.798** ***	**1.265** ***	**1.546** ***
	0.315	*0.333*	*0.349*	*0.322*	*0.311*	*0.319*	*0.007*	*0.301*	*0.317*	*0.325*	*0.419*	*0.308*	*0.381*	*0.453*
EMU convergence dummy	**0.710** ***	**0.997** ***	**0.724** ***	**0.611** **	**0.685** ***	**0.671** ***	**0.719** ***	**0.687** ***	**0.716** ***	**0.721** ***	**0.745** **	**0.704** ***	**0.996** ***	**1.514** ***
	0.241	*0.280*	*0.258*	*0.253*	*0.241*	*0.237*	*0.226*	*0.229*	*0.243*	*0.251*	*0.346*	*0.240*	*0.284*	*0.435*
Primary budget balance (lagged 1 year)	**0.656** ***	**0.647** ***	**0.657** ***	**0.619** ***	**0.656** ***	**0.654** ***	**0.634** ***	**0.648** ***	**0.650** ***	**0.656** ***	**0.656** ***	**0.645** ***	**0.650** ***	**0.512** ***
	0.035	*0.031*	*0.037*	*0.035*	*0.035*	*0.036*	*0.037*	*0.037*	*0.036*	*0.036*	*0.035*	*0.036*	*0.035*	*0.037*
Real GDP growth rate	**0.271** ***	**0.270** ***	**0.270** ***	**0.254** ***	**0.272** ***	**0.266** ***	**0.254** ***	**0.273** ***	**0.274** ***	**0.271** ***	**0.271** ***	**0.271** ***	**0.252** ***	**0.226** ***
	0.031	*0.033*	*0.031*	*0.030*	*0.032*	*0.031*	*0.029*	*0.030*	*0.030*	*0.032*	*0.031*	*0.031*	*0.033*	*0.035*
Inflation	**0.026** *	**0.042** ***	**0.025** *	**0.014**	**0.027** *	**0.022**	**0.038** **	**0.025** *	**0.027** *	**0.024**	**0.025** *	**0.022**	**0.020**	**0.010**
	0.014	*0.014*	*0.014*	*0.013*	*0.014*	*0.015*	*0.017*	*0.014*	*0.014*	*0.018*	*0.014*	*0.016*	*0.014*	*0.022*
Interest paid on existing government debt	**0.093** *	**0.140** **	**0.091**	**0.096** **	**0.089** *	**0.095**	**0.095** *	**0.066**	**0.099** *	**0.093** *	**0.092** *	**0.098** *	**0.089** *	**0.100** ***
	0.056	*0.069*	*0.055*	*0.044*	*0.053*	*0.060*	*0.054*	*0.052*	*0.058*	*0.056*	*0.053*	*0.054*	*0.051*	*0.034*
Interest payments (% of GDP)	**-0.172** **	**-0.225** ***	**-0.175** **	**-0.145** **	**-0.187** ***	**-0.168** **	**-0.194** ***	**-0.117**	**-0.180** ***	**-0.170** **	**-0.171** **	**0.192**	**-0.226** ***	**0.700** **
	0.068	*0.065*	*0.073*	*0.072*	*0.065*	*0.070*	*0.074*	*0.087*	*0.069*	*0.068*	*0.068*	*0.305*	*0.080*	*0.317*
Public Investment (% of GDP)		**-0.769** ***												**-1.278** ***
		0.142												*0.153*
Per capita GDP (in 10,000 USD, PPP)			**0.049**											**0.146**
			0.287											*0.284*
Unemployment rate				**-0.127** ***										**-0.205** ***
				0.043										*0.046*
Population (millions)					**-0.059** ***									**-0.053** ***
					0.010									*0.013*
Election Dummy						**-0.322** **								**-0.291** ***
						0.125								*0.103*
Lagged real GDP growth rate (1 year)							**0.065** *							**0.017**
							0.038							*0.042*
Gross government debt (% of GDP)								**-0.008**						**-0.022** ***
								0.008						*0.005*
Openness (% of GDP)									**0.035** **					**0.038**
									0.016					*0.028*
Inflation record										**0.000**				**0.000**
										0.002				*0.004*
GDP volatility											**0.009**			**0.095**
											0.044			*0.100*
Debt service (interest payments/gov. exp.)												**-0.174**		**-0.410** ***
												0.148		*0.151*
Liquidity constraint													**0.165** **	**0.237** **
													0.080	*0.113*
Constant	**-1.856** ***	**0.205**	**-1.732** **	**-0.843** *	**0.126**	**-1.752** ***	**-2.041** ***	**-1.462** ***	**-2.216** ***	**-1.866** ***	**-1.892** ***	**-1.750** ***	**-2.019** ***	**5.164** ***
	0.405	*0.579*	*0.830*	*0.456*	*0.589*	*0.419*	*0.442*	*0.513*	*0.481*	*0.416*	*0.512*	*0.426*	*0.422*	*1.372*
Adjusted R square	0.853	0.860	0.852	0.855	0.853	0.856	0.856	0.848	0.853	0.852	0.852	0.854	0.850	0.884
Standard error of regression	1.339	1.287	1.341	1.329	1.337	1.331	1.338	1.337	1.340	1.341	1.341	1.338	1.332	1.221

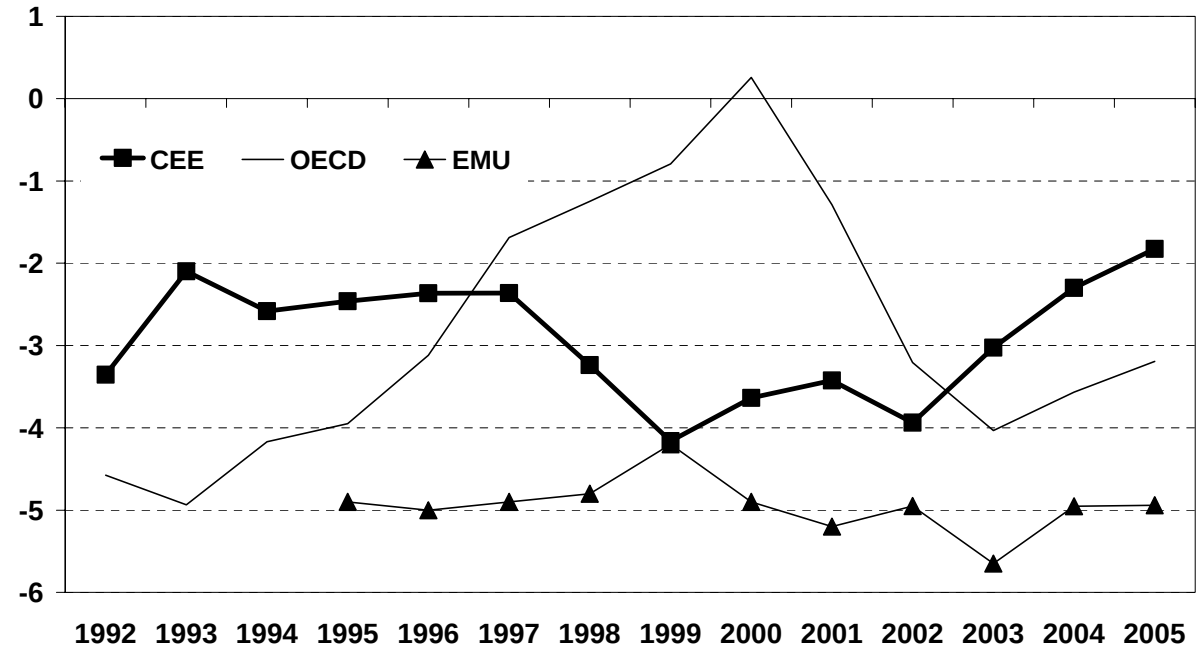
****, **, * asterisks denote significance at the 1, 5 and 10% level respectively.*
Standard errors are listed below the coefficients

Chart 1: gross government debt, % of GDP



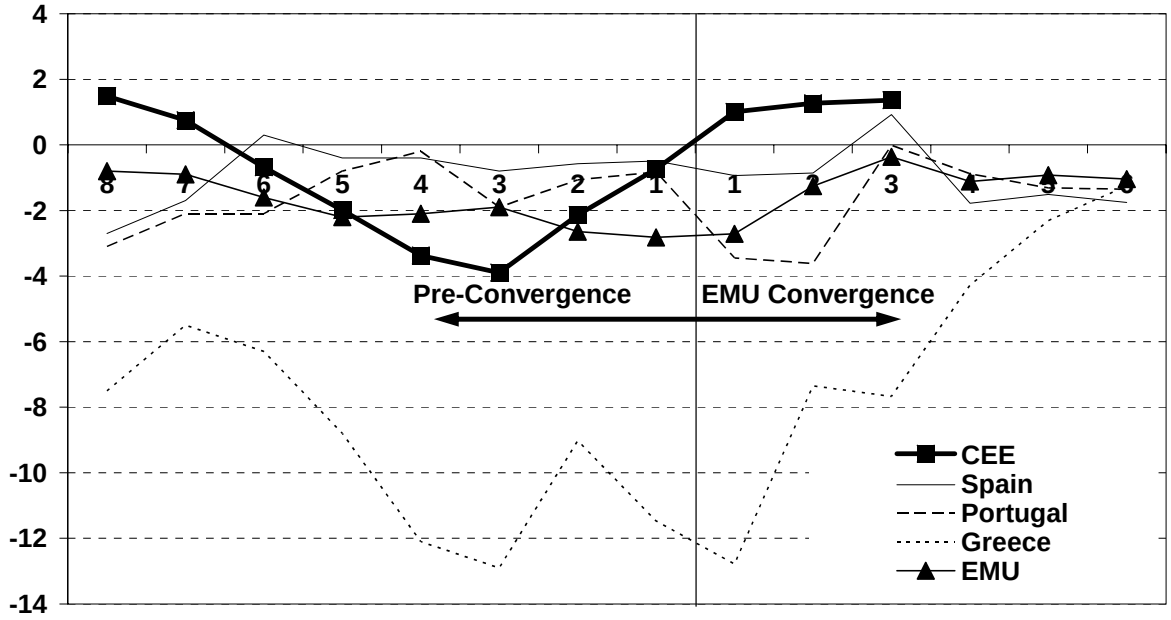
Source: OECD, Eurostat

Chart 2: budget balances as % of GDP



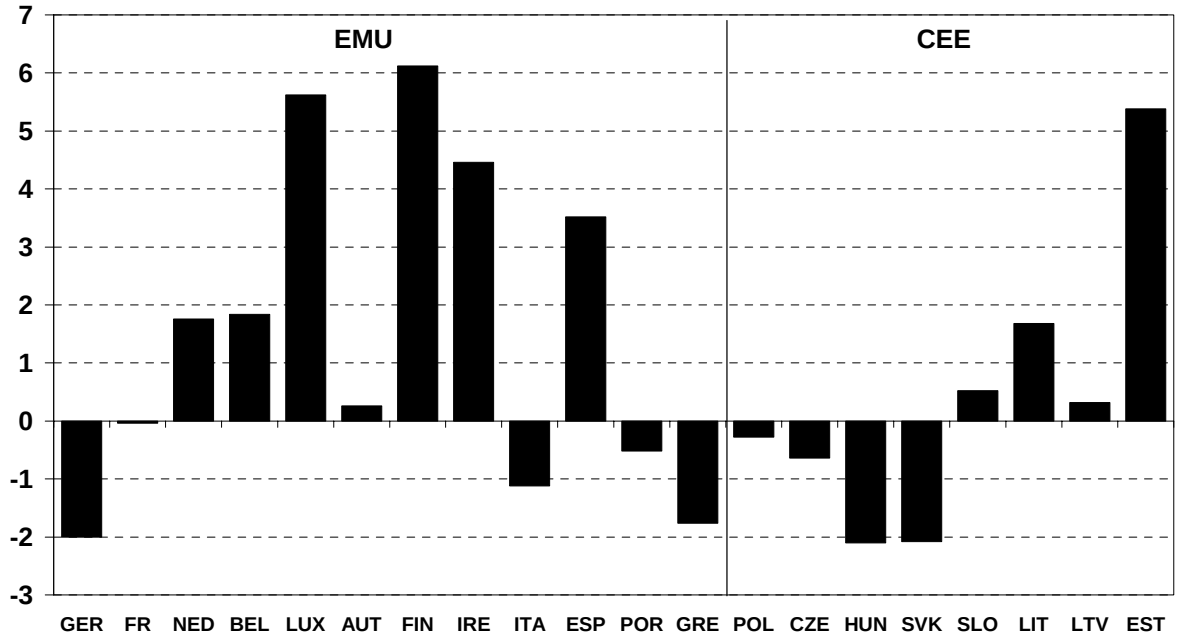
Source: OECD, Eurostat

Chart 3: % of GDP points difference of budget balance to OECD average. X axis in years



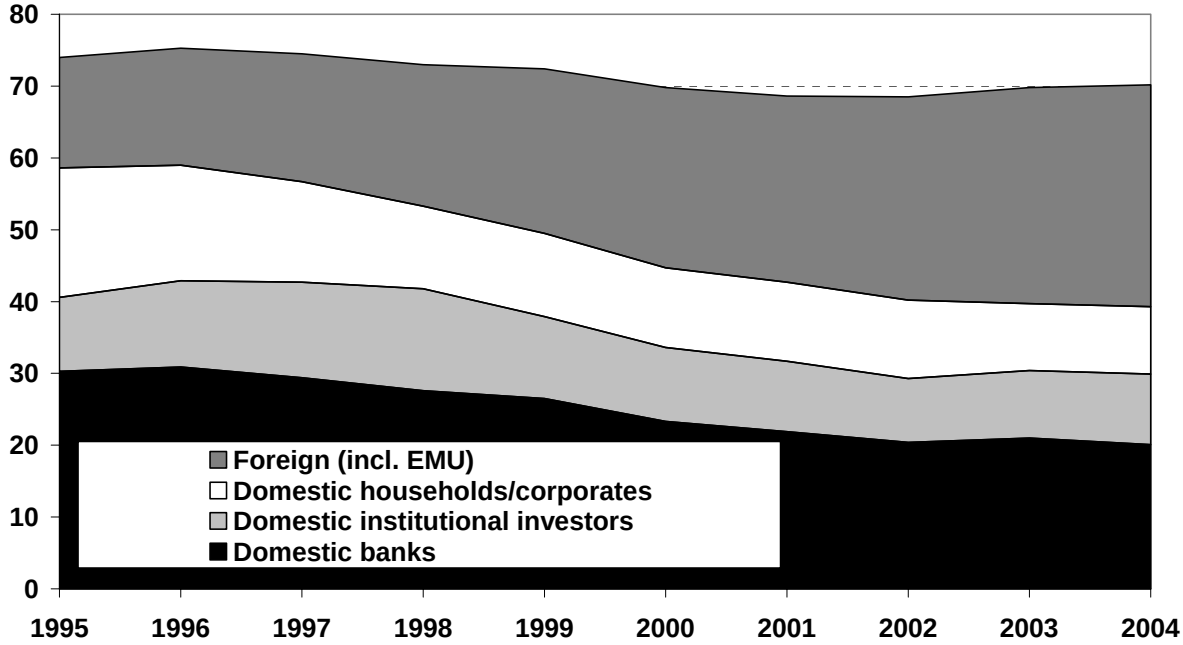
Source: OECD, Eurostat, own calculations

Chart 4: budget balances + public investment, % of GDP, average 1992-2005



Source: Eurostat, own calculations

Chart 5: % of GDP gross government debt owed to



Source: ECB, own calculations