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Evidence from the European Union**

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Fiscal convergence and discipline in monetary unions: Evidence from the European Union

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Abstract

We empirically examine the fiscal discipline of the recent ten European Union (EU) members with respect EU15, using the Maastricht fiscal convergence criteria. Our tests include alternative measures of fiscal discipline and employ vastly flexible methods, allowing for structural breaks. The results suggest poor fiscal discipline in the Union in general, suggesting that monetary unions may not provide fiscal discipline for its members. We also provide some estimates of the impact of fiscal indiscipline on interest rates and find that capital markets may require risk premium for lack of fiscal discipline.

Keywords: convergence, European Union, integration, fiscal discipline, transition, Eurozone.

JEL Classification: C23, E42, E61, F02, H60, P50

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1. Introduction

In this paper, we study fiscal discipline in the enlarged European Union (EU). Our general measure of fiscal discipline is based on satisfying Maastricht fiscal criteria, as it requires fiscal discipline by the new members before their entry to the EMU. We examine the performance of the ten EU newcomers, as well as the Eurozone by using alternative measures of fiscal discipline and employing tests that allow for structural breaks. We also include some estimates of the impact of fiscal deficits on interest rates, providing some extension of earlier studies (i.e., Knot and de Haan, 1995). Since the underlying idea in fiscal rules of the EU is debt sustainability, our paper is related to recent studies on debt sustainability of developed and developing countries (e.g., Uctum, Thurston and Uctum, 2006; Uctum and Wickens, 2000), as well as fiscal sustainability in the EU15 in general (i.e., Afonso and Rault, 2007; Hughes Hallett and Lewis, 2007). However, we are interested in the question of how the EU countries are developing in terms of heterogeneity (rather than sustainability) of their fiscal performance on their path to a monetary union. Our results suggest poor fiscal discipline in the EU in general. More importantly, we find that the new members are as undisciplined as the EU15, if not more. Since the outcome of the estimations imply that monetary unions may not provide fiscal discipline, we offer ideas for the EU newcomers on improving their fiscal performance in order to meet the Maastricht criteria, aside from the monetary ones discussed by Kutan and Orlowski (2006). In terms of country coverage of the new EU member states, our paper is related to Hughes Hallett and Lewis (2007), but their focus is on fiscal sustainability, rather than fiscal convergence and discipline. They study debt dynamics for the eight new members from Central and Eastern Europe that are part of our sample as well.

Our study is important for several reasons. First, fiscal discipline in the EU has been receiving increasing attention since the formulation of the convergence criteria under the Maastricht treaty.¹ The two fiscal criteria limiting the deficit and debt ratios within a

¹ See, for example, Glick and Hutchison (1993), Hutchison and Kletzer (1995), and Watson (1997).

percentage of GDP have come under sharp scrutiny.² These conditions were set to allow qualifying countries to form the Economic and Monetary Union (EMU) in 1999. After this formation, empirical literature has turned to analyzing the new EU fiscal framework under the Stability and Growth Pact and its reform.³ Our study provides a different perspective on fiscal discipline via an explicit comparison of the fiscal convergence during accession, membership and the Stability Growth Pact.

Second, in May 2004, ten new members joined the EU.⁴ All of these countries must join the Eurozone once they satisfy the Maastricht criteria; Fidrmuc and Korhonen (2003 and 2006) show that at least some new members have already achieved a sufficient degree of business cycle synchronization. Although EU accession leaves new members some freedom to select how to link their national currencies to the euro, the new EU countries must first complete their restructuring process and become more like the core EU members in terms of a broad range of macroeconomic indicators. The sooner they do so, the more likely and faster they are to adopt the euro (e.g., Salvatore 2004). Understandably, several observers have raised concerns about the fiscal indiscipline of some new members.⁵ Many of the new EU members have therefore been put under the Excessive Deficit Program (EDP) since their entry in 2004. In this respect, our empirical study of fiscal discipline offers a way to evaluate the necessity for the EDP.

Third, although the analysis of the fiscal discipline of the 10 new members is understudied in comparison to the core EU15, a comparison of the fiscal performance of the new 10 members against the core EU15 is missing in the literature.

² See, for example, Corsetti and Roubini (1995), and Holzman, Herve and Demel (1996).

³ Buti and Giudice (2002), Orban and Szapary (2004), Tanzi (2004), Eichengreen (2005), Eijffinger (2005), Feldstein (2005), and Schuknecht (2005).

⁴ Eight of them were Central and Eastern European countries (hereafter the CEE8), namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia. The other new members were Cyprus and Malta.

⁵ Berger, Kopits and Szekély (2004) point out that deteriorating fiscal performance, especially in Central European countries, may constrain these members from satisfying the Maastricht criteria successfully because continuing large fiscal deficits can create inflationary pressures. Further arguments in the same spirit are voiced by De Grauwe and Schnabl (2004).

Fourth, studying fiscal discipline and convergence in a monetary union is important for several reasons. First of all, evidence indicates a direct relationship between fiscal policy and macroeconomic performance. In their study of discretionary fiscal policy for 91 countries, Fatás and Mihov (2003) conclude that “governments that use fiscal policy aggressively induce significant macroeconomic instability” in the form of output volatility.⁶ Second, there is ample evidence that fiscal convergence is systematically associated with enhanced business cycle synchronization as it eliminates idiosyncratic fiscal shocks. And finally, there is proof of reduced primary fiscal deficits (or higher surpluses) increasing the coherence of business cycles across countries (Darvas, Rose, and Szapáry, 2005; Artis, Fidrmuc, and Scharler, 2008). Therefore, since both the Maastricht convergence criteria and the Stability and Growth Act require fiscal discipline before entry to the EMU, they indirectly move EU closer to an optimum currency area in the sense of Mundell (1961). Thus, it is argued that the increased business cycle coherence due to fiscal discipline makes countries within the region better candidates for a currency union (Darvas et al. 2005). Further, reducing or even removing independence in fiscal policy means removing a source of asymmetric shocks, hence moving towards monetary integration faster. Finally, fiscal discipline or lack of it may affect financial markets (Afonso and Rault, 2007), and different fiscal outcomes in individual members may slow down the financial market integration, if different countries have different risk premiums in bonds markets, reflecting the size of their expected budget deficit and debt. In this respect, Knot and de Haan (1995) find that persistent government deficits were associated with higher interest rates in the European Community during 1960-89 period. In a recent study, Poghosyan and de Haan (2007) find limited financial integration in the EU when they examine the largest EMU economies: Germany, France, Italy, Belgium and the Netherlands.

⁶ In a similar spirit based on the data from the U.S. states, Fatás and Mihov (2004) state that “fiscal policy is a significant source of business cycle volatility among the U.S. states, and, as a result, constraints on politicians lead to less volatile economic fluctuations.”

Fifth, our study is related to the literature on the empirical link between fiscal discipline and the choice of an exchange rate regime.⁷ In a similar spirit, we investigate whether monetary unions like EMU may provide fiscal discipline for both the new and core members. Some observers have argued that the two key features of EU, namely, the centralized monetary policy and decentralized fiscal policy, may encourage member countries to pay closer attention to inflation; hence monetary convergence can be more important than fiscal discipline (Feldstein, 2005).⁸ On other hand, Orłowski (2004) finds that foreign exchange risk is pronounced in several new-EU countries and there exist a common source of the foreign exchange risk propagation, which is a questionable outlook of their fiscal policies. Our empirical results, which also include some estimates of the impact of fiscal deficits on interest rates, may provide indirect and some partial support to the claims about the costs of fiscal indiscipline.

In the next section, we briefly summarize the existing theoretical and empirical studies. In sections 3 and 4, we describe our methodology and data. Empirical results are reported in Section 5. The last section concludes.

2. Related Studies and Our Contribution

2.1 Theoretical and Empirical Studies

Restoy (1996) theoretically analyzes the market-generated mechanisms disciplining fiscal and financial policy in a monetary-union regime in contrast to the fixed exchange rate arrangement. Under both regimes, interest rates depend positively on debt and deficit. However, according to the model, only for those countries with moderate debt ratios, the cost of financing public debt is higher within a monetary union than under a fixed-exchange-rate regime. The findings support the hypothesis that undisciplined governments

⁷ See Giavazzi and Pagano (1988) and Tornell and Velasco (1995, 1998, and 2000) and the references cited within.

⁸ For evidence on monetary convergence within new EU members, see Kočenda (2001), Kutan and Yigit (2004, 2005), and Brada et al. (2005). These studies report empirical evidence of considerable monetary convergence, supporting the theoretical argument above.

may find fewer incentives to reduce their deficit and debt ratios as a junior member of a monetary union than they find when they are able to issue their own currency.⁹

Based on a simple game theoretical framework where agents agree on the long-term goals, Onorante (2004) shows that fiscal constraints lead to implicit coordination characterized by lower deficits, low interest rates and controlled inflation. Further, fiscal activism is always increased by the entry into the monetary union in which the capacity of a central bank to keep inflation close to targets is much smaller than in the one-country case. Finally, a strategy of convergence in public finances prior to entry in a monetary union may be preferable both for acceding country and the stability of the existing monetary union. To sum up, the model provides an argument for benefits of fiscal discipline with respect to the integration and existence of a monetary union, and helps us extend the conclusions we can derive from our empirical findings.

Like theoretical studies, there are scant empirical analyses on fiscal policy coordination in the EU countries. Knot and de Haan (1995) estimate a reduced form equation of nominal interest rates in the European Community during the period from 1960 to 1989. The results indicate a strong linkage between fiscal variables and the interest rate at a European level than at the national level. Moreover, they find that deficit financing is not neutral in the European Community, as their results show that budget deficits raised interest rates.

Sanz and Velázquez (2003) test whether the convergence of the composition of government expenditures is greater for EU member states than in the non-EU countries of the OECD. Using data from 1970 to 1997, they find that EU member states are converging towards a different steady state composition of government expenditures and their convergence is faster than the non-EU countries of the OECD. Finding different steady states for each country suggests that each country has its own individual functional

⁹ Restoy (1996) shows that the default risk of a fiscally undisciplined member in a fixed exchange rate regime will reflect on the member's interest rate.

distribution of public expenditure in the long term, indicating lack of sustainable EU fiscal policy.

Arestis, Khan, and Luintel (2002) voice that the notion that a sustainable fiscal arrangement is a must for a viable monetary union. In their comparison of the Eurozone deficit with the US federal deficit, they find (i) fiscal discipline measured by fiscal convergence in most of the countries and by the achievement of 3% criteria by all Euro-countries immediately before the launch of the Euro; (ii) similar magnitudes and variability of deficit in EU and US, and (iii) that Euro-area is subject to smaller fiscal shocks than the US. Our research may also be considered as extending their results as we compare the pilgrims against the core EU members.

Faini (2006) investigate the link between fiscal policy and interest rates in the European context and found that an expansionary fiscal policy in one EMU member will have an effect both on its spreads and on the overall level of interest rates for the currency union as a whole. Finding that the second effect is quantitatively much more significant suggests that there are substantial spillovers, through the interest rate channel, among fiscal policies of member countries. To limit countries' incentive to run expansionary fiscal policies, a set of rules, like those embedded in the Stability and Growth Pact, is needed.

Finally, Afonso and Rault (2007) investigate whether public finances in the EU15 are sustainable, using panel unit root tests allowing for structural breaks. They also test for cointegration between general government expenditures and revenues and find cointegration. They conclude that fiscal policy was generally sustainable for the EU15 panel, although some individual countries had problems.

2.2 Our Contribution

Given limited studies on fiscal discipline, in particular, for the new-EU states, and its importance for EU policymakers, we provide a comprehensive empirical study on fiscal convergence of the new EU members against that of EU15. We relate the fiscal discipline to the progress in managing public finances and specific risks that policymakers in the new

members must overcome in the process of joining the Eurozone. To measure fiscal discipline based on fiscal convergence (to different benchmarks), we employ *beta*- and *sigma*-convergence tests, allowing for structural breaks. Towards this end, we use a test developed by Vogelsang (1998) which is particularly suitable for analyzing absolute convergence.¹⁰ In this approach we are confronted with the existing empirical evidence on structural breaks in many economic indicators during the transition and pre-accession process in the Central and Eastern European (CEE) countries.¹¹ Since such structural breaks in economic series may distort the findings, we employ the modified version of the Vogelsang test that allows for structural breaks (see Methodology section for details). Since this method not only allows for structural breaks but is also flexible enough to allow researchers to derive convergence estimates reliably, it yields more reliable inferences about fiscal convergence than those found in earlier studies.

One of the ways to test for the fiscal discipline of the new members towards the EU is to compare their distance from convergence criteria as set in the Maastricht Treaty: (1) fiscal deficit up to 3% of GDP and (2) national debt up to 60% of GDP. In this respect we do not dispute or discuss the choice of the two ratio-values. Instead we complement the previous criteria with an alternative way of measuring the fiscal discipline in the EU newcomers with respect to the two synthetic benchmarks: (1) the EU core represented by Austria, Belgium, France, Germany and the Netherlands, and (2) the EU periphery represented by Greece, Portugal, and Spain. This alternative measure of fiscal discipline is in the spirit of the Stability and Growth Act since we test whether any of the new EU members have been performing like the old EU countries (EU15). This tells us whether the

¹⁰ Until recently, the cross-sectional tests used in analyzing absolute convergence were criticized for over-rejection of the null hypothesis of no convergence (Bernard and Durlauf 1996), shifting the emphasis to conditional and stochastic convergence. However, the need to meet the EU criteria for full EMU membership has regenerated interest in absolute convergence.

¹¹ See Dibooglu and Kutan (2001), Fidrmuc and Tichit (2004), and Kočenda (2005), among others. Further, it has to be recognized that the transition alone represented a massive structural shift by definition.

new EU members are as fiscally disciplined as the EU15 countries.¹² Hence, our empirical results have important implications on the disciplining effects of market-based mechanisms in monetary unions as discussed in the theoretical literature (e.g., Restoy, 1996). In this regard, our paper may be related to the literature on the empirical link between fiscal discipline and the choice of an exchange rate regime as well (Tornell and Velasco, 1995, 1998, and 2000). Our study is also related to the literature that investigates the link between fiscal policy and interest rates in the European context (i.e., Knot and de Haan, 1995, and Faini, 2006), as it provides some estimates of the impact of the lack of fiscal convergence on interest rates.

3. Methodology

The analysis of convergence used in this paper to infer about fiscal discipline has been an active as well as a challenging field of interest since the late 1980s.¹³ Numerous methods have been used to analyze different measures of convergence, namely absolute or conditional β -convergence, sigma convergence, and stochastic convergence. While the former two types analyzed the issue of catching up, the latter and more recent focused on the synchronization of shocks and cross-sectional units moving together in time. The enlargement of the EU has refocused interest in the issue of the “catching up” of the new entrants to the core EU members. Cross-sectional tests mostly used to analyze β -convergence were criticized on the grounds of over-rejecting the null hypothesis of no convergence (Quah 1996, Bernard and Durlauf 1996). These criticisms pushed researchers to apply time series (or panel data) methodologies to introduce a second dimension to β -convergence.

¹² Fiscal prudence is the key issue since governments are conducive to deficits even at the time of the Growth and Stability Pact. This behavior is in accord with classical arguments by Kydland and Prescott (1977) or Buchanan and Wagner (1977).

¹³ For recent discussions, see Taylor (1999) and de la Fuente (2002).

A new test introduced by Vogelsang (1998, 1999) deals with the β -convergence issue by relying on time-series methodology. Following this literature, we consider a simple model of convergence towards a benchmark as

$$y_t = \mu + \delta t + \gamma x_t + u_t \quad (1)$$

where y_t is the difference of the natural logarithm of a variable minus a benchmark, in our case for example, the budgeted deficit-to-GDP ratio of country i minus the Maastricht (or other) benchmark at time t would be the y_t variable, while μ is an intercept to capture the initial level of the deviation, t is a deterministic time trend, x_t includes control variables if any, and u_t is the residual term. In such a set-up, β -convergence requires that for countries where μ is initially significantly negative, so the country is lagging behind, the trend coefficient δ should have the opposite sign (positive) and be statistically significant. Carlino and Mills (1993) developed this test with a very restricted form of serial correlation for the residual term, namely AR(2). Vogelsang (1998) extended the analysis of this specification to u_t with an unknown form of serial correlation, allowing for specifications ranging from integration of order zero, $I(0)$, to order one, $I(1)$. Since the possibility of no convergence implies nonstationarity of the error terms, one can draw a false inference on the trend coefficient when the errors are assumed to be stationary AR(2).¹⁴ Vogelsang's (1998) methodology, in the spirit of Equation 1, considers the following Partial Sums with J correction (PSW) test statistic that helps to alleviate the above problems.¹⁵ It is defined as:

$$PSW_T = T^{-1} (R\hat{\beta} - r)' \left[R(X'X)^{-1} R' \right]^{-1} (R\hat{\beta} - r) / \left(100T^{-1} s_z^2 \exp(bJ_T(m)) \right) \quad (2)$$

¹⁴ When u_t is $I(1)$, the estimate of β obtained from the above regression is not related to the true trend, and information on β must be obtained from the estimate of the intercept in the autoregressive representation of y_t .

¹⁵ See Vogelsang (1998) for further test statistics and a deeper elaboration of the tests.

where X and β consist of $[1 \ t]$ and $[\mu \ \delta]$ respectively, s_z^2 is the standard deviation of the partial cumulated sum of y_t and J_T is the Park and Choi (1988) unit root test statistic obtained from the following regression

$$y_t = X_t\beta + \sum_{i=2}^m c_i t^i + u_t \quad (3)$$

$$J_T(m) = (RSS_y - RSS_J) / RSS_J$$

In other words, J_T is the Wald statistic that tests the joint hypothesis of $c_2 = c_3 = \dots = c_m = 0$. In Monte Carlo simulations, Vogelsang (1998) finds the values of b and m for which the above tests would be comparable and valid for every type of serial correlation form, including unit roots.

Despite the great flexibility of these tests in deriving the mean and trend coefficient estimates in time series with varying stationarity properties, one needs to be careful in using this methodology in the analysis of post-transition economies. The reason stems from the volatile nature of these economies and the presence of structural shifts that are documented in the empirical literature. The problem of structural breaks during the transition process is given serious empirical consideration in Fidrmuc and Tichit (2004) who provide evidence of significant breaks for macroeconomic data. They argue that empirical analyses of transition economies must account for the possibility of structural changes, otherwise inferences are misleading. However, only a few papers consider the structural breaks on transition issues (see, for example, Dibooglu and Kutun 2001, and Kočenda 2005).

We obtain robust results by using Vogelsang's (1999) methodology that allows for structural breaks in the modification of the statistics by including the possibility of shifts in the trend function. The test has been designed in two versions: one with predetermined breaks and the other with endogenous break selection. We favor the latter one. First, we estimate the break date using the optimal tests of Andrews and Ploberger (1994). Then, using the estimated break date, normalized critical values are obtained using the following altered version of Equation (1)

$$y_t = \mu_1 DU_{1t} + \mu_2 DU_{2t} + \delta_1 DT_{1t} + \delta_2 DT_{2t} + \gamma x_t + u_t \quad (4)$$

where $DU_{1t} = 1$ if $t \leq T_b$ (the break date) and zero otherwise, $DU_{2t} = 1$ if $t > T_b$ and zero otherwise, $DT_{1t} = t$ if $t \leq T_b$ and zero otherwise, and finally $DT_{2t} = t - T_b$ if $t > T_b$ and zero otherwise.

To derive inferences on fiscal discipline we test the significance and the opposite signs in the pair of coefficients, μ_1, δ_1 and μ_2, δ_2 . The null hypothesis is that trend coefficients are equal to zero, which in our framework translates to no trend in developments of budget deficit or debt. An alternative hypothesis of trend coefficients being statistically different from zero indicates existence of positive or negative trends in developments of both measures, depending on the sign. In particular, finding of (statistically significant) mean and trend coefficients with opposite signs indicates how countries with different starting positions approach the benchmark. As an example consider the dependent variable being the budget deficit (surplus) to GDP ratio in country i minus the 3% deficit benchmark. Then a positive intercept indicates a surplus or a deficit ratio below 3% since the negative 3% benchmark subtracted from a less negative deficit ratio yields positive value. Accordingly, a positive trend coefficient indicates improving comparative fiscal stance. The reverse follows for the opposite combination of signs. We supplement these results by tests of σ -convergence¹⁶ since confirmation of absolute convergence requires both β - and σ -convergence.

Granted that the Vogelsang (1999) methodology allows for only a single break, and it is desirable to use methodologies allowing for more breaks like Bai and Perron (BP henceforth, 1998), the data availability and the performance of BP under $I(1)$ errors prevent us from pursuing alternative methodologies. Uctum et al. (2006) analyze the mean reversion of the debt of developed and developing countries to examine sustainability by using a combination of the BP and Zivot and Andrews (1992) tests. These tests revolve

¹⁶ Sigma-convergence occurs when the cross-sectional standard deviation of a variable for a group of economies decrease in time.

around the same idea by testing for the mean reverting trends and temporary fluctuations around them in the existence of breaks, hence, broken trend stationarity. We prefer the Vogelsang methodology since it gives more accurate inference on the trend functions, and breaks in them, regardless of the (non)stationarity of the data series.¹⁷ This way, one does not have to test for the stationarity of the series around the trend values to evaluate convergence to benchmarks (or debt sustainability in the case of Uctum et al., 2006). Finally, we complement our analysis with a panel study of long-term interest rates to show the potential cost of fiscal indiscipline.

4. Data and Sample Period

We assess fiscal discipline of the CEE8, Cyprus, and Malta using the official Maastricht criteria of the deficit-to-GDP and debt-to-GDP ratios. We further examine fiscal discipline of these countries with respect to two naturally produced benchmarks. These are deficit and debt ratios achieved in the core of the EU, represented by the average values in Austria, Belgium, France, Germany and the Netherlands, and the EU periphery, represented by average values from Greece, Portugal and Spain. An analysis of the deficit and debt ratios is also consistent with testing the theoretical implications of the disciplining effects of monetary unions. We include GDP growth as a control variable in the deficit regressions in order to incorporate cyclical effects on deficit.

We use quarterly data from 1995:1 through 2005:4 for variables under research. The time span was chosen because: 1) official EU membership applications started in 1995, and 2) EuroStat began using the harmonized time series on macroeconomic variables at that time, and 3) consistent data are available for all countries through end of 2005. In addition, the post-1995 period excludes the major transition-related shocks observed in the early 1990s. The data are obtained primarily from the EuroStat database and checked for consistency against the International Financial Statistics of the IMF. In case of missing or incomplete observations, data are gathered from the individual central banks and finance

¹⁷ The determination of the structural break date in Uctum et al (2006) and our paper is quite similar.

ministries.¹⁸ We also annualize the quarterly debt and deficit data by summing the four quarters and then using this sum to obtain the deficit-to-GDP and debt-to-GDP ratios. We should reiterate at this point that the serial correlation generated by the methodology used for de-seasonalizing the data is of little concern here since the Vogelsang test is able to handle broad forms of serial correlation. Finally, we built a monthly dataset from Global Financial Database, which we use in our complementary interest rate regressions. The data consists of 10-year government bond yields and the control variables, industrial production and inflation, with a sample range from 2000:01 to 2005:12.

5. Empirical Findings

The Vogelsang test results are displayed in Tables 1 through 2. They display the results for *PSW* (Partial Sums with *J* correction) tests, given by the specification in Equation 2. The last column in each table contains the estimated break date using the maximum $T^{-1}W_T$ statistic of Andrews and Ploberger (1994). Following the theoretical grounds of the methodology employed, we apply a 10% trimming from each end of the sample since the break dates close to the endpoints are unreliable and should mostly be disregarded. We display the test statistics below the coefficient estimates and the asymptotic critical values for the endogenous break option of the *PSW* tests at the bottom rows of each table, respectively.

When interpreting results, the readers should note that positive trend coefficients represent *improvements* of fiscal position in comparison to the Union, suggesting that pilgrims are better disciplined than the old Union members.. For instance, a positive trend coefficient shows new members' fiscal position is improving further, away from the 3% deficit benchmark. In short, a positive trend coefficient is always good. We supplement this

¹⁸ In some cases, quadratic interpolation of annual data was necessary to fill some missing data points because the empirical methodology we use relies on uninterrupted data. Quadratic interpolation of annual data was used for debt in the case of Austria, Estonia, France, Germany, and the Netherlands, and for the Portuguese deficit and second half of the Greek deficit.

brief explanation at the bottom of each table by indicating the dependent variable and providing a brief guideline to interpret the results easily.

The dependent variables in the analyses are the ratio of the budget deficit (surplus) to GDP and total debt to GDP in a new member country minus the benchmarks, 3% for deficit and 60% for total debt. Since all deficits (debt) are indicated by a negative number (e.g., minus 2% stands for two percent deficit), all mean values that are positive indicate surplus or deficit (debt) ratios below (less negative) 3% (60%), values that are zero indicate deficit (debt) of exactly 3% (60%), and values that are negative indicate deficit (debt) ratios greater than 3% (60%). As the GDP growth is used as a control variable accounting for cyclical deficit movements, we modify the test specification according to the choice of benchmark. While we use the country specific growth levels in the 3% benchmark regressions for instance, we prefer growth deviations for the core and periphery regressions. Accordingly, negative trend coefficients depict deficit (debt) increases (or declining budget surpluses) with respect to the benchmark, suggesting fiscal indiscipline relative to the benchmark, and positive coefficients suggest just the opposite (fiscal discipline).

As a complementary measure of fiscal discipline, we also report the σ -convergence tests to be able to test whether the fiscal position of the pilgrims are diverging or converging towards the core and periphery EU members. We illustrate the σ -convergence levels graphically. One should note that since the sigma (standard deviation in our case) is calculated cross-sectionally, then the choice of benchmark does not alter the results.

5.1 Fiscal Discipline: Budget Deficit results

Table 1 examines whether the mean and trend coefficients of Equation (4) are *i*) statistically different from zero, implying that there is a positive or negative trend in budget deficits and, *ii*) have opposite signs, indicating that countries with higher (or more negative) deficit approach the benchmark or each other. Initially, one becomes aware of the fact that the pre-accession period (before 2000) is represented by significant levels of fiscal indiscipline. The pattern that emerges from the table in general is that the earlier fiscal indiscipline

subsidies as membership gets closer and that the more undisciplined countries tend to perform with more discipline than the ones with low deficits.

The deficit-to-GDP ratio with respect to the benchmark of the core shows in essence a confirmation of the 3% benchmark (Table 1) results. All new members worsen their deficit position in comparison to the core countries, which can be noted from the significantly lower post-break means. Initially, better fiscal positions of these countries in comparison to the core implies that their attention was focused elsewhere. In other words, the new members have higher unjustified expansion in their deficits than the core countries. Czech Republic, Baltic countries and Slovakia are the countries who try to improve on their poor pre-break performance by having positive trends in the second half of the sample period. The observed fiscal indiscipline conclusion is strengthened even more when we compare the new members with the periphery. The drastic difference in fiscal position between the new members and the periphery at the beginning of the sample period had not only been closed in all countries, but it reverses direction in many countries. This indicates that of all the 3 groups the periphery has been the best performer in controlling its unjustified deficits. Latvia and Estonia are the only new-EU countries to have a higher trend in their budget performance in the second half of the sample period. In short, the difference between the new members and the core and periphery regressions point towards more fiscal discipline in the EU15 than the ten new members.

Inspecting Figure 2a for sigma convergence, one notices that the older EU members are quite in conjunction with one another while the new 10 members show a very slow decline in their cross-sectional standard deviation. Accounting for the average mean deficit of each group (Figure 2b) confirms this finding with the deficit condition of the new members exhibiting an inferior trend when compared to the older members. The periphery countries seem to be the best performers with their constant decline in the mean and standard deviation of the deficit ratio while the core countries seem to lose focus after 2001. Mean ratio of the newcomers shows no improvement (or decline) with a flat trend during the period under research. The old members seem to be converging to a higher than desired

equilibrium. From this perspective, convergence of the newcomers in terms of deficit-to-GDP ratio towards either the core or the periphery looks like a dubious enterprise, confirming the necessity of EDP.

5.2 Fiscal Discipline: Debt results

Convergence of the general government debt-to-GDP ratio towards the Maastricht benchmark of 60% as well as towards the core and periphery is displayed in Table 2 and Figure 3, in a similar fashion as with the budget deficit. The key dependent variable in Table 2 is the consolidated debt-to-GDP ratio in a new member country minus the 60% benchmark. A positive number indicates a debt ratio below 60% since the negative 60% benchmark subtracted from a less negative debt ratio yields positive values; thus, for example, a mean value of 40 means a 20% debt-to-GDP ratio. All countries, except Hungary, start with a debt-to-GDP ratio lower than the Maastricht benchmark of 60% since the mean coefficients are all positive. The few positive trend coefficients observed in the pre-break period either reverse direction or lose significance in the post-break period, suggesting that the new member countries are increasing their debt-to-GDP ratio or showing lack of fiscal discipline. Countries like Malta and the Czech Republic stand out with the large deterioration of their indebtedness towards the benchmark.

A similar tendency and a clearer picture are observed when the 60% benchmark is replaced by the actual debt-to-GDP ratio in the core and the periphery. Again the big debt position difference at the beginning of the sample period narrows down the second half due to the fiscal indiscipline of the new members. Only Hungary stands out as the consistently prudent country among the new members. The other more disciplined countries Estonia and Poland seem to adopt fiscal discipline either in post- and pre-2000, respectively, not displaying as consistent a picture as Hungary. A quick glance at Figure 3 shows that the slight decline in the core's debt situation, while the high debt of the periphery keeps the new members within comparatively acceptable debt positions. However, we can hardly call

it a success story because their indebtedness increases in general and its dynamics are discomfoting.

Both results from Table 2 and the sigma convergence results in Figure 4a support earlier findings, as we observe that the new 10 members have outperformed the EU15 members, especially before 2001. Afterwards, their fiscal discipline loses some of its momentum as the variation of the debt positions of the new ten members evolve at par with the core after 2003. Fiscal discipline of the periphery starts to improve after 1996 but loses its original dynamics in 1998, further worsening in the recent period. The average debt ratios in Figure 4b confirm this finding since the periphery as well as the core show worse debt positions than the newcomers. On the other hand, its dynamics point at slowly diminishing debt position over the time. The results of the sigma convergence thus support better performance of the new members compared to the older ones but this finding is confronted with the worsening dynamics of their debt position.

5.3 Financial Costs of Fiscal Indiscipline

Restoy (1996) shows that the default risk of the fiscally undisciplined member of a fixed exchange rate regime will reflect on its interest rate. In line with these claims, we run a complementary regression of the effect of the fiscal performance of the new candidates on their long run interest rates. We note that these results are preliminary due to lack of availability for long term interest rates and the low liquidity of these markets, but the results may provide yardstick estimates for future studies. The comprehensive data for long-term interest rates are available since 2000 and data are obtained from Global Financial Data. We run four regressions on the debt and deficit for full sample and post-2004 (post-EU membership) monthly data.¹⁹ All regressions include time trend, German 10-year government bond yield, inflation, industrial production, and initial bond yield levels as

¹⁹ We interpolate quarterly debt and deficit values using quadratic averaging to match the monthly frequency of the other data.

control variables. The initial bond yield level picks up the fixed country effects since it is time invariant. We report the results in Table 3.²⁰

Our findings, and especially those for deficit, indirectly support Restoy's claims since the number of significant positive coefficients increase after the countries became the EU members (post-2004 results). It is also in line with Knot and de Haan (1995) who reported that that persistent government deficit pushed up nominal interest rates in the European Community during 1960-89 period. The findings are also consistent with our findings above that the new members have outperformed the EU15 members, especially before 2001, but their fiscal discipline lost its momentum after 2003. This finding indicates that the long term interest rates increased with the breakdown in fiscal discipline, reflecting risk (of default) premium. On other hand, countries with relatively flexible exchange regime (Czech Republic, Hungary, Poland) lack statistically significant coefficients for the post-2004 period. This finding suggests that, in the exchange rate regime context, other factors than government budget may play a role. We do not observe the same clear message in the results for the debt estimations, which may be due to short sample period.

Again, our findings should be taken with caution because of two reasons. First, the new EU members are not members of the monetary union in a sense of the Restoy's model. EU membership may enhance potential for more stable exchange rate management by central banks but does not substitute for the fixed exchange rate regime. Second, we are aware of short data span in our supplementary analysis that might not guarantee stable coefficients from longer perspective.

5.4 Policy Implications

Our results indicate that the ongoing reform of the public finance systems in the whole EU25 is an agenda that is not to be underestimated. In the new EU members, this issue is even more important, because a neglect of public finance reforms and lack of fiscal

²⁰ Even though maximum heterogeneity is allowed in the panel regression, only average coefficient estimates are displayed for space conservation.

discipline could lead to serious consequences for these countries, well beyond the satisfaction of the Maastricht criteria and the consideration of entry into the Eurozone.

Another implication is for the authorities in the new EU and old core members to better coordinate fiscal and monetary policies to improve fiscal discipline.²¹ Such a claim is supported by our empirical evidence and is consistent with Gleich (2003) who shows that countries having institutional structures that are more conducive to strengthening coordination and cooperation in budget decision-making have been associated with lower budget deficits and reduced debt levels. Consequently, our results are consistent with the notion that countries with weak budget institutions tend to have a lower level of fiscal discipline. Hence, further and more serious reforms in the areas of budget preparation and legislation are necessary to improve fiscal discipline.

Another policy recommendation is that policymakers need to design policies to improve fiscal consolidation. It is widely suggested in the literature that most EU countries have been lowering both direct and indirect taxes and although such trends are sensitive to the economic cycles experienced by the countries, lowering taxes is consistent with the fiscal consolidation.

EU policymakers may also consider adopting fiscal policy rules, rather than a counter-cyclical fiscal policy.²² Some countries, such as Poland and the Netherlands, have already introduced fiscal rules into the laws and constitutions (Tanzi, 2005). Of course, the fact that the member states have different fiscal positions certainly creates implementation problems, at least initially. Tanzi suggests that “flexibility is required as to the time needed to conform to the rule, but the rule should not be relaxed to the point of making sinning more acceptable for everyone” (p. 63).

²¹ See Dixit (2001) and Dixit and Lambertin (2001) for a review of the literature on the interaction of monetary and fiscal policies in a monetary union. For supporting empirical evidence, see Darnaut and Kutos (2005).

²² For an important early treatment of this issue, see Kydland and Prescott (1977).

6. Conclusion

Our study examines the fiscal discipline of the new EU members with respect to EU15, using alternative measures of fiscal convergence and employing vastly flexible tests of convergence, allowing for structural breaks, hence, providing enhanced inference. We observe an extent of heterogeneity in fiscal convergence and a lack of discipline in general, raising warning signals for the old and new members. This finding may raise concerns about the ability of monetary unions to provide fiscal discipline for its members. Moreover, the findings on the significant and positive impact of post-2004 fiscal deficits in the new member states on their long-term interest rates tentatively show that capital markets may require risk premium for any lack of fiscal discipline. An interesting finding is there is no positive risk premium evidence for countries with relatively flexible exchange regime during the post-2004 period. Our results are preliminary, and therefore further analysis is necessary to better gauge the impact of fiscal indiscipline on capital markets in the European context.

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Table 1: Budget Deficit Convergence to Maastricht Benchmark as well as the core and the

<i>Countries</i>	<i>PSW test with endogenous break selection *regression</i>				<i>Break</i>
	μ_1	δ_1	μ_2	δ_2	
<i>Cyprus - bench.</i>	3.45** (1.57)	-0.48* (-1.77)	-0.62 (-0.33)	-0.02 (-0.27)	1998Q1
<i>Cyprus - core</i>	3.20* (1.40)	-0.34 (-0.75)	-2.59** (-2.56)	-0.01 (-0.28)	1996Q4*
<i>Cyprus - perip.</i>	8.01** (2.44)	-0.66 (-1.01)	-1.06 (-0.73)	-0.07 (-0.96)	1996Q4**
<i>Czech - bench.</i>	3.63** (3.51)	-0.24** (-5.01)	-3.05 (-1.23)	0.42 (0.91)	2003Q4
<i>Czech - core</i>	4.74** (4.15)	-0.36** (-5.48)	-6.07** (-3.78)	0.29* (1.59)	2002Q1**
<i>Czech - perip.</i>	9.19** (3.13)	-0.51 (-1.11)	-1.57 (-0.74)	-0.09 (-0.73)	1997Q4
<i>Estonia - bench.</i>	0.74 (0.41)	0.22 (1.31)	0.25 (0.20)	0.19** (2.49)	1998Q4
<i>Estonia - core</i>	1.64 (0.82)	0.09 (0.49)	-1.30 (-0.95)	0.18** (1.99)	1998Q4
<i>Estonia - perip.</i>	6.17** (3.45)	-0.17 (-0.95)	-0.37 (-0.29)	0.14* (1.61)	1998Q4*
<i>Hungary - bench.</i>	2.53 (1.14)	-0.46* (-1.87)	-1.77 (-0.55)	-0.10 (-0.80)	1999Q3
<i>Hungary - core</i>	1.68 (0.55)	-0.11 (-0.22)	-4.60** (-2.76)	-0.01 (-0.15)	1997Q2
<i>Hungary - perip.</i>	8.28** (3.08)	-0.84** (-3.39)	-1.87 (-0.84)	-0.15 (-1.03)	1999Q2
<i>Latvia - bench.</i>	0.46 (0.67)	0.25** (3.41)	-0.31 (-0.52)	0.12** (3.81)	1998Q4
<i>Latvia - core</i>	1.56* (1.36)	0.08 (0.67)	-2.21** (-2.40)	0.14** (2.40)	1999Q1*
<i>Latvia - perip.</i>	5.98** (6.63)	-0.15* (-1.64)	-1.07 (-1.56)	0.07* (1.69)	1998Q4**
<i>Lithuania - bench.</i>	2.86** (3.32)	-0.20** (-3.42)	0.18 (0.21)	0.08 (1.31)	2000Q2
<i>Lithuania - core</i>	2.97** (2.75)	-0.22** (-2.18)	-3.13** (-3.92)	0.13** (2.51)	1999Q1**
<i>Lithuania - perip.</i>	7.99** (11.56)	-0.54** (-9.82)	-0.67 (-1.04)	0.02 (0.36)	2000Q1**
<i>Malta - bench.</i>	-8.82** (-5.14)	0.19** (2.31)	-7.87** (-2.76)	0.73* (1.74)	2003Q1
<i>Malta - core</i>	-8.49** (-4.57)	0.10 (1.14)	-9.00** (-2.59)	0.72 (1.29)	2003Q2
<i>Malta - perip.</i>	-1.97* (-1.22)	-0.38** (-2.56)	-5.16** (-3.87)	0.01 (0.10)	1999Q2
<i>Poland - bench.</i>	-0.30 (-0.44)	0.13** (4.38)	-1.60** (-2.86)	0.00 (-0.03)	2001Q3**
<i>Poland - core</i>	0.51 (0.82)	0.01 (0.31)	-2.81** (-4.36)	-0.04 (-0.67)	2001Q3
<i>Poland - perip.</i>	4.00** (2.17)	-0.11 (-1.00)	-2.18 (-1.13)	-0.12 (-0.59)	2001Q3
<i>Slovak - bench.</i>	-0.17 (-0.06)	-0.18 (-1.03)	-8.41** (-4.13)	0.42** (2.77)	2000Q1
<i>Slovak - core</i>	0.37 (0.13)	-0.27 (-1.32)	-10.46** (-4.83)	0.44** (2.68)	2000Q1*
<i>Slovak - perip.</i>	5.36** (2.40)	-0.57** (-3.75)	-6.67** (-2.84)	0.29 (1.31)	2001Q1*
<i>Slovenia - bench.</i>	3.07** (7.24)	-0.07** (-2.97)	3.49** (5.71)	-0.06 (-0.79)	2002Q2
<i>Slovenia - core</i>	3.73** (7.05)	-0.18** (-5.95)	2.87** (3.57)	-0.17** (-1.84)	2002Q2**
<i>Slovenia perip.</i>	8.18** (6.21)	-0.38** (-1.95)	1.03 (1.40)	0.00 (-0.04)	1997Q3**
<i>Crit. Val.</i>					
5%	1.51	1.88	1.92	1.81	
10%	1.21	1.58	1.65	1.54	

Note: The first dependent variable is the budget deficit (surplus) to GDP ratio in country i minus the 3% deficit benchmark (a positive number indicates a surplus or a deficit ratio below 3% since the negative 3% benchmark subtracted from a less negative deficit ratio yields positive values). For the core (periphery), it is the deficit to GDP ratio in country i minus the core (periphery) deficit ratio (hence a negative number indicates a deficit ratio worse than that of the core (periphery) and a positive trend indicates lowering comparative deficit ratios). Hence, a positive trend coefficient indicates improving comparative fiscal stance. GDP growth (differences when necessary) has been used to control for cyclicity. The numbers in the parentheses for the above table and those that follow below indicate the test statistic associated with the coefficient estimate and are to be compared with the critical values at the bottom of the table. **(*) indicates 95%(90%) significance. Significance levels of breaks are determined using the critical values in Andrews and Ploberger (1994).

Table 2: Consolidated Debt/GDP Convergence to Maastricht Benchmark as well as the core and the periphery

<i>Countries</i>	<i>PSW test with endogenous break selection (regression of y_t with J_T correction)</i>				<i>Break</i>
	μ_1	δ_1	μ_2	δ_2	
<i>Cyp - bench.</i>	8.81** (3.99)	-0.46** (-2.04)	6.51** (3.99)	-0.75** (-7.61)	1998Q4
<i>Cyp - core</i>	4.05** (1.77)	-0.64** (-2.70)	-2.57 (-1.52)	-0.70** (-6.82)	1998Q4
<i>Cyp - perip.</i>	32.61** (17.72)	-0.83** (-8.83)	-0.26 (-0.08)	0.09 (0.18)	2003Q1
<i>Cze - bench.</i>	51.50** (12.45)	-0.26 (-1.33)	25.19** (2.66)	0.27 (0.14)	2003Q4**
<i>Cze - core</i>	46.11** (12.45)	-0.38** (-2.17)	18.08** (2.13)	0.23 (0.13)	2003Q4**
<i>Cze - perip.</i>	67.59** (10.66)	0.69 (0.55)	73.55** (26.56)	-1.00** (-7.66)	1996Q4
<i>Est - bench.</i>	50.32** (92.52)	0.19** (5.76)	53.89** (73.38)	0.06 (0.83)	2001Q4**
<i>Est - core</i>	45.69** (58.02)	0.00 (0.08)	44.50** (44.10)	0.21** (2.17)	2001Q3
<i>Est - perip.</i>	74.86** (42.90)	-0.33** (-4.03)	67.43** (16.88)	-0.06 (-0.08)	2003Q4
<i>Hun - bench.</i>	-18.65** (-3.87)	1.05** (3.11)	8.53 (1.60)	-0.44 (-1.00)	2000Q4*
<i>Hun - core</i>	-27.21** (-4.65)	1.38** (1.60)	-6.20** (-1.92)	0.05 (0.28)	1997Q3*
<i>Hun - perip.</i>	-0.21 (-0.04)	1.51** (2.46)	16.50** (5.41)	-0.09 (-0.56)	1998Q1*
<i>Lat - bench.</i>	49.12** (50.80)	0.00 (0.03)	45.83** (60.75)	0.02 (0.45)	1999Q1
<i>Lat - core</i>	44.84** (50.76)	-0.24** (-3.30)	35.41** (44.20)	0.18** (3.14)	1999Q4**
<i>Lat - perip.</i>	73.88** (28.88)	-0.60** (-4.94)	58.09** (9.92)	0.22 (0.19)	2003Q4*
<i>Lit - bench.</i>	36.68** (23.38)	0.01 (0.05)	26.96** (19.90)	0.58** (6.34)	1999Q3**
<i>Lit - core</i>	31.74** (17.77)	-0.14 (-0.89)	17.10** (11.09)	0.69** (6.62)	1999Q3**
<i>Lit - perip.</i>	62.12** (17.18)	-0.63** (-2.09)	38.29** (11.67)	0.62** (2.70)	1999Q4**
<i>Mal - bench.</i>	24.97** (11.23)	-1.19** (-7.65)	1.92 (0.79)	-1.05** (-5.12)	2000Q4
<i>Mal - core</i>	20.31** (9.98)	-1.37** (-9.63)	-8.20** (-3.65)	-0.87** (-4.67)	2000Q4
<i>Mal - perip.</i>	49.12** (11.76)	-1.60** (-3.48)	19.16** (6.54)	-0.88** (-5.18)	1998Q3
<i>Pol - bench.</i>	8.93** (3.43)	0.81** (3.00)	20.82** (10.81)	-0.23** (-1.95)	1998Q4**
<i>Pol - core</i>	4.36** (3.35)	0.60** (4.74)	11.29** (11.11)	-0.16** (-2.48)	1999Q1*
<i>Pol - perip.</i>	33.28** (11.91)	0.33 (1.16)	33.51** (16.20)	-0.29** (-2.32)	1998Q4
<i>Slov - bench.</i>	40.38** (17.98)	-0.16 (-1.02)	23.95** (9.67)	-0.15 (-0.74)	2000Q4
<i>Slov - core</i>	35.72** (15.84)	-0.34** (-2.16)	13.83** (5.56)	0.02 (0.10)	2000Q4
<i>Slov - perip.</i>	65.28** (22.05)	-0.72** (-3.48)	34.57** (10.59)	-0.09 (-0.33)	2000Q4*
<i>Slovak - bench.</i>	48.68** (54.04)	-0.77** (-9.74)	36.03** (46.32)	-0.22** (-4.26)	1999Q3**
<i>Slovak - core</i>	43.92** (33.29)	-0.94** (-7.73)	26.52** (24.48)	-0.13* (-1.80)	1999Q2**
<i>Slovak - perip.</i>	73.25** (40.31)	-1.28** (-8.45)	47.10** (28.58)	-0.21** (-1.86)	1999Q4**
<i>Crit. Val.</i>					
5%	1.51	1.88	1.92	1.81	
10%	1.21	1.58	1.65	1.54	

Note: Values are in percentages. The dependent variable for the benchmark is the consolidated debt to GDP ratio in country i minus the 60% benchmark (a positive number indicates a debt ratio below 60% since the negative 60% benchmark subtracted from a less negative debt ratio yields positive values). For the core (periphery), it is the consolidated debt to GDP ratio in country i minus the core (periphery) debt ratio (hence a negative number indicates a debt ratio worse than that of the core (periphery) and a positive trend indicates lowering comparative debt ratios). Therefore, a positive trend coefficient indicates improving comparative debt position. ** (*) indicates 95%(90%) significance. Significance levels of breaks are determined using the critical values in Andrews and Ploberger (1994).

Table 3: Effect of deficit/debt on 10-year government bond yields

	<i>Deficit</i>		<i>Debt</i>	
	2000-2005	2004-2005	2000-2005	2004-2005
<i>Cyprus</i>	0.57** (0.10)	1.89** (0.31)	0.00 (0.03)	0.19* (0.11)
<i>Czech Rep</i>	0.00 (0.05)	-0.09 (0.06)	0.02 (0.02)	-0.04 (0.03)
<i>Estonia</i>	0.31 (0.20)	1.46** (0.69)	-0.18 (0.45)	-1.22 (1.40)
<i>Hungary</i>	-0.15** (0.07)	0.45 (0.30)	0.03 (0.03)	-0.02 (0.07)
<i>Latvia</i>	0.07 (0.10)	0.07 (0.06)	-0.28** (0.09)	0.12 (0.10)
<i>Lithuania</i>	-1.62** (0.14)	0.99** (0.50)	-0.09 (0.15)	0.06 (0.07)
<i>Malta</i>	0.04** (0.02)	-0.17** (0.06)	-0.06** (0.01)	0.00 (0.01)
<i>Poland</i>	0.36** (0.09)	0.09 (0.18)	-0.27** (0.06)	0.08 (0.12)
<i>Slovak</i>	0.10* (0.06)	1.21** (0.61)	0.02** (0.01)	0.11** (0.03)
<i>Slovenia</i>	-0.22** (0.09)	0.17* (0.09)	0.08 (0.10)	-0.08** (0.03)
<i>Industrial Prod.</i>	0.04 (0.02)	0.04* (0.03)	0.04 (0.03)	0.03 (0.03)
<i>Inflation</i>	0.23** (0.07)	0.18** (0.09)	0.26** (0.09)	0.17** (0.08)
<i>Trend</i>	-0.09** (0.04)	-0.11** (0.05)	-0.08** (0.03)	-0.08** (0.04)
<i>German rate</i>	0.59** (0.30)	0.62** (0.29)	0.54 (0.35)	0.62* (0.34)
<i>Initial yield</i>	0.49 (0.40)	1.68** (0.48)	0.85** (0.43)	0.91 (0.91)
<i>Adj. R²</i>	0.93	0.98	0.91	0.97
<i>DW</i>	0.59	1.90	0.56	1.80

Notes: The dependent variable is the 10-year government bond yields. Coefficient heterogeneity is preserved for the control variables, but to conserve space only average values are reported. Standard errors are displayed in the parentheses. The standard errors reported for the averaged control variable coefficients are the joint sample standard errors. **(*) represents 95(90)% significance.

Figure 1: Budget Deficit to GDP ratios

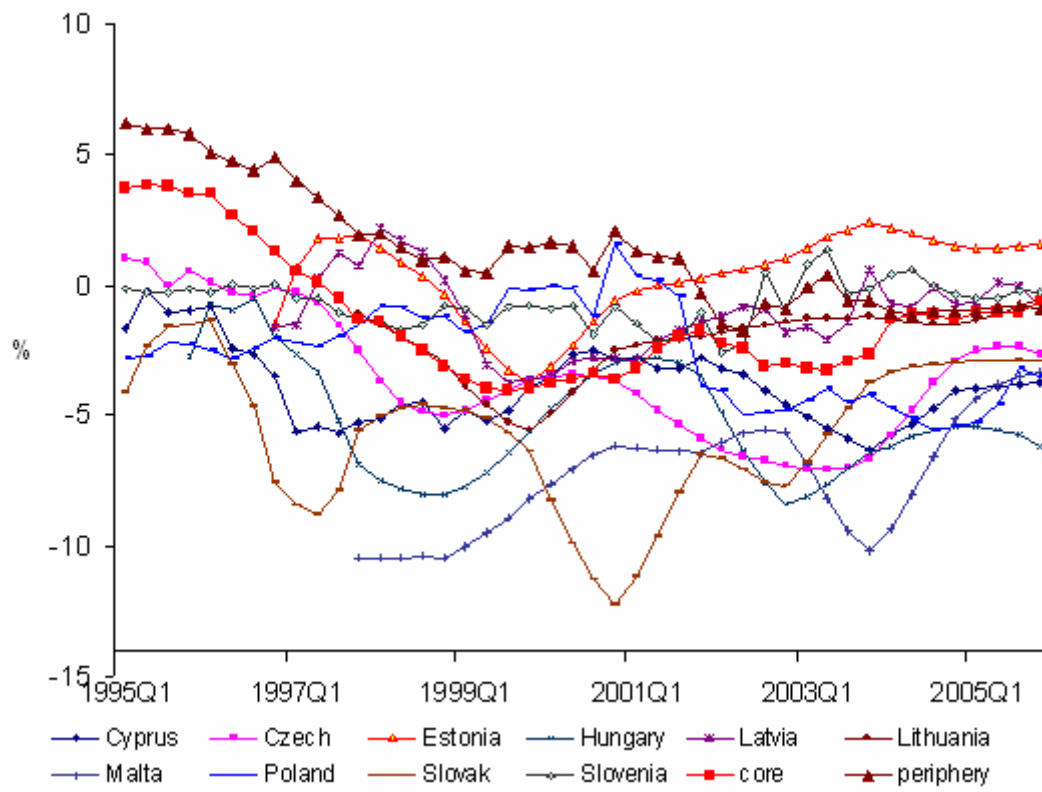


Figure 2a: Deficit (sigma) convergence

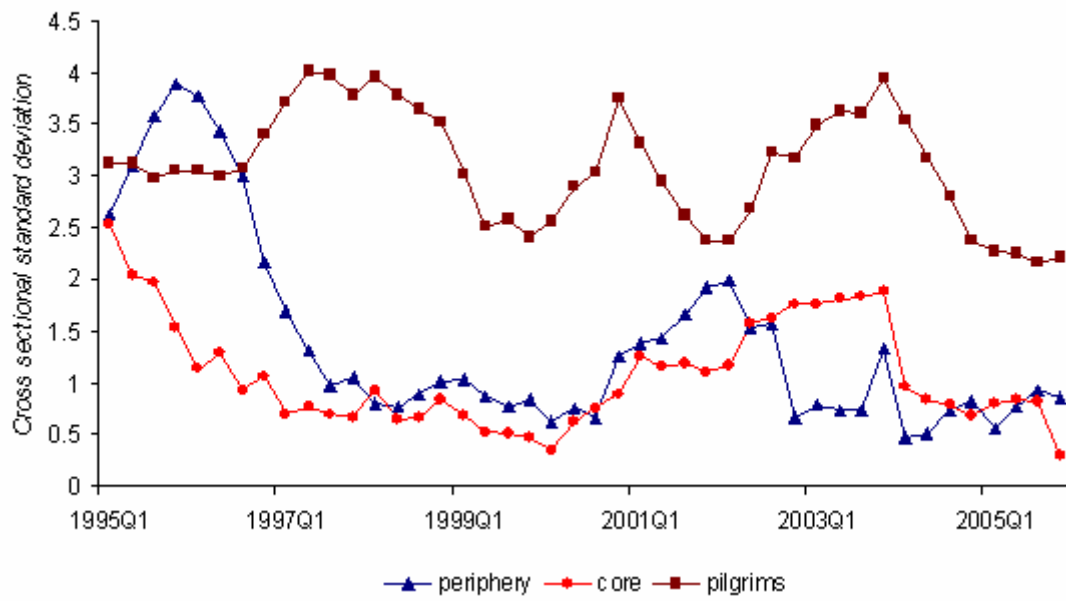


Figure 2b: Average Deficit Levels

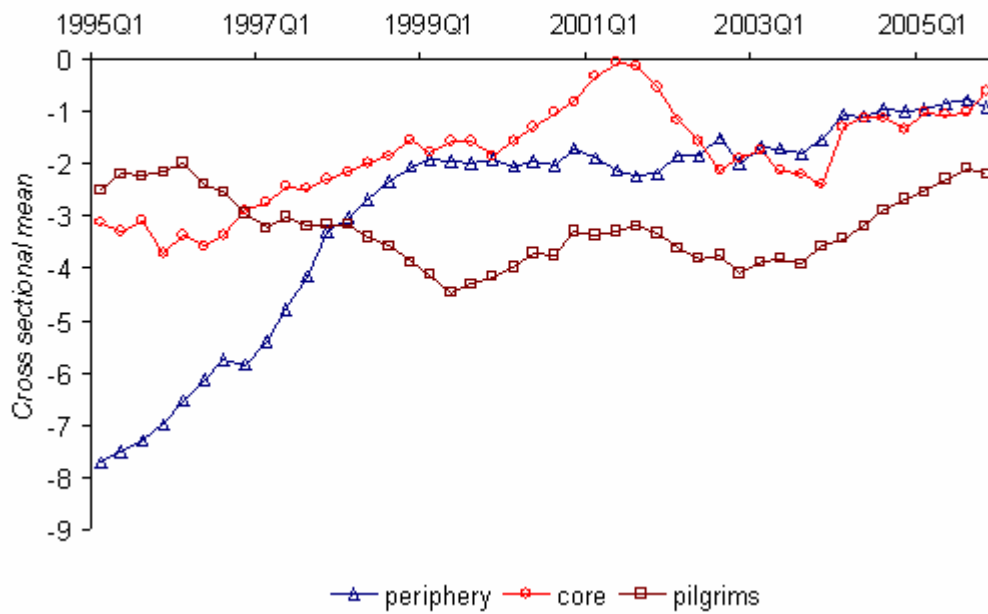


Figure 3: Debt to GDP Ratio

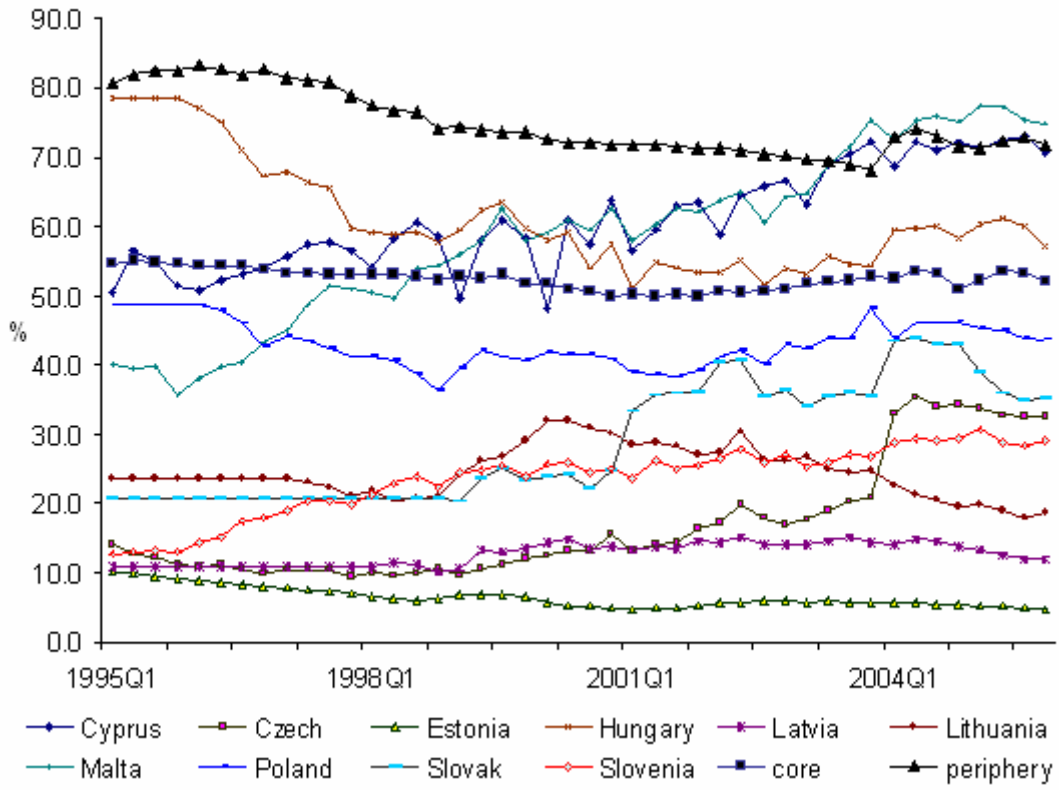


Figure 4a: Debt (sigma) convergence

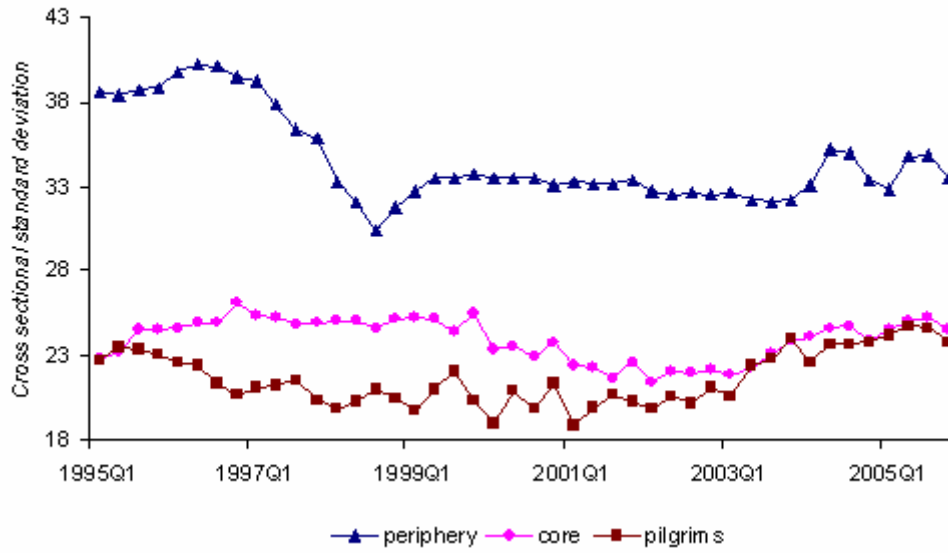


Figure 4b: Average Debt Levels

