Fiscal Sustainability:
Does EU Membership Change Policy Behavior?
Empirical Evidence from Central and Eastern Europe

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Abstract

This paper studies fiscal policy behavior with regard to sustainability for the group of the eight eastern new member states which joined the European Union in 2004. Using the approach of Bohn (1995, 1998) the fiscal reaction function is estimated for the years 1996 until 2013. Further, separating the response in periods before and after accession studies potential changes in fiscal sustainability. The results of the panel regressions reveal a positive statistically significant reaction coefficient, indicating sustainable behavior. Moreover, once the responses are split in 2004 the reaction coefficient is somewhat larger in size ahead of the accession. Accounting for the crisis reveals that these years challenge fiscal sustainability.

1. Introduction

With the recent crisis in Europe, aspects of fiscal sustainability evoke as the public budget situation impaired, fiscal deficits increased and the debt situation regained particular interest. Regular budget sourcing through tax revenues aggravated and sustainability of public finances was challenged. This situation was not limited to Western European economies like Greece, Ireland, Portugal or Spain, who had to apply for financial assistance. Central and Eastern European Union members, like Slovenia for instance, and potential future new member states in Eastern Europe were affected, too, and suffered from serious difficulties. As mentioned by Staehr (2010) for instance Latvia and Hungary suffered from severe problems leading to bailouts.

In this context it is important to recall that for EU members the Maastricht Treaty and the Stability and Growth Pact require sound fiscal positions, as it is recorded in Art. 121 of the treaty. Plus, regarding fiscal aspects, in the wake of the crisis these legal agreements have been extended by the European fiscal compact.[1] These requirements intensify fiscal sustainability considerations for all member states.

In this respect it is instructive to consider the EU's first eastward enlargement of 2004. On May 1st 2004 the ten countries Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia were joining the union and all of them had to fulfill the obligations to become member states. Many of them were keen on joining the euro-zone, so they also had to fulfill the Maastricht criteria, including the fiscal ones. However, in view of the current economic situation in Europe some questions in this context arise for the new member states (NMS)[2] as regards fiscal sustainability. Amongst others, this becomes relevant since 2014 was the 10 year commemoration of the EU's eastward enlargement.

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[1] The compact holds for the NMS except Czech Republic.

[2] This study concentrates on the eastern NMS, thus, Cyprus and Malta are not considered here.

This study contributes to the research on public finances by analyzing whether the governments of the NMS pursue sustainable fiscal policies. Moreover, it studies whether EU membership has changed fiscal policy behavior. These central research questions will be analyzed empirically by using the fiscal response approach of Bohn (1995, 1998). The idea is to test whether a government reacts in a counter-acting manner with its primary balance to changes in its debt situation. In a second step, the accession in 2004 is taken into account by analyzing if this policy behavior changed before and after joining the EU.3 The study is conducted with annual data for the period from 1995 to 2013. So it covers some years of the transition phase as well as the recent troubles within the crisis. The remainder of this paper is organized as follows: section 2 presents a literature overview covering empirical studies on sustainability in general and those with a special focus on Central and Eastern European countries (CEEC). Section 3 presents some theoretical background on Bohn's fiscal sustainability concept. Section 4 shows the data set and the estimation results. Section 5 summarizes and concludes.

2. Literature overview

Several papers in the economics literature address fiscal sustainability aspects, mainly based on the concept of the inter-temporal budget constraint.4 Here, the focus is set on empirical contributions based on time series approaches, especially the fiscal reaction function.

Bohn (1995, 1998) has introduced fiscal response functions. If the primary surplus ratio reacts in an enhancing manner to increases of the public debt ratio, fiscal sustainability seems to be given. For an overview and discussion of fiscal sustainability approaches see for example Afonso (2005) or Chalk and Hemming (2000). Many applications have followed.

Burger (2012) and Fincke and Greiner (2011a) utilize Bohn (1995, 1998)'s approach in order to calculate stabilized debt ratio values for the US and UK or detect changes in the response over time for certain EU (crisis) economies, respectively. Also in this line, Cizkowicz et al. (2015) study sustainability for a panel of 12 euro-zone members for the years 1970-2013 with a focus on windfall gains (from bond yield convergence) related to euro introduction. Further, the divergence of the fiscal situation in periphery and core countries is analyzed. They find weakened fiscal reactions in the periphery group during the windfall years (1996-2007) compared to a strengthened response in the core countries for those years, adding that adjustment in terms of spending cuts was more pronounced for the latter group.

However, the amount of contributions concerning specifically Eastern European countries is more sparsely. Stoian and Câmpeanu (2010) analyze fiscal sustainability in CEECs by applying Bohn's fiscal response approach. They estimate regression equations individually for all ten economies with OLS based on quarterly data for 2000 until 2008. The results are mixed as they indicate sustainable behavior for some countries (Bulgaria, Czech Republic, Estonia and Lithuania), whereas others (Latvia, Poland, Romania and Slovenia) face difficulties.

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[3] Here the focus is set on the fiscal effects of the EU accession in 2004. For a discussion of the political economy perspective of 'political credit cycles' see Fernández-Villaverde et al. (2013).

[4] A brief formal presentation of the theoretical concept and the sustainability definition is presented in section 3. For more details see for instance Fincke and Greiner (2011b).

Also, Staehr (2010) and Baldi and Staehr (2016) utilize fiscal response functions to study the public finance situation in CEECs with a special focus on the current crisis for the period 1999-2008 and 2000-2012 respectively. Baldi and Staehr (2016) analyze fiscal reaction functions before and after the current crisis - and possible changes - in order to explain the different fiscal performance situation of EU economies. They utilize panel regressions for different groups of EU members, diversified by characteristics of integration (in this way including CEECs) and the crisis impact. Their estimations are separated in pre-crisis and post-crisis phases and are based on quarterly data from 2000-2012. They find a change in policy: there is only a slight and rather similar response before the crisis, but a stronger debt effect after 2008, especially for crisis-affected economies.

Concerning the link between structural breaks, fiscal reactions and specified well-defined events, there are also rather few contributions for the CEECs. Cuestas and Staehr (2013) study stationarity properties of the overall budget balance in ten NMS and especially account for effects of structural breaks over the period 1999-2010. They discover stationarity of the fiscal position without structural changes only for Slovakia and Slovenia (linear setting) and the Baltics (non-linear setting), whereas with two structural breaks all countries reveal stationary series (eventually indicating sustainability). Fincke and Wolski (2016) is a study that particularly tests for a structural break in fiscal policy for the 2004 accession with data from 2000 until 2011. They ask whether the direction of fiscal policy has changed once becoming an EU member and find that NMS conduct a more counter-cyclical behavior after joining EU.

By applying Bohn's approach, this paper goes into a similar direction like Stoian and Câmpeanu (2010) and Baldi and Staehr (2016). However, a special focus is set on the 2004 enlargement. We not only test sustainability for the eastern NMS in general, but especially account for the behavior before and after EU accession. Moreover, the data set runs from 1995 until 2013 with annual data. This allows to include the early stage as well as the recent crisis.

3. Theory

In order to conduct a profound study, some theoretical background on Bohn's fiscal sustainability concept should be provided. The starting point is the budget identity of the public sector. Like any other economic agent the government has to balance it's revenues and expenditures. If there is a funding gap, this has to be filled by issuing new bonds (credit financing). Thus, the dynamic evolution of the government budget can be stated like (cf. for instance Greiner et al. (2007) or Greiner and Fincke (2009).):

$$\frac{dB(t)}{dt} = G(t) - T(t) + iB(t). \tag{1}$$

Revenues, which are mainly taxes, are expressed by T, and the government spending is split into two parts: primary spending G and interest payments iB on outstanding debt. Solving equation (1) leads to the two central theoretical concepts for fiscal sustainability:

$$\lim_{t \to \infty} B(t)e^{-it} = 0, \tag{2}$$

which indicates that the discounted of value of public debt should converge to zero asymptotically (sometimes denoted as the No-Ponzi-Game condition, cf. Blanchard and Fischer (1989)[5]).

$$\int_0^\infty e^{-it}\left[T(t) - G(t)\right] dt = \int_0^\infty e^{-it} PS(t) dt = B(0)$$

(3)

states that future primary surpluses PS should pay off existing debt (strictly speaking it's expected primary surpluses, as they have to be achieved in the future, which involves expectations.). As growth is an important characteristic of modern economies, this idea may also be transfered to the variables measured as ratios to GDP. See for instance Greiner and Fincke (2009) for more detailed theoretical derivations.

Bohn (1995, 1998) introduced fiscal reaction functions, studying whether the government reacts with its primary surplus to changes in public debt, both measured as ratios to GDP. The central idea of the concept is analyzing whether the primary balance ratio is a positive function of the public debt ratio, cf. Greiner et al. (2007). This may be denoted by:

$$ps = \alpha_0 + \gamma b,$$

(4)

with small letters presenting ratios to GDP. Here, γ gives the response parameter, which expresses the fiscal reaction. The parameter α_0 contains all other influences on the primary balance (thinking in an empirical setting, this could present effects such as the control variables or the errors for instance), cf. Greiner et al. (2007).

4. Empirics

This section presents the empirical estimations and results. Ahead of that, some information on the data set is presented to get a first impression of the public finance situation in the eight countries under consideration.

4.1. Dataset

The data set covers annual data for the years from 1995 until 2013 for the eight eastern NMS that joined in 2004: Estonia, Latvia, Czech Republic, Lithuania, Hungary, Poland, Slovenia and Slovak Republic.[6]

For the estimations the data set is used as a panel, meaning the NMS are treated as a group unlike other country-by-country studies such as Stoian and Câmpeanu (2010) for instance. The aim is to analyze the common behavior across all NMS (due to the accession), rather than individual country actions. In addition, the series are likely to be

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[5] Similar approaches may be found in Blanchard (2000), Neck and Sturm (2008) or Burger (2003) for instance.

[6] Again, the focus is set on the eastern NMS, thus, Cyprus and Malta are not considered here.

too short for such a procedure. In order to incorporate the different behavior before and after the accession, the data series are separated after 2003. Since the data set refers to annual data and the NMS joined on May 1st 2004, most of that year they were EU members, thus, it is reckoned for the second part.

Owing to availability the data set has been constructed using different (but few) sources. GDP and the deflator stem from International Monetary Fund (2014). The primary balance and public debt ratio mainly come from European Central Bank (2015), some missing observations have been completed (after careful examination of trend and neighbors) by OECD (2014) entries (Estonian and Czech public debt and primary balance data, however, mainly stems from the latter source.)[7]. Total public spending has mainly been extracted from AMECO (2015), rarely missing data has been supplemented by International Monetary Fund (2014) observations. Due to utilization of lagged debt ratio variable in the regressions, the series for all variables in the estimations cover the years from 1996-2013, except for the debt ratio, which runs from 1995 to 2012. Table 1 summarizes the central information.[8]

Table 1: Detailed data information (own calculations).

Variable	Source	No. of obs.	Descriptive Statistics			
			Mean	Min.	Max.	St.D.
Primary balance (ps)	ECB (2015) OECD (2014)	144	-1.72	-4.84	0.09	1.16
Public debt (b)	ECB (2015) OECD (2014)	144	31.40	25.16	46.80	6.64
YGap	GDP: IMF (2014) Defl.: IMF (2014)	144	3.10	-5.40	6.19	2.78
Infl	Defl.: IMF (2014)	144	4.82	0.56	14.17	3.29

The descriptive statistics refer to the averages cross countries of the actually used data in the regressions, meaning for the eight eastern NMS with data from 1996-2013, except for the lagged debt ratio (1995-2012). The statistics reveal that for the group of the eight NMS the primary balance ratio was in deficit on average, with the maximum primary deficit of almost 5% in 2009 and the largest surplus value of nearly 1% in 2007. The average value for the debt ratio in the NMS is 31.4 %, with the lowest value of about 25% in 1999 and the highest value of 46.8% in 2013 with the crisis. The average output gap ratio for the considered period is 3.1%, with the minimum in 2009 and the highest value in 2007. The average inflation in the group was about 5%, with the lowest value in 2010 and the maximum of 14.17% in 1996.

As regards the stationarity properties of the series utilized in the regression, ahead of the estimations Augmented Dickey-Fuller Test have been conducted. They reveal stationarity for all variables except the debt ratio. However, with $p - value = 0.1691$ it comes rather close. Further, Burger (2012, pp. 937f.) discusses this issue and points out

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[7] For Latvia the primary balance ratio data for 2010-2012 have been calculated manually by resorting to Central Statistical Bureau of Latvia (2015) and World Bank (2015), see appendix A for details.

[8] Please see also Appendix A for more detailed information on the data series.

that Bohn didn't particularly check stationarity of the series. Here, stationarity (or relatively close proximity) is assumed.

In order to test for sustainable behavior in the NMS with Bohn (1995, 1998)'s fiscal response approach, the focus is set on the two central variables primary balance to GDP ratio and public debt to GDP ratio. To get a first visual impression, figures 1 and 2 depict their development.
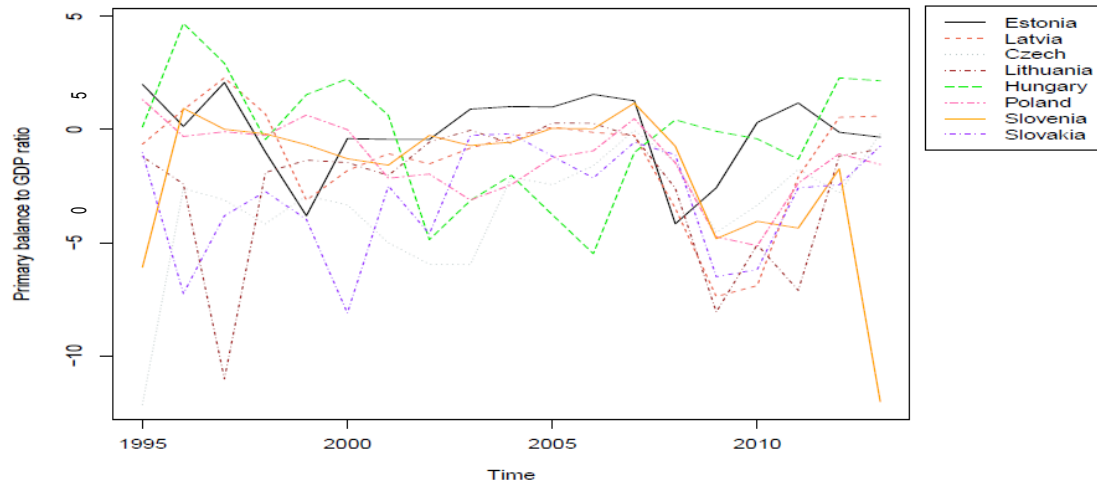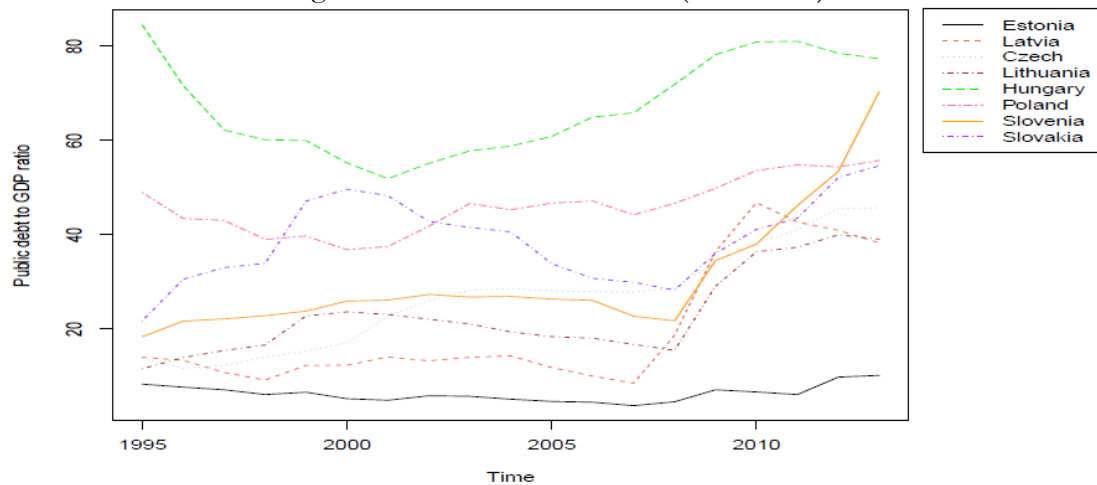
Figure 1: Primary balance NMS (1995-2013)

Figure 2: Public debt ratio NMS (1995-2013)

The individual primary balances reveal a rather wiggly behavior with most movement in terms of (smaller) deficits. Summarizing the primary balance ratio across time and countries yields a value of -1.72 %, indicating that on average the NMS run primary deficits over this time horizon. However, for instance Hungary was able to run high surpluses of about 5 and 3 % during the late 1990s, whereas other countries such as Czech Republic or Lithuania were suffering from high primary deficits of over 10% of GDP during in some of those years. Regarding the public debt ratio, the initial situation in the Baltic states was characterized by very low values, whereas Hungary revealed a value of 84.5 % which decreased until the early 2000s. While Poland's debt ratio remained fairly stable over time, Latvia experienced a crucial rise 2008/2009 - leading to a bailout in order to

stabilize the economy, Staehr (2010). Also, the strong increase of the Slovenian public debt ratio is noteworthy, which almost quadrupled from 18% in 1995 to 70% in 2013. The recent crisis is visible in the most current observations.

For both figures, from a first rough descriptive and graphical impression, no particular impact of the 2004 enlargement is directly visible. Therefore, in a next step, the response function according to Bohn (1995, 1998) will be estimated in order to analyze the fiscal sustainability behavior further.

4.2. Estimation results

The following regression model will be estimated:

$$ps_{i,t} = \alpha_0 + \gamma\, b_{i,t-1} + \sum_j \alpha_j Z_{j,i,t} + \epsilon_{i,t},$$

(5)

where $ps_{i,t}$ indicates the primary balance to GDP ratio for country i at time t. The variable b represents the public debt to GDP ratio and ϵ is the error term. The vector of the control variables is denoted by $Z_{j,i,t}$. These additional aspects are twofold: they contain a variable, which is motivated by the tax smoothing hypothesis, stating that a government shall run public deficits in order to keep the tax rates constant. So, a business cycle variable, $Y\,Gap$, is included to account for fluctuations. It is constructed like an output gap ratio, i.e. $\frac{(Y_t - Y^*)}{Y^*}$, with Y for the real GDP and Y^* its trend constructed with a moving average.[9]

Moreover, the inflation rate $Infl$ is included as it accounts for changes in the price level and captures some inflation from monetary policy. The debt ratio is included in lagged terms. On the one hand, economically, this allows to capture the actual response on realized (past) values of the debt ratio. On the other hand, technically, this mitigates endogeneity. As regards the estimation technique, the regression will be conducted as a panel with fixed effects. This allows to cope with the different fiscal situations depicted in figures 1 and 2 and incorporates country specific characteristics. Moreover, suitability tests (in comparison with a pooled or random effects setting) support this decision.

In a first step, the research addresses the general question whether there is sustainable fiscal behavior of the group of the NMS. This is expressed by a statistically significant positive reaction coefficient γ in the estimation of equation (5). In a second step, the focus is set on the 2004 enlargement. In particular, did the fiscal behavior change in the eight eastern NMS after accession? Thus, the response parameter γ is then dismantled in order to account for different behavior before and after accession separately. Therefore, two interaction terms are introduced which capture the fiscal response in the two periods

(BA = before accession, i.e. (1996-2003) and AA = after accession, i.e. (2004-2013)). They are constructed with a Dummy D containing ones and zeros:[10]

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[9] Here, the output gap is based on own calculations. For a similar approach, using the HP-Filter, see for instance Fincke and Greiner (2011b).

[10] For instance DBA contains ones for the years 1996 until 2003 and zeros afterwards.

$$ps_{i,t} = \phi_0 + \gamma_{BA}\, b_{i,t-1} * D_{BA} + \gamma_{AA}\, b_{i,t-1} * D_{AA} + \sum_j \phi_j Z_{j,i,t} + \epsilon_{i,t}.$$

(6)

Table 2 summarizes the information on the reaction coefficients.

The first part of table 2 presents the outcomes of the estimation of equation (5). γ presents the common response parameter for the eastern NMS and indicates whether their governments reacted to changes in their public debt ratio by adjusting their primary balance ratios. According to Bohn (1995, 1998) a positive coefficient signifies sustainable behavior. The result reveals a positive and significant coefficient, indicating sustainable fiscal behavior for the group of the eastern NMS for the years from 1996 to 2013. This can be interpreted in a way that an increase in the public debt ratio goes along with enhancing the primary surplus (or at least reducing deficits). This finding is in line with the behavior several other European economies such as Germany for instance Fincke and Greiner (2011b). Regarding the controls, only the output gap is statistically significant. The positive coefficient indicates counter-cyclical behavior for the group of the CEECs. This could be interpreted in a way that in prosperous periods the primary balance increases, while it decreases in recessions.

Table 2: Estimation results for the reaction coefficients (1996-2013).

Common effect	Coefficient	Std. Error
b	0.050*	0.022
Y Gap	0.316***	0.057
Infl	0.069	0.047
	R^2_{adj} = 0.223	DW = 1.237
Separated effects	**Coefficient**	**Std. Error**
bBA	0.060*	0.027
bAA	0.052*	0.022
Y Gap	0.318***	0.057
Infl	0.054	0.052
	R^2_{adj} = 0.224	DW = 1.238
Signf. levels	****(1% level)**	***(5% level)**

Moreover, the second part of table 2 presents the estimation outcomes of the segregated fiscal reactions. The coefficients γ*BA* and γ*AA* both possess a statistically significant positive sign, which signals sustainability. However, the estimation of the separated fiscal reaction reveals additional information: by splitting the response into periods before and after accession, the reaction indicates to be stronger in the years before 2004. This holds true for both, the magnitude of the coefficient as well as the significance level. Economically this makes clear sense, as the countries were putting strong effort and emphasis on fulling the criteria for the membership.

Some robustness checks were conducted to study the strength of the results. First, in order to account for the influence of the crisis, the estimations were run with a truncated sample. This has been conducted by cutting the data set after 2008 so leaving out all crisis

observations. The outcome can be found in table 5. The results confirm the outcomes presented in table 2: again, the general reaction coefficient is significantly positive. This can be interpreted as sustainable fiscal policy behavior and holds true for both, with and without the crisis years.

Next, instead of conducting a formal structural break test on the accession year, the regressions are implemented in the manner of Baldi and Staehr (2016). We split the whole data set in between 2003 and 2004 and run the estimations with two (unrestricted) models before accession (1996-2003) and after accession (2004-2013). Such a proceeding implies that the break is pertained also to all other variables, namely the output gap and inflation.

The estimation yields some interesting additional insights. The results can be found in tables 3 and 4 below.

Table 3: Estimation results (1996-2003).

Variable	Coefficient	Std. Error
b	0.129**	0.047
Y Gap	0.196	0.170
Infl	0.051	0.061
	$R^2_{adj} = 0.124$	DW = 1.75
Signf. levels	**(1% level)	*(5% level)

Table 4: Estimation results (2004-2013).

Variable	Coefficient	Std. Error
b	0.033	0.031
Y Gap	0.322**	0.072
Infl	0.049	0.111
	$R^2_{adj} = 0.291$	DW = 1.18
Signf. levels	**(1% level)	*(5% level)

For the pre-EU-phase the positive debt reaction coefficient presents the only significant effect in the model, whereas in the post-accession model the business cycle variable becomes the only significant influence (positive sign). This supports the findings from above by stressing the central effect of the debt response ahead of the entry. It can be interpreted as the enhanced efforts to join. The latter result indicates important influence of business cycle aspects, signaling counter-cyclicality. Since this interval includes the period of the current crisis, one may question whether there may be potential influence of the crisis. This is addressed again by the truncated sample, being cut after 2008. The result is presented in table 6.

Table 5: Estimation results (1996-2008).

Variable	Coefficient	Std. Error
b	0.142**	0.035
Y Gap	0.358**	0.096
Infl	0.069	0.044
	R^{2adj} = 0.219	DW = 1.37
Signf. levels	**(1% level)	*(5% level)

Table 6: Estimation results (2004-2008).

Variable	Coefficient	Std. Error
b	0.260**	0.074
Y Gap	0.377**	0.084
Infl	0.104	0.087
	R^2_{adj} = 0.368	DW = 1.69
Signf. levels	**(1% level)	*(5% level)

If the second period of the unrestricted model is run until 2008 only (i.e. 2004-2008), this splitted model allows to study potential crisis effects. It shows not only a significant *Y Gap* coefficient for the second phase but also a statistically significant positive response parameter. This means without the crisis years the response is sustainable. Obviously, with respect to debt sustainability, there is a crucial influence of the crisis which should not be neglected. The period from 2009 to 2013 indicate to be tough years for public finances challenging the fiscal response.

Additionally, other robustness checks have been conducted, they show for instance the central result of fiscal sustainability is also affirmed for different estimation specifications (i.e. model types, such as a pooled estimation or different sets of regressors/controls). For instance, aspects of the influence of (national) fiscal rules or institutional variables have been accounted for by the European Commission's fiscal rule index. This also shows a positive statistically significant effect on the primary balance.[11] However, in combination with the other regressors, the debt ratio looses significance once the fiscal rule indicator is included. This may be due to the similar effect, as a fiscal rule also has the incentive to enhance budget discipline.

Moreover, in order to check for drivers and potential influence of for instance initial conditions, the analysis has been conducted with sub-sets and different samples, for instance just the Baltics, the Visegrád group (Poland, Czech Republic, Slovakia and Hungary) or for the group of CEECs with the highest real GDP p.c. (Czech Republic, Slovakia and Slovenia - cf. appendix B). It shows that the sustainable response is not driven by the Baltics, for them central influence on the primary balance seems to be the business cycle. In contrary, for the Visegrád group the results shows sustainability and response is stronger than for the full sample. Size in terms of the GDP p.c. does not seem to matter for the response, for the group of the three economies with the highest real GDP p.c. the

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[11] The index comprises constraints on fiscal policy in a summary indicator, see European Commission (2016).

debt coefficient is not statistically significant. These results are reported in appendix C. Due to the reduced sample size only sustainability (not the accession effect) is tested.

Relating these result to other literature contribution is somewhat difficult, as for instance Stoian and Câmpeanu (2010) or Baldi and Staehr (2016) work with a different testing framework: the first contribution perform country-by-country studies yielding mixed results for sustainable behavior and Baldi and Staehr (2016) have put the focus on a comparison of pre-crisis and post-crisis behavior, respectively.

There are some points of discussion. The fixed cut in 2004 for the analysis of the accession may be debatable. Certainly, there may have been incentive effects of anticipating the EU membership. But as May 1st 2004 was the official day for membership, this date is used for the clear cut to assess a break in the NMS's policy here. Moreover, due to the limited amount of observations in the sample, the data set is fairly small and the results obtained from the estimations should be reflected with some caution, especially as regards the policy implications.

Despite these aspects, the results presented in the tables above offer some new and current empirical research regarding sustainability studies for Central and Eastern EU members with special emphasis on the 2004 accession. They show fiscal sustainability in the eight eastern NMS for the considered time period. This holds true for the common response of the group over the entire period. Plus, the crisis years have been a challenge for sustainability in the selected CEECs. Separated response indicate that the response may have been stronger before the accession. Certainly, further research this direction in the future is necessary, for instance in order to study the fiscal behavior of EU applicant countries or future EU members. Moreover, it could address the sample specification, for instance level of debt, with which the countries entered the period (heterogeneity) or the robustness if certain economies are left our. Also, reflections on the euro accession or real time data (for the business cycle variable etc.) may be taken into account in follow up study.

5. Summary

This paper studies the fiscal policy behavior for the group of the eight eastern new member states which joined the EU in 2004. The approach of Bohn (1995, 1998) is used to estimate the fiscal reaction function with annual data for the years 1995 to 2013 with panel regressions. By separating the response in periods before and after accession, we studied potential changes in fiscal sustainability behavior. The results of the estimations reveal a positive statistically significant reaction coefficient indicating sustainability. In a second step, the responses are estimated separately in order to capture the behavior before and after 2004. This split is motivated economically by the EU accession.

The outcome signifies a stronger reaction ahead of the accession in some cases. This is reasonable from an economic point of view as it covers the preparation phase before joining the EU and shows the effort of fulfilling the qualification criteria. Moreover, the estimations indicate considerable influence of the current crisis on the sustainability situation. A truncated sample accounts for the crisis period and reveals influence on the fiscal behavior in these special years. It shows that the fiscal response is not significant for 2004 to 2013 while the behavior is sustainable if the 2009 to 2013 period is left out.

This study aims at contributing to the literature on fiscal reaction functions in CEECs by providing some new estimation results indicating fiscal sustainability for the

group of the NMS. This simply addresses the general statement and direction of the response. Certainly, for particular and tangible policy assessment the estimations have to be refined and evaluated on a country specific foundation, which a panel may not provide.

Moreover, these results only hold true for the considered time period. In order to maintain the sustainable fiscal situation, the governments of the economies need to continue pursuing their counter-acting behavior and adhere to that policy. Concerning policy implications, the results show that especially the pre-accession years, or the EU anticipation phase, brought along improvement in terms of fiscal positions and sustainable fiscal performance. This development should be followed up on. The effort and endeavors to achieve sustainable debt positions should not decline. A sound fiscal situation is especially important for members of a union, as for instance spillovers or transfer mechanisms may affect other members or the whole group. Thus, the economic interpretation and policy implications of the results from above call for retuning to previous fiscal paths and appeal for prudent cautious debt polices. Looking ahead, these results may also be interesting for the perspective of future members. They also strain to comply and fulfill the criteria.

Acknowledgements

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Appendix A: Additional data information

Please note, Latvia's observations for the primary balance ratio 2010-2012 have been calculated manually by resorting to Central Statistical Bureau of Latvia (2015) and World Bank (2015), meaning the primary spending has been calculated by correcting total expenditures by interest payments. Further, Lithuania's public debt ratio data for 2000-2003 stem from International Monetary Fund (2014). The (local) trend for calculating *Y Gap* is computed with moving averages based on 3-periods (except for Lithuania and Czech, for which only 2-period steps were possible). Plus, they are computed backward-looking in order to use available observations. Whenever necessary adjustment to euro has been calculated according to the official rate, e.g. for Lithuania with 3.45280 LTL = 1 €.

Appendix B: Initial economic conditions and development in CEECs

As pointed out by several contributions, the initial situation of the economy matters. Regarding the initial conditions, here presented by GDP per capita at the beginning and end of the considered period and measured in US $ (constant prices of 2005) for comparison reasons, it shows that for the eight selected CEECs the situation improved markedly. For instance the GDP p.c. for Estonia, Poland and Slovakia roughly doubled over the considered time horizon. Notably, for the Baltics Latvia and Lithuania these values even increased by about 150%. The development shows the catching-up process, which is remarkable here. For countries with a rather high GDP p.c. at the beginning of the period, like Czech Republic or Slovenia, the gains were lower as their GDP p.c. "only" rose by about 40% over the considered time horizon. Nevertheless, even Slovenia's high 2013 value of 18634 US$ is still comparatively low in relation to other European states - as it is only about half of the value of Germany (39219 US$) or France (35620 US$).[12]

Figure 3: GDP per capita (1996 and 2013)

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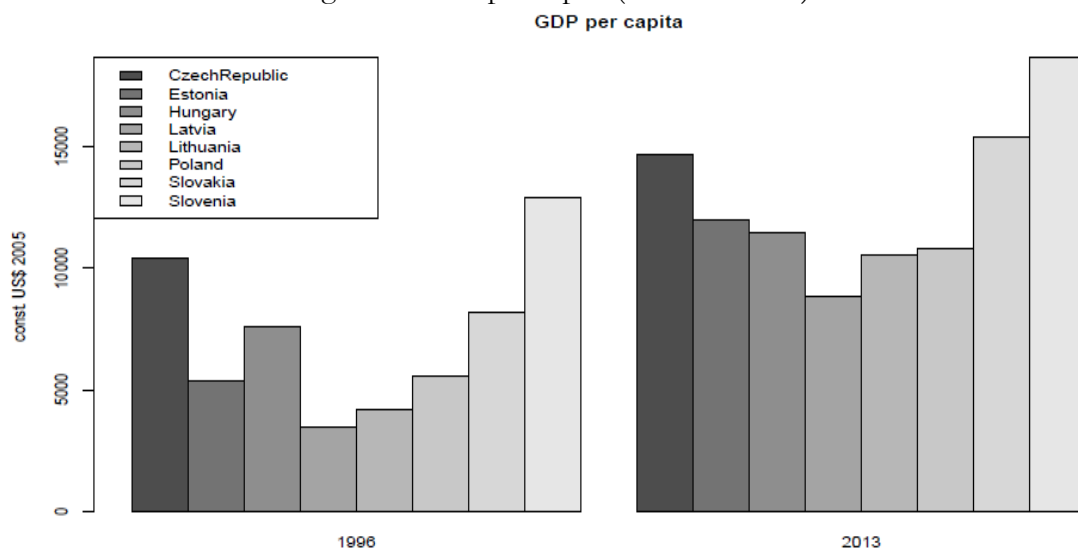
[12] See World Bank (2015) for the Data.

Appendix C: Additional estimation results

Table 7: Estimation results Baltics.

Variable	Coefficient	Std. Error
b	0.015	0.035
Y Gap	0.329***	0.065
Infl	- 0.052	0.067
	$R^2_{adj} = 0.322$	DW = 1.47
Signf. levels	***(0.1% level)	

Table 8: Estimation results No Baltics.

Variable	Coefficient	Std. Error
b	0.078**	0.029
Y Gap	0.389***	0.112
Infl	0.168**	0.063
	$R^2_{adj} = 0.206$	DW = 1.24
Signf. levels	***(0.1% level)	**(1% level)

Table 9: Estimation results Visegrád.

Variable	Coefficient	Std. Error
b	0.125***	0.028
Y Gap	0.274*	0.116
Infl	0.155*	0.058
	$R^2_{adj} = 0.265$	DW = 1.30
Signf. levels	***(0.1% level)	*(5% level)

Table 10: Estimation results CZ, SK, SI.

Variable	Coefficient	Std. Error
b	0.036	0.038
Y Gap	0.587***	0.127
Infl	0.063	0.111
	$R^2_{adj} = 0.288$	DW = 1.65
Signf. levels	***(0.1% level)	