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# Euro area time-varying cyclicality of fiscal policy[*]

António Afonso [$] Francisco Tiago Carvalho [#]

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**Abstract**

We assess the cyclicality of fiscal policy in the 19 Euro area countries, notably during recessions, for the period 1995-2020. We use a time-varying measure of fiscal cyclicality to describe fiscal policy developments. The results suggest that during recessions discretionary fiscal policy becomes more pro-cyclical, but the overall budget balance becomes more counter-cyclical. Hence, pursuing a Ricardian fiscal regime by more indebted countries leads to higher counter-cyclicality of fiscal policy. Government size reduces counter-cyclicality, as well as trade openness, and financial development has a positive impact on counter-cyclicality.

KEYWORDS: Fiscal Policy; Cyclicality; Time-varying coefficient; Euro area.
JEL CODES: C23; E62; H30; H62.

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## 1. INTRODUCTION

The cyclicality of fiscal policy has been revisited notably after the Global Financial Crisis (GFC), and the COVID-19 pandemic. Indeed, the responses from authorities to the economic and health COVID-19 crisis, and the shutdown imposed by lockdown measures brought to a new spotlight the ability and willingness of governments to smooth the business cycle. Those lockdown measures led to an unprecedented fall on GDP around the world. With that unparalleled fall it seems to be arriving an also unprecedented (i.e., in size) fiscal response from authorities. From Washington, where President Biden announced a $1.9 trillion American Rescue Plan (White House, 2021) to Brussels, where the European Commission (EC) (2021) announced a stimulus package worth EUR 2.018 trillion in current prices (EUR 1.8 trillion in 2018 prices)., authorities seem to be willing to open the tap of public money to ensure the economy does not run dry for too long.

Even though there is a previous experience regarding a European-wide stimulus package, designed in response to the 2009 GFC and worth around €200 billion, the current EC plan dwarves its forerunner. However, the subsequent events after the 2009 stimulus have shown us that this apparent counter-cyclical behaviour may not be long lasting, since in ensuing years the European Sovereign Debt crisis erupted, which led to some pro-cyclical fiscal adjustments in several economies.

Therefore, if the authorities leave fiscal policy reactions merely to moments of crisis and recessions, as they seem to (IMF, 2008) they risk, on the one hand, to be exacerbating the business cycle and, on the other hand, not taking advantage of good times to improve debt sustainability, crucial to ensure the ability of a response once bad times come. Thus, it is relevant to study if the difference between expansionary and contractionary fiscal stance is statistically significant in the 19 Euro Area (EA) countries.

Smoothing the business cycle was considered by Musgrave (1959) as one of the three crucial functions of the government and for that end, at least until the 1970's, governments tended to implement a very active fiscal policy. However, the inability to solve the problems stemming from the oil shocks and stagflation led some economists to disregard fiscal policy as an effective method to smooth the business cycle (Beetsma & Giuliodori, 2011) and, since then, monetary policy has assumed a more centre-stage position as a stabilization tool. Business cycle stabilization is important because macroeconomic volatility can hamper medium-term growth (Furceri & Jalles, 2018). However, even before the pandemic hit, interest rates were still historically low in Europe, ever since the Sovereign Debt Crisis. With unconventional monetary policy still trying to tackle the Zero Lower Bound (ZLB) problem and inflation persistently

below the 2% target, fiscal policy emerged once more as a useful tool to help aggregate demand to bounce back. Nevertheless, with sovereign debt levels historically high, it is important to be sure that governments using fiscal policy are indeed contributing to smoothing the cycle and not magnifying it, as stated before. Stimuli must be switched off once economic activity picks up again, hence the importance in shedding a light on the possible different pattern in EA countries' fiscal policy cyclicality during up and down-swings. For instance, if counter-cyclical fiscal policy in the past has been only used to boost the economy and not to smooth its booms, it is important for policy makers to be aware of this bias, which has the potential to harm medium-term growth, by increasing output volatility and raising debt sustainability concerns.

To address this research question, we estimate country-specific time-varying cyclical measures for EA countries, using data from 1995 to 2020. To measure the cyclicality of the fiscal stance, i.e., of discretionary budgetary measures, we use the cyclically adjusted primary balance (CAPB). As a comparison we also use the overall budget balance, which considers automatic stabilizers. To assess how the fiscal stance changes during output slowdowns, we will use a dummy variable to identify such years and assess if its effect is statistically significant.

The remainder of the paper is organised as follows. Section 2 reviews the literature on the topic of fiscal policy cyclicality. Section 3 presents the methodology. Section 4 reports the results. Finally, section 5 is the conclusion.

## 2. LITERATURE

According to the IMF (2008) there are three criteria to be achieved for the fiscal stimulus to be effective: timely, targeted and temporary. Answering the research question of this paper will allow to assess if the fiscal stance behaviour (i.e., the discretionary part of fiscal policy) has been compatible with these criteria, namely the first and third. If governments end up missing one of the three criteria, they risk being putting off fires with gasoline. As mentioned by Larch et al. (2021), "With the exception of very large shocks, discretionary measures remain ill-timed from a stabilization perspective (…)".

On the other hand, some authors also show that pro-cyclicality of fiscal policy does not always rise only from timing flaws but also from political institutions. The voracity effect explored by Tornell and Lane (1999) predicts a pro-cyclical behaviour of fiscal policy due to fiscal competition among "power blocks" for the absorption of rising fiscal revenues during expansions. Alesina, Campante and Tabellini (2008) attribute pro-cyclical fiscal behaviour, mostly in developing countries, to asymmetric information and political agency problems that

lead voters to demand expansionary fiscal policy when observing a boom, to avoid governments from absorbing extra revenues as rents (which voters cannot observe) – in their words, an attempt to "starve the Leviathan". This strand of literature is corroborated by Fatás and Mihov (2003 and 2006) who found that discretionary fiscal policy can induce macroeconomic instability, which harms economic growth, but such can be prevented with political constraints on politicians, as per their work on a sample of US states.

However, most authors are generally in favour of counter-cyclical fiscal policy as a tool to reduce macroeconomic volatility. This can indicate some improvement on the caveats of this tool and it is notwithstanding the more recent findings of Jalles (2021) of pro-cyclical fiscal policy during financial distressed times in developed countries, due to financing constraints, something that was not considered in the literature as a real possibility before the Financial and the European Sovereign Debt Crisis (see, for instance Lane, 2003). Under these findings, it follows that a possible answer to our research question is that downturns may impinge in such a way on public finance that fiscal policy stance does not change significantly in downturns either due to financing constraints. All in all, even if fiscal policy is not perfect, it is an important tool to promote economic stability and is in place to be used in the following years to deal with the pandemic economic crisis. Thus, it is important to know how the fiscal stance changed in response to past economic developments for it might tell us how it is likely to behave once the economy is back on track.

To measure cyclicality, two main alternative approaches were summarized by Ceron (2020). On the one hand, we have those studies that focus their analysis using specific periods of changes of fiscal and output variables above a certain threshold. This is followed by the said author, who in turn follows Alesina and Perotti (1995 and 1997), among others. On the other hand, there are those who use a regression model to explain how (and why) fiscal variables react to changes in the business cycle and where the sign of the coefficient associated with output will tell us the cyclicality of the fiscal variable. This is the approach followed by Lane (2003) and Galí and Perotti (2003). Recent work allows us to further divide this latter branch on those who study cyclicality on a static way, using a cross country analysis to estimate the average cyclicality coefficient over a sample period and others who, like Furceri and Jalles (2018), analyse cyclicality in a dynamic way, allowing to observe changes through time. We will use this last approach in the analysis for the Eurozone countries.

Galí and Perotti (2003) divide the budget balance in two components: the cyclical and the structural component. The cyclical component reacts directly to business cycle conditions and thus is outside of policy makers immediate and direct control. In this category are the so-called

automatic stabilizers, like unemployment benefits, which raise government spending when there is a downturn in the economy that results in more unemployment. The structural component is then what is left from the budget balance after we account for the current business cycle position and it is what indeed reflects the fiscal stance chosen by fiscal authorities. Once we subtract interest payments, we get the CAPB. The same authors further decompose the structural component into an endogenous component that reacts to expected cyclical conditions in the future and where active fiscal policy falls in and into an exogenous component that is the result of more pure political actions, not related to the economy. War effort expenditure is often given as an example of this budgetary component. However, we will focus the analysis on the structural component, measured by the CAPB.

As put by Afonso, Agnello and Furceri (2010), "the conventional wisdom that emerges from such literature is that fiscal policy is countercyclical or a-cyclical in most developed countries". This difference is identified, among others, by Gavin and Perotti (1997) and is corroborated by the later work of Lane (2003) who, even if working with an OECD country sample, found that "richer countries enjoy less pro-cyclical government spending".

Besides economic development, other variables, both macroeconomic and institutional have shown explanatory power over cyclicality of fiscal policy. According to Jalles (2021) government spending cyclicality was negatively associated with financial development, as it is easier for governments to raise money during bad times. Also, trade openness was found by the same author to promote pro-cyclicality, which is also pointed out by Lane (2003) and can be explained to higher exposition to external shocks, which may lead countries to use more active fiscal policy. However, Beetsma and Giuliodori (2011) argue that in the context of the EU, to be successful, fiscal efforts must be put together, since fiscal policy put in place by single national governments will leak away via trade. In a European setting this could also raise the contradicting hypothesis that EU countries more open to trade use less active fiscal policy, due to leakage concerns, and use it only when it is a shared effort.

On the topic of political constrains in a European context, Bénétrix and Lane (2013) conduct an analysis on the effects of the Maastricht Treaty and the European Monetary Union (EMU) on member states' fiscal policy. Given that European countries have abdicated from their monetary policy autonomy when joining the euro, which could have implied a stronger reliance on counter-cyclical fiscal policy to smooth output shocks. These authors found that, even though fiscal policy cyclicality became more counter-cyclical after the signing of the Maastricht Treaty, this was reversed after countries actually joined the euro, observing a pro-cyclical fiscal policy in the years preceding the financial crisis. Also, worth noting, a similar behavior was

observed regarding government debt stocks, that had a more positive relation with counter-cyclicality after the Maastricht Treaty but whose effect vanished after the concretization of the EMU. An add-on to this work could be to test if the Stability and Growth Pact (SGP) Reform of 2005, where Medium Term Objectives (MTO) and the adjustment path towards it began to be defined in cyclically adjusted terms (González-Páramo, 2005), had a significant impact on Eurozone countries' fiscal policy stance. Aside from those European-specific constraints like the SGP, Furceri and Jalles (2018) found explanatory power regarding cyclicality of fiscal policy of constraints on the executive. According to Fatás and Mihov (2013) these constraints reduce fiscal policy volatility.

Furceri and Jalles (2018) results suggest that the impact of crisis on fiscal counter-cyclicality depends on the type of crisis, having a positive impact if we talk about a banking crisis and a negative impact during currency or sovereign debt crisis, which may be a result coming from bank bailouts eroding budget balance during banking crisis. Jalles (2021) found that the European debt crisis of 2011/12 led to a pro-cyclical behaviour of fiscal policy. Afonso, Baxa and Slavík (2018) show that the response of output to fiscal shocks is stronger during periods of high financial stress, which in turn are found to typically increase debt and to deteriorate the fiscal position. This shows us that, during financial crisis, the counter-cyclical power of fiscal policy may be enhanced but debt sustainability concerns may prevent governments from acting on it. However, Afonso et al. (2011) evidence suggest that in recent times, governments are losing their ability of using automatic stabilizers to smooth the economy due to a reduction on revenues responsiveness to output.

## 3. METHODOLOGY

### *3.1. Measuring Cyclicality*

Regarding our methodological approach, we regress our fiscal variable on the change on economic activity, to get the cyclicality coefficient for country *i* on year *t* (that is, $\beta_{i,t}$):

$$(1) \qquad Fiscal_{i,t} = \alpha_{i,t} + \beta_{i,t} * \Delta y_{i,t} + \varepsilon_{i,t},$$

where $Fiscal_{i,t}$ is the fiscal variable of interest, either Overall (or total) Budget Balance (OBB) or CAPB, both in GDP ratios. We focus on both those fiscal variables, rather than only on CAPB, with a similar purpose of Bénétrix and Lane (2013) that is to assess the differences on how the automatic (reflected on the OBB) and discretionary components (the true fiscal stance,

net of the cycle, given by the CAPB) react to the business cycle. As a proxy for economic activity ($\Delta y_{i,t}$) we use real GDP growth.

Due to our specification of fiscal variables in ratios-to-GDP, higher values of $\beta$ are a sign of higher counter-cyclicality – meaning that when GDP falls starkly, $Fiscal_{i,t}$ follows the fall, indicating that, for instance, CAPB fell even harder than GDP, which is on the denominator of our $Fiscal_{i,t}$ variable. According to Bénétrix and Lane (2013), this specification can result in some ambiguity since if the government balance does not react to changes in GDP, implying an estimated coefficient of zero, we may be induced to believe that this is an a-cyclical behaviour while it is, in truth, pro-cyclical. For the balance-to-GDP ratio to be constant over the cycle, it means, for instance, that revenue increases during booms are being absorbed by increasing spending. However, as those authors, we will consider that if balance-to-GDP ratio remains constant over the cycle, ($\beta_{i,t}$=0) we have a-cyclical behaviour.

In addition, we assume $\beta$ to change "slowly and unsystematically over time", which translates into:

$$\beta_{i,t} = \beta_{i,t-1} + v_{i,t} \,, \tag{2}$$

where $v_{i,t} \sim N(0; {\sigma_i}^2)$.

Equations (1) and (2) are jointly estimated using the Varying-Coefficient model proposed by Schlicht (2003). According to the literature already mentioned, this method to get time-varying coefficients has multiple advantages, namely the reduction of reverse causality. As regarding the application of the said method, we use the software *VC - A Program for Estimating Time-Varying Coefficients*, provided by Schlicht (2021) which executes his method and returns the values for $\beta_{i,t}$.

*3.2. Explaining Cyclicality*

After estimating the cyclicality coefficients, in a second step we proceed to estimate their explaining factors (see notably Aghion et al., 2008). Thus, we estimate:

$$\hat{\beta}_{i,t} = \delta_i + \gamma_t + \boldsymbol{\theta X_{i,t-1}} + \varepsilon_{i,t} \tag{3}$$

where $\hat{\beta}_{i,t}$ is the cyclicality coefficient estimate for country *i*, in year *t*, $\delta_i$ and $\gamma_t$ are country and time fixed effects, respectively, to account for country unobserved heterogeneity and global

shocks. Lastly, $\boldsymbol{X_{i,t-1}}$ is a vector of macroeconomic, financial, and institutional variables, all introduced with one lag to avoid reverse causality issues.

The macroeconomic variables considered are real GDP per capita, an indicator of economic development used by Lane (2003). Government size is also usually found to have explanatory power regarding fiscal cyclicality (Afonso & Jalles, 2013; Fatás & Mihov, 2013; and Furceri & Jalles, 2018). We measure it as government expenditure-to-GDP ratio, as per the literature (Debrun, Pisani-Ferry & Sapir, 2008, Furceri & Jalles 2018 and Jalles, 2018).

Lane (2003) shows that trade openness leads to greater pro-cyclicality in spending and less pro-cyclicality in primary surplus. The rational is that more open economies are more prone to import external shocks (Rodrik, 1998) which may force the government to be more fiscally active. We will measure trade openness as the sum of imports and exports over GDP. Besides trade openness, the literature suggests that capital account openness can also have an impact on fiscal cyclicality. According to Aghion et al. (2008) foreign capital usually flees the economy during recessions, thus making it more difficult for authorities to raise money to conduct counter-cyclical fiscal policy. The opposite is true during expansions. This dynamic can impinge on the ability of very open countries to conduct counter-cyclical fiscal policy. To capture this effect, we follow the literature and use the Chinn-Ito index of capital account openness. Still according to Aghion and Marinescu (2008), higher credit-to-GDP ratio enhances the ability of governments to raise money during downturns, affecting its ability to conduct counter-cyclical fiscal policy. According to Benétrix and Lane (2013) we also include the debt-to-GDP ratio, which was found to have explanatory power regarding the cyclicality of fiscal policy.

To assess if fiscal policy reacts differently to output conditions, we use a dummy variable that assumes the value of 1 in year *t* if output growth was negative in that year. That is, we test if fiscal policy in year *t* reacts in a statistically different way to GDP contractions. Because of possible implementation lags, we also test with a dummy that assumes value 1 in year *t* if output growth in the previous, *t-1*, year was negative. This methodology is inspired on Afonso and Jalles (2013) who although found counter-cyclicality of total expenditure coefficients both during good and bad times, they report a stronger effect during bad times, at least in OECD countries. This effect was led by social security and welfare spending components and thus it is now interesting to see if they also have explanatory power in explaining the fiscal stance, i.e., the discretionary part of the budget balance, measured by CAPB.

Regarding institutional features, we introduce an executive constraints indicator, taken from the Polity5 data set (Center for Systemic Risk, 2018). Also, mimicking the approach from

Bénétrix and Lane (2013) regarding the effects of the Maastricht Treaty and the European Monetary Union (EMU) on fiscal policy, will use a dummy variable from 2006 onwards, to see if the changes on the SGP that entered into force after the 2005 reform had an impact on authorities' behaviour. All data and sources are explained in Appendix A.

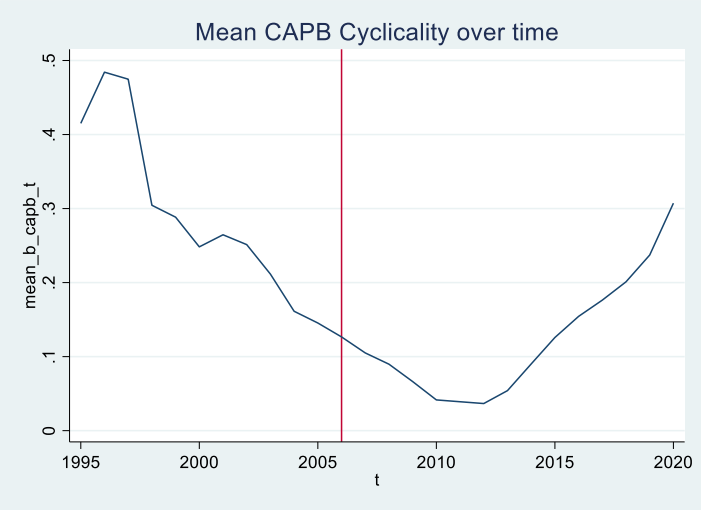
## 4. RESULTS

### *4.1. Measuring Cyclicality*

#### *4.1.1. CAPB Cyclicality*

Regarding the time-varying measures of cyclicality estimated using equations (1) and (2) for the CAPB, our estimates yielded a mean cyclicality coefficient of 0.19 over the period in analysis, which means that an increase in output growth of 1 percentage points (p.p.) raises, on average, the CAPB (as a ratio to GDP) by 0.19 p.p.. Being positive, the mean cyclicality coefficient indicates that fiscal policy in our sample, measured by the CAPB, was on average counter-cyclical from 1995 to 2020. That is, for instance, GDP growth led to an improvement of the CAPB as a ratio to GDP, meaning that the budget balance, in absolute value, was growing faster than GDP itself.

**Figure 1** – Sample mean of the CAPB time-varying coefficients, over time.



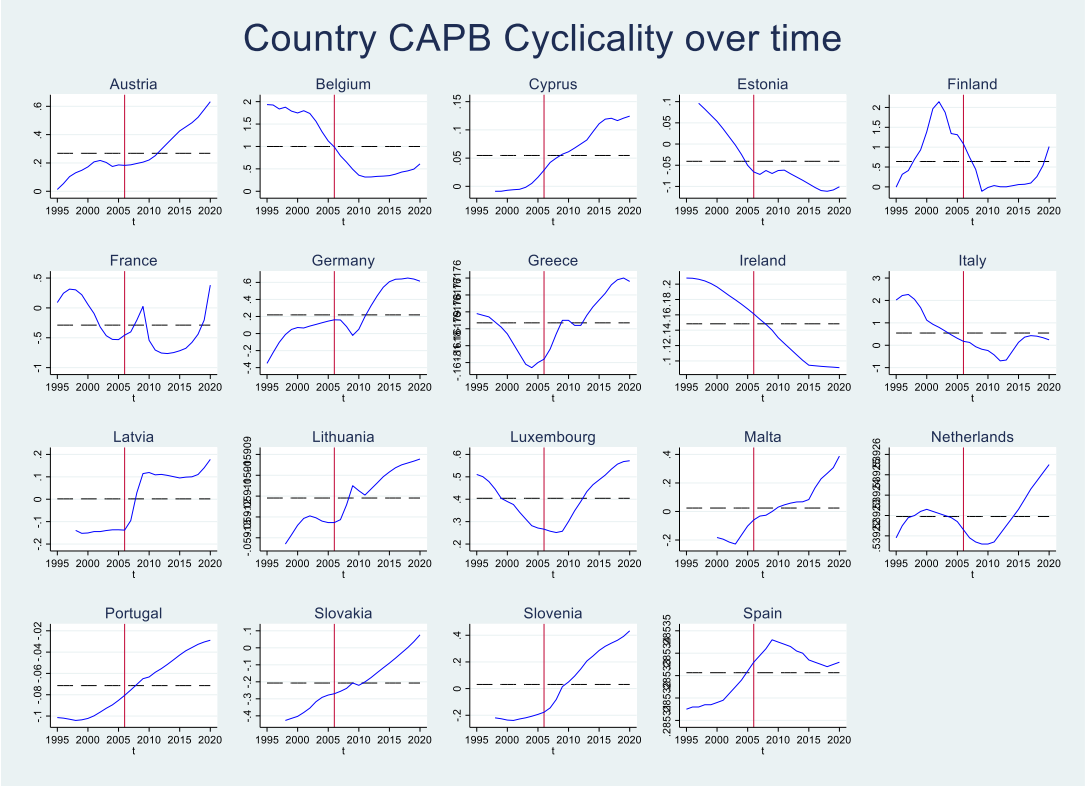

Note: the vertical line indicates 2006, the year when the 2005 SGP reform came into force.

However, Figure 1 shows us that even though, on average, the CAPB has been counter-cyclical, this counter-cyclicality peaked around 1997 and then fell, up until 2012, after which it recovered. This pattern goes accordingly to the results of Bénétrix and Lane (2013), who describe an increase in counter-cyclicality after 1992 due to the Maastricht Treaty and a

subsequent deterioration after those countries' Euro Area membership became effective. The lowest point of counter-cyclicality being in 2012, after the euro sovereign debt crisis.

Figure 2 shows the pattern of the CAPB cyclicality over time for the 19 EA countries. The red vertical line still indicates 2006 and the dashed line indicates the average cyclicality coefficient for that country, over the sample period. The average coefficient was negative for six of the 19 countries, i.e., close to one third of the sample presented an average pro-cyclical fiscal policy measured by the CAPB. Those were Estonia, France, Greece, Lithuania, Portugal and Slovakia. Also, 15 out of the 19 countries presented improvements in counter-cyclicality from 1995 to 2020, as observed by the increase in the cyclicality coefficient over time. The exceptions to this trend were Belgium, Estonia, Ireland and Italy.

**Figure 2**– Time-varying CAPB cyclicality for the EA countries.




Note: the dashed line indicates the average cyclicality coefficient for that country over the sample period and the vertical line indicates 2006, the year when the SGP reform came into force.

*4.1.2. OBB Cyclicality*

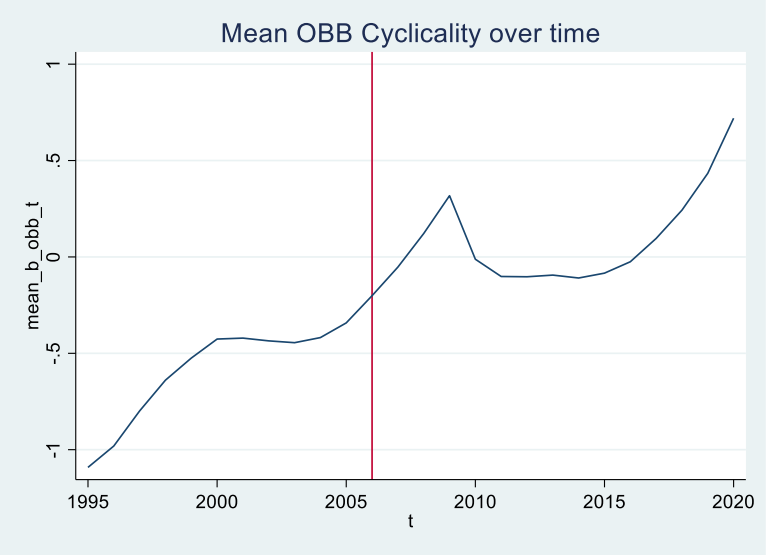
On what concerns the cyclicality of the OBB, the average cyclicality coefficient for our country and time sample was -0.21, which means the average fiscal policy, measured by the OBB, was pro-cyclical from 1995 to 2020 – in this case, when GDP grew, the OBB as a ratio

to GDP decreased, meaning the balance growth, in absolute terms, was not keeping up with GDP growth. By each increase of 1 p.p. of GDP growth, the OBB-to-GDP ratio is reduced by 0.21 p.p.. This average pro-cyclicality may seem unexpected and to contradict previous findings about advanced economies, namely those of Gavin and Perotti (1997), Fatás and Mihov (2012) and Furceri and Jalles (2018) referred before. However, it is corroborated by Bénétrix and Lane (2013) findings about the behaviour of EA countries after their euro membership became effective and by Jalles (2021) who report evidence of pro-cyclical adjustment during the European debt crisis. According to our results, such pro-cyclical behaviour was strong enough to affect the OBB cyclicality, hence overrunning automatic stabilizers, which usually make the OBB counter-cyclical. These results also seem to highlight the "deterioration of the capacity of fiscal authorities to use automatic stabilizers to counteract the negative effects of the crisis" described by Afonso et al. (2011), which is, according to the same authors, result of a "reduction of the responsiveness of government revenues to the economic cycle (…) compared to responsiveness of government spending". Previous work by Afonso et al. (2010), had also found a higher persistence than responsiveness of fiscal policy, indicating a higher difficulty for temporary fiscal measures, mainly due to a reduction of revenue responsiveness to economic activity. Thus, one can speculate that the OBB pro-cyclicality here identified is stemming from the revenue side of the balance, rather than the expenditure side.

Nevertheless, looking at the evolution of the mean OBB cyclicality coefficient over time (Figure 3), we find that it has improved and has become counter-cyclical since 2017. Notice that the behaviour from 2010 to 2017 depicts a pro-cyclical adjustment during the European debt crisis.

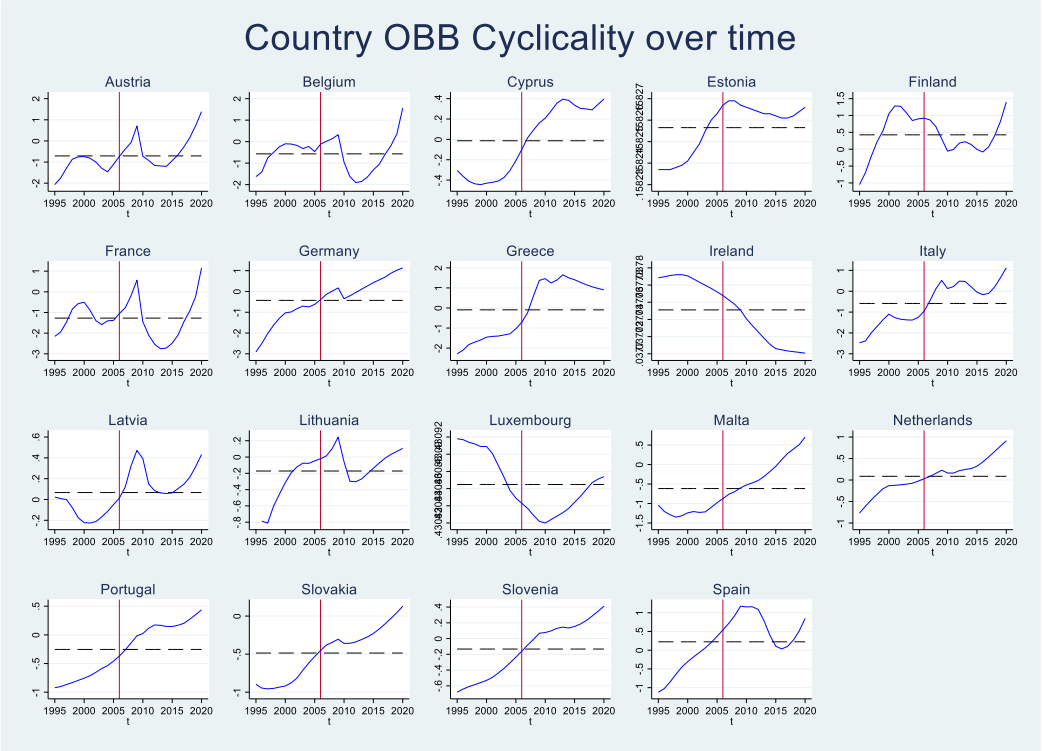
Looking once more to the individual behaviour of the 19 EA countries in Figure 4, we find, as expected, some heterogeneity. Seven of the 19 countries have positive mean coefficients for this period, indicating a counter-cyclical OBB, on average. They were Estonia, Finland, Ireland, Latvia, Luxembourg, the Netherlands and Spain. Notwithstanding, Ireland and Luxembourg were the only countries from the whole sample where counter-cyclicality of the OBB decreased from 1995 to 2020.

**Figure 3** - Sample mean of the OBB time-varying coefficients, over time.




Note: the vertical line indicates 2006, the year when the 2005 SGP reform came into force.

**Figure 4** - Time-varying OBB cyclicality for the EA countries, over time.




Note: The dashed line indicates the average cyclicality coefficient for that country over the sample period and the red vertical line indicates 2006, the year when the SGP reform came into force.

*4.2. Explaining Cyclicality*

In this subsection we present the OLS estimations for equation (3), with country fixed effects. Our baseline specification, which is identified in the tables as specification (1), is as follows:

$$(4) \quad \hat{\beta}_{i,t} = \delta_i + \alpha_1 Government\ Size_{i,t-1} + \alpha_2 Trade\ Openness_{i,t-1} + \alpha_3 KA\ Openness_{i,t-1} + \alpha_4 Credit - to - GDP_{i,t-1} + \alpha_5 Debt - to - GDP_{i,t-1} + \alpha_6 D\_Growth\ t_i + \alpha_7 D\_SGP + \varepsilon_{i,t},$$

where $\hat{\beta}_{i,t}$ is the cyclicality coefficient estimate for country i, in year t (either regarding CAPB or OBB) $\delta_i$ are country fixed effects, to account for country unobserved heterogeneity. We estimated the regressions with country fixed effects, with time fixed effects in an isolated manner and, finally, with both types of fixed effects. The latter two types can be found in Appendix B. The results presented in this section are those with country fixed effects. D_Growth and D_SGP are dummy variables, the former assuming the value of 1 in year t if output growth of one country was negative in that year and the latter assuming the value 1 from 2006 onwards to capture any impact from the SGP reform.

*4.2.1. CAPB Cyclicality*

Regarding how to explain cyclicality, we first test each of the selected variables described above (plus the alternative dummy variable D_Growth t-1, which assumes the value of 1 in year *t* if output growth was negative in *t-1*), in an isolated manner, one regressor at a time. The results of each regression can be found in Appendix B. The regressions were estimated with country fixed effects, with time fixed effects and, lastly, with both types of fixed effects. Country fixed effects proved to be always statistically significant in the standalone regressions, either with or without time fixed effects. Once we conjugate both fixed effects, the presence of time fixed effects cannot be rejected in all but two standalone regressions, indicating the presence of cross time differences in the other eight. The overall results of our estimate with country fixed effects are as following: from the seven variables selected, only the size of the public sector and financial development had stand-alone statistically significant explanatory power regarding the CAPB cyclicality coefficients. From the three dummies tested we find that both the SGP dummy and the dummy regarding output conditions in the year *t-1*, by themselves, have explanatory power over cyclicality at a 1% significance level and that the dummy

regarding output conditions in *t* cannot also be ignored at a 10% level. Nevertheless, all three have a negative sign, indicating more pro-cyclicality.

After regressing all seven variables with the three dummies, it was found that the Polity 5 variable, used to identify constraints on the executive, had to be omitted for this sample of countries and years, since there was no variation of this indicator across the sample, violating assumptions of no collinearity. Real GDP per capita was also initially considered as an explanatory variable but since it proved to be statistically insignificant in most of the regressions and its absence did not change the results obtained, this variable was also omitted. Therefore, although those two variables are included in the standalone regressions, they are not in the baseline specification and its variations. Table 1 reports the OLS estimation results of equation (3).

**Table 1** – Determinants of CAPB cyclicality: regressions with country fixed effects.

| Regressors | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Gov. Size | -.021*** | -.019*** | -.021*** | -.02*** | -.018*** | -.02*** |
| | (.005) | (.006) | (.005) | (.006) | (.006) | (.006) |
| Trade Open. | 0 | 0 | 0 | -.002 | -.003* | -.002* |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| KA Open. | .047 | .048 | .052 | .004 | .004 | .008 |
| | (.044) | (.045) | (.045) | (.046) | (.046) | (.046) |
| Credit-to-GDP | .002* | .001 | .001 | 0 | 0 | -.001 |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| Debt-to-GDP | .004*** | .004*** | .004*** | .002** | .003** | .003** |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| D_Growth t | -.09** | | | -.1** | | |
| | (.043) | | | (.045) | | |
| D_SGP | -.249*** | -.252*** | -.254*** | | | |
| | (.049) | (.049) | (.049) | | | |
| D_Growth t-1 | | -.069 | | | -.076 | |
| | | (.046) | | | (.048) | |
| Observations | 291 | 291 | 291 | 291 | 291 | 291 |
| R-squared | .172 | .166 | .159 | .091 | .083 | .074 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.1) Baseline specification; using the dummy variables D_Growth t and D_SGP; 2) using the dummy variables D_Growth t-1 and D_ SGP; 3) using only a dummy variable D_SGP; 4) same as (1) but without the SGP dummy variable; 5) same as (2) but without the SGP dummy variable; 6) without dummy variables.

The country fixed effects proved to be relevant regardless of whether conjugated with time fixed effects or not. However, regarding time fixed effects, one only rules out the null hypothesis of them being zero on those specifications where the SGP dummy is not included

(i.e., specifications 4 to 6), regardless of conjugated with country fixed effects or not. Thus, the results for the estimations with only time fixed effects and its conjugation with country fixed effects are presented in Appendix B, while the estimations with only country fixed effects, proved to be more relevant.

Starting with government size, this variable is associated with more pro-cyclical fiscal policy. By each increase in 1 p.p. on government expenditure to GDP ratio, we expect a decrease in the cyclicality coefficient of around 0.02, which in turn tells us that, once GDP growth increases 1 p.p., CAPB (in GDP ratio) will increase less 0.02 p.p., on average, ceteris paribus. This indicates that it is more difficult for bigger governments to conduct counter-cyclical fiscal policy, which can be explained by the evidence that government expenditure is mainly a-cyclical (Afonso and Jalles, 2013) and that there has been less ability of governments to capture revenues during upturns (Afonso et al., 2011). Thus, bigger governments will have a bigger a-cyclical component on their balances, which combined with less reactive revenues leads to a more mitigated counter-cyclical fiscal policy.

Trade openness is statistically significant in the two last specifications, suggesting that more open countries experience a more pro-cyclical discretionary fiscal policy. This contradicts Lane's (2003) expectations that trade openness leads to less pro-cyclicality in primary surplus. However, in the present work it is the CAPB that is used and not primary surplus. Also, if more open economies are indeed more exposed to external shocks and that forces government to be more fiscally active (Rodrik, 1998), this may prove that, once we account for the business cycle, those measures seem to fail their aim to stabilize activity for any of the various reasons enumerated before. Accordingly, where trade openness is 10 p.p. higher, when GDP growth increases 1.p.p., the CAPB will increase less 0.02 p.p. than where it is not, ceteris paribus.

On the other hand, financial development, measured as credit-to-GDP ratio, is statistically significant in the baseline specification and its coefficient implies that the higher this ratio is, the more counter-cyclical fiscal policy also is. This result supports Aghion and Marinescu (2008), who say that a higher credit-to-GDP ratio enhances the ability of governments to raise money during downturns, making it easier to implement counter-cyclical fiscal policy during troubled times.

The only other variable with explanatory power over cyclicality of the CAPB is the debt-to-GDP ratio. This variable indicates that more indebted countries have more counter-cyclical fiscal policy, a result also found by Bénétrix and Lane (2013). Hence, countries that have a higher debt ratio are somehow forced to implement counter-cyclical fiscal policy to curb it, namely during expansions. This indicates the prevalence of a Ricardian fiscal regime, a result

previously found by Afonso (2008) and Afonso and Jalles (2019) for EA countries. Those results suggest that governments improve their budget balances in reaction to higher debt levels, to reduce them, with the latter work finding stronger emphasis for this behaviour after 2007, i.e., after the global financial crisis. On top of that, a finding that the compliance with a Ricardian regime may improve counter-cyclicality was pointed by Afonso (2008), who indicates that revenues rise with increases in the output gap. It is also mentioned by the same author that the reaction of primary balances to debt levels is higher the higher the debt level of that country. All in all, our results are supported by these previous findings: more indebted countries perform a stronger adjustment toward the Ricardian regime, namely during upturns, which promotes counter-cyclicality of fiscal policy. A ten-percentage point increase in debt-to-GDP ratio leads to a higher cyclicality coefficient of about 0.04, in the baseline specification. This means that, once GDP grows 1 p.p. more, CAPB increases more 0.04 p.p. than if debt ratio was 10 p.p. lower, on average, ceteris paribus.

Regarding the SGP dummy, it is statistically significant and seems to indicate a more pro-cyclical fiscal policy after 2006. This interpretation can be two-fold: it can mean that the SGP reform was unable to promote counter-cyclicality of fiscal policy or, even if it was, it was not enough to cancel the debt-crisis effect that forced pro-cyclical adjustment in European economies, after 2011. In addition, there seems to be no effect on cyclicality when GDP growth is negative in the year before, while on that same year, the dummy (D_Growth t) has a negative sign, providing evidence that when GDP growth is negative in year *t*, fiscal policy gets more pro-cyclical in that same year. In other words, keeping all other variables constant, in years of negative output growth, the cyclicality coefficient is reduced, on average, by 0.09. That means that when GDP growth is – 1%, CAPB change is 0.09 p.p. smaller, in absolute value, than when GDP growth is +1%. This result can also be explained by the strong effect of the sovereign debt crisis, which led to financing constraints in some Eurozone governments.

*4.2.2. OBB Cyclicality*

The results accounting for country fixed effects, to be comparable to those of the CAPB, are as follows: more variables have isolated explanatory power regarding OBB than for CAPB. Real GDP per capita, trade openness, capital account (KA) openness, credit-to-GDP level and debt-to-GDP ratio all boost counter-cyclicality of OBB. As for the dummies, only the one regarding economic growth in year t-1 did not prove to be statistically significant, with the other two having a positive impact in counter-cyclicality (for CAPB, the results were the opposite,

with those dummies indicating higher pro-cyclicality, but with a much smaller coefficient, in absolute value). Country and time fixed effects results are reported in Appendix B.

Regarding our baseline specification, along with its variations, with specifications 1) to 6) having the same meaning as before, the results for the OLS estimates with country fixed effects are presented on Table 2. The results for the estimations with time fixed effects and the conjugation of both can be found in Appendix B. With OBB, country fixed effects also appear to be significant either alone or conjugated with time fixed effects. The latter were significant by themselves in all specifications but number 3, while once conjugated with country fixed effects, we can reject the null hypothesis of these being zero in all specifications.

**Table 2 –** Determinants of OBB cyclicality: regressions with country fixed effects

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Gov. Size | -.043*** | -.049*** | -.043*** | -.044*** | -.05*** | -.045*** |
| | (.011) | (.011) | (.011) | (.011) | (.012) | (.011) |
| Trade Open. | .002 | .003 | .003 | .005* | .007** | .006** |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |
| KA Open. | .032 | .028 | .016 | .087 | .084 | .072 |
| | (.091) | (.092) | (.092) | (.091) | (.092) | (.092) |
| Credit-to-GDP | .005** | .006*** | .007*** | .007*** | .009*** | .009*** |
| | (.002) | (.002) | (.002) | (.002) | (.002) | (.002) |
| Debt-to-GDP | .006*** | .005** | .005** | .008*** | .006*** | .007*** |
| | (.002) | (.002) | (.002) | (.002) | (.002) | (.002) |
| D_Growth t | .284*** | | | .298*** | | |
| | (.089) | | | (.091) | | |
| D_SGP | .315*** | .324*** | .33*** | | | |
| | (.1) | (.101) | (.102) | | | |
| D_Growth t-1 | | .191** | | | .2** | |
| | | (.095) | | | (.097) | |
| Observations | 291 | 291 | 291 | 291 | 291 | 291 |
| R-squared | .221 | .203 | .191 | .192 | .172 | .159 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels,

As for the results on Table 2, one finds that, as it was the case with CAPB, government size seems to promote pro-cyclicality of OBB. Trade openness is again statistically significant, at least in those specifications without the SGP dummy but, contrary to the findings with the CAPB, now it has a positive coefficient, meaning that it promotes counter-cyclicality of the OBB. Financial development is again statistically significant and, still having a positive sign, it supports once more the idea that countries with higher credit-to-GDP have a more counter-cyclical fiscal policy, which Aghion and Marinescu (2008) argue to be due to being easier for

governments to raise liquidity during downturns. Debt-to-GDP ratio is also statistically significant and has the same interpretation as for the CAPB, indicating that more indebted countries tend to have more counter-cyclical fiscal policy – another evidence pointing to a Ricardian behaviour of more indebted countries. Regarding the SGP dummy variable, that is always statistically significant, it indicates a more counter-cyclical OBB after the SGP reform. Namely, it indicates that for an increase in GDP growth of 1 p.p. after 2006, OBB rose more 0.32 p.p. than before. This evidence may show that, even if the SGP did not improve the counter-cyclicality of CAPB, it may have done so for OBB, with countries being more surgical on their use of the cyclical component of their fiscal policy. However, the financial and sovereign debt crises may be impinging in these results, since the OBB considers debt payments, which increased as output decreased in many European countries during those years. The output growth dummies also suggest a statistically significant more counter-cyclical OBB in recession years and in the years immediately after recessions. This is not surprising and captures the automatic stabilizers behaviour that is expected during those times.

*4.2.3 The Global Financial Crisis*

Given the concerns raised by the possible influence of GFC on the results, we estimated the baseline specification adding a dummy variable (D_GFC) assuming the value of 1 for the years between 2008 and 2012. In Table 3, those new specification are on the two columns on the right, and adding the GFC dummy does not alter the interpretation of our previous results with country fixed effects. The dummy is not statistically significant neither for the CAPB nor the OBB cyclicality, meaning there is no evidence of a change in the cyclicality of fiscal policy during this period.

**Table 3** – Effects of the GFC on the cyclicality of fiscal policy

| Dependent Variable: | CAPB | OBB | CAPB | OBB |
|---|---|---|---|---|
| Gov. Size | -.021*** | -.043*** | -.02*** | -.041*** |
| | (.005) | (.011) | (.006) | (.011) |
| Trade Open. | 0 | .002 | 0 | .002 |
| | (.001) | (.003) | (.001) | (.003) |
| KA Open. | .047 | .032 | .048 | .034 |
| | (.044) | (.091) | (.044) | (.091) |
| Credit-to-GDP | .002* | .005** | .002* | .005** |
| | (.001) | (.002) | (.001) | (.002) |
| Debt-to-GDP | .004*** | .006*** | .003*** | .006** |
| | (.001) | (.002) | (.001) | (.002) |
| D_Growth t | -.09** | .284*** | -.082* | .296*** |
| | (.043) | (.089) | (.046) | (.094) |
| D_SGP | -.249*** | .315*** | -.244*** | .323*** |
| | (.049) | (.1) | (.05) | (.102) |
| D_GFC | | | -.023 | -.033 |
| | | | (.041) | (.083) |
| Observations | 291 | 291 | 291 | 291 |
| R-squared | .172 | .221 | .174 | .221 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels,

## 5. Conclusion

Euro Area countries followed, on average, a counter-cyclical discretionary fiscal policy during the years considered. Nevertheless, the average counter-cyclicality of EA fiscal policy recovered from its fall that occurred in the early 2000's. Looking at individual countries, six out of the 19 members showed an average pro-cyclical fiscal policy and 15 presented an increase of counter-cyclicality during the period of analysis.

As regarding what variables may affect the cyclical behaviour of discretionary fiscal policy, our results suggest that higher debt-to-GDP seems to promote counter-cyclicality. These results support the existence of a Ricardian behaviour of fiscal policy in those countries with higher debt levels, which prevents them from engaging in a more pro-cyclical behaviour than others. Government size turns out to reduce counter-cyclicality, as well as trade openness. In the baseline specification, financial development also has a positive impact on counter-cyclicality.

In addition, the results suggest a more pro-cyclical fiscal policy after the SGP reform of 2005, a result that is maintained even once we isolate the years of the Global Financial Crisis. Finally, the answer to the research question of how Eurozone countries' fiscal stance change during recessions is that fiscal stance became more pro-cyclical in those years, meaning that

during recessions, on average, countries implemented more contractionary fiscal policy. In other words, when GDP falls, CAPB gets stickier and does not react as much to GDP fluctuations as when GDP grows.

The results regarding the cyclicality of the OBB suggest, notwithstanding the improving trend towards counter-cyclicality, and an average pro-cyclical behaviour of EA countries' OBB. Individually, only seven out of the 19 members had an average counter-cyclical behaviour of OBB but 16 showed signs of decreasing pro-cyclicality. Moreover, a bigger government leads to more pro-cyclicality and more debt-to-GDP has the opposite result. The degree of financial development and trade openness also promote counter-cyclicality. One difference is that the OBB became more counter-cyclical after the SGP reform. Lastly, one also concludes that, although it was not the case with discretionary fiscal policy, the overall fiscal policy, that is, with automatic stabilisers, became more counter-cyclical immediately during and after recessions. Hence, one can say that, even though discretionary fiscal policy may have become more contractionary during recessions in this period, that was offset by automatic stabilizers, since the OBB, which encompasses both dimensions, became more counter-cyclical during those times, indicating a more expansionary fiscal policy in the economy during those years.

Further research on fiscal policy in the context of the European Monetary Union could look closer to institutional features of member countries, namely the existence of fiscal rules at a national level and how they can affect the cyclicality of fiscal policy. Another possible path could be to assess if there were changes in the ability of fiscal policy to smooth the business cycle in different periods of time (before and after the SGP, for instance).

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## Appendix A

### List of countries.

Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, Spain.

**Table A 1** – Variables, definitions and sources

| Variable | Definition | Source |
|---|---|---|
| CAPB | Net lending, excluding interests of general gov. adjusted for the cyclical component, percentage of GDP. | AMECO |
| OBB | Overall Budget Balance. Net lending, percentage of GDP. | AMECO |
| Real GDP growth | Annual percentage change of real GDP. | IMF World Economic Outlook |
| Real GDP per capita | Gross domestic product per capita, constant prices, national currency. | IMF World Economic Outlook |
| Government Size | Government total expenditure, percentage of GDP. | AMECO |
| Trade Openness | Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. | World Bank |
| KA openness | Chinn Ito Index for capital account openness. Index measuring the restrictions on cross-border financial transactions. | Chinn Ito Index of Financial Openness |
| Credit to GDP | Domestic credit to private sector, percentage of GDP | World Bank |
| Deb-to-GDP | Gross public debt, percentage of GDP | AMECO |
| Executive Constraints | XCONS - institutionalized constraints on the decision-making powers of chief executives. | Polity 5 |
| SGP dummy | Takes value 1 after 2005. | |
| Growth dummy (in t) | Takes value 1 when Real GDP growth in t is negative. | |
| Growth dummy (in t-1) | Takes value 1 when Real GDP growth in t-1 is negative. | |

## Appendix B

**Table B1** – Time-varying CAPB cyclicality coefficients per country and mean coefficients per year and per country.

| | **Mean** | Austria | Belgium | Cyprus | Estonia | Finland | France | Germany | Greece | Ireland | Italy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1995 | .415 | .013 | 1.935 | | | -.005 | .09 | -.35 | -.162 | .208 | 2.018 |
| 1996 | .484 | .054 | 1.926 | | | .318 | .245 | -.222 | -.162 | .208 | 2.221 |
| 1997 | .475 | .103 | 1.836 | | .096 | .413 | .315 | -.103 | -.162 | .206 | 2.267 |
| 1998 | .304 | .131 | 1.876 | -.009 | .083 | .694 | .303 | -.012 | -.162 | .204 | 2.051 |
| 1999 | .288 | .148 | 1.79 | -.009 | .068 | .931 | .22 | .048 | -.162 | .201 | 1.682 |
| 2000 | .248 | .172 | 1.748 | -.007 | .054 | 1.384 | .058 | .071 | -.162 | .196 | 1.121 |
| 2001 | .265 | .208 | 1.798 | -.006 | .036 | 1.968 | -.093 | .065 | -.162 | .191 | .938 |
| 2002 | .251 | .218 | 1.736 | -.005 | .017 | 2.146 | -.318 | .088 | -.162 | .185 | .8 |
| 2003 | .211 | .204 | 1.562 | -.002 | -.002 | 1.878 | -.465 | .107 | -.162 | .18 | .637 |
| 2004 | .161 | .175 | 1.328 | .005 | -.025 | 1.344 | -.527 | .127 | -.162 | .174 | .467 |
| 2005 | .145 | .186 | 1.124 | .016 | -.05 | 1.313 | -.531 | .146 | -.162 | .168 | .31 |
| 2006 | .127 | .183 | .989 | .029 | -.066 | 1.083 | -.456 | .162 | -.162 | .161 | .175 |
| 2007 | .105 | .187 | .793 | .042 | -.072 | .747 | -.402 | .159 | -.162 | .154 | .128 |
| 2008 | .090 | .196 | .65 | .05 | -.062 | .443 | -.205 | .082 | -.162 | .148 | -.064 |
| 2009 | .066 | .206 | .491 | .057 | -.069 | -.11 | .024 | -.021 | -.162 | .14 | -.176 |
| 2010 | .042 | .221 | .36 | .061 | -.062 | -.015 | -.542 | .05 | -.162 | .13 | -.235 |
| 2011 | .039 | .251 | .318 | .068 | -.062 | .034 | -.705 | .199 | -.162 | .123 | -.426 |
| 2012 | .037 | .297 | .32 | .075 | -.07 | .004 | -.755 | .327 | -.162 | .115 | -.697 |
| 2013 | .054 | .34 | .333 | .082 | -.078 | .003 | -.764 | .442 | -.162 | .108 | -.66 |
| 2014 | .090 | .384 | .339 | .097 | -.085 | .029 | -.748 | .543 | -.162 | .101 | -.264 |
| 2015 | .126 | .426 | .349 | .111 | -.094 | .059 | -.717 | .608 | -.162 | .094 | .131 |
| 2016 | .154 | .455 | .383 | .119 | -.102 | .067 | -.676 | .637 | -.162 | .094 | .363 |
| 2017 | .176 | .484 | .429 | .121 | -.11 | .098 | -.577 | .641 | -.162 | .093 | .429 |
| 2018 | .201 | .523 | .455 | .116 | -.111 | .259 | -.44 | .651 | -.162 | .092 | .406 |
| 2019 | .237 | .577 | .495 | .121 | -.108 | .54 | -.204 | .639 | -.162 | .092 | .338 |
| 2020 | .307 | .633 | .611 | .124 | -.101 | 1.015 | .382 | .614 | -.162 | .091 | .244 |
| **Mean** | .185 | .268 | .999 | .055 | -.041 | .64 | -.288 | .219 | -.162 | .148 | .546 |

**Table B2** – continuation of B1

| | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Portugal | Slovakia | Slovenia | Spain |
|---|---|---|---|---|---|---|---|---|---|
| 1995 | | | .511 | | .539 | -.101 | | | .285 |
| 1996 | | | .501 | | .539 | -.102 | | | .285 |
| 1997 | | | .479 | | .539 | -.103 | | | .285 |
| 1998 | -.139 | -.059 | .446 | | .539 | -.104 | -.427 | -.219 | .285 |
| 1999 | -.152 | -.059 | .404 | | .539 | -.104 | -.415 | -.226 | .285 |
| 2000 | -.151 | -.059 | .39 | -.182 | .539 | -.102 | -.403 | -.236 | .285 |
| 2001 | -.144 | -.059 | .376 | -.194 | .539 | -.1 | -.381 | -.238 | .285 |
| 2002 | -.144 | -.059 | .342 | -.215 | .539 | -.096 | -.354 | -.228 | .285 |
| 2003 | -.14 | -.059 | .312 | -.228 | .539 | -.093 | -.317 | -.219 | .285 |
| 2004 | -.136 | -.059 | .282 | -.165 | .539 | -.09 | -.291 | -.207 | .285 |
| 2005 | -.136 | -.059 | .272 | -.102 | .539 | -.085 | -.278 | -.193 | .285 |
| 2006 | -.138 | -.059 | .266 | -.059 | .539 | -.081 | -.27 | -.177 | .285 |
| 2007 | -.095 | -.059 | .257 | -.032 | .539 | -.076 | -.256 | -.144 | .285 |
| 2008 | .029 | -.059 | .251 | -.026 | .539 | -.07 | -.238 | -.082 | .285 |
| 2009 | .114 | -.059 | .257 | 0 | .539 | -.065 | -.207 | .015 | .285 |
| 2010 | .119 | -.059 | .301 | .031 | .539 | -.063 | -.221 | .05 | .285 |
| 2011 | .109 | -.059 | .349 | .047 | .539 | -.059 | -.2 | .094 | .285 |
| 2012 | .111 | -.059 | .39 | .059 | .539 | -.055 | -.175 | .147 | .285 |
| 2013 | .107 | -.059 | .434 | .067 | .539 | -.051 | -.146 | .207 | .285 |
| 2014 | .101 | -.059 | .465 | .068 | .539 | -.047 | -.118 | .245 | .285 |
| 2015 | .095 | -.059 | .486 | .084 | .539 | -.043 | -.09 | .286 | .285 |
| 2016 | .099 | -.059 | .508 | .165 | .539 | -.039 | -.061 | .317 | .285 |
| 2017 | .1 | -.059 | .534 | .229 | .539 | -.036 | -.029 | .341 | .285 |
| 2018 | .111 | -.059 | .557 | .267 | .539 | -.033 | .001 | .362 | .285 |
| 2019 | .14 | -.059 | .568 | .307 | .539 | -.03 | .037 | .392 | .285 |
| 2020 | .178 | -.059 | .572 | .388 | .539 | -.029 | .077 | .433 | .285 |
| **Mean** | .002 | -.059 | .404 | .024 | .539 | -.071 | -.207 | .031 | .285 |

**Table** B3 – Time-varying OBB cyclicality coefficients per country and mean coefficients per year and per country.

| | **Mean** | Austria | Belgium | Cyprus | Estonia | Finland | France | Germany | Greece | Ireland | Italy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1995 | -1.092 | -2.067 | -1.628 | -.305 | .158 | -1.05 | -2.154 | -2.91 | -2.284 | .038 | -2.473 |
| 1996 | -.981 | -1.754 | -1.409 | -.362 | .158 | -.696 | -1.947 | -2.502 | -2.105 | .038 | -2.382 |
| 1997 | -.799 | -1.284 | -.756 | -.411 | .158 | -.212 | -1.457 | -2.026 | -1.82 | .038 | -1.998 |
| 1998 | -.639 | -.86 | -.497 | -.436 | .158 | .225 | -.831 | -1.621 | -1.698 | .038 | -1.683 |
| 1999 | -.525 | -.754 | -.236 | -.444 | .158 | .548 | -.57 | -1.287 | -1.599 | .038 | -1.371 |
| 2000 | -.426 | -.741 | -.098 | -.43 | .158 | 1.049 | -.504 | -1.028 | -1.453 | .038 | -1.1 |
| 2001 | -.421 | -.817 | -.11 | -.422 | .158 | 1.284 | -.885 | -.986 | -1.415 | .038 | -1.265 |
| 2002 | -.435 | -.999 | -.177 | -.409 | .158 | 1.273 | -1.392 | -.822 | -1.398 | .038 | -1.343 |
| 2003 | -.444 | -1.293 | -.322 | -.373 | .158 | 1.077 | -1.585 | -.703 | -1.343 | .038 | -1.373 |
| 2004 | -.418 | -1.46 | -.224 | -.305 | .158 | .852 | -1.404 | -.741 | -1.288 | .038 | -1.383 |
| 2005 | -.342 | -1.109 | -.462 | -.21 | .158 | .901 | -1.381 | -.624 | -1.034 | .038 | -1.252 |
| 2006 | -.201 | -.729 | -.12 | -.1 | .158 | .921 | -1.051 | -.398 | -.722 | .038 | -.961 |
| 2007 | -.0525 | -.387 | .018 | .015 | .158 | .87 | -.772 | -.134 | -.232 | .038 | -.454 |
| 2008 | .122 | -.073 | .136 | .091 | .158 | .672 | -.186 | .017 | .598 | .038 | .114 |
| 2009 | .318 | .708 | .325 | .162 | .158 | .308 | .566 | .174 | 1.376 | .038 | .521 |
| 2010 | -.012 | -.728 | -.951 | .208 | .158 | -.059 | -1.443 | -.35 | 1.466 | .038 | .13 |
| 2011 | -.101 | -.921 | -1.628 | .279 | .158 | -.007 | -2.099 | -.209 | 1.247 | .038 | .223 |
| 2012 | -.103 | -1.16 | -1.902 | .356 | .158 | .185 | -2.535 | -.049 | 1.395 | .038 | .486 |
| 2013 | -.094 | -1.182 | -1.856 | .395 | .158 | .222 | -2.754 | .109 | 1.654 | .038 | .469 |
| 2014 | -.109 | -1.204 | -1.643 | .384 | .158 | .143 | -2.721 | .269 | 1.503 | .038 | .214 |
| 2015 | -.084 | -.935 | -1.313 | .336 | .158 | -.004 | -2.485 | .428 | 1.409 | .038 | -.041 |
| 2016 | -.025 | -.652 | -1.053 | .305 | .158 | -.082 | -2.087 | .558 | 1.279 | .038 | -.164 |
| 2017 | .096 | -.28 | -.587 | .3 | .158 | .072 | -1.442 | .691 | 1.158 | .038 | -.103 |
| 2018 | .243 | .16 | -.179 | .29 | .158 | .396 | -.922 | .88 | 1.056 | .038 | .201 |
| 2019 | .434 | .724 | .361 | .345 | .158 | .823 | -.223 | 1.023 | .973 | .038 | .643 |
| 2020 | .720 | 1.386 | 1.56 | .397 | .158 | 1.403 | 1.16 | 1.137 | .902 | .038 | 1.12 |
| **Mean** | -.205 | -.708 | -.567 | -.013 | .158 | .427 | -1.273 | -.427 | -.091 | .038 | -.586 |

**Table** B4 – continuation of B3

| | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Portugal | Slovakia | Slovenia | Spain |
|---|---|---|---|---|---|---|---|---|---|
| 1995 | .024 | | .431 | -1.043 | -.77 | -.922 | -.896 | -.681 | -1.121 |
| 1996 | .009 | -.787 | .431 | -1.201 | -.611 | -.902 | -.946 | -.642 | -1.027 |
| 1997 | -.001 | -.81 | .431 | -1.288 | -.463 | -.866 | -.956 | -.61 | -.846 |
| 1998 | -.079 | -.602 | .431 | -1.35 | -.329 | -.833 | -.95 | -.585 | -.642 |
| 1999 | -.175 | -.456 | .431 | -1.315 | -.202 | -.793 | -.933 | -.559 | -.451 |
| 2000 | -.223 | -.313 | .431 | -1.239 | -.13 | -.755 | -.918 | -.531 | -.305 |
| 2001 | -.226 | -.194 | .431 | -1.205 | -.123 | -.714 | -.878 | -.493 | -.178 |
| 2002 | -.212 | -.12 | .431 | -1.228 | -.111 | -.653 | -.812 | -.438 | -.059 |
| 2003 | -.167 | -.075 | .431 | -1.215 | -.095 | -.587 | -.71 | -.378 | .064 |
| 2004 | -.114 | -.077 | .431 | -1.099 | -.075 | -.536 | -.616 | -.309 | .205 |
| 2005 | -.049 | -.047 | .431 | -.981 | -.025 | -.459 | -.531 | -.236 | .37 |
| 2006 | .013 | -.02 | .431 | -.874 | .03 | -.369 | -.454 | -.161 | .542 |
| 2007 | .12 | .014 | .431 | -.762 | .086 | -.263 | -.38 | -.083 | .719 |
| 2008 | .325 | .106 | .431 | -.697 | .156 | -.141 | -.344 | -.011 | .921 |
| 2009 | .471 | .245 | .431 | -.597 | .228 | -.015 | -.303 | .068 | 1.175 |
| 2010 | .393 | -.057 | .431 | -.524 | .164 | .023 | -.359 | .076 | 1.158 |
| 2011 | .148 | -.297 | .431 | -.47 | .161 | .116 | -.357 | .098 | 1.161 |
| 2012 | .085 | -.303 | .431 | -.41 | .218 | .173 | -.339 | .13 | 1.091 |
| 2013 | .063 | -.269 | .431 | -.306 | .244 | .167 | -.308 | .145 | .789 |
| 2014 | .058 | -.202 | .431 | -.181 | .267 | .148 | -.274 | .134 | .401 |
| 2015 | .064 | -.138 | .431 | -.046 | .321 | .147 | -.228 | .153 | .107 |
| 2016 | .105 | -.073 | .431 | .124 | .421 | .168 | -.169 | .184 | .035 |
| 2017 | .148 | -.013 | .431 | .283 | .538 | .203 | -.101 | .23 | .101 |
| 2018 | .214 | .033 | .431 | .396 | .662 | .274 | -.03 | .286 | .27 |
| 2019 | .316 | .07 | .431 | .511 | .79 | .353 | .046 | .346 | .518 |
| 2020 | .432 | .106 | .431 | .706 | .913 | .438 | .13 | .41 | .848 |
| **Mean** | .067 | -.171 | .431 | -.616 | .087 | -.254 | -.485 | -.133 | .225 |

**Table B5** – Determinants of CAPB cyclicality: standalone regressions with country and time fixed effects.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP per capita | .00001** | | | | | | | | | |
| | (0) | | | | | | | | | |
| Gov. Size | | -.005 | | | | | | | | |
| | | (.003) | | | | | | | | |
| Trade Open. | | | .003*** | | | | | | | |
| | | | (.001) | | | | | | | |
| KA Open. | | | | .119*** | | | | | | |
| | | | | (.03) | | | | | | |
| Credit-to-GDP | | | | | .001 | | | | | |
| | | | | | (.001) | | | | | |
| Debt-to-GDP | | | | | | .004*** | | | | |
| | | | | | | (.001) | | | | |
| Executive Const. | | | | | | | .387 | | | |
| | | | | | | | (.354) | | | |
| D_Growth t | | | | | | | | -.072 | | |
| | | | | | | | | (.062) | | |
| D_Growth t-1 | | | | | | | | | -.096 | |
| | | | | | | | | | (.062) | |
| D_SGP | | | | | | | | | | .002 |
| | | | | | | | | | | (.122) |
| Observations | 471 | 463 | 472 | 428 | 328 | 462 | 433 | 472 | 472 | 472 |
| R-squared | .103 | .101 | .118 | .122 | .165 | .114 | .094 | .092 | .094 | .089 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels,

**Table B6 –** Determinants of CAPB cyclicality: standalone regressions with country fixed effects.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP per capita | 0 | | | | | | | | | |
| | (0) | | | | | | | | | |
| Gov. Size | | -.008** | | | | | | | | |
| | | (.003) | | | | | | | | |
| Trade Open. | | | 0 | | | | | | | |
| | | | (.001) | | | | | | | |
| KA Open. | | | | .036 | | | | | | |
| | | | | (.028) | | | | | | |
| Credit-to-GDP | | | | | -.002** | | | | | |
| | | | | | (.001) | | | | | |
| Debt-to-GDP | | | | | | .001 | | | | |
| | | | | | | (.001) | | | | |
| Executive Const. | | | | | | | .217 | | | |
| | | | | | | | (.351) | | | |
| D_Growth t | | | | | | | | -.077* | | |
| | | | | | | | | (.042) | | |
| D_Growth t-1 | | | | | | | | | -.123*** | |
| | | | | | | | | | (.044) | |
| D_SGP | | | | | | | | | | -.132*** |
| | | | | | | | | | | (.031) |
| Observations | 471 | 463 | 472 | 428 | 328 | 462 | 433 | 472 | 472 | 472 |
| R-squared | .003 | .015 | .001 | .004 | .018 | .004 | .001 | .007 | .017 | .039 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B7** – Determinants of CAPB cyclicality: standalone regressions with time fixed effects.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP per capita | .00001 *** | | | | | | | | | |
| | (0) | | | | | | | | | |
| Gov. Size | | .009 *** | | | | | | | | |
| | | (.003) | | | | | | | | |
| Trade Open. | | | .001** | | | | | | | |
| | | | (0) | | | | | | | |
| KA Open. | | | | .17*** | | | | | | |
| | | | | (.028) | | | | | | |
| Credit-to-GDP | | | | | 0 | | | | | |
| | | | | | (.001) | | | | | |
| Debt-to-GDP | | | | | | .002 *** | | | | |
| | | | | | | (.001) | | | | |
| Executive Const. | | | | | | | .774 | | | |
| | | | | | | | (.487) | | | |
| D_Growth t | | | | | | | | -.124 | | |
| | | | | | | | | (.085) | | |
| D_Growth t-1 | | | | | | | | | -.153* | |
| | | | | | | | | | (.083) | |
| D_SGP | | | | | | | | | | -.108 |
| | | | | | | | | | | (.17) |
| Observations | 471 | 463 | 472 | 428 | 328 | 462 | 433 | 472 | 472 | 472 |
| R-squared | .186 | .085 | .076 | .142 | .084 | .092 | .068 | .067 | .07 | .063 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B8** – Determinants of CAPB cyclicality**:** country and time fixed effects

| Regressors | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Gov. Size | -.016*** | -.015** | -.016** | -.016*** | -.015** | -.016** |
| | (.006) | (.006) | (.006) | (.006) | (.006) | (.006) |
| Trade Open. | .001 | .001 | .001 | .001 | .001 | .001 |
| | (.002) | (.002) | (.002) | (.002) | (.002) | (.002) |
| KA Open. | .07 | .069 | .073 | .07 | .069 | .073 |
| | (.046) | (.046) | (.046) | (.046) | (.046) | (.046) |
| Credit-to-GDP | .002** | .002** | .002* | .002** | .002** | .002* |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| Debt-to-GDP | .004*** | .004*** | .004*** | .004*** | .004*** | .004*** |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| D_Growth t | -.092 | | | -.092 | | |
| | (.06) | | | (.06) | | |
| D_SGP | -.34*** | -.343*** | -.344*** | | | |
| | (.103) | (.103) | (.103) | | | |
| D_Growth t-1 | | -.073 | | | -.073 | |
| | | (.06) | | | (.06) | |
| Observations | 291 | 291 | 291 | 291 | 291 | 291 |
| R-squared | .219 | .216 | .211 | .219 | .216 | .211 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B9** – Determinants of CAPB cyclicality: regressions with time fixed effects

| Regressors | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Gov. Size | -.016*** | -.015** | -.016** | -.016*** | -.015** | -.016** |
| | (.006) | (.006) | (.006) | (.006) | (.006) | (.006) |
| Trade Open. | .001 | .001 | .001 | .001 | .001 | .001 |
| | (.002) | (.002) | (.002) | (.002) | (.002) | (.002) |
| KA Open. | .07 | .069 | .073 | .07 | .069 | .073 |
| | (.046) | (.046) | (.046) | (.046) | (.046) | (.046) |
| Credit-to-GDP | .002** | .002** | .002* | .002** | .002** | .002* |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| Debt-to-GDP | .004*** | .004*** | .004*** | .004*** | .004*** | .004*** |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| D_Growth t | -.092 | | | -.092 | | |
| | (.06) | | | (.06) | | |
| D_SGP | -.34*** | -.343*** | -.344*** | | | |
| | (.103) | (.103) | (.103) | | | |
| D_Growth t-1 | | -.073 | | | -.073 | |
| | | (.06) | | | (.06) | |
| Observations | 291 | 291 | 291 | 291 | 291 | 291 |
| R-squared | .219 | .216 | .211 | .219 | .216 | .211 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B10** – Determinants of OBB cyclicality: standalone regressions with country and time fixed effects

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP per capita | .00006*** | | | | | | | | | |
| | (0) | | | | | | | | | |
| Gov. Size | | -.006 | | | | | | | | |
| | | (.005) | | | | | | | | |
| Trade Open. | | | -.004*** | | | | | | | |
| | | | (.001) | | | | | | | |
| KA Open. | | | | .102** | | | | | | |
| | | | | (.043) | | | | | | |
| Credit-to-GDP | | | | | .006*** | | | | | |
| | | | | | (.002) | | | | | |
| Debt-to-GDP | | | | | | .007 *** | | | | |
| | | | | | | (.002) | | | | |
| Executive Const. | | | | | | | -.267 | | | |
| | | | | | | | (.296) | | | |
| D_Growth t | | | | | | | | .481 *** | | |
| | | | | | | | | (.097) | | |
| D_Growth t-1 | | | | | | | | | .433 *** | |
| | | | | | | | | | (.096) | |
| D_SGP | | | | | | | | | | 1.811*** |
| | | | | | | | | | | (.175) |
| Observations | 487 | 478 | 492 | 440 | 328 | 477 | 449 | 493 | 493 | 493 |
| R-squared | .456 | .394 | .411 | .411 | .313 | .406 | .352 | .426 | .42 | .394 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B11 –** Determinants of OBB cyclicality: standalone regressions with country fixed effects.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP per capita | .00004 *** | | | | | | | | | |
| | (0) | | | | | | | | | |
| Gov. Size | | -.007 | | | | | | | | |
| | | (.006) | | | | | | | | |
| Trade Open. | | | .008*** | | | | | | | |
| | | | (.001) | | | | | | | |
| KA Open. | | | | .332 *** | | | | | | |
| | | | | (.045) | | | | | | |
| Credit-to-GDP | | | | | .004*** | | | | | |
| | | | | | (.002) | | | | | |
| Debt-to-GDP | | | | | | .011 *** | | | | |
| | | | | | | (.002) | | | | |
| Executive Const. | | | | | | | .508 | | | |
| | | | | | | | (.346) | | | |
| D_Growth t | | | | | | | | .658 *** | | |
| | | | | | | | | (.077) | | |
| D_Growth t-1 | | | | | | | | | .095 | |
| | | | | | | | | | (.084) | |
| D_SGP | | | | | | | | | | .667*** |
| | | | | | | | | | | (.052) |
| Observations | 487 | 478 | 492 | 440 | 328 | 477 | 449 | 493 | 493 | 493 |
| R-squared | .09 | .003 | .09 | .114 | .027 | .089 | .005 | .133 | .003 | .256 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B12 –** Determinants of OBB cyclicality: standalone regressions with time fixed effects.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP per capita | 0 | | | | | | | | | |
| | (0) | | | | | | | | | |
| Gov. Size | | -.019 *** | | | | | | | | |
| | | (.004) | | | | | | | | |
| Trade Open. | | | .001** | | | | | | | |
| | | | (0) | | | | | | | |
| KA Open. | | | | .067* | | | | | | |
| | | | | (.037) | | | | | | |
| Credit-to-GDP | | | | | .004 *** | | | | | |
| | | | | | (.001) | | | | | |
| Debt-to-GDP | | | | | | -.004 *** | | | | |
| | | | | | | (.001) | | | | |
| Executive Const. | | | | | | | .083 | | | |
| | | | | | | | (.356) | | | |
| D_Growth t | | | | | | | | .633*** | | |
| | | | | | | | | (.119) | | |
| D_Growth t-1 | | | | | | | | | .617 *** | |
| | | | | | | | | | (.118) | |
| D_SGP | | | | | | | | | | 1.811*** |
| | | | | | | | | | | (.223) |
| Observations | 487 | 478 | 492 | 440 | 328 | 477 | 449 | 493 | 493 | 493 |
| R-squared | .272 | .318 | .292 | .294 | .204 | .295 | .232 | .319 | .318 | .278 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B13 –** Determinants of OBB cyclicality: with country and time fixed effects

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Gov. Size | -.026** | -.032*** | -.028** | -.026** | -.032*** | -.028** |
| | (.012) | (.012) | (.012) | (.012) | (.012) | (.012) |
| Trade Open. | .004 | .003 | .002 | .004 | .003 | .002 |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |
| KA Open. | -.007 | -.004 | -.023 | -.007 | -.004 | -.023 |
| | (.09) | (.091) | (.092) | (.09) | (.091) | (.092) |
| Credit-to-GDP | .006*** | .006*** | .008*** | .006*** | .006*** | .008*** |
| | (.002) | (.002) | (.002) | (.002) | (.002) | (.002) |
| Debt-to-GDP | .006** | .005** | .006** | .006** | .005** | .006** |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |
| D_Growth t | .409*** | | | .409*** | | |
| | (.117) | | | (.117) | | |
| D_SGP | .742*** | .755*** | .76*** | | | |
| | (.202) | (.204) | (.206) | | | |
| D_Growth t-1 | | .335*** | | | .335*** | |
| | | (.119) | | | (.119) | |
| Observations | 291 | 291 | 291 | 291 | 291 | 291 |
| R-squared | .324 | .313 | .291 | .324 | .313 | .291 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Table B14 –** Determinants of OBB cyclicality: regressions with time fixed effects

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Gov. Size | -.039*** | -.042*** | -.039*** | -.039*** | -.042*** | -.039*** |
| | (.008) | (.008) | (.008) | (.008) | (.008) | (.008) |
| Trade Open. | -.002** | -.002*** | -.003*** | -.002** | -.002*** | -.003*** |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| KA Open. | .001 | .017 | -.013 | .001 | .017 | -.013 |
| | (.074) | (.074) | (.078) | (.074) | (.074) | (.078) |
| Credit-to-GDP | .002* | .002 | .003*** | .002* | .002 | .003*** |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| Debt-to-GDP | .001 | 0 | .001 | .001 | 0 | .001 |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) |
| D_Growth t | .782*** | | | .782*** | | |
| | (.141) | | | (.141) | | |
| D_SGP | 1.053*** | .989*** | 1.021*** | | | |
| | (.234) | (.233) | (.246) | | | |
| D_Growth t-1 | | .787*** | | | .787*** | |
| | | (.14) | | | (.14) | |
| Observations | 291 | 291 | 291 | 291 | 291 | 291 |
| R-squared | .328 | .331 | .251 | .328 | .331 | .251 |

Notes: Panel estimates with country fixed effects; estimation by OLS; standard errors are in parentheses; constants omitted; all variables inserted with one lag, except the dummies. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.