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Fiscal activism in the euro area and in other advanced economies: New evidence

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Fiscal activism in the euro area
and in other advanced economies:
new evidence

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Abstract

We review the determinants of the discretionary fiscal policy action of governments in the euro area and in other advanced economies during the past 20 years. This is done by estimating fiscal reaction functions using dynamic panel techniques and country-by-country estimates. The results suggest that, on average, discretionary fiscal policy did not deliver economic stabilisation: during good economic times (positive output gaps) it has been on average pro-cyclical both in the euro area and in the other regions. However, the loosening bias during good times has been countered by the presence of efficient public institutions, higher long term interest rates and higher debt-to-GDP ratios. Overall, as a result of various counterbalancing forces, fiscal activism has not been a major feature of policy making in the euro area, nor in other advanced economies during the past 20 years.

Key words: fiscal stance, business cycle, government effectiveness, panel estimates

JEL Classification: E62, H6, C23

Non-technical summary

The aim of this paper is to study the determinants of the discretionary fiscal policy action of the euro area governments since the inception of the EMU. In particular, we are interested in disentangling the role played by economic stabilisation and fiscal sustainability objectives in the euro area countries vis-à-vis other advanced economies.

This is done by distinguishing between different states of the economy such as bad and good economic times, economic upturns and downturns, high and low debt regimes, and between different groups of countries (advanced economies, the EU and euro area). Analysing the drivers of discretionary fiscal policy is important not only because sovereign debt levels remain high in several countries, thus potentially limiting the room for manoeuvre in the next downturn, but also because understanding past fiscal behaviour can help identifying what are the constraints or the incentives to move towards more fiscal activism in an environment where other levers of economic policies appears more constrained than in the past.

This paper is closely related to the literature on fiscal reaction functions and in particular to the stream analysing the stabilisation properties of discretionary fiscal policy. In this paper we define fiscal activism as the discretionary use of fiscal policy for the purpose of stabilising the business cycle. The target variable for our analysis is the change in the cyclically adjusted primary balance, i.e. the primary balance adjusted for the impact of the economic cycle, generally referred to as the fiscal policy stance. The cyclically adjusted primary balance is taken from the Commission database and it is obtained by removing the effect of automatic stabilisers and interest payments from the budget balance. Using the fiscal policy stance as dependent variable, instead of the change in the primary balance (which also includes the impact of automatic stabilisers) allows focusing on discretionary policy actions. In addition to the “standard” drivers of discretionary fiscal policy considered in the literature (e.g. the output gap and the debt level), a novelty of this paper is to test for the role of the institutional factors in determining a country’s fiscal stance, based on the World Bank index on government effectiveness. The claim is that the higher the efficiency of the public institutions the more a country tends to pursue prudent fiscal policies, i.e. by improving its cyclically adjusted budget balance. Besides the panel approach we also show country-by-country estimates for the four largest euro area countries.

Using a panel approach, the findings of the analysis show that fiscal policy has tended to behave procyclically in both the euro area and in the other regions during good times, i.e. when the output gap was positive. We also find that in downturns the fiscal stance has been tightening. Together, these findings seem to suggest that the loosening bias in good times was reined in too late, i.e. when the downturn started. The above analysis is based on ex-post data. Generally, the change in output gap is less subject to ex-post revisions than the level of the output gap. In other words there is less doubt about the difference between policy intentions and actions when the reference variable is the change in the output gap. Overall, our findings suggest that governments are not able to adjust counter-

cyclically to a worsening of economic conditions, possibly because previous good times have not been used to build fiscal buffers.

While the result of pro-cyclicality seems to hold only in good times and downturns, we show that the fiscal stance is influenced positively by a number of factors. First, more efficient national institutions tend to lead to an improvement of the cyclically adjusted budget balance (e.g. tightening stance), thus mitigating the pro-cyclicality in good times. Second, higher long term interest rates also tend to be associated with a more tightening stance. Finally, the existence of fiscal imbalances in the form of both a low initial level of the cyclically adjusted budget balance and a high debt-to-GDP ratio are associated with a more tightening stance. The debt-to-GDP ratio appears to matter more for the euro area than elsewhere, as indicated by the higher estimated coefficient on the debt-to-GDP ratio in the euro area aggregate than in the advanced economies group. This can be interpreted as indication that the common fiscal framework in the euro area is more conducive to achieving the sustainability than elsewhere. We also show that sustainability concerns are higher for the sample of observations which lies above the 60% debt-to-GDP ratio threshold. Associating negative output gaps with a debt-to-GDP ratio above 60% leads to a sustainability coefficient for the euro area of 0.09, as opposed to the sustainability coefficient of 0.04 obtained for the average cycle and without debt threshold. A number of robustness checks over the benchmark model, carried out on the estimation method, the explanatory variables and the dependent variable confirm the above results.

Due to the lack of long-time series for the cyclically adjusted primary balance, country specific estimates for the four largest euro area countries are generally less robust than panel estimates. Having in mind the above caveat, country-specific estimates point to significant cross-country heterogeneity in the determinants of the fiscal stance. Only in Italy and France the fiscal stance seems to respond to (the change in) cyclical conditions. The size of debt seems to matter only for Italy as the coefficient on the debt ratio is significant, while France and Spain are the only two countries where there is some evidence of an electoral cycle, as in the year before the elections the fiscal stance is looser. Finally, in Germany no significant drivers of the fiscal stance have been singled out by our analysis, besides the initial level of the cyclically adjusted budget balance. These results are confirmed when using real time data for the output gap, when including different explanatory variables and when using the primary balance as dependent variable.

Overall, and given the interplay of various counterbalancing forces, our results show that fiscal activism has not been a major feature of policy making in the euro area, nor in other advanced economies in the past 20 years.

1. Introduction

We use a fiscal reaction function approach to study the discretionary fiscal policy behaviour of the euro area governments during the past 20 years and compare it with that of other advanced economies. Our goal is to study the drivers of the governments' fiscal policy stance in periods of expansions and recessions, with special attention to the size of government debt and a country's institutional characteristics. Focusing on the past 20 years implies that for the euro area countries the analysis covers only the EMU period. This allows overcoming the potential structural change for the European countries' fiscal behaviour which arose from the introduction of the EU fiscal framework in 1997.

In this paper we define fiscal activism as the discretionary use of fiscal policy for the purpose of stabilising the business cycle. While the existing empirical literature on the determinants of fiscal activism is already extensive, the topic remains very relevant as discretionary fiscal policy has been acclaimed as an important stabilisation tool at a time in which monetary policy appears constrained by the effective lower bound in several advanced economies. Nonetheless, this call seems to neglect that implementation lags, uncertainty about the economic situation and the distortionary impact of certain measures may, in practice, render the stabilisation objective of fiscal policies very difficult. For this reason, reliance on automatic stabilisers has been the preferred prescription in the fiscal domain.

Fiscal reaction functions (FRF) have generally been used to address both stabilisation and sustainability questions. Depending on the policy question, FRF are modelled differently. Generally, when focusing on the sustainability objective, the literature uses the level or change of the primary balance (PB) as the dependent variable, as it directly enters the debt accumulation equation. Instead, when focusing on the stabilisation objective the change in the cyclically adjusted primary balance (CAPB), or other measures of the discretionary fiscal effort, is the preferred dependent variable. In both cases the debt-to-GDP ratio enters as a key explanatory variable to test for sustainability, while real GDP growth or the output gap enters as key explanatory variable to test for stabilisation. The use of the PB versus the CAPB leads to a higher stabilisation coefficient since it captures also the effect of the automatic stabilisers (Golinelli and Momigliano, 2008). As we are primarily interested in the stabilisation properties of discretionary fiscal policies, in this paper the benchmark FRF is constructed over the change in CAPB (fiscal stance) measured as a percent of trend GDP, while FRF based on changes in PB are included in the robustness analysis.

While from a conceptual point of view the (change in) CAPB is more attractive than the (change in) PB as it is a direct measures of the discretionary action of the government, it has the shortcoming related to high measurement uncertainty in real time.

Most econometric literature uses a panel approach to estimate FRF, this allow circumventing time-series data limitation, given that fiscal variables are still predominantly measured at low frequencies and long data series for most European countries are missing, in particular for cyclically adjusted variables. Despite the data limitation, this paper shows results for both panel and country-by-country approach, to account for the importance of heterogeneous behaviour across countries. The individual country approach covers the four largest euro area countries and includes a longer span of data,

starting from the mid-1980s. There are a few recent papers that estimate FRF for EU countries in isolation (Fincke and Greiner, 2012; Baldi and Staehr, 2016, Berti et al., 2016, Barbier-Gauchard and Mazuy, 2018), making use of quarterly data, while the vast majority of the empirical literature focus on panel approaches.

Compared to the existing literature, the value added of this paper is the following:

First, we use an up-to-date dataset running until 2017. The possibility to conduct econometric analysis by looking more closely at fiscal policies during the most recent past allows to corroborate (or not) previous findings. Furthermore, it provides a more robust estimate for the euro area aggregate.

Second, and new in the FRF literature, we test for the significance of institutional variables in determining the degree of fiscal activism. Our claim is that “government effectiveness” matters for understanding the extent to which governments engage in discretionary policy actions, with more efficient institutions being prone to a more responsible use of discretionary policy (i.e. less fiscal profligacy in good economic times). We show that that the tendency to consolidate is higher when the institutional set-up is more efficient, as measured by the World Bank government effectiveness indicator.

Third, mindful of the shortcomings related to the measurement of the level of the output gap, we control also for the change in output gap. The latter appears less subject to ex-post revisions, it is strongly correlated with measures of economic confidence, and thus it appears more suitable to capture economic upturns and downturns as also perceived by economic agents. It turns out that the change in output gap is generally more robust than the level of output gap as an indication of the cyclical position of the economy. The results show that fiscal policies tend to be expansionary in economic good times and contractionary in economic downturns. Together, these findings suggest that governments are not able to adjust counter-cyclically to a worsening of economic conditions, possibly because previous good times have not been used to build fiscal buffers.

Fourth, our analysis distinguishes the euro area from the EU and other advanced economies, while generally the literature tends to focus on one region. We show that the euro area has one key distinctive characteristic, related to the size of the sustainability coefficient, which appears systematically higher and more robust to changes in the estimated model compared to that of a sample including other advanced economies.

The remainder of the paper is organised as follows: Section 2 reviews the empirical literature on FRF; Section 3 presents the data, focusing in particular on the comparison between the euro area aggregate and the US; Section 4 presents the panel estimates for the benchmark model and several robustness exercises; Section 5 shows the estimates for four individual euro area countries and related robustness exercises. Section 6 concludes.

2. Literature overview

The empirical literature on FRF has grown significantly during the past twenty years. Initially developed to test sustainability considerations in the conduct of US fiscal policy (Bohn, 1998), the focus shifted later on (Fatas and Mihov, 2003) to the stabilisation properties of fiscal policy across developing and developed countries. The sustainability objective has generally been tested by means of a FRF estimated on the (level of) primary balance while the stabilization properties of fiscal policies have instead generally been tested using FRF based on the change of PB or CAPB.

On the sustainability side, the work developed from a linear relationship between the primary balance and the public debt-to-GDP ratio, after controlling for other determinants, e.g. the business cycle, inflation, external deficit, etc. (Bohn, 1998) to non-linear relationship, e.g. by including polynomial terms of public debt (Ghosh et al., 2013). The polynomial term aims to capture fiscal fatigue, under the hypothesis that while it is likely that fiscal policy is more responsive to high debt levels, this link might change at very high levels of debt. This hypothesis has been validated by Ghosh et al. (2013) in panel of 23 advanced economies over the period 1970-2007. However, country heterogeneity matters, as demonstrated by Everaert and Jansen (2018). The authors use an unbalanced panel for 21 OECD countries over the period 1970-2014 to show that quadratic and cubic debt-to-GDP terms that imply fiscal fatigue become insignificant once a heterogeneous coefficient to lagged debt is allowed for.

As to the euro area, the literature finds a higher responsiveness of changes in fiscal policy to debt levels during the recent euro area sovereign debt crisis (Plodt and Richter, 2015; Checherita-Westphal and Zdarek, 2017, Baldi and Staehr, 2015). The sustainability coefficient (i.e. the change in the primary balance for a 1 percentage point increase in the debt ratio) has been most often estimated in the range of 0.04-0.06, and on the upper limit of this range during the sovereign debt crisis. Excluding the recent sovereign debt crisis, the evidence with respect to the responsiveness in the period since the Maastricht Treaty entered into force (since 1992) and the period since the launch of the euro (since 1999) is more mixed. While Gali and Perotti (2003) do not find evidence of a statistically different fiscal reaction to debt before and after the Maastricht Treaty, other most recent studies (Benetrix and Lane, 2013; Weichenrieder and Zimmer, 2014, Plodt and Richter, 2015) point to a stronger average responsiveness after the Maastricht Treaty followed by a weakening of the responsiveness after joining the euro area, up until the start of the crisis.

All in all, despite variations in the size of the estimated coefficient, the FRF literature generally finds that the government's discretionary fiscal policy action is responsive to sustainability considerations. On the contrary, the findings of the literature are not conclusive when it comes to the stabilisation properties of fiscal policies. Looking at individual fiscal instruments the available evidence suggests higher activism on the spending side rather than on the of tax revenues side (Fatas and Mihov, 2003), but the stabilisation properties of government spending differ across different types of spending. For example, Lane (2003) estimates the reaction of the growth rate of different categories of government spending to GDP growth in OECD countries, finding that while the growth in government transfers reacts negatively to that of GDP, the reaction is positive for government consumption and government investment. Evidence of pro-cyclicality of government spending in the euro area countries is also

found in Gali and Perotti (2003), particularly in the period preceding the Maastricht Treaty. Implementation lags and inconsistent incentives are among the possible explanations underlying the observed pro-cyclical behaviour of expenditure policies.

More generally, a key problem in testing for the stabilisation properties of discretionary fiscal policies is related to the reliance on the output gap (level and change) as an indicator of the economy's position in the business cycle. Given that it is unobservable, the use of real time and/or ex-post measures for the level of both the output gap and the CAPB might lead to different results and explain the lack of conclusive empirical evidence across different studies. This is very well reported by Golinelli and Momigliano (2008) who show how different choices concerning data vintages, (i.e. traditional analysis fully based on ex-post data; real time data only for the explanatory variables, analysis fully based on real-time data), influence the stabilisation coefficient. In particular, the analysis based fully on real-time data points to pro-cyclical behaviour in bad times and to counter-cyclical behaviour in good times. The analysis of actual policies based on real-time output gap tends to indicate broadly symmetrical weakly countercyclical behaviour, a-cyclical in good times and countercyclical in bad times. Finally, the analysis based fully on ex-post data gives an unambiguous indication of a-cyclical behaviour. The authors conclude that the ex-ante weakly countercyclical behaviour is offset by the error made by the government in evaluating cyclical conditions in real time. This finding suggests the active use of fiscal policy should be warranted only when there is a large consensus regarding the assessment of cyclical condition.

The main interest of this paper lies on actual policies based on ex-post data. This is because in order to learn new lessons about fiscal activism it appears relevant to understand what actually has been observed (albeit with errors) in terms of discretionary fiscal action, beyond what could have been the intentions of the governments. Our estimates consider also the change in the output gap, which is generally less subject to data revisions, as we are interested in capturing the response of fiscal policies not only to the level of the output gap but also to upturns and downturns in the economic cycle. This distinction appears prominently in Turrini (2008), who puts forwards two concepts of stabilisation: (1) at the margin, e.g. response of the cyclically adjusted budget balances to changes in output gap, and (2) on average, i.e. response of cyclically adjusted budget balance to the level of output gap. He finds that fiscal policy at the margin appears a-cyclical, i.e. the change in the CAPB is not affected in a significant way by variations in the output gap. However, he finds evidence that the average stance of fiscal policies in the euro area up to 2005 was expansionary in times of positive output gap, while no strong evidence of a cyclical bias is found in times of negative output gap. The author also finds also that there is no evidence that the introduction of SGP resulted in a more pro-cyclical response of fiscal policy to cyclical conditions.

Table 1 summarises the findings of the empirical literature when the dependent variable is the change in the CAPB. It shows a prevalent evidence of pro-cyclical behaviour in good times and a-cyclical behaviour in bad times when using fully ex-post data.

Table 1. Achievements of the stabilisation objectives and data vintages of output gaps / CAPB according to the FRF literature

	Countercycl. in good times	Pro-cyclical in good times	Countercycl. in bad times	Pro-cyclical in bad times	Acyclical in good times	Acyclical in bad times
Fully ex-post		√√√√√				√√√
Partly real time			√		√	
Fully real time	√		√	√	√	√

Note: Number of √ denotes the findings in the literature included in the sources below. Marker in red denotes the findings of this paper for the panel of advanced economies.

Sources: Cimadomo (2007), European Commission (2006, 2019), Forni and Momigliano (2004), Gali and Perotti (2003), Golinelli and Momigliano (2008), Turrini (2008).

FRF have been also used to test the importance of fiscal rules and in general of fiscal frameworks in the European context. In general, a number of studies find a significant, positive influence of fiscal rules - EU-wide or national-specific - on fiscal aggregates (Maltritz, Wuste, 2015). Badinger (2009) finds that fiscal rules have reduced the discretionary use of fiscal policy. Golinelli and Momigliano (2008) do not find evidence of the shift from pro-cyclicality to a-cyclicality after the Maastricht Treaty that some other authors have found (e.g. Gali and Perotti, 2003). By contrast, Nerlich and Reuter (2015) analyse the interaction between fiscal rules and fiscal space for a sample of EU 27 member countries. They find that fiscal rules tend to be associated with higher fiscal space (defined as the room for fiscal manoeuvre) and they in turn reduce the pro-cyclicality of discretionary fiscal policy. Similarly, a more recent work from the European Commission (2019) suggests that the respect of fiscal rules seems to have mitigated pro-cyclicality of fiscal policy in the EU. This work reveals evidence of a pro-cyclical fiscal effort since 2000 in the EU on average, implying that discretionary fiscal policy tightens in bad times and loosens in good times. However, the respect of fiscal rules seems to have mitigated the pro-cyclicality of fiscal policy, with both national fiscal rules and medium-term budgetary framework having a positive and significant impact on the CAPB. The role of fiscal frameworks is generally tested by including dummies associated to the year when the institutional change occurred. In our sample, such an approach did not lead to a significant coefficient for the 1997 dummy (introduction of the SGP), 2005 dummy (instruction of structural balances in the SGP) and 2011 (introduction of the debt rule in the SGP).

3. Data analysis

Our empirical analysis is based on annual data, covering all EU 28 countries and other advanced economies, namely: US, Canada, Japan, Island, Israel and Australia for which data coverage is relatively large on account of a homogeneous database. The key variables of interest are: cyclically adjusted primary balance, output gap, government debt, long term interest rates, a measure of government efficiency, and a series of dummies capturing election years, the financial and sovereign debt crises (see Annex 1 for the data description).

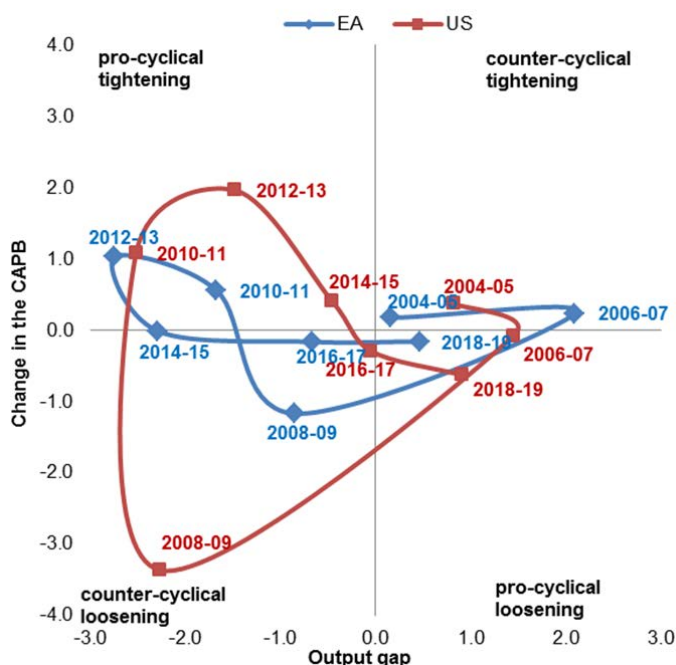
The computation of the output gap and cyclically adjusted primary balances is based on the potential growth estimates computed by the European Commission. The analysis relies fully on ex-post data, as the objective of the paper is not to assess policy intentions but policy outcomes. Arguably, fiscal policy makers do not rely only on real time measures of the output gap when assessing the state of the economy, as they are aware of the uncertainty associated with its measurement. Other indicators, less subject to measurement's errors and to ex-post revisions, such as GDP growth, unemployment rate, capacity utilisation, and qualitative indicators such as economic sentiment are also generally used to capture the state of the economy. The ex-ante signal coming from these indicators is much more correlated with ex-post rather than ex-ante output gap measures.

Throughout the paper the fiscal stance, i.e. the discretionary action of the government, is measured by the change in the cyclically adjusted primary balance (CAPB). The CAPB is taken from the Commission's database and it is computed by removing the effect of automatic stabilisers and interest spending from the budget balance (Mourre et al., 2014). The computation implies that the orthogonality of the CAPB to the output gap is not imposed a priori.

Before moving to the empirical model, we explore some pair-wise correlations between the fiscal stance and output gap and government debt, respectively. We

focus here on what we consider the two most similar regions, in term of size and intra-regional heterogeneity, the euro area and the US. Chart 1 shows the relationship between the fiscal stance and the output gap for the euro area aggregate and the US from 2014 to 2019. For readability purposes 2-

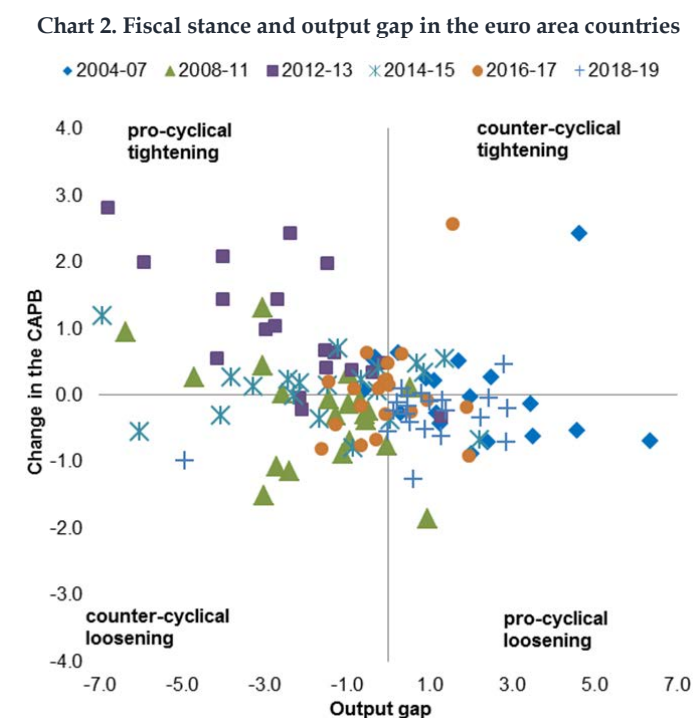
Chart 1. Fiscal stance and output gap in the euro area and the US



Source: Authors' computation on European Commission and OECD data. Data for 2019 are European Commission and OECD forecasts

year averages have been taken. The chart is divided into four quadrants: (1) positive fiscal stance (i.e. consolidation) and positive output gap (i.e. good times) imply counter-cyclical tightening; (2) positive fiscal stance (i.e. consolidation) and negative output gap (i.e. bad times) imply pro-cyclical tightening; (3) negative fiscal stance (i.e. loosening) and positive output gap (i.e. good times) imply pro-cyclical loosening; (4) negative fiscal stance (i.e. loosening) and negative output gap (i.e. bad times) imply counter-cyclical loosening. Chart 1 shows that over the past 15 years the observations for the euro area aggregate and the US have moved largely symmetrically, despite different amplitudes. This visual inspection limited to the past 15 years does not reveal any univocal cyclicity of the fiscal stance, and more interestingly it shows that the sign of discretionary policies in the two sides of the Atlantic have been very much aligned, with the main difference being in the amplitude of the counter-cyclical loosening in 2008-2009.

Chart 2 shows the relationship between the fiscal stance and the output gap across the 19 euro area countries during the past 15 years. We consider averages over six periods: 2004-07 (characterized by positive output gap in the euro area as a whole), 2008-2011 (characterised by negative output gap in the euro area as a whole), 2012-13 (the post sovereign crisis years), 2014-15 (the recovery of the euro area as a whole), 2016-2017 (the closing of the of output gap in the euro area as a whole) and 2018-2019 (the years where the euro area output gap turns positive). The chart shows that the dots are generally evenly distributed in all



four quadrants, with the exception of the post-sovereign debt crisis period (2012-13) when in almost all countries fiscal policy turned to pro-cyclical tightening. From the two charts above it is not straightforward to conclude that discretionary fiscal policy has been unequivocally pro or counter-cyclical, largely in line with the findings of the empirical literature.

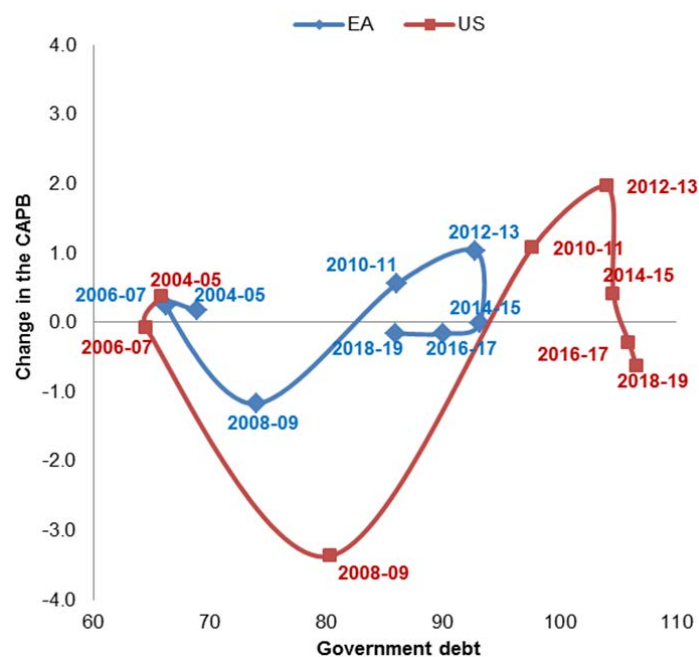
We look now at the correlation between the fiscal stance and the government debt during the past 15 years (Chart 3 and Chart 4). According to the empirical literature reported in the previous section a positive and significant link between the level of debt and the fiscal stance is often found.

Chart 3 indicates that such a positive relationship has been evident between 2008 and 2013 in the euro area and in the US, but not before or afterwards. Chart 4, which plots fiscal stance and government debt in the 19 euro area countries, confirms the presence of a positive relationship only in the period 2008 -2013. The visual inspection seems in line with the findings that this relationship has strengthened during the sovereign crisis and weakened afterwards (Checherita-Westphal et al. 2017).

Both in the case of the relationship between fiscal stance and output gap and between fiscal stance and government debt we note that the US and the euro area have behaved rather similarly at least up to 2015.

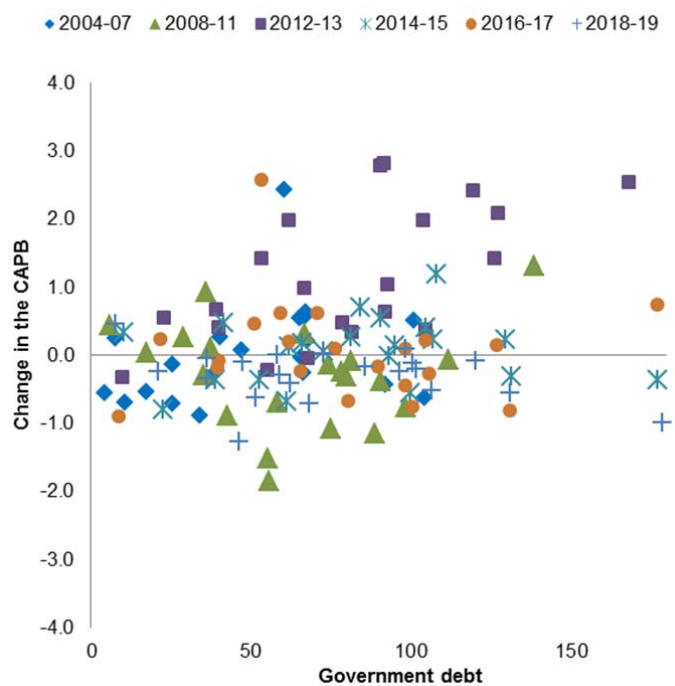
Output gap measures are not observable; therefore they tend to be largely revised ex-post. While knowing the exact position in the cycle is intrinsically difficult in real time, knowing the direction, e.g. whether a country is an economic downturn or upturn, is less subject to errors. Interestingly, for most countries, economic sentiment and business confidence appear to be highly correlated with changes in output gap, measured ex-post (Chart 5, Chart 6 and Chart 7), i.e. with upturns and downturns in economic activity. This suggests that the change in output gap, measured

Chart 3. The fiscal stance and government debt in the euro area and US



Source: Authors' computation on European Commission and IMF data.

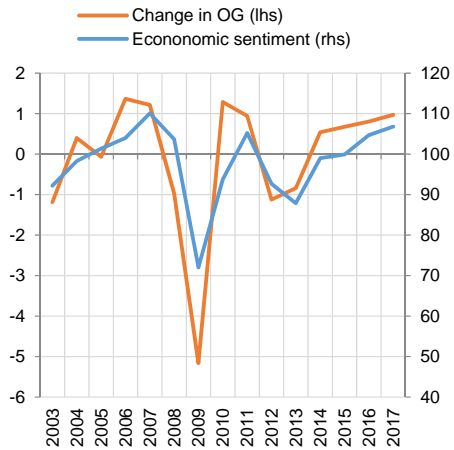
Chart 4. The fiscal stance and government debt in the euro area countries



Source: Authors' computation on European Commission data.

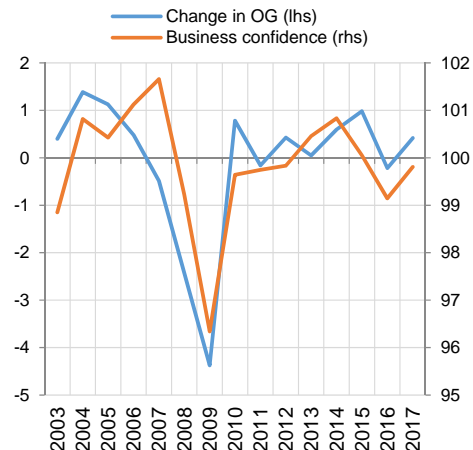
on ex-post data, appears well suited to capture the perception regarding the state of the economy from the businesses and consumers society.

Chart 5. Euro area: economic sentiment (index) and change in the output gap (in pp)



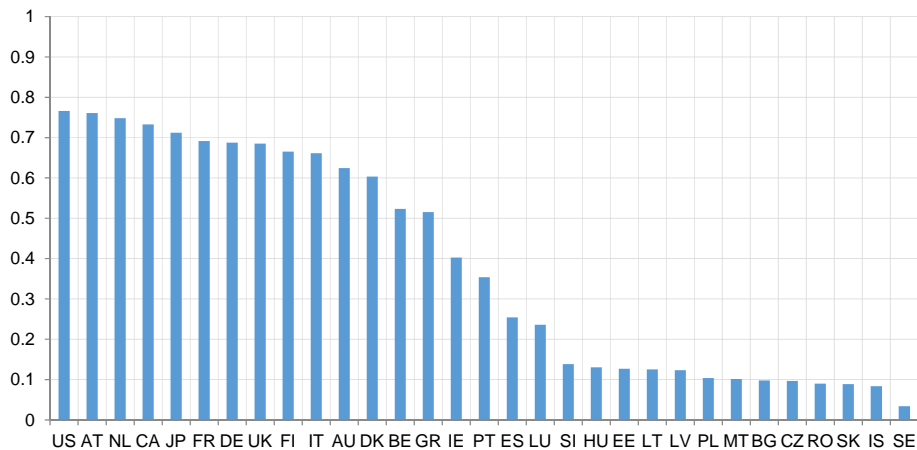
Source: Authors' computations on European Commission data

Chart 6. US: Business confidence (index) and change in the output gap (in pp)



Source: Authors' computations on OECD data

Chart 7. Contemporaneous correlation between change in output gap and measures of economic sentiment / business confidence across countries

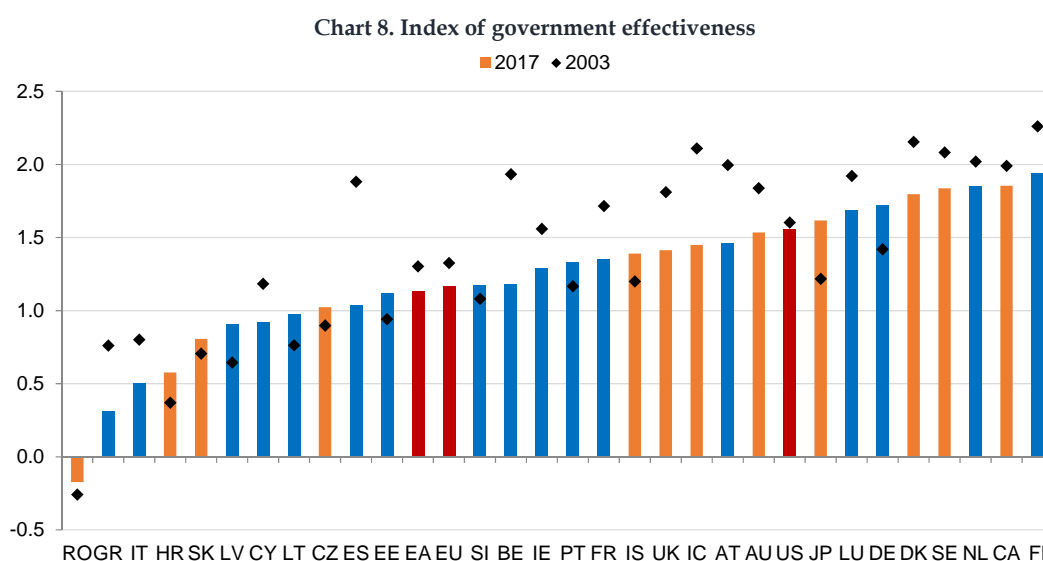


Source: Authors' computations on European Commission and OECD data

While stabilisation and sustainability considerations might be considered the most important drivers of discretionary fiscal actions, fiscal policy decisions are affected by other determinants, e.g. the fiscal framework in which the country operates (in the EU the SGP), other institutional factors that affect the effectiveness of the government, the degree of consensus that a government has and the proximity to elections periods.

Compared to other empirical analyses our benchmark model includes an additional variable that is generally neglected, government efficiency. This variable aims at capturing institutional differences

across countries which might explain differences in economic policies. The index of government effectiveness is computed by the World Bank (see Kaufmann, Kraay, & Mastruzzi, 2010) and measures the quality of public services, the quality of the civil service and its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to its stated policies. The index ranges from -2.5 (weak) to +2.5 (strong). Our hypothesis is that the higher is a country's government effectiveness the more likely is that fiscal policies are conducted in a prudent manner; therefore a positive relationship between government effectiveness and the fiscal stance is expected. Chart 8 shows the index of government effectiveness for the euro area countries, the US and the OECD average. It shows that for the vast majority of euro area countries the dispersion of the index is not very large since it ranges from 1.0 to 2.0, i.e. 1/5 of the total world-wide dispersion. Two exceptions are GR and IT, for which the index moves significantly below 1.



Source: Authors' computations on World Bank data.

Before testing econometrically the relationship between the fiscal stance and the control variables described above, Table 2 provides a summary of some of our key indicators for the euro area, the EU, the largest euro area countries and the US. It distinguishes between good (positive output gap) and bad times (negative output gap) and shows that, prevalently, in absolute terms, the output gap in bad times had been on average larger than in good times since 1985. Budget balances have improved with positive output gap and deteriorated with negative output gaps. This positive correlation is largely driven by the working of automatic stabilisers. Table 2 also shows that on average the fiscal stance (change in CAPB) has been neutral (i.e. very close to zero) in the EU, EA, US, DE, FR and IT. Across the largest euro area countries, primary balances have been consistently positive in good and bad times only in Germany and Italy, while government efficiency has been slightly deteriorating in bad times, with the exception of IT.

Table 2. Key summary statistics of the indicators used in the regression analysis
(Averages over periods when the output gap is positive and negative, 1985-2017)

		US	JP	CA	AU	EU	EA	DE*	FR	IT	ES
Output gap	good times	1.4	1.6	1.2	0.6	1.0	1.2	1.3	1.4	1.5	2.1
	bad times	-2.1	-1.7	-0.9	-1.1	-1.4	-1.5	-1.2	-1.7	-1.9	-3.6
Change in CAPB	good times	-0.1	0.7	-0.1	-0.4	-0.1	0.0	0.2	-0.2	0.0	0.8
	bad times	0.0	-0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.3	-1.2
CAPB	good times	1.1	-1.3	4.6	1.7	0.5	0.4	0.8	-0.6	-0.2	0.8
	bad times	-0.3	-3.4	2.6	-0.7	0.2	0.5	0.4	-0.6	2.3	-1.2
Budget Balances	good times	-2.9	2.6	-0.3	-4.9	-3.0	-2.8	-1.1	-2.6	-5.6	-1.5
	bad times	-6.4	2.7	-2.6	-3.8	-3.2	-4.1	-3.0	-4.2	-5.6	-6.4
Change in the Budget Balance	good times	0.4	0.1	0.1	0.3	-0.6	0.0	0.4	-0.1	0.0	0.0
	bad times	-0.1	0.0	-0.4	0.1	0.4	0.2	-0.2	0.1	0.4	0.2
Primary Balances	good times	1.6	0.1	1.6	1.2	1.0	1.0	1.4	0.2	0.7	2.0
	bad times	-1.4	-4.5	-0.7	-1.8	-0.5	-0.3	-0.2	-1.5	1.5	-3.3
Government Debt	good times	81.8	144.3	77.3	16.2	59.8	64.8	62.0	60.9	92.9	47.0
	bad times	114.9	173.5	89.3	28.7	72.8	79.9	64.0	70.7	105.1	73.6
Government Efficiency	good times	1.7	1.2	1.9	1.8	1.2	1.2	1.7	1.6	0.6	1.5
	bad times	1.5	1.4	1.8	1.7	1.2	1.2	1.6	1.4	0.6	1.2

Source: Authors' computations on European Commission and OECD data.

Note: (*) Data for DE starts in 1991. Data on Government Efficiency are only available as of 1996 for all countries.

4. The empirical model and panel estimation results

The estimated benchmark model for the country panel takes the following specification:

$$(1) \quad \Delta CAPB_{i,t} = \alpha + \beta CAPB_{i,t-1} + \tau \Delta CAPB_{i,t-1} + \delta \left(\frac{B}{Y} \right)_{i,t-1} + \gamma \left(\frac{Y^* - Y}{Y^*} \right)_{i,t-1} + \mu \Delta \left(\frac{Y^* - Y}{Y^*} \right)_{i,t} + \theta D_{ij} \\ + \vartheta Z_{i,t-1} + \varphi GE_{i,t-1} + \phi_i + \varepsilon_{i,t}$$

where:

the dependent variable $\Delta CAPB_{i,t}$ is the change in the cyclically adjusted primary balance for country i at time t . As regards the explanatory variables, a priori there is no right or wrong sign attached to their coefficients. Equation (1) aims at testing the relative weights of the factors that can potentially affect governments' discretionary fiscal policy decisions, i.e.:

(1) $CAPB_{i,t-1}$. is the level of the cyclically adjusted primary balance in the previous year. In the EU context, this variable should have gained prominence with the 2005 reform of the SGP. With this reform the objective of being "close to balance or surplus" in structural terms (Medium Term Objectives) became the guidance for setting the budget targets throughout the economic cycle. Besides the normative importance in the EU, it is likely that the level of primary balance (here cyclically adjusted) plays a role in determining the fiscal stance in the following year since the higher is the

starting level of the primary balance the lesser would be the need to build fiscal buffers. We would therefore expect a negative sign for the coefficient β .

(2) $\Delta CAPB_{i,t-1}$ is the change in the cyclically adjusted primary balance in the previous year. The inclusion of this variable aims at measuring the persistence of the stance of fiscal policy.

(3) $\left(\frac{B}{Y}\right)_{i,t-1}$ is the level of government debt as a ratio to GDP in the previous year. According to the empirical literature the level of debt influences discretionary fiscal policies since it is likely that sustainability concerns are higher the higher is the level of debt. In this case the sign of the sustainability coefficient δ is expected to be positive.

(4) $\left(\frac{Y^*-Y}{Y^*}\right)_{i,t-1}$ is the output gap (OG) as a ratio to potential GDP in the previous year and aims at measuring the state of the economy. In line with the existing empirical literature that uses the CAPB (i.e. the primary balance netted out from the impact of automatic stabilisers) as dependent variable in FRF, we interpret the estimated coefficient γ as an indication of the orientation of fiscal policy vis-à-vis the economic cycle. A significant positive coefficient means that the discretionary fiscal policy responds counter-cyclically to the business cycle, i.e. the CAPB improves as a result of tightening policies in the presence of a positive output gap. A significant negative coefficient would mean that the discretionary fiscal action is instead pro-cyclical, i.e. the CAPB deteriorates as a result of loosening policies in the presence of a positive output gap. A non-significant coefficient is indicating that fiscal policy is passive relative to the cycle, i.e. acyclical. This interpretation of the coefficient is standard in the literature that uses the CAPB (i.e. the primary balance netted out from the impact of automatic stabilisers) as dependent variable in FRF. Nonetheless, the empirical evidence is not conclusive about the sign for the coefficient γ .

(5) $\Delta\left(\frac{Y^*-Y}{Y^*}\right)_{i,t}$ is the change in the output gap and aims at measuring the fiscal stance at the margin (see Turrini 2008) i.e. during an upturn or downturn of the economy. A positive and significant coefficient μ means that fiscal policies tighten in an upturn or loosen in a downturn. Instead, a negative and significant coefficient μ means that fiscal policies loosen in an upturn and tighten in a downturn; therefore fiscal policies are pro-cyclical at the margin.

(6) D_{ij} are three dummy variables assuming the value of 1 when j = election years, the 2009 financial crisis, the 2010 sovereign crisis. Given that we are estimating a dynamic panel model, the persistence of the dummies is captured by the lagged dependent variable.

(7) Z_{it-1} is the long-term nominal interest rate. The significance of other macroeconomic variables is reported in Appendix 2 (e.g. the inflation rate). The inclusion of the nominal rather than the real rate has been an empirical choice, since it turned out the nominal interest rate is significant while the real rate is not. A positive and significant coefficient ϑ means that the discretionary fiscal policy tightens on average with a higher interest rate. This might imply that governments associate higher interest rate with sustainability concern. Instead, a negative and significant coefficient ϑ means that the discretionary fiscal policy loosens on average with higher interest rates. This might imply that

governments associate higher interest rates with expected better economic conditions and thus less pressing sustainability concerns.

(8) $GE_{i,t-1}$ is the indicator of government efficiency, measured as z-score (in deviation from the OECD average). A positive and significant coefficient φ means that fiscal policies tend to be tighter in countries with more effective institutional frameworks.

All explanatory variables enter with one year lag to control for endogeneity problems, apart from the change in output gap since this variable aims at capturing the actual state of the economy. Equation (1) also includes country-fixed effects \emptyset_i to capture additional systematic differences across countries which are not included in the institutional variable $GE_{i,t-1}$.

In the panel version of the model we estimate equation (1) by using both country fixed effects and dynamic generalised method of moments. The fixed effects model removes the effect of individual time-invariant characteristics, which may affect or bias the relationship between the predictor and the outcome variable. By controlling for those fixed unobserved variables, it is possible to assess the net effect of the regressors on the dependent variable.

In order to account for potential endogeneity deriving from the inclusion of the lagged dependent variable as regressor we use the dynamic generalised method of moments (GMM). The Arellano-Bond estimator uses lags of the dependent variables, either differenced or in levels, as an instrument for the one-time lagged dependent variable.

Given that the data for government efficiency only start in 1996, the sample used in the panel estimates cover the period 1996-2017, i.e. 22 years of observations. While this appears a relatively short period of time, the panel dimension allows circumventing the data limitations at country level. This also reduces the reliance on unbalanced panel. Moreover, it focuses mainly on the period after the introduction of the Stability and Growth Pact (1997) in the EU, therefore characterised by no major structural breaks in term of prevailing supranational institutional framework. We test the panel model for three groups of countries. The first group encompasses all countries considered in this analysis, namely all EU (including the UK) and the other six advanced economies US, JP, CA, AU, IS, IL (34 countries). The second group includes only the EU28 countries and the third group includes only the euro area countries.

4.1 Panel estimation results

Table 3 shows the estimation output for equation (1) for the three groups using fixed effects and GMM estimators. The results are not affected by the estimation method. Moreover, the sign of the coefficients remains unaltered across the three groups. It is also interesting to note that the significance of the coefficients is not very different across groups. Looking at the coefficients of the individual explanatory variables reported in Table 3 the following conclusions can be derived:

- The lagged level of the CAPB is significant and with a negative sign. This confirms our prior according to which the higher is the level of the CAPB the lower is its improvement. The size of the

coefficient is slightly higher for the euro area group than for the advanced economies group, which we interpret as a sign that the level of CAPB matters more within the euro area than elsewhere. This would be consistent with the prominence of structural balances, in particular since the mid-2000s in the EU surveillance framework.

- The previous year change in the CAPB is mildly significant and with a negative sign. This implies that there is no evidence of persistence in the direction of discretionary policies.
- Given the inclusion of the CAPB in levels and in change one can read the coefficients of the level and the change of the CAPB in conjunction, e.g., ceteris paribus, substituting the estimated $\hat{\beta}$ and $\hat{\tau}$ in (1), we obtain:

$$(1) \Delta CAPB_{i,t} = -0.4CAPB_{i,t-1} - 0.1\Delta CAPB_{i,t-1} + \dots = -0.5CAPB_{i,t-1} + 0.1CAPB_{i,t-2} + \dots$$

Consistently with the above interpretation, given that $\hat{\beta} > \hat{\tau}$ the discretionary fiscal action tend to be inversely related with the past level of the CAPB.

- The lagged debt-to-GDP ratio is significant and with a positive sign. In line with the literature, government action is found to be responsive to sustainability considerations. The size of the coefficient is higher for the euro area group (0.04) compared to the advanced economies group (0.02), suggesting that the debt level matters more for the euro area than for the rest of the countries in triggering a discretionary fiscal response.
- The lagged output gap is mildly significant for the advanced economies group but not for the EU and the euro area. In the former group the sign is negative, pointing to pro-cyclical average fiscal policies. The absence of any significance in the stabilisation coefficient in the EU and euro area is interpreted as a-cyclicality of the stance on average.
- The change in the output gap is significant in all groups and shows a negative sign. This implies pro-cyclicality at the margin. In other words, in downturns fiscal policies tend to be contractionary and expansionary in upturns.
- When reading the estimated coefficients of the level and change of the output gap in conjunction, e.g. $\hat{\gamma} \left(\frac{Y^* - Y}{Y^*} \right)_{i,t-1} + \hat{\mu} \Delta \left(\frac{Y^* - Y}{Y^*} \right)_{i,t} = \hat{\mu} \left(\frac{Y^* - Y}{Y^*} \right)_{i,t} + (\hat{\gamma} - \hat{\mu}) \left(\frac{Y^* - Y}{Y^*} \right)_{i,t-1}$

Table 3 shows that while $|\hat{\mu}| \geq |\hat{\gamma}|$ since $\hat{\mu}$ is negative, there appears to be a generalised evidence of pro-cyclical discretionary fiscal policies.

- The Dummy on the election years is not significant, therefore elections do not appear, prima facie, to influence in a significant manner the direction of discretionary fiscal policy.
- The Dummies on the financial (2009) and sovereign debt crises (2010) are both significant for the advanced economies group and the euro area. The negative sign of both variables suggests that the two crises are associated with a deterioration of the CAPB.
- The long term interest rate is significant in all groups. The positive coefficient implies that an increase in interest rate leads usually to an improvement of the CAPB. The interpretation of this result is twofold: first, a positive coefficient might signal that governments are taking into consideration sustainability concerns, as interest rates increases affect debt sustainability, second

the result might also be consistent with the hypothesis that governments associate higher interest rates with more favourable future economic conditions.

- Finally the government effectiveness indicator is significant and with a positive sign in both group of countries. Given that the indicator has been included as z-score, this suggests that higher than sample average government effectiveness is associated with an improvement of the CAPB.

Overall, the results point to only one main euro area specific characteristic which is related to the higher weight given to sustainability considerations.

Table 3. Estimation output of equation (1)

Change in the cyclically adjusted budget balance ($\Delta CAPB$)						
Explanatory variables	Advanced economies		European Union		Euro area	
	FE	GMM	FE	GMM	FE	GMM
$CAPB_{t-1}$	-0.376*** [0.030]	-0.388*** [0.038]	-0.406*** [0.031]	-0.406*** [0.043]	-0.421*** [0.035]	-0.412*** [0.050]
$DCAPB_{t-1}$	-0.104** [0.042]	-0.092** [0.045]	-0.111** [0.046]	-0.111** [0.049]	-0.124** [0.050]	-0.133** [0.056]
$(B/Y)_{t-1}$	0.021** [0.008]	0.022*** [0.005]	0.033*** [0.007]	0.033*** [0.007]	0.035*** [0.009]	0.036*** [0.008]
OG_{t-1}	-0.095** [0.045]	-0.090** [0.036]	-0.078 [0.049]	-0.078** [0.038]	-0.064 [0.067]	-0.065 [0.047]
DOG_t	-0.138** [0.055]	-0.142*** [0.049]	-0.160*** [0.054]	-0.162*** [0.052]	-0.156** [0.059]	-0.158*** [0.059]
$D Elections$	-0.165 [0.127]	-0.190 [0.173]	-0.206 [0.148]	-0.217 [0.197]	-0.237 [0.155]	-0.248 [0.241]
$D 2009$	-2.849*** [0.518]	-2.872*** [0.465]	-2.640*** [0.672]	-2.648*** [0.528]	-2.843*** [0.805]	-2.854*** [0.636]
$D 2010$	-2.201*** [0.757]	-2.147*** [0.382]	-2.062** [0.913]	-2.055*** [0.425]	-2.524** [1.190]	-2.531*** [0.527]
IR_{t-1}	0.131*** [0.048]	0.130*** [0.040]	0.119** [0.047]	0.118*** [0.042]	0.130** [0.062]	0.130** [0.052]
GE_{t-1}	1.090* [0.547]	1.157** [0.518]	1.692*** [0.502]	1.720*** [0.579]	1.371** [0.554]	1.390** [0.669]
$Constant$	-1.593** [0.607]	-1.619*** [0.437]	-2.093*** [0.473]	-2.102*** [0.500]	-2.338*** [0.693]	-2.393*** [0.658]
$Observations$	580	546	462	436	358	338

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.2 Distinguishing between good and bad times, economic upturns and downturns

The benchmark model (1) is further tested by isolating (i) periods of good economic times (positive output gaps) and bad times (negative output gaps); (ii) periods of economic upturns (positive change in in output gaps) and downturns (negative change in output gaps) Given the large similarities between EU and euro area sample, below we report the estimates only for the advanced economies and the euro area, while estimates for the EU are shown in Annex 2.

Table 4 shows the result for the two groups of countries for good and bad times (given the similarity of results between FE and GMM in what follow we report the FE estimated coefficients, GMM estimates are shown in Annex 2). In the sample period considered (1996-2017) the number of observations with negative output gap is larger than that with positive output gap for both groups of countries. Overall, compared to the average cycle, the results suggest that discretionary fiscal policies are more active in good than in bad times.

Table 4. Estimation output of equation (1) for good and bad times

Change in the cyclically adjusted budget balance (Δ CAPB)						
Explanatory variables	Advanced economies			Euro area		
	Per Memoria (average cycle)	Good times	Bad times	Per Memoria (average cycle)	Good times	Bad times
$CAPB_{t-1}$	-0.376*** [0.030]	-0.491*** [0.088]	-0.504*** [0.078]	-0.421*** [0.035]	-0.457*** [0.103]	-0.648*** [0.066]
$DCAPB_{t-1}$	-0.104** [0.042]	0.0680 [0.081]	-0.0856 [0.070]	-0.124** [0.050]	0.135 [0.111]	-0.057 [0.081]
$(B/Y)_{t-1}$	0.021** [0.008]	0.024*** [0.008]	0.030** [0.011]	0.035*** [0.009]	0.035*** [0.008]	0.048*** [0.014]
OG_{t-1}	-0.095** [0.045]	-0.279*** [0.098]	0.196 [0.124]	-0.064 [0.067]	-0.239** [0.087]	0.198 [0.145]
DOG_t	-0.138** [0.055]	-0.129* [0.066]	0.076 [0.086]	-0.156** [0.059]	-0.163** [0.068]	0.075 [0.078]
$D Elections$	-0.165 [0.127]	-0.240 [0.180]	-0.080 [0.184]	-0.237 [0.155]	-0.396** [0.163]	-0.304 [0.213]
$D 2009$	-2.849*** [0.518]	-2.272*** [0.544]	-3.173*** [1.073]	-2.843*** [0.805]	-2.382*** [0.671]	-1.230 [1.020]
$D 2010$	-2.201*** [0.757]	-1.226 [0.764]	-2.087*** [0.686]	-2.524** [1.190]	-0.594 [0.664]	-2.557** [1.089]
IR_{t-1}	0.131*** [0.0477]	0.141** [0.0585]	0.212** [0.0899]	0.130** [0.061]	0.198*** [0.043]	0.164 [0.112]
GE_{t-1}	1.090* [0.547]	1.701*** [0.532]	0.670 [0.751]	1.371** [0.554]	1.190* [0.588]	1.498 [0.983]
<i>Constant</i>	-1.593** [0.607]	-1.284* [0.648]	-2.118** [0.896]	-2.338*** [0.693]	-2.169*** [0.605]	-2.892*** [0.984]
<i>Observations</i>	580	262	318	358	166	192
<i>R-squared</i>	0.333	0.299	0.422	0.376	0.343	0.484

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4 shows that:

- The lagged level of CAPB remains significant and negative regardless of the sign of the output gap (i.e. in both good and bad times). The size of the coefficient is broadly invariant in good times (compared to the average cycle) and it is higher in bad times. This supports the view that considerations related to the level of the fiscal position become more important in adverse cyclical conditions.
- The previous year change in the CAPB loses its significance in both groups.

- The lagged debt-to-GDP ratio remains significant and with a positive sign in both groups. The size of the coefficient becomes higher in bad times. This supports the view that also fiscal sustainability concerns are more important in adverse cyclical conditions.
- The lagged output gap is significant only in good times and with a negative sign. This indicates that when the output gap is positive discretionary fiscal policies tend to be pro-cyclical on average. While in bad times fiscal policy appears acyclical.
- The same results are obtained for the change in output gap. In good times, when macroeconomic conditions improve (deteriorate) the fiscal stance deteriorates (improves). Interestingly in good times $|\hat{\mu}| < |\hat{\gamma}|$, which confirms that pro-cyclicality is stronger in good times than for the average cycle. In other words, the observed pro-cyclicality in good time is what drives the pro-cyclical behaviour of discretionary fiscal policies in the business cycle.
- The election dummy is significant with a negative sign only for the euro area group in good times. This suggests that there is a tendency to loosen the stance in election period only in economic good times in the euro area.
- The long term interest rate remains significant in the two states of the economy for the advanced economies group, while for the euro area it remains significant only in the presence of positive output gaps. This result seems more consistent with the interpretation that the interest rate is here rather a proxy of expected economic developments rather than of sustainability considerations.
- Finally the government effectiveness indicator remains significant and with a positive sign only in the presence of a positive output gap. This suggests that the tendency to consolidate when the institutional set-up is stronger is only affecting good times.

Table 5 shows the results when the sample is divided in upturns (positive change in the output gap) and downturns (negative change in the output gap) irrespective of the position of the cycle (output gap positive or negative).

Downturns and upturns can occur both in good and bad times as shown in Chart 9. In our sample downturns are less frequent than upturns as well as good time are less frequent than bad times. Table 5 shows that the coefficient on downturns is always highly significant both for the advanced economies and the euro area sample and with a negative sign. This means that in downturns the fiscal stance improves. Reading this result in conjunction with the result that in good times the fiscal stance deteriorates seem to suggest that the tendency to loosen in good times is reined in too late, i.e. when the downturn starts.

Chart 9 - Stylised representation of good / bad times and upturns / downturns

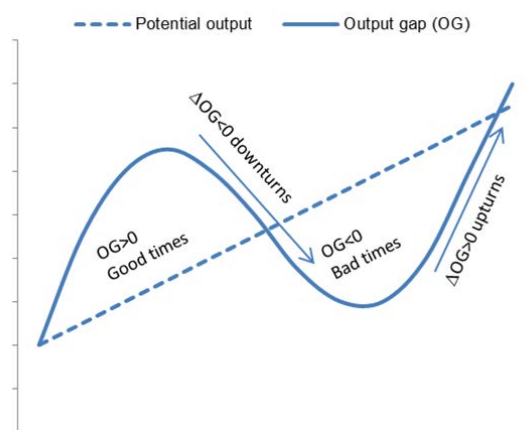


Table 5. Estimation output of equation (1) for upturns and downturns

Change in the cyclically adjusted budget balance (Δ CAPB)						
Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (average cycle)	Upturns	Downturns	<i>Per Memoria</i> (average cycle)	Upturns	Downturns
$CAPB_{t-1}$	-0.376*** [0.030]	-0.213*** [0.047]	-0.458*** [0.056]	-0.421*** [0.035]	-0.280*** [0.074]	-0.445*** [0.074]
$DCAPB_{t-1}$	-0.104** [0.042]	-0.304*** [0.090]	0.033 [0.055]	-0.124** [0.050]	-0.286** [0.101]	-0.056 [0.087]
$(B/Y)_{t-1}$	0.021** [0.008]	0.021*** [0.006]	0.014 [0.015]	0.035*** [0.009]	0.026** [0.010]	0.044** [0.017]
OG_{t-1}	-0.095** [0.045]	-0.102* [0.052]	-0.107 [0.070]	-0.064 [0.067]	-0.096 [0.063]	-0.048 [0.103]
DOG_t	-0.138** [0.054]	-0.187 [0.112]	-0.325*** [0.112]	-0.156** [0.059]	-0.190 [0.143]	-0.370*** [0.122]
<i>D Elections</i>	-0.165 [0.127]	-0.103 [0.184]	-0.248 [0.209]	-0.237 [0.155]	-0.232 [0.218]	-0.09 [0.224]
<i>D 2009</i>	-2.849*** [0.518]		-3.384*** [0.565]	-2.843*** [0.805]		-3.601*** [0.805]
<i>D 2010</i>	-2.201*** [0.757]	-2.632** [1.071]	-0.603 [0.710]	-2.524** [1.190]	-3.176* [1.560]	0.293 [0.848]
IR_{t-1}	0.131*** [0.048]	0.194*** [0.037]	0.027 [0.094]	0.130** [0.0615]	0.200*** [0.0560]	-0.008 [0.129]
GE_{t-1}	1.090* [0.547]	0.395 [0.741]	2.555*** [0.851]	1.371** [0.554]	0.738 [0.835]	2.820*** [0.844]
<i>Constant</i>	-1.593** [0.607]	-1.672*** [0.551]	-1.303 [1.053]	-2.338*** [0.693]	-1.982** [0.884]	-3.032** [1.431]
<i>Observations</i>	580	349	231	358	218	140
<i>R-squared</i>	0.333	0.313	0.469	0.376	0.377	0.496

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.3 Introducing a debt threshold

We move to test our benchmark model (1) for cases when (i) the government debt is above or below the 60% of GDP Maastricht threshold and when (ii) conditional of having government debt above the 60% of GDP threshold, the output gap is positive or negative. While the 60% value is irrelevant for the non EU countries, we decided to use it as a threshold because the majority of the countries in the sample are from the EU and also because the 60% debt-to-GDP ratio is significantly below the threshold value that a number of papers have identified as harmful to growth (Baum et al., 2013), therefore it could be seen as providing a margin of safety also outside the EU.

To test for the relevance of the 60% threshold for governments' fiscal policy making we have isolated the observations associated with debt-to-GDP ratio above and below 60% and estimated equation (1) for the two groups of observations. Table 6 shows the results of this exercise. For the advanced economies the number of observations with debt above 60% is slightly higher than with debt below 60%, however the sample is not strongly biased towards one group or the other, implying that both groups have similar information content.

Table 6 shows that compared to the estimates when no debt threshold is imposed, the coefficient associated with the debt-to-GDP ratio is higher and significant when debt is above 60%, and lower and not significant when debt is below 60%. This result confirms that sustainability considerations have been more important in the past 20 years for governments with a relatively high debt ratio. Across the two country groups with debt higher than 60% the coefficient is higher for the euro area than for the advanced economies. As to the other coefficients, the largest differences compared to the estimation output without threshold concern the interest rate. When debt is higher than 60% the interest rate loses its significance in the euro area group. This seems to suggest that in the euro area the relevant variable to assess sustainability is the level of debt rather than the interest rate. Other coefficients associated with the cycle (output gap and change in the output gap) tend to lose their significance for both group of observations. Generally, cyclical conditions appear more important in the presence of low debt for both groups of countries. It is also interesting that higher government effectiveness is associated with higher consolidation effort only in cases of low debt.

Table 6 - Estimation output of equation (1) for high and low debt

Explanatory variables	Change in the cyclically adjusted budget balance (Δ CAPB)					
	Advanced economies			Euro area		
	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60
$CAPB_{t-1}$	-0.376*** [0.030]	-0.353*** [0.048]	-0.442*** [0.078]	-0.421*** [0.035]	-0.443*** [0.030]	-0.436*** [0.095]
$DCAPB_{t-1}$	-0.104** [0.042]	-0.150*** [0.044]	-0.026 [0.089]	-0.124** [0.050]	-0.199*** [0.044]	-0.057 [0.120]
$(B/Y)_{t-1}$	0.021** [0.00802]	0.029** [0.014]	0.008 [0.017]	0.0347*** [0.009]	0.070** [0.028]	0.011 [0.026]
OG_{t-1}	-0.095** [0.045]	0.022 [0.101]	-0.109* [0.059]	-0.0639 [0.067]	0.108 [0.149]	-0.086 [0.0811]
DOG_t	-0.138** [0.054]	-0.155 [0.149]	-0.0891 [0.061]	-0.156** [0.059]	-0.348*** [0.108]	-0.083 [0.0619]
<i>D Elections</i>	-0.165 [0.127]	0.142 [0.259]	-0.461** [0.200]	-0.237 [0.155]	-0.141 [0.301]	-0.436 [0.273]
<i>D 2009</i>	-2.849*** [0.518]	-3.857*** [0.915]	-2.077*** [0.559]	-2.843*** [0.805]	-3.897*** [1.027]	-2.183** [0.858]
<i>D 2010</i>	-2.201*** [0.757]	-3.116** [1.492]	-1.210*** [0.368]	-2.524** [1.190]	-3.722 [2.219]	-1.253** [0.480]
IR_{t-1}	0.131*** [0.048]	0.188* [0.105]	0.112** [0.053]	0.130** [0.062]	0.149 [0.101]	0.126* [0.067]
GE_{t-1}	1.090* [0.547]	-0.568 [0.712]	2.266*** [0.758]	1.371** [0.554]	1.062 [1.110]	1.506* [0.752]
<i>Constant</i>	-1.593** [0.607]	-2.792* [1.387]	-0.661 [0.693]	-2.338*** [0.693]	-6.020** [2.502]	-0.789 [1.131]
<i>Observations</i>	580	295	285	358	182	176
<i>R-squared</i>	0.333	0.357	0.306	0.376	0.476	0.270

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7 shows the results of the estimates for the observations when debt is above 60% conditional on the output gap being positive or negative. The results indicate that sustainability concerns are significant when the output gap is negative, i.e. in bad economic times. It is interesting to note that for the euro area the level of the CAPB and that of the debt-to-GDP ratio are the only significant variables for high debt countries when the output gap is negative. When the output gap is positive, the higher is the interest rate the higher is the consolidation effort.

Table 7 - Estimation output of equation (1) for high debt countries in good and bad times

Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (No threshold)	Debt>60& OG>0	Debt>60& OG<0	<i>Per Memoria</i> (No threshold)	Debt>60& OG>0	Debt>60* &OG<0
$CAPB_{t-1}$	-0.376*** [0.030]	-0.311** [0.112]	-0.591*** [0.146]	-0.421*** [0.035]	-0.376** [0.127]	-0.909*** [0.130]
$DCAPB_{t-1}$	-0.104** [0.042]	0.054 [0.128]	-0.075 [0.0799]	-0.124** [0.050]	0.066 [0.171]	0.047 [0.086]
$(B/Y)_{t-1}$	0.021** [0.008]	0.008 [0.014]	0.041* [0.022]	0.035*** [0.009]	0.022 [0.032]	0.092* [0.049]
OG_{t-1}	-0.0953** [0.045]	-0.330* [0.190]	0.424* [0.233]	-0.064 [0.067]	-0.269 [0.265]	0.355 [0.219]
DOG_t	-0.138** [0.055]	-0.0547 [0.253]	0.187 [0.183]	-0.156** [0.059]	-0.477* [0.247]	0.245 [0.159]
<i>D Elections</i>	-0.165 [0.127]	0.331 [0.458]	0.0493 [0.205]	-0.237 [0.155]	-0.273 [0.296]	0.061 [0.417]
<i>D 2009</i>	-2.849*** [0.518]	-2.718** [1.059]	-3.186* [1.647]	-2.843*** [0.805]	-4.082** [1.290]	
<i>D 2010</i>	-2.201*** [0.757]		-3.184** [1.281]	-2.524** [1.190]		-4.314** [1.710]
IR_{t-1}	0.131*** [0.048]	0.220*** [0.071]	0.275 [0.165]	0.130** [0.062]	0.285*** [0.088]	0.119 [0.131]
GE_{t-1}	1.090* [0.547]	-1.588 [1.643]	-0.755 [0.889]	1.371** [0.554]	-0.532 [1.624]	2.804 [1.788]
<i>Constant</i>	-1.593** [0.607]	-0.766 [1.399]	-3.541 [2.202]	-2.338*** [0.693]	-2.454 [3.214]	-7.270 [4.260]
<i>Observations</i>	580	112	183	358	71	111
<i>R-squared</i>	0.333	0.288	0.501	0.376	0.494	0.639

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.4 Robustness exercises

In this section we summarise the battery of robustness exercises reported in Annex 2 which test for: a) more parsimonious specifications of the benchmark model and b) for a fiscal reaction function based on the change in the primary balance rather than in the cyclically adjusted primary balance. The latter implies that in this specification we don't isolate the discretionary fiscal policy action from the impact of automatic stabilisers on the budget balance.

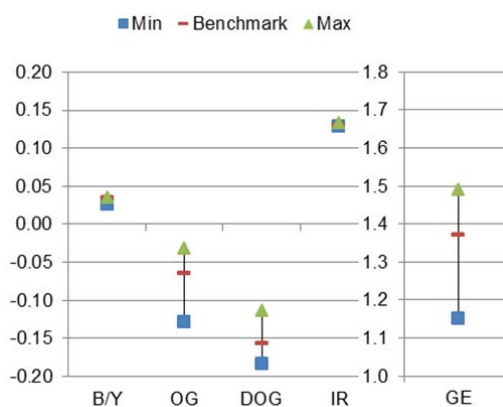
Starting with the alternative specifications of the model, the aim is to show that the inclusion of additional explanatory variables in the benchmark model (1) does not alter the main results of the

more parsimonious model and the results described before are robust to the exclusion or inclusion of other explanatory variables. Here we focus on five coefficients, those associated with lagged B/Y , lagged OG , change in OG , IR_{t-1} , and GE . We consider the alternative models reported in Annex 2.3 and compare them with the benchmark model estimates reported in Table 3.

Focusing on the euro area group, Chart 10 shows that the range of the coefficients on debt, interest rates and change in the output gap is relatively narrow. In particular, the coefficient on B/Y ranges between 0.02 and 0.04 and it is always significant, that on the interest rate ranges between 0.12 and 0.13 and it is also always significant. The coefficient on OG ranges between -0.12 and -0.03, i.e. it is always negative and most of the times not significant, as in our benchmark model. The coefficient on the change in OG ranges between -0.11 and -0.18, it is always negative and always significant. Finally the coefficient on GE ranges between 1.2 and 1.5, it is always significant and positive.

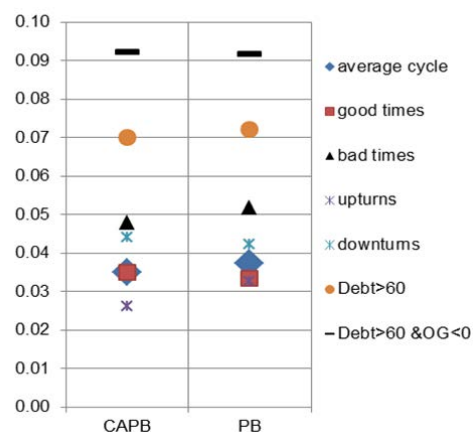
Fiscal reaction functions where the dependent variable is the change of the primary balance (PB), rather than the change in the cyclically adjusted primary balance have been often used to answer questions related to sustainability rather than stabilisation, i.e. the focus is generally on the coefficient of the debt-to-GDP ratio (B/Y). Chart 11 shows that irrespective of the dependent variable chosen the estimates for the B/Y coefficient are very stable both for the average cycle and also when conditioning for the same state of the economy (good and bad times, upturns, downturns, high debt). The two specifications consistently show that the size of the coefficient increases in bad times and when debt is high. Chart 12 shows that also the coefficient on the interest rate behaves very similarly in both specifications. However, contrary to the coefficient on B/Y , the size of the coefficient increases in good times. A possible interpretation is that in the context of panel regressions, a higher interest rate is, on average, associated with better economic conditions.

Chart 10: Estimated coefficients across alternative models (euro area)



Source: Table A2.3.2

Chart 11: Estimated coefficients on B/Y for the CAPB and PB specifications (euro area)



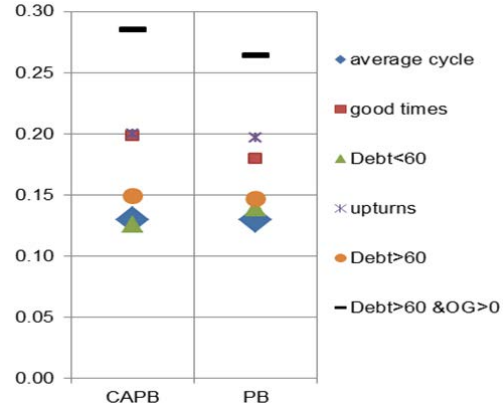
Sources: Tables 3 to 7 and Tables A2.4.1 to A2.4.5. Only significant coefficients are reported in the chart.

Chart 13 and Chart 14 show the significant coefficients on the output gap and on the change in the output gap respectively.

Chart 13 shows that the coefficient on output gap is significant in more instances when the dependent variable is the change in the PB as opposed to the change in CAPB. Also, the *states of the economy* in which the coefficient is significant are not the same across the two specifications. Golinelli and Momigliano (2008) explain that a difference of about 0.5 is to be expected between the two coefficients given that the primary balance also includes the effect of automatic stabilisers. Chart 13 shows a 0.5 difference between the CAPB (in good times) and the PB (for the average cycle), however the difference becomes larger in high debt regimes and in bad economic times. A possible interpretation of these results is that there is a

positive and high correlation between high debt countries and size of automatic stabilisers and an asymmetry between automatic stabilisers in good time and in bad times, possibly due to the fact that not the same countries enjoy good and bad times. Chart 14 shows that there are a higher number of *states* when the estimated coefficients on the change in output gap are significant for the two specifications compared to the estimated coefficient on the level of output gap. Also in this case for the average cycle and good times the differential between the two specifications is about 0.5, however this differential is higher for high debt and bad times.

Chart 12: Estimated coefficients on interest rate for the CAPB and PB specifications (euro area)



Sources: Tables 3 to 7 and Tables A2.4.1 to A2.4.5. Only significant coefficients are reported in the chart.

Chart 13: Estimated coefficients on output gap for CAPB and PB specifications (euro area)

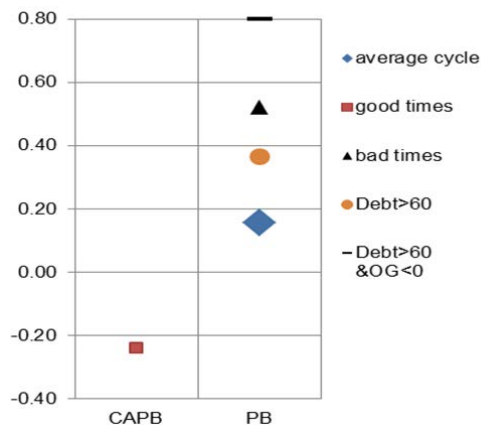
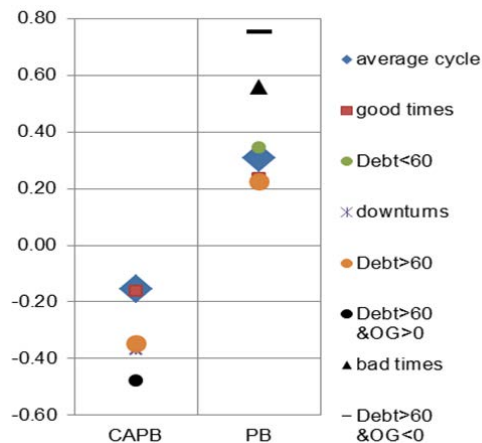


Chart 14: Estimated coefficients output gap change for CAPB and PB specifications (euro area)



Sources: Tables 3 to 7 and Tables. A2.4.1 to A2.4.5. Only significant coefficients are reported in the chart

5. Country-specific results

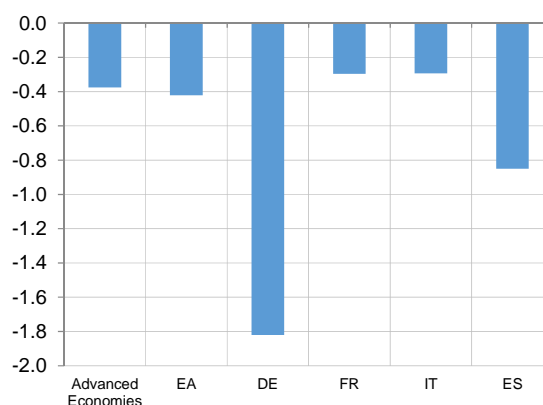
This section discusses the estimation results for selected individual countries. The estimated model is fully aligned to that used for the panel estimates, e.g.:

$$(2) \quad \Delta CAPB_t = \alpha + \beta CAPB_{t-1} + \tau \Delta CAPB_{t-1} + \delta \left(\frac{B}{Y} \right)_{t-1} + \gamma \left(\frac{Y^* - Y}{Y^*} \right)_{t-1} + \mu \Delta \left(\frac{Y^* - Y}{Y^*} \right)_{i,t} + \theta D_j + \vartheta Z_{it-1} + \varepsilon_t$$

Equation (2) has been estimated separately for each of the four largest euro area countries (Germany, France, Italy, and Spain). A key drawback of this type of analysis concerns the limited number of observations, particularly in relation to cyclically adjusted measures. Moving to quarterly data is not a viable alternative in this case, as data on discretionary fiscal action are only available at annual frequency. When using annual data, the sample size rarely reaches more than 30 observations. This implies that the estimates for the individual countries are significantly less robust than those obtained with the panel. With this caveat in mind, Table 8 shows the estimation results for the individual countries compared to those obtained for the two groups of advanced economies and euro area countries. The comparison across the estimated coefficients shows that:

- The lagged level of the CAPB is the only variable that remains significant in all countries. Chart 15 shows that the size of the coefficient is relatively similar across countries with the exception of Germany, where the coefficient in absolute terms is around 4 times higher than in France and Italy, and 2 times higher than in Spain. In the case of Germany this is the only significant variable in a sample that includes 25 years of observations. Therefore for this country, on average over the sample, the direction of discretionary fiscal policies has been closely anchored to past structural fiscal positions, irrespective of the position in the business cycle.

Chart 15. Estimated coefficients of $CAPB_{t-1}$



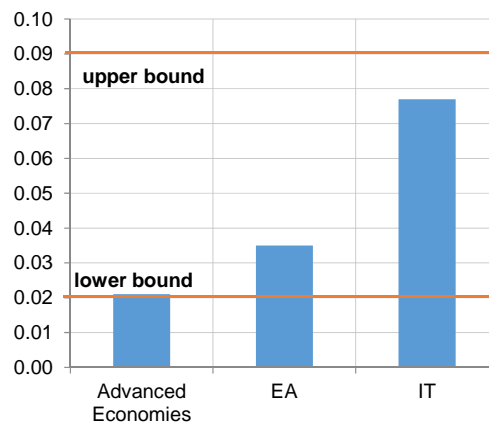
Source: Table 3 and Table 8

- The change in the CAPB in the previous year is not significant in any of the largest countries. Thus there is no sign of persistence of fiscal policy action.
- The lagged debt-to-GDP ratio is only significant in Italy and the estimated coefficient is more than 2 times bigger than that of the euro area and three times bigger than that of the advanced economies group (Chart 16). More generally, the estimated coefficient for Italy lies close to the upper range of the values estimated across the different states (see Chart 11 above). Given that the level of debt-to-GDP ratio in Italy has been persistently and significantly above the rest of the

euro area countries during the past 30 years, the results are consistent with the findings in the panel estimates according to which the responsiveness of the fiscal stance to the debt ratio (B/Y) is higher for high debt countries.

- The lagged output gap is significant only in France. Like for the advanced economies, it is negatively related to the change in the CAPB, an indication that fiscal policies have been pro-cyclical on average.
- The change in the output gap is significant only in Italy. Also in line with the panel estimates, it shows that fiscal policies in Italy have been tightening in downturns and loosening in upturns.
- The elections dummy is significant in France and to a lesser extent in Spain, and suggests a loosening bias in times of elections in both countries.
- The crisis dummies are significant in France, Italy and to a lesser extent in Germany.
- Finally the interest rate is only significant in Italy, and as for the panel estimates it is positively associated with the change in the cyclically adjusted primary balance.

Chart 16. Estimated coefficients of $(B/Y)_{t-1}$



Sources: Table 3 and Chart 10. Upper and lower bound are the coefficients found in the estimated panel models reported in section 4.

Overall, our results point to significant cross-country heterogeneity in the determinants of the fiscal stance. Only in Italy and France the fiscal stance (i.e. the change in the CAPB) seems to respond to (the change of) cyclical conditions. The size of debt seems to matter only for Italy as the coefficient of B/Y is significant, while France and Spain are the only two countries where there is some evidence of an electoral cycle, as in the year before the elections the fiscal stance is looser. Finally, in Germany no significant drivers of the fiscal stance, beyond the level of the CAPB, have been singled out by our analysis.

The government effectiveness index has not been included in the regression, given the limited data availability as the data only starts in 1996. The estimates including government effectiveness are shown in Annex 3. They show that the inclusion of this variable does not alter the results shown in Table 8.

Table 8 - Estimation output of equation (2)

Explanatory variables	Per Memoria		Germany	France	Italy	Spain
	(Advanced Economies)	(euro area)				
$CAPB_{t-1}$	-0.376*** [0.030]	-0.421*** [0.035]	-1.820** [0.634]	-0.296*** [0.068]	-0.293*** [0.087]	-0.850** [0.380]
$DCAPB_{t-1}$	-0.104** [0.042]	-0.124** [0.050]	0.477 [0.323]	0.063 [0.145]	-0.081 [0.155]	0.223 [0.420]
$(B/Y)_{t-1}$	0.021** [0.008]	0.035*** [0.009]	0.027 [0.067]	-0.005 [0.014]	0.077*** [0.019]	-0.017 [0.035]
OG_{t-1}	-0.0953** [0.045]	-0.0639 [0.067]	0.837 [0.601]	-0.204*** [0.0630]	0.150 [0.0998]	0.086 [0.270]
DOG_t	-0.138** [0.055]	-0.156** [0.059]	0.690 [0.485]	-0.127 [0.116]	-0.568*** [0.138]	0.735 [0.600]
$D Elections$	-0.165 [0.127]	-0.237 [0.155]	0.594 [0.931]	-0.640*** [0.220]	-0.266 [0.364]	-1.792* [0.912]
$D 2009$	-2.849*** [0.518]	-2.843*** [0.805]	4.504* [2.411]	-2.449*** [0.512]	-3.099*** [0.717]	-3.457 [3.594]
$D 2010$	-2.201*** [0.757]	-2.524** [1.190]	0.791 [2.463]	-1.372*** [0.375]	1.140*** [0.274]	-2.646 [2.896]
IR_{t-1}	0.131*** [0.048]	0.130** [0.0615]	-0.643 [0.456]	-0.031 [0.086]	0.184*** [0.063]	0.090 [0.188]
GE_{t-1}	1.090* [0.547]	1.371** [0.554]				
Constant	-1.593** [0.607]	-2.338*** [0.693]	1.933 [5.112]	0.466 [1.334]	-8.738*** [2.255]	1.053 [2.516]
Observations	580	358	25	38	36	21
R-squared	0.333	0.376	0.691	0.611	0.655	0.721

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.1 Robustness exercises

In this section we summarise the battery of robustness exercises reported in Annex 3, which show the estimation results of fiscal reaction functions based on the change in the primary balance rather than in the cyclically adjusted primary balance and based on real time data for the output gap.

When the dependent variable is computed as the change in the primary balance (table A3.2) one can notice that the significance of the individual coefficients improves slightly compared to the CAPB model. As in the case of the CAPB model, the level of the lagged primary balance is always significant in all countries. Chart 17 shows that size of the coefficients across countries is very similar for the two alternative specifications of the dependent variable.

The change in the primary balance is significant only in France with a positive sign, suggesting that the persistence in the evolution of the primary balance appears related to cyclical factors. The level of B/Y remains significant only in Italy, also in the PB model and with the same coefficient. The level of the output gap becomes significant in Italy, with a positive coefficient equal to 0.3 and turns insignificant in France in the PB model.

The change in the output gap is significant in Germany, France and Spain in the PB model (Chart 18). In all countries the sign is positive, suggesting an improvement of the primary balance in upturns and deterioration in downturns. The size of the coefficients is very different across countries and points to larger automatic stabilisation in Spain and Germany compared to France. The results obtained for Spain should be taken with caution given the very limited number of observations used for the estimates.

The election dummy remains significant in France and Spain, and suggests a deterioration of the primary balance in times of elections in both countries. The interest rate remains only significant in the case of Italy.

We move now to the comparison of the CAPB model based on ex-post data with the one based on real time data for the output gap (Table A3.3). According to the terminology used by Golinelli and Momigliano (2008) this model allows having a real time analysis of actual policies. As in the ex-post data model, the overall significance of the estimated coefficients is very low across countries and the country with the highest number of significant variables remains Italy. Chart 19 compares the significant coefficients across the two models. The coefficient on the previous year

level of the CAPB continues to be significant in all countries; however the size of the coefficient is significantly smaller in the case of Germany and Spain with real time data compared to ex post data. Irrespective of real time or ex-post data, Italy remains the only country with a significant coefficient for B/Y , with relatively limited differences between the two specifications. Finally Chart 19 shows that with real time data the change of the output gap becomes significant in Spain, pointing to a pro-cyclical response of the CABP to changes in the output gap.

Chart 17. Estimated coefficients of the level of CAPB (CAPB model) and PB (PB model)

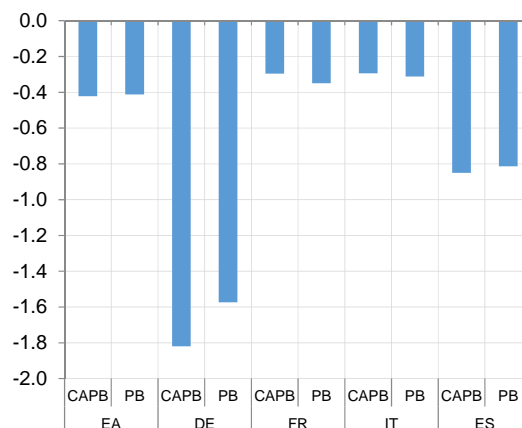
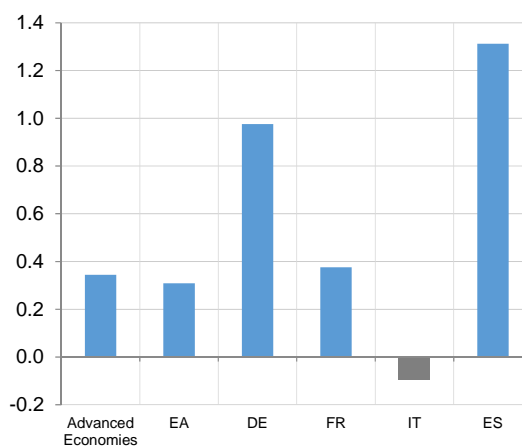
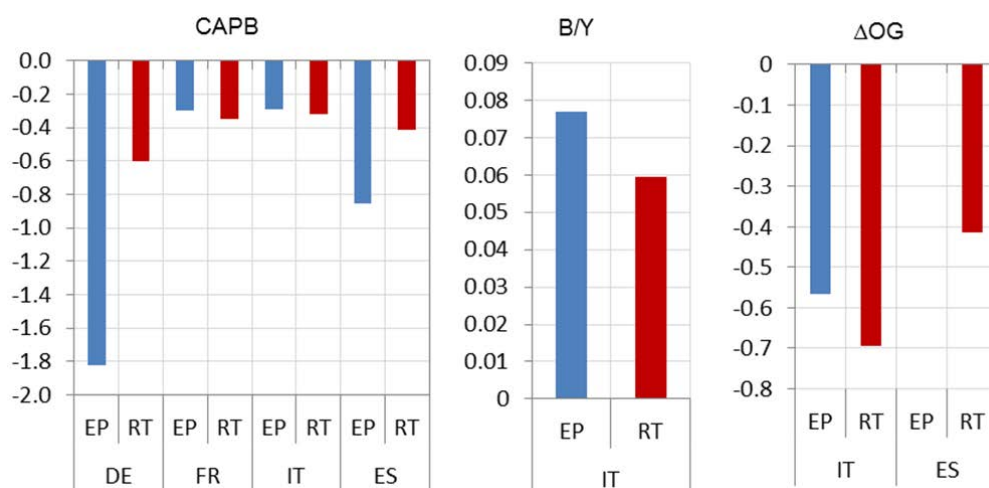


Chart 18. Estimated coefficients of the change in output gap (PB model)



Note: grey indicates non-significant coefficient

Chart 19. Ex-post and real time estimated coefficients



Note: EP=ex-post, RT= real time. See Table A3.3

6. Conclusions

This paper has collected new evidence on the drivers of discretionary fiscal policy for a large sample of advanced economies during the past 20 years, controlling for different states of the economy, namely : bad and good economic times, economic upturn and downturns, high and low debt regimes, and for different groups of countries (advanced economies, the EU and euro area).

We show a battery of estimates of fiscal reaction functions, which allow testing for the importance of both stabilisation and sustainability issues, by using ex-post data on the output gap and on the change in the cyclically adjusted primary balance. In addition to the “standard” drivers of discretionary fiscal policy considered in the literature a novelty of this paper is to test for the role of the institutional factors in determining a country’s fiscal stance, based on the World Bank index on government effectiveness. We show that the higher is the efficiency of the public institutions, where key policy decisions are taken, the more a country tends to pursue prudent fiscal policies, i.e. improve its structural fiscal position. Our benchmark model also controls for the change in output gap. This appears less subject to ex-post revisions as opposed to the output gap, it is strongly correlated with measures of economic confidence, and thus it appears more suitable to capture economic upturns and downturns as also perceived by economic agents. The results show that fiscal policies tend to be expansionary in economic good times and contractionary in economic downturns. Reading these results in conjunction, they suggest that the tendency to loosen in good times is reined in too late, i.e. when the downturn starts.

While the result of pro-cyclicality seems to hold only in good times and downturns, we show that the fiscal stance is affected positively by a number of factors. First, more efficient national institutions tend to be associated with a more tightening stance. Second, the level of the long term interest rate also

tends to be associated with a more tightening stance. Finally, the existence of fiscal imbalances in the form of both a low initial level of the cyclically adjusted budget balance and a high debt-to-GDP ratio are associated with a more tightening stance. As a result of these counterbalancing forces, fiscal activism has not been a major feature of policy making in the euro area, nor in other advanced economies. We find that what differentiates most the euro area from the other advanced economies is the importance of the debt-to-GDP ratio, which appears to matter more for the euro area than elsewhere. This can be interpreted as indication that the common fiscal framework in the euro area is more conducive to achieving the sustainability than elsewhere. A number of robustness checks over the benchmark model, carried out on the estimation method, the explanatory variables and the dependent variable confirm the above results.

Due to the lack of long-time series for the cyclically adjusted primary balance, country specific estimates for the four largest euro area countries are generally less robust than panel estimates. Having in mind the above caveat, country-specific estimates point to significant cross-country heterogeneity in the determinants of the fiscal stance. Only in Italy and France the fiscal stance seems to respond to (the change of) cyclical conditions. The size of debt seems to matter only for Italy as the coefficient on the debt ratio is significant, while France and Spain are the only two countries where there is some evidence of an electoral cycle, as in the year before the elections the fiscal stance is looser. Finally, in Germany no significant drivers of the fiscal stance have been singled out by our analysis, besides the initial level of the cyclically adjusted budget balance. These results are confirmed when using real time data for the output gap.

As for all empirical analyses, the exercises carried out in this paper are subject to a number of caveats related to model, parameter and data uncertainty. In particular, high measurement uncertainty for the output gap and the cyclically adjusted primary balance, which rely on unobservable variables, might exacerbate the problem of data uncertainty. To the extent possible these caveats have been addressed by performing a large battery of robustness checks, i.e. starting from a more parsimonious model towards richer specifications, by using different estimation methods and different dependent and explanatory variables. This notwithstanding, the results only speak for the past and cannot be extrapolated into the future.

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Annex 1. Data descriptions

Table A1.1 – Budget balances per decades
(in % of GDP)

	1970-79	1980-89	1990-99	2000-09	2010-19
BE	-6.7	-11.1	-4.7	-1.1	-2.6
DE ⁽¹⁾	-1.6	-2.0	-3.3	-2.2	0.1
EE	-	-	-0.2	0.7	0.2
IE	-	-	0.7	-0.9	-6.6
GR	-	-	-7.2	-7.6	-5.0
ES	-1.9	-5.8	-5.3	-1.2	-6.0
FR	-0.8	-2.3	-3.8	-3.2	-4.0
IT	-6.7	-10.4	-7.2	-3.3	-2.9
CY	-	-	-3.3	-2.2	-2.3
LV	-	-	-0.8	-2.4	-2.1
LT	-	-	-4.5	-2.5	-2.1
LU	-	-	2.8	2.2	0.9
MT	-	-	-6.8	-4.5	-0.7
NL	-1.7	-4.3	-3.0	-1.2	-1.8
AT	-0.7	-3.5	-3.6	-2.4	-1.7
PT	-4.6	-5.3	-5.2	-4.9	-4.7
SI	-	-	-3.4	-2.4	-4.0
SK	-	-	-6.3	-5.0	-2.8
FI	5.3	3.7	-2.3	3.4	-1.8
BG	-	-	-2.4	0.2	-1.0
CZ	-	-	-5.2	-3.8	-1.0
DK	-0.5	-3.1	-2.2	2.0	-0.9
HU	-	-	-6.2	-6.0	-2.8
PO	-	-	-3.9	-4.4	-3.2
RO	-	-	-3.5	-3.3	-3.3
UK	-2.5	-2.4	-3.4	-3.1	-4.8
EA ⁽²⁾	-2.2	-4.1	-3.7	-2.5	-2.6
US	-3.9	-4.8	-3.6	-4.7	-6.6

Sources: European Commission (Ameco database) and OECD

(1) West Germany data used for the period pre-1991

(2) The euro area in 1970-89 is the aggregate of 9 countries (BE, West DE, ES, FR, IT, NL, AT, PT, FI).

Table A1.2 – Government debt per decades
(in % of GDP)

	1970-79	1980-89	1990-99	2000-09	2010-19
BE	59.3	108.3	126.3	98.4	103.7
DE ⁽¹⁾	22.1	37.8	51.4	63.9	71.1
EE	-	-	7.0	5.0	8.6
IE	52.8	92.2	75.6	33.6	88.4
GR	19.4	44.2	92.2	107.1	172.2
ES	12.9	32.7	55.8	46.5	90.1
FR	21.0	29.0	50.8	65.6	94.1
IT	49.4	73.3	108.4	103.2	127.2
CY	-	-	51.9	57.9	92.7
LV	-	-	11.8	15.0	40.0
LT	-	-	16.0	20.1	38.7
LU	18.6	12.2	7.8	8.9	21.5
MT	-	-	46.6	65.7	59.6
NL	39.0	61.2	66.3	50.0	61.2
AT	23.0	47.3	66.2	68.0	80.8
PT	22.7	46.8	55.2	64.1	121.6
SI	-	-	21.7	26.4	66.1
SK	-	-	33.2	38.3	49.5
FI	8.7	14.7	43.9	39.6	57.2
BG	-	-	80.3	35.8	21.7
CZ	-	-	13.4	26.7	38.5
DK	14.5	63.8	66.5	41.0	40.3
HU	-	-	67.4	61.9	76.2
PO	-	-	41.9	44.0	52.1
RO	-	-	14.1	18.7	35.9
UK	59.7	43.6	42.7	41.6	85.0
EA ⁽²⁾	27.3	44.9	71.8	69.1	89.9
US	42.7	51.6	66.2	64.2	103.8

Sources: European Commission (Ameco database) and OECD

(1) West Germany data used for the period pre-1991

(2) The euro area in 1970-89 is the aggregate of 12 countries (BE, West DE, IE, GR, ES, FR, IT, LU, NL, AT, PT, FI).

**Table A1.3 – Primary balances per decades
(in % of GDP)**

	1970-79	1980-89	1990-99	2000-09	2010-19
BE	-3.3	-2.3	4.2	3.6	0.6
DE ⁽¹⁾	-	-	-0.6	0.5	1.8
EE	-	-	0.7	-0.3	1.1
IE	-	-	4.8	-1.5	-2.7
GR	-	-	2.5	-4.4	0.9
ES	-2.4	-4.9	-1.7	0.5	-3.6
FR	-0.6	0.1	-0.5	-0.9	-1.5
IT	-4.7	-3.8	2.3	1.6	1.3
CY	-	-	-0.5	-0.2	1.3
LV	-	-	0.2	-2.9	0.3
LT	-	-	-3.6	-2.2	0.1
LU	-	-	4.4	1.9	1.7
MT	-	-	-4.0	-1.3	2.1
NL	-0.1	-1.0	0.7	0.5	-0.8
AT	0.0	-1.4	-0.7	0.0	0.1
PT	-2.9	-0.8	-0.6	-2.4	-0.9
SI	-	-	-0.9	-1.6	-0.8
SK	-	-	-4.3	-2.7	-1.0
FI	6.4	4.5	2.3	4.1	0.1
BG	-	-	5.6	2.0	0.1
CZ	-	-	-4.2	-3.2	0.5
DK	-0.4	1.1	1.4	3.6	-0.3
HU	-	-	2.1	-2.7	1.7
PO	-	-	0.2	-1.7	-1.1
RO	-	-	-0.3	-2.0	-1.1
UK	-0.2	0.7	-1.0	-1.3	-2.4
EA ⁽²⁾	-1.2	-1.2	1.5	0.1	0.3
US	-1.2	-1.5	0.1	-2.2	-4.4

Sources: European Commission (Ameco database) and OECD

(1) West Germany data used for the period pre-1991

(2) The euro area in 1970-89 is the aggregate of 9 countries (BE, West DE, ES, FR, IT, NL, AT, PT, FI).

**Table A1.4 – Cyclically adjusted primary balances
per decades
(in % of potential GDP)**

	1970-79	1980-89	1990-99	2000-09	2010-19
BE	-	1.9	4.3	3.5	0.6
DE ⁽¹⁾	-	-	-0.5	0.7	1.7
EE	-	-	2.9	-0.6	0.0
IE	-	-	3.9	-0.2	-3.5
GR	-	-	1.3	-3.6	4.2
ES	-	-3.6	-1.1	-0.5	0.5
FR	-0.3	0.4	0.1	-1.2	-1.3
IT	-	-3.4	3.1	0.9	2.8
CY	-	-	-0.6	-1.0	1.7
LV	-	-	0.4	-2.2	-0.2
LT	-	-	-4.9	-1.5	-0.3
LU	-	-	3.6	2.1	2.0
MT	-	-	-3.9	-1.1	1.7
NL	-	0.4	0.8	0.1	-0.1
AT	-	-0.9	-0.8	-0.3	0.7
PT	-	1.4	-1.2	-2.8	1.6
SI	-	-	-0.3	-1.6	-0.7
SK	-	-	-5.4	-2.8	-0.9
FI	7.1	5.1	2.0	4.9	0.3
BG	-	-	5.2	2.2	-0.1
CZ	-	-	-1.8	-3.4	0.3
DK	-	4.9	2.0	2.9	0.2
HU	-	-	1.8	-2.0	1.1
PO	-	-	-0.2	-1.1	-1.3
RO	-	-	0.1	-2.4	-1.0
UK	-1.1	1.0	-0.4	-1.7	-1.9
EA ⁽²⁾	-	-0.7	2.2	0.3	0.6
US	-	-1.1	0.8	-2.5	-3.2

Sources: European Commission (Ameco database) and OECD

(1) West Germany data used for the period pre-1991

(2) The euro area in 1970-89 is the aggregate of 12 countries (BE, West DE, IE, GR, ES, FR, IT, LU, NL, AT, PT, FI).

Table A1.5 – GDP growth

	1970-79	1980-89	1990-99	2000-09	2010-19
BE	3.3	2.2	2.2	1.7	1.4
DE ⁽¹⁾	3.1	2.0	2.2	0.8	2.1
EE	-	-	3.9	4.4	3.6
IE	4.9	3.1	6.9	3.7	6.6
GR	5.1	0.8	2.1	2.8	-1.9
ES	3.8	2.7	2.7	2.8	1.0
FR	3.9	2.4	2.0	1.5	1.4
IT	3.9	2.6	1.5	0.5	0.4
CY	-	-	4.7	3.8	1.0
LV	-	-	-3.8	5.0	2.8
LT	-	-	-3.3	4.8	3.3
LU	2.9	4.6	4.7	3.1	2.9
MT	-	-	4.7	2.3	5.2
NL	3.2	2.0	3.3	1.7	1.5
AT	3.8	2.0	2.7	1.7	1.7
PT	5.0	3.4	2.9	0.9	0.7
SI	-	-	1.7	3.0	1.9
SK	-	-	5.1	4.6	3.2
FI	3.9	3.7	1.9	2.0	1.3
BG	-	-	-1.9	5.0	2.4
CZ	-	-	0.3	3.4	2.3
DK	2.5	1.9	2.5	1.0	1.6
HU	-	-	1.6	2.4	2.5
PO	-	-	3.7	4.0	3.5
RO	-	-	-1.4	4.8	3.1
UK	2.6	2.7	2.2	1.8	1.8
EA ⁽²⁾	3.6	2.3	2.6	1.4	1.4
US	3.6	3.1	3.2	1.9	2.3

Sources: European Commission (Ameco database) and OECD

(1) West Germany data used for the period pre-1991

(2) The euro area in 1970-89 is the aggregate of 9 countries (BE, West DE, ES, FR, IT, NL, AT, PT, FI).

Table A1.6 – Output gap
(in % of potential GDP)

	1970-79	1980-89	1990-99	2000-09	2010-19
BE	-0.4	-0.9	-0.1	0.6	-0.3
DE ⁽¹⁾	1.2	-0.6	0.3	-0.2	0.0
EE	-	-	-6.4	3.4	0.6
IE	-	-	0.7	1.3	-0.4
GR	-	-	1.8	2.4	-10.2
ES	0.0	-2.1	-0.8	2.0	-3.9
FR	0.9	-1.1	-1.4	1.3	-0.8
IT	-0.7	-0.6	-0.5	1.0	-2.3
CY	-	-	-1.1	3.2	-2.5
LV	-	-	-0.5	1.4	-1.5
LT	-	-	1.8	0.2	-0.7
LU	-	-	0.5	1.0	-1.5
MT	-	-	-1.0	0.5	0.1
NL	1.4	-0.5	0.3	-0.2	-1.2
AT	1.6	-0.4	0.0	0.1	-0.4
PT	-0.5	-2.0	1.4	0.2	-1.1
SI	-	-	-0.4	1.9	-2.0
SK	-	-	2.5	0.1	-0.9
FI	-1.1	0.0	-1.5	0.5	-1.6
BG	-	-	3.0	0.0	-0.5
CZ	-	-	-2.2	1.5	-0.6
DK	1.3	-0.7	-0.7	1.0	-1.7
HU	-	-	-1.3	0.6	-0.6
PO	-	-	1.2	-1.3	0.4
RO	-	-	-0.7	2.6	-2.2
UK	1.0	0.2	-0.3	0.2	-0.9
EA ⁽²⁾	0.5	-0.8	0.1	0.7	-1.4
US	1.7	-0.5	-0.2	0.1	-0.7

Sources: European Commission (Ameco database) and OECD

(1) West Germany data used for the period pre-1991

(2) The euro area in 1970-89 is the aggregate of 12 countries (BE, West DE, IE, GR, ES, FR, IT, LU, NL, AT, PT, FI).

Annex 2. Robustness exercises for the panel estimates

A2.1 FRF estimates using GMM

Table A2.1.1 Estimation output of equation (1) for good and bad times (GMM estimates)

Explanatory variables	Change in the cyclically adjusted budget balance (Δ CAPB)					
	Advanced economies			Euro area		
	<i>Per Memoria</i> (average cycle)	Good times	Bad times	<i>Per Memoria</i> (average cycle)	Good times	Bad times
$CAPB_{t-1}$	-0.388*** [0.038]	-0.749*** [0.114]	-0.931*** [0.075]	-0.412*** [0.050]	-0.583*** [0.129]	-1.234*** [0.092]
$DCAPB_{t-1}$	-0.092** [0.045]	0.179 [0.111]	0.0613 [0.065]	-0.133** [0.056]	0.220* [0.130]	0.180** [0.0760]
$(B/Y)_{t-1}$	0.022*** [0.005]	-0.015 [0.021]	0.117*** [0.015]	0.036*** [0.008]	-0.002 [0.026]	0.201*** [0.019]
OG_{t-1}	-0.090** [0.036]	-0.320*** [0.084]	0.128 [0.097]	-0.0646 [0.047]	-0.300*** [0.0843]	0.233** [0.107]
DOG_t	-0.142*** [0.049]	-0.073 [0.067]	-0.030 [0.103]	-0.158*** [0.059]	-0.153** [0.065]	0.001 [0.113]
$D\ Elections$	-0.190 [0.173]	-0.304 [0.241]	-0.198 [0.234]	-0.248 [0.241]	-0.446* [0.263]	-0.194 [0.298]
$D\ 2009$	-2.872*** [0.465]	-2.008*** [0.579]	2.480* [1.371]	-2.854*** [0.636]	-2.377*** [0.624]	13.46*** [2.462]
$D\ 2010$	-2.147*** [0.382]	-1.504 [1.830]	-0.801* [0.442]	-2.531*** [0.527]	-0.986 [1.688]	-0.127 [0.562]
IR_{t-1}	0.130*** [0.040]	0.217** [0.099]	-0.025 [0.094]	0.130** [0.052]	0.177* [0.095]	0.051 [0.100]
GE_{t-1}	1.157** [0.518]	2.939*** [0.919]	0.938 [1.166]	1.390** [0.669]	1.997** [0.957]	3.310** [1.444]
<i>Constant</i>	-1.619*** [0.437]	0.664 [1.233]	-7.914*** [1.153]	-2.393*** [0.658]	0.190 [1.555]	-13.54*** [1.453]
<i>Observations</i>	546	197	239	338	130	145

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A2.1.2 - Estimation output of equation (1) for high and low debt (GMM estimates)

Change in the cyclically adjusted budget balance (Δ CAPB)						
Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60
$CAPB_{t-1}$	-0.388*** [0.038]	-0.387*** [0.052]	-0.460*** [0.062]	-0.412*** [0.050]	-0.513*** [0.069]	-0.491*** [0.095]
$DCAPB_{t-1}$	-0.092** [0.045]	-0.144** [0.059]	0.057 [0.068]	-0.133** [0.0559]	-0.191*** [0.0718]	0.001 [0.0944]
$(B/Y)_{t-1}$	0.022*** [0.005]	0.037*** [0.009]	0.012 [0.015]	0.036*** [0.008]	0.088*** [0.013]	0.012 [0.02162]
OG_{t-1}	-0.090** [0.036]	0.069 [0.073]	-0.082** [0.041]	-0.065 [0.047]	0.167* [0.090]	-0.068 [0.057]
DOG_t	-0.142*** [0.049]	-0.167* [0.097]	-0.108** [0.050]	-0.158*** [0.059]	-0.352*** [0.113]	-0.086 [0.062]
$D\ Elections$	-0.190 [0.173]	0.102 [0.242]	-0.538*** [0.200]	-0.248 [0.241]	-0.145 [0.315]	-0.483* [0.283]
$D\ 2009$	-2.872*** [0.465]	-3.964*** [0.693]	-2.159*** [0.519]	-2.854*** [0.636]	-3.902*** [0.859]	-2.252*** [0.740]
$D\ 2010$	-2.147*** [0.382]	-3.055*** [0.558]	-0.857* [0.446]	-2.531*** [0.527]	-3.636*** [0.714]	-1.124* [0.633]
IR_{t-1}	0.130*** [0.040]	0.190*** [0.063]	0.095* [0.054]	0.130** [0.052]	0.138* [0.077]	0.125* [0.073]
GE_{t-1}	1.157** [0.518]	-1.319 [0.906]	1.861*** [0.650]	1.390** [0.669]	0.248 [1.208]	1.503* [0.837]
<i>Constant</i>	-1.619*** [0.437]	-3.339*** [0.861]	-0.700 [0.653]	-2.393*** [0.658]	-7.482*** [1.285]	-0.789 [0.980]
<i>Observations</i>	546	265	259	338	163	159

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A2.2 FRF for the EU sample

Table A2.2.1. Estimation output of equation (1) for good and bad times – EU sample

Change in the cyclically adjusted budget balance (Δ CAPB)						
Explanatory variables	FE			GMM		
	<i>Per Memoria</i> (average cycle)	Good times	Bad times	<i>Per Memoria</i> (average cycle)	Good times	Bad times
$CAPB_{t-1}$	-0.406*** [0.031]	-0.419*** [0.0913]	-0.622*** [0.0651]	-0.406*** [0.0432]	-0.508*** [0.106]	-1.173*** [0.0819]
$DCAPB_{t-1}$	-0.111** [0.0456]	0.124 [0.092]	-0.058 [0.075]	-0.111** [0.049]	0.172 [0.106]	0.164** [0.0674]
$(B/Y)_{t-1}$	0.033*** [0.007]	0.031*** [0.007]	0.049*** [0.013]	0.033*** [0.007]	0.010 [0.021]	0.188*** [0.017]
OG_{t-1}	-0.078 [0.049]	-0.215** [0.083]	0.184 [0.124]	-0.0780** [0.038]	-0.267*** [0.074]	0.180* [0.094]
DOG_t	-0.160*** [0.054]	-0.158** [0.065]	0.064 [0.076]	-0.162*** [0.052]	-0.161*** [0.059]	-0.005 [0.101]
<i>D Elections</i>	-0.206 [0.148]	-0.371* [0.183]	-0.129 [0.241]	-0.217 [0.197]	-0.443** [0.219]	-0.061 [0.248]
<i>D 2009</i>	-2.640*** [0.672]	-2.142*** [0.582]	-1.190 [1.041]	-2.648*** [0.528]	-2.290*** [0.532]	12.29*** [2.302]
<i>D 2010</i>	-2.062** [0.913]	-0.620 [0.584]	-2.035** [0.809]	-2.055*** [0.425]	-0.776 [1.545]	-0.003 [0.459]
IR_{t-1}	0.119** [0.047]	0.152*** [0.047]	0.169* [0.092]	0.118*** [0.042]	0.162* [0.085]	-0.011 [0.091]
GE_{t-1}	1.692*** [0.502]	1.692*** [0.570]	1.694* [0.873]	1.720*** [0.579]	2.038** [0.812]	3.323*** [1.243]
<i>Constant</i>	-2.093*** [0.473]	-1.809*** [0.463]	-2.836*** [0.807]	-2.102*** [0.500]	-0.577 [1.175]	-11.61*** [1.207]
<i>Observations</i>	462	215	247	436	168	189

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A.2.2.2 - Estimation output of equation (1) for high and low debt - EU sample

Change in the cyclically adjusted budget balance (Δ CAPB)						
Explanatory variables	FE			GMM		
	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60
$CAPB_{t-1}$	-0.406*** [0.031]	-0.435*** [0.028]	-0.397*** [0.064]	-0.406*** [0.0432]	-0.503*** [0.0644]	-0.451*** [0.0680]
$DCAPB_{t-1}$	-0.111** [0.0456]	-0.200*** [0.0389]	-0.031 [0.101]	-0.111** [0.049]	-0.193*** [0.067]	0.025 [0.072]
$(B/Y)_{t-1}$	0.033*** [0.007]	0.068** [0.026]	0.016 [0.018]	0.033*** [0.007]	0.084*** [0.012]	0.016 [0.016]
OG_{t-1}	-0.078 [0.049]	0.103 [0.131]	-0.091 [0.056]	-0.078** [0.038]	0.154* [0.082]	-0.076* [0.043]
DOG_t	-0.160*** [0.054]	-0.345*** [0.104]	-0.095 [0.056]	-0.162*** [0.052]	-0.353*** [0.107]	-0.104** [0.052]
<i>D Elections</i>	-0.206 [0.148]	-0.0226 [0.301]	-0.411* [0.209]	-0.217 [0.197]	-0.0172 [0.284]	-0.471** [0.217]
<i>D 2009</i>	-2.640*** [0.672]	-3.888*** [0.996]	-1.933*** [0.600]	-2.648*** [0.528]	-3.899*** [0.821]	-2.057*** [0.556]
<i>D 2010</i>	-2.062** [0.913]	-3.283 [1.989]	-0.957** [0.347]	-2.055*** [0.425]	-3.193*** [0.653]	-0.795* [0.469]
IR_{t-1}	0.119** [0.047]	0.149 [0.096]	0.109* [0.052]	0.118*** [0.042]	0.133* [0.072]	0.102* [0.056]
GE_{t-1}	1.692*** [0.502]	0.935 [1.079]	1.709** [0.634]	1.720*** [0.579]	0.195 [1.115]	1.725** [0.686]
<i>Constant</i>	-2.093*** [0.473]	-5.700** [2.213]	-0.923 [0.701]	-2.102*** [0.500]	-7.011*** [1.151]	-0.843 [0.722]
<i>Observations</i>	462	205	257	436	182	234

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A2.3 Testing for alternative models

Table A.2.3.1 – Testing for alternative models

Change in the cyclically adjusted budget balance (Δ CAPB)							
Advanced economies							
Explanatory var.							
$CAPB_{t-1}$	-0.420***	-0.401***	-0.378***	-0.376***	-0.383***	-0.405***	-0.440***
	[0.035]	[0.037]	[0.036]	[0.030]	[0.037]	[0.031]	[0.043]
$(B/Y)_{t-1}$	0.018**	0.019**	0.019**	0.021**	0.019**	0.033***	0.010
	[0.007]	[0.008]	[0.008]	[0.008]	[0.008]	[0.007]	[0.011]
OG_{t-1}	-0.080**	-0.075**	-0.115***	-0.095**	-0.117***	-0.080	-0.066
	[0.030]	[0.033]	[0.039]	[0.045]	[0.038]	[0.050]	[0.045]
D Elections	-0.245	-0.206	-0.167	-0.165	-0.161	-0.210	-0.117
	[0.155]	[0.143]	[0.136]	[0.127]	[0.136]	[0.147]	[0.106]
D 2009	-1.852***	-1.927***	-2.996***	-2.849***	-2.965***	-2.677***	-2.467***
	[0.465]	[0.485]	[0.528]	[0.518]	[0.516]	[0.673]	[0.517]
D 2010	-2.077**	-2.104***	-2.139***	-2.201***	-2.111***	-2.053**	-2.012***
	[0.769]	[0.762]	[0.764]	[0.757]	[0.757]	[0.984]	[0.717]
GE_{t-1}	1.063**	0.911*	1.049**	1.090*	1.138**	1.723***	1.213**
	[0.456]	[0.490]	[0.490]	[0.547]	[0.530]	[0.400]	[0.527]
$DCAPB_{t-1}$		-0.055	-0.086*	-0.104**	-0.083*	-0.111**	-0.085**
		[0.043]	[0.044]	[0.042]	[0.044]	[0.046]	[0.041]
D OG_t			-0.175***	-0.138**	-0.169***	-0.168***	-0.084*
			[0.054]	[0.054]	[0.053]	[0.055]	[0.048]
DIR_{t-1}				0.131***		0.115**	0.108**
				[0.048]		[0.051]	[0.045]
DP_{t-1}					0.021**		
					[0.008]		
$Consump._{t-1}$						-0.0134	
						[0.259]	
Rev_{t-1}							0.317***
							[0.099]
$Constant$	-0.733	-0.807	-0.757	-1.593**	-0.865	-2.098***	-14.01***
	[0.450]	[0.497]	[0.489]	[0.607]	[0.535]	[0.487]	[3.740]
$Observations$	635	623	623	580	623	456	580
R -squared	0.295	0.304	0.322	0.333	0.325	0.363	0.394

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A.2.3.2 – Testing for alternative models

Change in the cyclically adjusted budget balance (Δ CAPB)							
Euro Area							
Explanatory var							
<i>CAPB</i> _{<i>t</i>-1}	-0.485*** [0.044]	-0.462*** [0.050]	-0.434*** [0.043]	-0.421*** [0.035]	-0.443*** [0.043]	-0.421*** [0.036]	-0.444*** [0.042]
<i>(B/Y)</i> _{<i>t</i>-1}	0.027*** [0.007]	0.029*** [0.009]	0.028*** [0.009]	0.035*** [0.009]	0.030*** [0.010]	0.034*** [0.010]	0.028** [0.012]
<i>OG</i> _{<i>t</i>-1}	-0.074 [0.042]	-0.064 [0.047]	-0.107* [0.054]	-0.064 [0.067]	-0.128** [0.047]	-0.071 [0.073]	-0.0326 [0.065]
<i>D Elections</i>	-0.334* [0.180]	-0.281* [0.158]	-0.258 [0.157]	-0.237 [0.155]	-0.240 [0.164]	-0.246 [0.157]	-0.182 [0.139]
<i>D 2009</i>	-1.671** [0.685]	-1.743** [0.703]	-2.991*** [0.801]	-2.843*** [0.805]	-2.972*** [0.771]	-2.913*** [0.796]	-2.681*** [0.799]
<i>D 2010</i>	-2.598** [1.195]	-2.594** [1.190]	-2.624** [1.194]	-2.524** [1.190]	-2.502** [1.136]	-2.541* [1.299]	-2.437* [1.162]
<i>GE</i> _{<i>t</i>-1}	1.308*** [0.429]	1.151** [0.487]	1.326** [0.489]	1.371** [0.554]	1.491** [0.595]	1.346*** [0.413]	1.302** [0.454]
<i>DCAPB</i> _{<i>t</i>-1}		-0.0681 [0.052]	-0.102* [0.054]	-0.124** [0.050]	-0.0920 [0.055]	-0.123** [0.051]	-0.115** [0.051]
<i>D OG</i> _{<i>t</i>}			-0.184*** [0.054]	-0.156** [0.059]	-0.181*** [0.053]	-0.170** [0.061]	-0.114* [0.056]
<i>DIR</i> _{<i>t</i>-1}				0.130** [0.062]		0.128* [0.064]	0.133** [0.060]
<i>DP</i> _{<i>t</i>-1}					0.080 [0.066]		
<i>Consump.</i> _{<i>t</i>-1}						0.055 [0.307]	
<i>Rev</i> _{<i>t</i>-1}							0.197*** [0.065]
<i>Constant</i>	-1.163** [0.413]	-1.305** [0.518]	-1.178** [0.513]	-2.338*** [0.693]	-1.519** [0.690]	-2.340*** [0.714]	-10.36*** [2.422]
<i>Observations</i>	387	380	380	358	380	352	358
<i>R-squared</i>	0.333	0.348	0.368	0.376	0.373	0.378	0.392

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A2.4 FRF with Primary Balance as dependent variables

Table A2.4.1 Estimation output of equation (1) - Primary balance

Explanatory variables	Change in the primary balance (ΔPB)					
	Advanced economies		European Union		Euro area	
	FE	GMM	FE	GMM	FE	GMM
<i>PBt-1</i>	-0.398*** [0.028]	-0.430*** [0.041]	-0.400*** [0.029]	-0.418*** [0.044]	-0.412*** [0.034]	-0.420*** [0.051]
<i>DPBt-1</i>	-0.111*** [0.032]	-0.079* [0.046]	-0.108*** [0.038]	-0.089* [0.048]	-0.131*** [0.038]	-0.122** [0.056]
<i>(B/Y)t-1</i>	0.027*** [0.008]	0.024*** [0.006]	0.035*** [0.007]	0.033*** [0.007]	0.037*** [0.009]	0.036*** [0.009]
<i>OGt-1</i>	0.117** [0.052]	0.118*** [0.040]	0.132** [0.054]	0.130*** [0.040]	0.155** [0.072]	0.154*** [0.045]
<i>D OGt</i>	0.344*** [0.064]	0.343*** [0.052]	0.301*** [0.059]	0.302*** [0.0513]	0.309*** [0.063]	0.309*** [0.058]
<i>D Elections</i>	-0.267* [0.132]	-0.279 [0.185]	-0.203 [0.152]	-0.212 [0.197]	-0.239 [0.156]	-0.243 [0.239]
<i>D 2009</i>	-2.773*** [0.538]	-2.768*** [0.506]	-2.957*** [0.640]	-2.953*** [0.533]	-3.152*** [0.771]	-3.150*** [0.636]
<i>D 2010</i>	-2.442*** [0.733]	-2.264*** [0.436]	-2.287** [0.926]	-2.210*** [0.457]	-2.839** [1.178]	-2.805*** [0.556]
<i>IRt-1</i>	0.127** [0.048]	0.126*** [0.043]	0.118** [0.051]	0.115*** [0.042]	0.130* [0.067]	0.129** [0.052]
<i>GET-1</i>	1.043* [0.557]	1.110** [0.564]	1.608*** [0.505]	1.664*** [0.587]	1.273** [0.559]	1.307* [0.676]
<i>Constant</i>	-2.039*** [0.570]	-1.861*** [0.471]	-2.187*** [0.499]	-2.050*** [0.519]	-2.483*** [0.739]	-2.406*** [0.686]
<i>Observations</i>	581	549	463	438	359	340

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A2.4.2 Estimation output of equation (1) - Primary balance (PB) in good and bad times
Advanced economies and euro area

Change in the primary balance (ΔPB)						
Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (average cycle)	Good times	Bad times	<i>Per Memoria</i> (average cycle)	Good times	Bad times
<i>PB</i> -1	-0.398*** [0.028]	-0.545*** [0.088]	-0.512*** [0.068]	-0.412*** [0.0342]	-0.449*** [0.0870]	-0.619*** [0.0534]
<i>DPB</i> <i>t</i> -1	-0.111*** [0.032]	0.0521 [0.064]	-0.112** [0.052]	-0.131*** [0.0383]	0.095 [0.121]	-0.099* [0.0564]
<i>(B/Y)</i> <i>t</i> -1	0.027*** [0.008]	0.038*** [0.010]	0.033*** [0.012]	0.037*** [0.00981]	0.033*** [0.00818]	0.052*** [0.0155]
<i>OG</i> <i>t</i> -1	0.117** [0.0518]	-0.0534 [0.0860]	0.457*** [0.143]	0.155** [0.072]	-0.071 [0.078]	0.521*** [0.157]
<i>DOG</i> <i>t</i>	0.344*** [0.0641]	0.318*** [0.0744]	0.552*** [0.0815]	0.309*** [0.063]	0.234*** [0.068]	0.559*** [0.076]
<i>D Elections</i>	-0.267* [0.132]	-0.431** [0.194]	-0.156 [0.181]	-0.239 [0.156]	-0.399** [0.167]	-0.308 [0.201]
<i>D 2009</i>	-2.773*** [0.538]	-2.215*** [0.559]	-3.515*** [1.025]	-3.152*** [0.771]	-2.837*** [0.674]	-1.920** [0.886]
<i>D 2010</i>	-2.442*** [0.733]	-1.551** [0.737]	-2.368*** [0.617]	-2.839** [1.178]	-0.899 [0.974]	-2.768** [0.996]
<i>IR</i> <i>t</i> -1	0.127** [0.0484]	0.131* [0.0739]	0.209** [0.0916]	0.130* [0.066]	0.180*** [0.044]	0.176 [0.118]
<i>GE</i> <i>t</i> -1	1.043* [0.557]	1.683** [0.611]	0.622 [0.750]	1.273** [0.559]	1.297** [0.543]	1.299 [0.998]
<i>Constant</i>	-2.039*** [0.570]	-2.063*** [0.520]	-2.425** [0.939]	-2.483*** [0.739]	-1.942*** [0.575]	-3.159*** [1.084]
<i>Observations</i>	581	262	319	359	166	193
<i>R-squared</i>	0.441	0.480	0.445	0.477	0.598	0.491

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A2.4.3 - Estimation output of equation (1) Primary balance in upturns and downturns

Change in the primary balance (ΔPB)						
Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (average cycle)	Upturns	Downturns	<i>Per Memoria</i> (average cycle)	Upturns	Downturns
PB_{t-1}	-0.398*** [0.028]	-0.222*** [0.045]	-0.484*** [0.052]	-0.412*** [0.034]	-0.263*** [0.082]	-0.432*** [0.076]
DPB_{t-1}	-0.111*** [0.032]	-0.298*** [0.096]	-0.057 [0.043]	-0.131*** [0.038]	-0.319** [0.123]	-0.049 [0.081]
$(B/Y)_{t-1}$	0.027*** [0.008]	0.025*** [0.007]	0.031* [0.016]	0.037*** [0.009]	0.033*** [0.011]	0.042** [0.017]
OG_{t-1}	0.117** [0.0518]	0.0346 [0.0608]	0.163* [0.0816]	0.155** [0.0721]	0.072 [0.0730]	0.177 [0.124]
DOG_t	0.344*** [0.0641]	0.307** [0.121]	0.160 [0.112]	0.309*** [0.063]	0.297* [0.152]	0.082 [0.123]
<i>D Elections</i>	-0.267* [0.132]	-0.083 [0.190]	-0.492 [0.413]	-0.239 [0.156]	-0.142 [0.211]	-0.111 [0.241]
<i>D 2009</i>	-2.773*** [0.538]	-3.350***	-3.152*** [0.605]	-3.873*** [0.771]		-3.493*** [0.749]
<i>D 2010</i>	-2.442*** [0.733]	-3.516** [1.322]	-0.728 [0.566]	-2.839** [1.178]	-4.210** [1.891]	0.317 [0.948]
IR_{t-1}	0.127** [0.048]	0.178*** [0.036]	0.021 [0.093]	0.130* [0.067]	0.197*** [0.054]	0.005 [0.131]
GE_{t-1}	1.043* [0.557]	0.281 [0.724]	2.239** [0.953]	1.273** [0.559]	0.386 [0.799]	2.816*** [0.897]
<i>Constant</i>	-2.039*** [0.570]	-1.821*** [0.567]	-2.432** [1.023]	-2.483*** [0.739]	-2.294** [0.944]	-3.055** [1.415]
<i>Observations</i>	581	350	231	359	219	140
<i>R-squared</i>	0.441	0.328	0.529	0.477	0.410	0.583

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A.2.4.4 - Estimation output of equation (1) - Primary balance for high and low debt

Change in the primary budget balance (Δ PB)						
Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60	<i>Per Memoria</i> (No threshold)	Debt>60	Debt<60
<i>PB</i> _{<i>t</i>-1}	-0.398*** [0.028]	-0.377*** [0.055]	-0.454*** [0.097]	-0.412*** [0.034]	-0.462*** [0.030]	-0.406*** [0.085]
<i>DPB</i> _{<i>t</i>-1}	-0.111*** [0.032]	-0.156*** [0.048]	0.06219 [0.119]	-0.131*** [0.038]	-0.166*** [0.048]	-0.071 [0.099]
<i>(B/Y)</i> _{<i>t</i>-1}	0.027*** [0.008]	0.034** [0.013]	0.007 [0.019]	0.037*** [0.009]	0.072** [0.029]	0.013 [0.027]
<i>OG</i> _{<i>t</i>-1}	0.117** [0.052]	0.235* [0.120]	0.084 [0.057]	0.155** [0.072]	0.364** [0.157]	0.108 [0.081]
<i>DOG</i> _{<i>t</i>}	0.344*** [0.064]	0.374** [0.138]	0.342*** [0.070]	0.309*** [0.063]	0.222* [0.110]	0.343*** [0.068]
<i>D Elections</i>	-0.267* [0.132]	0.060 [0.234]	-0.567* [0.276]	-0.239 [0.156]	-0.110 [0.287]	-0.433 [0.278]
<i>D 2009</i>	-2.773*** [0.538]	-3.456*** [0.865]	-2.180*** [0.599]	-3.152*** [0.771]	-3.922*** [1.017]	-2.571** [0.886]
<i>D 2010</i>	-2.442*** [0.733]	-3.451** [1.416]	-0.896* [0.492]	-2.839** [1.178]	-4.118* [2.278]	-1.436* [0.688]
<i>IR</i> _{<i>t</i>-1}	0.127** [0.048]	0.187* [0.104]	0.091 [0.061]	0.130* [0.067]	0.147 [0.105]	0.139* [0.069]
<i>GE</i> _{<i>t</i>-1}	1.043* [0.557]	-0.384 [0.773]	2.268** [0.852]	1.273** [0.559]	1.023 [1.077]	1.457* [0.813]
<i>Constant</i>	-2.039*** [0.570]	-3.333** [1.317]	-0.586 [0.826]	-2.483*** [0.739]	-6.197** [2.572]	-0.932 [1.190]
<i>Observations</i>	581	295	286	359	182	177
<i>R-squared</i>	0.441	0.420	0.446	0.477	0.486	0.492

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A.2.4.5 - Estimation output of equation (1) for high debt countries in good and bad times

Explanatory variables	Advanced economies			Euro area		
	<i>Per Memoria</i> (No threshold)	Debt>60& OG>0	Debt>60& OG<0	<i>Per Memoria</i> (No threshold)	Debt>60& OG>0	Debt>60* OG<0
PB_{t-1}	-0.398*** [0.0280]	-0.352*** [0.120]	-0.638*** [0.148]	-0.412*** [0.0342]	-0.380** [0.152]	-0.896*** [0.110]
DPB_{t-1}	-0.111*** [0.0316]	-0.063 [0.149]	-0.061 [0.079]	-0.131*** [0.0383]	0.0483 [0.278]	0.0326 [0.0579]
$(B/Y)_{t-1}$	0.027*** [0.008]	0.021 [0.018]	0.044* [0.022]	0.0373*** [0.00981]	0.0211 [0.0389]	0.0917* [0.0490]
OG_{t-1}	0.117** [0.052]	0.0543 [0.228]	0.747** [0.277]	0.155** [0.0721]	-0.0803 [0.341]	0.823*** [0.257]
DOG_t	0.344*** [0.064]	0.528* [0.292]	0.718*** [0.176]	0.309*** [0.0632]	0.0350 [0.318]	0.753*** [0.138]
$D Elections$	-0.267* [0.132]	0.228 [0.386]	-0.070 [0.232]	-0.239 [0.156]	-0.246 [0.315]	0.0654 [0.395]
$D 2009$	-2.773*** [0.538]	-2.179* [1.176]	-3.004* [1.729]	-3.152*** [0.771]	-4.212*** [1.262]	
$D 2010$	-2.442*** [0.733]		-3.418*** [1.170]	-2.839** [1.178]		-4.261** [1.598]
IR_{t-1}	0.127** [0.0484]	0.235*** [0.057]	0.264 [0.160]	0.130* [0.067]	0.264** [0.088]	0.137 [0.135]
GE_{t-1}	1.043* [0.557]	-0.571 [1.484]	-0.437 [0.850]	1.273** [0.559]	-0.407 [1.757]	2.739 [1.813]
<i>Constant</i>	-2.039*** [0.570]	-2.338 [1.726]	-3.981 [2.314]	-2.483*** [0.739]	-2.323 [3.986]	-7.354 [4.295]
<i>Observations</i>	581	112	183	359	71	111
<i>R-squared</i>	0.441	0.478	0.516	0.477	0.664	0.629

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Annex 3. Robustness exercises for the country-specific estimates

A 3.1 Testing for other control variables

Table A3.1 - Estimation output of equation (2) with other control variables

Explanatory variables	<i>Per Memoria (Advanced Economies)</i>	<i>Per Memoria (euro area)</i>	Germany	France	Italy	Spain
$CAPB_{t-1}$	-0.376*** [0.030]	-0.421*** [0.035]	-1.324*** [0.378]	-0.290** [0.113]	-0.222 [0.243]	-0.837* [0.377]
$DCAPB_{t-1}$	-0.104** [0.042]	-0.124** [0.050]	0.206 [0.179]	0.071 [0.277]	-0.202 [0.296]	0.216 [0.437]
$(B/Y)_{t-1}$	0.021** [0.008]	0.035*** [0.009]	0.051 [0.039]	0.025 [0.031]	0.077* [0.036]	-0.022 [0.051]
OG_{t-1}	-0.0953** [0.045]	-0.0639 [0.067]	0.216 [0.255]	-0.0223 [0.173]	0.229 [0.199]	0.0511 [0.323]
DOG_{t-1}	-0.138** [0.055]	-0.156** [0.059]	0.180 [0.273]	0.157 [0.165]	-0.342 [0.211]	0.713 [0.573]
<i>D Elections</i>	-0.165 [0.127]	-0.237 [0.155]	-0.223 [0.476]	-0.644 [0.461]	-1.096* [0.509]	-1.793* [0.954]
<i>D 2009</i>	-2.849*** [0.518]	-2.843*** [0.805]	2.550 [1.627]	-1.678** [0.659]	-2.718* [1.240]	-3.486 [3.720]
<i>D 2010</i>	-2.201*** [0.757]	-2.524** [1.190]	-1.188 [1.054]	-1.576** [0.692]	0.469 [0.709]	-2.657 [3.049]
IR_{t-1}	0.131*** [0.048]	0.130** [0.062]	-0.341 [0.299]	0.312 [0.224]	0.476*** [0.145]	0.0367 [0.371]
GE_{t-1}	1.090* [0.547]	1.371** [0.554]	3.083** [1.263]	-2.036 [1.816]	-3.785 [2.162]	0.319 [1.532]
<i>Constant</i>	-1.593** [0.607]	-2.338*** [0.693]	-1.980 [3.257]	-2.553 [2.927]	-12.83** [4.858]	1.584 [4.353]
<i>Observations</i>	580	358	22	22	22	21
<i>R-squared</i>	0.333	0.376	0.841	0.852	0.755	0.721

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A3.2 FRF with primary balance as dependent variables

Table A.3.2 - Estimation output of equation (2) - Primary Balance

Explanatory variables	Per Memoria (Advanced Economies)	Per Memoria (euro area)	Germany	France	Italy	Spain
PB_{t-1}	-0.398*** [0.028]	-0.412*** [0.034]	-1.574** [0.564]	-0.349*** [0.0692]	-0.312*** [0.0791]	-0.813* [0.388]
DPB_{t-1}	-0.111*** [0.032]	-0.131*** [0.038]	0.312 [0.264]	0.219** [0.092]	-0.099 [0.156]	-0.139 [0.601]
$(B/Y)_{t-1}$	0.027*** [0.008]	0.037*** [0.009]	0.014 [0.064]	-0.009 [0.014]	0.076*** [0.019]	-0.035 [0.037]
OG_{t-1}	0.117** [0.052]	0.155** [0.072]	1.368* [0.743]	-0.02465 [0.071]	0.306** [0.116]	0.386 [0.361]
DOG_{t-1}	0.344*** [0.064]	0.309*** [0.063]	0.976** [0.391]	0.376*** [0.109]	-0.095 [0.125]	1.312* [0.638]
$D\ Elections$	-0.267* [0.132]	-0.239 [0.156]	0.468 [0.944]	-0.674*** [0.224]	-0.206 [0.337]	-1.924* [0.943]
$D\ 2009$	-2.773*** [0.538]	-3.152*** [0.771]	3.301 [2.001]	-2.692*** [0.471]	-3.541*** [0.696]	-5.623 [4.252]
$D\ 2010$	-2.442*** [0.733]	-2.839** [1.178]	0.946 [2.985]	-0.617 [0.407]	0.919** [0.419]	-4.818 [5.018]
IR_{t-1}	0.127** [0.048]	0.130* [0.067]	-0.577 [0.460]	-0.0377 [0.078]	0.189*** [0.059]	0.110 [0.174]
GE_{t-1}	1.043* [0.557]	1.273** [0.559]				
<i>Constant</i>	-2.039*** [0.570]	-2.483*** [0.739]	2.365 [5.369]	0.691 [1.236]	-8.577*** [2.188]	2.230 [2.737]
<i>Observations</i>	581	359	25	38	36	21
<i>R-squared</i>	0.441	0.477	0.690	0.813	0.636	0.796

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A3.3 FRF with Real Time data

Table A.3.3- Estimation output of equation (2) with real time data

Explanatory variables	Germany	France	Italy	Spain
<i>CAPB_{t-1}</i>	-0.597*** [0.200]	-0.344*** [0.117]	-0.321*** [0.097]	-0.415** [0.185]
<i>DCAPB_{t-1}</i>	0.375 [0.243]	0.242 [0.165]	-0.014 [0.137]	-0.002 [0.297]
<i>(B/Y)_{t-1}</i>	0.040 [0.028]	-0.006 [0.019]	0.060*** [0.016]	0.003 [0.019]
<i>OG_{t-1}</i>	0.120 [0.310]	-0.132 [0.125]	0.130 [0.103]	0.142 [0.164]
<i>DOG_t</i>	0.0776 [0.232]	-0.113 [0.160]	-0.694*** [0.168]	-0.408* [0.193]
<i>D Elections</i>	-0.0119 [0.341]	-0.455 [0.279]	-0.195 [0.303]	-1.111 [0.753]
<i>D 2009</i>	-0.323 [0.855]	-4.177*** [0.483]	-3.407*** [0.624]	-10.56*** [1.138]
<i>D 2010</i>	-1.234** [0.424]	-0.020 [0.712]	-0.004 [0.362]	-2.199 [2.007]
<i>IR_{t-1}</i>	-0.032 [0.173]	-0.016 [0.106]	0.083 [0.077]	0.029 [0.158]
<i>Constant</i>	-1.619 [2.476]	0.427 [1.705]	-5.878*** [2.068]	1.041 [1.780]
<i>Observations</i>	25	36	36	21
<i>R-squared</i>	0.607	0.707	0.615	0.886

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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