Financial Cycles and Fiscal Cycles*

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Abstract

There is an extensive literature on the behaviour of fiscal variables vis-à-vis the output cycle. We show that fiscal variables also co-vary with the financial cycle, as captured by fluctuations in the current account balance and credit growth. These financial factors affect fiscal outcomes, over and above their influence on the output cycle. We argue that fiscal surveillance and the design of fiscal rules should pay close attention to the interaction between the financial cycle and the fiscal cycle.

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1 Introduction

The aim of this paper is to examine the role of financial cycles in driving the cyclical behaviour of fiscal policy. Traditionally, the predominant focus in the fiscal cyclicality literature has been on how fiscal variables co-move with the output cycle (see Lane 2003 and Alesina et al 2008, amongst many others). However, the deterioration in fiscal positions that accompanied the global financial crisis has highlighted the sensitivity of fiscal outcomes to financial factors.[1]

In this regard, Bénétrix and Lane (2015) show that the decline in fiscal balances during the crisis was significantly correlated with the scale of financial imbalances during the pre-crisis years, even controlling for the variation in GDP outcomes. In particular, fiscal outcomes during the crisis are highly correlated with the scale of pre-crisis current account imbalances and credit growth.

There has been considerable research on the two-way inter-connections between financial crises and fiscal crises. For instance, taking a broad sweep of the historical evidence, Reinhart and Rogoff (2009) highlight that public debt levels grow rapidly in the wake of a banking crisis. In related fashion, Honohan and Klingebiel (2003) document the mechanisms by which a banking crisis can generate a high fiscal burden. In the other direction, there are also negative feedback loops at work by which a weak sovereign can induce instability in the financial sector. For instance, Reinhart and Sbrancia (2015) highlight that financially-challenged sovereigns often turn to financial repression measures. The interplay between fiscal crises and financial crises is a central theme in the current European debt crisis.

However, while much of the recent focus has been on the implications of financial crises for fiscal policy, it is also important to gain a better understanding of the role played by financial factors in determining fiscal outcomes during "normal" times. In particular, financial cycles can induce volatility in fiscal balances. Furthermore, if the induced

[1] Discretionary stimulus programmes accounted for only a small proportion of the total decline in fiscal balances in most countries (Bénétrix and Lane 2015).

fiscal shocks are procyclical in direction, these may amplify macroeconomic imbalances and weaken the underlying capacity of the government to effectively respond upon the occurrence of a financial crisis.

Accordingly, the main contribution of this paper is to examine whether financial variables influence the cyclical behaviour of fiscal variables. We focus on net capital flows (as captured by the current account balance) and domestic credit as key financial factors that may affect fiscal variables over the cycle. We report panel VAR models and regression estimates for a set of twenty-two advanced countries and thirty emerging market economies over 1980-2007.[2]

The structure of the rest of the paper is as follows. Section 2 provides a conceptual framework for the analysis and relates our contribution to the previous literature. We turn to the empirical analysis in Section 3. Some policy implications are laid out in Section 4, while Section 5 concludes.

2 Conceptual Framework

An extensive literature has examined the behaviour of fiscal variables over the output cycle (see Bayoumi and Eichengreen 1995, Gavin and Perotti 1997 and Lane 2003 for early contributions). A theme in this literature has been to measure whether the fiscal balance and/or public spending has been inappropriately procyclical in some country groups and identify the sources of such procyclicality.

However, in some of the literature, it has also been recognised that simple measures of the output cycle are not sufficient to capture all sources of fiscal volatility. For instance, Bouthevillain et al (2001) highlight that shifts in the distribution of income between labour income and profit income alter the composition of the tax base and thereby the level of revenues. Similarly, these authors also emphasise that different components of aggregate demand have different revenue implications (consumption versus exports, for

[2]We end the sample in 2007, since the aftermath of the post-2007 crisis has not yet fully played out.

example).

In relation to financial variables, Eschenbach and Schuknecht (2004) and Girouard and Price (2004) show that asset price cycles influence fiscal outcomes. A striking finding is that asset price booms not only raise revenues from asset-related taxes but also lead to generalised revenue growth, due to the wealth effect of increasing asset values on consumption.

Two recent papers have examined the role of the current account balance in influencing the fiscal cycle. Both Dobrescu and Salman (2011) and Lendvai et al (2011) emphasise that a current account deficit should improve revenues from indirect taxes, since net capital inflows finance a higher level of domestic absorption. A primary focus of these studies is to derive an augmented cyclical adjustment for the fiscal balance that takes into account the mechanical impact of the current account balance on tax revenues. The objective is that such a corrected measure might better capture the true underlying structural fiscal position, net of both the output cycle and the current account cycle. Similarly, Liu et al (2015) propose an empirical approach to estimate structural fiscal balances that explicitly accounts for the impact of asset price cycles.

Other financial variables may also influence fiscal outcomes. We focus on domestic credit growth. As was indicated in the introduction, Bénétrix and Lane (2015) find that pre-crisis credit growth is a strong indicator of the scale of fiscal deterioration during the 2008-2009 crisis period. The interpretation is that credit expansion may have fuelled additional revenue growth during the pre-crisis period, which then melted away when the credit cycle went into reverse.

The influence of credit growth on fiscal outcomes is highly visible in the detailed Irish revenue data (Lane 2007).[3] Credit growth affects revenues through several channels. First, the positive impact of credit growth on domestic asset and property prices improves revenues through the direct and indirect channels highlighted by Eschenbach and Schuknecht (2004), Girouard and Price (2004) and Addison-Smyth and McQuinn (2010).

[3]Indeed, De Manuel and Raciborski (2015) show that corrections for the credit and house price cycles would have yielded different estimates of Ireland's fiscal stance in the years leading to the crisis.

Second, credit growth may fuel a greater volume of asset market turnover, which raises revenues from asset transactions taxes. Third, if credit growth is associated with a shift in the composition of production towards the construction sector and other nontradables, this may alter the composition of the tax base to the extent sectors differ in the distribution of income between wages and profits and in the composition of spending between domestic spending and exports. Fourth, credit growth may be associated with inflation and/or real exchange rate appreciation (an increase in the relative price of nontradables) and thereby raise revenues, since tax systems are not fully inflation-indexed.

We prefer to use credit growth rather than other domestic financial indicators, such as asset price indices (housing prices or equity prices). First, the credit data are far more widely available and more easily comparable across countries.[4] Second, as is documented by Claessens et al (2011), credit growth is highly correlated with house prices and equity prices, so that it may be a good general proxy variable. Third, credit growth may be more easily targeted by policymakers than asset prices. Fourth, the relation between credit growth and macroeconomic variables may be more stable than the relation between asset prices and macroeconomic variables.

In addition to the mechanical impact of financial variables on tax revenues, financial shocks may also operate through political economy channels. The fiscal cyclicality literature has emphasised that political distortions may induce the discretionary component of fiscal policy to respond procyclically to output shocks, since the political equilibrium may exhibit a pattern by which an expansion in tax revenues induces matching increases in public spending or an offsetting reduction in tax rates (see Tornell and Lane 1999, Talvi and Vegh 2003, Alesina et al 2009, amongst others). Accordingly, the overall fiscal response to a shock may go in either direction, depending on the relative importance of the automatic and discretionary responses. The political economy literature is general in scope, such that the underlying shock might be an output shock, a terms of trade shock

[4] Although the availability of housing price indices is improving, the cross-country coverage is still relatively low and there are differences in the scope and definition of these indices. Stock market development varies widely across countries and over time, such that the representativeness of national equity price indices as a domestic financial indicator is open to question.

or a resource endowment shock, such as the discovery of oil.[5] By the same token, if a financial boom induces a revenue windfall, it may trigger similar political dynamics that result in increased public spending or discretionary tax cuts.

Accordingly, our main focus is on how the overall fiscal balance responds to the financial cycle. Our empirical specification generally follows the literature but with the addition of financial variables to the fiscal equation.

3 Empirical Analysis

3.1 Descriptive Statistics and Correlations

As a prelude to the econometrics, Tables 1 and 2 report some descriptive statistics. Table 1 shows the mean, standard deviation and first autocorrelation coefficient for each variable, where Panel A reports the statistics for advanced countries and Panel B shows the emerging economies. All variables are expressed as deviations from country means, so the focus is on within-country variation.

Table 2 shows the matrices of bivariate correlations among the variables. In terms of the advanced country sample, the aggregate fiscal surplus is pro-cyclical vis-à-vis both the GDP cycle and the absorption cycle. Not surprisingly, these correlations are considerably smaller in the case of the cyclically-adjusted fiscal balance. The fiscal balance is positively correlated with both the current account and credit growth, with the latter presenting a stronger pattern. In terms of covariation with the output cycle and the absorption cycle, the current account surplus is counter-cyclical, while credit growth is pro-cyclical. Finally, faster credit growth is associated with a larger current account deficit.

These patterns are largely similar for the emerging economies. However, the correlations of fiscal variables with the financial variables are stronger for the advanced economies, while the correlations of these variables with the output and absorption cycles are weaker for the advanced economies.

[5] See Kaminsky (2010) on the impact of terms of trade shocks on fiscal outcomes.

3.2 Panel-VAR Models

The next step to further study the link between financial and fiscal cycles is to look at the impact of financial cycle shocks on the short-term dynamics of different fiscal indicators. To this end, we estimate parsimonious panel-VAR models using four endogenous variables and report the impulse-response functions associated with these shocks.

The fiscal indicator used in the baseline specification is the government general balance scaled by GDP, since our main focus is on aggregate fiscal measures. This allows the financial cycle to operate through discretionary fiscal responses as well as through the automatic stabilisers. Discretionary responses include both general expenditure changes but also changes to the tax code and transfer programmes, which have the effect of altering the sensitivity of the automatic stabilisers to the output cycle. In terms of evaluating policy performance, the aggregate fiscal variables may provide a better guide than the cyclically-adjusted fiscal variables since those are subject to large ex-post revisions.[6]

The financial cycle is measured by two variables in this study. The first is the change in the ratio of private credit to GDP and the second is the current account balance, both scaled by GDP.[7] To allow for interactions with the rest of the economy, we include the GDP cycle as the fourth endogenous variable.

The model to be estimated in its structural form is given by

$$A_0 Z_{i,t} = A(L) Z_{i,t-1} + C X_{i,t} + \epsilon_{i,t}, \tag{1}$$

where $Z_{i,t}$ is a vector including the endogenous variables and $X_{i,t}$ captures observed and unobserved sources of cross-country heterogeneity. It includes country-specific intercepts and the outstanding level of public debt scaled by GDP. The reason for including the

[6] In addition, it would be interesting to look at the behaviour of real-time estimates of cyclically-adjusted fiscal variables, as in Beetsma and Guilodori (2010) and Cimadomo (2012). However, these real-time datasets are not available for a wide panel of countries or for a long time series.

[7] Clearly, domestic credit growth and the current account imbalance may be correlated variables, with shocks to the external balance affecting domestic credit and vice versa. In particular, Lane and McQuade (2014) show that international net debt flows are correlated with domestic credit growth, while there is no similar connection between international net equity flows and domestic credit growth. In the data, net debt flows dominate net equity flows.

latter is to account for the link between the stock of public debt and the fiscal balance.[8] Finally, $\epsilon_{i,t}$ capture the structural shocks of the model.

We study the short-run dynamic effects of shocks to financial cycles on the fiscal balance by looking at the impulse-response functions generated by them. To this end, we implement a recursive approach for shock identification. We assume that financial cycles are exogenous to the fiscal balance and GDP within a window of one year. In addition, we treat the change in private credit as the "most exogenous" financial cycle variable.[9] Thus, the recursive ordering for the identification of these shocks is private credit, current account balance, GDP and the fiscal balance.

Figure 1 reports the dynamic responses of the four endogenous variables to a shock in domestic credit using a sample of twenty-two advanced countries. The size of the credit shock is equivalent to one percentage point of GDP.

Figure 1 shows that an acceleration in domestic credit improves the government balance contemporaneously and an improvement is also visible three years after the realisation of the shock. This is consistent with mechanisms by which credit growth is associated with a shift in economic activities to tax-rich sectors such as construction and/or a shift in the tax base, with an increase in asset values. From the fourth year onward, the response of this fiscal variable is statistically zero. Since credit negatively co-moves with the current account balance, shocks to the former are associated with current account deficits that emerge on impact and in each of the ten periods of the reported impulse-response horizon. Finally, the average response of the GDP cycle is statistically zero in most periods. The exceptions are the responses on impact and in years six and seven, where the responses are negative and statistically different from zero. However, Figure 1 shows that the magnitudes of these responses is small.

Figure 2 shows the impulse-response functions for a shock to net financial inflows,

[8] A positive relation between debt and the primary fiscal balance is typically required to support non-explosive debt dynamics. See Bohn (1998), Ballabriga and Martinez-Mongay (2002), Galí and Perotti (2003), Wyplosz (2006) and Fatás and Mihov (2010).

[9] In robustness checks, we relax this assumption and estimate the dynamic effects of financial cycle shocks under the alternative assumption that the current account is the most exogenous variable. We find that our qualitative results are unaltered.

which is defined as an increase of one percentage point of GDP in the current account deficit. Strikingly, increases in net financial inflows are associated with deteriorations in the government balance. This contrasts with the finding by Dobrescu and Salman (2011) and Lendvai et al (2011) who emphasise that increases in net financial inflows should increase revenues via indirect taxes, since larger current account deficits represent greater absorption and, therefore, larger a tax base for indirect taxation.

To shed more light on this, Figure 3 reports the impulse-response functions of models including revenues and expenditures as separate endogenous variables. These are reported together with the responses of the overall government balance from Figures 1 and 2. For a shock to domestic credit, the improvement in the fiscal balance is attributable to a reduction in expenditure and a small positive response of revenues. For a shock to the current account deficit, our model shows that the deterioration in the fiscal balance is the result of expenditure increasing more than revenues. This pattern is consistent with the presence of a "voracity effect," whereby the political equilibrium response to a increase in revenues is a more-than-proportionate increase in public spending, as is laid out in Tornell and Lane (1999).

Taken together, Figures 1-3 suggest that the fiscal dynamics generated by financial cycles shocks are mainly driven by government expenditure. This suggests that political economy mechanisms are at work in relation to the discretionary component of government spending, such that an exclusive focus on the mechanical impact of financial shocks on tax revenues would be misdirected.

So far, we have focused on the aggregate fiscal balance. In Section 2, we provided a set of reasons why it may be preferable to examining the general government balance. Still, we next turn to the cyclically-adjusted balance to gain a better understanding of the effects of financial cycle shocks. Since this fiscal indicator already takes into account the GDP cycle, we would expect that it will react less to financial cycle shocks as its response will only capture the orthogonal contribution of these shocks, instead of also including those that operate by shifting GDP.

The first row of Figure 4 shows the responses of the cyclically-adjusted government balance to changes in both financial cycle measures. For a credit shock, the qualitative response of the cyclically-adjusted balance is very similar to the one for the unadjusted general government balance. For the current account deficit shock, the response of the cyclically-adjusted fiscal balance is also negative. However, the magnitude of its response is smaller. This result provides further evidence that the financial cycle has also a direct impact on the short term dynamics of the fiscal balance. Moreover, the sensitivity of the cyclically-adjusted balance to the current account and credit growth suggests that this is not an accurate measure of the "permanent" component of the budget balance, since fluctuations in credit growth are associated with volatility in the cyclically-adjusted budget balance. While this counter-cyclical pattern may provide some macroeconomic stabilisation, an approach that focuses only on the output cycle might mistakenly attribute a credit-driven improvement in the cyclically-adjusted fiscal balance as a permanent increase in the underlying structural fiscal position.

The next exercise takes into account that credit and the degree of international financial integration grew more rapidly after the 1990s in advanced countries. To this end, we also focus on a more recent time period and estimate the baseline VAR model using data for 1990-2007. The impulse-response functions for the government balance are reported in the second row of Figure 4. In line with the baseline results, financial cycle shocks also affect the short term dynamics of the fiscal balance. Although the point estimates of the mean responses suggest that the fiscal balance increases by less in response to credit shocks and reduces by more in response to current account shocks, these quantitative differences are statistically zero.

Finally, we compare the results of the baseline model with the fiscal responses of a model using thirty emerging economies. The aim of this exercise is to compare the previous results with countries that may be structurally different. For instance, emerging economies have lower income levels, less-developed financial sectors and are less financially integrated with the rest of the world.

The final row of Figure 4 shows that emerging economies also exhibit an improvement in the fiscal balance in response to a credit shock. Although the point estimate of the mean response is larger than in the case of advanced economies, these are statistically similar. For the case of current account shocks, we find a qualitative difference in the response of the fiscal balance which is statistically significant:fiscal balances in advanced countries deteriorate much more than in emerging economies. The response in the latter group is slightly negative in years zero and one and then becomes statistically zero. For advanced countries, the fiscal balance is negative throughout the impulse-response horizon, with the largest deterioration between years four and five.

Overall, this section illustrates that shocks to the financial cycle affect the dynamics of fiscal balances directly and indirectly (through their impact on GDP). This finding is not confined to the aggregate general government balance. These shocks also affect the short run dynamics of government revenues, expenditure and the cyclically-adjusted government balance. In addition, these qualitative findings also emerge in versions that just examine the latter period of the sample and, for the credit shock only, in emerging economies.

3.3 Regression Models

Next, we explore an alternative empirical approach, which focuses on understanding the relation between fiscal variables and financial variables in a set of panel regressions.

To this end, we examine the following regression model

$$FISCAL_{it} = \alpha_i + \beta_i CYCLE_{it} + \gamma_i Z_{it} + \lambda_i DEBT_{it-1} + \rho_i FISCAL_{it-1} + \epsilon_{it}, \quad (2)$$

where $FISCAL_{it}$ is the fiscal variable of interest of country i in time t and the $CYCLE_{it}$ variable captures the cyclical state of the economy. The coefficient β_i captures the responsiveness of the fiscal variable to the output cycle. In the case where the

fiscal variable of interest is the government balance, $\beta_i > 0$ indicates a countercyclical pattern, while $\beta_i < 0$ a procyclical one.[10]

In terms of cyclical measures, we first examine the deviation of GDP from its trend value (expressed as percentage point deviations). The GDP trend is obtained as the predicted values of a model regressing GDP on a linear and quadratic trends.[11] Second, we explore the deviation of absorption from its trend. Again, the trend is obtained from a regression model in which absorption is measured as the difference between gross national income and the current account surplus. Since both are derived from underlying stock positions, we treat the current account balance and credit growth as stationary variables, even if these may be quite persistent.

The Z_{it} vector comprises the financial cycle variables that are included individually or jointly as additional regressors. Since the output cycle is always included in the specification, these variables should only be important if financial factors have additional fiscal effects, over and beyond their influence on output dynamics. As before, we also include the lagged level of the public debt ($DEBT_{it}$). The final regressor is the lag of the fiscal variable, since fiscal variables typically exhibit considerable persistence.

We estimate (2) in two ways. We report fixed-effects panel estimates; in addition, we also report the mean group estimator developed by Pesaran and Smith (1995). The former is followed to account for unobserved heterogeneity across countries in the average fiscal values. In addition, the inclusion of country-specific constants also means that our focus is on explaining the time series variation in the data, rather than the cross-sectional differences. The mean group estimator approach is followed to account for country-specific slope coefficients. More precisely, we allow for the covariation patterns between the fiscal indicator, the financial cycle and the other explanatory variables to differ across countries

[10] In most of our specifications, the fiscal variable is scaled as a ratio to GDP. Accordingly, there is some terminological ambiguity about the meaning of cyclicality for such a ratio. For instance, a constant deficit to GDP ratio over the cycle may be termed acyclical in one sense but is procyclical in terms of underlying dynamics, with revenue gains during upswings used to finance spending increases or tax cuts and revenue declines during downturns inducing spending cuts or tax rate hikes.

[11] An alternative could have been the use of output gap. However, these data are not available for the full time span for all countries.

and report the mean group estimator to capture the "typical" estimates.[12]

Table 3 reports estimates of the specification laid out in equation (2) for a sample of twenty-two advanced countries, where the fiscal measure is the general government fiscal balance. Columns (1)-(4) report the estimates from panel data models with fixed effects while columns (5)-(8) show the mean group estimates. These are the unweighted cross-country averages of the intercept and slope coefficients.[13]

Columns (1)-(3) show that the fiscal balance is mildly countercyclical vis-à-vis the output cycle and that, as expected, it is increasing in the outstanding stock of public debt. In relation to the sensitivity to financial factors, columns (1) and (2) show that neither the current account deficit nor the change in domestic credit have a statistically significant association with the general government balance when they are included individually. However, the current account deficit exhibits a statistically significant coefficient when both financial cycle variables are included jointly in column (3). The negative sign of this coefficient is in line with the dynamic response of the fiscal balance reported in Figure 2. More precisely, an increase in net financial inflows is associated with a deterioration in the government balance. As discussed before, under the hypothesis that a current account deficit mechanically improves indirect tax revenues, one would expect an opposite relation.

Column (4) of Table 3 reports the specification using the absorption cycle instead of the GDP cycle. Here, it is striking that the fiscal balance is acyclical with respect of the absorption cycle.[14]

These results are confirmed by the mean group estimates in columns (5)-(8) that allow for cross-country heterogeneity in the slope coefficients. As before, the coefficient of domestic credit is statistically zero and the current account deficit is statistically significant when credit is also included as explanatory variable. The main difference with the panel

[12]It is important to also account for this heterogeneity as the effect of the financial cycle variables on the fiscal balance varies across countries. For instance, the range of the country-specific coefficients of the regression model including both financial cycle measures in Table 3 is (-0.78,0.55) for the current account balance and (-0.59,0.35) for credit growth.

[13] This is the standard implementation of Pesaran and Smith (1995).

[14]Dobrescu and Salman (2011) report panel regressions that look at the relation between the absorption cycle and different fiscal measures. However, they do not control for credit growth.

data approach is that, as expected, the fiscal cycle is mildly countercyclical vis-à-vis the absorption cycle.

As in the previous section, we proceed exploring the covariation patterns of government revenues and expenditure with the financial indicators. To this end, we take columns (3) and (7) which include both financial cycle variables from Table 3 and estimate similar regression models using revenues and expenditure as the dependent variable. Table 4 reports these estimates, with columns (1)-(3) showing the results for the panel data model and (4)-(6) reporting the mean group estimator.

In line with the regression models for the government balance and the impulse-response functions in the previous section, fiscal indicators covary more with the current account than domestic credit. In addition, this table shows that the revenues and expenditure positively covary with the current account, with the strongest pattern evident for expenditure. Table 4 gives further support to the previous finding showing that current account deficits are associated with fiscal deteriorations in advanced countries.

Although the point estimate of the current account coefficient on the revenue regressions is not statistically significant in the mean group estimator, it is positive and statistically significant in the panel data model. The latter result suggest that the potential impact of a current account deficit on revenues would be consistent with the sensitivity of taxation to the level of domestic spending, which is boosted by a current account deficit.

The positive covariation pattern between current account deficits and public spending supports the view that governments are more likely to spend such revenue windfalls rather than to accumulate a larger surplus. Moreover, the greater elasticity of spending than revenue is consistent with the "voracity effect," phenomenon whereby fluctuations in revenue trigger larger fluctuations in spending (Tornell and Lane 1999).

For the case of changes in domestic credit shocks we find that, with the exception of the mean group model showing a negative and significant coefficient for government expenditure, the rest of the coefficients are small and statistically zero.

Following the structure of the previous section, we now look at the covariation patterns

with the cyclically-adjusted fiscal balance. As shown in Table 5, it is not too surprising that the output cycle has no systematic association with this fiscal indicator. In terms of the financial cycle variables, we do not find statistically significant patterns. The only exception is the significance of domestic credit in the specification that includes both financial cycle variables in column (3).

Next, we estimate the baseline model but putting the focus on a more recent period (1990-2007) as well as looking at the emerging economy sample. Table 6 reports the estimates using data for this subperiod. The main difference with the baseline model is that the government balance is more countercyclical vis-à-vis both the GDP cycle and the absorption cycle, with most of these coefficients becoming statistically significant at 1 percent confidence levels. As before, the coefficient measuring cyclicality vis-à-vis the absorption cycle is statistically zero in the panel model. However, this is strongly significant in the mean-group estimates. For this sample period, none of the financial cycle variables are individually significant from a statistical point of view. However, the joint significance of the current account balance and credit in column (3) is different from zero at the 10 percent level. Finally, the sign of these point estimates does not change. These patterns are the same as in the baseline model estimated with the full period.

As before, we also look at the emerging economy sample to study whether the differences in the impact of the financial cycle between advanced and emerging economies previously reported still emerge in this estimation approach. Table 7 shows these estimates. Here, the fiscal balance does not show a significant covariation pattern with either the current account deficit or domestic credit. In addition, the two financial cycle variables are jointly zero from a statistical point of view. The result for the current account deficit is in line with the evidence from the impulse-response function reported in Figure 4.

In summary, we find evidence that the fiscal cycle comoves with the financial cycle under a regression-based estimation approach. In particular, the panel estimates (fixed effects and mean group) also show that there is evidence of a destabilising pattern between

the current account balance and the fiscal balance, in the sense that a current account deficit is associated with an increase in public spending. In relation to credit growth, however, we are not able to confirm the previous finding that faster credit growth is associated with larger fiscal surpluses. By contrast, we find evidence that once credit and the current account are jointly included in the empirical specification, these are jointly significant from a statistical point of view.[15]

4 Some Policy Implications

In relation to the cyclical conduct of fiscal policy, there are several reforms that warrant consideration. First, the analysis in the preceding section suggests that the assessment of the cyclical fiscal stance should be broadened to take into account the financial cycle in addition to the output cycle. In this way, even if aggregate output is measured as being close to its potential level, surges in tax revenues from financial booms would be banked rather than used to boost public spending in a non-sustainable manner. In turn, running larger surpluses during financial booms would facilitate greater fiscal counter-cyclicality upon a reversal in financial conditions.

As has been widely advocated in recent years, the implementation of a formal fiscal framework may help improve fiscal effectiveness. A central element in such a framework is the specification of numerical fiscal rules. Typically, the set of fiscal rules includes a target for the cyclically-adjusted fiscal balance. The potential sensitivity of the real-time estimate of the cyclically-adjusted fiscal balance to financial factors suggests that such rules should be designed to take account of the financial cycle as well as the output cycle.

Given the complexity of estimating the current state of the financial and output cycles, the robustness of the set of rules is an important criterion in assessing the value of a rules-based approach. In such an environment, an independent fiscal council may

[15] We tested the joint significance of the current account balance and credit variables in the panel data models and we rejected the null hypothesis of both coefficients being jointly zero in almost all the cases. The exception are the specifications revenues and emerging market countries.

play an especially valuable role in identifying the cyclical state of the economy and the distribution of macroeconomic risk factors (Lane 2010). Taken together, these considerations reinforce the importance of a well-designed institutional framework for the conduct of fiscal policy. While the literature on independent fiscal councils has largely focused on output stabilisation, such a council could also assess the appropriate fiscal stance in guarding against risks that may be embedded in the financial system.

Finally, the scope for the financial cycle to destabilise the fiscal position provides an additional rationale for preventive policies to minimise financial volatility. In relation to the current account, Summers (1988), Blanchard (2007) and Lane (2010) describe the conditions under which policymakers may wish to target excessive imbalances, with a possible role for various fiscal instruments in external stabilisation. Similarly, there is a vast literature on the policy tools that are available to curb volatility in credit growth. In terms of implementation, the new economic governance proposals for member countries of the European Union put a premium on external and sectoral imbalances in assessing macroeconomic stability and the appropriate stance for fiscal policy.

5 Conclusions

This paper has investigated the role of the financial cycle in driving the fiscal cycle. Although the results vary across specifications, we find some empirical evidence that current account deficits are fiscally destabilising and that credit booms are associated with improvements in the government fiscal balance in the short run. At a minimum, the sensitivity of fiscal outcomes to financial factors means that surveillance of fiscal positions needs to go beyond the output cycle to also incorporate the financial cycle. Moreover, it may be the case that the fiscal impact of the financial cycle should be incorporated into the design of numerical fiscal rules and the monitoring role of independent fiscal councils.[16]

[16]Recent contributions on this dimension include the work by Borio et al (2013, 2015), Liu et al (2015) outlining operational approaches to the impact of asset price cycles in the calculation of output gaps and structural balances and, De Manuel and Raciborski (2015) showing the importance of the credit and house price cycles for the estimation of the output gap in Ireland.

In addition, the potential for financial cycles to destabilise the fiscal position may provide additional motivation for preventive policies that can limit the macroeconomic impact of financial volatility.

In terms of the future research agenda, the estimates in this paper should be probed in further empirical analysis. In terms of mechanisms, the financial cycle affects fiscal outcomes through two types of channels. First, there may be mechanical effects, by which financial shocks affect the importance of different types of automatic stabilisers. Second, financial shocks may induce discretionary fiscal responses. Further work on the relative contributions of these two channels is clearly warranted.

Furthermore, there may be non-linearities in the relation between the financial cycle and the fiscal cycle. Accordingly, examining fiscal behaviour during large financial booms and busts may be especially revealing. Along another dimension, the prior literature has repeatedly shown that the cyclical behaviour of fiscal policy varies across different institutional and political environments. An investigation of how such factors influences the fiscal impact of the financial cycle would be interesting.

Data Appendix

The dataset covers the period 1980-2007 and includes annual data for 52 countries. It is composed of 22 advanced countries and 30 emerging market economies. The former group is formed by Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. The latter group includes Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Estonia, Hong Kong, Hungary, India, Indonesia, Israel, Korea, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Thailand, Turkey and Venezuela.

Fiscal Variables

The source of the general government balance data varies across groups of countries. For the advanced country set, we use data from the OECD Economic Outlook (OECD EO), with the exception of Switzerland. For this we use the IMF World Economic Outlook,

since it has better coverage than the OECD EO. For the emerging market economies group, we combine different sources. For China, Israel and Korea we use the OECD EO. For Chile, Egypt, India, Indonesia, Malaysia, Pakistan, Peru, Philippines, Singapore, South Africa, Thailand and Venezuela we use the World Bank World Development Indicators (WDI). For Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia we use the Annual Macro-Economic database from the European Commission (AMECO). For Turkey and Russia we use the Forecasts and Annual Indicators from the European Bank for Reconstruction and Development (EBRD). In addition, we fill missing data points for Czech Republic and Hungary using EBRD data. For Argentina, Brazil, Colombia and Mexico we use the Latin American and Caribbean Macro Watch Data Tool from the Inter-American Development Bank (IDB). In addition, we use this source to improve the series in Chile and Venezuela. Finally, Hong Kong's general government balance was obtained from national sources.

For the advanced country group, we also use alternative fiscal measures. These include the real general government balance, real general government revenues relative to trend, real general government expenditure relative to trend and the cyclically-adjusted general government balance scaled by GDP. The source of the data is the OECD EO.

Other Variables

We use two alternative measures for the business cycle: real GDP relative to trend and real absorption relative to trend. The source of the former is the World Bank WDI. The latter is constructed as the difference between nominal GDP and net exports. The source of the latter is the IMF Direction of Trade Statistics (DOTS). We deflate nominal absorption using GDP prices. Our regression models use GDP and absorption relative to trend. As in the case of revenues and expenditure, these are the residuals of regression models using linear and quadratic trends as explanatory variables.

The current account balance is scaled by GDP and the source is the IMF World Economic Outlook. Private credit is private credit by deposit money banks and other financial institutions scaled by GDP. The source for this variable is database on Financial Structure by Beck et al (2010). Debt is the debt to GDP ratio obtained from the Historical Public Debt Database from Abbas et al (2010) at the IMF.

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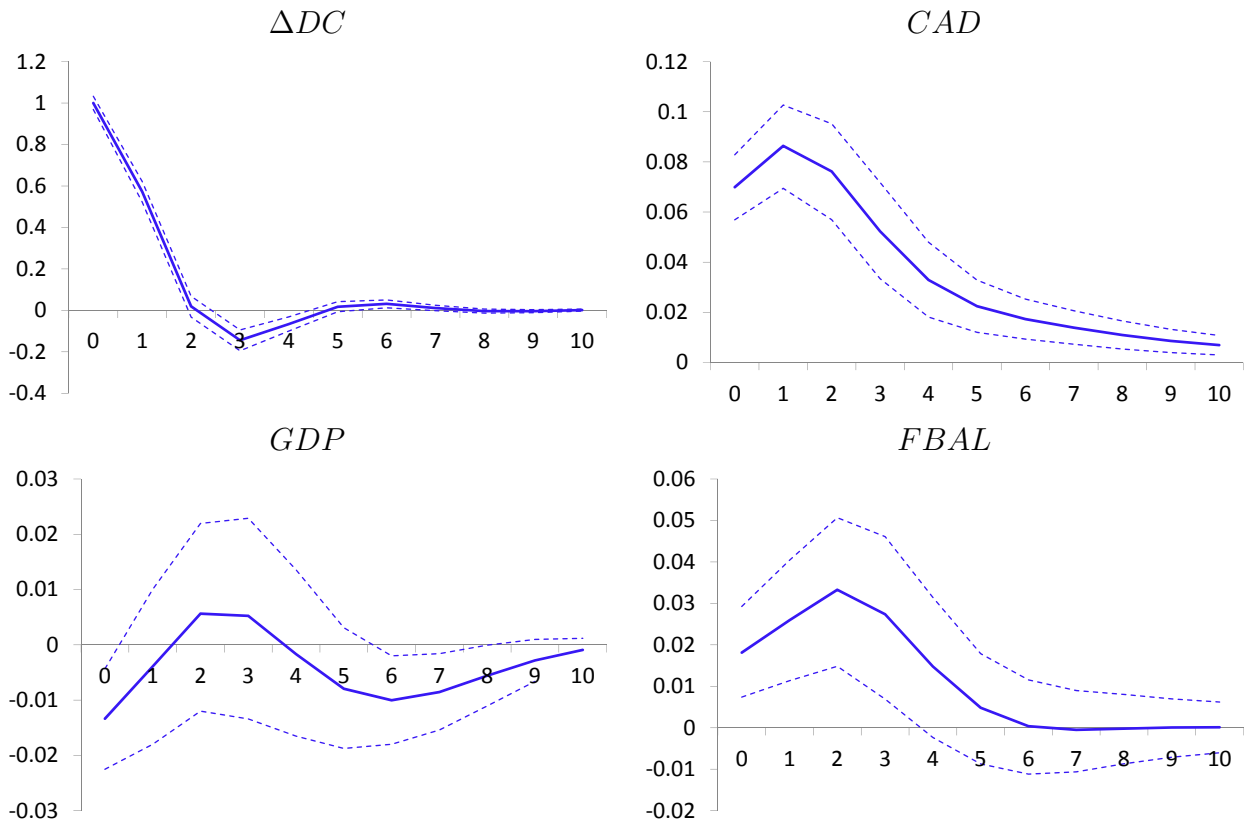
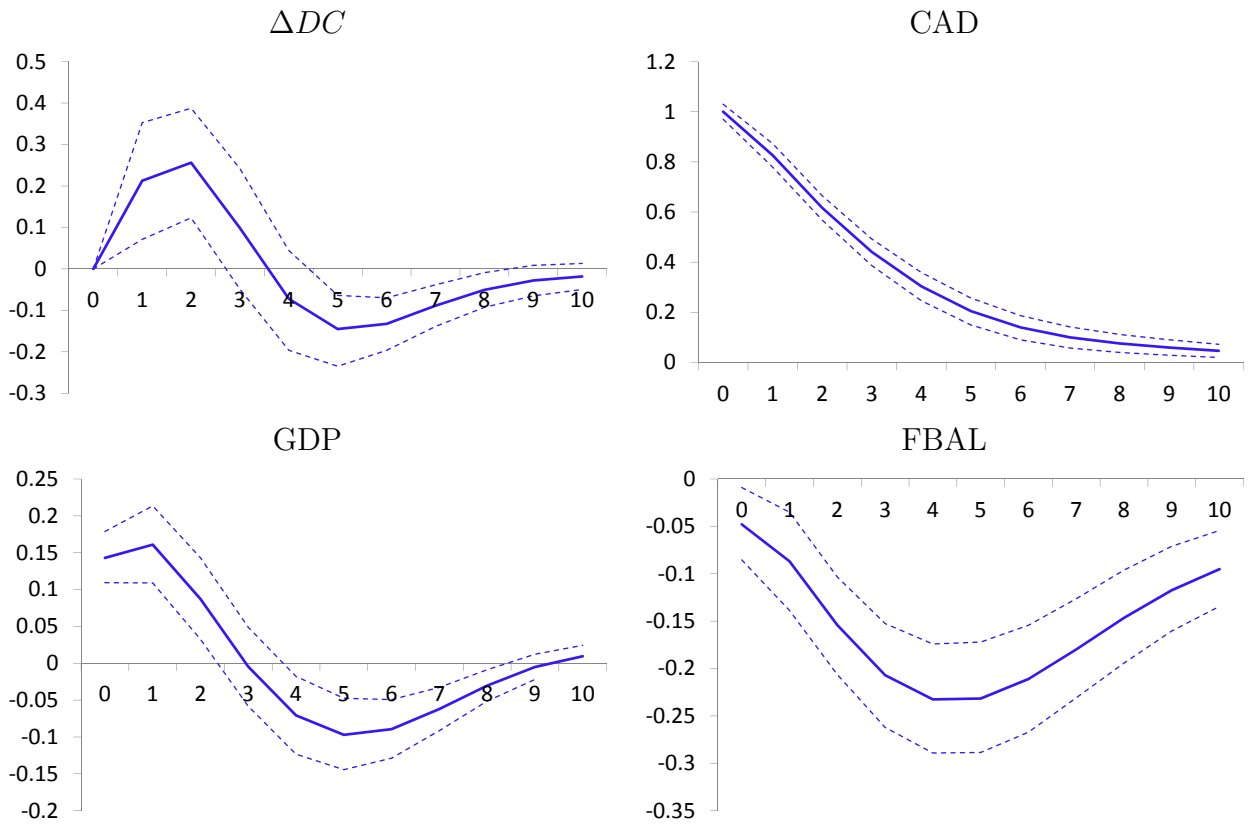
Figure 1: General government balance response to domestic credit shock.



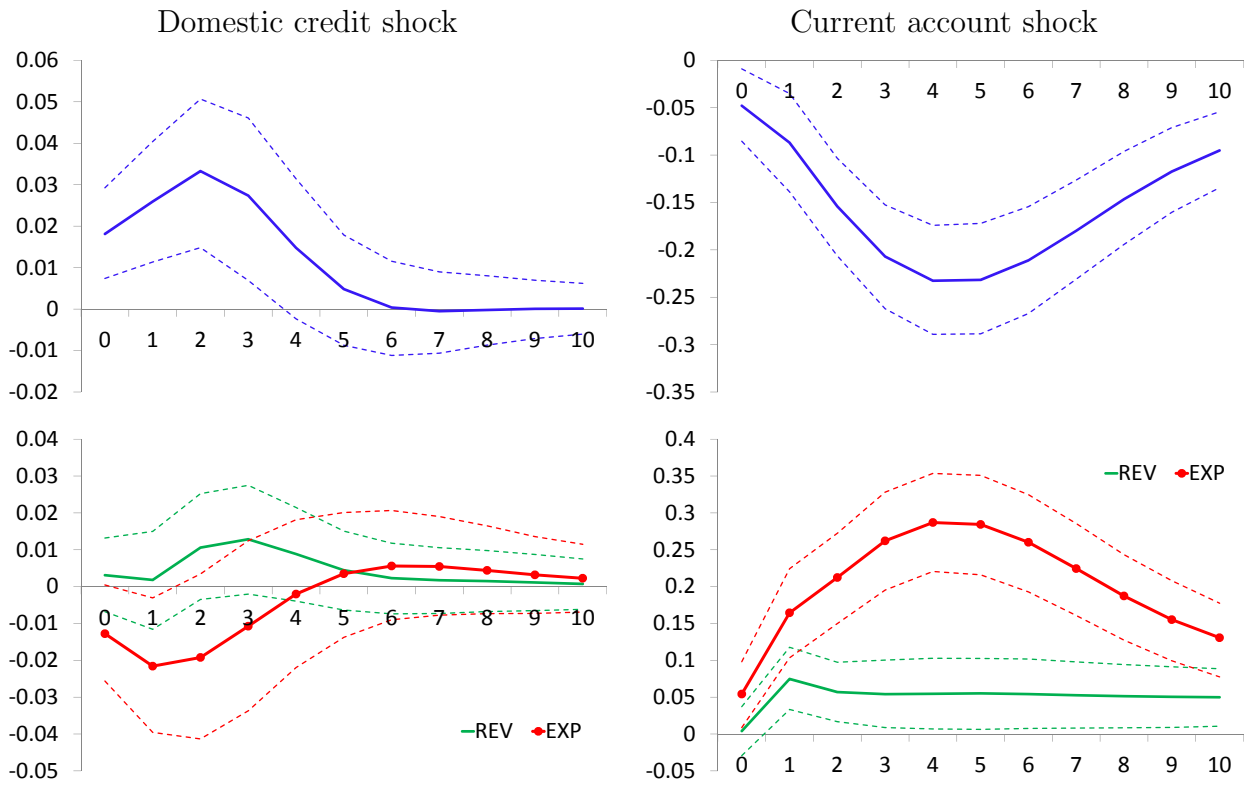
Notes: Solid lines are the point estimates of the impulse-response mean. Dashed lines represent the error bands. These are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. ΔDC is the percentage point difference in domestic credit scaled by GDP while CAD is the current account deficit scaled by GDP. GDP is the cycle of the real gross domestic product and $FBAL$ is general government balance scaled by GDP.

Figure 2: General government balance response to current account shock.



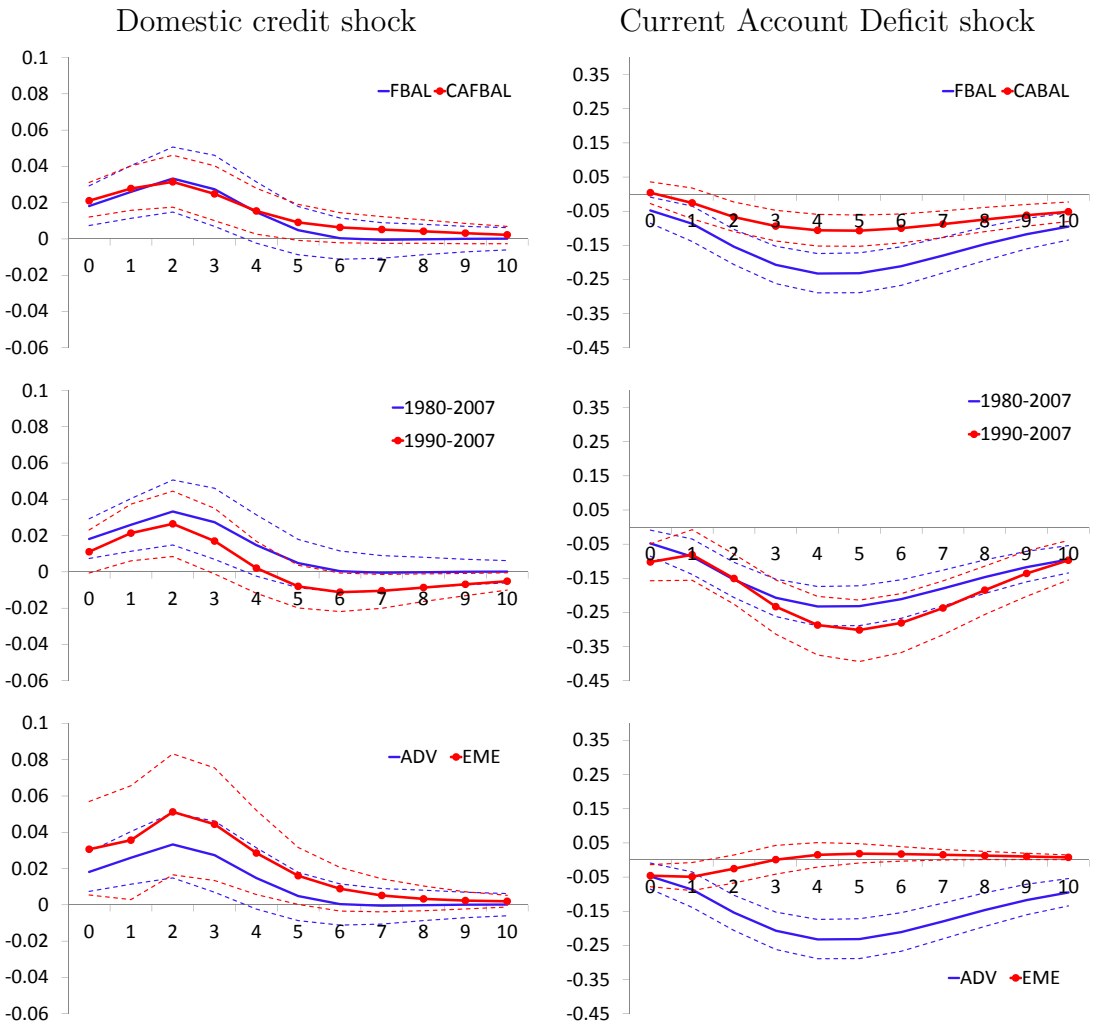
Notes: Solid lines are the point estimates of the impulse-response mean. Dashed lines represent the error bands. These are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. ΔDC is the percentage point difference in domestic credit scaled by GDP while CA is the current account surplus scaled by GDP. GDP is the cycle of the real gross domestic product and $FBAL$ is general government balance scaled by GDP.

Figure 3: Fiscal balance, revenue and expenditure



Notes: Solid lines are the point estimates of the impulse-response mean. Dashed lines represent the error bands. These are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. The first row reports the response of fiscal balances obtained from a four-variable panel VAR models including also the financial and GDP cycles. The second row reports the responses of government revenue and expenditure obtained from a five-variable panel VAR model. The financial and GDP cycle responses are omitted for presentation purposes.

Figure 4: Fiscal balance responses to domestic credit shock



Notes: Solid lines are the point estimates of the impulse-response mean. Dashed lines represent the error bands. These are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications.

Table 1: Descriptive statistics

Panel A: *Advanced*

	Mean	SD	Autocorrelation
FBAL	-2.46	4.45	0.92
CFBAL	-2.73	3.48	0.89
GDP		2.69	0.78
ABS		3.64	0.73
CA	-0.31	4.85	0.90
ΔDC	2.96	8.29	0.55

Panel B: *Emerging*

	Mean	SD	Autocorrelation
FBAL	-2.26	5.07	0.81
GDP		6.73	0.79
ABS		7.59	0.63
CA	-0.89	6.00	0.83
ΔDC	1.06	5.86	0.42

Note: FBAL is general government balance scaled by GDP, CFBAL is cyclically-adjusted general government balance scaled by GDP. GDP and ABS are two alternative cycle measures. GDP is real GDP relative to trend while ABS is real absorption (defined as GDP minus net exports) relative trend. To construct these deviations from trend we take the residuals of OLS models regressing each cycle measure on a linear and quadratic trends. CA is current account balance scaled by GDP. ΔDC is the percentage point difference in private credit scaled by GDP.

Table 2: Correlations

Panel A: *Advanced*

	FBAL	CFBAL	GDP	ABS	CA
CFBAL	0.88				
GDP	0.33	0.13			
ABS	0.28	0.10	0.90		
CA	0.20	0.15	-0.21	-0.39	
ΔDC	0.30	0.25	0.20	0.25	-0.25

Panel C: *Emerging*

	FBAL	GDP	ABS	CA
GDP	0.23			
ABS	0.17	0.77		
CA	0.03	-0.32	-0.51	
ΔDC	0.17	0.26	0.31	-0.35

Note: De-meaned variables by country. FBAL is general government balance scaled by GDP, CFBAL is cyclically-adjusted general government balance scaled by GDP. GDP and ABS are two alternative cycle measures. GDP is real GDP relative to trend while ABS is real absorption (defined as GDP minus net exports) relative trend. To construct these deviations from trend we take the residuals of OLS models regressing each cycle measure on a linear and quadratic trends. CA is current account balance scaled by GDP. ΔDC is the percentage point difference in private credit scaled by GDP.

Table 3: General government balance. Advanced countries.

	Panel data with FE				Mean group estimator			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP_t^{CYC}	0.12**	0.09**	0.12**		0.15**	0.11**	0.16***	
	(0.04)	(0.03)	(0.04)		(0.06)	(0.05)	(0.06)	
ABS_t^{CYC}				0.03				0.06**
				(0.02)				(0.03)
CAD_t	-0.08		-0.09*		-0.11		-0.13*	
	(0.06)		(0.05)		(0.08)		(0.07)	
$\Delta DC_{(t,t-1)}$		0.01	0.02	0.01		0.01	0.01	0.02
		(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	(0.02)
$DEBT_{t-1}$	0.02**	0.02***	0.02**	0.02***	0.03**	0.03***	0.03**	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
$FBAL_{t-1}$	0.86***	0.87***	0.84***	0.88***	0.63***	0.78***	0.66***	0.80***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.05)	(0.06)	(0.05)
Obs.	615	614	613	614	615	614	613	614
R^2	0.76	0.76	0.76	0.75				

Notes: Robust standard errors in panel data models and standard errors robust to outliers in mean group models are reported in parenthesis. Statistical significance of the point estimates is denoted as * for 10% , ** for 5% and *** for 1% confidence levels. These models are estimated using data for 1980-2007. $FBAL_t$ is general government balance scaled by GDP. GDP_t^{CYC} and ABS_t^{CYC} are two alternative cycle measures. GDP_t^{CYC} is real GDP relative to trend while ABS_t^{CYC} is real absorption (defined as GDP minus net exports) relative to trend. To construct these cycles we take the residuals from OLS regression models in which the explanatory variables for GDP and absorption are a linear and a quadratic trends. CAD_t is current account deficit and $DEBT_{t-1}$ is the outstanding level of public debt (both are scaled by GDP). $\Delta DC_{(t,t-1)}$ is the percentage point change in private credit scaled by GDP.

Table 4: General government revenues and expenditure. Advanced countries.

	Panel data with FE			Mean group estimator		
	Bal	Rev	Exp	Bal	Rev	Exp
	(1)	(2)	(3)	(4)	(5)	(6)
GDP_t^{CYC}	0.12**	-0.05	-0.16**	0.16***	-0.07	-0.19***
	(0.04)	(0.04)	(0.07)	(0.06)	(0.04)	(0.05)
CAD_t	-0.09*	0.05*	0.13***	-0.13*	0.03	0.16**
	(0.05)	(0.02)	(0.04)	(0.07)	(0.05)	(0.08)
$\Delta DC_{(t,t-1)}$	0.02	-0.003	-0.02	0.01	-0.001	-0.03*
	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)
$DEBT_{t-1}$	0.02**	0.01*	-0.01*	0.03**	0.03***	-0.02
	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
$FISCAL_{t-1}$	0.84***	0.88***	0.86***	0.66***	0.64***	0.74***
	(0.03)	(0.01)	(0.03)	(0.06)	(0.05)	(0.07)
Obs.	613	613	613	613	613	613
R^2	0.76	0.87	0.83			

Notes: Robust standard errors in panel data models and standard errors robust to outliers in mean group models are reported in parenthesis. Statistical significance of the point estimates is denoted as * for 10% , ** for 5% and *** for 1% confidence levels. These models are estimated using data for 1980-2007. $FISCAL$ is general government balance, revenues or expenditure scaled by GDP. GDP_t^{CYC} is real GDP relative to trend. This cycle measure is the residual from an OLS regression model in which the explanatory variables are a linear and a quadratic trends. CAD_t is current account deficit and $DEBT_{t-1}$ is the outstanding level of public debt (both are scaled by GDP). $\Delta DC_{(t,t-1)}$ is the percentage point change in private credit scaled by GDP.

Table 5: Cyclically-adjusted general government balance. Advanced countries.

	Panel data with FE			Mean group estimator		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP_t^{CYC}	0.02	0.01	0.02	-0.01	-0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.07)	(0.06)	(0.07)
CAD_t	-0.02		-0.03	-0.05		-0.10
	(0.04)		(0.03)	(0.07)		(0.08)
$\Delta DC_{(t,t-1)}$		0.02	0.02*		0.02	0.02
		(0.01)	(0.01)		(0.01)	(0.02)
$DEBT_{t-1}$	0.02**	0.02***	0.02**	0.02*	0.02***	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$CFBAL_{t-1}$	0.84***	0.83***	0.82***	0.55***	0.67***	0.54***
	(0.03)	(0.03)	(0.03)	(0.06)	(0.05)	(0.06)
Obs.	577	577	577	577	577	577
R^2	0.71	0.71	0.71			

Notes: Robust standard errors in panel data models and standard errors robust to outliers in mean group models are reported in parenthesis. Statistical significance of the point estimates is denoted as * for 10% , ** for 5% and *** for 1% confidence levels. These models are estimated using data for 1980-2007. $CFBAL_t$ is cyclically-adjusted general government balance scaled by GDP. GDP_t^{CYC} and ABS_t^{CYC} are two alternative cycle measures. GDP_t^{CYC} is real GDP relative to trend while ABS_t^{CYC} is real absorption (defined as GDP minus net exports) relative to trend. To construct these cycles we take the residuals from OLS regression models in which the explanatory variables for GDP and absorption are a linear and a quadratic trends. CAD_t is current account deficit and $DEBT_{t-1}$ is the outstanding level of public debt (both are scaled by GDP). $\Delta DC_{(t,t-1)}$ is the percentage point change in private credit scaled by GDP.

Table 6: General government balance. Advanced countries 1990-2007.

	Panel data with FE				Mean group estimator			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP_t^{CYC}	0.18***	0.16***	0.17***		0.38***	0.35***	0.40***	
	(0.06)	(0.05)	(0.06)		(0.07)	(0.07)	(0.08)	
ABS_t^{CYC}				0.05				0.22***
				(0.03)				(0.05)
CAD_t	-0.10		-0.11		-0.06		-0.08	
	(0.08)		(0.07)		(0.09)		(0.09)	
$\Delta DC_{(t,t-1)}$		0.01	0.02	0.01		0.04	0.03	0.01
		(0.02)	(0.02)	(0.02)		(0.02)	(0.03)	(0.02)
$DEBT_{t-1}$	0.02**	0.03**	0.03**	0.03**	0.08***	0.09***	0.08***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)
$FBAL_{t-1}$	0.80***	0.81***	0.78***	0.85***	0.40***	0.54***	0.43***	0.64***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.07)	(0.08)	(0.08)	(0.09)
Obs.	396	396	396	396	396	396	396	396
R^2	0.72	0.71	0.72	0.70				

Notes: Robust standard errors in panel data models and standard errors robust to outliers in mean group models are reported in parenthesis. Statistical significance of the point estimates is denoted as * for 10% , ** for 5% and *** for 1% confidence levels. These models are estimated using data for 1980-2007. $FBAL_t$ is general government balance scaled by GDP. GDP_t^{CYC} and ABS_t^{CYC} are two alternative cycle measures. GDP_t^{CYC} is real GDP relative to trend while ABS_t^{CYC} is real absorption (defined as GDP minus net exports) relative to trend. To construct these cycles we take the residuals from OLS regression models in which the explanatory variables for GDP and absorption are a linear and a quadratic trends. CAD_t is current account deficit and $DEBT_{t-1}$ is the outstanding level of public debt (both are scaled by GDP). $\Delta DC_{(t,t-1)}$ is the percentage point change in private credit scaled by GDP.

Table 7: General Government Balance. Emerging Market Economies.

	Panel data with FE				Mean group estimator			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP_t^{CYC}	0.05***	0.03	0.04**		0.06**	0.04	0.04	
	(0.02)	(0.03)	(0.02)		(0.03)	(0.04)	(0.03)	
ABS_t^{CYC}				-0.00				-0.00
				(0.04)				(0.03)
CAD_t	-0.09		-0.08		-0.04		-0.08	
	(0.07)		(0.07)		(0.05)		(0.05)	
$\Delta DC_{(t,t-1)}$		0.01	0.03	0.02		0.05	0.09	0.07
		(0.02)	(0.03)	(0.02)		(0.06)	(0.06)	(0.06)
$DEBT_{t-1}$	0.00	0.01	0.01	0.01	0.02	0.02**	0.02**	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$FBAL_{t-1}$	0.61***	0.69***	0.68***	0.69***	0.42***	0.50***	0.41***	0.51***
	(0.08)	(0.06)	(0.07)	(0.06)	(0.07)	(0.08)	(0.09)	(0.09)
Obs.	620	609	609	609	620	609	603	609
R^2	0.435	0.463	0.471	0.462				

Notes: Robust standard errors in panel data models and standard errors robust to outliers in mean group models are reported in parenthesis. Statistical significance of the point estimates is denoted as * for 10% , ** for 5% and *** for 1% confidence levels. These models are estimated using data for 1980-2007. $FBAL_t$ is general government balance scaled by GDP. GDP_t^{CYC} and ABS_t^{CYC} are two alternative cycle measures. GDP_t^{CYC} is real GDP relative to trend while ABS_t^{CYC} is real absorption (defined as GDP minus net exports) relative to trend. To construct these cycles we take the residuals from OLS regression models in which the explanatory variables for GDP and absorption are a linear and a quadratic trends. CAD_t is current account deficit and $DEBT_{t-1}$ is the outstanding level of public debt (both are scaled by GDP). $\Delta DC_{(t,t-1)}$ is the percentage point change in private credit scaled by GDP.