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Fiscal Reaction Functions Across the World: A Battle of Statistical (In-)Significance*

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Abstract

We estimate fiscal reaction functions for a panel of 173 countries using data between 1970-2014. Most notably, we assess the existence of non-Ricardian regimes, as postulated in the Fiscal Theory of the Price Level (FTPL), or, contrarily, the possibility of Ricardian regimes. By means of several, well established and state-of-the-art, panel data techniques, we find that: governments have on average increased the primary balance as a response to higher previous government indebtedness, implying a Ricardian fiscal regime, contradicting the FTPL. In addition, the Ricardian results are confirmed for the advanced countries and for the euro area group, but are less clear for the other country groups, lacking statistical significance. A more Ricardian fiscal regime emerged essentially after 1995 and notably in the sub-period 2008-2014, after the Global Financial Crisis (before that statistical insignificance is the norm) From a P-VAR analysis, we find that increases in government indebtedness increase primary balances, supporting overall the existence of an average Ricardian fiscal regime.

JEL: C23, E62, H62

Keywords: fiscal regimes, FTPL, panel data, panel VAR, panel stationarity, cross-sectional dependence, global financial crisis

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1. Introduction

In the aftermath of the recent Global Financial Crisis (GFC) and in the context of important restrictions to the implementation of fiscal policies, notably in the Advanced Economies (and in some Emerging Market Economies), with the need for fiscal consolidation ever so present, the appraisal of how fiscal authorities adjust their reactions is quite important. For instance, it is useful to assess whether the track record has been one of more active (less Ricardian) or more passive fiscal developments in several groups of homogenous economies, which can hint at the future expected reaction from the fiscal authorities.

The existing literature has estimated fiscal policy response functions notably in a cross-country analysis setup. In this context, where the underlying economic rationale is that governments care about fiscal sustainability issues, it is possible to envisage a simple fiscal reaction function with the primary balance improving to counteract past increases in government debt.

Several studies have addressed this question via single country analysis (Bohn, 2008) and panel analysis, although a VAR approach has also been used (see Canzoneri et al., 2001). For instance, Ballabriga and Martinez-Mongay (2005) mention that primary balances increase as response to higher government indebtedness in the EU. Afonso (2008), for an EU panel, reports evidence of a passive fiscal regime, and a counter-cyclical response of fiscal policy, with the primary balance improving with increases in the output gap.¹ On the other hand, the existence of possible cross-section dependences, notably given the economic and financial linkages in OECD countries, capital markets integration and spillover effects, common monetary policy for the Euro area countries, has been scarcely addressed in this framework.

However, several studies struggle with alternative and often opposite results in the estimation of fiscal reaction functions, which also then links with the possible fiscal sustainability assessments. Hence, the purpose of this paper, as alluded by the title. In practice, we are applying both simple and sophisticated techniques to shed light on the existence of statistical significance, statistical insignificance or both (depending on sample, time span and estimator, therefore casting doubts on the robustness of results).

Therefore, we empirically revisit the magnitudes of fiscal responses for a wide heterogeneous sample of 173 countries split between advanced, emerging and low income, between 1970 and 2014. Our contributions include notably: i) considering cross-country interactions that occur inside specific groups of homogenous countries, due to possible

¹ Golinelli and Momigliano (2008) review alternative specifications of fiscal policy reaction functions on the basis of different measures for the primary balance.

underlying (unobserved) common factors; ii) estimating primary balances and a debt responses together in a panel VAR to provide further robustness.

Briefly, we find that governments have on average increased the primary balance as a response to higher previous government indebtedness, implying a Ricardian fiscal regime, contradicting the FTPL. In addition, the Ricardian results are confirmed for the advanced countries and for the euro area group, but are less clear for the other country groups. A more Ricardian fiscal regime emerged essentially after 1995 and notably in the sub-period 2008-2014, after the GFC. From a P-VAR analysis, we find that increases in government indebtedness increase primary balances, supporting overall the existence of an average Ricardian fiscal regime.

The remainder of the paper is structured as follows. Section 2 presents the empirical methodology. Section 3 briefly discusses the data, then presents, and discusses our empirical results. Section 4 concludes and highlights some policy implications.

2. Methodology

2.1. Fiscal Reaction Function Representations and Baseline Estimators

We follow Canzoneri et al. (2001), Afonso (2008) and Bohn (2008) for the empirical validation of the existence of Ricardian Fiscal regimes. Such approach aims at assessing: i) whether fiscal authorities are motivated by both stabilization and sustainability motives, which means a positive response of the budget balance to the debt stock; ii) whether the primary budget balance negatively affects government liabilities. In mathematical terms, we can estimate the following fiscal relationships for country i and time t :

$$\Delta s_{it} = \delta \Delta s_{it-1} + \theta \Delta B_{it-1} + \alpha \Delta z_{it} + \Delta v_{it} , \quad (1)$$

$$\Delta B_{it} = \gamma \Delta s_{it-1} + \varphi \Delta B_{it-1} + \beta \Delta z_{it} + \Delta u_{it} . \quad (2)$$

In equation (1) the primary balance (s) is a function of government debt (B) and allows us to test whether $\theta = 0$, signalling a non-Ricardian fiscal regime or whether $\theta > 0$, translating a Ricardian fiscal regime. This is, in essence, a fiscal reaction function similar to that described in Bohn (2008). On the other hand, equation (2) is compatible with the standard budget deficit and debt dynamics formulation (see Afonso, 2008 for details). The hypothesis of a Ricardian fiscal regime is not rejected when $\gamma < 0$, as most likely the government is then using budget surpluses to reduce outstanding government debt. On the other hand, with $\gamma \geq 0$ there may be

a case for a non-Ricardian regime, i.e., a regime of fiscal dominance. In addition, the output gap (z) – defined as actual minus potential GDP –, is also added to control for the reaction of fiscal variables to the business cycle. v_{it} and u_{it} are white noise disturbance terms satisfying standard assumptions of zero mean and constant variance.

Such first-differenced equation should take care of stationarity issues (see below), however it introduces a correlation between the differenced lagged dependent variable and the differenced error term, hence, the use of instruments is required. Consistent estimates can be obtained employing a two-stage least squares (TSLS) estimator and relying on instrumental variables (IV) which are correlated with Δs_{it-1} (ΔB_{it-1}) and orthogonal to Δv_{it} (Δu_{it}). Indeed, lagged values Δs_{it-2} and B_{it-2} satisfy these assumptions and can be used as IV for the first-differenced equations (1) and (2). For completeness, we also used the pooled OLS version (augmented with country and time effects included to control, respectively, for all time-invariant differences across countries (such as in countries' growth rates) and for global shocks such as shifts in oil prices or the global business cycle), and we also provide some robustness by running both the pooled and panel versions of an IV TSLS estimator as well as Arellano-Bover's (1995) System-GMM estimator.²

2.2. Econometric Issues: Robustness Checks

Time-series properties of the data can play an important role in panel data estimations.³ In particular, nonstationary errors can bias coefficient estimates when running either fixed-effects or GMM regressions due to the imposition of parameter homogeneity. Careful modelling of short-run dynamics requires a slightly different econometric approach. We assume that equations (1) or (2), represent the equilibrium which holds in the long-run, but that the dependent variable may deviate from its path in the short-run (due, e.g., to fiscal or macroeconomic shocks that may be persistent). There are often good reasons to expect the long-run equilibrium relationships between variables to be similar across groups of countries, via e.g. budget constraints or common technologies, capital markets integration and spillover effects.

² Which jointly estimates the equations in first differences, using as instruments lagged levels of the dependent and independent variables, and in levels, using as instruments the first differences of the regressors.

³ There exists the possibility of spurious correlation between the variables of interest, which happens when series are not stationary (Granger and Newbold, 1974).

The parameters of equations (1) and (2) can be obtained via recent panel data methods. Based on the mean of the estimates, we can use the Mean Group (MG)⁴ estimator (Pesaran and Smith, 1995). This estimator is appropriate for the analysis of dynamic panels with both large time and cross-section dimensions and has the advantage of accommodating both the long-run equilibrium and the possibly heterogeneous dynamic adjustment process. In addition, we use the Common Correlated Effects Pooled (CCEP) estimator that accounts for the presence of unobserved common factors by including cross-section averages of the dependent and independent variables in the regression equation, and where the averages are interacted with country-dummies to allow for country-specific parameters.⁵ In its heterogeneous version, the Common Correlated Effects Mean Group (CCEMG), the presence of unobserved common factors is achieved by construction and the estimates are obtained as averages of the individual estimates (Pesaran, 2006). Yet another recent approach is due to Eberhardt and Teal (2010), termed Augmented Mean Group (AMG) estimator, and it accounts for cross-sectional dependence by including of a “common dynamic process”. Finally, the previous set of estimators is complemented with a panel estimation allowing for Driscoll-Kraay (1998) robust standard errors. This is a non-parametric technique that assumes the error structure to be heteroskedastic, autocorrelated up to some lag, and possibly correlated between the groups.

2.3. Panel VAR

As an additional exercise, we have estimated a panel VAR version (P-VAR) to analyse the short to medium-run transition of debt (budget balance) to shocks in the budget balance (debt) controlling for the business cycle as before. Take a first-order VAR model as:

$$Y_{i,t} = \Gamma_0 + \Gamma(L)Y_{i,t} + v_i + \varepsilon_{i,t}, \quad (3)$$

where $Y_{i,t}$ is a vector of endogenous variables, Γ_0 is a vector of constants, $\Gamma(L)$ is a matrix polynomial in the lag operator, v_i is a matrix of country-specific fixed effects and $\varepsilon_{i,t}$ is a vector of error terms. The correlation between fixed effects and regressors due to lags of the dependent variables implies that the mean-differencing procedure creates biased coefficients

⁴ The MG approach consists of estimating separate regressions for each country and computing averages of the country-specific coefficients (Evans, 1997; Lee et al., 1997). This allows for heterogeneity of all the parameters.

⁵ For reasons of parsimony we abstract from presenting these country-specific results but they are available on request.

(Holtz-Eakin, Newey, and Rosen 1988). This drawback is solved using the ‘Helmert procedure’⁶ and estimating a system by GMM using the lags of the regressors as instruments. In our model, the number of regressors is equal to the number of instruments. As far as impulse-response functions (IRFs) are concerned, given that the variance–covariance matrix of the error terms may not be diagonal, we follow the Choleski decomposition.

3. Empirical Analysis

3.1. Data and Stationarity Issues

We use annual data for 173 countries over 45 years that is, focusing on the period 1970-2014. Due to the unbalanced nature of the panel, the maximum number of observations in a typical baseline regression amounts to 3306. Our main variables of interest are the primary balance (expressed in percentage of GDP) and the debt-to-GDP ratio. In addition, as detailed in the previous section, we use the output gap to control for business cycle fluctuations. The fiscal data comes from the IMF’s Government Finance Statistics database. The output gap comes from the IMF’s World Economic Outlook (WEO) database. The Appendix provides the country list, data definitions and summary statistics.

A few comments on the use of WEO’s output gap are in order. First, despite substantial progress in the estimation methodologies to calculate potential output, there is still not a widely accepted approach in the profession. As Borio (2013) suggests, researchers in the literature adopt two different approaches to estimate potential GDP: on the one hand, there are univariate statistical approaches, which usually consist of filtering out the trend component from the cyclical one⁷; on the other hand, there are the structural approaches, which derive the estimates directly from the theoretical structure of a model. Aware of the shortcomings of using either one or the other⁸, and at the cost of not maximizing the total number of observations in our panel dataset, we prefer to rely on WEO’s as the privileged source. While, the IMF does not have an official method for computing potential output⁹ and every country desk decides which measure fits best, the most common IMF approach uses a production

⁶ This is a forward mean-differencing approach that removes only the mean of all future observations available for each country-year.

⁷ Commonly used examples include the Hodrick-Prescott, Baxter-King and Christiano-Fitzgerald.

⁸ Statistical methods suffer from the end-point problem, that is, they are extremely sensitive to the addition of new data and to real-time data revisions. Structural models, on the other hand, may be difficult to implement consistently in cross-sectional environments and rely on the imposition of pre-determined assumptions.

⁹ As far as other institutions are concerned, the OECD uses a method which stands somewhere in between a univariate approach and a model-built measure to calculate trend participation rates, trend hours worked and trend total factor productivity (Giorno et al., 1995; Cotis et al., 2004). According to Denis et al. (2002), the European Union’s method of computing potential output is very close to the OECD’s using a Cobb-Douglas production function with an exogenous trend.

function approach, with assumptions that vary greatly across countries, but discretion is left to the country desks.

As far as panel stationarity is concerned, results of first (Im-Pesaran-Shin, 1997; Maddala-Wu, 1999) and second-generation (Pesaran CIPS, 2007) panel integration tests are available upon request for reasons of parsimony.¹⁰ Essentially, we can accept most conservatively that non-stationarity cannot be ruled out in the two main variables of interest in levels.¹¹

3.2 Baseline Results

Table 1 shows the baseline estimation results of equations (1) and (2). We can see that changes in the primary balance are not statistically relevant for the debt-to-GDP ratio. In other words, there is no evidence of a Ricardian fiscal regime in the baseline exercise since primary balances were not used to reduce the level of outstanding government debt in the subsequent periods. This is true for all the estimation methods employed (OLS with country and time effects; pooled IV-FE; Panel IV-FE; SYS-GMM).

[insert Table 1]

Table 2 repeats the exercise controlling for the business cycle, by adding the output gap (which is the measure computed by the IMF in a country specific fashion). In this case, we find for the fiscal reaction depicted by equation (1) that governments have on average increased the primary balance as a response to higher previous government indebtedness. Hence, a Ricardian fiscal regime emerges, contradicting the FTPL. In addition, the estimation of equation (2) shows that improving primary balances translates into lower levels of outstanding government debt. Interestingly, a commonly assumed feature of public finances, that fiscal policies can be counter-cyclical, is not picked up in our results since there is no statistically estimated positive effect of the output gap on the primary balance, while past above trend growth also does not imply a reduction in government debt.

[insert Table 2]

In order to provide a robustness check, to deal notably with such issues as short spanned time series and to use cross-section information to reduce the probability of spurious regressions, we report additional results in Tables 3 and 4. We can now see that better fiscal

¹⁰ For further details on these tests, the interested reader should refer to the original sources.

¹¹ The advantage of panel data integration is threefold: firstly, enables to by-pass the difficulty related to short spanned time series; secondly, the tests are more powerful than the conventional ones; thirdly, cross-section information reduces the probability of a spurious regression (Banerjee, 1999).

primary balances are statistically relevant to reduce government debt, controlling for either the business cycle or not. On the other hand, the statistical evidence in favour of governments increasing the primary balance after increases in the level of government debt is more mitigated (see Table 4, when the output gap is also considered).

[insert Table 3]

[insert Table 4]

We summarise in Table 5 the signs (positive or negative) of the obtained estimated coefficients, whenever these are statistically significant (if they are not, then a zero is plugged in).

[insert Table 5]

3.2. By Income Group

Next we assess to what extent the baseline results obtained previously go through when considering different country income groups. Indeed, the level of say per capita income, linked notably to per capita GDP, can imply bigger or smaller sizes of government, which can translate into different automatic stabilisers' magnitudes. Therefore, fiscal policy reactions may also vary according to the average income group.

Hence, we have divided the country sample into three income groups: Advanced Economics (AE); Emerging Market Economies (EME); Low Income Countries (LIC) (see the Appendix for the country lists).

[insert Table 6]

From the results in Table 6 we can see that the main conclusions from the overall country panel go through entirely for the case of the AE country group (see panel 6.1A, B). Indeed, for this group we still find statistically significant evidence a Ricardian fiscal regime, with governments reducing government debt when primary balances increase. In the same vein, when the level of government indebtedness rises in the previous period governments also increase the fiscal primary balances as a response. Therefore, this Ricardian evidence does not provide support for the FTPL in the AE countries.

Regarding the EME country group (panel 6.2B) there is statistical evidence of a Ricardian fiscal regime, notably with higher primary surpluses reducing government debt. For the LIC country group (panel 6.3A) we also find some evidence, in two cases, that primary balances

improve after increases in government debt in the past periods, and that debt is reduced with better primary balances (panel 6.3B).

3.3. By Region

The so-called Ricardian fiscal regime is akin to a fiscal rule, under which government would react to adverse past fiscal developments. Therefore, one may witness a demonstration effect by which the likelihood that a country acts in a Ricardian fashion may increase as the neighboring countries do so as well. In this context, geographical proximity can be a possible diffusion channel of such fiscal policy development. For instance, Ptilik (2007) mentions the relevance of diffusion of economic policies, and reports a significant and positive interdependence of policy reforms between countries implying that that geographical proximity has a relevant effect on policy implementation.

Hence, another robustness exercise takes into account the possibility of differentiated fiscal behaviour per geographical region. We split the country sample into five major groups: Euro Area; Commonwealth of Independent States (CIS); Developing Asia; Latin America; Sub-Saharan Africa (see the Appendix for the country lists).

[insert Table 7]

The results from Table 7 confirm for the Euro area (panels 7.1A, B) the overall results already uncovered for the AE group. In other words, euro area governments increase the primary balances after past increases in the level of government debt and they use better primary balances to reduce government indebtedness. Overall, evidence of Euro area Ricardian fiscal regimes.

Similar Ricardian fiscal behaviour is uncovered for the Latin American country group (panel 7.4), although the estimated relevant coefficients for (1) and (2) have a lower magnitude than in the case of the Euro area. Indeed, several of these countries have in the past adopted fiscal rules, notably after 2000. The existence of fiscal rules is also a characteristic present in the Euro area country group.¹² These developments may help explaining the statistical significance that we find, for instance, for a reaction function as the one in equation (1), where the primary balance reacts and improves after an increase in past government debt.

Regarding the Sub-Saharan country group (panel 7.5), we essentially find no statistical evidence purporting the existence of a Ricardian fiscal regime. Hence, from a statistical point

¹² For instance, Schaechter et al. (2012) report that after the financial crisis of 2008-2009 many countries adopted fiscal rules.

a view one would not reject the possibility of some influence of fiscal developments on the price determination. For the CIS country group (panel 7.2B) there is some evidence of government debt decreasing when primary balances improve, in two of the estimations.

For the country group of Developing Asia economies (panel 7.3A) increases in government indebtedness show up as statistically significant in reducing the primary balance, a result that is hard to square, since it is neither supporting a Ricardian fiscal regime nor a possible FTPL explanation. Moreover, that result does not go through once one controls for the business cycle, which depicts in this case some counter-cyclicality (panel 7.3B).

3.4. By time periods

Considering the fact that government's fiscal responses can change over time, we have also addressed this possibility by splitting the time span into decades. Taking into account our data set, we estimated (1) and (2) for the following sub-periods: 1975-1985; 1985-1995; 1995-2005; 2005-2014.

[insert Table 8]

From Table 8 we can conclude that in the sub-period 1975-1985 (panel 8.1) there is scarcely any statistical evidence of a Ricardian behaviour for the country sample available, which is, due to data availability, more limited.

In the sub-period 1985-1995, a Ricardian response emerges with the debt ratios decreasing as a response to higher primary surpluses (panel 8.2). However, when statistically significant the response of the debt ratio to the primary balance is not Ricardian.

Regarding the sub-period 1995-2005, the fiscal reaction for the primary balance is in line with a well-behaved fiscal authority (panel 8.3). In addition, previous improvements of the primary balance also imply a reduction in the level of the debt ratios. We have similar findings for the sub-period 2005-2014 (panel 8.4). Therefore, a more Ricardian fiscal regime seems to have emerged essentially after 1995.

3.5. The Global Financial Crisis

Given that almost all economies had to face the 2008-2009 Global Financial Crisis, it is relevant to assess the responsiveness of the so-called fiscal reaction functions before and after that particular event. Therefore, we have split the time sample into two additional sub-periods: 1970-2007 and 2008-2014.

[insert Table 9]

The results in Table 9 show that for both sub-periods higher primary surpluses have translated into a reduction in outstanding government debt (panels 9.1B and 9.2B). However, the estimated negative magnitude of the γ coefficient (in specification (2)) is lower in the sub-period 2008-2014 than in the previous sub-period. For instance, an increase of 1pp of GDP in the primary balance in $t-1$ in the sub-period 1970-2007 would imply a reduction in the debt ratio in t of around 0.4-0.5 pp of GDP. On the other hand, an increase of 1pp of GDP in the primary balance in $t-1$ in the sub-period 2008-2014 implies a decrease in the debt ratio in t of around 0.2 pp of GDP.

In terms of the fiscal reaction function specification (1), the Ricardian responsiveness of the primary balance to the changes in government indebtedness is essentially only statistically significant in the sub-period 2008-2014.

3.6. Panel VAR results

The P-VAR uses three variables, primary balance, government debt, and the output gap, both in levels and in first differences, with four lags. Figures 1 and 2 illustrate the impulse response functions respectively for levels and differences (over a 6-year horizon).

[insert Figure 1]

[insert Figure 2]

Focussing for instance on the impulse response functions of the P-VAR in differences, we find that an improvement in the primary balance contributes to a reduction in the debt ratios. On the other hand, when there is an increase in government indebtedness the primary balances also react by increasing. Both results would support the existence of an average Ricardian fiscal regime in the full sample, and not necessarily any evidence for the relevance of fiscal developments for the price level.

4. Conclusion

We have estimated fiscal reaction functions for a panel of 173 countries in the period 1970-2014, assessing notably the existence of non-Ricardian regimes, as postulated in the Fiscal Theory of the Price Level, or, on the other hand, the possibility of Ricardian regimes. We have taken into account the cross-country interactions inside specific groups of

homogenous countries, due to possible underlying (unobserved) common factors; and we have estimated fiscal reaction functions in a panel VAR to provide further robustness.

Our main results show that the fiscal authorities have increased primary balances to deal with higher government debt levels, and that primary budgetary balances increase in order to counteract the level government debt.

More specifically in our panel analysis, we find that: i) Governments have on average increased the primary balance as a response to higher previous government indebtedness, implying a Ricardian fiscal regime, contradicting the FTPL. ii) Improving primary balances translates into lower levels of outstanding government debt. iii) Fiscal policies are not counter-cyclical, since there is no statistically estimated positive effect of the output gap on the primary balance. iv) The Ricardian results are confirmed for the AE country group and for the euro area group, with higher primary surpluses reducing government debt, but less clear for the LIC country group. v) Similar Ricardian fiscal behaviour is uncovered for the Latin American country group, but not for the Sub-Saharan country group or for the Developing Asia economies. vi) Using the full time span, a more Ricardian fiscal regime seem to have emerged essentially after 1995. vii) The Ricardian responsiveness of the primary balance to the changes in government indebtedness is essentially only statistically significant in the sub-period 2008-2014, after the GFC.

Regarding P-VAR analysis, we find that: viii) the IRF of the P-VAR in differences, show that improvements in the primary balance contribute to a reduction in the debt ratios, and ix) an increase in government indebtedness increases primary balances, supporting overall the existence of an average Ricardian fiscal regime.

Overall, caution is warranted when empirically testing some theoretical propositions or laws. Reconciling strong and weak (or at times even contradictory) results keeps on being a challenge for the empirical economist. Differences in statistical significance can simply arise by considering different country samples or looking at different time periods or even estimating using different techniques.

In terms policy conclusions, we can draw several implications from our study. Although we can find a general result of Ricardian fiscal regimes, this is not always valid for all the country groups, regions or time spans. In fact, in some instances we can also find statistical evidence that would go the other way around, not supporting the past adherence to a commonly accepted fiscal reaction function. Therefore, policy recommendations for policy makers for a certain fiscal development, that might increase the sustainability of public accounts, have to be more country based rather than only drawn from a general result.

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Table 1. Estimations of Debt Ratios and Primary Balances, 1970-2014

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.01 (0.059)	0.18** (0.071)	0.09 (0.058)	0.07 (0.082)	0.02 (0.036)	0.00 (0.041)	0.01 (0.044)	0.02 (0.030)
Δ balance(lagged)	0.02 (0.063)	0.01 (0.065)	0.00 (0.067)	0.02 (0.022)	-0.48** (0.245)	-0.46* (0.250)	-0.46* (0.255)	-0.47*** (0.035)
Constant	0.54 (1.586)	-0.55** (0.234)		-0.78*** (0.288)	2.28* (1.321)	0.05 (0.206)		0.08 (0.092)
Observations	3,295	3,114	3,114	3,295	3,306	3,122	3,122	3,306
R-squared	0.16	0.04	0.01		0.26	0.22	0.22	
Number of ifscode	173	173	173	173	173	173	173	173

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 2. Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, 1970-2014

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.19*** (0.059)	0.30*** (0.067)	0.23*** (0.066)	0.20*** (0.061)	0.03** (0.012)	0.04*** (0.012)	0.04*** (0.012)	0.03** (0.013)
Δ balance(lagged)	-0.31*** (0.085)	-0.40*** (0.089)	-0.43*** (0.088)	-0.31*** (0.074)	-0.15*** (0.050)	-0.06 (0.048)	-0.07 (0.051)	-0.01 (0.041)
Δ outputgap(lagged)	0.06 (0.079)	0.09 (0.073)	0.03 (0.076)	-0.06 (0.077)	-0.01 (0.028)	0.01 (0.031)	0.01 (0.030)	-0.00 (0.036)
Constant	-0.90 (1.442)	0.41*** (0.156)		0.43** (0.168)	2.01* (1.145)	-0.09 (0.057)		-0.06** (0.025)
Observations	1,789	1,692	1,692	1,789	1,791	1,694	1,694	1,791
R-squared	0.23	0.12	0.09		0.20	0.02	0.02	
Number of ifscode	95	95	95	95	95	95	95	95

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 3. Robustness: Estimations of Debt Ratios and Primary Balances, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	Driscoll-Kraay	CCEMG	MG	AMG	Driscoll-Kraay	CCEMG	MG	AMG
Δ debt(lagged)	0.03 (0.077)	0.08*** (0.023)	0.06 (0.140)	-0.06** (0.026)	0.02 (0.036)	-0.45 (0.432)	-0.10 (0.143)	-0.45 (0.437)
Δ balance(lagged)	0.01 (0.051)	-0.47*** (0.118)	-0.34*** (0.133)	-0.39*** (0.127)	-0.47*** (0.165)	-0.11*** (0.025)	-0.24*** (0.032)	-0.24*** (0.024)
Constant	-0.82 (0.943)	-13.56*** (4.752)	-3.35 (6.947)	7.70 (6.285)	0.09 (0.398)	3.16** (1.459)	0.31 (1.947)	-0.91 (1.587)
Observations	3,295	3,295	3,295	3,295	3,306	3,306	3,306	3,306
Number of ifscore	173	173	173	173	173	173	173	173

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 4. Robustness: Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	Driscoll-Kraay	CCEMG	MG	AMG	Driscoll-Kraay	CCEMG	MG	AMG
Δ debt(lagged)	0.21*** (0.076)	0.13*** (0.039)	-0.06 (0.051)	-0.07 (0.047)	0.03* (0.017)	-0.99 (1.072)	0.06* (0.035)	-0.97 (1.043)
Δ balance(lagged)	-0.40*** (0.084)	-0.65*** (0.142)	-0.44** (0.192)	-0.42*** (0.125)	-0.07* (0.039)	0.01 (0.046)	-0.25*** (0.058)	-0.21*** (0.038)
Δ outputgap(lagged)	0.03 (0.101)	0.00 (0.086)	0.06 (0.158)	0.01 (0.094)	0.00 (0.031)	0.02 (0.052)	0.05 (0.092)	-0.01 (0.042)
Constant	0.41 (0.525)	-7.50*** (2.519)	-0.33 (4.365)	-3.78 (2.959)	-0.07 (0.216)	-1.66 (1.683)	-0.73 (1.236)	-2.53 (1.656)
Observations	1,789	1,789	1,789	1,789	1,791	1,791	1,791	1,791
Number of ifscore	95	95	95	95	95	95	95	95

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 5. Summary of main estimated relations, 1970-2014

Effect of	On Δ balance (estimation of (1))							
	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	Driscoll-Kraay	CCEMG	MG	AMG
Δ debt (no output gap)	0	0	0	0	+	+	+	+
Δ debt (and output gap)	0	0	0	0	+	0	+	0
Effect of	On Δ debt (estimation of (2))							
	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	Driscoll-Kraay	CCEMG	MG	AMG
Δ balance (no output gap)	0	0	0	0	0	-	-	-
Δ balance (and output gap)	-	-	-	-	-	-	-	-

Table 6. Estimations of Debt Ratios and Primary Balances, 1970-2014, by Income Group
6.1A Advanced Economies 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.30*** (0.062)	0.42*** (0.056)	0.36*** (0.058)	0.42*** (0.074)	0.07** (0.029)	0.07*** (0.024)	0.08*** (0.026)	0.06** (0.029)
Δ balance(lagged)	-0.21** (0.094)	-0.28*** (0.095)	-0.32*** (0.098)	-0.20** (0.100)	-0.10 (0.093)	0.06 (0.080)	0.06 (0.082)	0.08 (0.068)
Constant	-1.88 (1.607)	0.76*** (0.174)		0.73*** (0.201)	1.90* (1.008)	-0.10 (0.082)		-0.06 (0.056)
Observations	819	782	782	819	821	784	784	821
R-squared	0.41	0.23	0.19		0.29	0.02	0.03	
Number of ifscore	35	35	35	35	35	35	35	35

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

6.1B Advanced Economies controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.30*** (0.061)	0.42*** (0.056)	0.35*** (0.059)	0.41*** (0.073)	0.07** (0.030)	0.08*** (0.026)	0.09*** (0.028)	0.07** (0.031)
Δ balance(lagged)	-0.19* (0.099)	-0.29*** (0.111)	-0.31*** (0.110)	-0.21** (0.101)	-0.11 (0.094)	0.03 (0.091)	0.03 (0.093)	0.05 (0.087)
Δ outputgap(lagged)	-0.09 (0.121)	0.02 (0.101)	-0.03 (0.097)	0.01 (0.109)	0.07 (0.052)	0.07 (0.063)	0.08 (0.065)	0.06 (0.114)
Constant	-1.72 (1.619)	0.76*** (0.176)		0.74*** (0.193)	1.78* (1.023)	-0.11 (0.082)		-0.08 (0.058)
Observations	815	778	778	815	817	780	780	817
R-squared	0.41	0.23	0.19		0.29	0.03	0.03	
Number of ifscore	35	35	35	35	35	35	35	35

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

6.2A Emerging Market Economies 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.04 (0.097)	0.16** (0.076)	0.11 (0.086)	0.02 (0.095)	0.00 (0.146)	-0.15 (0.220)	-0.14 (0.238)	-0.03 (0.079)
Δ balance(lagged)	0.03 (0.066)	0.01 (0.070)	0.01 (0.073)	0.02 (0.010)	-0.49* (0.267)	-0.48* (0.267)	-0.48* (0.273)	-0.48*** (0.034)
Constant	-4.45** (1.909)	-0.37 (0.269)		-0.68** (0.335)	-11.17*** (1.975)	0.05 (0.491)		0.16 (0.216)
Observations	1,354	1,279	1,279	1,354	1,356	1,279	1,279	1,356
R-squared	0.20	0.03	0.01		0.29	0.23	0.23	
Number of ifscode	74	74	74	74	74	74	74	74

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

6.2B Emerging Market Economies controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.19* (0.111)	0.28** (0.137)	0.22 (0.141)	0.20* (0.112)	0.02 (0.014)	0.03* (0.015)	0.02 (0.016)	0.03* (0.013)
Δ balance(lagged)	-0.29** (0.126)	-0.39*** (0.126)	-0.42*** (0.130)	-0.36*** (0.117)	-0.25*** (0.052)	-0.15*** (0.051)	-0.17*** (0.054)	-0.12** (0.057)
Δ outputgap(lagged)	0.17 (0.108)	0.14 (0.108)	0.10 (0.116)	0.06 (0.145)	-0.06 (0.040)	-0.03 (0.042)	-0.04 (0.039)	-0.05 (0.049)
Constant	-3.12** (1.575)	0.06 (0.252)		0.07 (0.230)	-1.17* (0.631)	-0.10 (0.090)		-0.09* (0.048)
Observations	755	707	707	755	755	707	707	755
R-squared	0.23	0.10	0.07		0.25	0.04	0.04	
Number of ifscode	48	48	48	48	48	48	48	48

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

6.3A Low Income Countries 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.13 (0.086)	0.02 (0.094)	-0.01 (0.096)	-0.06 (0.114)	0.01 (0.010)	0.01* (0.008)	0.02* (0.009)	0.01 (0.011)
Δ balance(lagged)	0.20 (0.204)	0.03 (0.194)	0.03 (0.197)	0.11 (0.222)	-0.41*** (0.103)	-0.40*** (0.111)	-0.41*** (0.113)	-0.39*** (0.041)
Constant	6.86 (7.536)	-2.29*** (0.764)		-2.24*** (0.805)	3.28* (1.785)	-0.04 (0.166)		-0.06 (0.075)
Observations	673	630	630	673	677	634	634	677
R-squared	0.20	0.00	0.00		0.32	0.17	0.18	
Number of ifscore	39	39	39	39	39	39	39	39

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

6.3B Low Income Countries controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.02 (0.080)	0.20** (0.089)	0.20** (0.092)	0.33 (0.596)	-0.00 (0.015)	-0.01 (0.011)	-0.01 (0.013)	-0.03 (0.134)
Δ balance(lagged)	0.10 (1.041)	-2.27*** (0.717)	-2.26*** (0.794)	4.04 (9.337)	-0.16 (0.174)	-0.06 (0.140)	-0.07 (0.145)	-1.21 (2.417)
Δ outputgap(lagged)	-0.28 (0.512)	0.55 (0.636)	0.56 (0.663)	-3.02 (6.914)	-0.12 (0.081)	-0.12 (0.077)	-0.12 (0.076)	-0.26 (3.363)
Constant	9.45 (6.283)	-2.19 (1.484)		-0.18 (2.959)	-1.66** (0.765)	-0.29 (0.212)		-0.63** (0.161)
Observations	89	83	83	89	89	83	83	89
R-squared	0.54	0.10	0.09		0.41	0.03	0.03	
Number of ifscore	6	6	6	6	6	6	6	6

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 7. Estimations of Debt Ratios and Primary Balances, 1970-2014, by Region
7.1A Euro Area 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.29*** (0.109)	0.44*** (0.093)	0.41*** (0.095)	0.47*** (0.130)	0.10* (0.050)	0.09** (0.044)	0.09** (0.045)	0.07 (0.052)
Δ balance(lagged)	-0.32** (0.130)	-0.36*** (0.137)	-0.37*** (0.141)	-0.24 (0.159)	-0.18 (0.153)	0.00 (0.141)	-0.00 (0.146)	0.06 (0.155)
Constant	1.09 (0.817)	1.01*** (0.252)		0.91** (0.332)	-1.97* (1.170)	-0.13 (0.108)		-0.07 (0.094)
Observations	400	381	381	400	401	382	382	401
R-squared	0.47	0.25	0.22		0.34	0.04	0.04	
Number of ifscode	18	18	18	18	18	18	18	18

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.1B Euro Area controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.27** (0.105)	0.44*** (0.098)	0.40*** (0.101)	0.57** (0.227)	0.10** (0.052)	0.11** (0.051)	0.12** (0.053)	0.10 (0.078)
Δ balance(lagged)	-0.31** (0.135)	-0.35** (0.156)	-0.35** (0.158)	-0.12 (0.225)	-0.19 (0.153)	-0.05 (0.156)	-0.05 (0.161)	-0.06 (0.127)
Δ outputgap(lagged)	-0.18 (0.243)	-0.02 (0.161)	-0.04 (0.160)	0.03 (0.157)	0.06 (0.097)	0.15 (0.110)	0.16 (0.114)	0.16 (0.178)
Constant	0.91 (0.893)	1.02*** (0.266)		0.56 (0.449)	-1.91* (1.156)	-0.17 (0.114)		-0.09 (0.179)
Observations	396	377	377	396	397	378	378	397
R-squared	0.47	0.25	0.22		0.34	0.05	0.06	
Number of ifscode	18	18	18	18	18	18	18	18

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.2A Commonwealth of Independent States 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.18 (0.131)	0.22* (0.115)	0.17* (0.102)	0.19 (0.119)	0.01 (0.021)	0.02 (0.015)	0.02 (0.016)	0.01 (0.033)
Δ balance(lagged)	-0.18 (0.192)	-0.10 (0.183)	-0.09 (0.177)	-0.12 (0.456)	-0.24** (0.109)	-0.26** (0.104)	-0.28*** (0.107)	-0.21 (0.319)
Constant	-1.77 (4.018)	-0.62 (0.934)		-0.59 (0.607)	5.33*** (1.929)	0.08 (0.280)		0.09 (0.215)
Observations	153	142	142	153	153	142	142	153
R-squared	0.48	0.05	0.03		0.38	0.08	0.09	
Number of ifscode	11	11	11	11	11	11	11	11

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.2B Commonwealth of Independent States controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.05 (0.128)	0.21* (0.118)	0.19 (0.119)	0.21** (0.079)	-0.08*** (0.017)	0.00 (0.015)	0.00 (0.014)	0.01 (0.093)
Δ balance(lagged)	0.77 (0.504)	-0.85* (0.456)	-0.84* (0.499)	-0.33 (0.325)	-0.25*** (0.080)	-0.06 (0.117)	-0.07 (0.125)	0.06 (0.421)
Δ outputgap(lagged)	0.16 (0.223)	0.39 (0.313)	0.38 (0.383)	0.25 (0.656)	-0.04 (0.054)	-0.12** (0.053)	-0.12** (0.055)	-0.13 (0.598)
Constant	8.66*** (2.633)	-0.33 (1.602)		0.16 (0.973)	0.09 (0.730)	-0.24 (0.337)		-0.15 (0.267)
Observations	76	70	70	76	76	70	70	76
R-squared	0.86	0.05	0.04		0.75	0.05	0.05	
Number of ifscode	6	6	6	6	6	6	6	6

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.3A Developing Asia 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.13** (0.067)	-0.07 (0.066)	-0.09 (0.064)	-0.04 (0.110)	-0.35*** (0.128)	-0.34*** (0.124)	-0.35*** (0.129)	-0.34*** (0.038)
Δ balance(lagged)	-0.11 (0.163)	0.09 (0.205)	0.01 (0.226)	-0.04 (0.097)	0.04** (0.016)	0.03 (0.016)	0.03* (0.017)	0.02** (0.010)
Constant	-3.11 (2.136)	-0.33 (0.432)		-0.50 (0.497)	2.06 (1.259)	0.06 (0.223)		0.03 (0.073)
Observations	393	371	371	393	395	373	373	395
R-squared	0.27	0.01	0.00		0.24	0.12	0.13	
Number of ifscode	21	21	21	21	21	21	21	21

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.3B Developing Asia controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.19 (0.157)	0.18 (0.158)	0.07 (0.170)	-1.29 (0.725)	0.01 (0.035)	0.02 (0.024)	0.01 (0.024)	-0.01 (0.082)
Δ balance(lagged)	0.05 (0.250)	-0.06 (0.189)	-0.12 (0.209)	5.17* (2.122)	-0.47** (0.204)	-0.39** (0.187)	-0.40** (0.181)	-0.49 (0.813)
Δ outputgap(lagged)	-0.18 (0.382)	-0.18 (0.197)	-0.27 (0.213)	-4.96** (1.841)	0.20* (0.109)	0.22** (0.104)	0.22** (0.102)	-0.69 (0.952)
Constant	-1.41 (2.395)	-0.13 (0.474)		-0.62 (0.395)	1.10 (0.708)	0.01 (0.135)		-0.02 (.)
Observations	103	97	97	103	103	97	97	103
R-squared	0.47	0.05	0.03		0.44	0.16	0.17	
Number of ifscode	6	6	6	6	6	6	6	6

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.4A Latin America 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.09 (0.069)	0.26** (0.106)	0.21* (0.106)	0.18*** (0.054)	0.03** (0.014)	0.04*** (0.015)	0.04*** (0.015)	0.04*** (0.012)
Δ balance(lagged)	-0.28* (0.158)	-0.34** (0.172)	-0.37** (0.172)	-0.30* (0.158)	-0.19*** (0.058)	-0.16*** (0.056)	-0.17*** (0.057)	-0.09* (0.054)
Constant	-1.46 (5.162)	-0.12 (0.347)		-0.08 (0.304)	-9.62*** (0.469)	-0.13 (0.103)		-0.06 (0.044)
Observations	613	580	580	613	616	581	581	616
R-squared	0.30	0.09	0.06		0.24	0.05	0.06	
Number of ifscode	32	32	32	32	32	32	32	32

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.4B Latin America controlling for the business cycle, 1970-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.12 (0.102)	0.26** (0.124)	0.20 (0.125)	0.23** (0.107)	0.02 (0.016)	0.03* (0.016)	0.03 (0.017)	0.03 (0.017)
Δ balance(lagged)	-0.38** (0.187)	-0.54*** (0.204)	-0.57*** (0.206)	-0.51** (0.208)	-0.21*** (0.067)	-0.12* (0.064)	-0.14** (0.067)	-0.11 (0.067)
Δ outputgap(lagged)	0.33** (0.146)	0.18 (0.148)	0.14 (0.151)	0.22 (0.225)	-0.11** (0.057)	-0.08 (0.052)	-0.08 (0.053)	-0.09 (0.075)
Constant	5.77 (5.206)	0.07 (0.366)		0.10 (0.366)	-1.64*** (0.480)	-0.16 (0.104)		-0.12** (0.056)
Observations	514	485	485	514	514	485	485	514
R-squared	0.29	0.10	0.07		0.22	0.05	0.05	
Number of ifscode	29	29	29	29	29	29	29	29

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.5A Sub-Saharan Africa 1970-2014

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.06 (0.075)	0.17* (0.093)	0.09 (0.074)	0.16* (0.084)	0.01 (0.048)	0.02 (0.056)	0.02 (0.063)	0.02 (0.036)
Δ balance(lagged)	0.01 (0.065)	0.02 (0.070)	0.01 (0.072)	0.02* (0.012)	-0.50* (0.259)	-0.50* (0.272)	-0.50* (0.277)	-0.50*** (0.009)
Constant	11.48** (4.917)	-2.30*** (0.810)		-2.49*** (0.743)	2.10 (2.089)	0.21 (0.819)		0.16 (0.145)
Observations	788	740	740	788	793	744	744	793
R-squared	0.18	0.03	0.01		0.33	0.25	0.25	
Number of ifscode	44	44	44	44	44	44	44	44

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

7.5B Sub-Saharan Africa controlling for the business cycle, 1970-2014

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.02 (0.149)	0.13 (0.120)	0.08 (0.132)	0.06 (0.180)	0.00 (0.033)	0.01 (0.029)	0.00 (0.035)	0.03 (0.000)
Δ balance(lagged)	-0.13 (0.346)	-0.23 (0.226)	-0.26 (0.219)	0.29 (0.771)	-0.14 (0.176)	-0.05 (0.163)	-0.06 (0.170)	-0.09 (0.000)
Δ outputgap(lagged)	-0.44 (0.770)	0.27 (0.451)	0.29 (0.437)	-3.01 (1.798)	-0.12 (0.229)	0.07 (0.172)	0.07 (0.185)	-1.68 (0.000)
Constant	1.12 (1.810)	-0.35 (0.615)		-0.38 (0.417)	1.59 (2.356)	-0.27 (0.262)		-0.30 (0.000)
Observations	106	99	99	106	106	99	99	106
R-squared	0.25	0.04	0.02		0.27	0.00	0.00	
Number of ifscode	7	7	7	7	7	7	7	7

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 8. Estimations of Debt Ratios and Primary Balances, 1970-2014, by time periods**8.1A Estimations of Debt Ratios and Primary Balances, 1975-1985**

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.10 (0.239)	0.25 (0.154)	-0.04 (0.208)	0.33** (0.125)	0.02 (0.125)	0.12 (0.109)	-0.01 (0.129)	-0.02 (0.142)
Δ balance(lagged)	-0.28 (0.253)	-0.08 (0.193)	-0.41* (0.233)	-0.18 (0.123)	-0.47*** (0.120)	-0.32*** (0.124)	-0.36*** (0.133)	-0.33** (0.145)
Constant	-2.86** (1.124)	4.00*** (1.058)		3.13*** (1.002)	1.14*** (0.415)	-0.05 (0.461)		0.30 (0.450)
Observations	72	50	46	72	73	51	46	73
R-squared	0.54	0.05	0.09		0.50	0.15	0.21	
Number of ifscode	21	21	21	21	21	21	21	21

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.1B Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, 1975-1985

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.04 (0.234)	0.54*** (0.133)	-0.18 (0.231)	-0.12 (0.849)	0.00 (0.149)	0.16* (0.084)	0.04 (0.168)	0.18 (0.331)
Δ balance(lagged)	-0.03 (0.234)	0.06 (0.250)	-0.11 (0.194)	-0.63 (0.851)	-0.32 (0.262)	-0.12 (0.211)	-0.37 (0.271)	0.01 (0.380)
Δ outputgap(lagged)	0.02 (0.315)	-0.22 (0.313)	-0.34 (0.218)	0.48 (0.825)	-0.03 (0.216)	0.07 (0.201)	0.14 (0.173)	0.05 (0.336)
Constant	-4.16** (2.011)	1.20** (0.611)		3.50 (2.898)	1.35* (0.697)	0.09 (0.386)		-0.17 (0.781)
Observations	44	31	30	44	45	32	30	45
R-squared	0.72	0.37	0.20		0.58	0.13	0.15	
Number of ifscode	12	12	12	12	12	12	12	12

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.2A Estimations of Debt Ratios and Primary Balances, 1985-1995

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.06 (0.085)	0.06 (0.073)	0.07 (0.091)	0.07*** (0.014)	-0.85*** (0.175)	-0.79*** (0.173)	-0.88*** (0.189)	-0.79*** (0.071)
Δ balance(lagged)	-0.28** (0.113)	-0.16 (0.166)	-0.15 (0.107)	-0.22* (0.116)	-0.01 (0.116)	0.10 (0.250)	0.22 (0.294)	0.05 (0.097)
Constant	3.95* (2.225)	0.60 (0.684)		0.59 (0.722)	0.53 (1.279)	-0.30 (1.317)		0.04 (0.946)
Observations	435	377	373	435	445	384	380	445
R-squared	0.32	0.04	0.05		0.55	0.47	0.54	
Number of ifscode	75	75	75	75	75	75	75	75

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.2B Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, 1985-1995

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.01 (0.107)	0.35*** (0.102)	0.11 (0.106)	0.38*** (0.114)	0.05 (0.035)	0.04 (0.027)	0.05* (0.033)	0.03 (0.035)
Δ balance(lagged)	-0.49** (0.247)	-0.62** (0.269)	-0.58** (0.263)	-0.42* (0.250)	0.09 (0.092)	0.26*** (0.084)	0.18* (0.099)	0.24* (0.125)
Δ outputgap(lagged)	-0.08 (0.154)	0.07 (0.167)	-0.30 (0.185)	-0.01 (0.245)	0.07 (0.061)	0.03 (0.065)	0.11 (0.073)	-0.01 (0.106)
Constant	0.97 (1.376)	0.57 (0.376)		0.65 (0.477)	-0.03 (0.571)	-0.08 (0.127)		0.10 (0.102)
Observations	228	204	204	228	229	205	205	229
R-squared	0.42	0.18	0.10		0.24	0.08	0.07	
Number of ifscode	33	33	33	33	33	33	33	33

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.3A Estimations of Debt Ratios and Primary Balances, 1995-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.19** (0.096)	-0.04 (0.076)	-0.16 (0.100)	-0.09 (0.088)	0.06** (0.025)	0.02** (0.010)	0.06** (0.028)	-0.02 (0.040)
Δ balance(lagged)	-0.04 (0.086)	-0.02 (0.118)	-0.03 (0.092)	0.05*** (0.016)	-0.29 (0.413)	-0.24 (0.470)	-0.28 (0.420)	-0.43*** (0.023)
Constant	3.13 (2.591)	-1.14*** (0.425)		-1.35*** (0.448)	3.59 (2.428)	0.87** (0.397)		0.73** (0.328)
Observations	1,331	1,229	1,224	1,331	1,331	1,229	1,224	1,331
R-squared	0.22	0.00	0.03		0.29	0.09	0.15	
Number of ifscode	161	161	161	161	161	161	161	161

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.3B Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, 1995-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.01 (0.075)	0.18** (0.086)	0.02 (0.084)	0.08 (0.067)	0.02* (0.014)	0.02* (0.013)	0.03* (0.014)	0.01 (0.015)
Δ balance(lagged)	-0.42*** (0.151)	-0.58*** (0.166)	-0.62*** (0.169)	-0.43*** (0.142)	-0.17*** (0.055)	-0.11* (0.057)	-0.15** (0.062)	-0.05 (0.046)
Δ outputgap(lagged)	-0.05 (0.191)	0.04 (0.173)	0.00 (0.211)	-0.08 (0.181)	-0.07 (0.052)	-0.03 (0.048)	-0.03 (0.056)	-0.03 (0.075)
Constant	3.39 (2.426)	-0.10 (0.305)		-0.19 (0.315)	0.21 (0.697)	0.18** (0.083)		0.18*** (0.058)
Observations	709	647	644	709	709	647	644	709
R-squared	0.23	0.06	0.03		0.17	0.02	0.04	
Number of ifscode	92	92	92	92	92	92	92	92

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.4A Estimations of Debt Ratios and Primary Balances, 2005-20174

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.18** (0.090)	0.45*** (0.099)	0.23*** (0.082)	0.40*** (0.148)	0.09** (0.040)	0.06 (0.041)	0.08* (0.041)	0.07 (0.049)
Δ balance(lagged)	0.04 (0.123)	0.12 (0.125)	0.03 (0.123)	0.10 (0.076)	-0.45** (0.177)	-0.41** (0.166)	-0.41** (0.175)	-0.38*** (0.037)
Constant	-2.23 (1.614)	-0.13 (0.229)		-0.57** (0.274)	2.18** (1.025)	-0.35*** (0.124)		-0.13 (0.126)
Observations	1,547	1,542	1,542	1,547	1,547	1,542	1,542	1,547
R-squared	0.38	0.22	0.06		0.31	0.21	0.22	
Number of ifscode	173	173	173	173	173	173	173	173

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

8.4B Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, 2005-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.21*** (0.071)	0.46*** (0.056)	0.28*** (0.065)	0.47*** (0.051)	0.05** (0.026)	0.06*** (0.023)	0.08*** (0.025)	0.05*** (0.015)
Δ balance(lagged)	-0.19** (0.084)	-0.22** (0.090)	-0.28*** (0.085)	-0.25*** (0.069)	-0.22** (0.086)	-0.08 (0.071)	-0.10 (0.081)	-0.07 (0.051)
Δ outputgap(lagged)	0.10 (0.089)	0.19** (0.090)	0.10 (0.084)	0.16** (0.062)	0.01 (0.038)	0.02 (0.043)	0.03 (0.041)	0.02 (0.039)
Constant	0.04 (1.043)	0.68*** (0.193)		0.47*** (0.158)	0.76 (0.807)	-0.30*** (0.087)		-0.18*** (0.044)
Observations	853	850	850	853	853	850	850	853
R-squared	0.43	0.22	0.11		0.29	0.03	0.04	
Number of ifscode	95	95	95	95	95	95	95	95

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

Table 9. Estimations of Debt Ratios and Primary Balances, 1970-2014, before and after the GFC

9.1A Estimations of Debt Ratios and Primary Balances, before GFC 1970-2007

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	-0.13** (0.062)	0.05 (0.062)	-0.06 (0.063)	-0.04 (0.068)	0.02 (0.048)	-0.03 (0.058)	-0.00 (0.069)	-0.00 (0.030)
Δ balance(lagged)	0.02 (0.070)	0.01 (0.071)	0.01 (0.074)	0.02 (0.023)	-0.50* (0.273)	-0.48* (0.276)	-0.49* (0.286)	-0.49*** (0.029)
Constant	1.75 (1.891)	-1.54*** (0.346)		-1.80*** (0.426)	1.38 (1.187)	0.60* (0.361)		0.63*** (0.204)
Observations	2,091	1,910	1,908	2,091	2,102	1,918	1,916	2,102
R-squared	0.21	0.00	0.00		0.27	0.23	0.23	
Number of ifscore	168	168	168	168	168	168	168	168

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

9.1B Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, before GFC 1970-2007

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.09 (0.066)	0.25*** (0.081)	0.12 (0.078)	0.15** (0.069)	0.02 (0.012)	0.02* (0.011)	0.02 (0.013)	0.01 (0.013)
Δ balance(lagged)	-0.37*** (0.118)	-0.53*** (0.132)	-0.54*** (0.129)	-0.37*** (0.120)	-0.10** (0.046)	-0.05 (0.047)	-0.07 (0.051)	-0.00 (0.044)
Δ outputgap(lagged)	0.00 (0.114)	-0.00 (0.117)	-0.12 (0.124)	-0.16 (0.127)	-0.01 (0.039)	0.02 (0.037)	0.02 (0.040)	0.02 (0.052)
Constant	-0.42 (2.160)	-0.33 (0.226)		-0.32 (0.249)	1.53 (1.057)	0.16** (0.065)		0.17*** (0.033)
Observations	1,124	1,027	1,026	1,124	1,126	1,029	1,028	1,126
R-squared	0.24	0.09	0.05		0.12	0.01	0.01	
Number of ifscore	95	95	95	95	95	95	95	95

Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

9.2A Estimations of Debt Ratios and Primary Balances, after GFC 2008-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.26** (0.113)	0.46*** (0.124)	0.26** (0.106)	0.46*** (0.142)	0.12*** (0.045)	0.10** (0.048)	0.13*** (0.045)	0.07* (0.037)
Δ balance(lagged)	-0.05 (0.063)	0.05 (0.102)	-0.03 (0.067)	0.14** (0.073)	-0.33** (0.133)	-0.30* (0.162)	-0.31** (0.130)	-0.40*** (0.026)
Constant	3.20* (1.781)	0.93*** (0.228)		0.47** (0.212)	-0.93 (1.221)	-0.75*** (0.159)		-0.62*** (0.123)
Observations	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204
R-squared	0.41	0.28	0.09		0.40	0.23	0.26	
Number of ifscode	173	173	173	173	173	173	173	173

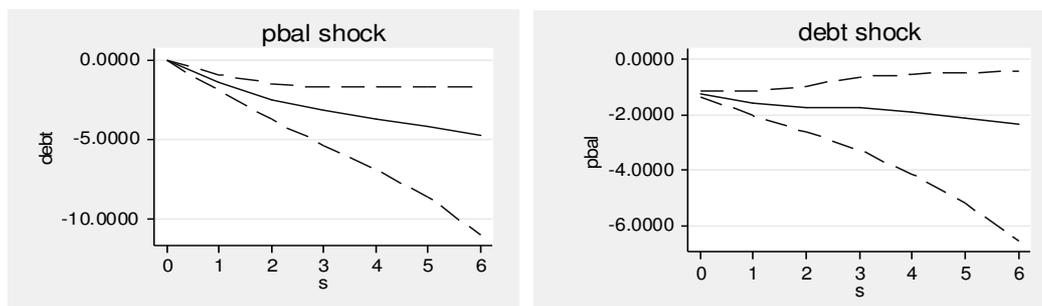
Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

9.2B Estimations of Debt Ratios and Primary Balances, controlling for the business cycle, before GFC 2008-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	D.debt				D.bal			
Regressors/estimation	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM	OLS with country and time effects	Pooled IV-FE	Panel IV-FE	SYS-GMM
Δ debt(lagged)	0.14* (0.085)	0.40*** (0.062)	0.13* (0.076)	0.47*** (0.057)	0.08** (0.033)	0.10*** (0.027)	0.14*** (0.033)	0.08*** (0.022)
Δ balance(lagged)	-0.26*** (0.090)	-0.20** (0.095)	-0.32*** (0.087)	-0.18** (0.088)	-0.23** (0.100)	-0.07 (0.076)	-0.09 (0.091)	-0.09* (0.054)
Δ outputgap(lagged)	0.08 (0.097)	0.24*** (0.092)	0.13* (0.077)	0.18** (0.081)	0.01 (0.043)	0.01 (0.049)	0.04 (0.048)	0.05 (0.051)
Constant	4.33*** (1.344)	1.62*** (0.222)		1.02*** (0.184)	-1.35 (1.080)	-0.58*** (0.100)		-0.43*** (0.070)
Observations	665	665	665	665	665	665	665	665
R-squared	0.38	0.17	0.05		0.32	0.06	0.09	
Number of ifscode	95	95	95	95	95	95	95	95

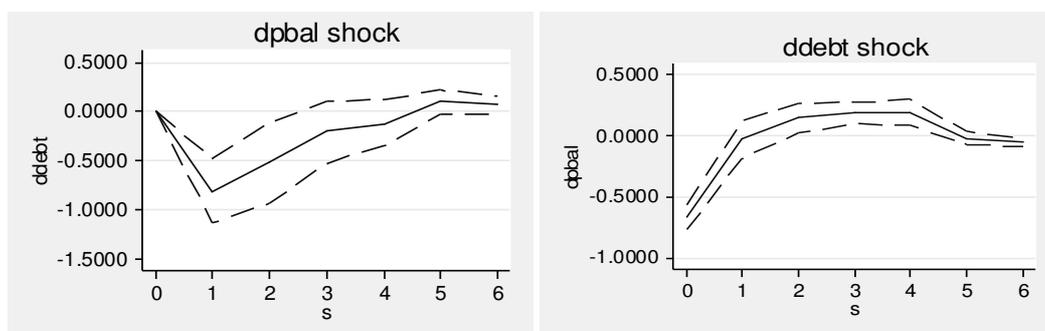
Note: Dependent variables identified in the second row; estimation approach identified in the third row. Country and time effects estimated and omitted for reasons of parsimony (where applicable). Robust standard errors in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively.

**Figure 1. Response of debt and primary balance ratios from an estimated PVAR, all countries, years
In levels**



Note: Impulse-responses for 4 lag VAR of debt, primary balance and output gap. Vertical axis identifies the response variable; the top heading identifies the shock variable. Errors are 5 percent on each side generated by Monte-Carlo with 500 replications.

**Figure 2. Response of debt and primary balance ratios from an estimated PVAR, all countries, years
In first differences**



Note: Impulse-responses for 4 lag VAR of the first difference of debt, first difference of primary balance and first difference of output gap. Vertical axis identifies the response variable; the top heading identifies the shock variable. Errors are 5 percent on each side generated by Monte-Carlo with 500 replications.

APPENDIX

Table A1 – Income groups

AE	United States, United Kingdom, Austria, Belgium, Denmark, France, Germany, Italy, Luxembourg, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Iceland, Ireland, Malta, Portugal, Australia, Spain, New Zealand, Cyprus, Israel, Korea, Singapore, Czech Republic, Slovak Republic, Estonia, Latvia, Lithuania, Slovenia.
EME	Turkey, South Africa, Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Mexico, Panama, Paraguay, Peru, Venezuela, Antigua and Barbuda, Bahamas, Barbados, Belize, Jamaica, St. Kitts and Nevis, Suriname, Trinidad and Tobago, Bahrain, Iran, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, UAE, Brunei, Sri Lanka, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand, Algeria, Angola, Botswana, Equatorial Guinea, Gabon, Libya, Mauritius, Morocco, Seychelles, Namibia, Swaziland, Tunisia, Fiji, Armenia, Azerbaijan, Albania, Bulgaria, Russia, China, Turkmenistan, Ukraine, Serbia, Hungary, Croatia, Bosnia, Poland, Romania.
LIC	Bolivia, Haiti, Honduras, Nicaragua, Yemen, Bangladesh, Myanmar, Cambodia, Nepal, Vietnam, Cameroon, Congo Republic, Congo Democratic, Benin, Ethiopia, Ghana, Cote Ivoire, Kenya, Madagascar, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sudan, Uganda, Zambia, Papua New Guinea, Kyrgyz, Moldova, Tajikistan, Uzbekistan.

Table A2 – Regional groups

Euro Area	Austria, Belgium, France, Germany, Italy, Luxembourg, Netherlands, Finland, Greece, Ireland, Malta, Portugal, Spain, Cyprus, Slovak, Estonia, Latvia, Slovenia.
Commonwealth of Independent States (CIS)	Armenia, Azerbaijan, Kyrgyz, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Developing Asia	Bangladesh, Bhutan, Brunei, Myanmar, Cambodia, Sri Lanka, India, Indonesia, Malaysia, Maldives, Nepal, Philippines, Thailand, Vietnam, Fiji, Vanuatu, Papua New Guinea, Samoa, Tonga, China.
Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Venezuela, Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Guyana, Belize, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent, Suriname, Trinidad and Tobago.
Sub-Saharan Africa	Sotuh Africa, Angola, Gostwana, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Comoros, Congo Republic, Congo Democratic, Benin, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea Bissau, Guinea, Cote Ivoire, Kenya, Lesotho, Liberia, Madagascar, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Seychelles, Senegal, Sierra Leone, Namibia, Swaziland, Uganda, Zambia.