THE EFFECTS OF FISCAL CONSOLIDATIONS ON THE COMPOSITION OF GOVERNMENT SPENDING

Moulaye Bamba[(a)], Jean-Louis Combes[(a)], Alexandru Minea[(a)(b)(c)]

(a) CERDI and School of Economics, University Clermont Auvergne, France
(b) Department of Economics, Carleton University, Canada
(c) Corresponding author: alexandru.minea@uca.fr

Abstract: In response to increasing debt paths, governments often implement fiscal consolidation programs. This paper studies the impact of these programs on the composition of government spending. System-GMM estimations performed on a sample of 53 developed and emerging countries over 1980-2011 reveal that fiscal consolidations significantly reduce the government investment-to-consumption ratio, i.e. a *composition* effect. Robust to a wide set of tests, this significantly stronger contraction of government investment with respect to government consumption is at work particularly when debt is high, for spending-based fiscal consolidations, in the low phase of the economic cycle, and following debt and stock market crises. Therefore, in such contexts, fiscal consolidations aimed at short-run stabilization may hurt the economy in the long-run through their detrimental effect on public investment, calling for a reflection upon how they could be re-designed to allow avoiding such undesirable consequences.

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1 Introduction

To fight the detrimental effects of the recent financial crisis, many governments adopted large demand-based fiscal stimuli. Designed to boost economy activity, these policies resulted into large fiscal deficits and debt-to-GDP ratios. Given the danger on public finance sustainability, governments decided to implement fiscal consolidation programs.

There exists a large and increasing literature on fiscal consolidations. While surveying it is beyond the scope of this paper, important questions related to fiscal consolidations include: (i) the size of the fiscal consolidation episode, see e.g. Giavazzi and Pagano (1995) or Ardagna (2004); (ii) its persistence, see e.g. Drazen (1990), Heylen and Everaert (2000), or Barrios et al. (2010); (iii) its measure, usually based on observed variables such as the cyclically-adjusted primary balance, or on the narrative approach, see e.g. Alesina and Ardagna (1998); Alesina and Ardagna (2010); Cotis et al. (2004); Guajardo et al. (2014) for comparisons of alternative methods; and (iv) the variable that adjusts, namely spending or taxes. On this last point, Afonso and Jalles (2012); Alesina and Ardagna (1998); Alesina and Perotti (1995); McDermott and Wescott (1996), among others, found that successful fiscal consolidations mainly rely on expenditure cuts rather than tax increases, and e.g. Alesina and Ardagna (2013); Alesina et al. (2015, 2018); Heylen et al. (2013); Schaltegger and Feld (2009) conclude that fiscal consolidations led by spending cuts are more likely to generate growth and reduce deficits/debt than those led by tax hikes.

Consequently, focusing on public spending, several contributions investigated the component of public expenditure that should be cut in the process of fiscal consolidation. On the one hand, governments could reduce public investment, which is less effective for debt reduction (Alesina and Perotti, 1995) but politically more acceptable. However, the decline in public investment may hurt overall productivity (Aschauer, 1989), economic growth (Abiad et al., 2016), and welfare (Heijdra and Meijdam, 2002), to the point where, given the current global mild economic conditions, the IMF (2014, 2015) advocates for large public investment in infrastructure to sustain the global recovery after the crisis (echoing the 2014 "Juncker Plan" of the European Commission). On the other hand, governments could reduce current spending, which are more efficient for deficit reduction but may affect governments' probability of reelection (Roubini and Sachs, 1989), and raise inequality and poverty (Agnello and Sousa, 2014).

Taking stock of these studies, the goal of this paper is to analyze the effect of fiscal consolidations on the composition of public spending. Despite being of particular importance, given the benefits and costs associated with reducing each type of public spending, this issue remains fairly unexplored with the notable exception of Castro (2017). Compared with Castro (2017), we draw upon Alesina and Ardagna (2013)'s novel measure of fiscal consolidations that accounts for the size and the persistence of the adjustment (instead of a dummy variable as a measure of fiscal consolidations, see also De Haan et al. (1996)[1]). In addition, while Castro (2017) looks at different components of government expenditure in 15 EU countries, we specifically focus on the government investment-to-consumption ratio to assess the relative change between them. Using the system-GMM estimator of Blundell and Bond (1998) that properly tackles endogeneity, our findings based on a large sample of 53 developed and emerging countries over the 1980-2011 period are as follows.

First, while we confirm that fiscal consolidations reduce both the government investment-to-GDP ratio (Balassone and Franco (1999); De Haan et al. (1996); Jonakin and Stephens (1999);

[1] Alternatively, Oxley and Martin (1991) draw upon descriptive statistics.

Turrini (2004); Välilä and Mehrotra (2005))[2] and the government consumption-to-GDP ratio (Castro (2017))–a level effect, we reveal that the government investment-to-consumption ratio equally significantly declines–a *composition* effect. Consequently, government investment is found to decrease more than government consumption during fiscal consolidations.

Second, we investigate the robustness of this finding with respect to an important source of debate, namely the definition of fiscal consolidations. Moving away from Alesina and Ardagna (2013)'s definition (used in our baseline analysis), we consider different lengths of the period used to define a fiscal consolidation episode, as well as endogenous definitions of fiscal consolidations following Yang et al. (2015). Estimations with these alternative measures confirm the existence of a composition effect, and this decline of the government investment-to-consumption ratio remains robust when further controlling for periods unrelated to fiscal consolidations, or for a wide set of additional control variables.

Third, we explore the sensitivity of the composition effect with respect to fiscal conditions, the overall state of the economy, and the presence of crises. Estimations show that fiscal consolidations significantly reduce the government investment-to-consumption ratio only in a context of high debt, when they are spending-based, and in the low phase of the economic cycle. Next, we find that the contraction of the government investment-to-consumption ratio can be up to four times higher in non-OECD compared with OECD countries following fiscal consolidations. Moreover, further estimations reveal that a composition effect is at work when fiscal consolidations occur after stock market crises and particularly after debt crises, while the ratio government investment-to-consumption is not significantly affected by fiscal consolidations taking place after banking, inflation, or currency crises.

Finally, we assess the effect of fiscal consolidations on the components of public spending. While the contraction of government investment is significantly stronger than that of public wages, education, and health government spending, fiscal consolidations are associated with a higher ratio of government investment to transfers & subsidies, suggesting a relatively stronger decline of the latter with respect to the former.

The paper is organized as follows. Section 2 discusses the measurement of fiscal consolidation episodes, Section 3 presents the data and the methodology, Section 4 reports the baseline results, Section 5 analyzes their robustness, Section 6 explores the sensitivity of our findings to various economic characteristics, Section 7 looks at the sub-components of government consumption, and Section 8 concludes.

2 Identification of fiscal consolidation episodes

2.1 Fiscal impulse measurement

We define a discretionary fiscal consolidation episode following the cyclically-adjusted primary balance (CAPB) approach developed by Blanchard (1990), and adopted by Alesina and Perotti (1995; 1997) and Alesina and Ardagna(1998; 2013), which consists of extracting the discretionary part of fiscal variables, excluding interest payments. Following Alesina and Perotti (1995), we

[2]Following the pioneering work of Musgrave (1939), Blanchard and Giavazzi (2004), among others, defended the idea of a "golden rule" of public finance, for protecting public investment by excluding it from the accountancy of the Stability and Growth Pact (SGP) 3% deficit rule. For a theoretical analysis of the golden rule, see e.g. Minea and Villieu (2009).

build the CAPB in two steps. First, we regress for each country revenues R_t and spending G_t (in ratio of GDP) on a linear time trend (TREND) and the unemployment rate U_t, to obtain the cyclically-adjusted revenues and spending (in ratio of GDP)

$$R_t = \alpha_0 + \beta_0 TREND + \gamma_0 U_t + \epsilon_t, \tag{1}$$

$$G_t = \alpha_1 + \beta_1 TREND + \gamma_1 U_t + u_t. \tag{2}$$

Using the estimated parameters we compute what would have been revenues and spending in time t if the unemployment rate has remained constant between t and $t-1$

$$R_t^*(U_{t-1}) = \hat{\alpha_0} + \hat{\beta_0} TREND + \hat{\gamma_0} U_{t-1}, \tag{3}$$

$$G_t^*(U_{t-1}) = \hat{\alpha_1} + \hat{\beta_1} TREND + \hat{\gamma_1} U_{t-1}. \tag{4}$$

Second, we construct the discretionary change in the fiscal balance as the difference between the cyclically-adjusted fiscal variables in year t, and their respective values in year $t-1$

$$CAPB_t = [R_t^* - R_{t-1}] - [G_t^* - G_{t-1}]. \tag{5}$$

2.2 Definition of fiscal consolidation episodes

There are several ways to define a fiscal consolidation episode, usually based on a threshold value related to the size or the persistence of the change in the fiscal policy (see (Yang et al., 2015), for a summary of different definitions). We define our fiscal consolidation episode following Alesina and Ardagna (2013).

Definition 1. *A fiscal consolidation is either:*

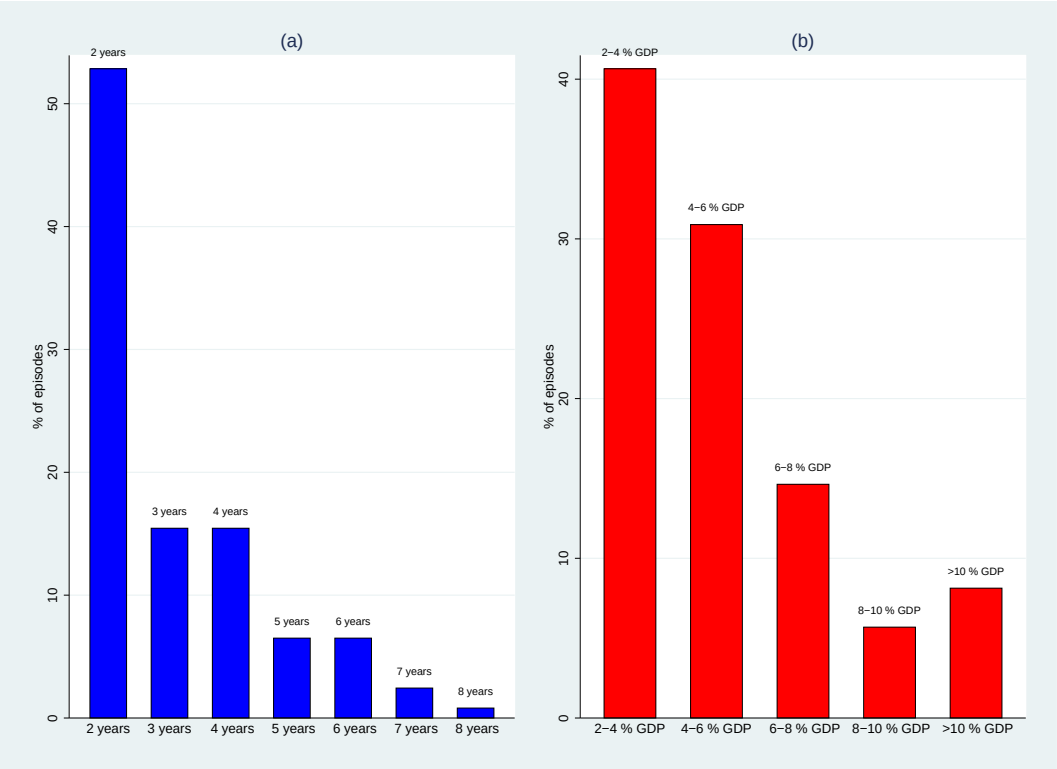
(1) the value of the fiscal retrenchment over a 2-year period if the ratio CAPB/GDP improves each year, and the cumulative improvement is of at least 2 percentage points, or

(2) the value of the fiscal retrenchment over a 3-year or more period if the ratio CAPB/GDP improves each year, and the cumulative improvement is of at least 3 percentage points.

This definition has several merits. First, it uses the novel approach that includes both the size and the persistence in the assessment of fiscal consolidations, whereas the size refers to the amplitude (intensity) of the CAPB/GDP change, and the persistence captures the length of the adjustment. Considering both features can overcome the famous "stop-and-go" problem in the fiscal consolidations literature. Second, it ensures the comparability of our analysis with the recent literature on fiscal consolidations that widely draws upon this definition (see e.g. Alesina and Ardagna(2010; 2013); Leigh et al., 2010; Guajardo et al., 2014;Yang et al., 2015).

We identified 123 fiscal consolidation episodes during our considered period of 32 years. Figure 1 depicts the distribution of these episodes in percentage of the total number of fiscal consolidations in our sample, based on their size and persistence. Among them, 65 fiscal consolidations (52.85%) last 2 years, 19 (15.45%) last 3 years, and so on (see the Appendix for the list of fiscal consolidations); and 50 fiscal consolidations (40.65%) improve the fiscal balance between 2-4 percentage points of GDP, 38 (30.89%) between 4-6 percentage points of GDP, and so forth.

Figure 1 – Distribution of the fiscal consolidation episodes by persistence and size



(a): the percentage of fiscal consolidations by length. (b): the percentage of fiscal consolidations by size.

3 Data, and methodology

3.1 Data

Our study is performed in an unbalanced panel covering the period 1980-2011. Using Mauro et al. (2015) database, which provides the widest coverage of fiscal aggregates to our knowledge, we obtained data for 56 developed and emerging countries. However, the need of unemployment data to build the CAPB forced us to exclude three countries, leading to a sample of 53 countries. We refrained from considering developing countries in our sample, given the high quality data on unemployment required by the computation of the CAPB.

Our dependent variables are government investment (GI), and government final consumption (GC). Government investment includes government expenditure devoted to fixed and durable goods, such as roads, energy, and telecommunications infrastructures (source: (IMF, 2017) database). According to the National Accounting System, government final consumption encompasses all current expenditure used for purchasing goods and services, excluding the military materials that are included in the government investment, but including compensation of employees and interest payments (source: WDI, 2016).

Control variables are those that can impact government spending, and may even affect fiscal consolidations, classified in two groups. First, the macroeconomic variables are (i) debt ($DEBT$), (ii) real growth ($GROWTH$), (iii) private investment ($IPRIV$), (iv) foreign direct investment

(FDI), (v) aid (AID), (vi) remittances ($REMIT$), (vii) trade openness ($TRADE$), (viii) natural resources rents ($NATR$), (ix) terms of trade (TOT), and (x) a dummy variable capturing the impact of being under an IMF program ($IMFP$); except real growth and the IMF program dummy, all variables are in ratio of GDP, and aid is in ratio of GNI. Second, we consider variables related to population, namely: (i) population growth ($POPr$), (ii) the share of population above 65 years old ($POP65$), (iii) the urban rate (URB), and (iv) the log of population size ($LPOP$); and to institutions, namely: (v) a left-wing governments dummy ($EXECL$), (vi) the political color of the legislature ($PCOL$), (vii) the presence of an electoral period ($EXELEC$), and (viii) government stability (GOV). The Appendix reports the sources, definitions, and descriptive statistics of variables.

3.2 The econometric model

We estimate the following dynamic model with country-fixed effects

$$GI_{it} = \alpha_0 + \rho_0 GI_{it-1} + \beta_0 CONS_{it} + \beta_0^k X_{it}^k + v_i + \epsilon_{it}, \tag{6}$$

$$GC_{it} = \alpha_1 + \rho_1 GC_{it-1} + \beta_1 CONS_{it} + \beta_1^k X_{it}^k + \mu_i + u_{it}. \tag{7}$$

The dependent variable $GI_{it}(GC_{it})$ stands for government investment (consumption) in ratio of GDP, ρ accounts for inertia in the dynamics of GI or GC, β^k is the marginal effect of each of the k control variable, $v_i(\mu_i)$ are country-fixed effects, and $\epsilon_{it}(u_{it})$ is the error term. The coefficient of interest is β_0 (β_1), which captures the effect of our fiscal consolidation variable ($CONS$) on $GI_{it}(GC_{it})$.

We use the Blundell and Bond (1998) system-GMM estimator in our baseline model, for the following reasons. First, OLS lead to bias estimates, since they do not account for country-unobserved heterogeneity. However, the country-fixed effects estimator is also inconsistent when the time panel dimension is short, due to the correlation between the lagged dependent variable and the error terms (Nickell, 1981). Besides, Hauk and Wacziarg (2009) emphasize that the fixed-effects estimator worsens the bias related to measurement errors, and undervalues the impact of covariates in a dynamic panel setting with time-persistent regressors, as in our case. Second, while the difference-GMM estimator copes with the heterogeneity bias in the first-difference step and mitigates endogeneity issues, it suffers from a weak-instrument problem due to the weak correlation between lagged variables in level and variables in first-difference in the presence of time-persistence (Alonso-Borrego and Arellano, 1999). Third, the system-GMM provides more consistent and efficient estimators than the difference-GMM in dynamic panels in the presence of highly-persistent variables over time ((Blundell and Bond, 1998) and (Blundell et al., 2001)). Finally, the system-GMM provides a smaller bias (in terms of size) than the difference-GMM or the fixed-effects estimators, even when the required stationary condition is doubtful (Hauk and Wacziarg, 2009).

4 Baseline results

Our baseline results are presented in Tables 1, 2, and 3. When implementing the system-GMM estimator, we overcome the proliferation of instruments by collapsing the matrix of instruments to have less instruments than countries (Roodman, 2009).[3] In addition to the strong effect of the

[3] In addition, we report that the variables are stationary (results are available upon request).

lagged depending variable, the use of the system-GMM estimator is equally supported by usual diagnostic tests, namely valid instruments (see the p-value of the Hansen test), and the presence (absence) of first-order (second-order) autocorrelation in the dependent variable as shown by the AR(1) (AR(2)) test.

4.1 Level effects

According to Table 1, fiscal consolidations significantly decrease GI on average, even in the presence of different control variables. Analogously, fiscal consolidations equally significantly decrease GC on average, as shown by Table 2.[4]

It is then interesting to compare the effect of fiscal consolidations on GI and GC. As shown by Tables 1-2, fiscal consolidations are found to decrease both variables. In terms of magnitude, based on columns (8) of Tables 1-2, a one percentage point increase of the ratio CAPB/GDP (under a fiscal consolidation) reduces the GI (GC) ratio by 0.085 (0.100) percentage points. However, concluding that these coefficients are statistically different (or not) is a fairly complicated task, given that they are of comparable size (all the more if we take into account standard errors), and are extracted from different regressions. In addition, when estimating the effect of fiscal consolidations on GI (GC), we use GC (GI) ratio as a covariate, i.e. the impact of fiscal consolidations on government investment (consumption) is computed for a *given* level of government consumption (investment); as such, we capture a pure level effect, and cannot assess their relative change. To deal with this issue in a more appropriate manner, we look in the following at the composition effect of fiscal consolidations.

4.2 The *composition* effect: government investment *versus* government consumption

To evaluate the relative response of the two types of public spending, we modify equations (6)-(7) and look at the effect of fiscal consolidations on the ratio GI/GC

$$\frac{GI_{it}}{GC_{it}} = \alpha_2 + \rho_2 \frac{GI_{it-1}}{GC_{it-1}} + \beta_2 CONS_{it} + \beta_2^k X_{it}^k + \lambda_i + \xi_{it}, \tag{8}$$

with $\frac{GI_{it}}{GC_{it}}$ the ratio between government investment and consumption.

Table 3 presents the results. As shown by regression (1), fiscal consolidations significantly decrease the ratio GI/GC. Corroborated with the individual decline previously emphasized for GI and GC, it comes that the relative change in the government investment ratio is stronger than the relative change in the government consumption ratio.[5]

[4] Only few control variables are significant. For example, an increase in private investment sometimes raises GI, but does not affect GC, suggesting that substitution effects between private and public investment may be at work. Conversely, higher economic growth and debt reduce only GC, the latter effect arising probably because of the reallocation of resources towards the payment of the increasing debt burden. Finally, higher trade is associated with a decrease in both GI and GC.

[5] This result can be intuitively supported as follows. The mean of the government investment ratio (4.13%) is roughly four times lower than the mean of the government consumption ratio (16.22%). Since the negative effect of fiscal consolidations is roughly the same (see the coefficients of $CONS$ in Tables 1-2), the relative decrease of the GI ratio is stronger. However, what Table 3 adds, in particular, is that this decrease is significant. According to the last column of Table 3, an improvement of the CAPB of 1.70 percentage points of GDP (the average CAPB improvement during fiscal consolidations) reduces the GI/GC ratio by roughly 3.8 percentage points of GDP in the long-run.

Table 1 – The effect of fiscal consolidations on the government investment-to-GDP ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GI_{it-1}	0.903***	0.798***	0.894***	0.620***	0.734***	0.636***	0.636***	0.928***
	(0.191)	(0.241)	(0.256)	(0.196)	(0.198)	(0.094)	(0.089)	(0.068)
$CONS_{it}$	-0.103***	-0.096***	-0.122***	-0.099***	-0.100***	-0.085***	-0.085***	-0.085***
	(0.025)	(0.028)	(0.034)	(0.028)	(0.025)	(0.020)	(0.019)	(0.024)
GC_{it}		-0.023	-0.010	0.004	0.002	0.001	-0.005	0.007
		(0.054)	(0.062)	(0.057)	(0.052)	(0.057)	(0.054)	(0.042)
$DEBT_{it-1}$			-0.004	-0.002	-0.002	-0.002	-0.002	-0.005
			(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.005)
$GROWTH_{it}$				-0.016	-0.005	-0.005	-0.003	0.018
				(0.014)	(0.014)	(0.011)	(0.010)	(0.013)
$TRADE_{it}$					-0.008*	-0.007**	-0.007*	-0.014***
					(0.004)	(0.004)	(0.004)	(0.005)
$IPRIV_{it}$						-0.028	-0.031	-0.071**
						(0.027)	(0.028)	(0.033)
$IMFP_{it}$							-0.183	-0.121
							(0.231)	(0.196)
GOV_{it}								-0.002
								(0.013)
N	1393	1280	1220	1220	1219	1219	1219	1152
groups	53	48	48	48	48	48	48	48
N_instr	8	9	11	13	16	19	20	20
AR(1)	0.004	0.026	0.012	0.020	0.012	0.000	0.000	0.000
AR(2)	0.212	0.355	0.566	0.481	0.404	0.286	0.311	0.245
Hansen	0.191	0.079	0.044	0.282	0.653	0.701	0.677	0.112

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged GI is predetermined, lagged debt is exogenous, and the remaining covariates are endogenous variables.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2 – The effect of fiscal consolidations on the government consumption-to-GDP ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GC_{it-1}	0.760***	0.733***	0.916***	0.867***	0.896***	0.895***	0.893***	0.925***
	(0.072)	(0.089)	(0.063)	(0.071)	(0.065)	(0.065)	(0.073)	(0.061)
$CONS_{it}$	-0.145**	-0.135**	-0.125***	-0.102**	-0.101**	-0.102**	-0.094**	-0.100**
	(0.062)	(0.060)	(0.047)	(0.049)	(0.045)	(0.044)	(0.044)	(0.046)
GI_{it}		0.403**	0.474***	0.450***	0.409***	0.385***	0.356***	0.181**
		(0.157)	(0.093)	(0.112)	(0.107)	(0.108)	(0.101)	(0.092)
$DEBT_{it-1}$			-0.010	-0.013**	-0.012**	-0.012**	-0.013**	-0.013**
			(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
$GROWTH_{it}$				-0.080***	-0.073***	-0.067***	-0.065***	-0.082***
				(0.023)	(0.021)	(0.024)	(0.024)	(0.023)
$TRADE_{it}$					-0.018**	-0.017**	-0.015**	-0.017**
					(0.008)	(0.007)	(0.007)	(0.007)
$IPRIV_{it}$						-0.034	-0.042	-0.027
						(0.040)	(0.041)	(0.026)
$IMFP_{it}$							-0.226	-0.103
							(0.259)	(0.200)
GOV_{it}								-0.000
								(0.034)
N	1278	1278	1218	1218	1218	1218	1218	1151
groups	48	48	48	48	48	48	48	48
N_instr	20	12	13	13	12	13	16	16
AR(1)	0.001	0.002	0.002	0.003	0.002	0.002	0.002	0.003
AR(2)	0.454	0.592	0.601	0.641	0.518	0.529	0.603	0.852
Hansen	0.163	0.054	0.775	0.708	0.865	0.869	0.787	0.278

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged GC is predetermined, GDP growth and fiscal consolidation are endogenous, and the remaining covariates are exogenous.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3 – The effect of fiscal consolidations on the GI/GC ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.817***	0.701***	0.712***	0.731***	0.674***	0.678***	0.811***
	(0.201)	(0.141)	(0.156)	(0.170)	(0.106)	(0.109)	(0.179)
$CONS_{it}$	-0.392**	-0.546***	-0.512***	-0.495***	-0.400**	-0.394**	-0.419**
	(0.193)	(0.188)	(0.168)	(0.171)	(0.157)	(0.159)	(0.196)
$DEBT_{it-1}$		-0.021	-0.019	-0.026	-0.032	-0.032	-0.026
		(0.020)	(0.021)	(0.021)	(0.020)	(0.020)	(0.030)
$GROWTH_{it}$			0.112	0.137	0.158	0.156	0.285***
			(0.120)	(0.142)	(0.111)	(0.123)	(0.098)
$TRADE_{it}$				-0.0225	-0.0241	-0.0235	-0.0290
				(-0.67)	(-0.84)	(-0.81)	(-0.84)
$IPRIV_{it}$					-0.255	-0.256	-0.444*
					(0.241)	(0.252)	(0.228)
$IMFP_{it}$						0.577	-0.023
						(0.806)	(0.820)
GOV_{it}							-0.029
							(0.072)
N	1278	1218	1218	1218	1218	1218	1151
groups	48	48	48	48	48	48	48
N_instr	7	8	11	14	17	18	19
AR(1)	0.006	0.001	0.002	0.003	0.001	0.001	0.003
AR(2)	0.309	0.452	0.467	0.484	0.587	0.611	0.806
Hansen	0.165	0.543	0.763	0.800	0.805	0.789	0.685

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged GI/GC is predetermined, lagged debt, government stability and IMF program are exogenous, and the remaining covariates are endogenous.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

With respect to an early literature, which insisted on the fact that fiscal consolidations tend to reduce government investment (see e.g.Oxley and Martin (1991), or De Haan et al. (1996)), our findings suggest that government consumption is equally reduced following fiscal consolidations, consistent with the view that challenges its importance for the likelihood of government's reelection (Peltzman (1992), Alesina et al. (1998)). However, the composition effect that we reveal suggests that fiscal consolidations lead to a more important cut in government investment than in government consumption.

5 Robustness

In this section we explore the robustness of our baseline results in several ways.

5.1 Alternative definitions of fiscal consolidations

In Alesina and Ardagna (2013)'s definition used to compute fiscal consolidations in the baseline specification, the threshold is somehow arbitrary. To check whether our findings are sensitive to a particular threshold, we consider the following alternative definitions of fiscal consolidations.

First, compared with the baseline definition of 2 years & 2 percentage points (hereafter pp), or 3 years & 3 pp, we increase the threshold to stress the fact that the change in fiscal policy is discretionary. With "threshold 1", a fiscal consolidation episode is signalled by either 2 years of consecutive CAPB improvement of at least 2.5 pp of GDP, or 3 years & 3.5 pp improvement; while for "threshold 2" ("threshold 3"), the corresponding numbers are 2 years & 3 pp (4 pp), or 3 years and 4 pp (5 pp). As shown by columns (2)-(4) in Table 4, using these different thresholds to define fiscal consolidations has little impact on the significance or the magnitude of their effect on the GI/GC ratio compared with our baseline results reported in column (1).

Table 4 – Fiscal consolidations and the GI/GC ratio: alternative definitions of thresholds

Alternatives	Baseline	threshold 1	threshold 2	threshold 3
	(1)	(2)	(3)	(4)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.811***(0.179)	0.809***(0.182)	0.803***(0.165)	0.828*** (0.165)
$CONS_{it}$	-0.419**(0.196)	-0.431** (0.207)	-0.484** (0.205)	-0.489** (0.219)
N	1151	1151	1151	1151
Groups	48	48	48	48
N_instr	19	19	19	22
AR(1)	0.003	0.003	0.002	0.002
AR(2)	0.806	0.812	0.822	0.871
Hansen	0.685	0.682	0.645	0.823
Controls	Yes	Yes	Yes	Yes

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged GI/GC is predetermined, lagged debt, government stability and IMF program are exogenous, and the remaining covariates are endogenous. We introduce lagged debt, GDP growth, trade, private investment, IMF program and government stability as explanatory variables.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Second, since countries do not present the same deficit level or the same structural capacity to reduce it, we allow the threshold to vary with respect to the country-specific average (me) and standard deviation (sd) in CAPB changes. Following Yang et al. (2015), "def 1" designs a fiscal consolidation episode defined as: (i) a one-year fiscal consolidation, if the CAPB improvement is at least me+sd for this year, except if the CAPB falls by me+sd in the previous or next year; or (ii) a two-year (three-year or more) fiscal consolidation, if the CAPB improves in the first year by at least me+1/4sd and the cumulative improvement is of at least me+sd (me+3/2sd); and (iii) a fiscal consolidation stops if the CAPB does not improve in one year or improves by less than me+1/4sd, and the cumulative improvement over the following year is of at least me+1/4sd; however, the fiscal consolidation continues if the variation of the CAPB ranges between me+1/4sd and me-1/4sd in this year. Similarly, "def2" and "def3" use the multiples (3/4,1/4,1,3/2) and (2,3/4,2,3) of the standard deviation to construct alternative fiscal consolidations measures. As shown by columns

Table 5 – Fiscal consolidations and the GI/GC ratio: endogenous thresholds and an alternative consolidation measure

Altenatives	endogenous threshold			CAPB concept
	Def1	Def2	Def3	Terms of Trade
	(1)	(2)	(3)	(4)
Single year	1	3/4	2	
Multiple years	1/4,1,3/2	1/4,1,3/2	3/4,2,3	
$\frac{GI_{it-1}}{GC_{it-1}}$	0.869***(0.051)	0.882***(0.052)	0.875*** (0.025)	0.746***(0.050)
$CONS_{it}$	-0.233** (0.059)	-0.221**(0.058)	-0.235**(0.087)	-0.221**(0.072)
N	1151	1151	1151	1124
Groups	48	48	48	47
N_instr	26	26	30	19
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.857	0.858	0.812	0.572
Hansen	0.602	0.565	0.693	0.819
Controls	Yes	Yes	Yes	Yes

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged GI/GC is predetermined, lagged debt, government stability and IMF program are exogenous, and the remaining covariates are endogenous. We introduce lagged debt, GDP growth, trade, private investment, IMF program and government stability as explanatory variables.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

(1)-(3) of Table 5, despite some magnitude loss, fiscal consolidations are still significantly related with a decrease in the GI/GC ratio.

Third, we further account for country-specific heterogeneities, and particularly for international trade shocks on fiscal policy, by including the terms of trade, in addition to the unemployment rate, when computing the CAPB. As such, a fiscal consolidation episode is signaled by: (i) a 2-year period in which the CAPB improves each year and the cumulative improvement is of at least 2*(me-sd) pp; or (ii) a 3-year or more period in which the CAPB improves each year and the cumulative improvement is of at least 3*(me-sd) pp. Despite a lower magnitude compared with the baseline, column (4) of Table 5 confirms yet again the negative effect of fiscal consolidations on the GI/GC ratio.

5.2 A "Placebo-test" of fiscal consolidations

Our baseline specification includes only changes in the CAPB during fiscal consolidation episodes. Indeed, we assume that the effect of fiscal consolidations is specific, and not related to discretionary changes in fiscal policy during "normal" times. To take a closer look at this assumption, we introduce in equations (6)-(8) the change in CAPB during the periods of no fiscal consolidations ($NCONS_{it}$), following Alesina and Ardagna (2013). Results in Table 6 support our assumption, since the effect of $NCONS$ is rarely and weakly significant. More importantly, we confirm the bias against public investment, since the effect of fiscal consolidations on the GI/GC ratio remains significant and negative.

Table 6 – The effect of fiscal consolidations on the GI/GC ratio: no consolidation episodes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.781***	0.737***	0.742***	0.797***	0.758***	0.789***	0.856***
	(0.179)	(0.110)	(0.098)	(0.102)	(0.085)	(0.071)	(0.164)
$CONS_{it}$	-0.289**	-0.531***	-0.477***	-0.472***	-0.358**	-0.342**	-0.395**
	(0.143)	(0.176)	(0.153)	(0.163)	(0.169)	(0.169)	(0.179)
$NCONS_{it}$	-0.131	-0.082	-0.118	-0.130	-0.118*	-0.121*	-0.121
	(0.108)	(0.071)	(0.083)	(0.088)	(0.060)	(0.066)	(0.095)
N	1278	1218	1218	1218	1218	1218	1151
groups	48	48	48	48	48	48	48
N_instr	10	11	14	17	19	25	26
AR(1)	0.006	0.000	0.000	0.000	0.000	0.000	0.003
AR(2)	0.324	0.464	0.507	0.515	0.585	0.551	0.736
Hansen	0.231	0.708	0.874	0.811	0.694	0.813	0.839

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Starting from the most parsimonious specification (column 1), we progressively introduce lagged debt, GDP growth, trade, private investment, IMF program, and government stability in columns (2)-(7).
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3 Additional control variables

We introduce several additional control variables, related to (i) the financing of development (foreign direct investment, aid, remittances, and natural resources rents), to account for a crowding-in/out effect, (ii) the structure of the economy (urban population, and population growth), to capture the burden of the population on government's fiscal stance, and (iii) institutions (the political tendency of the government party, the political color of the legislature, and the electoral period), to control for potential partisan cycles. As shown by Table 17 in the Appendix, the negative effect of fiscal consolidations on the ratio GI/GC is still at work when controlling for these additional variables.

6 Heterogeneity

This section analyzes the sensitivity of the effect of fiscal consolidations on the GI/GC ratio with respect to fiscal conditions (the debt level, and the adjustment fiscal variable), the overall state of the economy (in the short-run: the position in the business cycle, and in the long-run: the development stage), and financial conditions (financial crises).

6.1 Fiscal conditions: the debt level, and the adjustment fiscal variable

First, fiscal consolidations are usually designed to reduce public debt. Consequently, it is appealing to see if their effect depends on the debt level. We use the median of the distribution of the average debt for each consolidation period (equal to 53%, in ratio of GDP) to differentiate between fiscal consolidations arising in high-debt ($CONS_{it}^{HD}$) and low-debt ($CONS_{it}^{LD}$) contexts. According to Table 7, fiscal consolidations significantly reduce the GI/GC ratio only in a context of high debt, consistent with previous findings of strong public investment contraction in damaged fiscal stance (see e.g. (Bacchiocchi et al., 2011)).

Second, fiscal consolidations can be performed through spending-cuts or tax-hikes (or a combination of the two). To see if the composition of the adjustment matters, we split fiscal consolidation episodes into "tax-based" adjustments ($CTAX_{it}$) for which most of the variation in the CAPB is due to tax hikes, and "spending-based" adjustments ($CSPEND_{it}$) for which most of the variation in the CAPB is due to a reduction in spending ((McDermott and Wescott, 1996), (Guajardo et al., 2014), or (Yang et al., 2015) equally use such a distinction). Table 8 shows that, once we account for control variables (see from column 3 onwards), only fiscal consolidations based on spending-cuts robustly reduce the GI/GC ratio, suggesting that revenue-increasing strategies based on taxes may be a virtuous way to protect government investment.

6.2 The state of the economy

First, we consider the state of the economy in the short-run, captured by the phase of the business cycle. Drawing upon the popular Hodrick and Prescott (1997) filter to compute the cyclical component of GDP, we distinguish between "bad" times ($CONS_{it}^{LC}$) and "good" times ($CONS_{it}^{HC}$). As shown by Table 9, fiscal consolidations significantly reduce the GI/GC ratio only during bad times, corroborating to some extent our finding of a significant effect exclusively in high-debt contexts.

Second, we look at the state of the economy in the long-run, captured by the development stage. Despite most of the literature being devoted to developed countries, fiscal consolidations may impact differently the composition of public spending in OECD compared with non-OECD

Table 7 – The effect of fiscal consolidations on the GI/GC ratio: debt level sensitivity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.871***	0.821***	0.806***	0.864***	0.832***	0.805***	0.820***	0.872***
	(0.209)	(0.189)	(0.179)	(0.194)	(0.200)	(0.146)	(0.131)	(0.063)
$CONS^{HD}$	-0.914***		-0.880***	-0.929***	-0.792***	-0.743***	-0.747***	-0.839***
	(0.289)		(0.289)	(0.266)	(0.292)	(0.250)	(0.255)	(0.290)
$CONS^{LD}$		-0.055	-0.057	-0.076	-0.009	0.006	-0.004	0.060
		(0.221)	(0.225)	(0.229)	(0.186)	(0.175)	(0.174)	(0.175)
N	1278	1278	1278	1278	1278	1278	1278	1180
groups	48	48	48	48	48	48	48	48
N_instr	7	7	10	13	16	19	20	21
AR(1)	0.005	0.004	0.004	0.003	0.005	0.002	0.001	0.000
AR(2)	0.291	0.291	0.303	0.298	0.449	0.634	0.642	0.964
Hansen	0.293	0.235	0.419	0.536	0.544	0.617	0.562	0.739

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Starting from the most parsimonious specification (columns 1-3), we progressively introduce GDP growth, trade, private investment, IMF program, and government stability in columns (4)-(8).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8 – The effect of fiscal consolidations on the GI/GC ratio: the adjustment variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.898***	0.760***	0.682***	0.703***	0.665***	0.665***	0.752***
	(0.137)	(0.101)	(0.124)	(0.140)	(0.089)	(0.090)	(0.059)
$CTAX_{it}$	-0.480**	-0.368**	-0.337	-0.369	-0.248	-0.261	-0.140
	(0.211)	(0.164)	(0.287)	(0.291)	(0.241)	(0.248)	(0.146)
$CEXPD_{it}$	-0.579***	-0.471**	-0.435**	-0.387**	-0.307**	-0.302**	-0.452**
	(0.209)	(0.195)	(0.201)	(0.188)	(0.145)	(0.142)	(0.204)
N	1278	1218	1218	1218	1218	1218	1151
groups	48	48	48	48	48	48	48
N_instr	12	15	14	17	20	21	23
AR(1)	0.001	0.000	0.001	0.002	0.000	0.000	0.000
AR(2)	0.313	0.377	0.465	0.493	0.582	0.606	0.792
Hansen	0.340	0.572	0.655	0.718	0.748	0.748	0.669

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Starting from the most parsimonious specification (column 1), we progressively introduce lagged debt, GDP growth, trade, private investment, IMF program, and government stability in columns (2)-(7).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9 – The effect of fiscal consolidations on GI/GC: the phase of the business cycle

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.812***	0.826***	0.733***	0.719***	0.729***	0.698***	0.704***	0.828***
	(0.207)	(0.232)	(0.180)	(0.191)	(0.173)	(0.121)	(0.133)	(0.056)
$CONS^{LC}$	-0.384		-0.727***	-0.676***	-0.682***	-0.649***	-0.641**	-0.648***
	(0.245)		(0.253)	(0.244)	(0.226)	(0.245)	(0.256)	(0.215)
$CONS^{HC}$		4.324	-0.219	-0.156	-0.238	-0.059	-0.048	-0.118
		(7.090)	(0.226)	(0.265)	(0.282)	(0.211)	(0.226)	(0.137)
N	1278	1278	1218	1218	1218	1218	1218	1151
groups	48	48	48	48	48	48	48	48
N_instr	7	8	11	14	15	20	21	22
AR(1)	0.008	0.049	0.005	0.006	0.005	0.001	0.001	0.000
AR(2)	0.303	0.864	0.375	0.375	0.430	0.500	0.519	0.735
Hansen	0.129	0.195	0.321	0.391	0.489	0.501	0.479	0.374

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Starting from the most parsimonious specification (columns 1-3), we progressively introduce GDP growth, trade, private investment, IMF program, and government stability in columns (4)-(8).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10 – The effect of fiscal consolidations on the GI/GC ratio: OECD vs non-OECD countries

	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.931***	0.903***	0.895***	0.769***	0.639***	0.776***
	(0.064)	(0.041)	(0.043)	(0.230)	(0.159)	(0.062)
$CONS_{it}$	-0.306**	-0.232*	-0.155***	-0.535**	-0.722***	-0.628**
	(0.148)	(0.134)	(0.055)	(0.257)	(0.246)	(0.257)
N	646	625	578	632	593	573
groups	21	21	21	27	27	27
N_instr	15	12	20	7	8	19
AR(1)	0.003	0.003	0.002	0.017	0.008	0.001
AR(2)	0.194	0.273	0.330	0.300	0.498	0.747
Hansen	0.243	0.166	0.250	0.207	0.552	0.745
Dvp. stage	OECD	OECD	OECD	Non-OECD	Non-OECD	Non-OECD

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Starting from the most parsimonious specification (columns 1 and 4), we progressively introduce lagged debt in columns (2) and (5), and GDP growth, trade, private investment, IMF program, and government stability in columns (3) and (6).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

emerging countries, given the differences in their respective structural characteristics. Estimations reported in Table 10 show that this is indeed the case: although fiscal consolidations significantly reduce the GI/GC ratio in both OECD and non-OECD countries, the magnitude of the estimated coefficient can be up to four times higher in the latter group of countries (for example, if we compare columns 3 and 6). This may be related to a stronger political instability in non-OECD countries, making governments not to take electoral risks associated with cutting consumption spending.

6.3 Crises

In addition to the fiscal and economic conditions, the decision of governments to implement fiscal consolidations may be determined by the occurrence of crises. We consider five types of crises, namely debt, banking, inflation, currency, and stock market crises, and we are interested in fiscal consolidation episodes that occur between one and four years after the beginning of a crisis. Results reported in column (1) of Table 11 show that fiscal consolidations arising after a crisis significantly reduce the GI/GC ratio. This overall significant effect is driven by a significant effect of consolidations following stock market crises (column 6), and particularly debt crises (column 2). Indeed, debt and stock market crises put a high pressure on the fiscal balance and increase the risk of a systemic crisis; our results show that the required fiscal space is achieved by a stronger cut in public investment compared with public consumption. Finally, fiscal consolidations occurring after the beginning of banking, inflation, or currency crises were not found to significantly affect the GI/GC ratio, which may illustrate the fact that the policies required during these crises rest relatively less on government funds.

7 The sub-components of government consumption

So far, we focused on aggregate government consumption (GC) spending. We now investigate the effects of fiscal consolidations on disaggregated GC components, expressed in ratio of GDP. First, public wages ($WAGE$) measure the remuneration of public sector employees, and their consolidation may affect the welfare of the population. Second, transfers & subsidies (SUB) act as a distributional tool of national income, and their consolidation may affect population's living standards, and particularly the poor population. Third, health spending ($HEALTH$) are related to the healthcare system and social protection. Finally, education spending ($EDUC$) support the development of human capital, and may influence potential economic growth.

Using these variables we look both at the level and the composition effect. Regarding the level effect, Table 12 shows that the decrease of the GC ratio emphasized in our baseline analysis is mainly driven by the contraction of health and education government spending. On the contrary, fiscal consolidations lead to an increase in public wages, while transfers & subsidies are not significantly affected. Regarding the composition effect, Table 13 shows that the decline in GI is stronger than the contraction of public wages, education, and health government spending, corroborating our previous results based on aggregate measures of GC. However, fiscal consolidations are found to increase the ratio between GI and transfers & subsidies, suggesting a strong decline of the latter, relatively more important than the decline of the former.

Table 11 – The effects of fiscal consolidations on the GI/GC ratio: crises

	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.811***	0.790***	0.932***	0.816***	0.817***	0.834***
	(0.179)	(0.053)	(0.085)	(0.108)	(0.129)	(0.075)
$CONS_{it}$	-0.419**					
	(0.196)					
$CONS^{DC}$		-0.952**				
		(0.464)				
$CONS^{BC}$			-0.116			
			(0.387)			
$CONS^{IC}$				0.159		
				(0.800)		
$CONS^{CC}$					0.071	
					(0.312)	
$CONS^{SM}$						-0.400**
						(0.197)
N	1151	1151	1151	1151	1151	1151
groups	48	48	48	48	48	48
N_instr	19	17	19	19	19	20
AR(1)	0.003	0.000	0.000	0.001	0.001	0.000
AR(2)	0.806	0.973	0.646	0.757	0.800	0.628
Hansen	0.685	0.566	0.327	0.599	0.474	0.397

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged GI/GC is predetermined, lagged debt, government stability and IMF program are exogenous, and the remaining covariates are endogenous. $CONS^{DC}$, $CONS^{BC}$, $CONS^{IC}$, $CONS^{CC}$, and $CONS^{SM}$ design fiscal adjustments occurring within 1 to 4 years after the starting of sovereign debt, banking, inflation, currency, and stock market crises, respectively.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12 – The effect of fiscal consolidations on the GC sub-components (in GDP ratio)

	(1) $WAGE$	(2) SUB	(3) $HEALTH$	(4) $EDUC$
Dep_Var_{it-1}	0.673***	0.582***	0.909***	0.525***
	(0.057)	(0.076)	(0.120)	(0.103)
$CONS_{it}$	0.094**	0.011	-0.099***	-0.039**
	(0.044)	(0.120)	(0.035)	(0.018)
N	457	461	451	417
groups	41	41	41	41
N_instr	30	24	33	25
AR(1)	0.054	0.024	0.001	0.043
AR(2)	0.647	0.822	0.358	0.410
Hansen	0.557	0.587	0.136	0.282

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged Dep_Var_{t-1} is predetermined, lagged debt, government stability and IMF program are exogenous, and the remaining covariates are endogenous. For each sub-component, we also control by the other sub-components of government consumption.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 13 – The effect of fiscal consolidations on the ratio GI/GC-sub-components

	(1) GI_WAGE	(2) GI_SUB	(3) GI_HEALTH	(4) GI_EDUC
$DepVar_{it-1}$	0.778***	0.490***	0.997***	0.769***
	(0.098)	(0.013)	(0.017)	(0.045)
$CONS_{it}$	-0.864*	13.676**	-0.655**	-0.808**
	(0.479)	(6.804)	(0.273)	(0.400)
N	167	223	732	711
groups	17	17	48	48
N_instr	16	16	26	29
AR(1)	0.107	0.266	0.036	0.020
AR(2)	0.320	0.594	0.274	0.599
Hansen	0.312	0.681	0.318	0.415

Standard errors are in brackets. Regressions are based on the Blundell-Bond estimator. Lagged Dep_Var_{t-1} is predetermined, lagged debt, government stability and IMF program are exogenous, and the remaining covariates are endogenous.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

8 Conclusion

Existing studies emphasize a negative effect of fiscal consolidations on government investment and consumption as ratios of GDP (Balassone and Franco (1999); Castro (2017); De Haan et al. (1996); Jonakin and Stephens (1999); Turrini (2004); Välilä and Mehrotra (2005)). This paper looked at the effect of fiscal consolidations on the ratio between government investment and consumption. System-GMM estimations performed on a sample of 53 developed and emerging countries during the period 1980-2011 revealed that the contraction of government investment is more important than that of government consumption, i.e. a *composition* effect is at work, robust to a wide range of alternative specifications.

Given the large impact of both government consumption and investment on the economy documented by the existing literature, we investigated more in detail this composition effect. In particular, we found that public investment may be particularly affected by fiscal consolidations (i.e. its contraction may be stronger than that of public consumption) when debt is high, for spending-based fiscal consolidations, in the low phase of the economic cycle, and following debt and stock market crises. Consequently, our findings suggest that caution should be at work in such contexts, during which fiscal consolidations aimed at short-run stabilization may hurt the economy in the long-run through their detrimental effect on public investment. Future work could be devoted to exploring possible mechanisms in the design of fiscal consolidations that may allow avoiding such undesirable consequences.

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A Appendix

Table 14 – Episodes of fiscal consolidations

Countries	Adjustment periods	number
Argentina	1984-1985; 1991-1993; 2002-2004	3
Australia	1983-1988; 1993-1997	2
Austria	1996-1997; 2000-2001	2
Belgium	1984-1987; 1993-1995	2
Bolivia	2003-2006	1
Brazil	1999-2000	1
Bulgaria	2000-2001; 2010-2011	2
Canada	1981-1982; 1990-1997	2
Chile	1987-1989; 1994-1995; 2003-2006; 2010-2011	4
China	2004-2007	1
Colombia	1985-1987; 2000-2001; 2003-2004	3
Costa Rica	1981-1982; 1991-1992; 1995-1997	3
Denmark	1983-1986; 2003-2005	2
Dominican Republic	2004-2007	1
Finland	1984-1985; 1988-1989; 1993-1994; 1996-1998	4
France	1994-1999 ; 2010-2011	2
Germany	1982-1985; 1996-2000; 2004-2007	3
Greece	1986-1987; 1990-1991; 2005-2006	3
Honduras	1985-1989, 1995-1996; 2003-2004	3
Hong kong	2006-2007; 2009-2010	2
Hungary	1999-2000; 2003-2004; 2007-2008	3
Iceland	1990-1992; 2004-2006	2
Indonesia	1989-1990	1
Iran	2003-2004	1
Ireland	1986-1989	1
Israel	1993-1995; 1997-2000; 2004-2007	3
Italy	1982-1983; 1988-1992; 1995-1997; 2006-2007	4
Japan	1981-1987	1
Mexico	1983-1984; 1986-1989	2
Netherlands	1981-1985; 2004-2006	2
New Zealand	1985-1988; 1992-1995; 2000-2005	3
Nicaragua	1991-1992; 1997-1998; 2010-2011	3
Norway	1981-1985; 1988-1990; 1993-1996; 1999-2000; 2004-2006	5
Pakistan	1988-1990 ;1993-1994; 1998-1999; 2006-2007	4
Panama	1985-1986; 1989-1990; 2005-2007	3
Paraguay	1985-1986; 1989-1990; 1993-1994; 2003-2004	4
Peru	1984-1985; 1988-1989; 2004-2007; 2010-2011	4
Portugal	1981-1984; 2002-2003; 2006-2007; 2010-2011	4
Romania	1997-1998; 2010-2011	2
Russia	2003-2005; 2010-2011	2
South Africa	1994-1995; 1998-1999; 2004-2007	3
South Korea	1995-2000	1
Spain	1983-1988; 2010-2011	2
Sweden	1981-1987; 1993-1998; 2004-2005	3
Switzerland	1992-1996; 2005-2006	2
Turkey	1981-1983; 1994-1995; 1998-1999; 2002-2005	4
United Kingdom	1981-1986 ; 1995-2000; 2010-2011	3
United States	1981-1982	1
Uruguay	1985-1986; 1990-1991; 2000-2005	3
Venezuela	2002-2005	1
	Total	123

Table 15 – Description of the variables

Variables	Descriptions	Sources
GI	Public investment in % of GDP	Authors' estimations based on (IMF, 2017)
GC	Current spending in % of GDP	Authors' estimations based on (IMF, 2017)
CONS	Change in CAPB in fiscal consolidation stance and zero otherwise	Authors' estimations
DEBT	Total debt in % of GDP	Mauro et al. (2015)
GROWTH	Real GDP growth rate	World Development Indicators
IPRIV	Private investment in % of GDP	(IMF, 2017)
FDI	Foreign direct investment in % of GDP	World Development Indicators
AID	Total aid in % of GNI	World Development Indicators
REMIT	Remittances in % du GDP	World Development Indicators
TRADE	Imports plus exports in % du GDP	World Development Indicators
TOT	Terms of trade in % du GDP	World Development Indicators
POPr	Population growth	World Development Indicators
POP65	Share of population with 65 years old and above in % of total population	World Development Indicators
URB	Share of urban population in % of total population	World Development Indicators
LPOP	Logarithm of total population number	World Development Indicators
EXECL	Dummy variable equal to 1 if it is a left-wing government and zero otherwise	World Development Indicators
PCOL	Dummy variable equal to 1 if legislature and government are led by different parties and zero otherwise	World Development Indicators
EXELEC	Dummy variable equal to 1 in the electoral period and zero otherwise	World Development Indicators
IMFP	Dummy variable equal to 1 if the country is under IMF program and zero otherwise	World Development Indicators
NATR	Natural resources to GDP ratio	World Development Indicators
CONS_L	Interactive term between fiscal consolidations and the left-wing government dummy	Authors' estimations

Table 16 – Summary statistics

	count	mean	sd	min	max
GI	1455	4.1	2.5	0.2	21.9
GC	1333	16.2	4.8	3.0	43.5
GI/GC	1333	28.7	22.2	1.4	203.7
CONS	1393	0.5	1.1	0	13.5
TRADE	1340	63.4	31.7	11.5	190.1
IPRIV	1455	15.8	5.5	0.4	36.2
REMIT	1250	1.2	2.3	0.0	21.6
AID	609	1.7	4.8	-0.7	72.1
GROWTH	1449	3.2	3.5	-13.4	18.3
DEBT	1438	54.9	32.6	4.1	231.0
NATR	1451	2.6	4.3	0	33.8

Table 17 – The effect of fiscal consolidations on the GI/GC ratio: other controls

	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{GI_{it-1}}{GC_{it-1}}$	0.822***	0.830***	0.717***	0.824***	0.788***	0.728***
	(0.202)	(0.122)	(0.085)	(0.043)	(0.031)	(0.092)
$CONS_{it}$	-0.408**	-0.815***	-0.515***	-0.800***	-0.436**	-0.508***
	(0.200)	(0.305)	(0.150)	(0.242)	(0.221)	(0.153)
FDI	0.020					
	(0.031)					
AID		0.191***				
		(0.047)				
$DEBT_{it-1}$			-0.019	-0.002	-0.009	-0.018
			(0.018)	(0.015)	(0.020)	(0.018)
TOT			0.394***			0.384***
			(0.055)			(0.069)
$PCOL$				0.747	1.059*	
				(0.588)	(0.629)	
$EXECL$				-0.431	-0.366	
				(0.425)	(0.425)	
$EXELEC$				-0.310	0.038	
				(0.852)	(0.711)	
$CONS\_L$				0.646**		
				(0.294)		
$GROWTH$						0.098
						(0.076)
$NATR$						0.148
						(0.226)
N	1254	528	1191	982	982	1191
groups	48.000	22.000	47.000	41.000	41.000	47.000
N_instr	10.000	8.000	11.000	14.000	20.000	15.000
AR(1)	0.006	0.002	0.000	0.001	0.001	0.001
AR(2)	0.307	0.373	0.358	0.037	0.027	0.312
Hansen	0.360	0.455	0.732	0.609	0.171	0.865

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$