

The (non-)Keynesian effects of fiscal austerity: New evidence from a large sample

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Abstract

We empirically assess whether the negative response of private consumption and private investment to fiscal consolidation usually expected is reversed. We focus on a sample of 174 countries between 1970 and 2018 to determine episodes of fiscal consolidations using three alternative measures of the cyclically adjusted primary balance: (1) an International Monetary Fund (IMF)-World Economic Outlook (WEO) based measure, (2) a Hodrick-Prescott-based measure, and (3) a measure based on Hamilton (2018). We find that, first, increases in government consumption have a Keynesian effect on real per capita private consumption; second, tax increases have a positive effect on private consumption when a fiscal consolidation occurs; and, third, fiscal contraction has a crowding-in effect on private investment. Moreover, expansionary fiscal consolidations occur in highly indebted advanced economies, in particular, after an increase in taxes. We conclude that the negative effects of taxation on private consumption are larger when developing economies are experiencing a financial crisis and are not consolidating.

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JEL classifications: C23, E21, E62, H5, H62

1. Introduction

The recession due to COVID-19 once again highlights the question of episodes of fiscal consolidation and the importance of so-called expansionary fiscal contractions. Indeed, during the last 2007/08 global financial crisis, several institutions and economists argued that in that context the fiscal stimuli were important and in the discussion in the aftermath of that crisis made the case for fiscal retrenchment, which, via expectations, drives more private demand and growth. Now, history seems to be repeating and governments increased their spending in 2020 to mitigate the adverse consequences of the COVID-19 pandemic, with advanced economies spending substantially more than developing countries. Because revenue is falling, doing so has led to significant expansion in fiscal deficits globally. These deficits are not sustainable, therefore, fiscal adjustment in the post-COVID-19 period is inevitable. In this paper, we revisit the debate over the non-Keynesian effects of fiscal policy and assess the existence of expansionary fiscal consolidation, private consumption, and private investment in advanced and developing economies since 1970. The main contribution of our article, other than using different approaches to assess fiscal episodes, is in examining whether these effects hold among economies at different stages of development.

We contribute to the literature by applying two filtering techniques to determine so-called fiscal episodes: the Hodrick-Prescott (HP) filter (which suffers from the identification of spurious cycles, *inter alia*) and the Hamilton (2018) alternative filtering method. We employ this strategy to circumvent potential issues linked to the common use of the cyclically adjusted primary balance (CAPB), which is readily available from publicly available sources. In this context, a change in the CAPB of a considerable magnitude usually indicates the existence of a fiscal episode. In addition, we also employ the International Monetary Fund's (IMF's) World Economic Outlook (WEO) CAPB measure for comparison and completeness, though use of it constrains the country-time coverage.

Using a panel of 37 advanced economies and 137 developing economies over the period 1970-2018, we empirically test whether the negative response of private consumption (and investment) to fiscal consolidation usually expected is reversed. Such an event can arise if, for instance, consumers and investors anticipate future benefits stemming from current fiscal consolidations with an increase in permanent income, then allowing private consumption (and investment) to increase. Moreover, we perform robustness checks to evaluate whether our results are robust among our heterogenous sample of economies.

We find that: (1) an increase in general government spending on final consumption has a positive (Keynesian) effect on real per capita private consumption; (2) a rise in social transfer payments positively affects consumption; (3) when a fiscal consolidation takes place, increases in tax revenue have a positive effect on per capita consumption; (4) evidence emerges of a crowding-in effect for private investment that stems from fiscal retrenchment; (5) the effects are mostly significant for advanced economies, rather than for developing ones; (6) expansionary fiscal consolidation occurs in highly indebted advanced economies, in particular after a tax increase; (7) taxation has negative effects on private consumption in developing economies when they experience a financial crisis and do not consolidate.

The remainder of the paper is organized as follows. Section 2 briefly reviews the literature. Section 3 elaborates on the analytical framework to identify fiscal episodes and presents key stylized facts. Section 4 empirically assesses the effects of fiscal adjustments on private consumption and private investment and conducts several robustness checks. Section 5 concludes.

2. Literature review

The discussion of expansionary fiscal consolidation traces back to Feldstein (1982), who argued that when cuts in permanent public spending are seen as an indication of future tax cuts, expectations of permanent income increase. Thus, serious/credible fiscal consolidation

might have an induced wealth effect, leading to an increase in private consumption. At the same time, lower government borrowing requirements decrease the risk premium associated with government debt, contributing to reduction in real interest rates, and allowing the crowding-in of private investment.¹ However, if consumers do not find a given fiscal consolidation serious/credible, then the usual negative Keynesian effect on consumption will occur.² In fact, expectations play an important role in the effectiveness of fiscal policy. Blanchard (1990), Sutherland (1997), and Perotti (1999), among others, wrote that an increase in government debt levels raised the probability that fiscal policy is non-Keynesian. Furthermore, these expectations highlight a nonlinear response by the private sector to expansions/contractions by fiscal authorities. Namely, Giavazzi et al. (2000), Briotti (2005), and Minea and Villieu (2012), among others, describe various responses to increasing/decreasing the fiscal burden. In particular, Giavazzi et al. (2000) highlight that when fiscal authorities perform larger and more persistent fiscal contractions, nonlinear expectations trigger expectations in the private sector. Moreover, politically costly public policies to promote fiscal sustainability are associated with a regime change in public sector expectations.

Against this background, an empirical analysis conducted by Cavallari and Romano (2017) supports fiscal predictability as a condition for preventing crowding-out phenomena. A credible and anticipated fiscal policy helps agents to formulate rational expectations supporting a Ricardian behavior. In fact, expectations play an important role in the success of

¹ As noted in Escolano et al. (2018), as fiscal adjustments tend not to reduce the debt ratio, because governments tend to reduce the pace of fiscal adjustment with stabilization in the ratio of debt to the gross domestic product (GDP), an expansionary monetary policy is fundamental to the success of those adjustments, explaining the decrease in the risk premium associated with debt and, therefore, evidence of crowding in.

² This reasoning is sometimes also called “the expectational view of fiscal policy” (see Hellwig and Neumann, 2014).

fiscal consolidation. In connection to this, heterogeneous expectations among individuals on beliefs about the success and on the manner in which governments consolidate public finances are found to be crucial for explaining the success and the adherence of economic actors to fiscal consolidation (Hommes et al., 2018).³ Lemoine and Lindé (2016) also demonstrate the impact of imperfect credibility effects on the degree of success in fiscal consolidation with(out) monetary policy accommodation. The success of fiscal consolidation can be intimately related to monetary policy accommodation (see, e.g., Afonso and Martins, 2016; Jalil, 2016).

In addition, Bertola and Drazen (1993) refer to a “trigger point” as the moment after which fiscal adjustment is highly probable. When government spending rises above a given threshold, the probability of a fiscal consolidation increases. In this context, consumers tend to exhibit more Ricardian behavior. Bertola and Drazen show this using a model of intertemporal optimizing behavior that, if government spending follows an upward-trending stochastic process and if the public believes that the resulting fiscal imbalance will be cut sharply by tax increases after a specific trigger point is reached, the relationship between private sector consumption and government spending will be negatively nonlinear.

Several studies have empirically tackled the issue revisited in this paper, although with somewhat inconclusive results (see Afonso, 2010; Ahtiala and Kanto, 2002; Guajardo et al., 2014; Hjelm, 2002; van Aarle and Garretsen, 2003; Yang et al., 2015). Moreover, some studies, such as Blanchard and Leigh (2014) and Jordà and Taylor (2016), conclude that the lack of success of fiscal consolidation in promoting economic growth is related to a continuous misevaluation of fiscal multipliers, showing that this biased evaluation leads to

³ Gupta et al. (2018) conclude that governments are not electorally penalized when they are successful in launching fiscal consolidation at the same time that financial markets acknowledge that success in bringing public finances to a sustainable trajectory.

contraction in the real gross domestic product (GDP). Gobbin and van Aarle (2001) analyze countries in the European Union (EU) and find that non-Keynesian effects dominate the traditional Keynesian expenditure effects of government spending, taxation, and transfers. For instance, using a panel of member countries of the Organization for Economic Cooperation and Development (OECD), Afonso (2010) notes that general government final consumption has no statistically significant short-run effect on private consumption, with or without fiscal consolidation, and Yang et al. (2015) propose that a new definition of the CAPB based on fluctuations in asset prices and the characteristics of fiscal policy in specific countries do not demonstrate non-Keynesian effects from fiscal consolidation.

Another important aspect is composition. Some studies, such as Alesina and Ardagna (2010) and Alesina et al. (2019), conclude that large differential effects are produced when fiscal consolidation is based on government spending cuts or tax increases. They argue that fewer harmful effects are produced by governments that choose to consolidate through a reduction in spending. By contrast, Wiese et al. (2018) conclude that the results are the same whether fiscal consolidation occurs through tax increases or reductions in spending with respect to the degree of success achieved by that consolidation. However, left-wing and right-wing governments are more successful in consolidation when they rely on spending and on taxes, respectively.⁴ In addition to the political economy effects on fiscal consolidations, a higher degree of centralization appears to be positively correlated with improvement in the primary balance. Governments with greater power to spend and tax at low levels raise the probability of bringing public finances onto a sustainable path (Foremny et al., 2017). Moreover, Afonso and Jalles (2017) report that fiscal consolidation based on spending tended

⁴ Articles such as Tavares (2004) and Potrafke (2011) study the linkage between the political spectrum of governments and the degree of success in fiscal consolidation, via taxation or spending.

to be more countercyclical than consolidations via taxation with respect to markup dynamics in the short and medium term.

The question of the effects of fiscal consolidation on private investment, via, for instance, lowering overall costs to provide public services or due to a downward impact on the sovereign yield, also deserves an empirical assessment. A few studies argue that fiscal consolidation has a positive effect on private investment, notably Ardagna (2009) and Schaltegger and Weder (2012). Finally, looking at a sample of 14 EU countries, Afonso and Martins (2016) show that, in some cases, when fiscal consolidation is coupled with monetary expansion, the traditional Keynesian result is reversed.

3. Fiscal episodes

3.1. Approaches for determining fiscal episodes

The literature on the identification of fiscal episodes is vast and relies mostly on changes in the CAPB as a share of GDP. Some caveats about this approach have been highlighted recently. The CAPB approach might bias empirical estimations seeking evidence of non-Keynesian effects (see, e.g., Afonso and Jalles, 2014). Many nonpolicy factors influence the CAPB and can lead to erroneous conclusions about fiscal policy changes.⁵ Even when the CAPB accurately measures fiscal activities, they include discretionary responses to economic developments.

Despite these known drawbacks, the alternative “narrative approach” to identifying fiscal episodes is not considered in our study, which looks at a large heterogeneous sample of countries, because the publicly available dataset compiled by Devries et al. (2011) and updated by Alesina et al. (2019) covers only 16 advanced economies and ends in 2014 (which

⁵ For example, a stock price boom raises the CAPB by increasing revenue from capital gains tax and tends to coincide with an expansion in private demand (Morris and Schuknecht, 2007).

by now is outdated). Hence, the analysis that follows relies on changes in the CAPB. Some of the approaches commonly adopted for using this quantitative method to identify fiscal episodes are:

- Giavazzi and Pagano (1996), who decrease the probability of fiscal adjustment periods by only one year using a limit of three percentage points of GDP for a single year of consolidation. They proposed using the cumulative changes in the CAPB that are at least five, four, three percentage points of GDP in respectively four, three, or two years, or three percentage points in one year.
- Alesina and Ardagna (1998), who adopted a definition of fiscal episodes that allows that some stabilization periods may be only one year. They considered a change in the CAPB that is at least two percentage points of GDP in one year or at least 1.5 percentage points on average in the prior two years.
- Afonso (2010), who defined the occurrence of a fiscal episode as when either the change in the CAPB is at least 1.5 times the standard deviation (from the panel of countries under scrutiny) in one year, or when the change in the CAPB is at least one standard deviation on average in the prior two years.

Episodes of fiscal consolidation identified using changes in the CAPB can either use a publicly available source—such as the IMF WEO—or be calculated using a filtering approach (by decomposing GDP into its cyclical and trend components). Despite substantial progress in the estimation methodologies to calculate potential output, a widely accepted approach in the profession is still lacking. According to Borio (2013), researchers frequently adopt two alternative approaches to estimate potential GDP: first, univariate statistical approaches, which usually consist of filtering out the trend component from the cyclical one; second, structural approaches, which derive the estimates directly from the theoretical structure of a model. Additionally, a more structural CAPB approach used notably by Alesina and Perotti

(1995), Alesina and Ardagna (1998) and Alesina and Ardagna (2010), among others, has been criticized for being inaccurate in determining a CAPB-based approach when analyzing several European cases. Specifically, two factors that have contributed to these criticisms are related to the fact that CAPB methods suffer from a high correlation with economic development phases. Indeed, this approach overlooks the fact that different shocks (positive or negative) are related to changes in the CAPB (IMF, 2010).

Aware of the shortcomings of using either of the two approaches⁶ and at the cost of not maximizing the total number of observations in our panel dataset, instead of relying on the IMF's WEO measure of the CAPB,⁷ we prefer to apply two filtering techniques. Mindful of the criticism of the Hodrick-Prescott (HP) filter (e.g., the identification of spurious cycles, inter alia), particularly in the context of a large sample of very heterogeneous countries (see Harvey and Jaeger, 1993; Cogley and Nason, 1995), Hamilton (2018) proposes an alternative method. Hamilton's (2018) approach to extracting the cyclical and trend component of a generic variable y_t (denoted y_t^c and y_t^τ , respectively), consists of estimating:

$$y_{t+h} = \gamma_0 + \sum_{j=0}^k \gamma_j y_{t-j} + u_{t+h} \quad (1)$$

where y_t equals the sum of the trend and cyclical components, that is, $y_t = y_t^\tau + y_t^c$. The stationary part of Equation (1) provides the cyclical component:

⁶ 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 revision. Structural models, however, may be difficult to implement consistently in cross-sectional environments and rely on the imposition of prior assumptions.

⁷ The International Monetary Fund (IMF) does not have an official method for calculating potential output, and every country desk decides which measure fits best. Although the most common IMF approach uses a production function approach, assumptions vary greatly across countries, and discretion is left to the country desks.

$$y_t^c = \hat{u}_t \quad (2)$$

while the trend is given by

$$y_t^r = \hat{\gamma}_0 + \sum_{j=0}^k \hat{\gamma}_j y_{t-h-j}. \quad (3)$$

Hamilton (2018) suggested that h and k be chosen such that the residuals from Equation (1) are stationary and points out that, for a variety of processes, the fourth differences of a series are indeed stationary. We choose $h = 2$, because a two-year horizon is consistent with business cycles, and $k = 3$, which is line with the dynamics in real GDP.

After the output gap is obtained, we use it to measure the CAPB. Reflecting the fact that the elasticity of government revenues (REV) to output growth is close to one whereas primary expenditure ($PEXP$) is largely inelastic to growth (using the same assumptions as Girouard and André, 2005), we multiply government revenue by $[1/(1+OG/100)]$ to obtain REV_{adj} (adjusted revenue), in which OG is the output gap calculated by applying the HP filter and Hamilton's (2018) approach. Mathematically, we have:

$$CAPB = REV_{adj} - PEXP, \quad (4)$$

In this paper, we use three measures of the CAPB, the latter two maximizing the total available number of observations for econometric purposes: (1) WEO (which limits the country-time coverage); (2) HP based; and (3) Hamilton based. Mindful of the alternative set of quantitative criteria used to identify fiscal consolidations, we take a middle ground approach. Fiscal consolidation episodes are defined as those that show at least a positive annual change in the CAPB of 0.5 percent of GDP for two consecutive years. A dummy variable is created that takes a value of 1 if there is a consolidation year and 0 otherwise. The episode is then classified as expenditure based if the absolute change in primary spending (in percentage of GDP) divided by the absolute change in the CAPB (in percentage of GDP) is

larger than 0.5, provided that a consolidation occurs and provided that the change in (primary) spending is negative. If the ratio is less than 0.5, and the change in (primary) spending within a given consolidation episode is positive, that episode is defined as tax based, instead. Succinctly, we have an expenditure-based fiscal episode when $\frac{|\Delta PEXP|}{|\Delta CAPB|} < 0.5 \% (GDP)$ and a tax-based fiscal episode when $\frac{|\Delta PEXP|}{|\Delta CAPB|} > 0.5 \% (GDP)$ and $\Delta PEXP > 0$.

3.2. Fiscal episodes

Table 1 reports the fiscal consolidation episodes, calculated with the three underlying measures of the CAPB mentioned above, for the period 1970-2018, for 37 advanced economies and 137 developing economies.⁸

Table 1. Summary statistics on fiscal consolidation with the CAPB measure, by level of economic development.

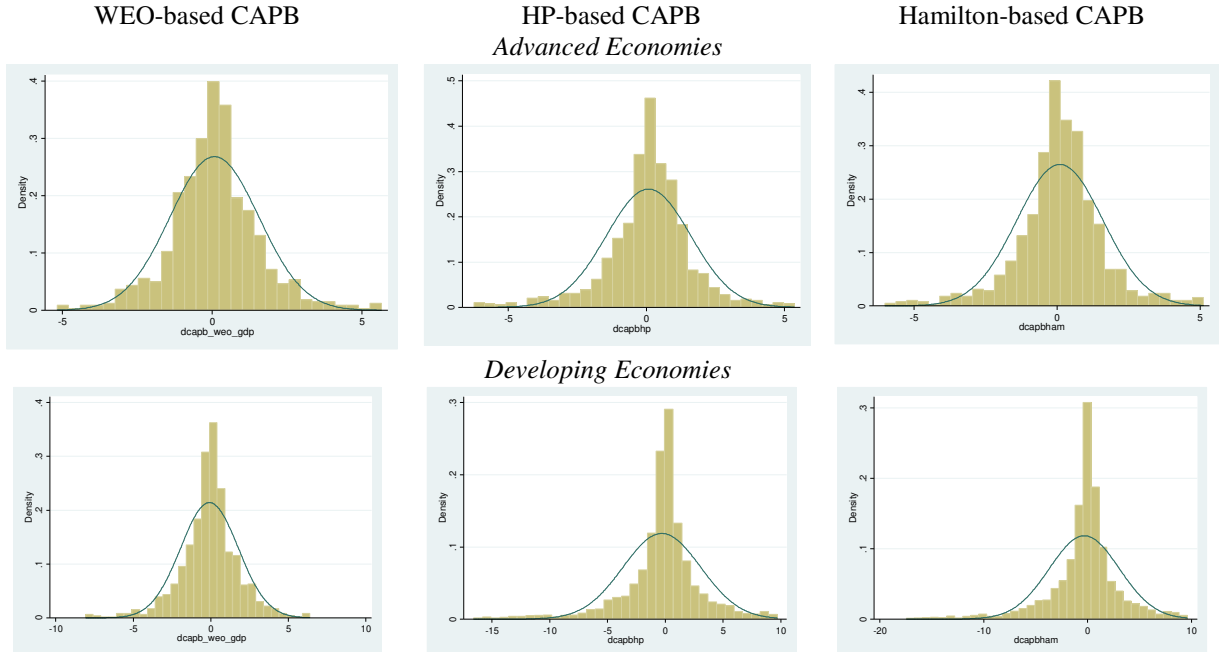
Advanced Economies										
	Mean	Std.Dev.	Min.	Max.	p1	p99	Skewness	Kurtosis	Obs	Average duration (years)
WEO based	1.592	1.07	0.513	5.759	0.519	5.508	1.769	6.291	122	1.783
HP based	1.617	1.42	0.132	10.653	0.14	7.318	2.893	14.52	169	1.690
Hamilton based	1.523	1.188	0.17	8.047	0.356	6.089	2.366	10.072	171	1.629
Developing Economies										
	Mean	Std.Dev.	Min.	Max.	p1	p99	Skewness	Kurtosis	Obs	Average duration (years)
WEO based	2.107	1.709	0.509	10.944	0.551	8.39	2.504	11.079	103	1.474
HP based	7.766	38.771	-4.341	554.058	-0.023	71.336	11.758	148.963	503	1.462
Hamilton based	8.479	40.528	-55.358	569.693	-0.481	117.239	11.035	135.526	498	1.423

Table 1 shows that the number of fiscal episodes is significantly lower when we consider the WEO-based consolidation criterion than with either the HP-based or the Hamilton-based

⁸ For reasons of parsimony, we do not detail the fiscal consolidation episodes by year and by country, and we do not provide the results by income group, however, the results are available from the authors upon request. In addition, online Appendix Tables A1 and A2 report the summary statistics for the change in CAPB and the duration, on average, of fiscal episodes, for each CAPB measure.

criteria. In fact, whereas we count 122 episodes with the WEO-based criterion, we observe 169 and 171 consolidation episodes with the HP-based and the Hamilton-based fiscal consolidation criteria for advanced economies, respectively. The same pattern is seen for developing economies: our results establish a set of 112 WEO-based, 503 HP-based, and 498 Hamilton-based fiscal consolidation episodes. The duration of a fiscal episode seems longer for advanced economies than for developing economies. In fact, whereas the reported duration is, on average, 1.7 years for advanced economies, it is slightly lower, 1.5 years, for developing economies. The three methods that determine fiscal austerity episodes on the basis of a change in the CAPB essentially coincide in identifying, for instance, the fiscal contraction in Australia in 1995-1997 and 2012-2013 and in China in 2004. In Figure 1, we report the distribution of changes in the CAPB by income group:

Figure 1. Changes in the cyclically adjusted primary balance by income group, 1970–2018

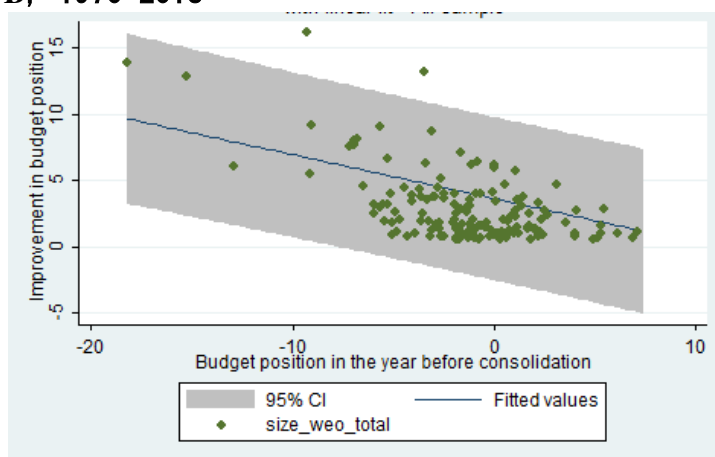


Note: CAPB expressed in percentage of potential GDP. Top and bottom 1% of the change in the respective CAPB dropped to remove extreme outliers. For the purpose of comparison, the HP-based CAPB and Hamilton-based CAPB distributions are limited to the same country-time coverage as the one for the WEO CAPB.

3.3. Characteristics of fiscal episodes

With respect to the characteristics of fiscal episodes, the prevailing initial fiscal conditions just before the beginning of a given consolidation episode seem to have an impact on the size of subsequent fiscal efforts (Figure 2). The lower the CAPB, the larger the ensuing fiscal consolidation. This might reflect that large budget deficits made it more necessary to consolidate and, at the same time, raised public awareness of the extent of the fiscal imbalance problem, making it easier to act. When each income group is inspected independently, we conclude that advanced economies seem to have been more concerned with fiscal sustainability than developing economies have.

Figure 2. Initial fiscal imbalances and subsequent adjustment, full sample, WEO-based CAPB, 1970–2018

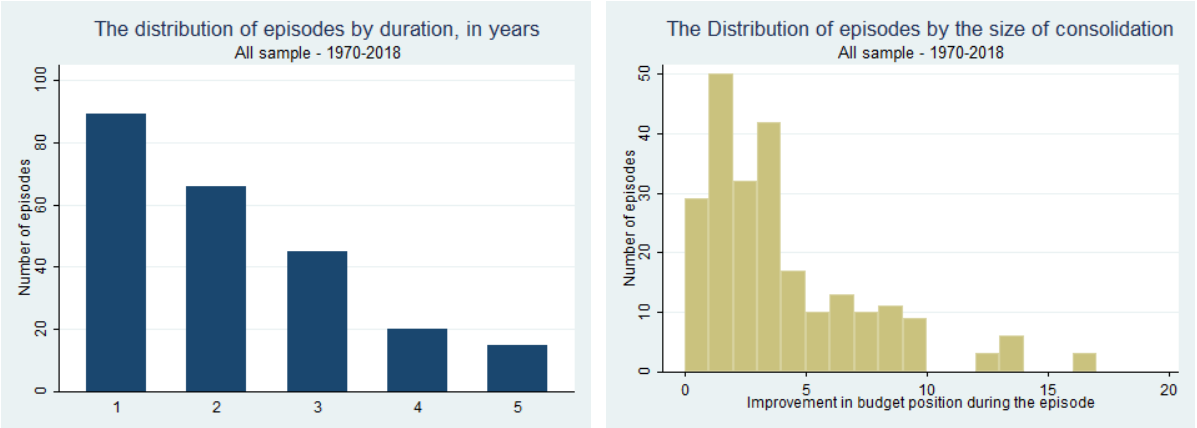


Note: The budgetary position is measured by the CAPB (% of potential GDP) on the vertical axis; “improvement” is measured during the consolidation years of the episode identified on the horizontal axis.

Most fiscal consolidation episodes were of short duration (with some exceptions for the WEO IMF-based measure; see Table 1) and involved relatively modest gains (Figure 3). However, there were a number of large efforts, amounting to improvements of more than 7 percent of GDP for the four measures, as well as a few episodes that lasted for four years (or more in the case of the IMF-based measure). When we look in more detail at the distribution of episodes by duration for each income group, we conclude that fiscal consolidation episodes

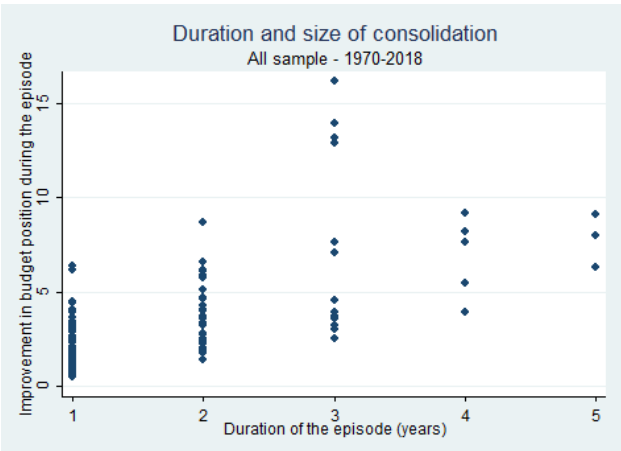
were longer in advanced economies than in developing economies. Advanced economies experienced fiscal episodes that lasted a maximum of 5 years—more than 30 episodes lasted more three years. In contrast, emerging markets experienced consolidations lasting a maximum of three years per episode. That said, developing economies experienced more concentrated budgetary improvement than is observed in advanced economies.

Figure 3. Strength and duration of consolidation episodes, full sample WEO-based CAPB, 1970–2018



Note: The budgetary position is measured by the CAPB (% of potential GDP); “improvement” is measured during the consolidation years of the episode identified.

Figure 4. Relationship between duration and size of consolidation, full sample, WEO-based CAPB, 1970–2018



Note: The budgetary position is measured by the CAPB (% of potential GDP); “improvement” is measured during the consolidation years of the episode identified.

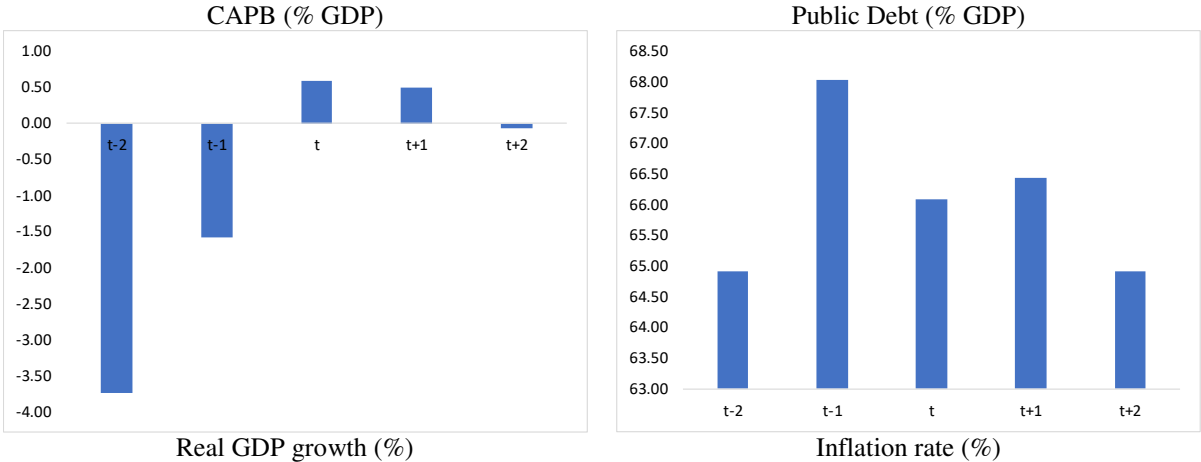
In general, we can also see that sizable fiscal consolidations lasted for longer periods and vice-versa (Figure 4). The time distribution of fiscal episodes is less concentrated for advanced economies than for emerging ones. Moreover, we note that budgetary position improvements are bigger for advanced economies, improving the overall fiscal sustainability levels in this income group.

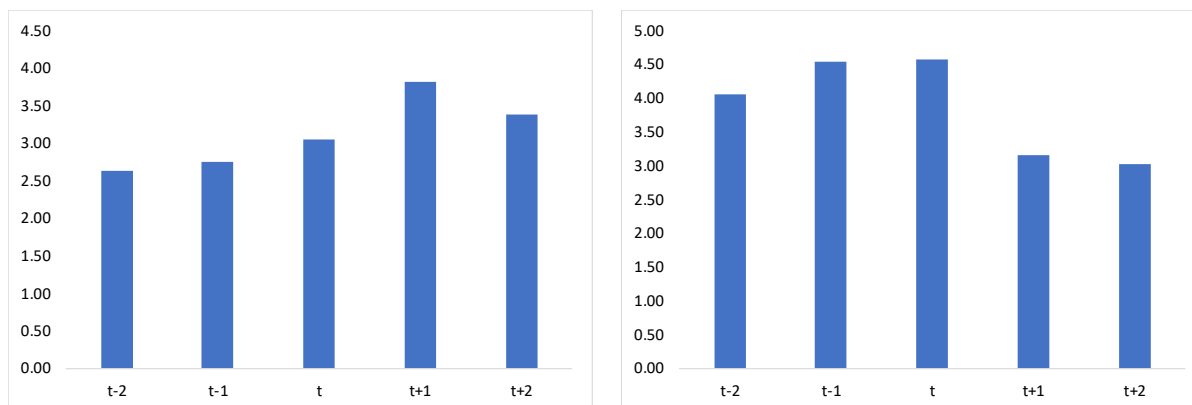
4. Effects of fiscal adjustments

4.1. Stylized facts: Fiscal consolidation and macroeconomic and fiscal variables

In this section, we assess some stylized links between fiscal consolidations and a series of macroeconomic and fiscal variables, namely, real GDP growth, private consumption, private investment, the debt-to-GDP ratio, government consumption, and tax revenue. Figure 5 shows an event-study-type chart with the paths of several variables showing averages from two years before the consolidation to as much as two years afterward.

Figure 5. Overview of selected fiscal and macroeconomic indicators around consolidation episode periods (t), full sample





Note: t is the first year of the consolidation episode. Horizontal axis in years. Consolidation is identified using the WEO-based CAPB.

The expected improvement in the CAPB during and after the consolidation episode takes place as a result of a simultaneous decrease in total government expenditure and an increase in total government revenue. These dynamics are true for both advanced and emerging economies. However, for developing economies, we observe a deterioration in the CAPB two years after the fiscal consolidation episode. The magnitude of this deterioration seems to exceed the fiscal improvement during the fiscal consolidation. It is also interesting to note that, despite the decrease in total government expenditure identified above, final government consumption increases during and after the consolidation period. However, public investment declines after the end of the consolidation episode (translating a lagged negative effect).

Finally, fiscal consolidation seems to be related to decreases in government debt ratios (both during and afterward). This pattern is similar to what happens when we observe the dynamics of government debt before and after fiscal consolidations by income group.

4.2. Baseline empirical analysis

In addition to unconditional relationships, we empirically analyze the impact of fiscal episodes on private consumption and investment more closely. Two main approaches can be used for specifying consumption functions—the first is the Euler approach (Perotti, 1999), and the second is the solved function approach (Giavazzi and Pagano, 1996)—though which

one to use is a subject of debate (for further discussion, see Campbell, 1996). We follow the latter approach (even though it is not based on microeconomic foundations), which has also been applied in van Aarle and Garretsen (2003) and Afonso (2010).

The baseline specifications for the real per capita private consumption and real per capita private investment are given by Equations (4) and (5), respectively:

$$\begin{aligned} \Delta C_{it} = & c_i + \lambda C_{it-1} + \omega_0 Y_{it-1} + \omega_1 \Delta Y_{it} + \delta_0 Y_{it-1}^{av} + \delta_1 \Delta Y_{it}^{av} + \\ & (\alpha_1 FCE_{it-1} + \alpha_3 \Delta FCE_{it} + \beta_1 TF_{it-1} + \beta_3 \Delta TF_{it} + \gamma_1 TAX_{it-1} + \gamma_3 \Delta TAX_{it}) \times FC_{it}^m + (\alpha_2 FCE_{it-1} + \alpha_4 \Delta FCE_{it} \\ & + \beta_2 TF_{it-1} + \beta_4 \Delta TF_{it} + \gamma_2 TAX_{it-1} + \gamma_4 \Delta TAX_{it}) \times (1 - FC_{it}^m) + \mu_{it} \end{aligned} \quad (5)$$

$$\begin{aligned} \Delta I_{it} = & c_i + \lambda C_{it-1} + \omega_0 Y_{it-1} + \omega_1 \Delta Y_{it} + \delta_0 Y_{it-1}^{av} + \delta_1 \Delta Y_{it}^{av} + \\ & (\alpha_1 FCE_{it-1} + \alpha_3 \Delta FCE_{it} + \beta_1 TF_{it-1} + \beta_3 \Delta TF_{it} + \gamma_1 TAX_{it-1} + \gamma_3 \Delta TAX_{it}) \times FC_{it}^m + (\alpha_2 FCE_{it-1} + \alpha_4 \Delta FCE_{it} \\ & + \beta_2 TF_{it-1} + \beta_4 \Delta TF_{it} + \gamma_2 TAX_{it-1} + \gamma_4 \Delta TAX_{it}) \times (1 - FC_{it}^m) + \mu_{it} \end{aligned} \quad (6)$$

where i denotes the country, t indicates the period (in years), and c_i denotes country-fixed effects to control for unobserved cross-country heterogeneity. In addition, C is private consumption; I is private investment (gross fixed capital formation); Y is GDP; Y^{av} is GDP of the full country sample (or respective subsample when regressions are carried out by income group—that is, GDP for the group of advanced economies and GDP for the group of developing economies) (per capita averages); FCE is general government final consumption expenditure; TF is social transfers; and TAX is taxes.

All these variables are taken as the logarithms of the respective real per capita observations (the GDP deflator is used to deflate nominal variables). FC^m is a dummy variable that controls for the existence of fiscal consolidation episodes, with $m=1, 2, 3$ for each of the fiscal episode criteria used (WEO based, HP based, or Hamilton based, yielding a total of three possible alternatives). The dummy variable FC^m takes yearly values and follows the rule $FC^m = 1$ when a fiscal consolidation occurs; $FC^m = 0$ when a fiscal consolidation does not occur.

Additionally, it is assumed that the disturbances u_{it} are independent and identically distributed random shocks across countries, with a zero mean and constant variance.⁹

We begin by estimating the baseline regressions with ordinary least squares (OLS), considering government consumption, social transfers, and tax revenues together to reduce possible omitted-variable bias.¹⁰

In addition, we also report the results of a panel two-stage-least squares estimation with instruments that are the first two lags of our regressors.¹¹ In this way, we arguably address endogeneity concerns, such as tax revenues and social transfers, that can be expected to fluctuate automatically with economic activity, raising the issue of reverse causality.

Tables 2 and 3 report the results for the baseline estimation of both private consumption and investment for the full panel using OLS and instrumental variables (IV), respectively. They show that increases in general government final consumption expenditure have a statistically significant and positive (Keynesian) effect on real per capita private consumption. This occurs in the absence of fiscal consolidations and when a fiscal consolidation episode takes place. However, the magnitude of that effect is higher in the presence of a fiscal consolidation. Moreover, we found that the increase in private consumption from an increase in government's final consumption, both under fiscal consolidations and without such fiscal

⁹ We conducted Im-Pesaran-Shin panel unit-root tests, and the results suggest rejection of the null of a common unit root. These results are presented in Appendix Table A4.

¹⁰ Alternatively, we estimated specifications (5) and (6) with each of these budgetary items individually, and we obtained similar results (these results are available from the authors upon request). Moreover, and in order to account for residual autocorrelation, we re-estimated specifications (5) and (6) using a bias-corrected Least Squares Dummy Variable estimator. As these results do not qualitatively change our main results, for reasons of parsimony, we do not give these estimations here, but they are available from the authors upon request.

¹¹ The Sargan-Hansen test, which is a test of overidentifying restrictions, confirms the validity of the instruments used at the usual significance levels.

consolidations, can be explained in light of the complementarity between public and private consumption. Jalles and Karras (2021) investigate the degree to which government consumption expenditures substitute for or complement private consumption, one of the most important (and most overlooked) determinants of the fiscal multiplier. They find that private and government consumption are best described as complementary in the aggregate and for nine different categories of government spending that they consider, supporting our results in Tables 2 and 3.

The increase in social transfers also positively influences private consumption, but this estimate is subject to more uncertainty. This effect is stronger when fiscal consolidation also takes place. We also find that the positive influence of tax revenue on per capita consumption increases when the fiscal accounts of an economy are consolidated, suggesting Ricardian behavior by economic actors (the impact of an increase in taxation does not affect consumption in the absence of fiscal consolidation). This result holds for both the HP-based and Hamilton-based CAPB approaches.

With respect to real per capita investment, the increase in social transfers when a fiscal consolidation occurs has the opposite effect vis-à-vis those seen with consumption: although we can confirm the positive effect of transfers on consumption, independently of whether fiscal consolidation occurs, social transfers have a positive effect on investment when a fiscal consolidation takes place, but real per capita investment seems to decline in the absence of fiscal consolidation. By influencing incentives, taxes can affect both supply and demand factors. Tax reforms have many moving parts: some taxes rise, while others fall. Although the overall aggregate effect stems from higher taxes, it is unclear which combination led to it. However, our results are in line with what Alinaghi and Reed (2021) indicate in their meta-analysis of the effects of taxes on growth in OECD countries. They divide policy changes into three categories: tax-negative fiscal policies, tax-positive fiscal policies, and tax-neutral fiscal

policies. Note that tax-positive fiscal policies include tax increases to fund productive investment, decreases in distortionary taxation combined with increases in nondistortionary taxation, or tax increases to reduce the deficit.

Table 2. Estimation results for real per capita private consumption and investment, OLS, full sample, 1970-2018

Dependent Variable		Real private consumption per capita			Real private investment per capita		
		1	2	3	4	5	6
Specification		WEO based	HP based	Hamilton based	WEO based	HP based	Hamilton based
λ	$dep. var._{t-1}$	-0.199*** (0.055)	-0.276*** (0.073)	-0.278*** (0.071)	-0.228*** (0.041)	-0.387*** (0.095)	-0.373*** (0.099)
ω_0	Y_{t-1}	0.101* (0.055)	0.218*** (0.053)	0.225*** (0.052)	0.298*** (0.110)	0.111 (0.153)	0.157 (0.151)
ω_1	ΔY_t	0.674*** (0.083)	0.582*** (0.095)	0.594*** (0.096)	2.457*** (0.216)	1.386*** (0.477)	1.570*** (0.436)
δ_0	Y^{av}_{t-1}	-0.011 (0.012)	-0.013 (0.018)	-0.013 (0.018)	-0.060 (0.039)	-0.044 (0.077)	-0.045 (0.075)
δ_1	ΔY^{av}_t	0.033 (0.031)	0.055 (0.070)	0.056 (0.069)	0.026 (0.135)	0.358 (0.290)	0.444 (0.286)
α_1	$FCE_{t-1} \times FC^m$	0.105*** (0.032)	0.003 (0.029)	0.004 (0.029)	-0.213** (0.101)	-0.132 (0.122)	-0.092 (0.107)
α_2	$FCE_{t-1} \times (1 - FC^m)$	0.084*** (0.030)	0.023 (0.026)	0.025 (0.027)	-0.116* (0.066)	-0.141 (0.112)	-0.152 (0.112)
β_1	$TF_{t-1} \times FC^m$	-0.023 (0.022)	0.005 (0.007)	0.004 (0.007)	-0.007 (0.044)	0.021 (0.039)	0.035 (0.039)
β_2	$TF_{t-1} \times (1 - FC^m)$	-0.022 (0.019)	-0.004 (0.006)	-0.004 (0.006)	-0.020 (0.036)	0.038 (0.038)	0.032 (0.036)
γ_1	$TAX_{t-1} \times FC^m$	-0.016 (0.020)	0.011 (0.024)	0.010 (0.024)	0.250*** (0.091)	0.265** (0.121)	0.200* (0.109)
γ_2	$TAX_{t-1} \times (1 - FC^m)$	0.002 (0.018)	0.000 (0.019)	-0.003 (0.019)	0.167*** (0.057)	0.253** (0.114)	0.256** (0.111)
α_3	$\Delta FCE_t \times FC^m$	0.126 (0.117)	0.065 (0.084)	0.010 (0.081)	-0.198 (0.376)	0.000 (0.286)	-0.001 (0.292)
α_4	$\Delta FCE_t \times (1 - FC^m)$	0.084* (0.052)	0.016 (0.042)	0.027 (0.042)	-0.118 (0.123)	0.030 (0.198)	0.095 (0.194)
β_3	$\Delta TF_t \times FC^m$	0.043 (0.058)	0.001 (0.021)	-0.030 (0.048)	0.337* (0.184)	-0.005 (0.066)	-0.018 (0.080)
β_4	$\Delta TF_t \times (1 - FC^m)$	-0.024 (0.024)	-0.016 (0.010)	-0.014 (0.009)	-0.060 (0.039)	0.016 (0.038)	0.008 (0.037)
γ_3	$\Delta TAX_t \times FC^m$	0.065 (0.072)	-0.080 (0.072)	-0.130* (0.079)	-0.014 (0.224)	0.263 (0.225)	0.548** (0.236)
γ_4	$\Delta TAX_t \times (1 - FC^m)$	-0.054 (0.050)	0.001 (0.032)	-0.001 (0.033)	0.117 (0.109)	0.258 (0.167)	0.189 (0.156)
<i>Obs.</i>		1,127	1,899	1,885	942	1,616	1,604
<i>R2</i>		0.428	0.251	0.249	0.467	0.246	0.242
<i># countries</i>		61	98	98	51	86	86
H0 (p-values)							
	$\alpha_1 - \alpha_2 = 0$	0.866	0.452	0.936	0.969	0.632	0.754
	$\gamma_1 - \gamma_2 = 0$	0.261	0.237	0.096	0.290	0.995	0.139
	$-\alpha_1 - \gamma_1 = 0$	0.015	0.693	0.692	0.665	0.148	0.249
	$\beta_1 - \beta_2 = 0$	0.307	0.871	0.473	0.068	0.727	0.558

Note: Robust standard errors clustered at the country level are reported in parentheses. Constants and country and time effects estimated but omitted for reasons of parsimony. *, **, and *** denote significance at 10%, 5%, and 1%.

The impact of an increase in government expenditures also hampers real per capita investment (WEO-based criterion). This effect is stronger, in absolute terms, when a fiscal consolidation occurs. Conversely, an increase in taxes promotes per capita investment, with higher effects during a fiscal consolidation (but this effect fades when we control for possible endogeneity).

Overall, and during fiscal episodes, fiscal contractions seems to promote real per capita investment when they are based on government spending cuts or increases in taxation. Accordingly, we support the expansionary fiscal consolidation phenomena.

Table 3. Estimation results for real per capita private consumption and investment, IV, full sample, 1970-2018

Dependent Variable		Real private consumption per capita			Real private investment per capita		
Specification		1	2	3	4	5	6
		WEO based	HP based	Hamilton based	WEO based	HP based	Hamilton based
λ	$dep. var._{t-1}$	-0.202*** (0.064)	-0.268*** (0.047)	-0.274*** (0.046)	-0.219** (0.093)	-0.308*** (0.052)	-0.331*** (0.076)
ω_0	Y_{t-1}	-0.050 (0.109)	-0.004 (0.103)	0.085 (0.095)	0.422* (0.252)	-0.341 (0.416)	-0.309 (0.506)
ω_1	ΔY_t	-0.298 (0.446)	-0.132 (0.351)	0.050 (0.308)	2.488** (1.096)	-0.184 (1.571)	0.535 (1.780)
δ_0	Y^{av}_{t-1}	-0.040* (0.025)	0.010 (0.023)	-0.004 (0.024)	-0.093 (0.058)	-0.012 (0.083)	0.041 (0.114)
δ_1	ΔY^{av}_t	-0.025 (0.078)	0.162** (0.074)	0.135** (0.064)	-0.092 (0.163)	0.771** (0.372)	0.679 (0.432)
α_1	$FCE_{t-1} \times FC^m$	0.150** (0.066)	0.096 (0.094)	0.060 (0.092)	-0.345** (0.164)	0.064 (0.457)	0.761 (0.706)
α_2	$FCE_{t-1} \times (1 - FC^m)$	-0.019 (0.038)	-0.000 (0.018)	-0.004 (0.018)	0.003 (0.064)	-0.030 (0.108)	-0.140 (0.127)
β_1	$TF_{t-1} \times FC^m$	0.120 (0.095)	0.092* (0.054)	0.079 (0.063)	0.280 (0.231)	0.437 (0.346)	-0.132 (0.487)
β_2	$TF_{t-1} \times (1 - FC^m)$	0.043 (0.514)	-0.318 (0.949)	-0.174 (1.139)	-0.242 (1.181)	0.296 (4.473)	9.975 (8.106)
γ_1	$TAX_{t-1} \times FC^m$	0.169 (0.347)	0.666** (0.276)	0.396* (0.231)	-0.996 (0.677)	1.246 (1.255)	1.193 (1.599)
γ_2	$TAX_{t-1} \times (1 - FC^m)$	-0.177 (0.468)	-0.064 (0.288)	0.079 (0.324)	0.698 (1.278)	1.492 (1.233)	-0.303 (1.707)
α_3	$\Delta FCE_t \times FC^m$	-0.071* (0.038)	-0.027 (0.033)	-0.053 (0.036)	-0.006 (0.060)	-0.094 (0.178)	-0.156 (0.208)
α_4	$\Delta FCE_t \times (1 - FC^m)$	1.235* (0.647)	-0.106 (0.542)	0.082 (0.445)	-0.064 (1.599)	-0.901 (2.057)	0.113 (1.812)
β_3	$\Delta TF_t \times FC^m$	0.585* (0.355)	0.312* (0.176)	0.251 (0.177)	0.357 (0.842)	0.904 (1.067)	0.354 (1.325)
β_4	$\Delta TF_t \times (1 - FC^m)$	0.106* (0.055)	0.151** (0.071)	0.102* (0.058)	-0.291* (0.153)	0.168 (0.332)	0.374 (0.436)
γ_3	$\Delta TAX_t \times FC^m$	-0.041 (0.040)	-0.010 (0.013)	-0.018 (0.014)	-0.010 (0.054)	0.004 (0.093)	-0.045 (0.096)
γ_4	$\Delta TAX_t \times (1 - FC^m)$	0.181 (0.122)	0.053 (0.047)	0.054 (0.047)	0.238 (0.248)	0.302 (0.235)	0.166 (0.336)
Obs.		1,003	1,698	1,684	843	1,451	1,439
# countries		60	96	96	50	84	84
Kleibergen-Paap p-value		0.285	0.900	0.908	0.519	0.937	0.927
Sargan-Hansen p-value		n.a.	0.619	0.326	0.012	0.604	0.720
H0 (p-values)							
	$\alpha_1 - \alpha_2 = 0$	0.828	0.639	0.826	0.927	0.959	0.217
	$\gamma_1 - \gamma_2 = 0$	0.073	0.725	0.995	0.823	0.558	0.908
	$-\alpha_1 - \gamma_1 = 0$	0.010	0.030	0.054	0.765	0.184	0.186
	$\beta_1 - \beta_2 = 0$	0.729	0.823	0.795	0.586	0.221	0.923

Note: Robust standard errors clustered at the country level are reported in parentheses. Constants and country and time effects estimated but omitted for reasons of parsimony. *, **, and *** denote significance at 10%, 5%, and 1%.

4.3. Robustness and sensitivity

4.3.1. Income groups and geographic regions

To shed light on heterogeneity in the sample, we estimated the effects of Hamilton-based fiscal consolidation on both per capita real private consumption and investment by

income group, presented in Table 4, and by geographic region (available upon request). The results are relatively close to those in Tables 2 and 3. However, these effects seem to matter the most in advanced economies (for developing countries, coefficient estimates are seldom significant). Even when both groups of countries have a statistically significant effect of a given fiscal variable on private consumption or investment, the effect is typically stronger in advanced economies (see, e.g., the effect of taxes on real per capita private consumption, in columns 1 and 2 of Table 4).

The effect on real per capita private consumption varies by geographic region. During fiscal consolidation, whereas countries in the Middle East, North Africa, Afghanistan, and Pakistan (MENAP) and Europe have positive effects of government spending on private consumption, countries in sub-Saharan Africa (SSA) experience the opposite effects of government spending on consumption (independent of whether these economies experience a fiscal consolidation). These results also apply to the effects of higher taxation on consumption in MENAP and European countries. Lastly, regarding social transfers, the MENAP countries have stronger positive effects of this fiscal variable on private consumption during a fiscal consolidation episode; in contrast, we find evidence of a negative impact on consumption for Asian, SSA, and European countries from an increase in transfers.

In Asian countries, we find evidence of negative effects of transfers on consumption during a fiscal episode (in the absence of fiscal consolidations, Asian countries have no statistically significant effects from social transfers, and vice-versa in SSA and European countries). Regarding the effects of fiscal consolidation on real private investment per capita, it is worth mentioning that tax revenue is relevant in explaining private investment dynamics when fiscal consolidation occurs.

Table 4. Estimation results for real per capita private consumption and investment by country group, IV (Hamilton based), 1970-2018

Dependent Variable		Real private consumption per capita		Real private investment per capita	
Specification		1	2	3	4
Income Group		AE	DEV	AE	DEV
λ	$dep. var_{t-1}$	-0.089*** (0.034)	-0.276*** (0.050)	-0.235*** (0.059)	-0.333*** (0.081)
ω_0	Y_{t-1}	-0.009 (0.047)	0.057 (0.118)	0.402* (0.244)	-0.191 (0.585)
ω_1	ΔY_t	0.397*** (0.154)	-0.129 (0.379)	2.187*** (0.672)	0.881 (2.149)
δ_0	Y_{t-1}^{av}	0.001 (0.013)	0.025 (0.034)	0.046 (0.055)	-0.025 (0.139)
δ_1	ΔY_{t-1}^{av}	0.055** (0.025)	0.233* (0.125)	0.161* (0.094)	0.749 (0.628)
α_1	$FCE_{t-1} \times FC^m$	0.103** (0.052)	0.040 (0.126)	0.032 (0.287)	0.754 (0.834)
α_2	$FCE_{t-1} \times (1 - FC^m)$	-0.006 (0.025)	0.005 (0.028)	-0.190** (0.095)	-0.167 (0.185)
β_1	$TF_{t-1} \times FC^m$	-0.029 (0.046)	0.101 (0.078)	0.060 (0.169)	-0.159 (0.545)
β_2	$TF_{t-1} \times (1 - FC^m)$	0.449 (0.461)	-0.773 (1.570)	-1.830 (2.966)	11.128 (9.582)
γ_1	$TAX_{t-1} \times FC^m$	0.646*** (0.227)	0.485* (0.273)	1.878* (1.170)	0.765 (1.795)
γ_2	$TAX_{t-1} \times (1 - FC^m)$	-0.690** (0.327)	0.234 (0.416)	0.678 (1.407)	-0.665 (1.926)
α_3	$\Delta FCE_t \times FC^m$	0.068 (0.195)	-0.057 (0.039)	-0.779 (0.632)	-0.132 (0.233)
α_4	$\Delta FCE_t \times (1 - FC^m)$	0.041 (0.468)	-0.058 (0.480)	-0.428 (1.363)	-0.352 (1.744)
β_3	$\Delta TF_t \times FC^m$	0.119 (0.125)	0.294 (0.192)	-0.002 (0.433)	0.260 (1.443)
β_4	$\Delta TF_t \times (1 - FC^m)$	0.083* (0.050)	0.119 (0.075)	0.200 (0.223)	0.290 (0.496)
γ_3	$\Delta TAX_t \times FC^m$	0.009 (0.040)	-0.020 (0.015)	-0.140 (0.126)	-0.030 (0.113)
γ_4	$\Delta TAX_t \times (1 - FC^m)$	-0.021 (0.038)	0.054 (0.056)	-0.179 (0.144)	0.159 (0.383)
<i>Obs.</i>		564	1,120	419	1,020
<i># countries</i>		27	68	20	63
<i>Kleibergen-Paap p-value</i>		0.627	0.944	0.676	0.958
<i>Sargan-Hansen p-value</i>		0.749	0.462	0.551	0.743
H0 (p-values)					
	$\alpha_1 - \alpha_2 = 0$	0.445	0.578	0.497	0.240
	$\gamma_1 - \gamma_2 = 0$	0.886	0.756	0.733	0.926
	$-\alpha_1 - \gamma_1 = 0$	0.110	0.131	0.684	0.293
	$\beta_1 - \beta_2 = 0$	0.032	0.570	0.528	0.794

Note: Robust standard errors clustered at the country level are reported in parentheses. Constants and country and time effects estimated but omitted for reasons of parsimony. *, **, and *** denote significance at 10%, 5%, and 1%.

4.3.2. Composition of fiscal consolidation

Regarding the composition of a fiscal episode, we also assessed whether the effects differ depending on whether a consolidation is based more on the spending side or the revenue (tax) side of the budget. In Table 5 (columns 3 and 4), a consolidation that is more on the spending side, via social transfers, promotes higher private investment, whereas that is not the case for consolidations on the revenue side. Additionally, this effect on private investment has a higher magnitude when a spending-based consolidation takes place than when it does not.

Table 5. Estimation results for real per capita private consumption and investment, spending vs. tax-based consolidations, IV (Hamilton based), 1970-2018

Dependent Variable		Real private consumption per capita		Real private investment per capita	
Specification		1	2	3	4
		Hamilton based		Hamilton based	
Consolidation composition		Spending based	Tax based	Spending based	Tax based
λ	$dep. var_{t-1}$	-0.265*** (0.023)	-0.272*** (0.049)	-0.317*** (0.033)	-0.331*** (0.068)
ω_0	Y_{t-1}	0.166** (0.071)	0.073 (0.111)	-0.481 (0.374)	0.616 (0.474)
ω_1	ΔY_t	0.582** (0.237)	0.047 (0.343)	0.397 (1.150)	2.954* (1.592)
δ_0	Y_{t-1}^{av}	0.012 (0.022)	-0.001 (0.023)	0.094 (0.123)	-0.066 (0.104)
δ_1	ΔY_t^{av}	0.188** (0.083)	0.138* (0.071)	1.071** (0.427)	0.481 (0.425)
α_1	$FCE_{t-1} \times FC^m$	0.054 (0.084)	0.070 (0.071)	1.035** (0.489)	-0.407 (0.359)
α_2	$FCE_{t-1} \times (1 - FC^m)$	0.148** (0.063)	0.117* (0.069)	0.816** (0.396)	-0.434 (0.337)
β_1	$TF_{t-1} \times FC^m$	-0.003 (0.028)	0.003 (0.017)	-0.273* (0.161)	-0.019 (0.109)
β_2	$TF_{t-1} \times (1 - FC^m)$	-0.024** (0.012)	-0.018 (0.014)	-0.131 (0.104)	0.029 (0.091)
γ_1	$TAX_{t-1} \times FC^m$	0.011 (0.053)	0.072 (0.049)	-0.120 (0.259)	0.086 (0.265)
γ_2	$TAX_{t-1} \times (1 - FC^m)$	-0.060 (0.045)	0.047 (0.046)	-0.019 (0.216)	0.080 (0.221)
α_3	$\Delta FCE_t \times FC^m$	-1.403 (1.019)	-0.165 (0.643)	6.692 (4.571)	1.202 (2.751)
α_4	$\Delta FCE_t \times (1 - FC^m)$	0.591** (0.245)	0.436 (0.295)	3.393** (1.427)	-1.126 (1.447)
β_3	$\Delta TF_t \times FC^m$	-0.175 (0.240)	0.254 (0.608)	-0.048 (1.102)	-1.738 (2.564)
β_4	$\Delta TF_t \times (1 - FC^m)$	-0.069** (0.032)	-0.053* (0.032)	-0.352* (0.210)	-0.009 (0.152)
γ_3	$\Delta TAX_t \times FC^m$	0.003 (0.673)	0.184 (0.471)	-1.739 (2.973)	-2.487 (1.939)
γ_4	$\Delta TAX_t \times (1 - FC^m)$	-0.158 (0.151)	0.225 (0.169)	-0.059 (0.713)	-0.343 (1.047)
<i>Obs.</i>		1,684	1684	1,439	1439
<i># countries</i>		60	96	50	84
<i>Kleibergen-Paap p-value</i>		0.22	0.68	0.45	0.70
<i>Sargan-Hansen p-value</i>		0.05	0.64	0.28	0.54
H0 (p-values)					
	$\alpha_1 - \alpha_2 = 0$	0.131	0.707	0.188	0.557
	$\gamma_1 - \gamma_2 = 0$	0.989	0.813	0.593	0.201
	$-\alpha_1 - \gamma_1 = 0$	0.335	0.088	0.021	0.404
	$\beta_1 - \beta_2 = 0$	0.461	0.679	0.833	0.505

Note: Robust standard errors clustered at the country level are reported in parentheses. Constants and country and time effects estimated but omitted for reasons of parsimony. *, **, and *** denote significance at 10%, 5%, and 1%.

4.3.3. Debt thresholds

The effects of government spending on private consumption might depend on the level of government debt. That is, the effects of government spending could become less Keynesian if large increases in the debt-to-GDP ratio occur or if they are already at relatively high levels, as policy options are constrained, and governments have less room for maneuver. To assess

the effect of different levels of government debt on the responsiveness of private consumption and investment, we consider a threshold for the debt ratio using the dummy variable *highdebt*, defined as follows: *highdebt_{it}* takes a value of 1 if the debt ratio is above the average of the debt ratio in year *t* for the respective income group sample, and 0 otherwise, represented by *lowdebt* (effectively it corresponds to 1-*highdebt*).

The results are shown in Table 6. We observe that the increase in government expenditure is positively associated with real private consumption in both advanced and developing economies, irrespective of the debt level. However, advanced economies with low government debt have a larger reduction in private consumption from an increase in government spending in the absence of fiscal consolidation.

Social transfers affect real private consumption per capita only in developing economies: increasing social transfers take a negative toll on consumption independently of public debt levels and of the presence or absence of fiscal consolidation. Tax increases positively affect consumption per capita, exhibiting Ricardian behavior mainly in highly indebted countries.

Regarding the effects of fiscal variables on private investment, an increase in government final consumption reduces real per capita private investment in advanced economies with lower debt levels that are not experiencing a fiscal contraction. The opposite effect is found for social transfers, for which higher levels are associated with higher investment levels, only for developing economies with lower debt. Lastly, expansionary fiscal consolidation occurs with an increase in tax revenue in advanced economies with higher debt during fiscal contraction episodes.

Table 6. Estimation results for real per capita private consumption and investment, high and low public debt, IV (Hamilton-based), 1970-2018

Dependent Variable	Real private consumption per capita		Real private investment per capita	
	1	2	3	4
Income Group	AE	DEV	AE	DEV
<i>dep. var.</i> _{<i>t-1</i>}	-0.073** (0.033)	-0.287*** (0.047)	-0.236*** (0.050)	-0.288*** (0.067)
<i>Y</i> _{<i>t-1</i>}	-0.028 (0.048)	0.186* (0.096)	0.329* (0.172)	-0.132 (0.324)

ΔY_t	0.273** (0.126)	0.458 (0.297)	1.588*** (0.306)	0.151 (1.116)
Y^{av}_{t-1}	-0.003 (0.015)	-0.012 (0.034)	0.035 (0.058)	-0.136 (0.168)
ΔY^{av}_t	0.045* (0.026)	0.276** (0.116)	0.105 (0.078)	0.603 (0.473)
$FCE_{t-1} \times FC^m \times highDebt$	0.148*** (0.053)	0.055 (0.114)	0.308 (0.366)	-0.346 (0.488)
$FCE_{t-1} \times (1 - FC^m) \times highDebt$	0.100 (0.065)	0.052 (0.094)	0.024 (0.273)	-0.376 (0.323)
$FCE_{t-1} \times FC^m \times lowDebt$	0.081* (0.048)	0.114** (0.051)	0.086 (0.149)	-0.097 (0.242)
$FCE_{t-1} \times (1 - FC^m) \times lowDebt$	-0.032 (0.024)	-0.007 (0.049)	-0.157* (0.083)	0.399 (0.339)
$TF_{t-1} \times FC^m \times highDebt$	-0.027 (0.029)	0.026 (0.032)	-0.104 (0.092)	0.009 (0.123)
$TF_{t-1} \times (1 - FC^m) \times lowDebt$	-0.006 (0.024)	-0.027* (0.014)	-0.087 (0.079)	0.028 (0.124)
$TF_{t-1} \times FC^m \times highDebt$	-0.048 (0.040)	0.031 (0.109)	-0.168 (0.371)	0.153 (0.560)
$TF_{t-1} \times (1 - FC^m) \times lowDebt$	-0.000 (0.046)	0.004 (0.063)	0.054 (0.218)	0.659** (0.308)
$TAX_{t-1} \times FC^m \times highDebt$	0.000 (0.041)	-0.005 (0.048)	-0.033 (0.103)	0.414* (0.230)
$TAX_{t-1} \times (1 - FC^m) \times lowDebt$	0.836 (0.627)	-0.072 (0.886)	-0.841 (1.773)	4.137 (4.013)
$TAX_{t-1} \times FC^m \times highDebt$	0.247 (1.255)	0.312 (0.703)	2.688 (5.195)	-2.450 (4.311)
$TAX_{t-1} \times (1 - FC^m) \times lowDebt$	0.593* (0.338)	-0.094 (0.299)	1.702* (0.955)	0.499 (1.327)
$\Delta FCE_t \times FC^m \times highDebt$	0.524** (0.231)	0.538** (0.225)	0.967 (0.883)	-0.656 (0.893)
$\Delta FCE_t \times (1 - FC^m) \times lowDebt$	-0.793* (0.483)	-0.114 (0.202)	0.975 (0.971)	-1.234 (1.038)
$\Delta FCE_t \times FC^m \times highDebt$	-0.331 (0.599)	-0.026 (0.580)	-2.329 (1.901)	-1.404 (3.088)
$\Delta FCE_t \times (1 - FC^m) \times lowDebt$	-0.060 (0.248)	-0.083 (0.054)	-0.512 (0.748)	0.069 (0.271)
$\Delta TF_t \times FC^m \times highDebt$	-0.046 (0.111)	-0.046* (0.027)	-0.574 (0.384)	-0.124 (0.138)
$\Delta TF_t \times (1 - FC^m) \times lowDebt$	0.094 (0.439)	-0.284 (0.488)	1.328 (1.731)	-0.424 (2.109)
$\Delta TF_t \times FC^m \times highDebt$	0.167 (0.455)	0.015 (0.377)	0.849 (1.514)	0.533 (1.691)
$\Delta TF_t \times (1 - FC^m) \times lowDebt$	0.178 (0.197)	0.118 (0.181)	0.310 (0.395)	0.826 (1.079)
$\Delta TAX_t \times FC^m \times highDebt$	0.174* (0.103)	-0.053 (0.193)	0.582*** (0.215)	1.120 (0.828)
$\Delta TAX_t \times (1 - FC^m) \times lowDebt$	0.076* (0.046)	0.109** (0.055)	0.159 (0.137)	-0.101 (0.219)
$\Delta TAX_t \times FC^m \times highDebt$	-0.009 (0.023)	-0.016 (0.013)	-0.136 (0.089)	0.031 (0.096)
$\Delta TAX_t \times (1 - FC^m) \times lowDebt$	0.010 (0.032)	-0.002 (0.048)	-0.060 (0.114)	0.393* (0.221)
<i>Obs.</i>	564	1,120	419	1,020
<i># countries</i>	27	68	20	63
<i>Kleibergen-Paap p-value</i>	0.998	0.938	0.971	0.808
<i>Sargan-Hansen p-value</i>	0.411	0.336	0.538	0.941

Note: Robust standard errors clustered at the country level are reported in parentheses. Constants and country and time effects estimated but omitted for reasons of parsimony. *, **, and *** denote significance at 10%, 5%, and 1%.

4.3.4. Financial crises

The influence of financial crises is likely to play a role when austerity and fiscal consolidation are designed and implemented. Before 2008, financial crises were not abundant in OECD countries (although some significant crises took place in countries such as Spain,

the US, Finland, or Sweden before the “Great Recession”), but we still have enough cases to consider. In the following, we rely on the database by Laeven and Valencia (2013, 2018) (which was recently updated and is publicly available) to assess whether the link between fiscal consolidation and private consumption and investment varies during crisis episodes. These episodes include precise dating for (systemic) banking crises, currency crises, debt crises, and sovereign debt restructuring. The link between these variables is likely to differ with an impaired credit channel (of almost) zero-bound monetary policy (more recently), and this is a hypothesis worth investigating. From a policy perspective, a relevant message can be extracted, such as the need to prop up the financial sector to restore confidence and the channeling of savings to private investment, thus favoring a non-Keynesian outcome of fiscal consolidation. Using a specification similar to the one in the previous section for debt thresholds and with a dummy variable (*crisis*) for financial crises, our results, available upon request, show that in the absence of crises, an increase in government spending (taxation), in the presence of fiscal consolidation (in the absence of fiscal consolidation), increases real private consumption per capita in advanced economies. An increase in tax and government spending levels positively affects real per capita consumption when consolidation is taking place but there was no financial crisis. The opposite effect is seen when, at a same time, an economy experiences a financial crisis and does not consolidate. Regarding the fiscal impact on real private investment, both government spending (during a crisis) and taxes (in the absence of a financial crisis) positively affect investment during a fiscal consolidation episode. The increase in the overall tax burden in a noncrisis period and in the absence of consolidation negatively affects private investment, whereas a rise in social transfers during a financial crisis, concomitant with a fiscal retrenchment period, leads to a fall in investment levels.

5. Conclusion and policy implications

Using a panel framework, with an unbalanced sample of 174 countries between 1970 and 2018 (37 advanced and 137 developing economies), we assess whether the normally expected negative response of private consumption and private investment to fiscal consolidation is reversed. We employ three alternative measures of the cyclically adjusted primary balance to determine the fiscal episodes: WEO based, HP based, and Hamilton based.

Our main results can be summarized as follows. First, increases in general government final consumption expenditures have a positive (Keynesian) effect on real per capita private consumption. Second, tax increases have a positive effect on private consumption in the presence of fiscal consolidation. Third, fiscal contractions create a crowding-in effect on private investment. In addition, these effects are stronger in advanced economies than in developing countries (notably for Hamilton-based fiscal consolidation). Expansionary fiscal consolidations occur in particular in highly indebted advanced economies after an increase in taxes. Finally, the negative effect of taxation on private consumption is larger when an economy experiences a financial crisis but not consolidation.

Our findings lead us to consider whether, in some cases, fiscal retrenchment can contribute to an increase in domestic demand via private investment, a channel that should not be disregarded, especially if it implies lower tax rates. Regarding the level of government debt, advanced economies with a low government debt ratio endure a larger reduction in private consumption after increases in government spending and in the absence of fiscal consolidation. In that sense, consumers in low-debt countries behave in a less profligate fashion when the government does not consolidate. Therefore, we present, in a general and summarized way, the results obtained in Table 7.

Future work should try to disentangle whether some countries are under more pressure to implement fiscal austerity than others, which might imply different public perceptions and consumer reactions.

Table 7. Summary results

Real per capita consumption										
	<i>Baseline</i>		Income group				Source of fiscal policy consolidation			
			AE		DEV		Spending based		Tax based	
	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.
<i>FCE</i>	+	+	+	0	0	0	+	0	+	0
<i>TF</i>	0	0	+	0	0	0	0	-	0	-
<i>TAX</i>	-	0	+	-	+	0	0	0	0	0
Geographic group										
	Latin America		MENAP		SSA		Europe		Asia	
	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.
<i>FCE</i>	0	0	+	0	-	-	+	0	0	0
<i>TF</i>	0	0	+	+	0	0	0	+	-	0
<i>TAX</i>	0	0	+	0	-	+	+	0	0	0
Real per capita investment										
	<i>Baseline</i>		Income group				Source of fiscal policy consolidation			
			AE		DEV		Tax based		Spending based	
	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.
<i>FCE</i>	-	-	0	-	0	0	+	+	0	0
<i>TF</i>	+	0	0	0	0	0	-	0	0	0
<i>TAX</i>	+	+	+	0	0	0	0	0	0	0
Geographic group										
	Latin America		MENAP		SSA		Europe		Asia	
	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.	Consol.	Not Consol.
<i>FCE</i>	0	0	0	0	0	0	0	0	0	0
<i>TF</i>	0	0	0	0	0	0	0	0	0	0
<i>TAX</i>	0	0	0	0	0	0	0	0	+	0

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