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# Assessing fiscal episodes

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ABSTRACT

In an OCDE panel, for the period 1970–2010, we assess the effects of fiscal consolidation episodes, with four different definitions. Our results reveal that lower final government consumption increases private consumption in three out of the four approaches, when a fiscal consolidation occurs, and the debt ratio is above the cross-country average. The magnitude of these coefficients is higher for countries with lower debt levels, implying more successful consolidations associated with reduced crowding-out effects. There is some evidence of non-Keynesian effects for both private consumption and private investment, and the effects of social transfers on private investment tend to be negative, both in the short and long run. In a financial crisis, such effects are also more prone to happen. Finally, raising long-term interest rates reduces per capita private investment.



## 1. Introduction

The 2008–2009 economic and financial crises brought again into the limelight the question of fiscal episodes and the importance of the so-called expansionary fiscal consolidations. Indeed, while several institutions and economists argued for the importance of fiscal stimuli in the context of the crisis, the case for fiscal retrenchment, which via expectations, promotes more private demand and growth, surfaced again in the discussion in the aftermath of the crisis. Therefore, in this paper we revisit the debate of the non-Keynesian effects of fiscal policy, and assess notably expansionary fiscal consolidation episodes in the context of OECD countries, via private consumption and private investment.

In view of the somewhat ad-hoc set-up that is usually available in the existing studies, we contribute to the literature by cross-checking several methods that have been used to determine the existence of fiscal episodes, in order to confer some robustness to the analysis. Consequently, on the one hand, we use several more established approaches to determine fiscal episodes, based on changes of the cyclically adjusted primary balance, proposed and applied by Giavazzi and Pagano (1996), Alesina and Ardagna (1998), and Afonso (2010). On the other hand, and as an additional comparison, we also use the fiscal episodes identified on the basis of a so-called policy action-based approach proposed by the IMF (2010).

Specifically, we assess in a panel framework, for the period 1970–2010, whether a usually expected positive response of private consumption and private investment to a fiscal expansion is reversed. Such event can arise if, for instance, consumers and investors might anticipate future difficulties stemming from fiscal expansions and a decrease in permanent income and in private consumption may occur. Moreover, if agents actually expect benefits from the implementation of a credible fiscal retrenchment, such reverse effect may indeed take place.

In a nutshell, our results show that lower final government consumption would increase private consumption in the short run, when there is a fiscal consolidation, and the debt ratio is above the cross-country average. The magnitude of these coefficients is higher for countries with lower debt levels, translating a more successful consolidation programme associated with reduced crowding-out effects. Regarding private investment, in general, our estimations deliver weaker but similar results to the ones reported for private consumption, with social transfers having a negative impact on private investment, both in the short and long run. The three approaches that determine the fiscal episodes on the basis of the cyclically adjusted primary balance tend to produce closer results than the so-called policy-based action method. In any case, empirical evidence seems to support the existence of non-Keynesian effects affecting both private consumption and private investment (which is further adversed in the presence of financial crises). Finally, raising long-term interest rates reduces per capita private investment.

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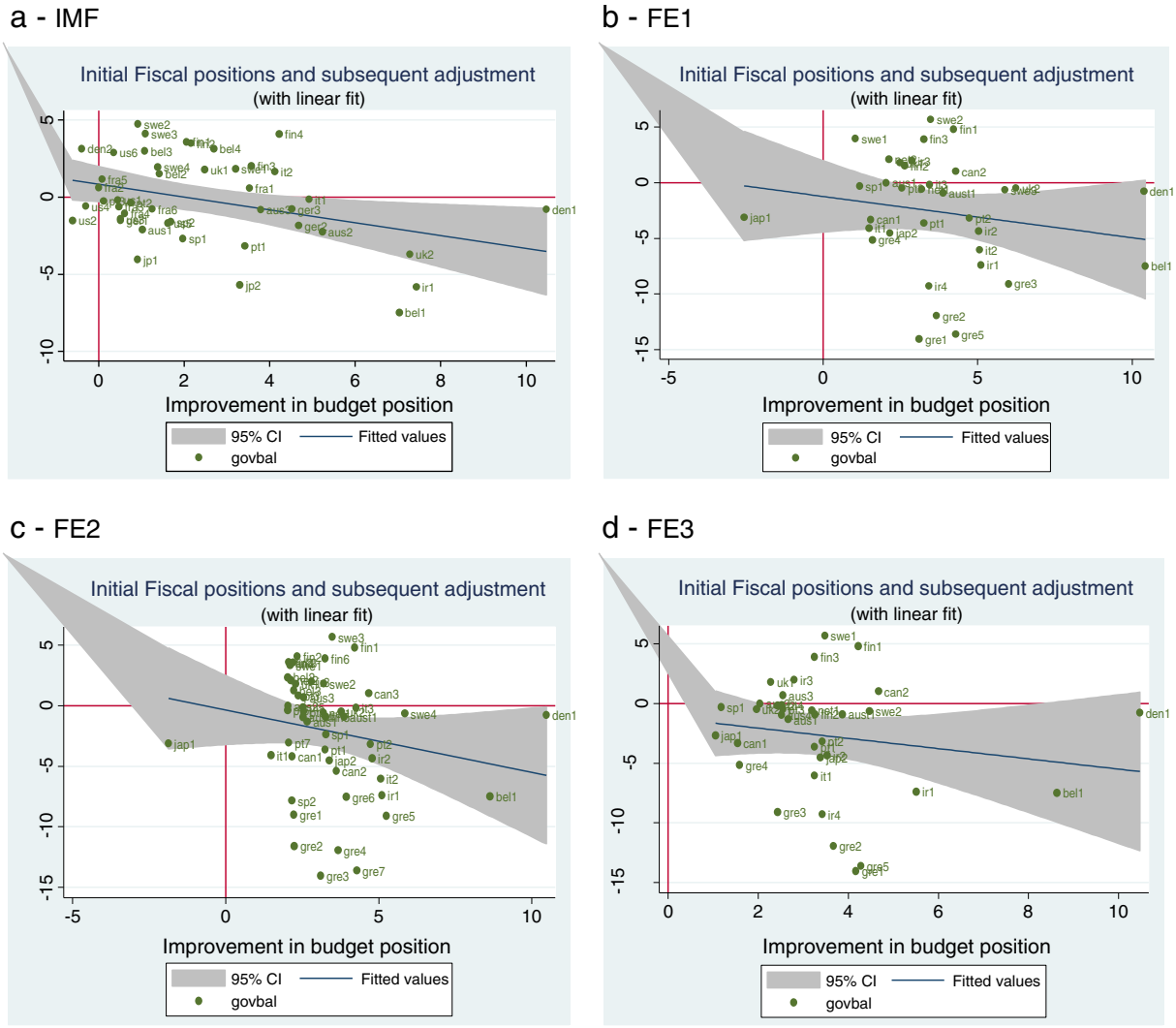
**Table 1**
Fiscal Episodes (FE), based on the change in the primary cyclically adjusted budget balance and on the so-called policy action-based approach.

| Country | IMF | FE1 | | FE2 | | FE3 | |
|---|---|---|---|---|---|---|---|
| | Contractions | Expansions | Contractions | Expansions | Contractions | Expansions | Contractions |
| Australia | 1980, 1985–88, 1994–99 | 2009 | 1987–88 | 1975, 2009 | 1987–88 | 2009 | 1987–88 |
| Austria | | 1976, 2004 | 1997 | 1976, 2004 | 1984, 1997, 2001, 2005 | 2004 | 1984, 1997, 2001, 2005 |
| Belgium | 1982–84, 1987, 1990, 1992–99 | 1981, 2005, 2009 | 1982–87 | 1981, 2005, 2009 | 1982–85, 1993, 2006 | 1981, 2005, 2009 | 1982–85 |
| Canada | 1980–1999 | 1975, 1977–78, 2002, 2009 | 1987, 1996–98 | 1977, 2001–02, 2009 | 1981, 1986–87, 1996–97 | 1975, 2009 | 1987, 1996–97 |
| Denmark | 1983–86, 1995 | 1975–76, 1982, 1991, 2010 | 1983–87 | 1975–76, 1982, 1990–91, 1994, 2009–10 | 1983–86 | 1975–76, 1982, 1991, 2010 | 1983–86 |
| Finland | 1984, 1988, 1992–2000, 2006–07 | 1979–80, 1991–93, 2010 | 1976–77, 1997–98, 2000–01 | 1978–79, 1987, 1991–92, 2009–10 | 1976–77, 1981, 1984, 1988, 1996–97, 2000–01 | 1978–79, 1987, 1991–92, 2010 | 1976–77, 1996–97, 2000–01 |
| France | 1984, 1986–89, 1991, 1995–98, 2000, 2006–07 | 2009–10 | | 2009–10 | | 2009–10 | |
| Germany | 1982–89, 1992–2000, 2003–07 | 1975, 1991, 2001–03 | | 1975, 1990–91, 2001–02 | | 1975, 1990–91, 2001–02 | |
| Greece | | 1981–85, 1989–90, 2008–09 | 1991–92, 1994, 1996–99, 2006, 2010 | 1981–82, 1985, 1989–90, 2008–09 | 1982, 1986, 1991–92, 1996–98, 2005–06, 2010 | 1981–82, 1985, 1990, 2008–09 | 1991,1994, 1996–97, 2006, 2010 |
| Ireland | 1982–88, 2009 | 1975, 1979, 2001–03, 2007–09 | 1976–77, 1983–86, 1988–89, 2010 | 1974–75, 1978–79, 1995, 2001–02, 2007–09 | 1976–77, 1983–84, 1988, 2010 | 1974–75, 1978–79, 2001–02, 2007–09 | 1976–77, 1983–84, 1988, 2010 |
| Italy | 1992–98, 2004–07 | 2001 | 1977, 1982–83, 1992–94 | 1981, 2001 | 1977, 1982–83, 1992–93 | 1981, 2001 | 1977, 1982–83, 1992–93 |
| Japan | 1997, 2003–07 | 1993–95, 1998 2009–10 | 1998–2000, 2005–07 | 1975, 1994–95, 1998, 2009–10 | 1998–99, 2005–06 | 1993–94, 1998, 2009–10 | 1999–00, 2006–07 |
| Netherlands | | 2002, 2010 | 1991, 1993 | 2001–02, 2009–10 | 1991, 1993 | 2002, 2009–10 | 1991 |
| Portugal | 1983, 2000–03, 2005–07 | 1978–80, 2005, 2009–10 | 1977, 1983–84, 1986 | 1978–79, 1985, 1990, 1993, 2005, 2009–10 | 1977, 1983–84, 1986, 1988, 1992, 1995,2006 | 1978–79, 1993, 2005, 2009–10 | 1977, 1983–84, 1986, 1988, 1992 |
| Spain | 1983–89, 1992–98 | 2008–10 | 1987 | 2008–09 | 1986, 1987, 2010 | 2008–09 | 1987 |
| Sweden | 1983–84, 1986, 1992–97, 2007 | 1974, 1979–80, 1991–94, 2002–03 | 1984, 1987, 1996–99 | 1974, 1979, 1991–93, 2002–03, 2010 | 1976, 1983–84, 1987, 1996–97 | 1974, 1979, 1991–93, 2002 | 1984, 1987, 1996–97 |
| United Kingdom | 1981–82, 1994–99 | 1972–75, 1992–94, 2001–04, 2009–10 | 1981–82, 1997–2000 | 1972–73, 1990, 1992–93, 2001–02, 2009–2010 | 1981, 1997–98, 2000 | 1972–73, 1992–93, 2001–03, 2009–10 | 1981, 1997–98 |
| United States | 1980–81, 1985–86, 1988, 1990–91, 1993–94, 2000 | 2001–02, 2007–10 | | 2001–02, 2007–08 | | 1974, 2001–02, 2007–08 | |
| Years with episodes | 172 | 95 | 73 | 95 | 79 | 78 | 59 |
| Average duration (years) | 3.8 | 2.0 | 2.1 | 1.6 | 1.5 | 1.6 | 1.6 |

Notes: all measures computed by the authors, except the IMF one.
FE1 — measure used by Giavazzi and Pagano (1996): the cumulative change in the primary cyclically adjusted budget balance is at least 5, 4, 3 percentage points of GDP in respectively 4, 3 or 2 years, or 3 percentage points in one year.
FE2 — measure used by Alesina and Ardagna (1998): the change in the primary cyclically adjusted budget balance is at least 2 percentage points of GDP in one year or at least 1.5 percentage points on average in the last two years.
FE3 — measure based on Afonso (2010): a fiscal episode occurs when either the change in the primary cyclically adjusted balance is at least one and a half times the standard deviation (from the full panel sample) in one year, or when the change in the primary cyclically adjusted balance is at least one standard deviation on average in the last two years.
IMF — measure computed by the IMF (2010), so-called policy action-based approach to account for consolidation episodes.




Note: budget position measured by the cyclically adjusted primary balance (% of GDP).

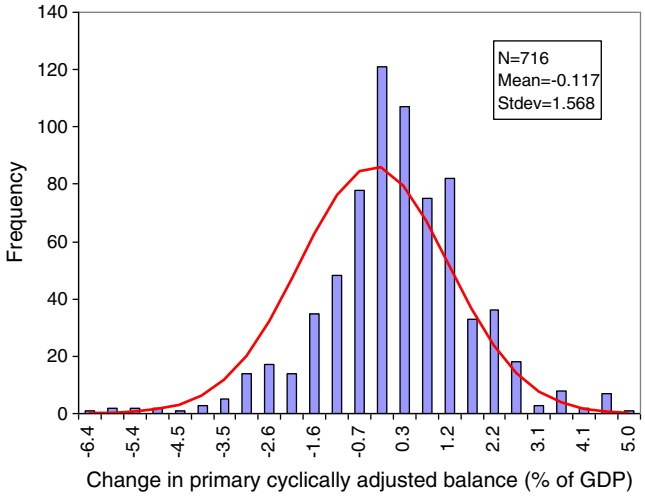
Source: authors' computations.

**Fig. 2.** Initial fiscal imbalances and subsequent adjustment: 1970–2010. Note: budget position measured by the cyclically adjusted primary balance (% of GDP). Source: authors' computations.

The remainder of the paper is organised as follows. Section 2 briefly reviews the related literature. Section 3 determines the fiscal episodes. Section 4 assesses the effects of the fiscal adjustments. Section 5 concludes.

## 2. Literature

The discussion of expansionary fiscal consolidations can be traced back to Feldstein (1982), who argued that when permanent public spending cuts are seen as an indication of future tax cuts, rising expectations of permanent income increase.[1] If a serious fiscal consolidation occurs, there may be an induced wealth effect, leading to an increase in private consumption. On the other hand, lower government borrowing requirements decrease the risk premium associated with government debt, contribute to reduce real interest rates and allow the crowding-in of private investment. However, if consumers do not




Source: authors' computations.

**Fig. 1.** Changes in the primary cyclically adjusted budget balance: 1970–2010. Source: authors' computations.

[1] Blanchard (1990), Sutherland (1997) and Perotti (1999) mentioned that with high debt ratios there is a higher probability of fiscal policy being non-Keynesian.

**Table 2**
Economic performance and fiscal adjustments, 1970–2010.

| 2.1: IMF | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| capbb_gdp | | | totgovexp_gdp | | | totgovrev_gdp | | | rpubinv | | | rgovcons | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| −0.25 | 1.19 | 1.94 | 46.59 | 36.50 | 44.82 | 42.78 | 34.74 | 43.41 | 43.12 | 43.51 | 38.86 | 304.00 | 315.34 | 293.65 |
| rgdp | | | rprivcons | | | rprivinv | | | Debt ratio | | | unemp | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| 1607.79 | 1676.85 | 1519.15 | 1008.20 | 1051.28 | 937.63 | 269.92 | 278.76 | 250.11 | 51.56 | 61.37 | 61.39 | 7.44 | 8.06 | 7.28 |

Note: each entry corresponds to the average values from the different fiscal episodes (contractions) computed under the four different methods: IMF, FE1, FE2 and FE3. The full set of information with the individual episodes is available from the authors upon request.

think that a given fiscal consolidation is credible, then the usual negative Keynesian effect on consumption will occur.[2]

In addition, Bertola and Drazen (1993) refer to a "trigger point," as a moment after which a fiscal adjustment is highly probable. In other words, when government spending rises above a given threshold, this increases the probability that a fiscal consolidation takes place. In this context, consumers tend to exhibit a more Ricardian behaviour. They show through the use of a model of intertemporal optimizing behaviour 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 when a specific trigger point is reached, there will be a nonlinear negative relationship between private sector consumption and government spending.

Several studies have tackled empirically this issue, although with somewhat inconclusive results (see Afonso, 2010; Ahtiala and Kanto, 2002; Hjelm, 2002; van Aarle and Garretsen, 2003). Gobbin and van Aarle (2001) analyse EU countries and find that non-Keynesian effects dominate the traditional Keynesian expenditure effects of government spending, taxation and transfer payments. For instance, Afonso (2010) mentions that regarding general government final consumption there is no statistically significant short-run effect on private consumption, with or without fiscal consolidations for an OECD panel.

Regarding the possible effects of a fiscal consolidation in private investment, via, for instance, lower overall costs to provide public services or due to a downward impact on the government debt implicit interest rate, the question also deserves an assessment. A few results have been provided arguing for a positive effect of a fiscal consolidation on private investment notably by Ardagna (2009) and Schaltegger and Weder (2010).

## 3. Fiscal episodes

### 3.1. Approaches to determine fiscal episodes

The most commonly used approaches to determine fiscal episodes (either fiscal adjustments or expansions) are based on the changes in the cyclically adjusted primary budget balance, which allows the correction of the effects, on the budget balance, resulting from changes in economic activity such as inflation or real interest rate changes. Therefore, we use the change in the cyclically adjusted primary budget balance as a percentage of GDP, a widely used measure, along the lines of Giavazzi and Pagano (1996), Alesina and Ardagna (1998), and Afonso (2010). On the basis of the abovementioned studies, we determine the periods where fiscal episodes occur using the respective proposed measures, which we label in our study as FE1, FE2, and FE3.

The FE1 measure follows Alesina and Ardagna (1998) who adopted a fiscal episode definition that allows the idea that some stabilisation periods may have only one year. More specifically, they consider the change in the primary cyclically adjusted budget balance that is at least 2 percentage points of GDP in one year or at least 1.5 percentage points on average in the last two years.

On the other hand, the FE2 measure is the definition used by Giavazzi and Pagano (1996), which decreases the probability of fiscal adjustment periods with only one year by using a limit of 3 percentage points of GDP for a single year consolidation. They proposed using the cumulative changes in the primary cyclically adjusted budget balance that are at least 5, 4, 3 percentage points of GDP in respectively 4, 3 or 2 years, or 3 percentage points in one year.

In addition the FE3 measure, used by Afonso (2010), defines the occurrence of a fiscal episode when either the change in the primary cyclically adjusted balance is at least one and a half times the standard deviation (from the panel sample) in one year, or when the change in the primary cyclically adjusted balance is at least one standard deviation on average in the last two years.

Finally, and for comparison purposes, we also use the fiscal consolidation episodes identified by the IMF (2010), following the Romer and Romer (2010) approach.[3] In this case, only consolidation events are available, while our computation of measures FE1, FE2, and FE3 allows us to determine both fiscal contractions and fiscal expansions. These episodes are identified by looking at IMF and OECD historical reports and by checking what countries intended to do at the time of publication. Note, however, that this approach differs from the one used in Romer and Romer (2010), who identify exogenous tax policy changes by carefully analysing US congressional documents. The IMF (2010) policy-action based approach makes use of descriptive historical facts that usually describe what happened to the deficit in a particular period but they do not go into the details of policy makers' intentions, discussions and congressional records.

Our analysis covers the period 1970–2010 for a set of 14 European Union (EU) countries plus four developed OECD economies, more specifically: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, the U.K., and Australia, Canada, Japan and the U.S. Overall, we have a panel of annual data whose dimension reaches a maximum of 738 observations (see Appendix A for data sources and descriptive statistics).

### 3.2. The fiscal episodes

In Table 1 we report the fiscal episodes computed according to the abovementioned four strategies. Under the headings FE1, FE2, and FE3 we report the fiscal episodes, both expansions and contractions, computed using the three alternative approaches proposed respectively by Giavazzi and Pagano (1996), Alesina and Ardagna (1998), and Afonso

[2] Such reasoning is sometimes also labelled as "the expectational view of fiscal policy" (see Hellwig and Neumann, 1987).

[3] Further details can be found in the background paper to the WEO's Fiscal Chapter, that is, in Devries et al. (2011).

2.2: FE1

| capbb_gdp | | | totgovexp_gdp | | | totgovrev_gdp | | | rpubinv | | | rgovcons | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| −2.64 | 0.53 | 0.70 | 47.81 | 46.62 | 46.22 | 41.02 | 42.61 | 42.91 | 15.21 | 14.12 | 14.75 | 95.41 | 97.59 | 105.64 |
| rgdp | | | rprivcons | | | rprivinv | | | Debt ratio | | | unemp | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| 432.96 | 450.14 | 492.31 | 240.23 | 249.15 | 270.36 | 73.35 | 77.65 | 87.41 | 67.39 | 70.94 | 73.20 | 8.09 | 8.54 | 8.03 |

(continued on next page)

(2010), as discussed in the previous section. In addition, we also report in the table the fiscal contraction episodes as taken from IMF (2010).

From Table 1 we observe that the number of fiscal contractions ranges from 59, in the approach proposed by Afonso (2010), to 79, using the approach from Giavazzi and Pagano (1996). The IMF (2010) reports a much higher number of years where fiscal contractions take place (in around 42% of the years there are fiscal contractions), even though the covered time sample is smaller (1980–2007). On the other hand, the identified fiscal expansion episodes range from 78 for the FE3 measure to 95 for the other two approaches.

The average duration of the reported fiscal episodes is around 1.6 years for the approaches of Alesina and Ardagna (1998), and Afonso (2010), around 2 years following the approach proposed by Giavazzi and Pagano (1996), and around 3.8 years for the fiscal contractions identified by the so-called policy action-based approach of the IMF.

The three methods that determine fiscal episodes on the basis of the change in the cyclically adjusted primary balance essentially coincide in identifying, for instance, the fiscal contractions of Denmark in 1983–84 and of Ireland in 1988–89. A broadly similar pattern also emerges from the IMF approach. Moreover, the fiscal expansions that took place in most countries around the period 2009–2010 are also captured by the three methods that use the cyclically adjusted primary balance.

In addition, from Fig. 1 we can also see that the average change in the primary structural budget balance in the full panel is −0.117, and the standard deviation is 1.568, with a slightly left skewed distribution.

### 3.3. Characteristics of the fiscal episodes

Regarding the characteristics of the fiscal episodes, the fiscal conditions prevailing just before the beginning of a consolidation episode seem to have had an impact on the size of subsequent efforts (Fig. 2a–d). The larger the cyclically adjusted primary deficit (CAPB), the larger was the size of ensuing fiscal consolidation. This may reflect that large 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.

## 4. Effects of fiscal adjustments

### 4.1. Stylised links to fiscal consolidations

In this sub-section we assess the stylised links between fiscal consolidations and a series of economic performance measures, such as real GDP growth, private consumption, private investment, changes in the unemployment rate, the debt ratio, and several budgetary components. Therefore, Table 2 follows the paths of several macroeconomic variables by reporting averages for the year before the episodes of significant fiscal consolidation, for the period during which the consolidation takes place, and for the following year.

The first comment relates to the expected improvement in the cyclically adjusted primary balance during and after the consolidation episode has taken place (this is true for all the four approaches). This is accomplished by a simultaneous decrease in total government expenditure ratios during the consolidation period and an increase in total government revenue ratios. Secondly, it is also interesting to note that despite the decrease in total government expenditures identified above, government final consumption increases during and after the consolidation period. However, one does observe a reduction in public investment after the end of the consolidation episode (denoting a lagged effect). Finally, fiscal consolidations occur together with increases in government debt ratios (both during and after), denoting a dragging effect of the fiscal imbalances, as well as a general rise in the unemployment rate. All in all, there is evidence that there has been a gradual convergence in key fiscal variables across the Euro area in particular over the consolidation period (a fact also acknowledged by De Bandt and Mongelli, 2000).

### 4.2. Empirical analysis: private consumption

Given that we wish to analyse more thoroughly the possible impact of fiscal episodes on private consumption and on private investment, we set up a baseline specification, for instance, for private consumption. There are two main approaches when specifying consumption functions: one is the Euler approach (Perotti, 1999) and the other is the solved-out function approach (Giavazzi and Pagano, 1996). There is ongoing debate as to which one to use (Campbell, 1996; Muellbauer and Lattimore, 1995 for further discussion). 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).

Therefore, the baseline specification for the real per capita private consumptions is given by:

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

where the index $i$ denotes the country, the index $t$ indicates the period, and $c_i$ stands for the individual effects to be estimated for each country $i$. In addition we consider: $C$ — private consumption; $Y$ — GDP; $Y^{av}$ — GDP of the full country sample (per capita average); $FCE$ — general government final consumption expenditure[4]; $TF$ — social transfers; and $TAX$ — taxes. All the abovementioned variables are taken as the logarithms of the respective real per capita observations. $FC^m$ is a dummy variable that controls for the existence of fiscal episodes that are labelled

[4] The common practice in the literature (see, e.g., Afonso, 2010) is to use government final consumption expenditure and not total spending which also includes interest payments and, hence, makes it harder to isolate the fiscal effects of interest with more precision.

**Table 2** (*continued*)

| 2.3: FE2 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| capbb_gdp | | | totgovexp_gdp | | | totgovrev_gdp | | | rpubinv | | | rgovcons | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| −2.05 | 0.83 | 0.86 | 47.05 | 46.18 | 46.21 | 41.04 | 42.71 | 43.02 | 13.94 | 13.12 | 13.09 | 89.36 | 90.96 | 94.17 |
| rgdp | | | rprivcons | | | rprivinv | | | Debt ratio | | | unemp | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| 415.48 | 427.26 | 440.07 | 236.23 | 243.22 | 248.97 | 71.91 | 74.76 | 77.85 | 60.82 | 63.26 | 64.31 | 7.48 | 7.76 | 7.42 |

as contractions, with $m = 1, 2, 3, 4$ for each of the four fiscal episode determination strategies used in the previous section. The dummy variable $FC^m$ assumes the following values: $FC^m = 1$ when there is a fiscal consolidation episode and $FC^m = 0$ when those fiscal adjustments do not occur. Additionally, it is assumed that the disturbances $u_{it}$ are independent and identically distributed random shocks across countries, with zero mean and constant variance.

Moreover, our fiscal data are also disentangled into taxes, general government final consumption, and social transfers. Taxes are the sum of current taxes on income and wealth (direct taxes) and taxes linked to imports and production (indirect taxes). In the subsequent analysis of the effects of fiscal adjustments, the variables are taken as the logarithms of real per capita observations (in Appendix A, panel unit root tests reject the null of a common unit root, and non-stationarity is mostly rejected).

#### 4.2.1. Baseline results

We develop our empirical strategy by estimating the full specification (1) with the two spending items, general government final consumption and social transfers, and with total tax revenues (direct plus indirect taxes) considered at the same time. In addition, we report the results of our panel IV–GLS estimations for both per capita real private consumption and for per capita real private investment.[5] Therefore, we address the endogeneity issue as, e.g., tax revenues and social transfers can be expected to fluctuate automatically with economic activity, raising the issue of reversed causality.[6]

The results (Table 3) show that final government consumption has a statistically significant negative long-run effect,[7] for the three standard methods of determination of fiscal episodes. Such effect has a bigger magnitude particularly when a fiscal contraction episode occurs. The short-run elasticity is around 0.71–0.72 in the four alternative approaches for determining fiscal episodes, with the long-run effect of income close to unity on the three standard approaches and around 0.71 in the IMF one.

Moreover, we can also conclude that social transfers now have both a positive short- and long-run effects on private consumption for the approaches FE2 (Alesina and Ardagna, 1998) and FE3 (Afonso, 2010), in the presence of a fiscal consolidation episode. Finally, total tax revenues depict a so-called non-Keynesian result.

If, alternatively, we estimate Eq. (1) with only one of the relevant budgetary items at a time, we obtain similar results. Notice, however, that such approach could be affected by omitted variable bias; hence we do not present the tables for reasons of parsimony and economy of space.

Considering first the specification with only total government expenditure as an initial baseline (not shown), the short-run and long-run elasticities of private consumption to income are positive and statistically significant. The short-run elasticity of private consumption with respect to total government spending is negative, in the three standard methods, implying that curtailing government consumption increases private consumption, when there are no fiscal contraction episodes. In the presence of such fiscal episode, the result is not statistically significant, and no statistical evidence is uncovered for the IMF method either. Moreover, for method FE1, the respective negative long-run elasticity, when a fiscal consolidation episode occurs, implies that a 1 euro decrease in total spending is estimated to raise long-run private consumption by around 11 cents.

Secondly, when we use only general government final consumption, instead of total spending, the abovementioned negative long-run effect is statistically significant for the three standard methods of determination of fiscal episodes, regardless of the existence of fiscal contractions (not shown). In this case, a one euro decrease in general government final consumption raises long-run private consumption by around 23–32 cents.

On the other hand, spending on social benefits and welfare transfers has a positive short-run effect on private consumption for the two approaches FE2 and FE3 for the determination of fiscal episodes, but only when a fiscal contraction occurs (not shown).

Lastly, regarding the existence of possible effects from government revenue items on private consumption developments, in three (IMF, FE2, and FE3) out of the four approaches total revenue keeps its (previously found) non-Keynesian effect when a fiscal contraction episode occurs. In terms of direct taxes (current taxes on income and wealth) and indirect taxes (taxes linked to imports and production), when taken separately as the single budgetary items in the baseline specification, no statistically significant effects can be reported (also not shown but available upon request).

A discussion is worth making at this point regarding in particular the fact that recent research shows that identifying fiscal episodes using the change in the CAPB is a highly imperfect measure of policy actions that bias the estimates towards finding evidence of non-Keynesian effects. As Morris and Schuknecht (2007) and Romer and Romer (2010) explain, many non-policy factors, such as price fluctuations, influence the CAPB and can lead to erroneous conclusions regarding the presence of fiscal policy changes.[8] In addition, even when the CAPB accurately measures fiscal actions, these include discretionary responses to economic developments, such as fiscal tightening to restrain rapid domestic demand growth. IMF (2010) and Guajardo et al. (2011) explain in more detail the problems behind cyclically adjustment based approaches.

[5] We use as instruments lagged values of the regressors. The Sargan–Hansen test, which is a test of overidentifying restrictions, confirms the validity of the used instruments at usual significance levels.

[6] In any case, estimations with panel fixed-effects yield similar results.

[7] The long-run elasticity is computed as the ratio between the (negative) coefficient estimate of our lagged variable of interest and the coefficient estimate of the lagged real private consumption per capita.

[8] For example, a stock price boom raises the CAPB by increasing capital gains tax revenue, and also tends to coincide with an expansion in private domestic demand.

| 2.4: FE3 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| capbb_gdp | | | totgovexp_gdp | | totgovrev_gdp | | | rpubinv | | | rgovcons | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| −2.67 | 0.58 | 0.81 | 47.46 | 43.32 | 40.75 | 42.35 | 40.07 | 12.46 | 11.50 | 11.33 | 84.22 | 85.18 | 86.31 |
| rgdp | | | rprivcons | | rprivinv | | | Debt ratio | | | unemp | | |
| $t-1$ | *During* | $t+1$ | $t-1$ | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ | $t-1$ | *During* | $t+1$ |
| 390.94 | 403.61 | 411.18 | 221.49 | 232.17 | 66.26 | 69.79 | 72.78 | 63.60 | 65.99 | 66.49 | 7.98 | 8.30 | 7.41 |

On the other hand, the policy-based fiscal consolidation episodes are not free from criticisms either. Alberto Alesina (Harvard) in a recent reply to an article in "The Economist" wrote that the latter tried to portray his paper and the WEO Fiscal Chapter "as polar opposites" while "in reality they agree on many points".[9] He identifies that two main drawbacks of this approach are the number of judgement calls that must be made and the highly questionable idea that one could eliminate endogeneity problems (i.e., fiscal policy reacting to the output performance and not the other way around). He advocates that the definition of fiscal episodes used is simply the "standard methodology used in the literature to date", despite the acknowledgment of the imperfections in measuring cyclical adjustments. He goes even further by stating that "The WEO chapter simply dismisses this methodology".

Therefore, as Alesina, we also don't claim that the approach followed in this paper is flawless and this is the main reason behind presenting several alternative definitions, performing a number of sensitivity tests and including the IMF (2010) approach (a welcome addition to the preceding literature on this topic).

With this in mind we make use of the data available in Devries et al. (2011) (in Table A1 of the Appendix A, pages 86–87) and retrieve the changes in both revenues and expenditures components. We then rerun a simpler version of our baseline Eq. (1) for both private consumption and investment defined as follows:

$$\Delta C_{it} = c_i + \lambda C_{it-1} + \omega_0 Y_{it-1} + \omega_1 \Delta Y_{it} + \theta IMF\text{rev}_{it} + \eta IMF\text{exp}_{it} + \mu_{it} \quad (2a)$$

$$\Delta INV_{it} = c_i + \lambda INV_{it-1} + \omega_0 Y_{it-1} + \omega_1 \Delta Y_{it} + \theta IMFrev_{it} + \eta IMF\,\text{exp}_{it} + \mu_{it} \quad (2b)$$

where *IMF*rev and *IMF*exp denote the changes in total government revenues and expenditures (in % of GDP), in consolidation years identified using the policy-action based approach. Again, it is assumed that the disturbances $u_{it}$ are independent and identically distributed random shocks across countries, with zero mean and constant variance.

Our results (see Table 4) show that, during consolidation episodes, coefficient estimates for changes in expenditures yield negative and statistically significant coefficients with both panel fixed-effects and IV–GLS estimations. This means that, during fiscal consolidations, reducing government expenditures increases both private consumption and private investment, therefore confirming our previous finding of the existence of non-Keynesian effects. However, we don't obtain statistically significant coefficients on the changes in revenues.

*4.2.2. Debt thresholds*

The effects of government spending notably on private consumption may depend on the level of the government indebtedness. That is, the effects of government spending could become less Keynesian if large increases in the debt-to-GDP ratio occur or if these are already at relatively high levels.

In order to assess how different levels of government indebtedness affect the responsiveness of private consumption we consider a threshold for the debt ratio using a dummy variable *Byear* is defined as follows: $Byear_{it}$ takes the value 1 if the debt ratio is above the average of the debt ratio in year $t$ for the entire cross-country sample, and 0 if otherwise.

According to the results reported in Table 5, lower final government consumption would increase private consumption in the short run, when there is a fiscal consolidation and the debt ratio is above the cross-country average (methods FE1, FE2 and FE3). This effect is smaller than compared to the one found in countries undergoing fiscal consolidation but with debt levels below the cross-country average. In this case (in methods F1 and F3) we obtain a larger magnitude of the government consumption coefficients, translating a more successful consolidation programme associated with reduced crowding-out effects. Nevertheless, the level of government indebtedness in this context does not provide relevant additional value regarding the short-run positive effect of social transfers.

As an alternative we also considered another debt threshold construction, $Bcountry_{it}$, which takes the value 1 if the debt ratio is above the average debt ratio in country $i$ for the entire sample average and 0 if otherwise. The country average of the debt ratio, on a given period, can also be important since markets compare individual countries notably in terms of the respective sovereign rating category. Our results (not shown) still uncover a similar result for general government final consumption, although with lower long-run magnitudes.

*4.2.3. Financial crises*

The influence of financial crises is likely to play a role when austerity and fiscal consolidations are in place. While financial crisis were not abundant in OECD countries prior to 2008 (although some significant crises took place in countries as Spain, the US, Finland or Sweden before the "Great Recession") there are enough cases to consider. Hence, we rely on Laeven and Valencia's (2010) database to assess whether the link between fiscal consolidations and private consumption is different during such crises episodes. Under an impaired credit channel (near to) zero-bound monetary policy (in more recent years) the link between these variables is likely to differ 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 channelling of savings to private investment thus favouring a non-Keynesian outcome of fiscal consolidations. Using a specification like the one in the previous section for the case of debt thresholds and by means of a dummy variable (*FIN*) for financial crises, we obtain the estimates in Table 6.

Lower final government consumption would increase private consumption in the short run, when there is a fiscal consolidation and the economy was hit by a financial crisis (method FE1). This effect is much larger than compared to the one found in countries undergoing fiscal consolidation but with the absence of such crises. In this case (in methods F1 and F2) we obtain a smaller magnitude of the

[9] http://www.economics.harvard.edu/faculty/alesina/Alesina.

**Table 3**
IV–GLS' estimation results for real per capita private consumption — 1970–2010.

| | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\lambda$ | $C_{t-1}$ | | −0.092*** | | −0.049*** | | −0.049*** | | −0.048*** | |
| | | | (0.025) | | (0.015) | | (0.015) | | (0.015) | |
| $\omega_0$ | $Y_{t-1}$ | | 0.066*** | 0.711*** | 0.057*** | 1.167*** | 0.056*** | 1.150*** | 0.054*** | 1.136*** |
| | | | (0.025) | (0.154) | (0.016) | (0.251) | (0.015) | (0.242) | (0.016) | (0.250) |
| $\omega_1$ | $\Delta Y_t$ | | 0.719*** | | 0.707*** | | 0.713*** | | 0.708*** | |
| | | | (0.058) | | (0.044) | | (0.044) | | (0.045) | |
| $\delta_0$ | $Y^{av}{}_{t-1}$ | | −0.002 | | −0.008 | | −0.007 | | −0.007 | |
| | | | (0.014) | | (0.010) | | (0.010) | | (0.010) | |
| $\delta_1$ | $\Delta Y^{av}{}_t$ | | −0.074 | | −0.002 | | 0.002 | | 0.002 | |
| | | | (0.071) | | (0.056) | | (0.055) | | (0.056) | |
| $\alpha_1$ | $FCE_{t-1}$ | | −0.013 | −0.140 | −0.057*** | −1.169*** | −0.041*** | −0.843** | −0.035** | −0.729** |
| | | | (0.011) | (0.132) | (0.017) | (0.450) | (0.013) | (0.351) | (0.014) | (0.354) |
| $\alpha_3$ | $\Delta FCE_t$ | | 0.074 | | 0.012 | | 0.077 | | 0.044 | |
| | | | (0.054) | | (0.045) | | (0.047) | | (0.049) | |
| $\beta_1$ | $TF_{t-1}$ | | 0.007 | 0.076 | 0.018* | 0.360* | 0.013* | 0.263* | 0.009 | 0.190 |
| | | | (0.008) | (0.088) | (0.009) | (0.185) | (0.008) | (0.156) | (0.008) | (0.159) |
| $\beta_3$ | $\Delta TF_t$ | $\times FC^m$ | −0.063 | | 0.060*** | | 0.110*** | | 0.081*** | |
| | | | (0.063) | | (0.022) | | (0.020) | | (0.021) | |
| $\gamma_1$ | $TAX_{t-1}$ | | 0.025*** | 0.272** | 0.036*** | 0.728** | 0.024** | 0.485** | 0.022** | 0.463* |
| | | | (0.009) | (0.124) | (0.011) | (0.293) | (0.010) | (0.234) | (0.010) | (0.246) |
| $\gamma_3$ | $\Delta TAX_t$ | | 0.043 | | −0.003 | | 0.029 | | 0.020 | |
| | | | (0.035) | | (0.037) | | (0.034) | | (0.034) | |
| $\alpha_2$ | $FCE_{t-1}$ | | −0.000 | −0.002 | −0.023*** | −0.467** | −0.025*** | −0.511*** | −0.025*** | −0.531*** |
| | | | (0.011) | (0.119) | (0.006) | (0.188) | (0.006) | (0.193) | (0.006) | (0.201) |
| $\alpha_4$ | $\Delta FCE_t$ | | 0.028 | | 0.029 | | 0.027 | | 0.027 | |
| | | | (0.056) | | (0.025) | | (0.026) | | (0.025) | |
| $\beta_2$ | $TF_{t-1}$ | | −0.002 | −0.019 | 0.000 | 0.008 | 0.001 | 0.019 | 0.001 | 0.016 |
| | | | (0.009) | (0.096) | (0.005) | (0.096) | (0.005) | (0.094) | (0.005) | (0.097) |
| $\beta_4$ | $\Delta TF_t$ | $\times (1 - FC^m)$ | −0.015 | | −0.008 | | −0.017 | | −0.012 | |
| | | | (0.029) | | (0.022) | | (0.023) | | (0.022) | |
| $\gamma_2$ | $TAX_{t-1}$ | | 0.022*** | 0.235** | 0.017*** | 0.357** | 0.019*** | 0.382** | 0.020*** | 0.411** |
| | | | (0.008) | (0.104) | (0.006) | (0.171) | (0.006) | (0.169) | (0.006) | (0.181) |
| $\gamma_4$ | $\Delta TAX_t$ | | 0.023 | | 0.007 | | −0.005 | | 0.003 | |
| | | | (0.025) | | (0.019) | | (0.019) | | (0.019) | |
| *Obs.* | | | 406 | | 674 | | 674 | | 674 | |
| *R-squared* | | | 0.707 | | 0.652 | | 0.658 | | 0.653 | |
| *Sargan–Hansen statistics* | | | 8.89 | | 6.30 | | 5.02 | | 7.55 | |
| *p-Value* | | | 0.448 | | 0.70 | | 0.83 | | 0.58 | |
| Null hypothesis | | | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value |
| $\alpha_1 - \alpha_2 = 0$ | | | 0.77 | 0.37 | 4.31 | 0.03 | 1.50 | 0.22 | 0.50 | 0.47 |
| $\gamma_1 - \gamma_2 = 0$ | | | 0.16 | 0.68 | 3.05 | 0.08 | 0.33 | 0.56 | 0.08 | 0.78 |
| $-\alpha_1 - \gamma_1 = 0$ | | | 1.32 | 0.25 | 4.98 | 0.02 | 4.23 | 0.03 | 2.10 | 0.14 |
| $\beta_1 - \beta_2 = 0$ | | | 1.06 | 0.30 | 4.37 | 0.03 | 3.14 | 0.07 | 1.41 | 0.23 |

Note: *FCE*, *TF* and *TAX* denote government consumption expenditure, social transfers, and total tax revenue in real terms and per capita. Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for the list of countries described in the main text over the period 1970–2010. *lr* — long-run elasticity of private consumption with respect to the relevant explanatory variable (standard errors are approximated with the Delta Method). FE1 — measure used by Giavazzi and Pagano (1996); FE2 — measure used by Alesina and Ardagna (1998); FE3 — measure used by Afonso (2010). The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

government consumption coefficients, translating a less successful consolidation programme associated with increased crowding-out effects. Moreover, in the presence of financial crises fiscal consolidations (method FE1) produce more non-Keynesian fiscal policy effects. For instance, when a financial crisis occurs, the test of equality of estimated coefficients for the case of social transfers is rejected ($\beta_{31} - \beta_{41} = 0$) in two out of four methods, depending on whether there are fiscal consolidations or not, with the Keynesian effect of social transfers only present when there is consolidation and a crisis (method FE1, column 2 in Table 6).

*4.2.4. Robustness*

First, we use a robust estimator, the Least Absolute Deviation (LAD) to deal with outliers, since the most severe fiscal adjustments may be driving some of the results. The estimator minimises the sum of squares over half the observations. The estimator seeks out part of the data for which the model has greatest explanatory power and then bases the parameter estimates on just that portion of the data. We then exclude any observations for which the LAD residual is more than two standard deviations from the mean residual, before re-estimating the model by IV–GLS (in our case we have excluded 69 observations).

The results of the LAD estimation, in Table 7, show that statistically significant results and their respective magnitudes still hold (as we can see when comparing with Table 3), which provides accrued robustness to the initial conclusions.

Secondly, it is important to check if our estimated coefficients are not being driven by a specific country. To account for this possibility, and hence test the stability of both short and long-run elasticities, we run

**Table 4**
IV–GLS' estimation results for real per capita private consumption and investment using changes in both total revenues and expenditures identified using IMF's policy-based action approach — 1970–2010.

| Specification | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| | | Consumption | Investment | Consumption | Investment |
| Estimation | | Fixed-effects | | IV–GLS | |
| $\lambda$ | $C_{t-1}/INV_{t-1}$ | −0.135** | −0.144*** | −0.095* | −0.169*** |
| | | (0.058) | (0.037) | (0.057) | (0.044) |
| $\omega_0$ | $Y_{t-1}$ | 0.126** | 0.106*** | 0.093* | 0.150*** |
| | | (0.049) | (0.034) | (0.054) | (0.043) |
| $\omega_1$ | $\Delta Y_t$ | 0.839*** | 3.060*** | 0.730*** | 2.727*** |
| | | (0.043) | (0.168) | (0.064) | (0.201) |
| $\theta$ | $IMFrev_t$ | −0.003 | −0.003 | −0.001 | −0.001 |
| | | (0.002) | (0.002) | (0.001) | (0.003) |
| $\eta$ | $IMF\ exp_t$ | −0.001** | −0.005** | 0.001 | −0.006* |
| | | (0.001) | (0.002) | (0.001) | (0.003) |
| *Obs.* | | 162 | 162 | 112 | 112 |
| *R-squared* | | 0.66 | 0.77 | 0.61 | 0.69 |
| *Sargan–Hansen statistics* | | | | 0.27 | 0.46 |
| *p-Value* | | | | 0.87 | 0.79 |

Note: *IMF*rev and *IMF*exp denote changes in government revenues and expenditures (in % of GDP) identified using IMF's (2010) policy-abased action approach and available in Devries et al. (2011) (in Table A1 of their Appendix). Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for identified consolidations years for the list of countries covered in Devries et al. (2011) for the period 1980–2009. The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

**Table 5**
IV–GLS' estimation results for real per capita private consumption — *Byear* dummy for debt ratio threshold, 1970—2010.

| Specification | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\lambda$ | $C_{t-1}$ | | −0.100*** | | −0.050*** | | −0.053*** | | −0.050*** | |
| | | | (0.026) | | (0.015) | | (0.015) | | (0.015) | |
| $\omega_0$ | $Y_{t-1}$ | | 0.065*** | 0.651*** | 0.056*** | 1.124*** | 0.056*** | 1.061*** | 0.055*** | 1.108*** |
| | | | (0.025) | (0.151) | (0.017) | (0.254) | (0.017) | (0.227) | (0.017) | (0.249) |
| $\omega_1$ | $\Delta Y_t$ | | 0.686*** | | 0.677*** | | 0.687*** | | 0.678*** | |
| | | | (0.060) | | (0.043) | | (0.043) | | (0.043) | |
| $\delta_0$ | $Y^{av}{}_{t-1}$ | | 0.003 | | 0.001 | | 0.002 | | 0.001 | |
| | | | (0.013) | | (0.010) | | (0.010) | | (0.010) | |
| $\delta_1$ | $\Delta Y^{av}{}_t$ | | −0.035 | | 0.024 | | 0.022 | | 0.024 | |
| | | | (0.067) | | (0.055) | | (0.054) | | (0.055) | |
| $\alpha_{10}$ | $FCE_{t-1}$ | | 0.006 | 0.064 | −0.167** | −3.358* | 0.024 | 0.455 | −0.102** | −2.053 |
| | | | (0.013) | (0.128) | (0.073) | (1.920) | (0.024) | (0.459) | (0.048) | (1.252) |
| $\alpha_{30}$ | $\Delta FCE_t$ | | 0.112* | | 0.156** | | 0.204*** | | 0.146** | |
| | | | (0.060) | | (0.077) | | (0.072) | | (0.074) | |
| $\beta_{10}$ | $TF_{t-1}$ | | 0.010 | 0.102 | 0.070** | 1.407* | 0.000 | 0.007 | 0.046** | 0.918* |
| | | | (0.010) | (0.092) | (0.030) | (0.770) | (0.013) | (0.237) | (0.020) | (0.505) |
| $\beta_{30}$ | $\Delta TF_t$ | $\times FC^m$ | −0.004 | | 0.145*** | | 0.133*** | | 0.134*** | |
| | | $\times (1 - Byear)$ | (0.044) | | (0.026) | | (0.027) | | (0.022) | |
| $\gamma_{10}$ | $TAX_{t-1}$ | | 0.009 | 0.088 | 0.080** | 1.599* | −0.024 | −0.460 | 0.042 | 0.847 |
| | | | (0.014) | (0.143) | (0.037) | (0.967) | (0.016) | (0.313) | (0.026) | (0.631) |
| $\gamma_{30}$ | $\Delta TAX_t$ | | 0.064* | | −0.027 | | 0.016 | | −0.001 | |
| | | | (0.038) | | (0.044) | | (0.044) | | (0.041) | |
| $\alpha_{20}$ | $FCE_{t-1}$ | | −0.020* | 0.200 | −0.035*** | −0.702*** | −0.036*** | −0.676*** | −0.036*** | −0.723*** |
| | | | (0.012) | (0.133) | (0.008) | (0.274) | (0.008) | (0.252) | (0.008) | (0.280) |
| $\alpha_{40}$ | $\Delta FCE_t$ | | 0.050 | | 0.036 | | 0.035 | | 0.032 | |
| | | | (0.053) | | (0.032) | | (0.032) | | (0.032) | |
| $\beta_{20}$ | $TF_{t-1}$ | | 0.010 | 0.100 | 0.003 | 0.052 | 0.003 | 0.053 | 0.003 | 0.057 |
| | | $\times (1 - FC^m)$ | (0.008) | (0.075) | (0.005) | (0.094) | (0.005) | (0.087) | (0.005) | (0.094) |
| $\beta_{40}$ | $\Delta TF_t$ | $\times (1 - Byear)$ | −0.045 | | −0.031 | | −0.041* | | −0.033 | |
| | | | (0.030) | | (0.024) | | (0.023) | | (0.024) | |
| $\gamma_{20}$ | $TAX_{t-1}$ | | 0.035*** | 0.349** | 0.025*** | 0.493** | 0.026*** | 0.483** | 0.025*** | 0.511** |
| | | | (0.012) | (0.152) | (0.008) | (0.228) | (0.008) | (0.210) | (0.008) | (0.233) |
| $\gamma_{40}$ | $\Delta TAX_t$ | | 0.043 | | 0.037* | | 0.024 | | 0.036 | |
| | | | (0.028) | | (0.022) | | (0.020) | | (0.022) | |
| $\alpha_{11}$ | $FCE_{t-1}$ | | 0.001 | 0.008 | −0.044** | −0.874* | −0.059*** | −1.111** | −0.041* | −0.833* |
| | | | (0.022) | (0.214) | (0.022) | (0.471) | (0.022) | (0.481) | (0.024) | (0.506) |
| $\alpha_{31}$ | $\Delta FCE_t$ | | 0.063 | | −0.030 | | 0.049 | | 0.047 | |
| | | $\times FC^m$ | (0.081) | | (0.059) | | (0.076) | | (0.093) | |
| $\beta_{11}$ | $TF_{t-1}$ | $\times Byear$ | −0.009 | −0.092 | −0.002 | −0.033 | 0.010 | 0.188 | −0.004 | −0.080 |
| | | | (0.016) | (0.156) | (0.013) | (0.268) | (0.013) | (0.241) | (0.014) | (0.279) |
| $\beta_{31}$ | $\Delta TF_t$ | | −0.178 | | −0.073 | | 0.030 | | −0.036 | |
| | | | (0.123) | | (0.060) | | (0.061) | | (0.060) | |

*(continued on next page)*

**Table 5** (*continued*)

| Specification | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\gamma_{11}$ | $TAX_{t-1}$ | | 0.032*** | 0.322** | 0.038*** | 0.758** | 0.042*** | 0.797*** | 0.038*** | 0.771** |
| | | | (0.012) | (.133) | (0.013) | (.312) | (0.013) | (.305) | (0.014) | (.333) |
| $\gamma_{31}$ | $\Delta TAX_t$ | | −0.017 | | 0.010 | | 0.023 | | 0.021 | |
| | | | (0.067) | | (0.039) | | (0.039) | | (0.043) | |
| $\alpha_{21}$ | $FCE_{t-1}$ | | 0.036* | 0.359* | −0.009 | −0.170 | −0.014 | −0.268 | −0.015* | −0.310 |
| | | | (0.019) | (0.215) | (0.009) | (0.197) | (0.009) | (0.184) | (0.009) | (0.201) |
| $\alpha_{41}$ | $\Delta FCE_t$ | | −0.113* | | 0.033 | | 0.025 | | 0.027 | |
| | | | (0.067) | | (0.030) | | (0.031) | | (0.030) | |
| $\beta_{21}$ | $TF_{t-1}$ | | −0.026* | −0.257 | −0.006 | −0.116 | −0.003 | −0.053 | −0.004 | −0.078 |
| | | $\times (1 - FC^m)$ | (0.015) | (0.169) | (0.007) | (0.145) | (0.006) | (0.126) | (0.007) | (0.139) |
| $\beta_{41}$ | $\Delta TF_t$ | $\times$ *Byear* | 0.055 | | 0.013 | | 0.006 | | 0.007 | |
| | | | (0.059) | | (0.027) | | (0.027) | | (0.027) | |
| $\gamma_{21}$ | $TAX_{t-1}$ | | 0.014 | 0.135 | 0.007 | 0.133 | 0.010 | 0.192 | 0.012* | 0.236 |
| | | | (0.010) | (0.095) | (0.007) | (0.151) | (0.007) | (0.138) | (0.007) | (0.154) |
| $\gamma_{41}$ | $\Delta TAX_t$ | | 0.005 | | −0.013 | | −0.026 | | −0.018 | |
| | | | (0.034) | | (0.025) | | (0.024) | | (0.024) | |
| *Obs.* | | | 382 | | 614 | | 614 | | 614 | |
| *R-squared* | | | 0.738 | | 0.688 | | 0.694 | | 0.689 | |
| *Sargan–Hansen statistics* | | | 25.18 | | 20.06 | | 24.86 | | 26.54 | |
| *p-Value* | | | 0.24 | | 0.52 | | 0.25 | | 0.18 | |
| Null hypothesis | | | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value |
| $\beta_{30} - \beta_{40} = 0$ | | | 0.71 | 0.40 | 22.74 | 0.00 | 22.69 | 0.00 | 26.06 | 0.00 |
| $\beta_{40} - \beta_{31} = 0$ | | | 1.11 | 0.29 | 0.44 | 0.50 | 1.30 | 0.25 | 0.00 | 0.96 |
| $\beta_{31} - \beta_{41} = 0$ | | | 1.79 | 0.18 | 11.02 | 0.00 | 2.39 | 0.12 | 6.99 | 0.01 |
| $\gamma_{10} - \gamma_{11} = 0$ | | | 2.15 | 0.14 | 1.18 | 0.27 | 11.44 | 0.00 | 0.02 | 0.89 |

Note: *FCE*, *TF* and *TAX* denote government consumption expenditure, social transfers, and total tax revenue in real terms, and per capita. Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for the list of countries described in the main text over the period 1970–2010. *lr* — long-run elasticity of private consumption with respect to the relevant explanatory variable (standard errors are approximated with the Delta Method). FE1 — measure used by Giavazzi and Pagano (1996); FE2 — measure used by Alesina and Ardagna (1998); FE3 — measure used by Afonso (2010). $Byear_{it}$ takes the value 1 if the debt ratio is above the average of the debt ratio in year *t* for the entire cross-country sample. The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

**Table 6**
IV–GLS' estimation results for real per capita private consumption — *FIN* dummy for Financial Crises, 1970–2010.

| Specification | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\lambda$ | $C_{t-1}$ | | −0.105*** | | −0.048*** | | −0.048*** | | −0.048*** | |
| | | | (0.023) | | (0.009) | | (0.009) | | (0.009) | |
| $\omega_0$ | $Y_{t-1}$ | | 0.083*** | 0.792*** | 0.059*** | 1.21*** | 0.058*** | 1.198*** | 0.056*** | 1.186*** |
| | | | (0.018) | (0.212) | (0.011) | (0.167) | (0.012) | (0.199) | (0.011) | (0.196) |
| $\omega_1$ | $\Delta Y_t$ | | 0.739*** | | 0.696*** | | 0.705*** | | 0.696*** | |
| | | | (0.091) | | (0.062) | | (0.064) | | (0.064) | |
| $\delta_0$ | $Y^{av}{}_{t-1}$ | | −0.000 | | −0.006 | | −0.006 | | −0.005 | |
| | | | (0.012) | | (0.011) | | (0.012) | | (0.012) | |
| $\delta_1$ | $\Delta Y^{av}{}_t$ | | −0.122 | | 0.008 | | 0.006 | | 0.010 | |
| | | | (0.076) | | (0.094) | | (0.096) | | (0.098) | |
| $\alpha_{10}$ | $FCE_{t-1}$ | | −0.019 | 0.003 | −0.058*** | −1.190** | −0.042** | −0.871** | −0.032 | −0.674 |
| | | | (0.011) | (0.133) | (0.019) | (0.548) | (0.016) | (0.382) | (0.020) | (0.452) |
| $\alpha_{30}$ | $\Delta FCE_t$ | | 0.069 | | −0.020 | | 0.055 | | −0.004 | |
| | | | (0.047) | | (0.052) | | (0.069) | | (0.084) | |
| $\beta_{10}$ | $TF_{t-1}$ | | 0.016 | 0.151 | 0.019** | 00383** | 0.013* | 0.277* | 0.008 | 0.170 |
| | | $\times FC^m$ | (0.010) | (0.089) | (0.007) | (0.166) | (0.007) | (0.148) | (0.009) | (0.199) |
| $\beta_{30}$ | $\Delta TF_t$ | $\times (1 - FIN)$ | −0.056 | | 0.053* | | 0.106*** | | 0.068** | |
| | | | (0.103) | | (0.028) | | (0.030) | | (0.031) | |
| $\gamma_{10}$ | $TAX_{t-1}$ | | 0.019 | 0.176 | 0.033** | 0.677* | 0.021* | 0.439* | 0.018 | 0.374 |
| | | | (0.014) | (0.124) | (0.013) | (0.343) | (0.011) | (0.234) | (0.011) | (0.257) |
| $\gamma_{30}$ | $\Delta TAX_t$ | | 0.030 | | −0.010 | | 0.025 | | 0.008 | |
| | | | (0.039) | | (0.043) | | (0.028) | | (0.043) | |
| $\alpha_{20}$ | $FCE_{t-1}$ | | 0.001 | 0.176 | −0.021*** | −0.433** | −0.023*** | −0.467** | −0.023*** | −0.492** |
| | | | (0.014) | (0.124) | (0.006) | (0.175) | (0.006) | (0.178) | (0.006) | (0.185) |
| $\alpha_{40}$ | $\Delta FCE_t$ | | 0.002 | | 0.030 | | 0.029 | | 0.028 | |
| | | | (0.059) | | (0.029) | | (0.030) | | (0.029) | |
| $\beta_{20}$ | $TF_{t-1}$ | | 0.003 | 0.032 | 0.000 | 0.009 | 0.001 | 0.021 | 0.001 | 0.021 |
| | | $\times (1 - FC^m)$ | (0.007) | (0.069) | (0.005) | (0.110) | (0.005) | (0.103) | (0.005) | (0.102) |
| $\beta_{40}$ | $\Delta TF_t$ | $\times (1 - FIN)$ | 0.014 | | −0.006 | | −0.014 | | −0.009 | |
| | | | (0.034) | | (0.032) | | (0.031) | | (0.032) | |
| $\gamma_{20}$ | $TAX_{t-1}$ | | 0.012 | 0.109 | 0.013* | 0.263* | 0.014** | 0.279* | 0.015** | 0.308* |
| | | | (0.015) | (0.141) | (0.007) | (0.148) | (0.006) | (0.140) | (0.007) | (0.151) |
| $\gamma_{40}$ | $\Delta TAX_t$ | | 0.020 | | 0.003 | | −0.008 | | 0.000 | |
| | | | (0.027) | | (0.020) | | (0.021) | | (0.020) | |

**Table 6** (*continued*)

| Specification | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\alpha_{11}$ | $FCE_{t-1}$ | | 0.038 | 0.362 | −1.753*** | −36.18*** | 0.002 | 0.051 | 0.006 | 0.119 |
| | | | (0.029) | (0.240) | (0.045) | (7.205) | (0.013) | (0.257) | (0.013) | (0.259) |
| $\alpha_{31}$ | $\Delta FCE_t$ | | 0.087 | | 0.323*** | | 0.275*** | | 0.286*** | |
| | | | (0.116) | | (0.057) | | (0.064) | | (0.064) | |
| $\beta_{11}$ | $TF_{t-1}$ | | −0.019 | 0.327 | 0.593*** | 12.248*** | −0.003 | −0.058 | −0.005 | −0.099 |
| | | $\times FC^m$ | (0.016) | (0.202) | (0.015) | (2.452) | (0.009) | (0.183) | (0.009) | (0.192) |
| $\beta_{31}$ | $\Delta TF_t$ | $\times FIN$ | −0.043 | | 5.470*** | | 0.019 | | 0.016 | |
| | | | (0.092) | | (0.132) | | (0.024) | | (0.027) | |
| $\gamma_{11}$ | $TAX_{t-1}$ | | 0.034 | −0.060 | 1.145*** | 23.64*** | −0.008 | −0.162 | −0.009 | −0.189 |
| | | | (0.033) | (0.310) | (0.029) | (4.648) | (0.007) | (0.143) | (0.008) | (0.157) |
| $\gamma_{31}$ | $\Delta TAX_t$ | | 0.078* | | 0.962*** | | 0.006 | | 0.003 | |
| | | | (0.039) | | (0.033) | | (0.026) | | (0.026) | |
| $\alpha_{21}$ | $FCE_{t-1}$ | | −0.040 | −0.381 | −0.020 | −0.408 | −0.022 | −0.448 | −0.021 | −0.446 |
| | | | (0.047) | (0.465) | (0.022) | (0.467) | (0.020) | (0.437) | (0.020) | (0.437) |
| $\alpha_{41}$ | $\Delta FCE_t$ | | −0.020 | | 0.016 | | 0.006 | | 0.005 | |
| | | | (0.067) | | (0.060) | | (0.056) | | (0.055) | |
| $\beta_{21}$ | $TF_{t-1}$ | | 0.034 | −0.177 | 0.007 | 0.142 | 0.007 | 0.145 | 0.007 | 0.142 |
| | | $\times (1 - FC^m)$ | (0.022) | (0.124) | (0.011) | (0.214) | (0.011) | (0.217) | (0.011) | (0.223) |
| $\beta_{41}$ | $\Delta TF_t$ | $\times FIN$ | −0.128 | | −0.099* | | −0.102* | | −0.103* | |
| | | | (0.080) | | (0.053) | | (0.053) | | (0.055) | |
| $\gamma_{21}$ | $TAX_{t-1}$ | | 0.026 | 0.242 | 0.007 | 0.136 | 0.008 | 0.159 | 0.008 | 0.164 |
| | | | (0.038) | (0.365) | (0.018) | (0.376) | (0.015) | (0.320) | (0.015) | (0.324) |
| $\gamma_{41}$ | $\Delta TAX_t$ | | −0.005 | | −0.046 | | −0.059* | | −0.058 | |
| | | | (0.054) | | (0.033) | | (0.034) | | (0.035) | |
| *Obs.* | | | 407 | | 676 | | 676 | | 676 | |
| *R-squared* | | | 0.717 | | 0.653 | | 0.658 | | 0.653 | |
| *Sargan–Hansen statistics* | | | 22.07 | | 20.52 | | 25.20 | | 27.85 | |
| *p-Value* | | | 0.39 | | 0.42 | | 0.28 | | 0.48 | |
| Null hypothesis | | | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value |
| $\beta_{30} - \beta_{40} = 0$ | | | 0.70 | 0.41 | 1.43 | 0.24 | 7.21 | 0.02 | 2.61 | 0.12 |
| $\beta_{40} - \beta_{31} = 0$ | | | 0.44 | 0.52 | 1511 | 0.00 | 0.66 | 0.42 | 0.32 | 0.57 |
| $\beta_{31} - \beta_{41} = 0$ | | | 0.01 | 0.91 | 1757 | 0.00 | 7.13 | 0.02 | 2.53 | 0.13 |
| $\gamma_{10} - \gamma_{11} = 0$ | | | 0.49 | 0.49 | 1453 | 0.00 | 12.76 | 0.00 | 7.50 | 0.01 |

Note: *FCE*, *TF* and *TAX* denote government consumption expenditure, social transfers, and total tax revenue in real terms, and per capita. Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for the list of countries described in the main text over the period 1970–2010. *lr* — long-run elasticity of private consumption with respect to the relevant explanatory variable (standard errors are approximated with the Delta Method). FE1 — measure used by Giavazzi and Pagano (1996); FE2 — measure used by Alesina and Ardagna (1998); FE3 — measure used by Afonso (2010). $FIN_{it}$ takes the value 1 if the there was a financial crises in year *t* at a given country. The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

our private consumption equation by dropping one country at a time. Fig. 3 plots the estimated short and long run elasticities (together with their 95% confidence intervals) for the FE1 method by running Eq. (1) and dropping one country at a time.[10] As we can see, the magnitudes of both the short and the long-run elasticities (for income and for the several budgetary items) do not change much, while the statistical significance of those coefficients also holds.

### 4.3. Empirical analysis: private investment

We now consider specification (1) with real per capita private investment as our dependent variable instead. Our purpose is then also to check whether fiscal episodes play a role via this GDP component, notably via possible crowding-out effects. In addition, in several situations of high fiscal imbalances, and when a fiscal adjustment takes place, government fixed capital formation is one of the budgetary items that usually suffer cuts. One may wonder whether such development impacts also negatively on private investment, via a complementary effect of public spending, or positively, via a substitution effect of government investment.

[10] Results do not change qualitatively if another method for determining the fiscal episodes (either IMF, FE2 or FE3) is employed instead.

Therefore, similarly to the private consumption analysis we start off by initially estimating Eq. (1), via panel IV–GLS estimation with all the three (spending and revenue) components included in the econometric specification. The results (Table 8) show that final government consumption does not have a statistically significant negative short or long-run effect, as opposed to our results with private consumption. Moreover, the short-run elasticity is around 2.3–2.5 in the four alternative approaches for determining fiscal episodes. Thus much higher magnitude than the coefficient estimates is obtained for private consumption.

On the other hand, spending on social benefits and welfare transfers has a negative short-run effect on private investment for the four approaches for the determination of fiscal episodes, regardless of the existence of fiscal contractions — this contrasts with our previous results for private consumption. This result also holds consistently for the long-run effect, for all four approaches to the determination of fiscal contraction episodes, with and without fiscal episodes. However, the long-run effect (the detrimental effect on private investment of an increase in social transfers) has a higher magnitude when a consolidation occurs in cases IMF, FE1 and FE2. Finally, as previously found in Table 3, total tax revenues also depict a so-called non-Keynesian result.

Considering the specification with only total government expenditure (not shown), the short-run elasticities of private investment to

**Table 7**
Outlier-robust LAD estimation results for real per capita private consumption — 1970–2010.

| | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\lambda$ | $C_{t-1}$ | | −0.091*** | | −0.041** | | −0.042*** | | −0.041** | |
| | | | (0.025) | | (0.016) | | (0.016) | | (0.016) | |
| $\omega_0$ | $Y_{t-1}$ | | 0.065** | 0.711*** | 0.046** | 1.123*** | 0.046** | 1.086*** | 0.044** | 1.068*** |
| | | | (0.026) | (0.157) | (0.019) | (0.31) | (0.018) | (0.291) | (0.019) | (0.299) |
| $\omega_1$ | $\Delta Y_t$ | | 0.722*** | | 0.708*** | | 0.717*** | | 0.711*** | |
| | | | (0.059) | | (0.047) | | (0.047) | | (0.048) | |
| $\delta_0$ | $Y^{av}{}_{t-1}$ | | −0.002 | | −0.005 | | −0.004 | | −0.003 | |
| | | | (0.014) | | (0.011) | | (0.011) | | (0.011) | |
| $\delta_1$ | $\Delta Y^{av}{}_t$ | | −0.074 | | 0.001 | | 0.007 | | 0.002 | |
| | | | (0.071) | | (0.058) | | (0.057) | | (0.058) | |
| $\alpha_1$ | $FCE_{t-1}$ | | −0.013 | −0.141 | −0.060*** | −1.44** | −0.040*** | −0.951** | −0.034** | −0.821* |
| | | | (0.011) | (0.136) | (0.019) | (0.655) | (0.014) | (0.465) | (0.015) | (0.452) |
| $\alpha_3$ | $\Delta FCE_t$ | | 0.074 | | −0.006 | | 0.081 | | 0.005 | |
| | | | (0.054) | | (0.059) | | (0.063) | | (0.067) | |
| $\beta_1$ | $TF_{t-1}$ | | 0.007 | 0.078 | 0.019** | 0.469* | 0.012 | 0.295 | 0.009 | 0.221 |
| | | | (0.008) | (0.090) | (0.010) | (0.257) | (0.008) | (0.197) | (0.008) | (0.198) |
| $\beta_3$ | $\Delta TF_t$ | $\times FC^m$ | −0.063 | | 0.059** | | 0.109*** | | 0.070*** | |
| | | | (0.063) | | (0.023) | | (0.023) | | (0.023) | |
| $\gamma_1$ | $TAX_{t-1}$ | | 0.025*** | 0.271** | 0.037*** | 0.901** | 0.024** | 0.569* | 0.022** | (0.540)* |
| | | | (0.009) | (0.126) | (0.011) | (0.417) | (0.010) | (0.309) | (0.010) | (0.313) |
| $\gamma_3$ | $\Delta TAX_t$ | | 0.043 | | 0.014 | | 0.035 | | 0.031 | |
| | | | (0.035) | | (0.040) | | (0.038) | | (0.038) | |
| $\alpha_2$ | $FCE_{t-1}$ | | 0.000 | 0.003 | −0.023*** | −0.553** | −0.024*** | −0.582** | −0.025*** | −0.604** |
| | | | (0.011) | (0.123) | (0.006) | (0.262) | (0.006) | (0.259) | (0.006) | (0.272) |
| $\alpha_4$ | $\Delta FCE_t$ | | 0.032 | | 0.041 | | 0.039 | | 0.040 | |
| | | | (0.056) | | (0.029) | | (0.030) | | (0.029) | |
| $\beta_2$ | $TF_{t-1}$ | | −0.002 | −0.02 | 0.000 | 0.442* | 0.001 | 0.019 | 0.001 | 0.016 |
| | | | (0.009) | (0.099) | (0.005) | (0.242) | (0.005) | (0.113) | (0.005) | (0.116) |
| $\beta_4$ | $\Delta TF_t$ | $\times (1 - FC^m)$ | −0.016 | | −0.004 | | −0.011 | | −0.006 | |
| | | | (0.030) | | (0.024) | | (0.024) | | (0.024) | |
| $\gamma_2$ | $TAX_{t-1}$ | | 0.021** | 0.231** | 0.018*** | 0.005 | 0.019*** | 0.459** | 0.020*** | 0.491** |
| | | | (0.008) | (0.106) | (0.006) | (0.118) | (0.006) | (0.234)_ | (0.006) | (0.251) |
| $\gamma_4$ | $\Delta TAX_t$ | | 0.019 | | 0.002 | | −0.011 | | −0.002 | |
| | | | (0.026) | | (0.020) | | (0.020) | | (0.020) | |
| *Obs.* | | | 400 | | 645 | | 645 | | 645 | |
| *R-squared* | | | 0.705 | | 0.650 | | 0.655 | | 0.650 | |
| *Sargan–Hansen statistics* | | | 8.817 | | 6.85 | | 5.59 | | 7.82 | |
| *p-Value* | | | 0.454 | | 0.652 | | 0.779 | | 0.552 | |
| Null hypothesis | | | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value |
| $\alpha_1 - \alpha_2 = 0$ | | | 0.81 | 0.368 | 4.08 | 0.043 | 1.22 | 0.268 | 0.41 | 0.522 |
| $\gamma_1 - \gamma_2 = 0$ | | | 0.18 | 0.668 | 2.97 | 0.084 | 0.27 | 0.605 | 0.05 | 0.818 |
| $-\alpha_1 - \gamma_1 = 0$ | | | 1.19 | 0.276 | 4.22 | 0.04 | 2.98 | 0.08 | 1.43 | 0.23 |
| $\beta_1 - \beta_2 = 0$ | | | 1.08 | 0.298 | 4.32 | 0.037 | 2.61 | 0.105 | 1.26 | 0.262 |

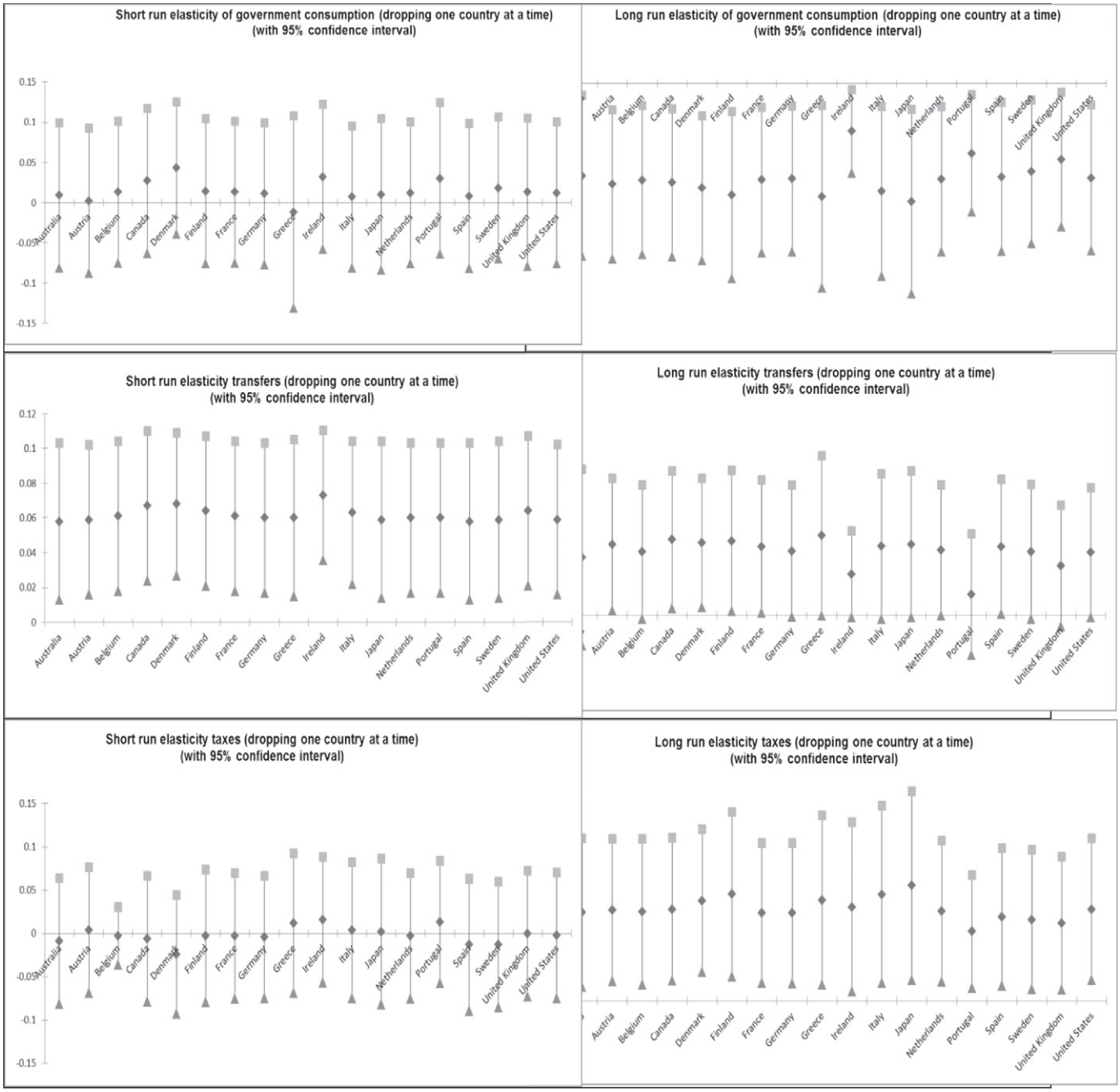
Note: *FCE*, *TF* and *TAX* denote government consumption expenditure, social transfers, and total tax revenue in real terms and per capita. Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for the list of countries described in the main text over the period 1970–2010. *lr* — long-run elasticity of private consumption with respect to the relevant explanatory variable (standard errors are approximated with the Delta Method). FE1 — measure used by Giavazzi and Pagano (1996); FE2 — measure used by Alesina and Ardagna (1998); FE3 — measure used by Afonso (2010). The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

income are statistically significant for all approaches; the long-run elasticity is only significant for the IMF method (and well above unity) in contrast with results previously obtained for private consumption. The short-run elasticity is around 2.6–2.9 in the four alternative approaches for determining fiscal episodes.

The short-run elasticity of private investment with respect to total government spending is negative, in the four approaches, implying that curtailing government consumption increases private investment, regardless of the existence of a fiscal contraction episode. On the other hand, the respective negative long-run elasticities, when a fiscal consolidation episode occurs are only statistically significant for the IMF and FE1 cases. Interestingly, when we use only general government final consumption, instead of total spending, the abovementioned negative long-run effects remain statistically insignificant for all methods of determination of fiscal episodes, regardless of the existence of fiscal contractions.

Regarding the existence of possible effects from government revenue items on private investment developments, only in two (FE2, and FE3) out of the four approaches have a total revenue depicting a non-Keynesian effect when a fiscal contraction episode occurs (results available upon request). In terms of direct taxes (current taxes on income and wealth) and indirect taxes (taxes linked to imports and production), when taken separately as the single budgetary items in the baseline specification, similar non-Keynesian effects can be reported, particularly in the case of the latter set of taxes for all approaches.[11]

[11] Estimations assessing the (un-)importance of debt thresholds have also been carried out using private investment as the dependent variable in specification (1) and with both the $Bcountry_{it}$ and $Byear_{it}$ alternative dummies. Results convey a similar message to the ones obtained with private consumption and are available from the authors upon request.




Note: figures present the estimated coefficients from equation (1) based on method FE1. Results do not change qualitatively by using other methods instead.

**Fig. 3.** Short and long-run eleasticities: robustness by dropping one country at a time. Note: figures present the estimated coefficients from Eq. (1) based on method FE1. Results do not change qualitatively by using other methods instead.

*4.3.1. Is there a role for the interest rate?*[12]

One could think that it is important, particularly when looking at the effects on private investment, to account for the (long-run) interest rate. We control for the effects of the borrowing costs by adding this variable to our investment equation. Results presented in Table 9 show that while the main results are kept, increases in the long-run interest rate diminish the level of per capita private investment. This result is true in the three specifications that determine the fiscal consolidation episodes via the CAPB.

## 5. Conclusion

This paper has revisited the debate on the so-called expansionary fiscal adjustments using four alternative approaches of computing and

[12] We thank an anonymous referee for raising this point.

**Table 8**
IV–GLS' estimation results for real per capita private investment — 1970–2010.

| | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\lambda$ | $INV_{t-1}$ | | −0.057* | | −0.083*** | | −0.080*** | | −0.080*** | |
| | | | (0.032) | | (0.025) | | (0.025) | | (0.025) | |
| $\omega_0$ | $Y_{t-1}$ | | 0.017 | 0.301 | 0.070 | 0839 | 0.069 | 0.858 | 0.069 | 0.870 |
| | | | (0.092) | (1.484) | (0.068) | (0.645) | (0.068) | (0.667) | (0.068) | (0.663) |
| $\omega_1$ | $\Delta Y_t$ | | 2.518*** | | 2.306*** | | 2.300*** | | 2.307*** | |
| | | | (0.193) | | (0.143) | | (0.144) | | (0.144) | |
| $\delta_0$ | $Y^{av}{}_{t-1}$ | | 0.100** | | 0.061 | | 0.061 | | 0.059 | |
| | | | (0.051) | | (0.042) | | (0.042) | | (0.042) | |
| $\delta_1$ | $\Delta Y^{av}{}_t$ | | −0.015 | | −0.005 | | −0.017 | | −0.022 | |
| | | | (0.193) | | (0.181) | | (0.183) | | (0.183) | |
| $\alpha_1$ | $FCE_{t-1}$ | | 0.055 | 0.967 | 0.046 | 0.547 | 0.032 | 0.393 | 0.008 | 0.098 |
| | | | (0.039) | (0.886) | (0.053) | (0.657) | (0.042) | (0.552) | (0.047) | (0.589) |
| $\alpha_3$ | $\Delta FCE_t$ | | −0.087 | | −0.105 | | −0.086 | | −0.007 | |
| | | | (0.148) | | (0.177) | | (0.165) | | (0.205) | |
| $\beta_1$ | $TF_{t-1}$ | | −0.115*** | −1.99** | −0.086*** | −1.037** | −0.076*** | −0.952*** | −0.064** | −0.806** |
| | | | (0.033) | (0.964) | (0.031) | (0.405) | (0.024) | (0.345) | (0.028) | (0.353) |
| $\beta_3$ | $\Delta TF_t$ | $\times FC^m$ | −0.410*** | | −0.368*** | | −0.390*** | | −0.365*** | |
| | | | (0.098) | | (0.064) | | (0.067) | | (0.076) | |
| $\gamma_1$ | $TAX_{t-1}$ | | 0.054 | 0.942 | 0.011 | 0.129 | 0.016 | 0.200 | 0.029 | 0.361 |
| | | | (0.037) | (0.886) | (0.036) | (0.433) | (0.032) | (0.404) | (0.035) | (0.445) |
| $\gamma_3$ | $\Delta TAX_t$ | | 0.267*** | | 0.333** | | 0.303** | | 0.279* | |
| | | | (0.093) | | (0.147) | | (0.119) | | (0.159) | |
| $\alpha_2$ | $FCE_{t-1}$ | | −0.026 | −0.457 | −0.029 | −0.353 | −0.026 | −0.329 | −0.024 | −0.304 |
| | | | (0.039) | (0.736) | (0.022) | (0.254) | (0.022) | (0.261) | (0.022) | (0.261) |
| $\alpha_4$ | $\Delta FCE_t$ | | −0.310 | | −0.171*** | | −0.178*** | | −0.178*** | |
| | | | (0.195) | | (0.062) | | (0.063) | | (0.061) | |
| $\beta_2$ | $TF_{t-1}$ | | −0.081** | −1.405** | −0.073*** | 0.875*** | −0.074*** | −0.917*** | −0.073*** | −0.919*** |
| | | | (0.037) | (0.700) | (0.017) | (0.279) | (0.017) | (0.300) | (0.017) | (0.299) |
| $\beta_4$ | $\Delta TF_t$ | $\times (1 - FC^m)$ | −0.200* | | −0.271*** | | −0.265*** | | −0.266*** | |
| | | | (0.121) | | (0.045) | | (0.045) | | (0.044) | |
| $\gamma_2$ | $TAX_{t-1}$ | | 0.101*** | 1.753 | 0.068*** | 0.821** | 0.065*** | 0.816 | 0.064*** | 0.802** |
| | | | (0.035) | (1.236) | (0.024) | (0.379) | (0.024) | (0.389) | (0.024) | (0.384) |
| $\gamma_4$ | $\Delta TAX_t$ | | 0.365*** | | 0.283*** | | 0.301*** | | 0.296*** | |
| | | | (0.081) | | (0.053) | | (0.057) | | (0.053) | |
| *Obs.* | | | 406 | | 674 | | 674 | | 674 | |
| *R-squared* | | | 0.707 | | 0.652 | | 0.658 | | 0.653 | |
| *Sargan–Hansen statistics* | | | 24.89 | | 16.78 | | 16.96 | | 17.21 | |
| *p-Value* | | | 0.00 | | 0.05 | | 0.05 | | 0.05 | |
| Null hypothesis | | | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value |
| $\alpha_1 - \alpha_2 = 0$ | | | 3.95 | 0.04 | 2.25 | 0.13 | 2.39 | 0.12 | 0.56 | 0.45 |
| $\gamma_1 - \gamma_2 = 0$ | | | 3.39 | 0.06 | 3.85 | 0.04 | 3.83 | 0.05 | 1.73 | 0.18 |
| $\alpha_1 - \gamma_1 = 0$ | | | 5.98 | 0.01 | 3.17 | 0.07 | 3.08 | 0.07 | 1.58 | 0.20 |
| $\beta_1 - \beta_2 = 0$ | | | 1.79 | 0.18 | 0.24 | 0.62 | 0.02 | 0.88 | 0.14 | 0.71 |

Note: *FCE*, *SS* and *TAX* denote government consumption expenditure, social security and welfare transfers and total tax revenue in real terms and per capita. Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for the list of countries described in the main text over the period 1970–2010. *lr* — long-run elasticity of private investment with respect to the relevant explanatory variable (standard errors are approximated with the Delta Method). FE1 — measure used by Giavazzi and Pagano (1996); FE2 — measure used by Alesina and Ardagna (1998); FE3 — measure used by Afonso (2010). The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

defining fiscal episodes, in particular: Giavazzi and Pagano (1996), Alesina and Ardagna (1998), Afonso (2010), and the policy action-based IMF (2010) procedure. In a panel of OECD countries between 1970 and 2010 we pay special attention to the short and long-run elasticities of different (aggregated and disaggregated) budgetary elements in affecting private consumption and investment levels.

Our results, regarding the fiscal effects on private consumption and on investment, can be summarized as follows. First, most of the consolidation episodes in our sample were of short duration and involved relatively modest gains. However, there were a number of large efforts, amounting to improvements of more than 7% of GDP. Stylised evidence shows that the larger the initial fiscal imbalance the larger was the ensuing fiscal consolidation.

In terms of empirical results, our initial baseline specification with total government expenditure reports positive and statistically significant short and long-run elasticities of private consumption to income. The short-run elasticity of private consumption with respect to total government spending is negative, implying that curtailing government consumption increases private consumption (with no fiscal contraction episodes).

Moreover, in the specification using only general government final consumption we find a statistically negative long-run effect in three out of four approaches regardless of the existence of fiscal contraction episodes. In three out of four cases, total revenue has a non-Keynesian effect when a fiscal contraction episode occurs. Furthermore, when taking into account different levels of government indebtedness, lower

**Table 9**
IV–GLS' estimation results for real per capita private investment, with long-run interest rates — 1970–2010.

| | | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | IMF | *lr* | FE1 | *lr* | FE2 | *lr* | FE3 | *lr* |
| $\lambda$ | $INV_{t-1}$ | | −0.043 | | −0.062** | | −0.057** | | −0.059** | |
| | | | (0.035) | | (0.027) | | (0.028) | | (0.027) | |
| $\omega_0$ | $Y_{t-1}$ | | 0.010 | 0.239 | 0.007 | 0.109 | 0.005 | 0.085 | 0.009 | 0.157 |
| | | | (0.095) | (2.089) | (0.073) | (1.128) | (0.074) | (1.251) | (0.071) | (1.143) |
| $\omega_1$ | $\Delta Y_t$ | | 2.682*** | | 2.239*** | | 2.211*** | | 2.219*** | |
| | | | (0.224) | | (0.186) | | (0.190) | | (0.187) | |
| $\delta_0$ | $Y^{av}{}_{t-1}$ | | −0.005 | | 0.020 | | 0.016 | | 0.013 | |
| | | | (0.055) | | (0.046) | | (0.046) | | (0.045) | |
| $\delta_1$ | $\Delta Y^{av}{}_t$ | | −0.319 | | −0.033 | | −0.073 | | −0.061 | |
| | | | (0.236) | | (0.223) | | (0.222) | | (0.222) | |
| | **LRIR** | | −0.108 | | −0.085* | | −0.085* | | −0.083* | |
| | | | (0.083) | | (0.045) | | (0.046) | | (0.046) | |
| $\alpha_1$ | $FCE_{t-1}$ | | 0.039 | 0.919 | 0.110 | 1.761 | 0.014 | 0.2501 | 0.028 | 0.467 |
| | | | (0.055) | (1.411) | (0.097) | (1.779) | (0.063) | (1.117) | (0.080) | (1.365) |
| $\alpha_3$ | $\Delta FCE_t$ | | −0.105 | | −0.102 | | −0.050 | | 0.138 | |
| | | | (0.166) | | (0.249) | | (0.221) | | (0.318) | |
| $\beta_1$ | $TF_{t-1}$ | | −0.153*** | −3.585 | −0.132* | −2.120 | −0.063 | −1.103 | −0.088 | −1.485 |
| | | $\times FC^m$ | (0.041) | (2.638) | (0.074) | (1.443) | (0.046) | (0.859) | (0.063) | (1.167) |
| $\beta_3$ | $\Delta TF_t$ | | −0.530*** | | −0.664** | | −0.593*** | | −0.768** | |
| | | | (0.098) | | (0.302) | | (0.226) | | (0.354) | |
| $\gamma_1$ | $TAX_{t-1}$ | | 0.117** | 2.736 | 0.026 | 0.418 | 0.057 | 0.987 | 0.066 | 1.112 |
| | | | (0.050) | (2.518) | (0.053) | (0.876) | (0.047) | (0.948) | (0.055) | (1.064) |
| $\gamma_3$ | $\Delta TAX_t$ | | 0.219** | | 0.393** | | 0.352** | | 0.318 | |
| | | | (0.109) | | (0.183) | | (0.146) | | (0.198) | |
| $\alpha_2$ | $FCE_{t-1}$ | | −0.054 | −1.258 | −0.013 | −0.215 | −0.007 | −0.119 | −0.006 | −0.105 |
| | | | (0.051) | (1.718) | (0.031) | (0.486) | (0.031) | (0.533) | (0.031) | (0.512) |
| $\alpha_4$ | $\Delta FCE_t$ | | −0.368* | | −0.150** | | −0.178** | | −0.172** | |
| | | | (0.188) | | (0.073) | | (0.077) | | (0.074) | |
| $\beta_2$ | $TF_{t-1}$ | | −0.091** | −2.132 | −0.069*** | −1.104** | −0.073*** | −1.269** | −0.072*** | −1.208** |
| | | $\times (1 - FC^m)$ | (0.040) | (1.548) | (0.021) | (0.492) | (0.021) | (0.611) | (0.021) | (0.542) |
| $\beta_4$ | $\Delta TF_t$ | | −0.293** | | −0.375*** | | −0.376*** | | −0.373*** | |
| | | | (0.116) | | (0.078) | | (0.078) | | (0.076) | |
| $\gamma_2$ | $TAX_{t-1}$ | | 0.152*** | 3.557 | 0.088*** | 1.417* | 0.084*** | 1.472 | 0.084*** | 1.413 |
| | | | (0.045) | (3.132) | (0.033) | (0.849) | (0.033) | (0.951) | (0.032) | (0.861) |
| $\gamma_4$ | $\Delta TAX_t$ | | 0.387*** | | 0.339*** | | 0.377*** | | 0.359*** | |
| | | | (0.097) | | (0.065) | | (0.071) | | (0.065) | |
| *Obs.* | | | 314 | | 502 | | 502 | | 502 | |
| *R-squared* | | | 0.805 | | 0.700 | | 0.701 | | 0.701 | |
| *Sargan–Hansen statistics* | | | 24.29 | | 22.68 | | 17.01 | | 19.42 | |
| *p-Value* | | | 0.00 | | 0.01 | | 0.05 | | 0.02 | |
| Null hypothesis | | | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value | Test statistic | p-Value |
| $\alpha_1 - \alpha_2 = 0$ | | | 3.42 | 0.064 | 1.77 | 0.183 | 0.14 | 0.705 | 0.21 | 0.648 |
| $\gamma_1 - \gamma_2 = 0$ | | | 1.15 | 0.289 | 2.33 | 0.126 | 0.67 | 0.412 | 0.18 | 0.668 |
| $\alpha_1 - \gamma_1 = 0$ | | | 6.71 | 0.009 | 3.62 | 0.057 | 2.16 | 0.142 | 2.46 | 0.116 |
| $\beta_1 - \beta_2 = 0$ | | | 3.26 | 0.071 | 0.83 | 0.362 | 0.05 | 0.820 | 0.08 | 0.78 |

Note: *FCE*, *SS* and *TAX* denote government consumption expenditure, social security and welfare transfers and total tax revenue in real terms and per capita. Robust heteroskedastic-consistent standard errors are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1% levels. The data sample includes yearly observations for the list of countries described in the main text over the period 1970–2010. *lr* — long-run elasticity of private investment with respect to the relevant explanatory variable (standard errors are approximated with the Delta Method). FE1 — measure used by Giavazzi and Pagano (1996); FE2 — measure used by Alesina and Ardagna (1998); FE3 — measure used by Afonso (2010). The Sargan–Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

final government consumption would increase private consumption in the short-run when there is a fiscal consolidation and the debt ratio is above the cross-country average. Furthermore, financial crises increase the non-Keynesian effects of total tax revenues in the presence of a fiscal consolidation episode.

With respect to private investment, in general, our estimations deliver weaker but similar results to the ones reported for private consumption, with negative effects of social transfers on private investment. Finally, raising long-term interest rates reduces per capita private investment.

Therefore, in a context of relevant fiscal imbalances, some important and credible fiscal consolidation actions can contribute to the crowding-in of both private consumption and private investment, which would then also stimulate domestic demand alongside a positive contribution to the reversal of the abovementioned imbalances.

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## Appendix A. Data sources

| Original series | Ameco codes |
|---|---|
| Total population, millions. | 1.0.0.0.NPTN |
| Gross Domestic Product at current market prices, thousand national currency. | 1.0.0.0.UVGD |
| Price deflator of Gross Domestic Product, national currency, 1995 = 100. | 3.1.0.0.PVGD |
| Private final consumption expenditure at 1995 constant prices, thousand national currency. | 1.1.0.0.OCPH |
| Final consumption expenditure of general government, national currency, current prices. | 1.0.0.0.UCTG0F, 1.0.0.0.UCTG0 |
| Gross fixed capital formation at current prices: private sector | 1.0.0.0.UIGP |
| Price deflator — Gross fixed capital formation: total economy | 3.1.0.0.PIGT |
| Gross fixed capital formation at 2000 prices: total economy | 1.1.0.0.OIGT |
| Social benefits other than social transfers in kind, general government, national currency, current prices. | 1.0.0.0.UYTGHF, 1.0.0.0.UYTGH |
| Current taxes on income and wealth (direct taxes), general government, national currency, current prices. | 1.0.0.0.UTYGF, 1.0.0.0.UTYG |
| Taxes linked to imports and production (indirect taxes), general government, national currency, current prices. | 1.0.0.0.UTVGF, 1.0.0.0.UTVG |
| Net lending (+) or net borrowing (−) excluding interest of general government adjusted for the cyclical component. Adjustment based on potential GDP Excessive deficit procedure (% of GDP at market prices (excessive deficit procedure)). | 1.0.319.0.UBLGBP |
| Total expenditure: general government, Excessive deficit procedure (% of GDP at market prices). | 1.0.319.0.UUTGF, 1.0.319.0.UUTGE |
| Total revenue: general government, Excessive deficit procedure (% of GDP at market prices). | 1.0.319.0.URTGF, 1.0.319.0.URTGE |
| General government consolidated gross debt, excessive deficit procedure (based on ESA 1995) and former definition (linked series) (% of GDP at market prices). | 1.0.319.0.UDGGF, 1.0.319.0.UDGGL, |
| Long-run interest rate | 1.1.0.0.ILN |

**Table A1**
Descriptive Statistics (full sample) — 1970–2010.

| Series | Mean | Std. Dev | Min | Max | N |
|---|---|---|---|---|---|
| *C* | 1.24 | 0.58 | 0.42 | 3.38 | 738 |
| *INV* | 0.755 | 0.61 | 0.08 | 3.00 | 715 |
| *Y* | 1.47 | 0.58 | 0.65 | 3.64 | 758 |
| *FCE* | 0.750 | 0.62 | −0.28 | 2.91 | 715 |
| *TF* | 0.583 | 0.61 | −0.81 | 2.76 | 713 |
| *TAX* | 0.87 | 0.63 | −0.19 | 2.89 | 715 |
| *TEX* | 1.08 | 0.63 | −0.06 | 3.23 | 714 |
| *TRE* | 1.06 | 0.63 | −0.01 | 3.18 | 712 |
| *DT* | 0.57 | 0.68 | −0.69 | 2.69 | 715 |
| *IDT* | 0.56 | 0.59 | −0.37 | 2.56 | 715 |
| *INV* | 0.755 | 0.61 | 0.08 | 3.00 | 715 |
| *LRIR* | 8.514 | 4.044 | 2.74 | 27.74 | 544 |

Note: variables are taken as logarithms of real per capita observations. For example, C = log(CONS / YDEF) * (1 / POP), where CONS — private consumption; YDEF — price deflator of GDP, national currency; and POP — population.
Source: European Commission, AMECO database, autumn 2010.

**Table A2**
Panel unit root results — 1970–2010.

| Series | Common unit root (LLC) | | Individual unit root (IPS) | |
|---|---|---|---|---|
| | Statistic | Probability | Statistic | Probability |
| *C* | −7.52 | 0.000 | −2.69 | 0.003 |
| *INV* | −2.75 | 0.002 | −0.99 | 0.998 |
| *Y* | −5.38 | 0.000 | −1.18 | 0.11 |
| *FCE* | −0.70 | 0.240 | −2.72 | 0.003 |
| *TF* | −8.25 | 0.000 | −6.30 | 0.000 |
| *TAX* | −4.67 | 0.000 | 0.47 | 0.682 |
| *TEX* | −6.51 | 0.000 | −3.46 | 0.000 |
| *TRE* | −5.12 | 0.000 | −2.49 | 0.006 |
| *DT* | 4.56 | 0.000 | 0.22 | 0.587 |
| *IDT* | −4.49 | 0.000 | 0.65 | 0.744 |
| *INV* | −2.75 | 0.002 | −0.99 | 0.998 |
| *LRIR* | −5.24 | 0.000 | 2.75 | 0.997 |

Note: LLC — Levin, Lin and Chu. IPS — Im, Pesaran and Shin.

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