The Effects of Fiscal Policy on Consumption in Good and Bad Times

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Abstract

I examine the effects of fiscal policy actions on private consumption in a yearly panel of sixteen OECD countries conditional on the phase of the business cycle and the state of the public finances. I demonstrate that binding liquidity constraints on households can alter the efficacy of the policy changes in the four regimes—defined by the conditioning states—with expansionary fiscal policy boosting consumption in recessions, having a nil effect on it in normal times or in fiscal stress, and strongly displacing consumption in mixed states when recession and fiscal stress coincide. This happens because the liquidity constrained households consume the additional income generated by an expansionary fiscal policy in recession, and save it in normal times or in fiscal stress when liquidity constraints are not binding. If recession and fiscal stress coincide, fiscal action have an extra distortionary effect on income, and consequently on consumption. *JEL:* E62, E20, E32, H30

Keywords: Fiscal policy; Consumption; Public Deficit, Debt; Liquidity constraints

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1 Introduction

The effect of fiscal policy on private consumption is of central importance for the policy's macroeconomic efficacy.[1] Yet, the current debate about fiscal policy since the beginning of the Great Recession has made one thing clear: the empirical pre-crisis evidence on the impact of fiscal policy on output covers a wide range of possible effects.[2] In addition, the response of consumption following fiscal shocks has been found to be both positive or negative, but generally small. Key questions in the recent literature have been whether fiscal policy is more effective in periods of slack, and whether weak fiscal health can reduce this effectiveness.

The goal of this paper is to examine the effects of government spending and taxation on household consumption controlling simultaneously for two sets of initial conditions—*the phase of the business cycle* and *the state of the public finances* in a panel of sixteen OECD countries for the period from 1974 to 2011. To this intent, I divide business cycles into *good* and *bad* phases, or expansions and contractions, respectively, as has been done in the literature after Burns and Mitchell (1946) and as the general public appreciates this phenomenon. Similarly, I differentiate between *good* and *bad* health of the public finances. The notion for doing this is the idea that economic agents recognise the existence of a threshold for the accumulated actions of the government above which a stressful fiscal event is increasingly likely. This type of categorization of fiscal vulnerabilities is also widely spread in the economic analysis (see, e.g., Reinhart, Reinhart, and Rogoff, 2012).

The aim to measure the conditional effects of fiscal policy simultaneously is twofold. First, the fiscal policy's transmission mechanism may change significantly in the four possible states defined by the initial conditioning factors: *normal state*, *recession*, *fiscal stress*, and *mixed state*—periods when recession and fiscal stress coincide. For example, in periods of fiscal stress the economy's response to a fiscal consolidation may alter *qualitatively* relative to normal times. Namely, a fiscal consolidation—a policy that is highly probable to decelerate economic growth in normal times—may have a stimulative effect

[1] Aggregate private consumption is the biggest component of GDP—accounting for more than 60 percent of output in the total OECD economy for the period 1970 to 2011. Thus, unless fiscal policy has a very strong adverse effect on gross private domestic investment and net exports, the size and direction of the response of aggregate consumption to fiscal policy determines to a large extent the magnitude of fiscal policy's macroeconomic influence.

[2] See, e.g., Blanchard and Perotti, 2002; Mountford and Uhlig, 2009; Hall, 2009; Ramey, 2011, among others.

on output and consumption when the public budget is in bad shape. Analogously, in recessions the efficacy of fiscal policy may increase, or alter *quantitatively*, in contrast to normal times: i.e., to the extent that recession is a period when many households are liquidity constrained, a fiscal expansion may induce a crowding-out of private spending to a lesser degree, if at all. The empirical specification in this paper is guided by the theoretical frameworks in Perotti (1999) and Tagkalakis (2008). Both studies emphasize how a portion of liquidity constrained households may alter the fiscal policy's transmission mechanism. Second, throughout the Great Recession many OECD economies have been facing the dilemma how to encourage economic growth without jeopardizing fiscal stability. However, the theoretical and empirical guidance on how to steer the economy in times of low economic activity and high risks of fiscal sustainability is at least scarce, and on top of that harshly contended. The current empirical analysis is well suited to address this question.

This paper is adjacent to two strands in the empirical literature. In the first strand, a number of studies measure the conditional effects of fiscal policy on initial characteristics (see, e.g. Perotti, 1999; Giavazzi, Jappelli, and Pagano, 2000; and, especially relevant for the latest recession, Tagkalakis, 2008; Ilzetzki, Mendoza, and Végh, 2011; Corsetti, Meier, and Müller, 2012; and Auerbach and Gorodnichenko, 2012). In the second strand, the papers deal with the question to what extent contractionary fiscal policy, and what composition of the fiscal instruments, can encourage an expansion in private spending and accelerate economic growth (e.g., Giavazzi and Pagano, 1990; Alesina and Perotti, 1995; Alesina and Ardagna, 2010).

The closest forerunners to my article are the papers by Auerbach and Gorodnichenko (2012) and Corsetti, Meier, and Müller (2012). Both papers document that there is huge variation on the evidence of fiscal multipliers across countries and time. Moreover, both studies find that it may be necessary to control for more than one of the key factors which affect the size of the multipliers. Otherwise, the estimates may still suffer the problem of omitted variables bias. These predecessor studies also point out that fiscal policy may be especially effective in financial crisis (or recessions). The difference between my paper and the two mentioned studies, apart from my interest in consumption in particular, is the focus on binding *liquidity constraints* for the qualitative and quantitative switch of the effects of fiscal policy when conditioning on the two initial factors—the business cycle and fiscal stress. For that purpose I use an Euler equation approach, unlike the two papers which rely on dynamic time-series specifications.

In order to anticipate the results, I give a flavor of my main findings. First, I find strong support for the presence of liquidity constrained individuals in the OECD economies. There is also strong evidence that fiscal stimulus, mainly through an expansion in government spending, may have a big positive effect on consumption in recessions. The effect can be negative, however, in times of fiscal stress coinciding with recession. There is minor evidence that tax increases can play stimulative role on consumption in a pure fiscal stress regime.

The next section discusses the theoretical considerations, which motivate the empirical investigation. Section 3 discusses the data and the econometric strategy. Section 4 presents the main empirical results and robustness tests. Section 5 concludes.

2 Theoretical Considerations

In this section, as a guide to my empirical specification and a motivation for studying the conditional effects of fiscal policy on the phase of the business cycle and the state of the public finances simultaneously, I sketch briefly two theoretical models, described in detail in Perotti (1999) and Tagkalakis (2008). With a few but important differences, the model economies are almost identical.

There are several basic assumptions that taken together contribute for the asymmetric conditional effects of fiscal policy dependent on the initial factors. However, the main ingredient that insures the switch in the behaviour of the economy is the coexistence of liquidity constrained and unconstrained consumers.

2.1 Business Cycle

The model economy in Tagkalakis (2008) expiriences periodic switches of high and low economic activity, respectively expansions and recessions. The switch from low to high activity, and vice versa, happens with probability one every period. The government in the economy levies taxes on a lump-sum basis.[3] The economy is populated by heterogeneous agents. There are two types of forward-looking individuals: both of them know the structure of the economy, both have the same time-invariant utility function, with the difference that one of them, the *liquidity-constrained* ones, are unable to access financial markets in periods of recession and cannot borrow. This means that in recessions, the liquidity-constrained agents are unable to internalize the government budget constraint. In expansions, liquidity constraints do not bind. In addition, an increase in government consumption has a positive effect on economic output and consecutively on labor income, due to price stickiness or other Keynesian features that are not modelled explicitly. Finally, it is assumed that the positive effect on labor income following an increase in government consumption dominates the negative effect of higher taxation, leading to an overall positive change in disposable income given the shock.

Both type of agents smooth their consumption and react to innovations in the present discounted value of their life-time income. Hence when switching from expansions to recessions the change in consumption of both agents should be equal: they revise their spending by reacting to the unexpected change in their income. On the contrary, the change in consumption of the two agents is different when moving from recessions to expansions. Following a fiscal shock, the liquidity-constrained agents react fully to it. Thus, this simple model provides a testable hypothesis. In the presence of liquidity-constrained individuals, both *unanticipated* and *anticipated* shocks can influence private consumption in periods of recession.[4] It can be also tested whether a fiscal expansion, through increase in government consumption or a fall in taxes, generates a bigger positive change in private consumption in recessions compared to expansions. The size of the response hinges on the proportion of liquidity-constrained agents.

2.2 Fiscal Stress

The main difference between the model in Perotti (1999) and in Tagkalakis (2008), except that the economy experiences no periodic switches between high and low economic activ-

[3]Note that even with distortionary taxation the prediction of the model about the higher efficacy of fiscal policy in recessions will not change.

[4]Campbell and Mankiw (1989) were the first to relate the predictability of changes in consumption to changes in income growth due to the presence of liquidity constrained agents.

ity, is the higher discount rate at which the government discounts the future compared to households in Perotti (1999). This implies that the direct costs to society from taxation are higher, as tax-smoothing is initially not perfect. That is, the expected path of taxes is per se increasing. A minor difference, from the above framework, is that the liquidity constrained agents are excluded from the financial markets, no matter the state of the economy. Thus, their consumption is fully determined by their disposable income. As a result, these agents experience no wealth effects of fiscal policy. The unconstrained agents, however, do react to the wealth effect of the anticipated changes in fiscal policy.

This model economy provides also testable predictions. A fiscal consolidation will have a positive effect on private spending, by reducing future distortionary taxation, the higher is the proportion of liquidity unconstrained agents. Such a prediction is also more likely the worse is the public budget position—the cyclically adjusted deficit and debt/output ratio are high. Fiscal consolidations in times of no fiscal stress are supposed to decelerate output and consumption.

3 Data and empirical specification

I use the sketched models as a basis for my empirical specification. My empirical approach proceeds in two steps. First, I specify and estimate government spending and tax rules as well as the anticipated behaviour of household disposable income. In the second step, I use the estimated unanticipated policy movements—the predicted errors from the fiscal behaviour equations—and the anticipated effect on disposable income to estimate the structural equation and see whether the generated regressors from the first step have an impact on private consumption above and beyond what theory predicts and whether the shocks' importance differs depending on the state of the economy. This two-step method was used first by Barro (1977) to test the conjecture that only the unanticipated movements in money supply have an effect on the unemployment rate, in contrast to the anticipated. Recently, Perotti (1999) and Tagkalakis (2008) apply the same methodology for testing the effect of fiscal policy on consumption in different states of the economy.

3.1 Data

This section describes the data and the approximation of the empirical counterparts to the 'unobservables'—the phase of business cycle and the regimes of fiscal stress. The sample covers a panel of sixteen OECD countries, ranging from 1974 to 2011. In Table 1, I describe the data and their sources in detail. Most of the data is extracted from the OECD tables. The advantage of using these time-series is the consistent treatment of definitions of the series across countries. Except for the composite leading indicator series, extracted from the Main Economic Indicators (MEI), all other OECD data is published in the Economic Outlook (EO) No. 90. Public debt data and the narrative information on fiscal consolidations is taken from April 2012 edition of the International Monetary Fund's (IMF) World Economic Outlook and from Devries, Guajardo, Leigh, and Pescatori (2011), respectively. To have a better comparison between the results in this paper to those in Perotti (1999), in terms of the length of the time-series, initially I intended compiling an extension of his dataset. However, having at least twenty data points per country is a prerequisite for including any country in the current analysis. And respectively, the availability of the narrative series in Devries, Guajardo, Leigh, and Pescatori (2011) as well as data limitations related to fiscal and household sector data from the OECD tables constrain the choice of countries I can include in my sample. The sixteen included countries are the following: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Portugal, Spain, Sweden, the United Kingdom, and the United States.

Prior to studying the conditional effects of fiscal policy in *bad times*, I have to define them. The periods of *bad times* I have emphasized as important for the transmission mechanism of fiscal policy are the *recessionary* phase of the business cycle and the regime of *fiscal stress*, respectively. These two states have no distinctive manifestations that we can observe and, accordingly, have to be approximated. In both cases, there is no universally established definition of what represents recession or fiscal stress. To avoid creating my own definitions, I rely on ones used previously in the literature. I also consider two different specifications for the approximations of both recession and fiscal stress which are meant to capture to a varying degree the prevalence/severity of the unobservable state. These two specifications are denoted with a number in brackets, respectively (1) and (2), refering to criterion one or two.

In regard to the business cycles approximation, I consider definitions of recessions that rely on the concept of output gap, i.e., recessions are periods when the actual output is below the potential one, and pervasiveness of under-utilized resources plague the economy. Similar definitions of recessions have been used in Tagkalakis (2008), **?** and Baum, Poplawski-Ribeiro, and Weber (2012). For that purpose, for each individual country in my dataset I use output gaps calculated by the OECD. The OECD variable GAP measures the difference between actual and potential GDP as a share of potential GDP, where potential output is extrapolated using a production function method.[5] Accordingly, based on criterion (1), the dummy variable $D(1)_t$ that approximates the business cycle, assumes a value 1 when the GAP variable is negative, and 0 otherwise. Based on criterion (2), the dummy variable $D(2)_t$, which supposedly captures only the more severe recession periods, assumes a value 1 when the GAP is negative and when, in a sequence of periods with negative output gaps, at least one of the following two conditions is fulfilled: first, the output gap turns more negative between the first and the second period in the sequence, and/or second, the difference between the last positive output gap prior to the sequence and the first negative output gap is bigger than three percent.[6] The dates that are filtered as recessions according to criteria (1) and (2) are listed in Table 2.

Similar to my strategy for approximating the business cycles, to categorize the state of fiscal stress I rely on definitions that are common in the literature. Both, Perotti (1999) and Corsetti, Meier, and Müller (2012) focus on threshold values of the level of public debt and net government lending as a share of GDP to separate *bad* from *good* fiscal regimes. Likewise, according to criterion (1), the dummy variable $F(1)_t$ that proxies the fiscal state, assumes a value 1 when the share of lagged public debt to GDP is bigger than seventy percent and the the share of lagged government borrowing (the negative of net government lending) to GDP is bigger than four percent, and 0 otherwise. Based on criterion (2),

[5]There are other approaches available for approximating the output gap. Koske and Pain (2008. pp. 6–8) provide an overview of the usefulness of alternative output gap estimates, compared for example with output gaps extracted using the Hodrick-Prescott (HP) filter, in terms of their predictive power of inflation and cyclically-adjusted public budget balance. They find that the production-function estimates contain information for predicting inflation and the fiscal position that are comparable to the alternative measures, even slightly superior.

[6]The second rule aims to capture contractionary periods which feature a very steep fall of actual output below potential but which also can experience a quick, however feeble, rebound of output afterwards. Many OECD countries have experienced similar behaviour of output during the Great Recession.

the dummy variable $F(2)_t$, which is progressively a more stringent manifestation of fiscal turmoil, assumes a value 1 when the share of lagged public debt to GDP is bigger than eighty percent and the share of lagged government borrowing to GDP is bigger than five percent, and 0 otherwise. The periods that are filtered as bad states of fiscal stress according to criteria (1) and (2) are listed in Table 3.

3.2 Consumption Euler equation

I study the behaviour of private consumption following unanticipated actions in fiscal policy. The liquidity unconstrained agents smooth their consumption intertemporally and incorporate the unanticipated changes in government spending, ε_t^g, and taxation, ε_t^{ta}, in their decision rules. The liquidity constrained agents, however, react to both unanticipated and anticipated changes in their disposable income, $\Delta I_{t/t-1}$. Here $\Delta I_{t/t-1}$ denotes the anticipated change in disposable income between t and $t-1$. The construction of the anticipated and the unanticipated variables is discussed in this section below and in Section 3.3. According to the models in Perotti (1999) and Tagkalakis (2008), the unanticipated fiscal actions will have a distinctive impact on consumption conditional on the two bad states: fiscal stress and recession. By the logic of the two models, counteracting forces should define the size and sign of the effect of fiscal policy in the mixed state: that is, due to fiscal stress the wealth effect is enlarged when the fiscal budget position is bad, however, due to rise in the proportion of liquidity constrained agents in recessions the wealth effect should be weakened. To make explicit the distinctive effect of fiscal policy in the four possible states I interact the recession dummy, D_t, the fiscal stress dummy, F_t, and the mixed state—the interaction of the two dummies—D_tF_t, with the exogenous fiscal changes.

As a result, the empirical specification takes the form:

$$\begin{aligned}\Delta C_t = {} & \gamma_1^n\widehat{\varepsilon_t^g} + \gamma_2^n\widehat{\varepsilon_t^{ta}} + \gamma_1^d D_t\widehat{\varepsilon_t^g} + \gamma_2^d D_t\widehat{\varepsilon_t^{ta}} + \gamma_1^f F_t\widehat{\varepsilon_t^g} + \gamma_2^f F_t\widehat{\varepsilon_t^{ta}} + \gamma_1^{df} D_tF_t\widehat{\varepsilon_t^g} + \gamma_2^{df} D_tF_t\widehat{\varepsilon_t^{ta}} \\ & + \mu\Delta\widehat{I}_{t/t-1} + \omega_t^c, \qquad (1)\end{aligned}$$

where a hat, $\widehat{\bullet}$, over a variable denotes a generated regressor. Respectively, γ_1^n and γ_2^n measure the effects of the two fiscal shocks on consumption in normal states. The dummies D_t and F_t are set equal to 1 in recessions or fiscal stress, and 0 in normal times.

In Eq. (1) it is possible to test formally the variability of the shocks' coefficients in the different states. The coefficients γ_1^d and γ_2^d measure the *difference* in the impact of the fiscal shocks during recessions compared to normal times. Respectively, the coefficients γ_1^f and γ_2^f measure the change in impact of the fiscal shocks during fiscal stress relative to normal states. Finally, the coefficients γ_1^{df} and γ_2^{df} measure the change in impact of the fiscal shocks during mixed states, again relative to normal. Excluding the six new variables—the interaction of the dummies with the generated regressors—corresponds to the formulation made by many in the literature. That is, fiscal policy has an equal effect on private consumption regardless of initial conditions. ω_t^c is a stochastic unpredictable component of consumption that is uncorrelated with the regressors by assumption. The coefficient of the income regressor, μ, measures the significance of "anticipated" changes in disposable income on aggregate consumption.[7] I estimate Eq. (1) by the Prais-Winsten method, a linear estimation with a correction for first-order serial correlation in the error term. Full set of country and year dummies variables are included in the estimation.

The generated regressors ε_t^g and ε_t^{ta} in equation (1) need not be correlated with the error term ω_t^c for the estimation of the coefficients to be consistent. This assumption may be violated because policy-makers may react to contemporaneous developments in the economy due to automatic rules in the functioning of fiscal policy and because of discretionary actions of the government within an year. To that matter, I have cyclically adjusted the unanticipated fiscal shocks and from now on these have to be interpreted as shocks corrected from cyclical movements. The assumption that the government stays inactive following changes in the economy is more contentious. Concerning the adjustment of government spending within the year, Beetsma, Giuliodori, and Klaassen (2009) and Born and Müller (2009) provide evidence that the assumption is valid both in quarterly and in annual time series for a number of OECD countries.[8] In regard to the assumption about no discretionary changes in taxation within an year, Perotti (1999) argues that

[7]Disposable income can have an impact on consumption for unrelated reasons to liquidity constraints, e.g. income uncertainty, habit formation, non-separability between consumption and leisure. Also, overlapping generation models predict a rise in consumption with a rise in income. Therefore, as pointed out in Campbell and Mankiw (1989), the coefficient of the disposable income is a reduced form parameter, providing evidence in favour of binding liquidity constraints, among other things.

[8]Other authors are less convinced in the validity of this assumption. Results by Lane (2003) provide evidence that government wage consumption can be procyclical in a number of OECD countries. Evidence by Lamo, Pérez, and Schuknecht (2008) corroborates this by showing that government wages have a reasonably procyclical price component.

there is no reason to expect that the *difference* in the impact of taxation between the four distinctice states (the two in his paper) within an year, the main interest in this article, should be biased systematically in any direction.

Before proceeding further, I need to make one additional remark. Perotti (1999) observes that in a typical Euler equation, the scaling factor does not change results considerably: i.e., the ratio of consumption over disposable income is pretty stable over time.[9] The tested Euler equation, however, includes fiscal shocks that change invariably in size with the change of the size of government over time. Respectively, one can expect that changes in government consumption can produce different effects on private consumption depending on whether government consumption accounts for 10% or 30% of the total expenditures in the economy. Hence, following the standard log difference approach, taken by many in the literature, can lead to misleading conclusions. The proper scaling factor in the case is the lagged value of disposable income. Except otherwise stated, all variables are nominal series divided by the population size. To express the variables in real terms I divide the fiscal variables and the gross domestic product total (GDP), Y_t, used in the estimations latter, by the GDP deflator. For the private household variables I use the private consumption expenditure (PCE) deflator. All period-by-period changes are normalized by the lagged value of household disposable income expressed in real per capita terms.

I estimate the anticipated changes in disposable income conditional on lagged information only. Moreover, I control for the effect of fiscal policy changes on disposable income by explicitly including the fiscal variables in the prediction equation. Therefore, by construction $\Delta\widehat{I}_{t/t-1}$ is orthogonal to the error term in Eq. (1), ω_t^c. I impute the anticipated regressor in Eq. (1), $\Delta\widehat{I}_{t/t-1}$, by the fitted values from the following specification:

$$\begin{aligned}\Delta I_t = \beta_0 + \beta_1\Delta I_{t-1} + \beta_2\Delta I_{t-2} + \beta_3\Delta I_{t-3} + \beta_4\Delta T_{t-1} + \beta_5\Delta T_{t-2} + \beta_6\Delta G_{t-1} + \beta_7\Delta G_{t-2} \\ + \beta_8\Delta C_{t-2} + \beta_9 country\Delta C_{t-2} + \varepsilon_t^i, \end{aligned} \tag{2}$$

where I regress the change in household disposable income on its own lags, the lagged changes in tax labor revenues, ΔT_t, the lagged changes in government consumption, ΔG_t, and the lagged changes in consumption as well as the lagged changes in consumption

[9] In the short run, however, consumption may at times seem detached from disposable income, e.g. during the financial liberalization many households have spent consistently above their earnings.

interacted with the country specific dummy, *country*. Lagged consumption is included to capture the idea that income dynamics is anticipated by consumption (specifically labor income). The changes in lagged disposable income control for the state of the business cycle, while by including lagged fiscal variables I control for their anticipated effects of fiscal policy on disposable income.

3.3 Fiscal prediction equations

In the first step of the estimation procedure, I calculate the fiscal policy shocks in annual time series. The conjecture is that changes in government consumption, ΔG_t, and labour income taxation, ΔT_t, follow simple rules where the fiscal variable of interest, depends on its own lags, the lagged changes in output, ΔY_t, and the lagged between-periods difference in the imputed interest rate on public debt, ΔR_t. In addition, ΔG_t depends on the lagged changes in total government tax revenue, Q_t, while ΔT_t depends on the lagged changes in ΔG_t. Labour income taxation, T_t, is computed as the sum of the personal income taxes and employees contributions to the government social insurance. Respectively, total tax revenue, Q_t, is the sum of total direct and indirect taxes, plus private social security contributions to the government. Each equation includes also a constant.

$$\begin{aligned}
\Delta G_t &= \alpha_{1,0} + \alpha_{1,2}\Delta G_{t-1} + \alpha_{1,3}\Delta Q_{t-1} + \alpha_{1,4}\Delta Y_{t-1} + \alpha_{1,5}\Delta Y_{t-2} + \alpha_{1,6}\Delta R_{t-1} + \varepsilon_t^g, \\
\Delta T_t &= \alpha_{2,0} + \alpha_{2,2}\Delta G_{t-1} + \alpha_{2,3}\Delta T_{t-1} + \alpha_{2,4}\Delta Y_{t-1} + \alpha_{2,5}\Delta Y_{t-2} + \alpha_{2,6}\Delta R_{t-1} + \varepsilon_t^t, \\
\Delta Y_t &= \alpha_{3,0} + \alpha_{3,2}\Delta G_{t-1} + \alpha_{3,3}\Delta Q_{t-1} + \alpha_{3,4}\Delta Y_{t-1} + \alpha_{3,5}\Delta Y_{t-2} + \alpha_{3,6}\Delta R_{t-1} + \varepsilon_t^y.
\end{aligned} \tag{3}$$

I adjust the labor income tax shocks by using the methodology proposed by Blanchard (1990) and Perotti (1999). The adjustment is motivated by the necessity to remove fluctuations induced by cyclical movements of the tax base. The adjusted shock is computed by the formula $\widehat{\varepsilon_t^{ta}} = \widehat{\varepsilon_t^{t}} - \phi_t \widehat{\varepsilon_t^{y}} T_t^r$.[10] The elasticity ϕ_t is calculated by weighting the GDP-elasticity of each of the taxes included in T_t^r by the relative size of the same tax compared to the total tax revenue. The GDP-elasticities of taxes are provided by Giorno, Richardson, Roseveare, and van den Noord (1995), van den Noord (2000), and Girouard

[10] T_t^r is the ratio of government's labor income tax receipts to the previous year disposable income, where both series are expressed in real per capita terms.

and André (2005).[11] Government consumption shocks are not cyclically adjusted. A standard assumption in the VAR literature states that government consumption does not automatically respond to output, within a quarter or year.[12,13]

4 Results

Setting the stage

Table 4 summarizes the estimation results for six alternative econometric specifications nested in equation (1) using one of the four possible combinations between two different sets of dummies: these are respectively dummies $D(1)$ and $F(2)$. I present the table in order to highlight how different the conditional effect can be compared to the unconditional. For example, starting with column (1), the effect of government spending on consumption is positive but insignificant from zero. The effect of tax shocks is negative and significant at the one percent level. These results are in line with the cited pre-crisis literature. This finding can be seen in Perotti (2005) and Tagkalakis (2008), (table 10), among others. In the post-1980 period, like the data span in this paper, the effects of fiscal policy on consumption are small, even zero. Generally, small or negative fiscal multipliers have been attributed to the relaxation of credit constraints with the financial liberalization in this period.

In column (2), however, once I control for the presence of recession regimes the results change. The effect of government spending becomes negative and significant at 10 % level in normal times. In contrast, the conditional effect flips sign in recessions. The estimated value of γ_1^d is 0.92 and significant at 5 % level. Thus, in recession the effects of government spending on private consumption is overall positive and equal to 0.49, with a p-value of a test of the difference in coefficients between good and bad times equal to

[11] The OECD has computed the semi-elasticities of taxes on a regular basis for a number of OECD countries, about once per four years each time.

[12] The usual identification in Blanchard and Perotti (2002) is the assumption that there is no fiscal policy *systematic discretionary* response in quarterly data. Arguably, we can categorize changes in fiscal variables due to *automatic*, *systematic discretionary* and *random discretionary* reasons. We are interested in the random discretionary component. If there is no systematic discretionary factor, what is left are the automatic and random factors. With readily (externally available) elasticity of taxes to GDP, I can then construct random unanticipated fiscal changes, adjusted for cyclical components.

[13] A drawback of choosing higher frequency data is that it is available and reliable only for the post war period. Also non-interpolated series for government tax revenues are existant only for a number of countries.

zero (reported in the table below). Observe that the tax innovation has a negative and significant effect in normal times and more negative effect in bad times. The difference between the impact in good and bad times is not statistically significant. This is also reflected in the p-value of the test. Observe that in column (3) the difference in effect of the spending shock between pure recession and normal times becomes even bigger. This supports the hypothesis in my paper. That is, once I differenciate between pure recessions and states in which recessions accompany fiscal stress, the effects of fiscal policy on consumption in the two distinctive states become statistically different from each other: in the mixed regime the effect of government spending becomes negative and significant at 5 % level. Recall that the wealth effect on unconstrained individuals is increased in periods of fiscal vulnerability: The overall effect of public spending on consumption is -1.39 in the mixed state. Symmetrically, the effect of taxation becomes positive, but not statistically significant.

In columns (4) and (5) I condition on the presence of fiscal stress. The coefficients measuring the effects of fiscal policy in fiscal stress, γ_1^f and γ_2^f, are consistent with the prediction in Perotti (1999), however, they are not statistically significant. Similar to this finding, using a dataset with both industrialized and developing countries, Schclarek (2007) cannot find statistically significant support for the hypothesis that fiscal contractions can play stimulative role on private spending with an identical to Perotti's setup. Finally, specification (6) is a full scale version of the empirical specification. The results for this particular specification are also depicted in table 5.

Baseline results

Table 5 summarizes the results for the four combinations of the two sets of bad regime dummies. First, concerning the anticipated effect, my results are broadly consistent with the evidence presented in Campbell and Mankiw (1989), i.e., rule-of-thumb consumers (for whom, by assumption, consumption equals current income) are on average estimated to earn about μ=0.4-5 of aggregate income. Second, the efficacy of fiscal policy increases in recessions, as observed in Corsetti, Meier, and Müller (2012) and Auerbach and Gorodnichenko (2012). In all four combinations with the alternative dummies, the effect of government in recession is statistically different from the effect in normal times, and positive. Symmetrically, taxation decreases consumption by more in recessions. Third, fiscal policy contractions do not stimulate consumption in any of the four combinations. The overall effect of fiscal changes in purely fiscal stress states is zero.

Fourth, an interesting result of the current analysis is the estimate for the impact of government spending on consumption in mixed states. The effect is negative and statistically significant. The size of the overall effect varies between -2.0 and -2.5. In terms of the frameworks in Perotti (1999) and Tagkalakis (2008), the result is even puzzling. If the wealth effect is supposed to be very big or very small dependent on either fiscal stress or recession state, the effect should be in between when the two states coincide. This is not the case. The effect is even more negative compared to the impact of government spending on consumption conditional on purely fiscal stress state. A possible explanation for this empirical finding is the framework in Corsetti, Kuester, Meier, and Müller (2012). The authors emphasize how sovereign-risk premium can affect the borrowing conditions in the broader economy. In normal times, the correlation between public and private borrowing costs seem to be detached from each other. In crises situations, however, these become strongly correlated. Therefore, there is a spill-over in tightening of borrowing cosntraints from the private to the public sector, and vice versa. The effects of the two constraints may even reinforce each other.

Finally, note that at the bottom of the table I report the p-values of the F statistics of whether the spending shocks, or respectively the tax shocks, are statistically different from one another in the different regimes. For the full scale model, we observe that the tests provide statistical support that the government spending shocks have a different effect on consumption in all four possible states. The variability of the effects of taxation on consumption is weaker conditional on the four different states.

Predictability

A key assumption in the estimation of equation (1) is that unanticipated components to government spending and taxation are not predictable. In the near-VARs with which I generate the fiscal shocks, I try to ensure unpredictability by including sufficiently many endogenous variables as well as their lags so that the error component is orthogonal to past information. However, Ramey (2012) observes that many changes in fiscal variables are anticipated. To check whether the results so far pass the test of predictability I specify a new near-VAR system:

$$\begin{aligned}
\Delta G_t &= \alpha_{1,0} + \alpha_{1,2}\Delta G_{t-1} + \alpha_{1,3}\Delta Q_{t-1} + \alpha_{1,4}\Delta Y_{t-1} + \alpha_{1,5}\Delta Y_{t-2} + \alpha_{1,6}\Delta R_{t-1} \\
&\quad + \alpha_{1,7}D_t + \alpha_{1,8}F_t + \alpha_{1,9}D_tF_t + \alpha_{1,10}\Delta P_{t-1} + \varepsilon_t^g, \\
\Delta T_t &= \alpha_{2,0} + \alpha_{2,2}\Delta G_{t-1} + \alpha_{2,3}\Delta T_{t-1} + \alpha_{2,4}\Delta Y_{t-1} + \alpha_{2,5}\Delta Y_{t-2} + \alpha_{2,6}\Delta R_{t-1} \\
&\quad + \alpha_{2,7}D_t + \alpha_{2,8}F_t + \alpha_{2,9}D_tF_t + \alpha_{2,10}\Delta P_{t-1} + \varepsilon_t^t, \\
\Delta Y_t &= \alpha_{3,0} + \alpha_{3,2}\Delta G_{t-1} + \alpha_{3,3}\Delta Q_{t-1} + \alpha_{3,4}\Delta Y_{t-1} + \alpha_{3,5}\Delta Y_{t-2} + \alpha_{3,6}\Delta R_{t-1} \\
&\quad + \alpha_{3,7}D_t + \alpha_{3,8}F_t + \alpha_{3,9}D_tF_t + \alpha_{3,10}\Delta P_{t-1} + \varepsilon_t^y.
\end{aligned} \tag{4}$$

Here, I posit that the processes of government spending and taxation is augmented by a new lagged variable, ΔP_{t-1}, a composite leading indicator (CLI) that proxies the forecasters' expectations with respect to next-year growth, as well as the two regime dummies and their interaction. The CLI variable has been used also by Corsetti, Meier, and Müller (2012) on basis of its proven ability to predict cyclical turning points in advance. The new estimation of the fiscal shocks supposedly filters away past regularities that are not successfully purged by equation (3). The results from estimating equation (1) with the newly estimated fiscal shocks are displayed in Table 6. If anything, the benchmark results are reinforced.

Measurement error

The fiscal shocks in equation (3) and (4) are supposed to capture only randomly discretionary changes of the government actions, and purge away any systematic discretionary or cyclical adjustments of the fiscal variables. As already discussed, despite taking care of cyclically adjusting the government spending and tax shock, these may still be correlated with the error term in equation (1). Instrumental variable estimation is a natural solution to the problem. Devries, Guajardo, Leigh, and Pescatori (2011) estimate "action-based" or "narrative" measures of fiscal consolidations, in the spirit of Romer and Romer (2010). Respectively, the narrative series on exogenous, purely action-based fiscal changes provide for natural instruments for the fiscal shocks generated in the estimation of equation (3). The narrative series in this study, however, differ by those collected by Romer and Romer (2010) in one important aspect relevant for my analysis. Romer and Romer (2010) identify exogenous tax changes prompted by two main motives—the incentive to improve long-run growth and to reduce persistent budget deficits. Alternatively, Devries, Guajardo, Leigh, and Pescatori (2011) identify exogenous fiscal actions based only on the second motive. This consideration points to the possibility that the correlation between the narrative series and the generated regressors is reduced.

Similar to Ramey (2012) who uses the series in Romer and Romer (2010) to identify how strongly tax changes affect total private spending, I make the assumption that the motives to reduce persistent public budgets influence private consumption by the unanticipated changes in government spending and taxation, and by the anticipated changes in disposable income. In the estimation, I experimented with various lags of the two narrative instruments. Finally, I use three lags of the narrative series given that this number of lags produces the highest Anderson-Rubin Wald statistic, measuring the statistical significance of the endogenous regressors in the structural equation, and the Kleibergen-Paap statistic, testing for weak instruments. The results for the intrumental variable estimation are displayed in Table 7. The results differ slightly from baseline results. Namely, the effect of government spending on consumption in mixed states is only marginally significant now. Given the truncation problem with the exogenous narrative series, however, the lack of the statistical significance of the coefficient in mixed states does not overturn the main results in the paper. On the opposite, taking into consideration the overall effect of spending on consumption in the mixed state,-3.0 to -5.0, the results are even reinforced.

5 Conclusion

Throughout the Great Recession, many OECD countries reached to fiscal policy to offset the large negative shocks, initially triggered by sharp declines in house and stock prices and later by a tightening of credit and financing conditions. These discretionary fiscal changes, however, have not been greeted with equal sympathy.

In this paper, I have addressed the role of liquidity constraints for the varying degree of efficacy of fiscal policy. The results in the paper support predictions of Keynesian models, in the spirit of Keynes (1936), that fiscal policy, through an expansion in government spending, may be potent in boosting aggregate demand when the economy suffers from under-utilized resources. However, this action may be counter-productive when the government budget is itself under stress, and the economy is in a recession.

Table 1: Data Information

Variable	Definition	Source
POP	Population level	OECD FS: population level, POP;
$YDEF$	GDP deflator	OECD EO: deflator of gross domestic product, PGDP;
$CDEF$	Consumption deflator	OECD EO: deflator of private final consumption expenditure, PCP;
$INFL$	Rate of inflation, log difference of $YDEF$	OECD EO: deflator of gross domestic product, PGDP;
GDP	Nominal GDP	OECD EO: nominal gross domestic product, GDP;
$DEFC$	Negative of government net lending	OECD EO: government net lending, NLG;
$DEBT$	Gross government debt	Main source IMF WEO: General government gross debt, GGXWDG; missing data filled-in if available by OECD EO's general government gross financial liabilities, GGFL;
ΔI	Percentage change in disposable income, in decimals	OECD EO: Gross or net household disposable income, YDH_G or YDH; Population level, POP; Consumption Deflator, PCP;
ΔY	Change in GDP as a share of lagged I	OECD EO: Gross domestic product, value, GDP; Population level, POP; Consumption Deflator, PGDP;
ΔC	Change in consumption as a share of lagged I	OECD EO: Private final consumption expenditure, CP; Population level, POP; Consumption Deflator, PCP;
ΔG	Change in government consumption expenditures as a share of lagged I	OECD EO: Government final consumption expenditure, CG; Population level, POP; GDP Deflator, PGDP;
ΔG^i	Change in government fixed capital formation as a share of lagged I	OECD EO: Gross government fixed capital formation, IG; Population level, POP; GDP Deflator, PGDP;
ΔG^c	Change in government consumption and fixed capital formation as a share of lagged I	Government consumption and fixed capital formation is the sum of CG and IG; Population level, POP; GDP Deflator, PGDP;
ΔT	Change in labor income taxes on household as a share of lagged I	OECD EO: Sum of direct taxes on households, TYH, and social security contributions by households, TRSSH; Population level, POP; GDP Deflator, PGDP;
ΔQ	Change in total tax revenue as a share of lagged I	OECD EO: Sum of total direct taxes, TY, social security contribution received by general government, SSRG, and taxes on production and imports, TIND; Population level, POP; GDP Deflator, PGDP;
ΔR	Change in interest rate, in decimals; Interest rate is ratio of government net interest payments to gross government debt minus $INFL$	$DEBT$ and $INFL$ are defined above; OECD EO: Net government interest payments, GNINTP;
ΔP	Log difference of composite leading indicator	OECD MEI: amplitude adjusted composite leading indicator, CLI;
GAP	Output gap	OECD EO: Output gap of the total economy, GAP;

Notes: Unless otherwise stated, all nominal series expressed in real per capita terms. To comply to the critique of Whelan (2002), who discusses reasons why manipulating chain-weighted data in a linear way is incorrect, I add/substract nominal series and only in the final step I deflate them by the respective deflator. *OECD EO* is an abbreviation for OECD Economic Outlook, Statistics and Projections database. *OECD FS* is an abbreviation for OECD Factbook Statistics database. *OECD MEI* is an abbreviation for OECD Main Economic Indicators database. *IMF WEO* is an an abbreviation for IMF World Economic Outlook database. To avoid the structural break at German unification in 1991, I chain the West German and the unified German time series by using overlapping 1991 data.

Table 2: Recession Dummy Information

Dummy	Definition	Country	Time Period
$D(1)_t$	Assumes value of 1	Australia	1991-97, 2001, 2009-11
	if $GAP_t < 0$,	Austria	1976, 1978, 1981-88, 1993-97, 2002-05, 2009-11
	0 otherwise	Belgium	1975, 1977-79, 1981-87, 1993-98, 2002-05, 2009-11
		Canada	1975, 1982-84, 1991-98, 2008-11
		Denmark	1981-83, 1988-95, 2002-04, 2009-11
		Finland	1977-78, 1981-85, 1991-97, 2002-05, 2009-11
		France	1981-87, 1993-97, 2002-05, 2008-11
		Germany	1975, 1981-87, 1993-99, 2002-05, 2009-2011
		Italy	1982-87, 1992-99, 2003, 2009-11
		Japan	1975-78, 1980, 1982-87, 1993-95, 1998-2005, 2009-11
		Netherlands	1975, 1981-88, 1992-96, 2002-05, 2009-11
		Portugal	1995-96, 2003-06, 2009-11
		Spain	1979-87, 1993-98, 2009-11
		Sweden	1977-78, 1981-83, 1991-98, 2001-03, 2009-11
		U Kingdom	1975-76, 1980-85, 1991-97, 2009-11
		U States	1975-77, 1980-84, 1991-96, 2002-03, 2009-11
$D(2)_t$	Assumes value of 1	Australia	1991-97, 2009-11
	if $GAP_t < 0$,	Austria	1981-88, 1993-97, 2002-05, 2009-11
	and	Belgium	1981-87, 2002-05, 2009-11
	either, in a sequence	Canada	1982-84, 1991-98, 2008-11
	of negative GAPs,	Denmark	1981-83, 1988-95, 2002-04, 2009-11
	$GAP_1 - GAP_2 > 0$,	Finland	1977-78, 1981-85, 1991-97, 2002-05, 2009-11
	and/or, in a sequence	France	1981-87, 2002-05, 2008-11
	of negative GAPs,	Germany	1981-87, 2002-05, 2009-2011
	$GAP_0 - GAP_1 > 0.03$,	Italy	1982-87, 1992-99, 2009-11
	0 otherwise	Japan	1975-78, 1982-87, 1993-95, 1998-2005, 2009-11
		Netherlands	1981-88, 1992-96, 2002-05, 2009-11
		Portugal	1995-96
		Spain	1979-87, 2009-11
		Sweden	1981-83, 1991-98, 2001-03, 2009-11
		U Kingdom	1980-85, 1991-97, 2009-11
		U States	1975-77, 1980-84, 2009-11

Table 3: Fiscal Stress Dummy Information

Dummy	Definition	Country	Time Period
$F(1)_t$	Assumes value of 1 if $DEFC_{t-1}/GDP_{t-1}$ is bigger than 0.04, *and*, $DEBT_{t-1}/GDP_{t-1}$ is bigger than 0.7, 0 otherwise	Austria	2011
		Belgium	1981-97, 2010-11
		Canada	1987-96, 2010-11
		Denmark	1983-85,
		France	2010-11
		Germany	2011
		Italy	1976-97, 2006, 2010-11
		Japan	1996-2006, 2010-11
		Netherlands	1985, 1987-1991, 1993, 1996
		Portugal	2010-11
		Sweden	1995-96
		U Kingdom	2011
		U States	1993-94, 2009-11
$F(2)_t$	Assumes value of 1 if $DEFC_{t-1}/GDP_{t-1}$ is bigger than 0.05, *and*, $DEBT_{t-1}/GDP_{t-1}$ is bigger than 0.8, 0 otherwise	Belgium	1982-95, 2010
		Canada	1992-96, 2011
		Denmark	1984
		France	2011
		Italy	1979-80, 1982-83, 1986-97, 2010
		Japan	1997, 1999-2006, 2010-11
		Portugal	2010-11
		U States	2010-11

Table 4: Setting the stage

$$\Delta C_t = \gamma_1^n \widehat{\varepsilon_t^g} + \gamma_2^n \widehat{\varepsilon_t^{ta}} + \gamma_1^d D_t \widehat{\varepsilon_t^g} + \gamma_2^d D_t \widehat{\varepsilon_t^{ta}} + \gamma_1^f F_t \widehat{\varepsilon_t^g} + \gamma_2^f F_t \widehat{\varepsilon_t^{ta}} + \gamma_1^{df} D_t F_t \widehat{\varepsilon_t^g} + \gamma_2^{df} D_t F_t \widehat{\varepsilon_t^{ta}} + \mu \Delta \widehat{I}_{t/t-1} + \omega_t^c$$

	Baseline Estimates					
Coefficient	(1)	(2)	(3)	(4)	(5)	(6)
γ_1^n	0.05	−0.43*	−0.44*	0.08	0.08	−0.48*
	(0.14)	(0.18)	(0.18)	(0.15)	(0.15)	(0.19)
γ_2^n	−0.25***	−0.19*	−0.19*	−0.26***	−0.26***	−0.21*
	(0.06)	(0.09)	(0.09)	(0.07)	(0.07)	(0.09)
γ_1^d		0.92**	1.07***			1.12***
		(0.29)	(0.30)			(0.31)
γ_2^d		−0.12	−0.15			−0.13
		(0.10)	(0.10)			(0.10)
γ_1^f				−0.21	−0.21	0.40
				(0.29)	(0.51)	(0.57)
γ_2^f				0.12	0.30	0.24
				(0.08)	(0.20)	(0.20)
γ_1^{df}			−0.95**		−0.18	−1.34*
			(0.32)		(0.57)	(0.68)
γ_2^{df}			0.11		−0.26	−0.14
			(0.09)		(0.19)	(0.21)
μ	0.49***	0.46***	0.44***	0.49***	0.48***	0.44***
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
$\bar{R}^2$	0.68	0.69	0.69	0.68	0.68	0.69
P-value, $\widehat{\varepsilon_t^g}$'s γs equal	–	0.00	0.00	0.47	0.40	0.00
P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal	–	0.23	0.24	0.15	0.31	0.25
Number of D_t	–	239	239	–	239	239
Number of F_t	–	–	41	41	41	41
Number of $D_t F_t$	–	–	30	–	30	30
Number of Obs.	455	455	455	455	455	455

Notes: Regressions are estimated by the Prais-Winsten method correcting for country-specific heteroskedastic AR(1) residual structure. Columns (1) to (6) report estimation results for all six alternative econometric specifications nested in the equation (1). Robust standard errors are given in parentheses. $\{^*, ^{**}, ^{***}\}$ denote statistical significance at respectively $\{10, 5, 1\}$ percent. $\bar{R}^2$: Adjusted R^2 of the first-stage regression. P-value, $\widehat{\varepsilon_t^g}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^g}$ differ across regimes. P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^{ta}}$ differ across regimes. Number of D_t: Number of recession periods in sample. Number of F_t: Number of fiscal stress periods in sample. Number of $D_t F_t$: Number of recessions coinciding with fiscal stress periods in sample. Number of Obs.: Number of total periods in sample.

Table 5: Baseline: all dummy combinations

$$\Delta C_t = \gamma_1^n \widehat{\varepsilon_t^g} + \gamma_2^n \widehat{\varepsilon_t^{ta}} + \gamma_1^d D_t \widehat{\varepsilon_t^g} + \gamma_2^d D_t \widehat{\varepsilon_t^{ta}} + \gamma_1^f F_t \widehat{\varepsilon_t^g} + \gamma_2^f F_t \widehat{\varepsilon_t^{ta}} + \gamma_1^{df} D_t F_t \widehat{\varepsilon_t^g} + \gamma_2^{df} D_t F_t \widehat{\varepsilon_t^{ta}} + \mu \Delta \widehat{I}_{t/t-1} + \omega_t^c$$

	Baseline Estimates			
Coefficient	(1)	(2)	(3)	(4)
γ_1^n	-0.47^{*}	-0.39^{*}	-0.48^{*}	-0.40^{*}
	(0.20)	(0.19)	(0.19)	(0.18)
γ_2^n	-0.23^{*}	-0.24^{*}	-0.21^{*}	-0.22^{*}
	(0.10)	(0.09)	(0.09)	(0.09)
γ_1^d	1.14^{***}	1.04^{***}	1.12^{***}	1.02^{**}
	(0.34)	(0.35)	(0.31)	(0.31)
γ_2^d	-0.09	-0.07	-0.13	-0.11
	(0.11)	(0.10)	(0.10)	(0.10)
γ_1^f	0.08	0.14	0.40	0.48
	(0.50)	(0.43)	(0.57)	(0.38)
γ_2^f	0.30	0.21	0.24	0.14
	(0.16)	(0.14)	(0.20)	(0.12)
γ_1^{df}	-0.78	-0.79	-1.34^{*}	-1.39^{**}
	(0.66)	(0.60)	(0.68)	(0.52)
γ_2^{df}	-0.20	-0.12	-0.14	-0.03
	(0.17)	(0.15)	(0.21)	(0.13)
μ	0.44^{***}	0.44^{***}	0.44^{***}	0.44^{***}
	(0.11)	(0.11)	(0.11)	(0.11)
$\bar{R}^2$	0.69	0.69	0.69	0.69
P-value, $\widehat{\varepsilon_t^g}$'s γs equal	0.01	0.02	0.00	0.01
P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal	0.16	0.24	0.25	0.23
Number of D_t	239	196	239	196
Number of F_t	68	68	41	41
Number of D_tF_t	47	40	30	27
Number of Obs.	455	455	455	455

Notes: Regressions are estimated by the Prais-Winsten method correcting for country-specific heteroskedastic AR(1) residual structure. Columns (1) to (4) report estimation results using all combinations of the alternative two sets of dummies in the equation (1); respectively, (1): D(1) and F(1), (2): D(2) and F(1), (3): D(1) and F(2), (4): D(2) and F(2). Robust standard errors are given in parentheses. $\{^{*}, ^{**}, ^{***}\}$ denote statistical significance at respectively $\{10, 5, 1\}$ percent. $\bar{R}^2$: Adjusted R^2 of the first-stage regression. P-value, $\widehat{\varepsilon_t^g}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^g}$ differ across regimes. P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^{ta}}$ differ across regimes. Number of D_t: Number of recession periods in sample. Number of F_t: Number of fiscal stress periods in sample. Number of D_tF_t: Number of recessions coinciding with fiscal stress periods in sample. Number of Obs.: Number of total periods in sample.

Table 6: Robustness analysis: predictability

$$\Delta C_t = \gamma_1^n \widehat{\varepsilon_t^g} + \gamma_2^n \widehat{\varepsilon_t^{ta}} + \gamma_1^d D_t \widehat{\varepsilon_t^g} + \gamma_2^d D_t \widehat{\varepsilon_t^{ta}} + \gamma_1^f F_t \widehat{\varepsilon_t^g} + \gamma_2^f F_t \widehat{\varepsilon_t^{ta}} + \gamma_1^{df} D_t F_t \widehat{\varepsilon_t^g} + \gamma_2^{df} D_t F_t \widehat{\varepsilon_t^{ta}} + \mu \Delta \widehat{I}_{t/t-1} + \omega_t^c$$

	Control for Predictability			
Coefficient	(1)	(2)	(3)	(4)
γ_1^n	−0.29	−0.22	−0.40*	−0.32
	(0.20)	(0.18)	(0.20)	(0.18)
γ_2^n	−0.16	−0.18	−0.19	−0.21
	(0.14)	(0.12)	(0.12)	(0.11)
γ_1^d	0.93**	0.75*	1.09***	0.93**
	(0.34)	(0.33)	(0.33)	(0.32)
γ_2^d	−0.21	−0.17	−0.19	−0.16
	(0.15)	(0.13)	(0.13)	(0.12)
γ_1^f	0.70	0.48	0.92	0.70
	(0.42)	(0.40)	(0.64)	(0.47)
γ_2^f	0.11	0.15	0.05	0.11
	(0.17)	(0.13)	(0.20)	(0.12)
γ_1^{df}	−1.50**	−1.18*	−2.15**	−1.95**
	(0.57)	(0.58)	(0.80)	(0.70)
γ_2^{df}	−0.04	−0.08	0.02	0.02
	(0.19)	(0.17)	(0.23)	(0.18)
μ	0.60***	0.60***	0.59***	0.58***
	(0.09)	(0.09)	(0.09)	(0.09)
$\bar{R}^2$	0.70	0.69	0.70	0.70
P-value, $\widehat{\varepsilon_t^g}$'s γs equal	0.02	0.12	0.00	0.01
P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal	0.10	0.03	0.39	0.12
Number of D_t	234	191	234	191
Number of F_t	68	68	41	41
Number of D_tF_t	47	40	30	27
Number of Obs.	447	447	447	447

Notes: Regressions are estimated by the Prais-Winsten method correcting for country-specific heteroskedastic AR(1) residual structure. Columns (1) to (4) report estimation results using all combinations of the alternative two sets of dummies in the equation (1); respectively, (1): D(1) and F(1), (2): D(2) and F(1), (3): D(1) and F(2), (4): D(2) and F(2). Robust standard errors are given in parentheses. $\{^*, ^{**}, ^{***}\}$ denote statistical significance at respectively $\{10, 5, 1\}$ percent. $\bar{R}^2$: Adjusted R^2 of the first-stage regression. P-value, $\widehat{\varepsilon_t^g}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^g}$ differ across regimes. P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^{ta}}$ differ across regimes. Number of D_t: Number of recession periods in sample. Number of F_t: Number of fiscal stress periods in sample. Number of D_tF_t: Number of recessions coinciding with fiscal stress periods in sample. Number of Obs.: Number of total periods in sample.

Table 7: Robustness analysis: measurement error

$\Delta C_t = \gamma_1^n \widehat{\varepsilon_t^g} + \gamma_2^n \widehat{\varepsilon_t^{ta}} + \gamma_1^d D_t \widehat{\varepsilon_t^g} + \gamma_2^d D_t \widehat{\varepsilon_t^{ta}} + \gamma_1^f F_t \widehat{\varepsilon_t^g} + \gamma_2^f F_t \widehat{\varepsilon_t^{ta}} + \gamma_1^{df} D_t F_t \widehat{\varepsilon_t^g} + \gamma_2^{df} D_t F_t \widehat{\varepsilon_t^{ta}} + \mu \Delta \widehat{I}_{t/t-1} + \omega_t^c$

	IV Estimates			
Coefficient	(1)	(2)	(3)	(4)
γ_1^n	-2.07	-1.93^{*}	-1.58^{*}	-0.96
	(1.07)	(0.94)	(0.74)	(0.75)
γ_2^n	-0.61	-0.32	-0.58^{*}	-0.35
	(0.39)	(0.30)	(0.27)	(0.26)
γ_1^d	4.24^{***}	3.93^{***}	2.83^{***}	2.20^{**}
	(1.09)	(1.03)	(0.74)	(0.75)
γ_2^d	0.30	0.10	0.10	-0.08
	(0.45)	(0.34)	(0.35)	(0.30)
γ_1^f	0.87	1.01	1.44	0.90
	(1.50)	(1.48)	(1.48)	(1.45)
γ_2^f	0.51	0.21	0.39	0.33
	(0.46)	(0.35)	(0.46)	(0.40)
γ_1^{df}	-2.78	-2.68	-2.70	-2.32
	(1.57)	(1.55)	(1.66)	(1.55)
γ_2^{df}	-0.42	-0.38	-0.15	0.18
	(0.55)	(0.17)	(0.47)	(0.39)
μ	0.37^{*}	0.33^{*}	0.44^{**}	0.39^{**}
	(0.15)	(0.14)	(0.14)	(0.13)
P-value, K-P Wald	0.76	0.72	0.38	0.54
P-value, A-R Wald	0.00	0.00	0.00	0.00
P-value, $\widehat{\varepsilon_t^g}$'s γs equal	0.00	0.00	0.00	0.00
P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal	0.71	0.82	0.48	0.80
Number of D_t	235	195	235	195
Number of F_t	68	68	41	41
Number of $D_t F_t$	47	40	30	27
Number of Obs.	437	437	437	437

Notes: Regressions are estimated in the context of Generalized Method of Moments correcting for country-specific heteroskedastic AR(1) residual structure. Columns (1) to (4) report estimation results using all combinations of the alternative two sets of dummies in the equation (1); respectively, (1): D(1) and F(1), (2): D(2) and F(1), (3): D(1) and F(2), (4): D(2) and F(2). Robust standard errors are given in parentheses. $\{^{*}, ^{**}, ^{***}\}$ denote statistical significance at respectively $\{10, 5, 1\}$ percent. P-value, K-P Wald: p-values of the Kleibergen-Paap underidentification Wald statistic testing the "relevance" of the excluded instruments. P-value, A-R Wald: p-values of the Anderson-Rubin Wald statistic testing the significance of the endogenous regressors in the structural equation, i.e. weak instruments test. P-value, $\widehat{\varepsilon_t^g}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^g}$ differ across regimes. P-value, $\widehat{\varepsilon_t^{ta}}$'s γs equal: p-values of the Wald statistic testing whether γs of $\widehat{\varepsilon_t^{ta}}$ differ across regimes. Number of D_t: Number of recession periods in sample. Number of F_t: Number of fiscal stress periods in sample. Number of $D_t F_t$: Number of recessions coinciding with fiscal stress periods in sample. Number of Obs.: Number of total periods in sample.

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