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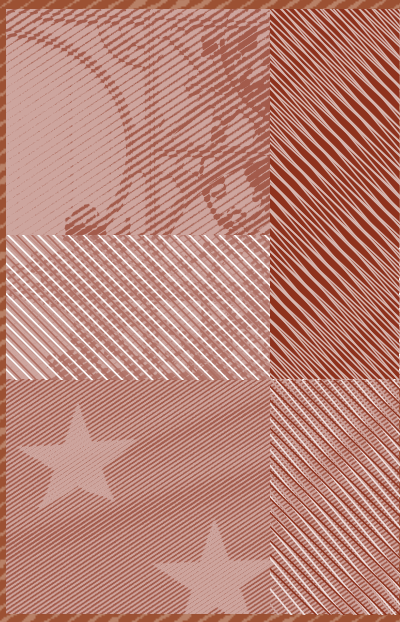

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FISCAL MULTIPLIERS IN TURBULENT TIMES: THE CASE OF SPAIN (*)

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Abstract

What are the output responses to fiscal policy? Despite important advances reported in the literature, quantifying the size of the fiscal multiplier remains a challenge. Indeed, the quest to estimate a unique fiscal multiplier is probably an ill-posed one. The magnitude of the multiplier may well depend on country- and time-specific characteristics of the fiscal stance under scrutiny. In this paper, we estimate state-specific multipliers for Spain depending on the state of the economy in several of its dimensions. The government spending multiplier is estimated to be larger during recessions and periods of banking stress, but much smaller (or even negative) during periods of weak public finances. Combining these three dimensions into a single global turmoil indicator by the use of principal component analysis, the estimated multipliers are 1.4 for crisis (or turbulent) times and 0.6 for tranquil times.

Keywords: fiscal policy, fiscal multiplier.

JEL classification: E62, H30.

Resumen

¿Cuál es el efecto de la política fiscal sobre la actividad económica? A pesar de la extensa literatura existente, la estimación del llamado «multiplicador fiscal» sigue suponiendo un desafío para los economistas. Además, la magnitud de dicho multiplicador también puede variar en función de la posición cíclica, de la salud de las cuentas públicas, o de otras características del país y/o del período analizados. En este trabajo se consideran multiplicadores fiscales específicos para España que varían con el estado de la economía a lo largo de varias dimensiones. En concreto, se estiman multiplicadores del gasto público mayores durante las recesiones y los períodos de estrés bancario, pero menores (o incluso negativos) durante los períodos de estrés fiscal. Combinando estas tres dimensiones en un solo indicador de crisis global, los multiplicadores estimados son de 1,4 para tiempos de crisis y 0,6 para tiempos tranquilos.

Palabras clave: política fiscal, multiplicador fiscal.

Códigos JEL: E62, H30.

1 Introduction

In a recent paper, Blanchard and Leigh (2013) cast doubt on the appropriateness of the fiscal multipliers employed by forecasters to predict the macroeconomic effects of planned fiscal consolidations during the crisis. This concern is somehow reinforced by a recent literature arguing that fiscal multipliers are probably different under special conditions (e.g. Corsetti et al., 2012; Auerbach and Gorodnichenko, 2012a,b; Barro and Redlick, 2011; Romer and Burstein, 2009). In spite of the inherent ambiguity of the wording "special conditions", it is hardly controversial that the current economic and fiscal situation of Spain within the Eurozone is quite unusual and turbulent. For instance, the high leverage of the private sector as well as the double-dip recession faced by the Spanish economy might amplify the effect of fiscal policy (e.g. Auerbach and Gorodnichenko, 2012a; Andres et al., 2012). In contrast, the weak situation of Spanish public finances might reduce and even switch the sign of the fiscal multiplier through the expectations channel (see e.g. Corsetti et al., 2012).

In spite of these concerns, the bulk of the literature estimating fiscal multipliers is so far based on VAR-type approaches under the implicit assumption that there is a country- and time-invariant multiplier independent of the state of the economy. Most VARs characterize the evolution of output after a fiscal policy action assumed not caused by economic developments (e.g. Blanchard and Perotti, 2002) or driven by factors exogenous to economic fluctuations (e.g. Ramey and Shapiro, 1998; Romer and Romer, 2010). In general, if we impose that the fiscal multiplier is unique, its estimates vary widely depending on the assumptions and techniques used.

A recent strand of the literature emphasizes the potential heterogeneity of the fiscal multiplier within the VAR framework. Favero et al. (2011) conclude that there is no unconditional fiscal policy multiplier. Along these lines, Auerbach and Gorodnichenko (2012a,b) conclude that the US multiplier is larger during recessions, confirming the intuition that the homogeneity constraint might not be appropriate. Ilzetzki et al. (2012) and Corsetti et al. (2012) find that the macro effects of fiscal policy depend crucially on country-specific characteristics such as the level of public indebtedness, the type of exchange rate regime, or the health of the financial system.[1]

[1] In addition to the fiscal VARs literature, some studies focus on analyzing episodes of large fiscal adjustments and their macroeconomic consequences. Based on statistical correlations between output growth and changes in the structural primary deficit, many of these studies conclude that fiscal consolidations might be expansionary for an economy depending on the composition of the adjustment (see e.g. Alesina and Ardagna, 1998). However, after accounting for reverse causality between the fiscal adjustment and economic activity, IMF (2010) as well as Hernandez de Cos and Moral-Benito (2013) conclude that fiscal consolidations per se are not expansionary in the short run.

In this paper, we first provide an overview of the recent fiscal VAR literature. One main conclusion is drawn from our reading of this literature, heterogeneity along several country- and time-specific dimensions is crucial for understanding the macroeconomic effects of fiscal policy; therefore, the policy maker should avoid applying multipliers estimated elsewhere without previously analyzing the country- and time-specific characteristics of the fiscal policy under study. Against this background a natural question arises, which is the size of the Spanish fiscal multiplier under the current circumstances?

We aim to shed light on this issue by estimating fiscal multipliers that are specific to the current state of the Spanish economy. In particular, we consider Spain-specific multipliers that depend on three different factors, namely, the business cycle, the situation of the public finances, and the health of the banking sector. The current situation in the Spanish economy is well characterized looking at these three dimensions. Spain is suffering a prolonged recession together with a banking stress situation, and its public debt-to-GDP ratio is at its highest level over the last 30 years and still increasing.[2]

What are the expected effects of fiscal policy under these circumstances? First, according to the standard Keynesian view, when the economy is in recession with slack resources, increases in government spending are less likely to crowd out private consumption or investment; therefore, the multiplier is expected to be larger as found by Auerbach and Gorodnichenko (2012a) for the US. Second, a fiscal consolidation at high levels of public debt or rapid deterioration of the fiscal stance could play out differently if it significantly reduces the likelihood of a sharp future retrenchment; Perotti (1999) provides the theoretical rationale for this hypothesis as well as empirical evidence for a panel of countries. Third, as long as financial/banking turmoil raises the share of credit-constrained agents in the economy, the size of the multiplier would also increase because the demand of constrained households is more sensitive to shifts in employment and wages caused by changes in public demand (for further insights see, for instance, the new Keynesian model in Gali et al., 2007).

In order to allow the Spanish multiplier to vary across these three dimensions, we consider a smooth transition vector autoregression model —STVAR approach— which is based on a VAR with two regimes and different parameters governing the contemporaneous and dynamic behavior of fiscal policy and output in each regime (see Auerbach and Gorodnichenko, 2012a). Similarly, some authors have employed threshold VAR —TVAR— approaches aiming to estimate state-specific multipliers over the business cycle (see e.g. Baum and Koester (2011) for Germany). While the TVAR discretely switches from one to another regime, STVARs allow the regimes to

[2]The fixed exchange rate regime might also amplify the effects of fiscal policy in Spain; however, the lack of within time variation in our Spanish data precludes the consideration of fiscal multiplier heterogeneity across exchange rate regimes within our econometric approach. Note that empirical studies investigating this dimension exploit cross-country variation in exchange rate regimes (see Corsetti et al., 2012; Ilzetzki et al., 2012).

change smoothly from one regime to another.[3] We consider the STVAR framework because we think it is very unlikely that the economy jumps between the regimes in a discrete fashion as imposed by the TVAR approach.

To the best of our knowledge, previous studies using either STVAR or TVAR approaches exclusively consider the expansion/recession dichotomy. In this respect, we also consider two additional dichotomies or "cycles" within the STVAR approach. On the one hand, we allow for good and bad fiscal stance regimes proxied by three different indicators, namely, the public deficit, the change in gross debt and the level of public debt; on the other hand, we consider two alternative indicators —the aggregate default rate and the quarter-to-quarter change in private credit— which aim to capture the current situation of banking/financial turmoil and high liquidity constraints in the Spanish economy.

Our results indicate that the Spanish multiplier is larger during recessions as found by Auerbach and Gorodnichenko (2012a) for the US. In particular, the government spending multiplier after the first year appears to be above 1 during recessions while it might be around 0.5 during expansions. Also, as found by Corsetti et al. (2012) and Ilzetzki et al. (2012) for a panel of countries, we estimate smaller (or even negative) multipliers under a situation of weak public finances in Spain. Turning to the dimension of banking/credit stress, we also find evidence of larger multipliers during such episodes. Finally, if we combine the three regimes into a single global turmoil indicator, the 1-year spending multiplier is estimated to be around 1.4 in global crisis (or turbulent) times and 0.6 during tranquil times.

The rest of the paper is organized as follows. Section 2 provides an overview and assessment of the fiscal VAR approaches typically considered to estimate fiscal multipliers. In Section 3 we present our empirical approach together with a description of the dataset. Multiplier estimates for the Spanish economy under the current circumstances are discussed in Section 4. Section 5 concludes.

2 Fiscal VARs: An Overview

In the fiscal VAR literature, one multiplier is often supposed to apply everywhere and always. Extrapolating multipliers estimated elsewhere using data for other countries and periods is relatively common when estimating the impact of a particular fiscal policy. This practice leaves only a few to worry about the validity of such extrapolation strategy.

[3]From a practical point of view, within the STVAR approach all observations in the sample can be used for estimation of the parameters in both regimes.

Moreover, estimating the causal effect of fiscal policy on economic activity remains a challenge. Shocks to fiscal and macro variables are typically correlated contemporaneously. Therefore, isolating truly exogenous fiscal policy shocks is difficult, i.e. finding an appropriate source of variation correlated with fiscal policy but uncorrelated with economic activity.[4]

In this section, we first summarize the most popular identification strategies considered in the fiscal VAR literature (typically applied using US quarterly data over the post-war period). Then we discuss some recent attempts to incorporate multiplier heterogeneity depending on different country- and time-specific characteristics.

2.1 The Identification Challenge

The bulk of the literature on estimating fiscal multipliers is based on VAR-type approaches including, at least, a macro and a fiscal variable. For the sake of clarity we only consider two variables, a fiscal variable (y_{1t} — which can be either government spending or tax revenues) and GDP (y_{2t}).[5] In this setting, the effect of fiscal policy on economic activity can be quantified based on the following structural relationship:

$$y_{1t} = \gamma_{10} + \beta_{12} y_{2t} + \gamma_{11} y_{1t-1} + \gamma_{12} y_{2t-1} + \epsilon_{1t} \quad (1)$$

$$y_{2t} = \gamma_{20} + \beta_{21} y_{1t} + \gamma_{21} y_{1t-1} + \gamma_{22} y_{2t-1} + \epsilon_{2t} \quad (2)$$

where ϵ_{1t} and ϵ_{2t} represent the uncorrelated structural shocks to the fiscal variable and GDP respectively. Moreover, we focus on a VAR(1) specification to avoid notational clutter.

The identification challenge in this setting arises because the β coefficients are typically nonzero, and thus it is difficult to disentangle both contemporaneous effects (β_{12} and β_{21}) from the simple correlation between the fiscal and the output variable. We basically have available one single statistic (the contemporaneous correlation) but we need to estimate two different coefficients.

More formally, the identification problem and its proposed solutions can be easily seen as follows. Let us rewrite the structural VAR above in matrix form:

[4] The most popular approaches in the empirical literature are VAR-based estimates (e.g. Blanchard and Perotti, 2002) which are the focus in this paper. However, there is also an extensive literature based on case studies (see e.g. Alesina and Ardagna, 1998).

[5] Although fiscal VARs typically include at least two fiscal variables (spending and revenues) and other macro variables such as the interest rate, we focus here on this simple bivariate VAR in order to clearly illustrate the key challenge of identifying exogenous fiscal policy shocks.

$$BY_t = \Gamma_0 + \Gamma_1 Y_{t-1} + \epsilon_t \tag{3}$$

where $Y_t = (y_{1t}, y_{1t})'$, $\Gamma_0 = (\gamma_{10}, \gamma_{20})'$, and $\epsilon_t = (\epsilon_{1t}, \epsilon_{2t})'$ with $\epsilon_t \sim iid(0, D)$. Moreover,

$$B = \begin{pmatrix} 1 & -\beta_{12} \\ -\beta_{21} & 1 \end{pmatrix} \qquad \Gamma_1 = \begin{pmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{pmatrix} \qquad D = \begin{pmatrix} \sigma_1^2 & 0 \\ 0 & \sigma_2^2 \end{pmatrix}.$$

Despite we are interested in the structural model just described, the econometrician can only observe the reduced form VAR:

$$Y_t = C + \Phi Y_{t-1} + e_t \tag{4}$$

where $C = B^{-1}\Gamma_0$, $\Phi = B^{-1}\Gamma_1$, and $e_t = B^{-1}\epsilon_t$ refers to the vector of forecast errors, given by linear combinations of the structural shocks. Therefore, the variance-covariance matrix of the reduced form shocks (or forecast errors) is no longer diagonal; instead, $e_t \sim iid(0, \Omega)$ with

$$\Omega = B^{-1}D(B^{-1})' = \begin{pmatrix} \omega_{11} & \\ \omega_{12} & \omega_{22} \end{pmatrix}$$

To sum up, the structural VAR in (3) contains 10 parameters to be estimated while the econometrician can only estimate the 9 parameters in the reduced VAR given by (4).[6] Therefore, there are infinite structural VARs compatible with the estimated reduced form VAR, e.g., there are infinite values for β_{12} and β_{21} compatible with ω_{12}. As a result, we do need additional identifying assumptions to estimate the structural VAR of interest and the corresponding fiscal multiplier. These assumptions might come from imposing zero (or sign) restrictions in some structural coefficients, exploiting exogenous sources of variation affecting the fiscal variable but not GDP (at least contemporaneously), or a combination of both.

2.1.1 Cholesky Ordering

The key assumption in this scheme is to impose that B is a lower triangular matrix, i.e., that either β_{12} or β_{21} is assumed to be 0. By doing so, the Cholesky decomposition of the variance-covariance matrix of the forecast errors exactly coincides with Ω, and we can thus estimate the reduced form VAR using the Cholesky decomposition and recover the structural parameters. In the basic setting above, the B matrix would be lower triangular by imposing $\beta_{12} = 0$.[7]

[6] Although other dynamic structures and larger dimensional VAR are typically considered, this basic setup describes the key identification challenge encountered when estimating fiscal multipliers.

[7] If B is lower triangular, B^{-1} is also lower triangular. Note also that imposing $\beta_{12} = 0$ clearly ensures identification because the number of parameters to be estimated would coincide in both the structural and the reduced form representations.

In this approach, the ordering of the variables in the VAR vector defines the identifying assumption we are willing to make. Intuitively, the first variable is assumed to be (contemporaneously) exogenous to the remaining variables in the VAR; hence, we typically place first the variables that react with some lag. For instance, placing first the fiscal variable in the Y_t vector above, the Cholesky identification implies that $\beta_{12} = 0$ and we thus impose that fiscal policy does not react to GDP in the current quarter — provided we are considering quarterly data. Instead, if we order output first, the assumption would be the opposite, that GDP does not react to fiscal policy in the current quarter.[8]

2.1.2 Blanchard and Perotti (2002)

Blanchard and Perotti (2002) —henceforth BP02— argue that, in the case of a VAR with a fiscal variable and output as described above, the reduced form shock to the fiscal variable (e_{1t}) is formed by three components, namely, (i) the automatic response of the fiscal variable to innovations in output (e.g. an unanticipated change in tax revenues caused by a shock to output for given tax rates); (ii) the discretionary response of fiscal policy to output shocks (e.g. a reduction in the tax rate in a recession); (iii) the pure random shock to the fiscal variable uncorrelated with any other structural shock (i.e. the structural shock we aim to identify).

Despite the VAR considered by BP02 included two fiscal variables (tax revenues and government spending) plus output (y_{2t}), we adapt here their identification scheme for the bivariate case outlined above with only one fiscal variable, namely y_{1t}. The first step in the BP02 approach is to rule out the first component of the reduced for fiscal shock (i.e. the automatic response of the fiscal variable to innovations in output). For this purpose, they construct a cyclically adjusted fiscal shock using external information on the elasticity of the fiscal variable (either taxes or spending) to economic activity. The cyclically adjusted fiscal shock is thus given by $e_{1t}^{CA} = e_{1t} - \hat{\eta} e_{2t}$, where $\hat{\eta}$ refers to the elasticity of the fiscal variable (taxes or spending) with respect to output. Note that this value is not estimated but computed from institutional information (Caldara and Kamps (2012) discuss the implications of considering alternative elasticity values for the estimated fiscal multipliers).

After redefining the reduced-form fiscal shock, the BP02 identification scheme is based on a Cholesky factorization with the fiscal variable (government spending in their case) ordered first implying that discretionary response of fiscal policy to output shocks is absent in quarterly data.[9]

[8] Fatas and Mihov (2001) and Favero (2002) are good examples of this identification scheme in the fiscal multipliers literature. However, the ordering of the fiscal variable is the opposite in both papers, while Favero (2002) orders the fiscal variable (government spending) last, Fatas and Mihov (2001) place first the fiscal variable.

[9] Note also that, since BP02 simultaneously consider taxes and spending in the VAR, they also need an extra assumption regarding the timing of causality between both variables. In particular they show that the contemporaneous responses from taxes to spending and vice versa (once controlled the effect of output) are small. Therefore, in the Cholesky terminology, the relative ordering of the fiscal variables in the VAR appears to be immaterial for the results.

2.1.3 Narrative Approach

Instead of estimating the structural (exogenous) fiscal shocks, the narrative approach constructs them using different sources of information such as Congresional reports or major historical events. Along these lines, Ramey and Shapiro (1998) and Ramey (2011) use news reports in Business Week and other sources to identify military buildups and other changes in US government purchases that occurred for reasons unrelated to macroeconomic developments. Romer and Romer (2010) use sources such as presidential speeches and reports of Congressional committees to identify the key motivation of each postwar legislated tax change in the US; then, they are able to isolate tax changes unrelated to factors affecting output in the short to medium run such as those aimed to achieve some long-run goal (e.g. increased fairness) or to deal with an inherited budget deficit. Finally, IMF (2010) considers the narrative approach and identifies fiscal policy actions in fifteen OECD countries implemented to reduce the budget deficit, and thus unrelated to economic activity in the short run, i.e. these actions are not taken in response to contemporaneous macroeconomic developments.

After the identification step, one can simply regress the variable of interest (e.g. output growth in the case of Romer and Romer, 2010) on the exogenous fiscal shock identified via the narrative method, which can be tax- or spending-based. For instance, Romer and Romer (2010) consider a single-equation specification to estimate the tax multiplier using quarterly data. Alternatively, one can also embed the narrative shocks in a VAR setting to ensure comparability of the estimated multipliers within the different identification schemes. One possibility is to include the narrative fiscal shock in the reduced form VAR as an additional exogenous regressor.[10]

2.1.4 Sign Restrictions

An alternative line of VAR research on fiscal multipliers employs an approach with sign restrictions to identify a structural shock. This approach requires impulse responses to have certain signs for a few periods (Mountford and Uhlig, 2009). More recently, Fry and Pagan (2011) argue that imposing sign restrictions only on impact responses is preferable to imposing sign restrictions also at longer horizons. In any case, empirical studies typically find that the results are insensitive to variations in the horizon at which IRFs are restricted (see e.g. Mountford and Uhlig (2009), p. 965).

In the simplest bivariate case described above, the mapping between reduced form and structural shocks can be rewritten as $e_t = \Pi\epsilon_t$ where Π is an unrestricted 2×2 matrix ($\Pi = B^{-1}$). Instead of imposing zero restrictions in the components of the Π matrix, the sign restrictions

[10] A potential concern with this approach is that other fiscal shocks might have occurred parallel to the identified narrative ones. Favero and Giavazzi (2012) provide an in-depth analysis of the connection between the narrative approach and the fiscal VAR literature.

identification requires certain sign restrictions in its components π_{11}, π_{12}, π_{21}, and π_{22}. For instance, that the impact responses of the fiscal variable to the fiscal shock (π_{11}) and of the output variable to the output shock (π_{22}) to be non-negative ($\pi_{11} \geq 0$ and $\pi_{22} \geq 0$); that the response of the fiscal variable to output is restricted to be non-negative ($\pi_{12} \geq 0$); and, finally, the element π_{21}, the contemporaneous reaction of the output shock to the fiscal shock is left unrestricted.

The main advantage of this method is to avoid the imposition of the exogeneity assumption (zero restrictions) eventually adopted by the other approaches. However, the cost of imposing more tenuous restrictions is that the identification is not exact, rendering a set of structural models that are consistent with the identification assumptions. The challenge is then how to select the best structural set of parameters among the candidates. Readers interested in more details are referred to Mountford and Uhlig (2009), Pappa (2009), and Caldara and Kamps (2012). These authors provide an in-depth econometric analysis on how to address this challenge. Also, Fry and Pagan (2011) and Paustian (2007) provide a detailed discussion on the use of sign restrictions for identification.

2.1.5 Further Considerations

Frequency of the Data: Most of the fiscal VAR literature is based on US quarterly data. Since for many countries there are no good quality data at the quarterly frequency, one possibility is to work with annual data bearing in mind that shorter time series would then be exploited. In this respect, Born and Muller (2012) argue that the BP02 identification scheme can also be valid for annual time-series data; also, the set of narrative fiscal shocks identified by IMF (2010) for a panel of countries is only available at the annual frequency. Finally, Ilzetzki et al. (2012) have compiled a quarterly database with government spending for a panel of 44 countries which might be useful for future research.

Debt Dynamics: Some authors point to the importance of including in the fiscal VAR the interest rate and the inflation rate together with output and the fiscal variables (see e.g. Favero and Giavazzi, 2007). By doing so, the researcher can track debt dynamics in response to a fiscal shock and avoid analyses of unsustainable fiscal policies. Favero and Giavazzi (2012) further include the nonlinear government budget constraint to ensure that the VAR never delivers unsustainable debt paths, and find that it does not significantly affect the estimated IRFs.

Anticipation Effects: A relevant concern is that the fiscal shocks identified within the VAR framework may well be anticipated by the economic agents. For instance, Ramey (2011) argues that professional forecasts and narrative shocks Granger-cause the VAR shocks identified using the BP02 scheme. In order to account for this anticipation effects, one can simply augment

the VAR system with expected values at time t of fiscal variables at time $t+1$, for instance using professional forecasts from different sources. On the other hand, Mertens and Ravn (2012) distinguish between the announcement date and the implementation date of the narrative-based tax shocks in Romer and Romer (2010),[11] and find that preannounced but not yet implemented tax cuts give rise to contractions in output. As a final remark, the use of annual data might represent an advantage in this respect because anticipation of fiscal shocks should be harder to observe at the annual frequency.

Empirical Estimates: Under the assumption of an homogeneous (tax or spending) multiplier, a wide range of estimates is available in the literature. For instance, Spilimbergo et al. (2009) provide a detailed account of this literature and the estimated multipliers, which range between -1.5 and 5.2 (despite there are few studies reporting multipliers above 2). However, most influential VAR-type studies are typically based on US quarterly data and provide a narrower range of multipliers. Regarding the spending multiplier, Ramey and Shapiro (1998), Ramey (2011), and Blanchard and Perotti (2002) place the spending multiplier between 0.6 and 1.2. Turning to taxes, Blanchard and Perotti's (2002) estimate of the tax multiplier is 0.7. Using the narrative approach, Romer and Romer (2010) find tax multipliers substantially larger than 1, but Favero and Giavazzi (2012) place the tax multiplier around 1 when using the RR2010 narrative shocks within a VAR setting.

2.1.6 A Pragmatic Assessment

All the identification schemes discussed above have advantages and drawbacks. Cholesky ordering can be easily implemented using conventional statistical packages but, if one is interested in tax multipliers, it imposes the assumption that tax revenues do not react to GDP in the current quarter, which is highly implausible. BP02 avoids this concern by using tax elasticities estimated outside the VAR, but these elasticities are difficult to obtain and the results are sensitive to the particular values considered. In contrast, the signs approach imposes more tenuous restrictions at the cost of loosing exact identification. Finally, the narrative method alleviates the aforementioned drawbacks but quarterly fiscal shocks as identified in RR2010 are hard to identify and thus they are not widely available outside the US.[12]

All in all, both BP02 and the narrative method are probably the most popular identification strategies considered in the literature with US data (see for example the May 2012 issue of the American Economic Journal: Economic Policy). However, given the scarcity of quarterly

[11] In particular, Mertens and Ravn (2012) classify a tax change as anticipated if the time span between these two dates is longer than 90 days.

[12] IMF (2010) represents an exception providing narrative fiscal shocks for a sample of 15 countries but at the annual frequency.

narrative shocks, BP02 is probably the most used identification approach in the worldwide fiscal VARs literature (note that BP02 reduces to Cholesky ordering for government spending shocks). For instance, among the 32 studies summarized in Tables 2 and 3 of Hebous (2011), 21 were based on BP02, 8 on sign restrictions, and only 3 on the narrative method.

Along these lines, the literature has usually focus on government spending shocks more than tax shocks. The main reason is that unexpected changes in tax revenues within a quarter may arise as a result of changes in the relationship between economic activity and tax revenues rather than changes in discretionary fiscal policy. In this respect, the reliability of tax elasticities is crucial to purge the changes in tax revenues, but these elasticities may well depend on the state of the economy which further complicates the identification of tax shocks.

Having these considerations in mind, in this paper we also focus on spending shocks identified using the BP02 approach.

2.2 Is there a universal fiscal multiplier?

Probably NOT. The effect of fiscal policy on economic activity is different depending on country- and time-specific characteristics as well as the specific design of the particular fiscal policy under scrutiny; hence, the homogeneous US multipliers discussed above are probably of little use for Spain under the current economic, financial and fiscal stress circumstances.

2.2.1 Fiscal Multipliers in Expansion and Recession

A natural heterogeneity dimension arises from the expansion/recession dichotomy. In particular, there is the possibility that countercyclical fiscal policy can be effective (increase output) only if there are significant slack resources in the economy (during a recession). Under this hypothesis, the multipliers estimated in most existing analyses will significantly underestimate the multiplier in a recession because they measure the average of the multiplier in a boom and the multiplier in a recession.

Auerbach and Gorodnichenko (2012a) consider a regime switching VAR model in order to test this hypothesis. Their approach allows the existence of two states of the economy (recession and expansion) with different parameters governing the contemporaneous and dynamic behavior of fiscal policy and output in each state. While identification is based on Choleski ordering with spending ordered first as in BP02, propagation of the shocks depends on the state of the economy both contemporaneously and dynamically.

Using US quarterly data, Auerbach and Gorodnichenko (2012a) find that spending multipliers are typically below 1 during expansions, but they are well above 1 in recessions. Building on their methodology, Auerbach and Gorodnichenko (2012b) find evidence along these lines using a panel of countries under cross-country homogeneity of multipliers. Also, Baum and Koester (2001), Batini et al. (2012) and Baum et al. (2012) estimate larger multipliers during downturns using a similar methodology.

2.2.2 Fiscal Multipliers under Special Conditions

Favero et al. (2011) estimate a multy-country Global VAR allowing for country-specific heterogeneity in fiscal multipliers (depending on country-specific debt dynamics and degree of openness) as well as international spillovers. In order to achieve identification, Favero et al. (2011) employ the annual narrative-based fiscal shocks identified in IMF (2010). They find very heterogeneous fiscal multipliers across the countries in their sample, suggesting that an aggregate homogeneous fiscal multiplier would be difficult to interpret. Their main conclusion is thus that there are many fiscal multipliers and an average fiscal multiplier is of very little use.[13]

Corsetti et al. (2012) investigate how different country characteristics might influence the size of the fiscal multiplier for a sample of 17 OECD countries over the 1975-2008 period. In a first step, they run country-by-country regressions of government spending on its determinants and obtain estimates of the government spending structural shocks ($\hat{\epsilon}_{1t}$). Armed with these shocks for each country, in a second step they estimate heterogeneous fiscal multipliers based on a panel regression of a macroeconomic variable (e.g. output) on the shocks and interactions of the shock with dummy variables indicating a certain feature of the economic environment in a particular year. In particular, they consider three different dimensions, namely, the exchange rate regime (dummy taking the value 1 if fixed regime in a given country-year pair), the state of public finances (1 if public debt above 100% of GDP and/or gov. net borrowing above 6% of GDP) and the health of the financial sector (1 if financial crisis —defined by Reinhart, 2010). Corsetti et al. (2012) find that fiscal multipliers are typically larger in countries with a fixed exchange rate regime, suffering a financial crisis, or under sound public finances.

Ilzetzki et al. (2012) construct quarterly series of government spending for a panel of 44 countries and they estimate different VARs *a la* BP02 for subsamples of countries. In line with the results in Corsetti et al. (2012), they find that the output effect of an increase on government consumption is larger in economies operating under fixed exchange rates. They also find that negative multipliers can be observed in high-debt countries.

Based on a DSGE approach Christiano et al. (2011) argue that the government spending multiplier could range between 3 and 5 under the binding zero lower bound (ZLB) on nominal interest rates. Due to the scarcity of data on such ZLB episodes, Almunia et al. (2010) consider data over the 1930s and provide evidence that the fiscal multiplier might be larger under such circumstances.

[13] However, Favero et al. (2011) do not explicitly discuss how country-specific characteristics affect the size of the multiplier.

2.2.3 Evidence about Multiplier Heterogeneity

In our view, four main results emerge from this strand of the literature:

1. The multiplier is higher during recessions (e.g. in times of low GDP growth or negative output gaps).[14]

2. In countries with fixed exchange rates and/or suffering a financial crisis —as defined by Reinhart (2010)— larger government spending multipliers might arise.

3. In situations where the zero lower bound on nominal interest rates is binding, the fiscal multiplier can be expected to be larger (e.g. Christiano et al., 2011).

4. In countries with high debt-to-GDP ratios (i.e. above 60% or 100%) and/or high net borrowing (i.e. above 6% of GDP) a negative (non-Keynesian) government spending multiplier might arise (e.g. Ilzetzki et al., 2012; Corsetti et al., 2012).

3 Empirical Approach

The discussion on the details of identification and estimation of fiscal multipliers might seem like an academic debate with little relevance, but it actually matters for policy makers when deciding the multipliers to use in the decision-making process for the design of specific fiscal programs; especially nowadays for the Eurozone periphery in general and Spain in particular, where there are no offsetting policy levers such as a monetary stimulus or a devaluation.[15] In view of the literature discussed above, it naturally follows that fiscal multipliers should be determined taking into account the particular circumstances of the fiscal policy under scrutiny. In this respect, country-, period-, and policy-specific characteristics must be incorporated into the analysis. Such

[14] Auerbach and Gorodnichenko (2012a) find that the cumulative multiplier (over 4 quarters) in the US for government total spending is 0.00 during expansions and 1.4 during recessions. Batini et al. (2012) place these multipliers at 0.3 and 2.2 for expansions and recessions, respectively. Finally, Baum et al. (2012) estimate an spending multiplier of 1.3 in expansions and 1.7 in recessions for a panel of countries. With respect to a revenue shock, Batini et al. (2012) and Baum et al (2012) find a cumulative multiplier around 0.1 and very similar in both expansions and recessions.

[15] The debate on the appropriateness of the fiscal multipliers used for estimating the impact of austerity programs has been recently revived by Blanchard and Leigh (2013) — who further develop the initial analysis published Box 1.1 of the October 2012 WEO. These authors suggest than fiscal multipliers considered for forecasting have been excessively low in the aftermath of the global crisis. This conclusion follows from the negative and significant relationship between growth forecast errors and the size of the associated fiscal policy change.

an analysis is specially challenging given the lack of appropriate data resembling the current situation in many Eurozone countries such as Spain.[16]

Country-specific multipliers for Spain are reported in De Castro (2006), De Castro and Hernandez de Cos (2008), and De Castro et al. (2013); based on a linear VAR approach, these studies find that the government spending multiplier is typically above 1. In this paper, we aim to investigate how the size of the Spanish multiplier might vary across three different dimensions that characterize the current economic situation in Spain, namely, an economic crisis in terms of GDP growth, a situation of weak public finances, and a banking/credit stress episode.

For this purpose, we consider the smooth transition vector autoregression (STVAR) methodology discussed in Auerbach and Gorodnichenko (2012a). Intuitively, this approach considers a nonlinear VAR with two states of the economy and different parameters governing the contemporaneous and dynamic behavior of fiscal policy and output in each state. More formally, the econometric specification is:

$$Y_t = C + (1 - F(z_{t-1}))\Phi_{S1}Y_{t-1} + F(z_{t-1})\Phi_{S2}Y_{t-1} + e_t \quad (5)$$

$$e_t \sim iid(0, \Omega_t) \quad (6)$$

$$\Omega_t = \Omega_{S1}(1 - F(z_{t-1})) + \Omega_{S2}F(z_{t-1}) \quad (7)$$

$$F(z_t) = \frac{exp(-\gamma z_t)}{(1 + exp(-\gamma z_t))}, \ \gamma > 0 \quad (8)$$

where the subindices $S1$ and $S2$ refer to two different states of the economy, and the vector Y_t contains the logarithms of real government purchases, taxes net of transfers, and real GDP observed at a quarterly frequency. Moreover, the matrices Φ_{S1}, Φ_{S2}, Ω_{S1}, and Ω_{S2} contain the coefficients of the lag polynomials and the variance-covariance matrices of the shocks in the different regimes (note that equation (5) contains one single lag to avoid notational clutter; however, we estimate the model considering a maximum of three lags selected based on information criteria). Indeed, the proliferation of coefficients to be estimated combined with the reduced sample size available for estimation preclude us from including additional variables in the model.

Finally, z_t is an indicator of the state of the economy in quarter t, normalized to have zero mean and unit variance (see below for details on the different z indicators we consider as proxies of the business cycle, the "public finances cycle", and the "banking cycle"). The weights assigned to each regime vary between 0 and 1 according to the weighting function $F(\cdot)$ so that $F(z_t)$ can be interpreted as the probability of being in a given regime, e.g. recession if z_t is GDP growth.[17]

[16] Along these lines, Parker (2011) argues that it is difficult to assess the effectiveness of countercyclical fiscal policy during recessions because deep recessions are few. The lack of data is even more pronounced when estimating the effects of contractionary fiscal policy during a recession, the policy that some countries in the Eurozone are currently undertaking.

[17] The index z is dated at $t-1$ to avoid contemporaneous feedbacks from policy actions to the state of the economy.

Auerbach and Gorodnichenko (2012a) considered expansion and recession as the regimes $S1$ and $S2$ respectively; in this paper, we also extend the approach to consider alternative dichotomies characterizing the state of the economy in addition to the expansion / recession regimes. On the one hand, we define a regime of weak public finances or bad fiscal situation ($S1$) and a regime of good fiscal stance ($S2$); on the other hand, we estimate the model under the states of banking stress / no stress. Finally, computing the first principal component of the three regimes above we also consider a global turmoil regime in which the three "crisis" regimes (recession, fiscal stress, banking stress) are simultaneously taken into consideration. We label the resulting regime as a turbulent (or crisis) times regime characterized by economic recession together with turmoil in both the public and the financial sectors.[18]

Identification of spending shocks in the model (5)-(8) is based on Cholesky ordering with government spending ordered first, tax revenues second and GDP third. Given our focus on government spending shocks, this identification scheme is equivalent to BP02, who assume that the contemporaneous spending-output elasticity is zero. On the other hand, the parameters are estimated by maximum likelihood (see Auerbach and Gorodnichenko, 2012a for more details). Note also the propagation of fiscal shocks depends on the state of the economy both contemporaneously (via differences in Ω_{S1} and Ω_{S2}) and dynamically (via differences in Φ_{S1} and Φ_{S2}). However, we compute the impulse response functions and the corresponding multipliers under the assumption that fiscal shocks cannot modify the state of the economy, and that their effect on economic activity does not depend on their size and direction. Allowing the regimes to switch after a shock depending on its size and direction is currently the subject of further research.[19]

3.1 Data

Results presented in the paper are based on the estimation of a STVAR model in the logarithm of real government spending (sum of government consumption and investment), taxes net of transfers, and real GDP. In particular, we use the Q-ESFIPDB database constructed by De Castro et al. (2013), which includes seasonally-adjusted fiscal data for Spain from 1986 to 2012 at the quarterly frequency.[20] De Castro et al. (2013) also provide a thorough description of the econometric methods used to construct the Q-ESFIPDB database together with an in-depth analysis of the Spanish fiscal stance over the 1986-2012 period.

[18] Note also that, besides the STVAR approach, a threshold VAR (TVAR) can also be considered for this purpose; however, we prefer the STVAR alternative because it allows the regimes to change smoothly from one regime to another while the TVAR impose discrete switches from one to another regime. Moreover, this implies that within the STVAR approach all observations in the sample can be used for estimation of the parameters in both regimes.

[19] For instance one can use generalized impulse response functions —GIRFs— as suggested in Koop et al. (1996).

[20] Fiscal variables are expressed in real terms using the GDP deflator.

Turning to the z_t indicators, we consider several variables defining the different "crisis" regimes. First, the expansion/recession dichotomy is identified considering the real GDP growth rate, the output gap, and the change in the unemployment rate.[21] Real GDP is taken from the Quarterly National Accounts (National Institute of Statistics, INE), the unemployment rate from the Labour Force Survey (INE), and the output gap from the Banco de España database. Second, we follow Corsetti et al. (2012) and define the regime of weak public finances for quarters with high levels of deficit-to-GDP ratio and debt-to-GDP ratio as well as large increases in gross debt (the fiscal variables are all taken from the Q-ESFIPDB database). Third, we identify the banking stress regime using large increases in the aggregate default rate (taken from the Banco de España database), as also considered by Reinhart and Rogoff (2010), and quarters in which the flow of private credit is low as a proxy for high credit constraints in the economy.[22] Finally, since the different "crisis" regimes (recession, fiscal stress, banking stress) tend to overlap, we compute the first principal component of the indicators considered in order to construct a global turmoil indicator encompassing all the three "crisis" regimes.

4 Results

4.1 The Spanish Multiplier in Expansion and Recession

In line with the traditional Keynesian view, given slack resources in the economy, fiscal policy may be more effective at increasing output in recessions than during normal times. Under this hypothesis, most studies averaging the multiplier over the cycle would under-estimate its size in recessions.

We identify the recession regime using three alternative z_t indicators,[23] namely, the output growth, the output gap, and the change in the unemployment rate.[24] According to these business cycle indicators, recession periods will be those in which GDP growth is low, the output gap is negative, or increases in the unemployment rate are large. Regarding the value of the γ parameter, we also follow Auerbach and Gorodnichenko (2012a) and calibrate $\gamma = 5$ to match the recessions identified by ECRI for Spain as depicted in Figure 1. In particular, ECRI identifies two recessions

[21] Auerbach and Gorodnichenko (2012a) consider both the GDP growth and the output gap as z_t indicators for the US. In addition, we also consider here the change in the unemployment rate.

[22] The volume of credit to households over disposable income is also taken from the Banco de España database.

[23] More concretely, we follow Auerbach and Gorodnichenko (2012a) and consider the seven-quarter moving average of these variables.

[24] Alternatively, one could also consider the level of unemployment rate. However, given the high persistence of this variable in Spain, its interpretation as a proxy of the business cycle is less clear. Also, the share of unemployed people can also be interpreted as an indicator of constrained consumers in the economy that might also affect the magnitude of the fiscal multiplier. In any event, estimates based on this indicator are in line with those based on the change in the unemployment rate. To save space these results are not reported here but are available upon request.

in Spain over the sample period, one in the early 1990s and another one after 2008. The solid lines in Figure 1, representing the weight on the recession regime given by the $F(z_t)$ function, capture appropriately both episodes regardless of the indicator considered (only the output gap identifies the recessions with a lag).

Table 1 presents the estimated fiscal multipliers of interest.[25] The overall conclusion from our estimates is that the spending multiplier appears to be larger and above 1 during recessions in Spain; however, the differences between expansion and recession are a bit smaller than that obtained for the US in Auerbach and Gorodnichenko (2012a). For instance, the cumulative multipliers after 8 quarters in the US are 1.8 and -0.1 for recessions and expansions, respectively, while the equivalent multipliers for Spain (using GDP growth as business cycle indicator as in Auerbach and Gorodnichenko, 2012a) are 1.25 and -0.01 — see Table 1 Panel A. A similar pattern arises for the consumption and investment components, with slighlty larger multipliers during recessions than in the case of overall spending. It is worth highlighting the case of government investment in Panels B and C of Table 1; estimated multipliers are negative (or statistically indistinguishable from zero) during expansions but they are positive and larger than 2 during recessions. This finding suggests that during a recession the crowding out on private investment is possibly smaller that that of consumption.

Figures 2-4 plot the estimated impulse response functions (IRFs) for both recession and expansion using the different indicators. In particular, we plot the responses of GDP (column 1) and the fiscal variables (columns 2 and 3) to a positive public spending shock (Panel A), consumption shock (Panel B), and investment shock (Panel C). The increase of government spending raises GDP at all horizons and in all cases during recessions (see dashed lines); however, the increase in GDP is lower or even negative during expansions. Importantly, plotted IRFs are limited to 12 quarters because it is highly unlikely that the economy remains in the same regime indefinitely, and, moreover, a fiscal shock can eventually generate a switch in the regime; therefore, the longer the horizon, the less informative the estimated responses. Finally, as found by Gali et al. (2007), government spending shocks appear to be highly persistent, especially in the recession regime, while the response of net taxes is generally non-significant.

4.2 The Spanish Multiplier in Good Fiscal Times and Bad

Another important concern in the current debate is the size (or even the sign) of the multiplier under a situation of weak public finances. Fiscal shocks might influence agents' expectations differently depending on the level of debt-to-GDP ratio and the deterioration of the country's fiscal imbalance. For instance, if debt-to-GDP or deficit-to-GDP ratios are very high, a fiscal adjustment might have a positive effect on agents' expectations and thus produce much lower (or even negative) fiscal multipliers.

[25] In particular, we report the impact multiplier ($\frac{\Delta GDP_t}{\Delta G_t}$), the cumulative multiplier at some horizon H ($\frac{\sum_{j=0}^{H}\Delta GDP_{t+j}}{\sum_{j=0}^{H}\Delta G_{t+j}}$), and the peak multiplier over any horizon H ($\max\frac{\Delta GDP_{t+H}}{\Delta G_t}$).

Along these lines, Corsetti et al. (2012) define a situation of bad fiscal times in a given country when public debt exceeds 100 percent of GDP or government net borrowing exceeds 6 percent of GDP. In order to investigate this issue for the case of Spain within the STVAR framework, we consider three alternative z indicators capturing the state of public finances along these lines, namely, the deficit-to-GDP ratio, the change in gross debt, and the debt-to-GDP ratio. We thus have, in each case, two regimes capturing bad and good fiscal times instead of expansion and recession. In particular, our weighting function $F(z_t)$ can be now interpreted as the probability of having a situation of weak public finances or bad fiscal times at quarter t, i.e., periods of abnormally high levels of debt- and deficit-to-GDP ratios. In this case, we calibrate the γ parameter to match the bad fiscal times periods identified by Corsetti et al. (2012) for Spain as depicted in Figure 5.[26]

Table 2 presents the estimated multipliers under the bad fiscal times regime based on the three different indicators. Interestingly enough, the effect of a government spending shock becomes close to zero (or even negative) under the regime of weak public finances (high debt, high deficit, or rapid increases in gross debt). In contrast, under the good fiscal times regime the estimated multiplier over the first year lies between 1 and 2 depending on the fiscal cycle indicator considered. Corsetti et al. (2012) and Ilzetzki et al. (2012) also find close to zero or negative multipliers under the weak public finances regime using a panel of countries. Turning to the components of government spending, a similar pattern arises for both public investment and government consumption.

Figures 6-8 plot the resulting IRFs under the two fiscal regimes based on the three fiscal "stress" indicators. The message from Figure 6 (based on the deficit-to-GDP as z_t indicator) is clear-cut, during the bad fiscal times regime the response of GDP to a government spending shock is negligible or even negative, while it becomes positive under the good fiscal times regime. Also, the persistence of a public spending or consumption shocks is slightly higher under the bad fiscal times regime but it is much lower for a public investment shock. The pattern is very similar for the first 8 quarters in the case of the public debt indicators in Figures 7 and 8; however, the response of GDP is clearly increasing (and positive) under the bad fiscal times regime after the first 2 years.

All in all, we find evidence in favor of the view emphasizing that the effects of current fiscal policy on economic activity depend on the influence of the policy on agents' expectations about the stance of the future fiscal policy. In the situation of weak public finances that Spain is currently experiencing, this channel predicts that fiscal multipliers should be smaller or even negative as long as agents perceive that the policy (i.e. fiscal consolidation) signals a change that will solve the country's fiscal imbalance leading to the stabilization of the debt-to-GDP ratio (see e.g. Perotti, 1999).

[26] In particular, γ is calibrated to 5, 10, and 2 for the deficit-to-GDP ratio, the change in gross debt, and the debt-to-GDP ratio respectively. Note that our results are robust to other calibrations of the γ parameter.

4.3 The Spanish Multiplier in Times of Banking Stress

The Spanish economy over the 2012-2013 period is also characterized by some turmoil in the banking sector. In particular, the problems of Spanish banks arise from a protracted deterioration in asset quality given the collapse in real estate prices. Under these circumstances, the share of nonperforming loans (aggregate default rate) can be used as an indicator of banking stress as argued by Reinhart and Rogoff (2010). Regarding fiscal multipliers, the turmoil in the banking sector may generate difficulties in access to credit for the agents in the economy, and thus the public spending multiplier might be larger (see e.g. Corsetti et al., 2012).

We thus consider the normalized aggregate default rate as the z_t index to define two regimes in the Spanish economy (banking stress versus tranquil times) with weights given by $F(z_t)$ — see the upper panel in Figure 9. In order to further investigate this issue, we also consider a more direct indicator of the difficulties in accessing credit experienced by the agents in the economy, namely, the quarter-to-quarter change in private credit. The weights on the credit stress regime depicted in the bottom panel of Figure 9 are similar to the banking stress weights based on the aggregate default rate. Two periods of banking/credit stress are identified for the Spanish economy, one over the years 1991-1994 and the current episode since 2008. Note that in this case we calibrate $\gamma = 5$ to match the banking crisis episode identified in Reinhart and Rogoff (2010) for Spain.

Table 3 presents the multipliers for the banking stress regime. In Panel A, multipliers based on the aggregate default rate indicator are larger during banking stress episodes but still smaller than 1 for government spending. In the case of public consumption and investment the corresponding multipliers are close to 1 in the first year and slightly above in the second year for the banking stress regime. Turning to the credit flow indicator in Panel B of Table 3, the differences are sharper for public spending and consumption with multipliers clearly above 1 during credit stress episodes; however, for public investment the estimated multipliers are not statistically significant.

In Figures 10 and 11 we plot the estimated responses of GDP, spending and net taxes to a public spending shock using the aggregate default rate and the flow of private credit as indicators of the banking/credit stress regime. The response of GDP during banking stress episodes is always above that of normal times. Moreover, the persistence of the public spending shock (either consumption- or investment-based) is higher under the banking stress regime.

4.4 The Spanish Multiplier in Turbulent Times

The fiscal multipliers reported above might be of little use when assessing the potential impact of fiscal policy under the current circumstances since the "crisis" regimes are obviously interrelated. Indeed, the "crisis" regimes (recession, fiscal stress, and banking stress) as depicted in Figures 1, 5, and 9 are highly correlated; they all point to a first turmoil period in the early 1990s and

a second global turmoil episode after 2008. In light of the estimates reported in the paper for Spain, one cannot unambiguously conclude which multiplier should be considered for estimating the macroeconomic effects of fiscal policy today, i.e., is it more appropriate to consider the bad fiscal times multiplier? Or, should we employ the recession multiplier?

Ideally, one would estimate a STVAR model with eight different regimes for Spain; however, the lack of data points for many of these regimes (e.g. a fiscal or banking stress episode during an expansionary period) precludes us from doing so. Alternatively, we construct a global turmoil indicator for the Spanish economy embedding the three "crisis" regimes considered above, i.e., economic recession, bad fiscal times, and banking stress. More concretely, we use a principal component procedure to build a synthetic index summarizing the three "crisis" regimes into a single turbulent/crisis times regime.

Our global turmoil indicator is represented by the first principal component of the three variables employed as proxies for the "crisis" regimes in our baseline exercises, namely, GDP growth, deficit-to-GDP ratio, and aggregate default rate. Note that the first principal component of these variables explains the greatest amount of the total variation among them. Specifically, the first principal component accounts for 80 percent of the overall variance of the three series. In addition, all three variables enter our global turmoil index with approximately similar weights (0.60 for GDP growth, 0.55 for the deficit-to-GDP ratio, and 0.58 for the aggregate default rate). As a robustness check, we also construct an alternative PCA indicator combining all the eight "crisis" indicators considered in the paper; in this case, the first principal component accounts for 61 percent of the overall variance and the weights are also similar for all the variables.[27]

Figure 12 depicts the resulting weights on the global turmoil regime. Interestingly enough, both PCA indicators provide a very similar picture despite they encompass a different set of economic, fiscal, and financial stress indicators as detailed above. According to these global PCA indicators, two periods of joint economic, fiscal, and financial turmoil are identified over the sample period for Spain, one in the early 1990s and the current episode since 2008. The current episode is more prolonged and receives higher weight for the crisis regime than the one corresponding to the early 1990s, which indicates that the current global crisis is more severe. Moreover, our estimated $F(z_t)$ weights based on the PCA indicators match the shaded regions in Figure 12; these shaded areas represent periods of economic recessions (as identified by ECRI) and/or weak public finances (as identified by Corsetti et al. (2012)) and/or banking stress (as identified by Reinhart and Rogoff (2010)).[28]

[27] More concretely, the weights are 0.38, 0.23, 0.36, 0.43, 0.41, 0.19, 0.37, and 0.36 for GDP growth, the output gap, the change in the unemployment rate, the deficit-to-GDP ratio, the change in gross debt, the debt-to-GDP ratio, the aggregate default rate, and the flow of private credit, respectively. Note also that the sign of some indicators is modified accordingly so that low values in absolute terms are associated with "crisis" periods.

[28] Note also that, in Figure 12, we calibrate $\gamma = 5$ as we did for most of the individual z_t indicators in previous sections. In any case, the weights resulting from other values are very similar and also match the shaded regions.

Table 4 present the estimated fiscal multipliers for the global turmoil/crisis regime. In the case of public spending (consumption plus investment), the impact multiplier is slightly above during crisis periods according to both PCA indices; however, one and two years after the shock, the cumulative multipliers are larger during crisis times and well above 1. In particular, the estimated one- and two-year multipliers are around 1.4 during global turmoil periods and 0.6 during tranquil times. One possible explanation for this finding is that two of the three "crisis" dimensions considered are associated with larger multipliers during stress periods (i.e., economic recession and banking/credit stress) while only one is expected to reduce the multiplier in time of stress (i.e., weak public finances); therefore, since all the three dimensions enter with similar weights into the PCA indices, the resulting global turmoil indicator would be dominated by the higher-than-normal multipliers dimension. In this respect, it is worth mentioning that other dimensions affecting the size of the multiplier discussed in the literature but not explored in our study are also expected to increase the size of the Spanish multiplier under the current circumstances (e.g. the fixed exchange rate regime and the zero lower bound on nominal interest rates).

Turning to the components of government spending, the overall conclusion is the same, the public consumption and investment multipliers are larger in times of global turmoil. More concretely, the estimated government consumption multiplier is larger than the spending multiplier at all horizons under both crisis and no crisis regimes. In contrast, the public investment multiplier is zero on impact and lower than the spending multiplier over the first year, but it becomes substantially larger after the second year, especially under the crisis regime.

Figures 13 and 14 plot the estimated impulse response functions using both PCA indices as switching variables in the STVAR. Looking at the first column, we see that GDP increases after the three shocks (government spending in Panel A, consumption in Panel B, and investment in Panel C) and under both crisis and no crisis regimes; however, the increase under the crisis/turmoil regime is clearly larger and more persistent in all cases. The second column of the figures shows that all government spending shocks appear to be highly persistent, especially in the global turmoil regime. Finally, column 3 indicates that the response of net taxes is generally non-significant.

5 Concluding Remarks

In the decision-making process for the design of specific fiscal programs, one multiplier is often supposed to apply everywhere and always. Extrapolating multipliers estimated elsewhere using data for other countries and periods is relatively common when anticipating the macroeconomic impact of a particular fiscal policy.

A recent strand of the literature concludes that fiscal multipliers are country-, time-, and episode-specific. Therefore, it is highly advisable to avoid the systematic use of universal multipliers estimated elsewhere and, instead, to conduct case-specific analyses for the particular fiscal policy under scrutiny (to the extent possible).

We analyze the case of Spain in some detail. Over the 2012-2013 period the Spanish economy is suffering a long-lasting recession combined with a situation of weak public finances (abnormally high levels and/or increases in the public debt-to-GDP ratio). We are also witnessing a banking/credit stress episode combined with a high level of private indebtedness (i.e. a large share of liquidity constrained agents in the economy). The effects of fiscal policy under these different states of the economy are probably different and also highly uncertain. Using the STVAR methodology developed in Auerbach and Gorodnichenko (2012a) we estimate state-specific multipliers for Spain.

Our results indicate that the Spanish fiscal multiplier might be larger and above 1 during the current double-dip recession. On the other hand, we find evidence that the weak situation of public finances in Spain might cause the spending multiplier to be around zero or even negative. Finally, the amplification channel of liquidity constraints (due to banking stress in the financial sector) seems to also increase the size of the spending multiplier, though the evidence regarding multipliers above 1 is less conclusive in this case. All in all, when we combine the three "crisis" regimes (economic recession, fiscal stress, and banking stress) into a single global turmoil regime, we find spending multipliers around 1.4 for crisis (or turbulent) times and 0.6 for tranquil times.

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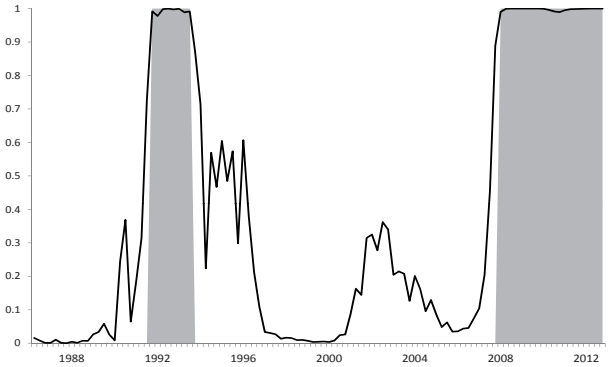
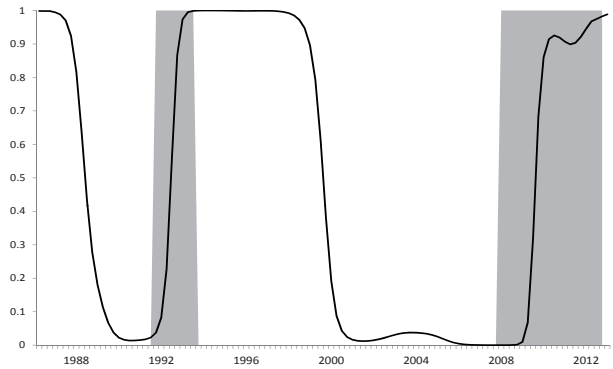
Figure 1: Weight on Recession Regime for the Spanish economy — $F(z_t)$

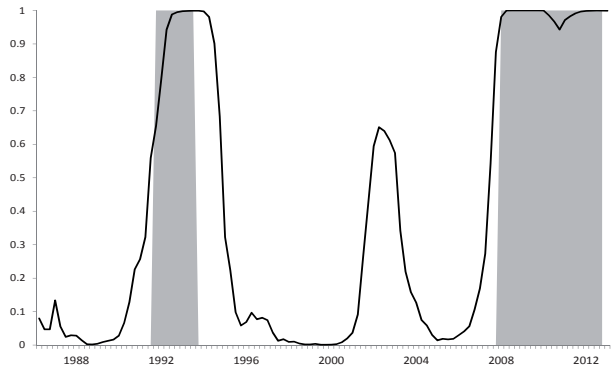
z_t = GDP Growth



z_t = Output Gap



z_t = Unemployment Rate



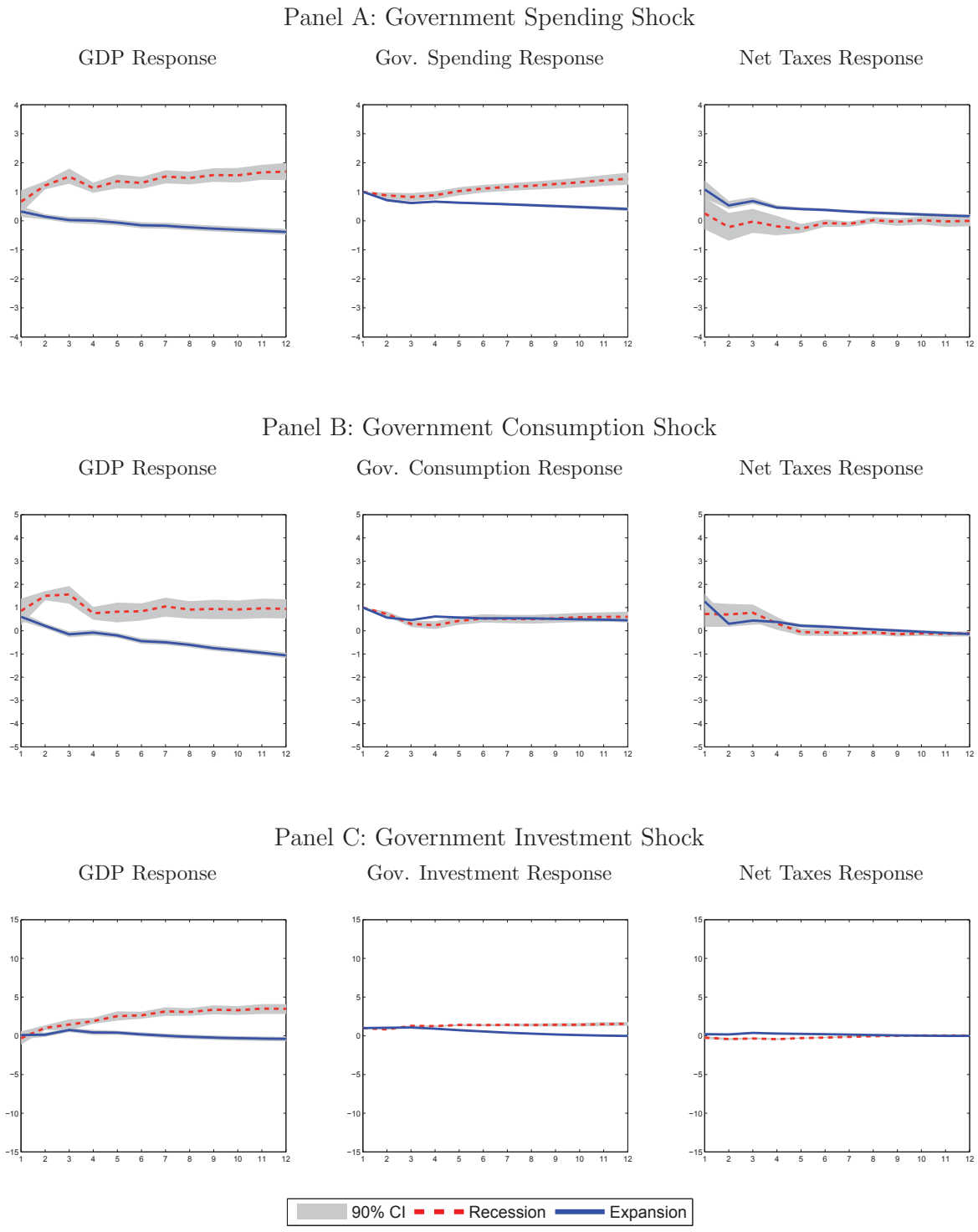
The solid black line shows the weight on recession regime —$F(z_t)$— for Spain. The shaded regions show Spanish recessions as defined by the Economic Cycle Research Institute (see http://www.businesscycle.com/).

Table 1: Government Spending Multipliers for Spain in Recession

		Panel A: Expansion and Recession — GDP Growth			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Recession	0.65*	1.26*	1.25*	1.96*
		(0.27)	(0.14)	(0.13)	(0.35)
G. Spending	Expansion	0.34*	0.17*	-0.01	0.34*
		(0.11)	(0.07)	(0.06)	(0.11)
G. Consumption	Recession	0.84*	2.07*	1.97*	1.56*
		(0.34)	(0.20)	(0.21)	(0.19)
G. Consumption	Expansion	0.60*	0.22*	-0.24*	0.60*
		(0.12)	(0.08)	(0.07)	(0.12)
G. Investment	Recession	-0.31	0.93*	1.55*	4.21*
		(0.48)	(0.30)	(0.29)	(0.69)
G. Investment	Expansion	0.08	0.35	0.31	0.74*
		(0.35)	(0.21)	(0.19)	(0.15)
		Panel B: Expansion and Recession — Output Gap			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Recession	0.86*	1.30*	1.32*	2.41*
		(0.14)	(0.11)	(0.11)	(0.64)
G. Spending	Expansion	0.64*	0.65*	0.72*	1.68
		(0.22)	(0.13)	(0.23)	(5.32)
G. Consumption	Recession	1.11*	1.47*	1.35*	2.02*
		(0.18)	(0.15)	(0.16)	(0.51)
G. Consumption	Expansion	0.97*	0.83*	0.59*	0.97
		(0.22)	(0.15)	(0.29)	(5.91)
G. Investment	Recession	1.32*	2.53*	2.39*	8.10*
		(0.52)	(0.35)	(0.35)	(1.66)
G. Investment	Expansion	-0.83	-0.83*	-1.77*	-0.35
		(0.62)	(0.43)	(0.65)	(1.63)
		Panel C: Expansion and Recession — Change in Unemployment Rate			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Recession	1.04*	1.75*	1.57*	2.49*
		(0.18)	(0.12)	(0.11)	(0.11)
G. Spending	Expansion	0.56*	0.55*	0.56*	0.56*
		(0.17)	(0.09)	(0.08)	(0.17)
G. Consumption	Recession	1.51*	1.97*	1.58*	2.52*
		(0.21)	(0.17)	(0.18)	(0.16)
G. Consumption	Expansion	0.87*	0.69*	0.52*	0.87*
		(0.23)	(0.13)	(0.13)	(0.21)
G. Investment	Recession	-0.02	2.20*	2.83*	5.82*
		(0.37)	(0.31)	(0.29)	(0.69)
G. Investment	Expansion	-0.25	0.27	0.39	0.89*
		(0.54)	(0.30)	(0.28)	(0.29)
		Panel D: Linear VAR			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Linear	0.65*	0.60*	0.30	0.87*
		(0.22)	(0.24)	(0.29)	(0.26)
G. Consumption	Linear	0.96*	0.62*	-0.01	0.96*
		(0.27)	(0.30)	(0.39)	(0.27)
G. Investment	Linear	0.00	0.64	0.80	2.54*
		(0.49)	(0.55)	(0.64)	(0.76)

Notes: * denotes statistical significance at the 5% level. Standard errors are in parentheses. Multiplier estimates based on the regime switching VAR —STVAR— discussed in Auerbach and Gorodnichenko (2012a). Identification of government shocks follows BP02, i.e., Cholesky ordering with G ordered first, T second, and GDP third. Sample period is 1986Q1:2012Q4 with quarter-specific weights on the recession regime plotted in Figure 1.

Figure 2: IRFs in Periods of Recession and Expansion — GDP Growth

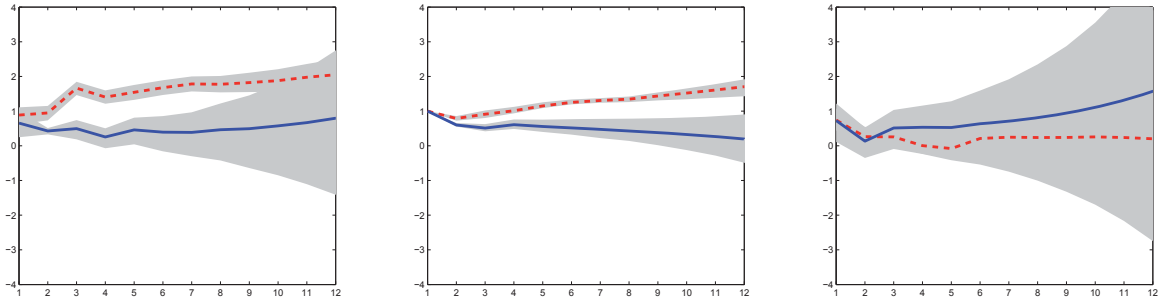


This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in expansionary regimes while dashed lines show IRFs in recessionary regimes. Shaded regions are the 90% confidence intervals for the IRFs.

Figure 3: IRFs in Periods of Expansion and Recession — Output Gap

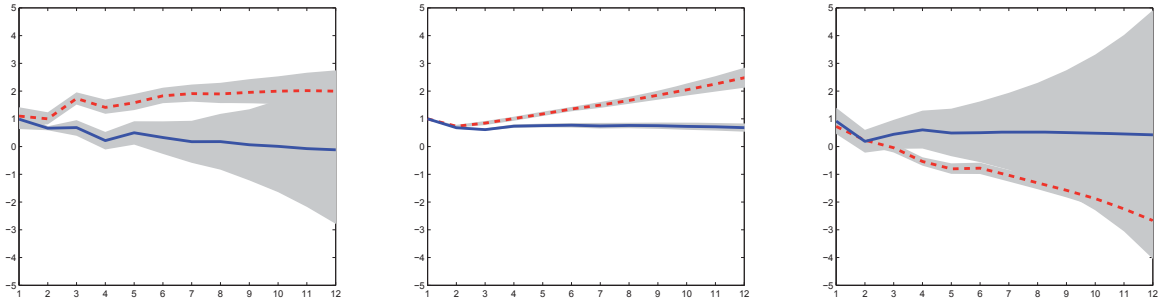
Panel A: Government Spending Shock

GDP Response | Gov. Spending Response | Net Taxes Response



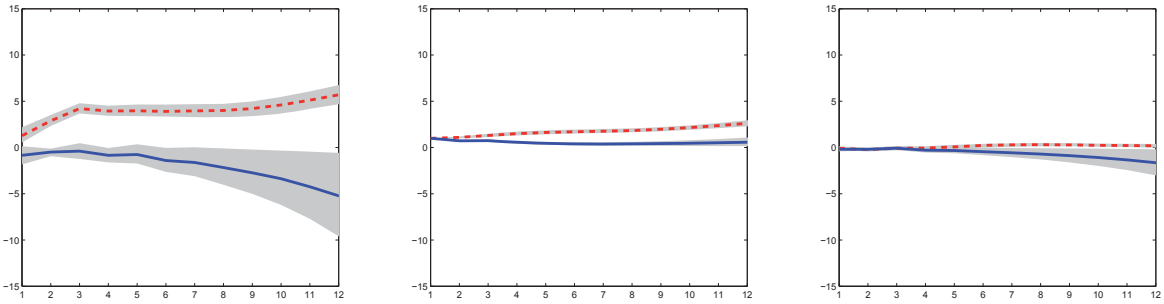
Panel B: Government Consumption Shock

GDP Response | Gov. Consumption Response | Net Taxes Response



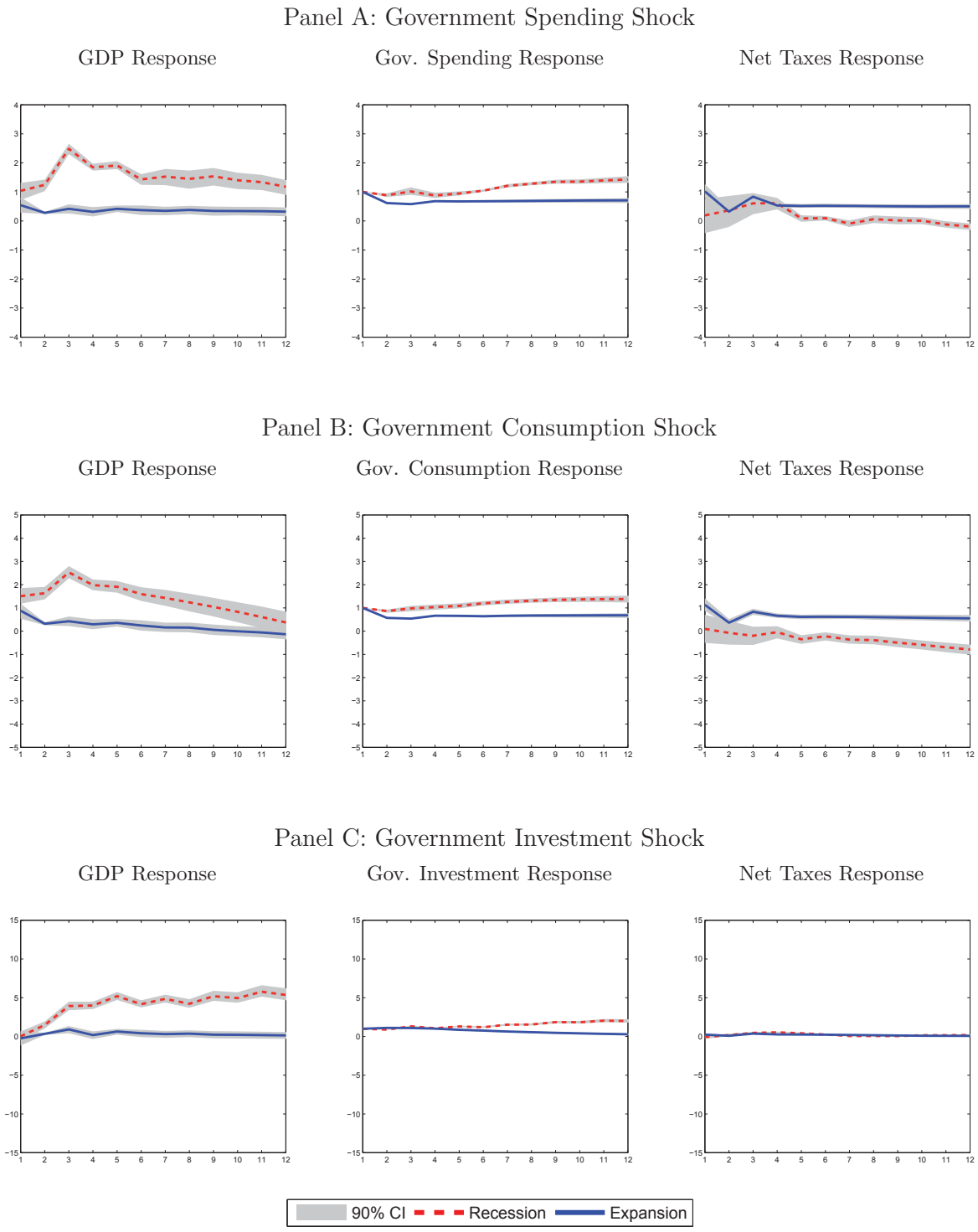
Panel C: Government Investment Shock

GDP Response | Gov. Investment Response | Net Taxes Response



This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in expansionary regimes (large output gap) while dashed lines show IRFs in recessionary regimes (small output gap). Shaded regions are the 90% confidence intervals for the IRFs.

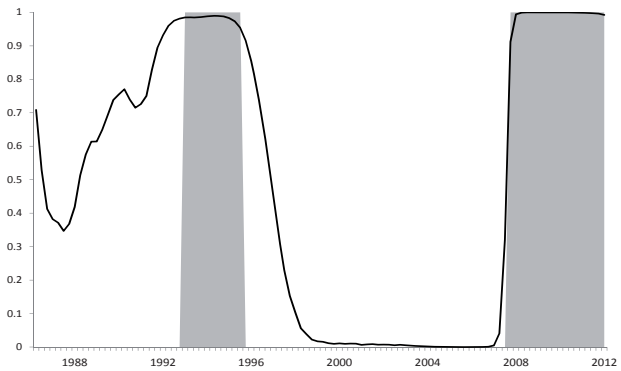
Figure 4: IRFs in Periods of Expansion and Recession — Change in Unemployment Rate



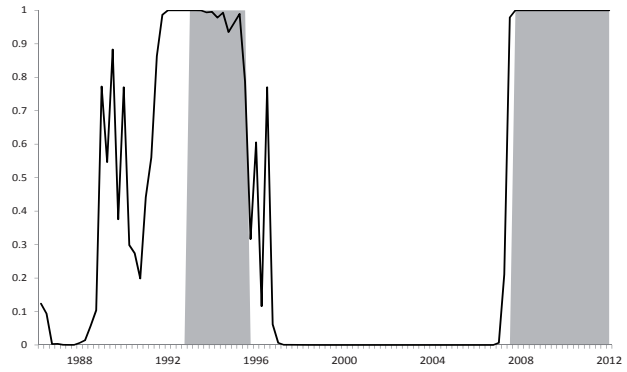
This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in expansionary regimes while dashed lines show IRFs in recessionary regimes (large increases in the unemployment rate). Shaded regions are the 90% confidence intervals for the IRFs.

Figure 5: Weight on Bad Fiscal Times Regime for the Spanish economy — $F(z_t)$

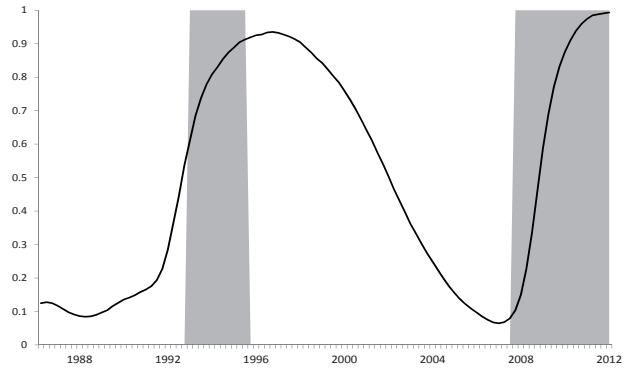
z_t = Deficit-to-GDP ratio



z_t = Change in Gross Debt



z_t = Debt-to-GDP ratio



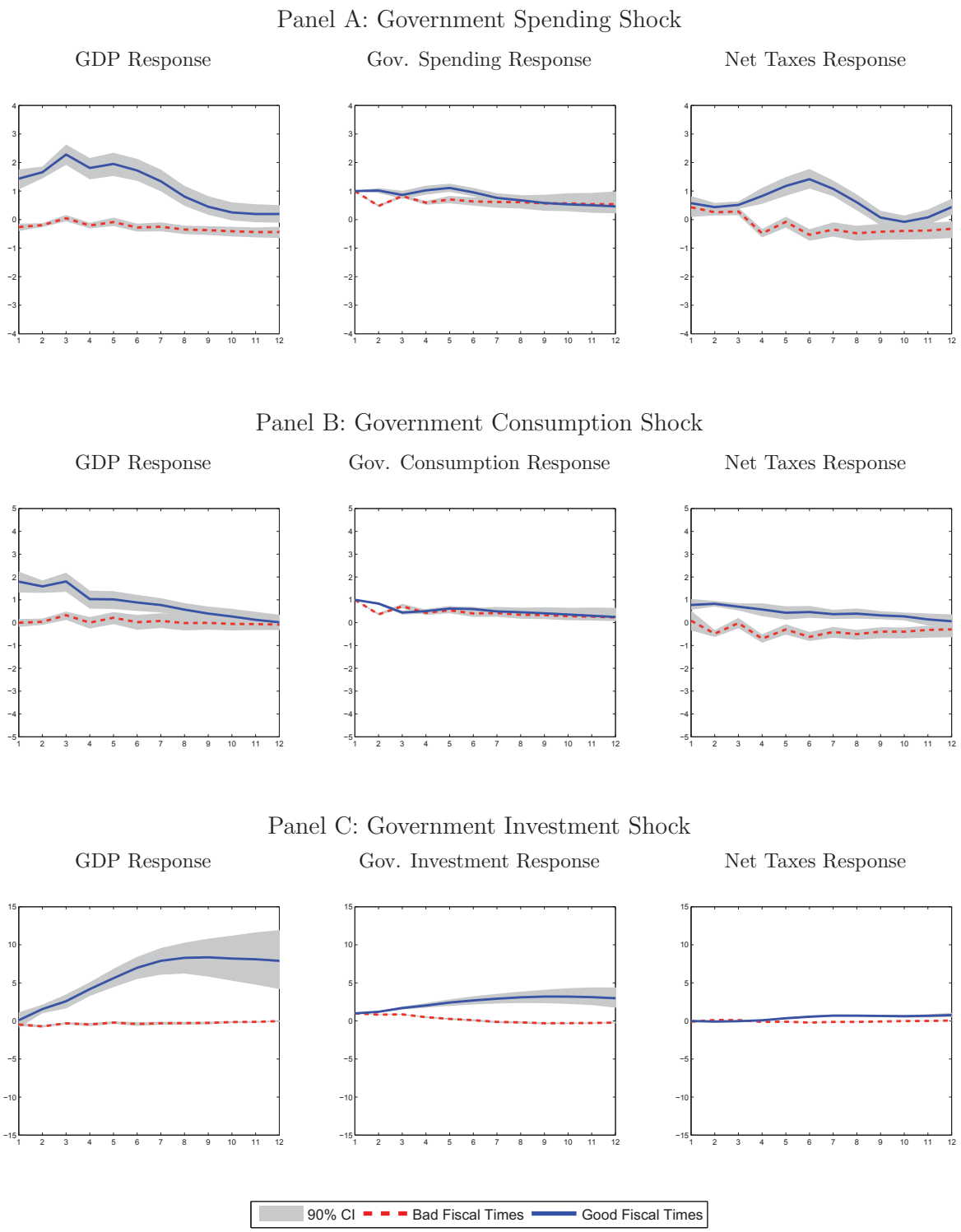
The solid black line shows the weight on bad fiscal times regime —$F(z_t)$— for Spain. The shaded regions show periods of weak public finances as labeled by Corsetti et al. (2012).

Table 2: Government Spending Multipliers for Spain in Bad Fiscal Times

		Panel A: Good Fiscal Times and Bad — Deficit-to-GDP ratio			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Bad fiscal times	-0.26*	-0.21*	-0.29*	0.04
		(0.08)	(0.05)	(0.06)	(0.06)
G. Spending	Good fiscal times	1.45*	1.84*	1.76*	2.29*
		(0.23)	(0.20)	(0.20)	(0.21)
G. Consumption	Bad fiscal times	0.00	0.15	0.16	0.33*
		(0.11)	(0.09)	(0.13)	(0.13)
G. Consumption	Good fiscal times	1.75*	2.19*	1.87*	1.75*
		(0.28)	(0.22)	(0.21)	(0.27)
G. Investment	Bad fiscal times	-0.47*	-0.62*	-0.98*	0.08
		(0.13)	(0.08)	(0.09)	(0.04)
G. Investment	Good fiscal times	0.10	1.41*	2.16*	8.35*
		(0.61)	(0.47)	(0.63)	(1.83)
		Panel B: Good Fiscal Times and Bad — Change in Gross Debt			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Bad fiscal times	-0.04	-0.07	0.22	2.68
		(0.12)	(0.12)	(0.15)	(1.71)
G. Spending	Good fiscal times	1.11*	1.22*	1.01*	1.38*
		(0.20)	(0.11)	(0.10)	(0.11)
G. Consumption	Bad fiscal times	0.14	-0.17	0.10	2.58
		(0.12)	(0.15)	(0.21)	(2.81)
G. Consumption	Good fiscal times	1.47*	1.18*	0.54*	1.47*
		(0.22)	(0.13)	(0.13)	(0.21)
G. Investment	Bad fiscal times	0.25	1.86*	2.08*	14.75*
		(0.14)	(0.21)	(0.33)	(4.29)
G. Investment	Good fiscal times	0.15	1.10*	1.57*	2.17*
		(0.70)	(0.42)	(0.35)	(0.39)
		Panel C: Good Fiscal Times and Bad — Debt-to-GDP ratio			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Bad fiscal times	-0.43*	-0.31*	-0.92*	0.57*
		(0.12)	(0.11)	(0.10)	(0.13)
G. Spending	Good fiscal times	0.81*	1.99*	2.38*	1.59*
		(0.23)	(0.17)	(0.13)	(0.20)
G. Consumption	Bad fiscal times	-1.52*	-1.65*	-1.16*	0.74
		(0.23)	(0.32)	(0.34)	(0.61)
G. Consumption	Good fiscal times	0.80*	0.65*	0.50*	1.22*
		(0.23)	(0.22)	(0.24)	(0.13)
G. Investment	Bad fiscal times	-0.20	0.30	0.08	0.65*
		(0.13)	(0.16)	(0.18)	(0.32)
G. Investment	Good fiscal times	0.52	3.52*	5.71*	5.25*
		(0.86)	(0.70)	(0.46)	(1.06)
		Panel D: Linear VAR			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Linear	0.65*	0.60*	0.30	0.87*
		(0.22)	(0.24)	(0.29)	(0.26)
G. Consumption	Linear	0.96*	0.62*	-0.01	0.96*
		(0.27)	(0.30)	(0.39)	(0.27)
G. Investment	Linear	0.00	0.64	0.80	2.54*
		(0.49)	(0.55)	(0.64)	(0.76)

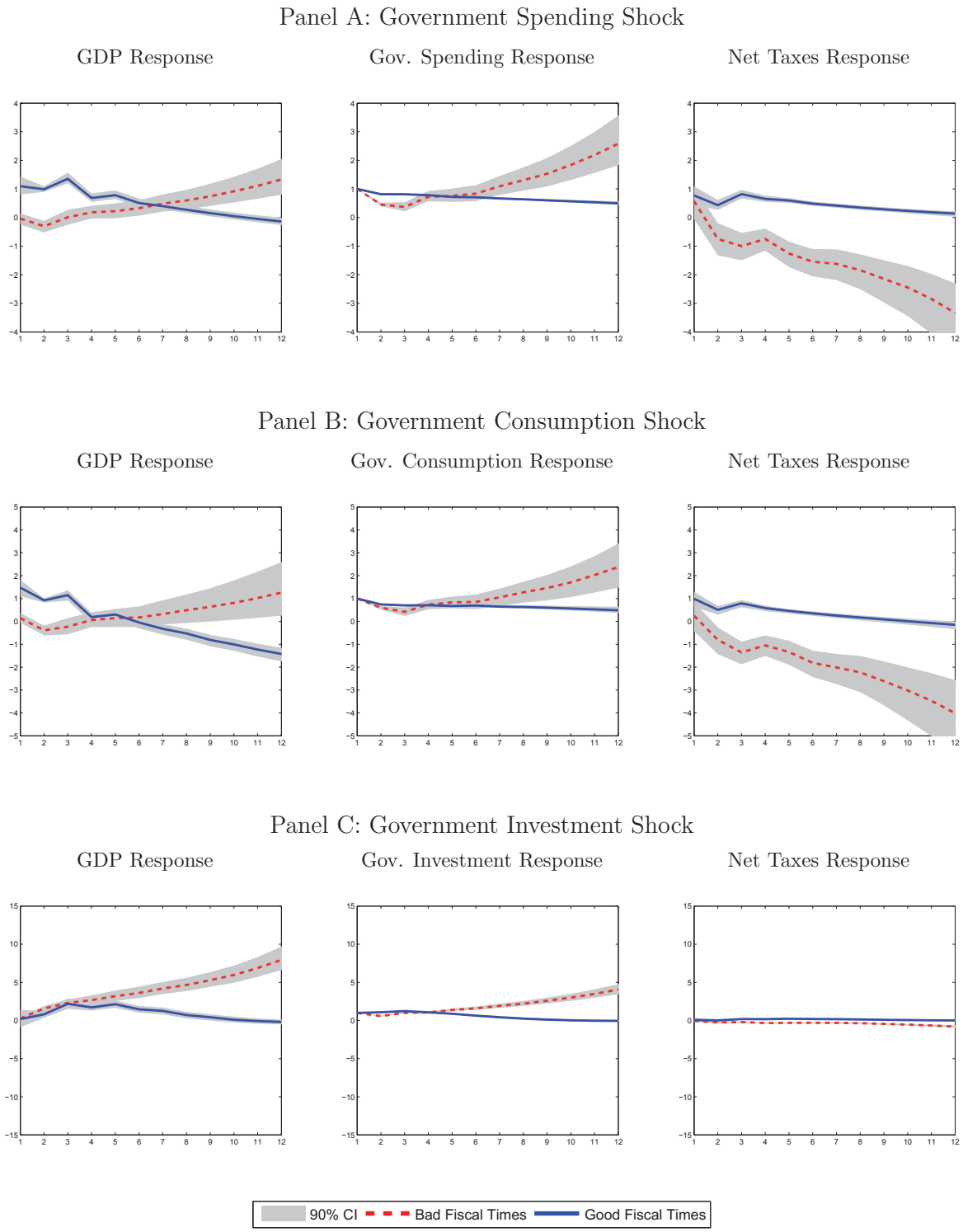
Notes: * denotes statistical significance at the 5% level. Standard errors are in parentheses. Multiplier estimates based on the regime switching VAR —STVAR— discussed in Auerbach and Gorodnichenko (2012a). Identification of government shocks follows BP02, i.e., Cholesky ordering with G ordered first, T second, and GDP third. Sample period is 1986Q1:2012Q4.

Figure 6: IRFs in Periods of Good and Bad Fiscal Times — Deficit-to-GDP ratio



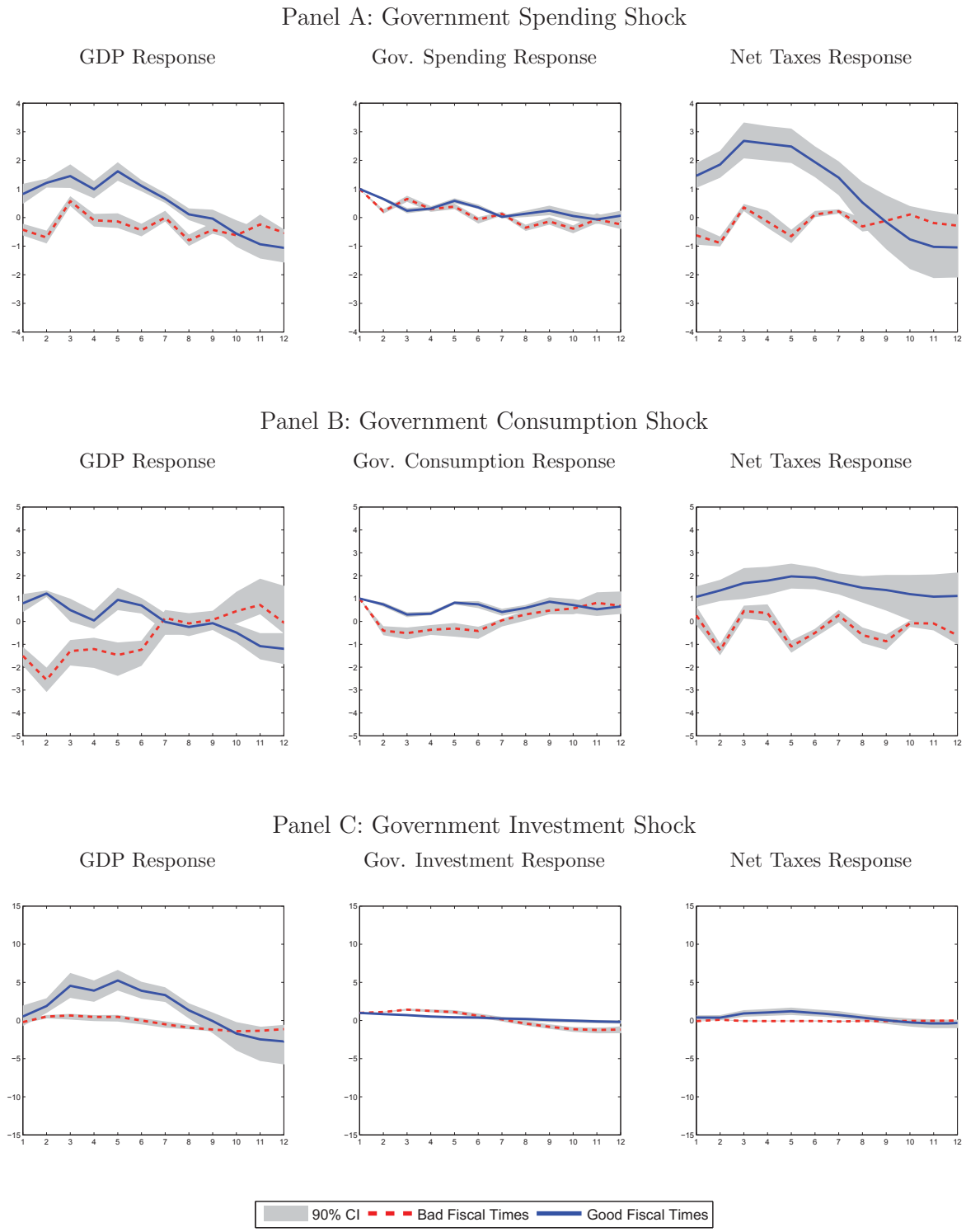
This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of good fiscal times (low deficit) while dashed lines show IRFs in periods of bad fiscal times (high deficit). Shaded regions are the 90% confidence intervals.

Figure 7: IRFs in Periods of Good and Bad Fiscal Times — Change in Gross Debt



This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of good fiscal times while dashed lines show IRFs in periods of bad fiscal times (large increases in gross debt). Shaded regions are the 90% confidence intervals for the IRFs.

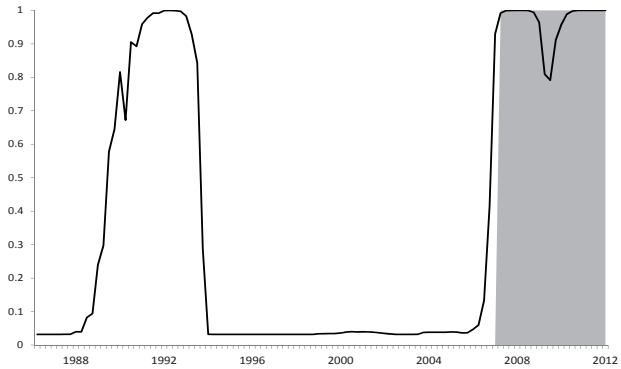
Figure 8: IRFs in Periods of Good and Bad Fiscal Times — Debt-to-GDP ratio



This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of good fiscal times (low debt) while dashed lines show IRFs in periods of bad fiscal times (high debt). Shaded regions are the 90% confidence intervals for the IRFs.

Figure 9: Weight on Banking/Credit Stress Regime for the Spanish economy — $F(z_t)$

z_t = Aggregate Default Rate



z_t = Private Credit Flow

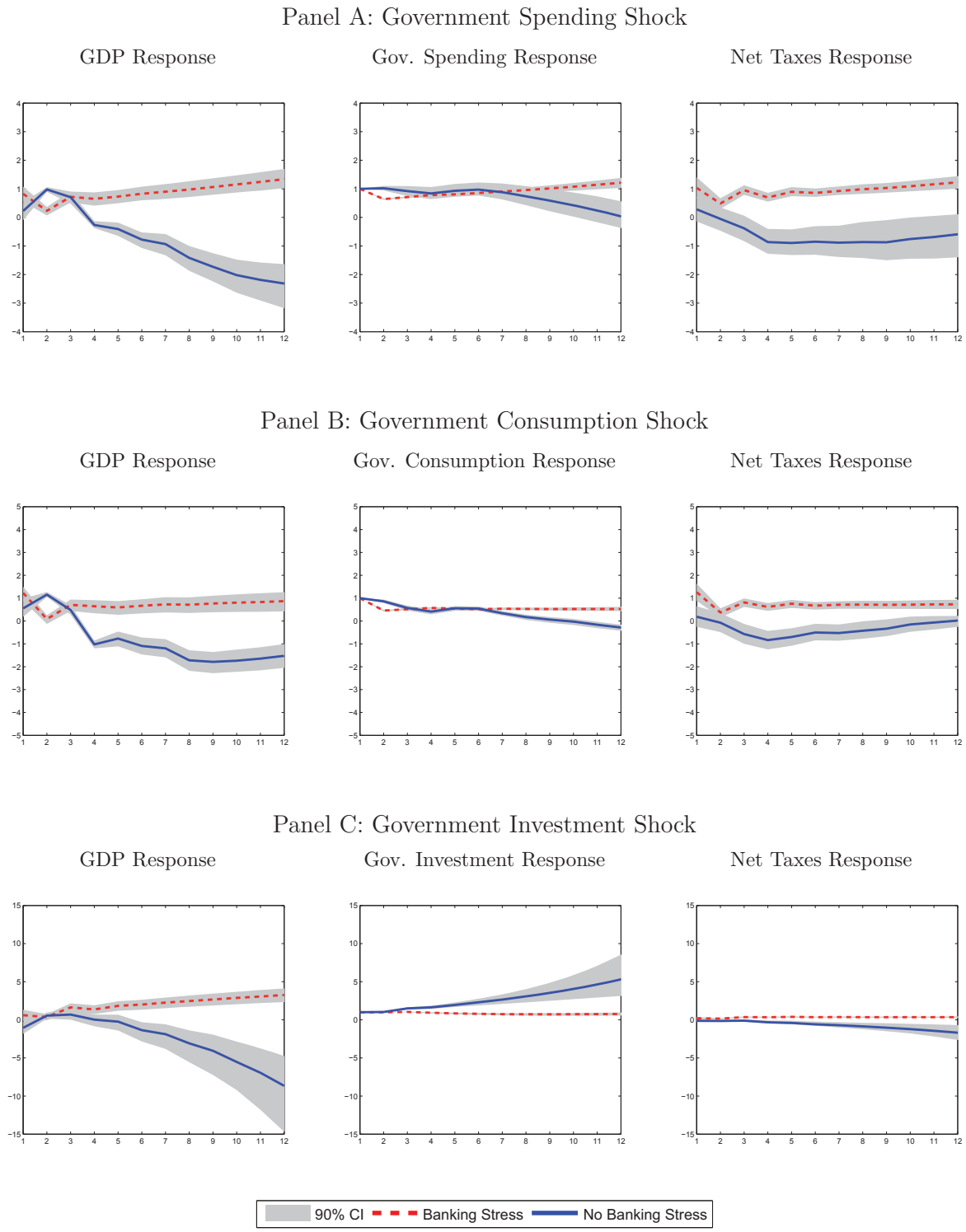
The solid black line shows the weight on banking/credit stress regime —$F(z_t)$— for Spain. Identified stress periods correspond to high aggregate default rates and low levels of private credit flow. The shaded regions show periods of banking crisis as identified by Reinhart and Rogoff (2010).

Table 3: Government Spending Multipliers for Spain in Periods of Banking/Credit Stress

		Panel A: Banking Stress — Aggregate Default Rate			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Banking Stress	0.83*	0.77*	0.88*	1.76*
		(0.16)	(0.12)	(0.13)	(0.35)
G. Spending	No Banking Stress	0.22	0.43*	-0.26*	0.97*
		(0.19)	(0.09)	(0.13)	(0.05)
G. Consumption	Banking Stress	1.23*	1.05*	1.16*	1.23*
		(0.18)	(0.15)	(0.17)	(0.21)
G. Consumption	No Banking Stress	0.57*	0.42*	-0.81*	1.16*
		(0.22)	(0.10)	(0.16)	(0.06)
G. Investment	Banking Stress	0.63	1.02*	1.79*	3.88*
		(0.45)	(0.33)	(0.36)	(0.78)
G. Investment	No Banking Stress	-1.08*	0.02	-0.44	0.68
		(0.50)	(0.37)	(0.62)	(0.38)
		Panel B: Credit Stress — Private Credit Flow			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Credit Stress	1.56*	1.40*	1.76*	2.27*
		(0.34)	(0.33)	(0.51)	(1.04)
G. Spending	No Credit Stress	0.16*	-0.70*	-0.67*	0.16
		(0.03)	(0.25)	(0.38)	(0.20)
G. Consumption	Credit Stress	2.20*	2.06*	1.56*	2.20*
		(0.31)	(0.26)	(0.29)	(0.42)
G. Consumption	No Credit Stress	0.27*	-0.66*	-1.51*	0.42*
		(0.02)	(0.14)	(0.25)	(0.72)
G. Investment	Credit Stress	-0.92	0.24	1.03	30.89
		(0.73)	(0.58)	(0.71)	(21.48)
G. Investment	No Credit Stress	0.08	0.02	0.52*	0.55*
		(0.13)	(0.18)	(0.22)	(0.19)
		Panel C: Linear VAR			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Linear	0.65*	0.60*	0.30	0.87*
		(0.22)	(0.24)	(0.29)	(0.26)
G. Consumption	Linear	0.96*	0.62*	-0.01	0.96*
		(0.27)	(0.30)	(0.39)	(0.27)
G. Investment	Linear	0.00	0.64	0.80	2.54*
		(0.49)	(0.55)	(0.64)	(0.76)

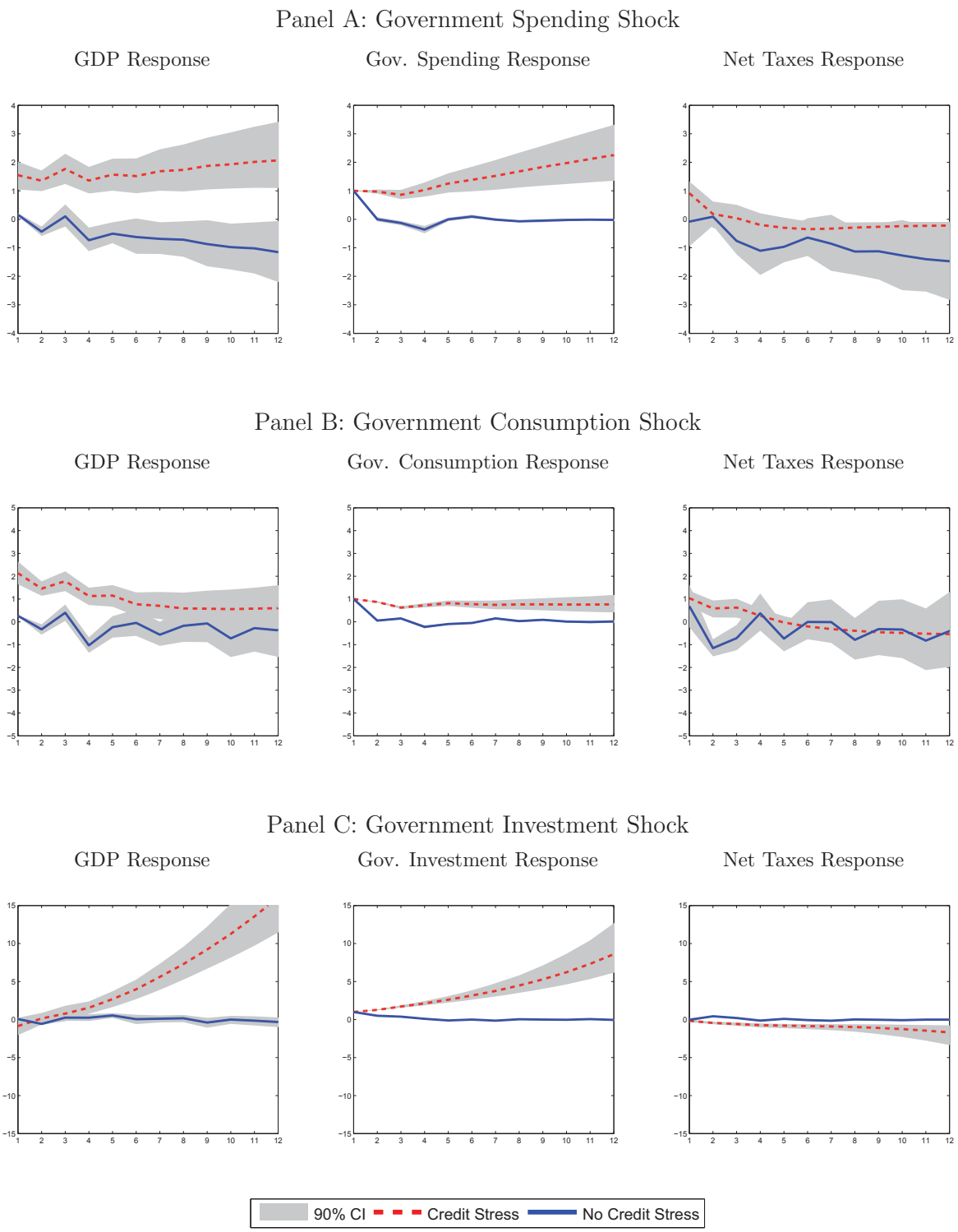
Notes: * denotes statistical significance at the 5% level. Standard errors are in parentheses. Multiplier estimates based on the regime switching VAR —STVAR— discussed in Auerbach and Gorodnichenko (2012a). Identification of government shocks follows BP02, i.e., Cholesky ordering with G ordered first, T second, and GDP third. Sample period is 1986Q1:2012Q4.

Figure 10: IRFs in Periods of Banking Stress and No Stress — Aggregate Default Rate



This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of no banking stress (low default rate) while dashed lines show IRFs in periods of banking stress (high default rate). Shaded regions are the 90% confidence intervals for the IRFs.

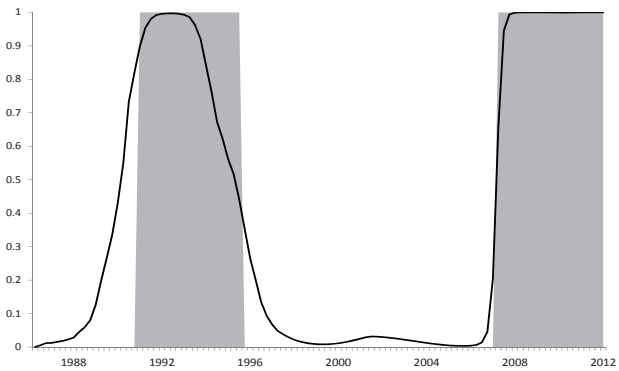
Figure 11: IRFs in Periods of Credit Stress and No Stress — Private Credit Flow



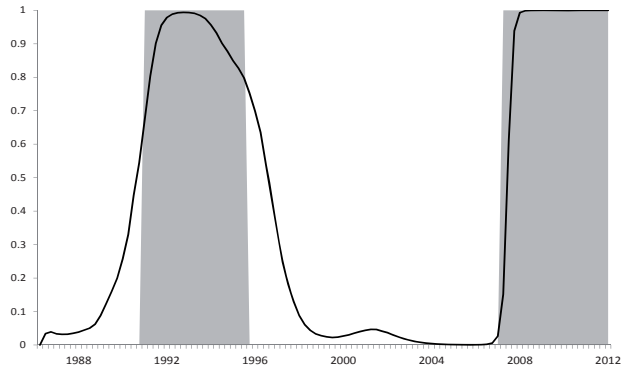
This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of no credit stress (large flow of private credit) while dashed lines show IRFs in periods of credit stress (small flow of private credit). Shaded regions are the 90% confidence intervals for the IRFs.

Figure 12: Weight on the Turbulent Times Regime for the Spanish economy — $F(z_t)$

z_t = PCA Index I



z_t = PCA Index II



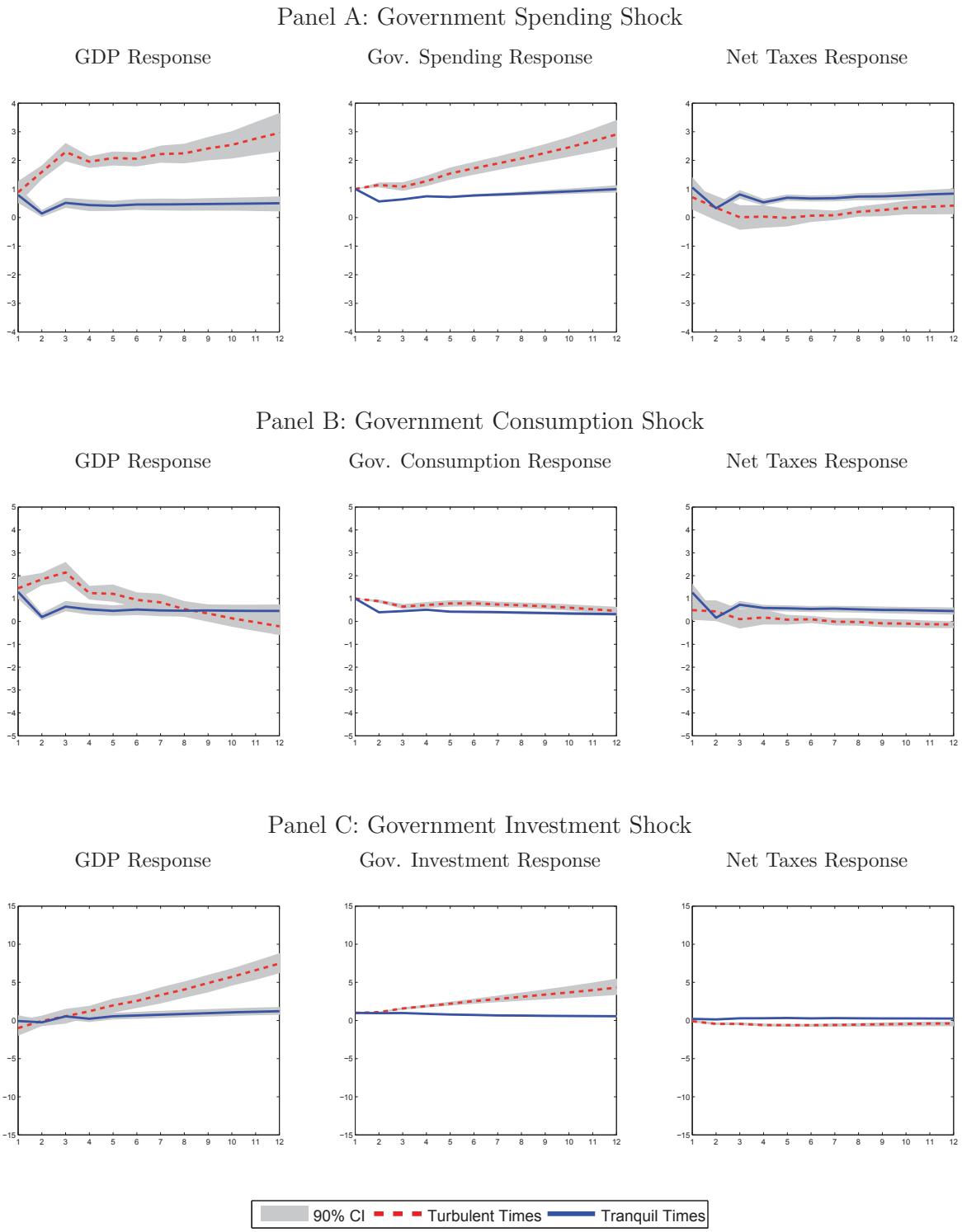
The solid black line shows the weight on the turbulent times regime —$F(z_t)$— for Spain. The z_t indicator is the first principal component of either gdp growth, deficit-to-GDP ratio and the aggregate default rate (PCA Index I) or gdp growth, output gap, unemployment rate, deficit-to-GDP ratio, change in gross debt, the debt-to-GDP ratio, the aggregate default rate and the flow of private credit (PCA Index II). The shaded regions show periods of economic recessions (as identified by ECRI) and/or weak public finances (as identified by Corsetti et al. (2012)) and/or banking crisis (as identified by Reinhart and Rogoff (2010)).

Table 4: Government Spending Multipliers for Spain in Turbulent Times

		Panel A: Turbulent Times — PCA Index I			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Crisis	0.84*	1.48*	1.30*	4.21*
		(0.25)	(0.17)	(0.15)	(1.27)
G. Spending	No Crisis	0.79*	0.64*	0.60*	0.79*
		(0.17)	(0.12)	(0.12)	(0.18)
G. Consumption	Crisis	1.44*	2.05*	1.63*	2.15*
		(0.30)	(0.22)	(0.22)	(0.25)
G. Consumption	No Crisis	1.26*	1.10*	1.13*	1.26*
		(0.19)	(0.13)	(0.14)	(0.18)
G. Investment	Crisis	-1.08	1.16*	4.06*	11.45*
		(0.59)	(0.48)	(0.64)	(2.72)
G. Investment	No Crisis	0.00	0.26	0.90*	1.46*
		(0.45)	(0.29)	(0.30)	(0.34)
		Panel B: Turbulent Times — PCA Index II			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Crisis	0.73*	1.38*	1.35*	2.39*
		(0.21)	(0.16)	(0.11)	(0.25)
G. Spending	No Crisis	0.71*	0.62*	0.56*	0.71*
		(0.22)	(0.10)	(0.08)	(0.21)
G. Consumption	Crisis	1.19*	2.09*	1.97*	5.49*
		(0.22)	(0.20)	(0.24)	(1.41)
G. Consumption	No Crisis	1.22*	0.88*	0.59*	1.22*
		(0.24)	(0.10)	(0.08)	(0.23)
G. Investment	Crisis	-0.51	1.32*	4.50*	6.39*
		(0.36)	(0.18)	(0.15)	(0.28)
G. Investment	No Crisis	-0.76	-0.58*	-0.07	-0.03
		(0.54)	(0.24)	(0.07)	(0.10)
		Panel C: Linear VAR			
Component	Regime	Impact	4q	8q	Peak
G. Spending	Linear	0.65*	0.60*	0.30	0.87*
		(0.22)	(0.24)	(0.29)	(0.26)
G. Consumption	Linear	0.96*	0.62*	-0.01	0.96*
		(0.27)	(0.30)	(0.39)	(0.27)
G. Investment	Linear	0.00	0.64	0.80	2.54*
		(0.49)	(0.55)	(0.64)	(0.76)

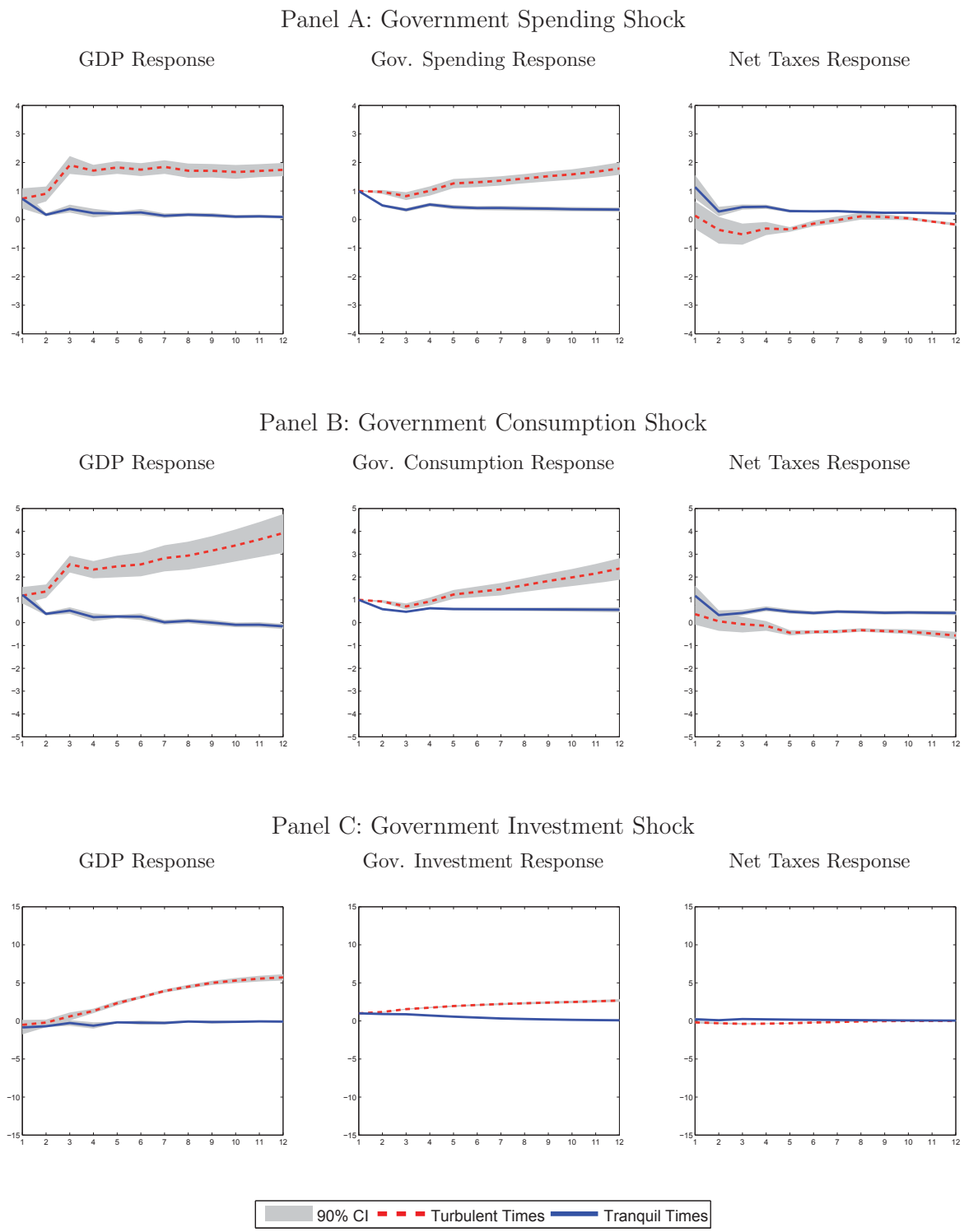
Notes: * denotes statistical significance at the 5% level. Standard errors are in parentheses. Multiplier estimates based on the regime switching VAR —STVAR— discussed in Auerbach and Gorodnichenko (2012a). Identification of government shocks follows BP02, i.e., Cholesky ordering with G ordered first, T second, and GDP third. Sample period is 1986Q1:2012Q4.

Figure 13: IRFs in Turbulent and Tranquil Times — PCA Index I



This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of crisis (turbulent times) while dashed lines show IRFs in periods of no crisis (tranquil times). Shaded regions are the 90% confidence intervals for the IRFs.

Figure 14: IRFs in Turbulent and Tranquil Times — PCA Index II



This Figure presents the IRFs to a 1 unit increase in government spending. Solid lines show the IRFs in periods of crisis (turbulent times) while dashed lines show IRFs in periods of no crisis (tranquil times). Shaded regions are the 90% confidence intervals for the IRFs.

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