Nonlinear effects of asset prices on fiscal policy: Evidence from the UK, Italy and Spain

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ABSTRACT

We test for nonlinear effects of asset prices on the fiscal policy of three major European economies (the UK, Italy and Spain). We model primary government spending and government revenue as time-varying transition probability Markovian processes (TVPMS). We find that while in Italy fiscal policy is substantially neutral vis-à-vis asset price movements, fiscal authorities in the UK and Spain seem to track the dynamics of wealth. In particular, revenue-based fiscal policy interventions in the UK are particularly effective in counteracting shocks in the asset markets induced by sharp wealth fluctuations. Similarly, in Spain, the spending-side of the fiscal policy plays a dominant role in stabilizing stock and housing markets.

1. Introduction

Asset-related changes in government revenue and spending appear to have been a factor explaining the movements in the fiscal balance. Indeed, financial markets can affect the fiscal stance via: (i) the "direct" channel i.e. an increase in stock prices can boost taxes related to capital gains, fiscal revenue from households and corporations, and turnover taxes and (ii) the "indirect" channel, whereby higher stock prices raise consumers' confidence and households' wealth and, consequently, private consumption and real economic activity, and lead investors to demand a lower risk premium, thus, reducing the cost of debt (re)financing. Similarly, housing markets can be influenced by fiscal policy via: (i) capital taxes on housing gains; (ii) first-house purchases' subsidies; (iii) home purchases' VAT and imputed rental housing value taxation; and (iii) tax deductibility of interest payments.

At the empirical level, some authors analyze the relationship between fiscal policy and: 1) asset market returns (Arin et al., 2009; Darrat, 1988); 2) stock prices (Ardagna, 2009); 3) interest rates (Maclennan et al., 1999); and 4) risk premium (Akitoby and Stratmann, 2008). Girouard and Price (2004) explore the impact of large asset markets' fluctuations in government revenue and, consequently, the measurement of the structural budget balance. The authors find that the decline in tax receipts is sharper than the one implied by output movements and tax measures. Bénétrix and Lane (2010) evaluate the cross-country dispersion in fiscal outcomes during the financial crisis of 2007–2009 and highlight that the fall in structural fiscal balances was larger for countries experiencing rapid credit growth in the pre-crisis

period. Afonso and Sousa (2011) use a fully simultaneous system of equations and show that fiscal policy shocks can substantially increase the volatility of housing and stock prices. Tagkalakis (2011a) estimates fiscal policy reaction functions and emphasizes that, although stock prices affect both government revenue and primary spending, the most important effect on fiscal balances is due to changes in housing prices. Tagkalakis (2011b) refers the importance of asset prices both for improving fiscal balances and for helping the achievement of a sustained fiscal stance. Agnello et al. (2012) estimate fiscal policy rules augmented with aggregate wealth, wealth composition and asset prices using a Smooth Transition Regression (STR) model and a Markov-switching (MS) model, and find relevant nonlinearities in the behavior of fiscal authorities, in particular, during periods of major financial distress.

This paper contributes to the literature on the linkages between fiscal policy and asset markets (Agnello and Nerlich, 2012; Castro and Sousa, 2012; Jaeger and Schuknecht, 2007; Schuknecht and Eschenbach, 2004; Sousa, 2010, 2014; Tagkalakis, 2011a, 2011b). In particular, we examine whether changes in stock and housing prices have an impact on government revenue and primary spending, with a specific focus on three European countries: Italy, Spain and the UK. While asset market developments play an important role in the economic activity of Spain and the UK, the other country (Italy) is a major European economy and is considered for comparison reasons.

We propose to measure the influence of the asset prices on government revenue and primary spending via the estimation of fiscal policy reaction functions augmented with housing and stock prices.

Our objective is twofold. First, we assess whether fiscal policies respond, in a linear fashion, to corrections in asset prices with the ultimate goal of limiting the risk of financial instability. Second, we test for the

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time-varying reaction of the fiscal authorities to asset market shocks. To address this latter point, we follow Agnello et al. (2013) and model government revenue and primary spending as time-varying transition probability Markovian processes (TVPMS).[1]

Our results suggest that, for the UK and Spain, a TVPMS model is better suited for capturing the reaction of the governments to the dynamics of the asset markets. In particular, in line with Agnello et al. (2012), we show that, for such countries, fiscal policy can be regarded as an important stabilization tool in the presence of asset market shocks. By contrast, a linear model is more appropriate to explain fiscal reaction functions in Italy.

The remainder of the paper is organized as follows. Section 2 deals with the modeling framework. Section 3 presents the data sources. Section 4 discusses the empirical evidence and provides some policy implications. Finally, Section 5 concludes.

2. The model

In order to test the empirical relevance of the fiscal responsiveness to asset prices, we employ a two-step estimation strategy. In the first step, we estimate a fiscal policy rule with a linear framework:

$$\Delta lnF_t = \sum_{i=1}^{M}\left\{\alpha_{1i}\Delta lnF_{t-i} + \alpha_{2i}\Delta lnY_{t-i} + \alpha_{3i}\Delta lnB_{-i} \right.$$
$$\left. +\alpha_{4i}\Delta lnHP_{t-i} + \alpha_{5i}\Delta lnSP_{t-i} + \alpha_0 + \varepsilon_t\right\} \tag{1}$$

where the fiscal policy instrument (F_t), which represents either government revenue (T_t) or government expenditure (S_t), is regressed on its own lags, the lagged values of the GDP growth rate (ΔY_t) and the debt to GDP ratio (ΔB_t). To this set of explanatory variables, we add housing prices (HP_t) and stock prices.[2] Given the limited number of degrees of freedom, we keep the model as parsimonious as possible by considering only two lags for each independent variable.[3]

In the second stage, we explore the nonlinear linkage between fiscal policy and asset prices by estimating the following regime-switching fiscal reaction function:

$$\Delta lnF_t = +\sum_{i=1}^{M}\left\{\alpha_{1i}(s_t)\Delta lnF_{t-i} + \alpha_{2i}\Delta lnY_{t-i} + \alpha_{3i}\Delta lnB_{t-i} \right. \tag{2}$$
$$\left. +\alpha_{4i}(s_t)\Delta lnHP_{t-i} + \alpha_{5i}(s_t)\Delta lnSP_{t-i} + \alpha_0(s_t) + \varepsilon_t(s_t)\right\}$$

where we allow the coefficients associated with asset prices (besides those linked to the constant and the lagged dependent variable) to switch between different states, i.e. $s_t \in \{1,2\}$. We also assume that the

relation between the fiscal policy indicators, output growth and public debt is always linear. This is in line with the idea that policymakers care about both demand stabilization and debt sustainability (Agnello et al., 2012).

The identification of the two regimes relies on the realization of the unobservable first-order Markov chain, s_t, with the conditional probability of being in a given state at time t depending only on the state observed at the preceding time $P\{s_t|s_{t-1}\}$. Moreover, we assume that the transition from one regime to another depends on the observation of a transition variable, Z_t so that $P\{s_t|s_{t-1}\} = P\{s_t|s_{t-1}, z_t\}$.

In our study, aggregate wealth (i.e., the sum of housing and financial wealth) has been considered as the most suitable candidate transition variable. From a theoretical point of view, this assumption is consistent with the literature that views fiscal policy rules as designed to target national wealth (Blake et al., 1988; Lossani and Tirelli, 1994) and is empirically supported by Agnello et al. (2012) and Agnello et al. (2013).[4] In addition, the formal tests validate our choice. This implies that fiscal policy is expected to react differently to asset price shifts depending on the wealth developments.

We conclude this section by remarking that the transition probabilities are defined as follows:

$$\begin{cases} p_{11}(z_{t-k}) = \dfrac{\exp(a_1 + b_1 z_{t-k})}{1 + \exp(a_1 + b_1 z_{t-k})}, \; p_{22}(z_{t-k}) = \dfrac{\exp(a_2 + b_2 z_{t-k})}{1 + \exp(a_2 + b_2 z_{t-k})} \\ p_{12}(z_{t-k}) = 1 - p_{11}(z_{t-k}) \text{ and } p_{21}(z_{t-k}) = 1 - p_2(z_{t-k}), \end{cases} \tag{3}$$

where $p_{ij}(z_{t-k})$ is the probability of moving from regime i to regime j conditional on the dynamics of the transition variable k periods before.

3. Data

We use quarterly data for Italy (1985Q1–2007Q2), Spain (1985Q1–2007Q2) and the UK (1975Q1–2007Q4). All the variables are expressed in first-differences of natural logarithms. Time series are seasonally adjusted and measured at constant prices.

Quarterly series of primary government expenditure and government revenue are taken from the national accounts in the case of the UK, and are based on fiscal cash data for Italy and Spain. The government debt series are provided by the Office for National Statistics (ONS) in the case of the UK, and by the Ministry of Finance for the other two countries. Real GDP series and stock price data are collected from the International Financial Statistics (IFS) of the International Monetary Fund (IMF).

Data on aggregate wealth are retrieved from the ONS in the case of the UK and from the national central banks for Italy and Spain. Housing price data are seasonally adjusted and provided by the Bank for International Settlements (BIS).

4. Empirical results

4.1. UK

The results for the UK are reported in Tables 1a and 1b. The linear regressions suggest that government revenue and primary spending do not respond to the output growth.[5] Moreover, we find that changes in

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[1] Agnello et al. (2013) test for nonlinear effects of asset prices on the US fiscal policy. They find that the fiscal policy developments that emerge in response to asset market changes may be well described with a time-varying transition probability Markov-switching (TVPMS) model.

[2] We highlight that our specification does not take into account the potential interaction between fiscal policy and monetary policy. This is explained for three main reasons. First, by including the central bank rate in the fiscal policy reaction, we would be implicitly questioning the principle of independence of the central bank vis-à-vis the fiscal authority, which governs the conduct of both types of policies in the three countries under analysis. Second, our sample period does not include the aftermath of the financial crisis of 2008–2009. Thus, the evidence presented in the current work characterizes the conventional fiscal policy rule (where the interaction with monetary policy is excluded) and not the unconventional fiscal policy rule (where the interaction with monetary policy could be taken into account). Third, in this way, we keep the model parsimonious. Despite this, we note that some authors have analyzed the question of the interaction between fiscal policy and monetary policy. For instance, Ferrero (2009) does so in the context of a currency union with two countries and uncovers a modified optimal targeting rule due to distortionary taxation and government debt. In Beetsma and Jensen (2005) and Gali and Monacelli (2008), the monetary policy is implemented by a single central bank, while fiscal policy is conducted at the country level. The authors show that the stabilizing role of fiscal policy goes beyond the efficient public goods' provision.

[3] We remark that, for each country considered in our study, the correlation between the changes in the output and the changes in the asset prices is very small (ranging from 0.01 in the case of Italy to 0.43 for the UK). This suggests that the feedback from the economic cycle to the asset markets is rather limited.

[4] Agnello et al. (2012) uncover an important compositional effect in the response of governments to the wealth dynamics.

[5] Following Buch et al. (2010), Tagkalakis (2011a) refers that part of the fiscal policy response to the asset price variable might be due also to variation in cyclical economic conditions i.e. to the feedback from output gap movements to asset price changes. Thus, multicollinearity between the two variables could lead to insignificant coefficient estimates of the output gap. Consequently, the author starts by regressing asset prices on the contemporaneous and the lagged values of the output gap. Then, asset prices are replaced by the residuals from asset price equations in the fiscal policy rules, as the new asset price variables will be orthogonal to the output gap. The author concludes that the empirical findings are not affected by multicollinearity.