Using time-varying transition probabilities in Markov switching processes to adjust US fiscal policy for asset prices

Luca Agnello a, Gilles Dufrénot b,c,d,e,f,⁎, Ricardo M. Sousa g,h

a University of Palermo, Department of Economics, Business and Finance, Italy
b Aix-Marseille University (Aix-Marseille School of Economics), Château La Farge — Route des Milles, 13290 Les Milles Aix-en-Provence, France
c CNRS, France
d EHESS, France
e Banque de France, France
f CEPII, France
g University of Minho, Department of Economics and Economic Policies Research Unit (NIPE), Portugal
h London School of Economics, Financial Markets Group (FMG), United Kingdom

A R T I C L E   I N F O

JEL classification:
E37
E52

Keywords:
Fiscal policy
Asset prices
Time-varying transition probability Markov process

A B S T R A C T

This paper tests for nonlinear effects of asset prices on the US fiscal policy. By modeling government spending and taxes as time-varying transition probability Markovian processes (TVPMS), we find that taxes significantly adjust in a nonlinear fashion to asset prices. In particular, taxes respond to housing and (to a smaller extent) to stock price changes during normal times. However, at periods characterized by high financial volatility, government taxation only counteracts stock market developments (and not the dynamics of the housing sector). As for government spending, it is neutral vis-a-vis the asset market cycles. We conclude that, correcting the fiscal balance and, notably, the revenue side for time-varying effects of asset prices provides a more accurate assessment of the fiscal stance and its sustainability.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

The deepening of the 2008–2009 financial crisis was mainly driven by the sharp collapse of asset prices (after several years of boom) and simultaneous destruction of financial wealth. This has renewed the interest of academics and policymakers on the linkages between economic policy and asset markets (Agnello and Nerlich, 2012; Agnello and Schuknecht, 2011; Agnello and Sousa, 2011, in press; Castro, 2010; Sousa, 2010, in press).

While several papers have emphasized the existence of a nexus between the conduct of monetary policy and the developments in financial markets, the empirical evidence on the reaction of fiscal authorities to such dynamics is still at an early stage. This is somewhat surprising, in particular, if one takes into account the recent behavior of sovereign bond markets and the new challenges for public debt that have emerged in advanced economies (Bouthéville et al., 2011).

Some authors have stressed that taxation should account not only for the business cycle, but also for the asset price cycle (Jaeger and Schuknecht, 2007; Tujula and Wolswijk, 2007).1

More recently, Afonso and Sousa (2011) use a fully simultaneous system of equations and quarterly data for Germany, Italy, UK and US, and find that fiscal policy shocks have a positive and persistent impact on housing prices and a negative effect on stock prices. Afonso and Sousa (2012) rely on a partial recursive identification of the fiscal policy shocks and data for the same set of countries, and uncover an important role for fiscal policy in explaining variation in both housing and stock prices. Agnello and Sousa (2011, in press)

1 In fact, asset prices can affect the government budget via two major mechanisms: (i) the “direct” channel, through certain revenue categories; and (ii) the “indirect” channel, through the feedback effect on real economic activity. In the case of the “direct” channel, an increase in stock prices can have a positive impact on capital gains–losses related taxes, government revenue from households and corporations and turnover taxes (i.e. changes in government revenue via transactions in assets) and, consequently, can influence the fiscal stance. As for the “indirect” channel, higher stock prices can lead to a rise in consumer’s confidence and household’s wealth, boosting consumption and real economic activity and, thereby, increasing government revenue. In contrast, a sharp correction in stock prices and the design of fiscal stimulus packages can raise costs to governments and, therefore, deteriorate the public finances.
show that fiscal policy is particularly effective during severe housing busts and the government’s attempt to mitigate stock price developments may de-stabilize housing markets. In the same vein, Agnello et al. (2012) find that fiscal policy becomes expansionary in the context of a rise in financial stress, thereby, partially offsetting the decline in wealth.

As it stands, most of the existing empirical works have typically relied on the assumption that there is either: (i) a linear relationship between the fiscal policy instrument and the dynamics of asset prices (as in Afonso and Sousa, 2011, 2012; Agnello and Sousa, 2011, in press); or (ii) a nonlinear relationship that characterizes sudden changes in fiscal policy associated with events such as a financial crisis, but also imposes fixed (exogenous) transition probabilities across the different states of the economy (as in Agnello et al., 2012).

In the current work, we argue that the US fiscal policy developments that emerge in response to asset market changes may be better described within a time-varying transition probability Markov-switching (TVPM) framework as originally proposed by Filardo (1994) and further extended by Kim et al. (2008). Indeed, the estimated state variable (such as asset wealth or asset prices) quite often displays a close link between the different states of the economy (as in Agnello et al., 2012).

In this context, reaction functions that can be associated with smoother (thereby, less frequent) regime switches are more prone to stabilize the economy and to provide a better understanding of how the fiscal authority responds to asset market developments.

Therefore, we model tax and spending rules as follows

$$
\Delta \log(F_t) = \rho_0(s) + \rho_1(s)\Delta \log(F_{t-1}) + \rho_2(s)\Delta \log(Y_{t-1}) + \rho_3(s)\Delta \log(B_{t-1}) + \rho_4(s)\Delta \log(HP_{t-1}) + \rho_5(s)\Delta \log(SP_{t-1}) + \sigma_i(s)\theta_i.
$$

where the fiscal policy instrument \(F_t\) either taxes \(T_t\) or government expenditure \(S_t\), is explained by its lagged values, the lagged values of the GDP growth rate \(\Delta Y_t\) and the debt to GDP ratio \(\Delta B_t\) as conventionally done in the standard fiscal policy rule. Then, we augment the model specification by accounting for the effects of housing prices \(\Delta H_P\) and stock prices \(\Delta S_P\). All variables are expressed in stationary terms.

The optimal lag is selected using the standard information criteria. We also allow the coefficients associated to asset prices (besides those linked to the constant and the lagged dependent variable) to switch between two different states, i.e. \(s_t \in \{1, 2\}\). In contrast, we 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 both about demand stabilization and debt sustainability (Agnello et al., 2012). But the policy reaction can differ across different regimes depending upon whether stock and housing prices are increasing or decreasing. The observation of either regime 1 or 2 at time \(t\) depends upon the realizations of an unobservable Markov chain, that is, \(S_t\) is conditioned by \(s_{t-1}, s_{t-2}, s_{t-3}, \ldots, s_{t-h}\). At any time \(t < t\) the regime that will be observed at time \(t\) is unknown with certainty. Thus, we introduce a probability \(P\) of occurrence of \(s_t\) given the past regimes. Assuming, for purpose of simplicity, that \(s_t\) is a first-order Markov-switching process, we define \(P(s_t|s_{t-1}, s_{t-2}, \ldots, s_{t-h}) = P(s_t|s_{t-h})\). We further assume that the transition from one regime to the other depends upon a transition variable observed at time \(t - k, z_{t-k}\), so that \(P(s_t|s_{t-1}) = P(s_t|s_{t-1}, z_{t-k})\). The transition probabilities are defined as follows:

$$
\begin{align*}
    &P_{11}(Z_{t-k}) = \exp(a_1 + b_1 z_{t-k}) \quad 1 + \exp(a_2 + b_2 z_{t-k}) \\
    &P_{21}(Z_{t-k}) = 1 - P_{11}(Z_{t-k}) \quad 1 + \exp(a_2 + b_2 z_{t-k}) \\
    &P_{12}(Z_{t-k}) = 1 - P_{11}(Z_{t-k}) \quad P_{21}(Z_{t-k}) = 1 - P_{21}(Z_{t-k}).
\end{align*}
$$
دریافت فوری
متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات