



# State-dependent effects of fiscal policy in Japan: Do rule-of-thumb households increase the effects of fiscal policy?



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## ABSTRACT

This study empirically investigates whether macroeconomic effects of fiscal policy are affected by the existence of rule-of-thumb households in Japan. Motivated by existing theoretical formulations, we estimate a consumption function as extended to a Markov switching model and divide the sample period into two parts depending on the share of rule-of-thumb (ROT) households. Subsequently, we estimate a Vector Autoregression (VAR) model to investigate the effects of two types of fiscal policy shock: unanticipated and anticipated. The results are subjected to robustness checks and reveal that the share of ROT households rises after large negative shocks (i.e., oil shock, economic bubble burst, Lehman shock), and then (unanticipated) fiscal policy shock stimulates private consumption more effectively in the high ROT households' period.

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## 1. Introduction

Fiscal policy has played an important role worldwide since the economic downturn associated with the financial crisis of 2008–2009, yet its effectiveness remains open to debate. One area of contention is whether fiscal policy has non-linear or state-dependent effects on the economy. The purpose of this paper is to empirically investigate one possibility for such effects: whether the economy's response to fiscal policy depends on its share of “rule-of-thumb (ROT)” households – households whose current consumption depends primarily on current income because of borrowing constraints (Galí et al., 2007).

The analysis conducted in this study is motivated by two strands of literature. The theoretical finding of Galí et al. (2007) is the first one. While most empirical studies represented by Blanchard and Perotti (2002) report positive effects of fiscal stimulus on consumption, the standard Real Business Cycle model (e.g., Baxter and King, 1993) predicts that an increase in government spending lowers private consumption because the rational agents regard an increase in government spending as an increase in tax. This conflict between theoretical and empirical results is known as the government spending puzzle. Galí et al. (2007) replicates this positive response of consumption by incorporating ROT households into a New Keynesian type Dynamic Stochastic General Equilibrium model, and thus presents one way to solve this puzzle. Furthermore, their theoretical model also predicts that the effects of fiscal policy on consumption are enhanced due to the increase in the share of

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ROT households in the economy. The aim of this study is to ascertain whether an empirical analysis pertaining to this real-world phenomenon supports the theoretical prediction in Galí et al. (2007), thus contributing to the policy-making significance of their model.

On the other hand, we also depend on research that investigates the state-dependent effects of fiscal policy conducted by Auerbach and Gorodnichenko (2012), Owyang et al. (2013), and Fazzari et al. (2013).<sup>1</sup> These studies use time-series data to estimate smooth transition or threshold Vector Autoregression (VAR) model that is able to distill state-dependent effects of fiscal policy. As a result, Auerbach and Gorodnichenko (2012) and Fazzari et al. (2013) report that the fiscal multiplier in the United State increases in the recession or in the period of low-capacity utilization. On the other hand, Owyang et al. (2013) examines the state-dependent effects of anticipated fiscal policy shock, i.e., fiscal news shock, and obtains the result that the effectiveness of fiscal news shock does not depend on the unemployment rate in the US economy. We adopt a similar approach and methodology in this study to analyze the state-dependent effects of unanticipated and anticipated fiscal policy.<sup>2</sup>

However, this study is different from previous studies in the following points. First, methodologically we adopt the Markov switching (MS) model to divide the sample period. As explained in more detail below, extending Campbell and Mankiw (1989)'s consumption function to MS model, we divide the sample period into two parts depending on the share of ROT households, that is, high or low ROT household periods. Then, we examine the differences of consumption responses in each state by estimating impulse response functions (IRFs) derived from the VAR model for each sample period. Second, we focus not on a change in the state of economy – such as capacity utilization or unemployment rate – but the change in the share of ROT households. Thus, we are able to investigate the justification of the theoretical model of Galí et al. (2007) and provide a suggestion with respect to the economic structure for the change in the effectiveness of fiscal policy.

The research of Tagkalakis (2008) is also related to our study and focuses on the relationship between the effects of fiscal policy and liquidity constraints; he reports that fiscal policy becomes more effective in a recession when liquidity constraints bind for a large fraction of households. In the study of Tagkalakis (2008), the maximum ratio of loan to the value of house in housing mortgages (LTV ratio) is regarded as a proxy of the degree of credit constraints, and he estimates the static single equation including LTV ratio by using panel data. The advantage of our study is to estimate the share of ROT households directly on the basis of the consumption function presented by Campbell and Mankiw (1989). This share corresponds to the degree of borrowing constraints employed by Galí et al. (2007).<sup>3</sup> Furthermore, we will clarify the dynamic effects of fiscal policy on consumption by using a VAR model.

In this study, we examine the Japanese economy during 1970–2012 for the following reasons. First, the fiscal authority in Japan has implemented a large number of fiscal packages compared with other countries after the economic bubble burst in early the 1990s. Moreover, concerns about the effects of fiscal policy are increasing recently in response to large scale fiscal package implemented by Prime Minister Shinzo Abe. For the above reasons, we choose the Japanese economy. However, it is possible to apply the analysis conducted in this study to other countries.

The empirical results obtained in this study are briefly summarized as follows. The share of ROT households increases after relatively large negative economic shocks (e.g., oil shock, bubble burst, Lehman shock). Moreover, as predicted in the theoretical model of Galí et al. (2007), it turns out that unanticipated fiscal policy becomes more effective in the state of high ROT households. On the other hand, similar to Owyang et al. (2013), there is no strong evidence that the effects of fiscal news shock change depending on the state.

The rest of this study is organized as follows. Section 2 explains the empirical model in detail. In Section 3, we describe our sourcing of the data and specification of the empirical model for the empirical analysis. Section 4 presents our estimation results, where we show the estimated smoothed probability, the estimated parameter values, and the IRFs. In Section 5, as a robustness check, we show the results in the case of time-varying transition probability. Finally, we conclude in Section 6.

## 2. Estimation methodology

### 2.1. Outline

In order to ascertain the state-dependent effects of fiscal policy empirically, we undertake the following methodological steps. First, we estimate Campbell and Mankiw (1989)'s consumption function extended to the Markov switching model, and use the results to divide the sample period on the basis of the share of ROT households. Second, for each sample period, we estimate a VAR model and investigate the effects of fiscal policy using impulse response function (IRF) analysis. The second step leads to the identification of two types of fiscal policy shocks: unanticipated and anticipated. Unanticipated fiscal policy shocks are defined by surprise changes in government spending and, have been analyzed in many previous studies. Existing studies (e.g., Ramey, 2011) point to the importance of fiscal foresight by analyzing the macroeconomic effects of anticipated

<sup>1</sup> In Japan, Kameda (2014) examines the state-dependent effects of fiscal policy using the threshold VAR model as adopted by Fazzari et al. (2013).

<sup>2</sup> With respect to monetary policy, Lo and Piger (2005) report that the effects of monetary policy on output increases in the recession.

<sup>3</sup> Galí et al. (2007) set the share of ROT households in their calibration based on the estimate in Campbell and Mankiw (1989).

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