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The Effects of Anticipated Fiscal Policy Shock on Macroeconomic Dynamics in Japan*

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Abstract

This study investigates the effect of fiscal policy on macroeconomic dynamics in Japan, focusing especially on the effects of anticipated fiscal policy shocks and the recent policies of Abenomics. We identify an anticipated fiscal policy shock by combining excess stock returns for the construction industry and the robust sign-restricted VAR, based on the theoretical model. The primary result is that the dynamics of consumption are explained by the anticipated fiscal policy shock. Further, the results of a historical decomposition focused on the period of Abenomics also reveals that anticipated fiscal shocks positively contribute to the dynamics of consumption.

Keywords: Fiscal policy; DSGE model; fiscal foresight; sign-restricted VAR; Abenomics

JEL codes: E62; H30

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1 Introduction

In the face of the recent global financial crisis, large-scale fiscal stimulus packages, such as the American Recovery and Reinvestment Act, have been implemented worldwide. This situation continues to provoke debate on the macroeconomic effects of fiscal policy all over the world , with the key question; does fiscal policy stimulate economic activity? In order to answer this question, this study uses the vector autoregression (VAR) model to evaluate the effects of fiscal policy by using a macroeconomic time series of the Japanese economy for the sample period 1980Q1 – 2013Q2. Since the collapse of the economic bubble in the early 1990s, the Japanese economy has suffered from a long depression, and a large number of fiscal stimulus packages have been performed through the sample period. In this sense, the Japanese economy is an attractive subject for this research, since there are abundant events to analyze. This is one reason to focus on the Japanese economy.

A second reason is related to the main contribution of this study. Due to the attractiveness, as stated above, there is a rich literature (e.g., Bayoumi 2001; Kuttner and Posen 2002; Watanabe, Yabu and Ito 2011) that has already investigated the effects of fiscal policy in Japan based on VAR analysis. However, these previous works miss the important fact that changes in fiscal policy might be anticipated. As noted in Blanchard and Perotti (2002) and Ramey (2011), fiscal policy entails two lags: the decision lag and the implementation lag. The former indicates a period between the time when a regulation is submitted and the time when it is enacted, while the latter refers to the period from the enactment of the regulation to its actual enforcement. Owing to the existence of the implementation lag, although the fiscal policy has not yet actually been adjusted, there is the possibility that agents know about the change in the fiscal policy and react to it immediately. Therefore, when such an increase in government spending is identified as a surprise shock, this may lead to incorrect results. In line with this, this study examines the effects of fiscal policy while taking into account the possibility that the fiscal policy is anticipated, which is called fiscal foresight. Accordingly, in this study, we investigate the effects of both anticipated and unanticipated fiscal policy shocks.

With respect to fiscal foresight, the Japanese economy has recently experienced a news shock about a large fiscal stimulus package. That is the "Abenomics" policy, which is the economic recovery policy put forth by Prime Minister Shinzo Abe. In fact, stock prices in Japan (Nikkei average) soared to ten thousand yen or more after Shinzo Abe won the general election, in spite of his not yet having implemented any policies. Moreover, the other fiscal stimulus packages in the 1990s and 2000s also affected stock prices, as discussed in Fukuda and Yamada (2011). This evidence tells us that fiscal foresight is the key to understanding the true effects of fiscal policy, at least in Japan. That such findings have been repeatedly observed is the second motivation for analyzing the Japanese economy, in addition to the Abenomics policy itself being an important research target. Of course, the empirical methodology conducted in this study is applicable to the economies of other countries for which there is sufficient data.

We employed the approach of Fisher and Peters (2010) to identify the anticipated fiscal policy shocks. Their idea is as follows. If the financial market is effective and agents are forward looking, the asset prices reflect the information that is currently available. Hence, news about changes in fiscal policies cause fluctuations in the prices of stocks of companies that are affected by the fiscal policy . On the basis of this idea, they identified government (military) spending shocks as innovations on the excess stock returns of large U.S. military contractors. In this study, we apply this identification strategy to the relationship between government spending and the construction industry in Japan. We do this because fiscal policy aiming at an economic stimulus in Japan is usually performed through public works, and those public works are undertaken by the construction industry.

However, there are some caveats regarding the direct application of the Fisher and Peters (2010) method to our analysis. First, as Fisher and Peters (2010) also states, not all variations in stock returns are due to fiscal policy news, because firms sell not only to the public sector but also to the private sector. In addition, stock prices are also influenced by the workings of the entire economy. To resolve this problem, they identify the top three military contractors and determine the excess stock returns as defined by the deviation of the stock returns of these military contractors from the market returns. While we also adopt the excess stock returns concept, the unavailability of data makes it impossible to identify the construction firms that undertake the largest amount of public works projects in Japan. Therefore, to overcome this problem, we adopt the sign-restriction VAR methodology developed by Uhlig (2005). Since the sign-restricted VAR model identifies structural shocks by imposing restrictions on the shape of the impulse response function (IRF), this enables us to isolate the changes in stock returns that result from anticipated fiscal policy shocks involving future increases in government spending. Therefore, we identify anticipated fiscal policy shocks by imposing the condition that excess stock returns rise in the first period, followed by increased government spending.

A second problem that is uniquely associated with this study stems from using the stock returns of the construction industry as a variable in the analysis. In general, the construction industry tends to be affected by the economic situation more than other industries, and thus, the influence of business fluctuations might persist, despite using the excess stock returns. In other words, there is a possibility that stock returns of the construction industry also respond to other shocks. In order to confront this problem, we adopted the robust sign restriction that is employed in Dedola and Neri (2007) and Pappa (2009). In this methodology, sign restrictions are derived from the theoretical model. More precisely, the theoretical IRF for each structural shock is calculated under a sufficiently wide range of parameters, and the features that are common to any combination of parameter values are adopted as robust sign restrictions. Based on the theoretical prediction, we are able to determine the characteristics that distinguish anticipated fiscal policy shocks from other shocks.

Specifically, this study examines the relative importance of fiscal policy shocks in the fluctuation of Japanese businesses and investigates the role of fiscal policy shocks, especially anticipated fiscal shocks, in the recent Abenomics period. For these purposes, we perform a forecast error variance decomposition (FEVD) and a historical decomposition (HD), as well as an IRF analysis. These methods enable us to evaluate the effect of fiscal policy shocks not only qualitatively but also quantitatively.

After Ramey (2011) pointed out that the standard VAR analysis without fiscal foresight fails to capture the true effects of fiscal policy, several papers attempted to estimate the effects of anticipated fiscal policy in the U.S. (e.g., Mountford and Uhlig 2009; Tenhofen and Wolff 2010; Fisher and Peters 2010; Mertens and Ravn 2010). To the best of my knowledge, this is the first paper that estimates the effects of anticipated fiscal policy shocks in Japan. Also, this study makes a theoretical contribution by extending the model of Galí, López-Salido, and Vallés (2007), which is often employed in the literature, to incorporate fiscal news shocks. Moreover, the method presented in this study is widely applicable to the analysis of the economies of other countries.

Our analysis reveals the following. First, as a result of comparing the estimated series of anticipated fiscal policy shocks and the dates of the announcements of fiscal stimulus packages, as reported in Fukuda and Yamada (2011), our identification strategy seems likely to correctly capture the fiscal news shock. Secondly, the IRF analysis reveals that fiscal policy shocks have positive effects on consumption but negative effects on investment. In particular, it turns out that consumption persistently responds positively to anticipated fiscal policy shocks, while investment is crowded out by unanticipated fiscal policy shocks. Thirdly, the results of FEVD also show that anticipated fiscal shocks play a large role in the variation of consumption. Finally, from the results of HD focusing on Abenomics, we confirm that the fiscal news shocks that occurred in 2013Q3 and 2013Q4 positively contributed to consumption.

The reminder of this paper is organized as follows. In Section 2, we present the theoretical model and determine the robust sign restrictions by calculating the theoretical IRFs. Section 3 explains the estimation method of the sign-restricted VAR model and then describes the data series and the specifications of the estimation model employed in this study. Section 4 presents the estimation results of the IRF, FEVD, and HD analyses. Section 5 presents the conclusions.

2 Theoretical Model

In order to determine the robust sign restrictions that characterize a fiscal policy shock, we adopted the methodology used in Dedola and Neri (2007) and Pappa (2009). In line with their method, we first constructed a New Keynesian (NK) model like the one of Galí, López-Salido, and Vallés (2007), and we then determined the common features of the dynamics induced by fiscal policy shocks by calculating the IRFs under various parameterizations.

To replicate the positive response of consumption to an unanticipated government spending shock, as seen in the results of the VAR analysis, the model of Galí, López-Salido, and Vallés (2007) has the following prominent characteristics: price stickiness, rule-of-thumb households, debt financing, and wage unions. In addition to the above features, we incorporated wage stickiness, public capital, and the news process of fiscal policy shocks, and we extended the fiscal and monetary policy rules to include reactions to the output gap. These extensions allow us to obtain the IRFs corresponding to the model of a wider class and thus mitigate the problem of misspecification in the theoretical model. Moreover, the structural shocks other than fiscal policy shocks (i.e., technology, monetary policy, and labor preference shocks) are also included in our model to ensure that the dynamics characterizing fiscal policy shocks are unique and cannot be generated by other shocks.

2.1 Households

We divided households into two types: optimizing or Ricardian (R) households that have access to the capital market, and rule-of-thumb or non-Ricardian (N) households that face liquidity constraints and consume all of their disposable income in each period. A fraction $\mu \in [0, 1]$ of the population are non-Ricardians, and the remaining population $1 - \mu$ are Ricardians.

Let $c_t^R(i)$ and $n_t^R(i)$ be the real consumption of and hours worked by Ricardians who belong to type i labor union. Following Colciago (2011), each household provides a differentiated labor input $n_t(i)$ and obtains a nominal wage $W_t(i)$. Then, Ricardians maximize a lifetime utility

$$U = E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{(c_t^R(i))^{1-\gamma} - 1}{1-\gamma} - \chi_t \frac{(n_t^R(i))^{1+\lambda}}{1+\lambda} \right], \tag{1}$$

subject to the budget constraint

$$P_t c_t^R(i) + P_t i_t^R(i) + B_t^R(i) = W_t(i) n_t^R(i) + P_t r_t^k k_{t-1}^R(i) + R_{t-1} B_{t-1}^R(i) + D_t^R(i) - P_t \tau_t^R(i), \tag{2}$$

and the capital accumulation equation,

$$k_t^R(i) = (1-\delta) k_{t-1}^R(i) + \left\{ 1 - S\left(\frac{i_t^R(i)}{i_{t-1}^R(i)} \right) \right\} i_t^R(i), \tag{3}$$

where χ_t captures the labor preference that follows an exogenous process, and β, γ, and λ denote the discount rate, risk aversion, and inverse of the Frisch labor elasticity, respectively. Capital letters denote nominal variables. P_t, B_t, and R_t are the aggregate price level, a one-period riskless nominal bond, and the gross nominal return on a bond, respectively. Since firms that produce intermediate goods face a monopolistic competition and make excess profits, Ricardians receive dividends $D_t^R(i)$. $\tau_t^R(i)$ denotes the lump-sum taxes paid by Ricardians. $i_t^R(i)$ and $k_t^R(i)$, respectively, denote real investment and real capital stock, and r_t^k is the real rental rate on capital. Unlike Galí, López-Salido, and Vallés (2007), we assumed that the adjustment costs of investment are proportional to the rate of change in the investment, as in Christiano, Eichenbaum, and Evans (2005), where $S(1) = S'(1) = 0$, and $S''(1) > 0$. As mentioned below, most studies using the dynamic stochastic general equilibrium (DSGE) model for Japan adopt this type of investment adjustment cost. Hence, we employ it to more easily calibrate our model.

On the other hand, non-Ricardians simply consume their current disposable income in each period. By denoting the consumption of and hours worked by type i non-Ricardians as $c_t^N(i)$

and $n_t^N(i)$, their budget constraints are written as

$$P_t c_t^N(i) = W_t(i) n_t^N(i) - P_t \tau_t^N(i), \tag{4}$$

where $\tau_t^N(i)$ denotes the lump-sum taxes paid by non-Ricardians.

2.2 Wage setting

As discussed above, each household provides a differentiated labor input indexed by $i \in [0, 1]$ and belongs to labor union i. A perfectly competitive labor-bundling firm bundles a differentiated labor input $n_t(i)$ into an effective labor n_t, according to

$$n_t = \left[\int_0^1 n_t(i)^{\frac{\varepsilon_w - 1}{\varepsilon_w}} di \right]^{\frac{\varepsilon_w}{\varepsilon_w - 1}} \tag{5}$$

where ε_w is the elasticity of substitution across the different types of labor input. As a result of the labor-bundling problem, the demand function for each differentiated labor input is expressed as

$$n_t(i) = \left(\frac{W_t(i)}{W_t} \right)^{-\varepsilon_w} n_t, \tag{6}$$

for all i, and the aggregate nominal wage is equal to

$$W_t = \left[\int_0^1 W_t(i)^{1-\varepsilon_w} di \right]^{\frac{1}{1-\varepsilon_w}}. \tag{7}$$

As in Galí, López-Salido, and Vallés (2007) and Colciago (2011), we assumed that households are distributed uniformly across unions. Namely, the fractions of non-Ricardian and Ricardians are, respectively, μ and $1 - \mu$ in each union.

With respect to wage setting, we followed the model used in Galí, López-Salido, and Vallés (2007) and Colciago (2011), in which each labor union i sets its nominal wage $W_t(i)$ to maximize the weighted average of the lifetime utility of Ricardians and non-Ricardians. In each period, a labor union resets the optimal nominal wage $W_t^*(i)$ with a probability $1-\rho_w$. Thus, the problem for a labor union i is written as

$$\max_{W_t^*(i)} E_t \sum_{s=0}^{\infty} \rho_w \Lambda_{t,t+s} \left[(1-\mu) \frac{c_{t+s}^R(i)^{1-\gamma}-1}{1-\gamma} + \mu \frac{c_{t+s}^N(i)^{1-\gamma}-1}{1-\gamma} - \chi_t \frac{n_{t+s}(i)^{1+\lambda}}{1+\lambda} \right], \tag{8}$$

subject to (2), (4), and (6), where $\Lambda_{t,t+s} = \beta^s (c_{t+s}^R / c_t^R)^{-1}$ denotes the stochastic discount factor. In the symmetric equilibrium, the first-order condition can be expressed as

$$W_t^*(i) = \frac{\varepsilon_w}{\varepsilon_w - 1} \frac{E_t \sum_{s=0}^{\infty} \rho_w^s \Lambda_{t,t+s} \chi_t n_{t+s}^{1+\lambda}}{E_t \sum_{s=0}^{\infty} \rho_w^s \Lambda_{t,t+s} \left[(1-\mu) \frac{n_{t+s}}{P_{t+s} c_{t+s}^{R\ \gamma}} + \mu \frac{n_{t+s}}{P_{t+s} c_{t+s}^{N\ \gamma}} \right]}, \tag{9}$$

and combining this with (7), the evolution of the aggregate nominal wage is given by

$$W_t = [(1-\rho_w) W_t^{*\,1-\varepsilon_w} + \rho_w W_{t-1}^{1-\varepsilon_w}]^{\frac{1}{1-\varepsilon_w}}. \tag{10}$$

Then, the log-linearization of (9) and (10) around the steady state yields the dynamic equation of the real wage as

$$\hat{w}_t = \Gamma \hat{w}_{t-1} + \Gamma \beta E_t \hat{w}_{t+1} + \Gamma \beta E_t \hat{\pi}_{t+1} - \Gamma \hat{\pi}_t + \kappa_w \Gamma \gamma \hat{c}_t + \kappa_w \Gamma \lambda \hat{n}_t + \kappa_w \Gamma \hat{\chi}_t, \tag{11}$$

where a hat denotes the deviation from the steady-state value, $\Gamma = \rho_w/(1+\beta\rho_w^2)$, and $\kappa_w = (1-\beta\rho_w)(1-\rho_w)/\rho_w$.

2.3 Firms

The production sector consists of two types of firms: the monopolistically competitive firms that produce differentiated intermediate goods, and the perfectly competitive firms that produce single final goods by using intermediate goods as the input. Each intermediate-goods firm, indexed by $j \in [0,1]$, produces an intermediate good $y_t(j)$, and its production function is assumed to be the Cobb-Douglas form:

$$y_t(j) = z_t n_t(j)^{1-\alpha} k_{t-1}(j)^{\alpha} {k_{t-1}^g}^{\alpha_g} \tag{12}$$

where $k_{t-1}(j)$ and $n_t(j)$, respectively, denote the capital stock and the labor input used by firm j, and k_{t-1}^g denotes the public capital stock. Also, z_t indicates the total factor productivity (TFP), which is given exogenously.

Although the market for intermediate goods is monopolistically competitive, the factor market faced by intermediate-goods firms is assumed to be competitive. As a result of the cost minimization problem for intermediate-goods firms, the real marginal cost mc_t is given by

$$mc_t = \frac{w_t}{(1-\alpha) A_t k_t^{g\alpha_g}} \left(\frac{(1-\alpha) r_t^k}{\alpha w_t} \right)^{\alpha}. \tag{13}$$

The final-goods firm has the following (CES) technology to produce the final goods y_t:

$$y_t = \left[\int_0^1 y_t(j)^{\frac{\varepsilon_p - 1}{\varepsilon_p}} dj \right]^{\frac{\varepsilon_p}{\varepsilon_p - 1}}, \tag{14}$$

where ε_p is the elasticity of substitution across each type of intermediate goods. By solving a profit maximization problem for the final-goods firm, the demand function for the intermediate goods is obtained as

$$y_t(j) = \left(\frac{P_t(j)}{P_t} \right)^{-\varepsilon_p} y_t, \tag{15}$$

and the final-goods pricing rule is written as

$$P_t = \left[\int_0^1 P_t(j)^{1-\varepsilon_p} dj \right]^{\frac{1}{1-\varepsilon_p}}. \tag{16}$$

2.4 Price setting

As in a wage union, intermediate-goods firms set their prices according to the Calvo (1983) mechanism. An intermediate-goods firm j can change its price with probability $1-\rho_p$, and thus the optimal price $P_t^*(j)$ is determined by solving the problem:

$$\max_{P_t^*(j)} E_t \sum_{s=0}^{\infty} \rho_p^s \Lambda_{t,t+s} \left[P_t^*(j) y_{t+s}(j) - P_{t+s} y_{t+s}(j) mc_{t+s}\right] \tag{17}$$

subject to the demand function (15). The laws of motion for the optimal and aggregate prices are written in way similar to that of wages:

$$P_t^* = \frac{\varepsilon_p}{\varepsilon_p - 1} \frac{E_t \sum_{s=0}^{\infty} \rho_p^s \Lambda_{t,t+s} P_{t+s} y_{t+s}(j) mc_{t+s}}{E_t \sum_{s=0}^{\infty} \rho_p^s \Lambda_{t,t+s} y_{t+s}(j)} \tag{18}$$

and

$$P_t = \left[(1-\rho_p) {P_t^*}^{1-\varepsilon_p} + \rho_p P_{t-1}^{1-\varepsilon_p}\right]^{\frac{1}{1-\varepsilon_p}} . \tag{19}$$

The New-Keynesian Phillips curve is obtained by log-linearization of (18) and (19), as follows:

$$\hat{\pi}_t = \beta E_t \hat{\pi}_{t+1} + \kappa_p \hat{mc}_t \tag{20}$$

where $\kappa_p = (1-\beta\rho_p)(1-\rho_p)/\rho_p$.

2.5 Fiscal policy and Monetary policy

The government budget constraint is

$$P_t \tau_t + B_t = P_t g_t + R_{t-1} B_{t-1} \tag{21}$$

where g_t denotes the real government spending. Also, we assume a tax rule of the form

$$\hat{\tau}_t = \phi_b \hat{b}_{t-1} + \phi_g \hat{g}_t + \phi_y \hat{y}_t \tag{22}$$

where $\hat{\tau}_t \equiv (\tau_t - \tau)/y$, $\hat{b}_t \equiv (\frac{B_t}{P_t} - \frac{B}{P})/y$, and $\hat{g}_t \equiv (g_t - g)/y$. Furthermore, the public capital simply accumulates as follows;

$$k_t^g = (1-\delta)k_{t-1}^g + g_t. \tag{23}$$

On the other hand, the monetary authority is assumed to set the nominal interest rate according to a simple Taylor rule:

$$\hat{r}_t = \psi_\pi \hat{\pi}_t + \psi_y \hat{y}_t + u_t^m, \tag{24}$$

where a hat denotes the log deviation from the steady-state value, and u_t^m denotes a monetary policy disturbance, which is assumed to be exogenous.

2.6 Aggregate and Market clearing

Aggregate consumption, lump-sum taxes, capital, investment, bond, and dividends are given, respectively, by

$$c_t = (1-\mu)c_t^R + \mu c_t^N;\ k_t = (1-\mu)k_t^R;\ b_t = (1-\mu)b_t^R$$
$$\tau_t = (1-\mu)\tau_t^R + \mu \tau_t^N;\ i_t = (1-\mu)i_t^R;\ d_t = (1-\mu)d_t^R.$$

The clearing conditions of the factor and goods market are expressed as

$$n_t = \int_0^1 n_t(j)dj;\ k_t = \int_0^1 k_t(j)dj;$$
$$y_t = c_t + i_t + g_t.$$

2.7 Dynamics of exogenous variables

The dynamics of the exogenous variables g_t, z_t, u_t^m, and χ_t are assumed to be, respectively,

$$\hat{g}_t = \rho_g \hat{g}_{t-1} + \varepsilon_t^g + \xi_{t-q}^g \tag{25}$$

$$\hat{z}_t = \rho_z \hat{z}_{t-1} + \varepsilon_t^z + \xi_{t-q}^z \tag{26}$$

$$\hat{u}_t^m = \rho_m \hat{u}_{t-1}^m + \varepsilon_t^m + \xi_{t-q}^m \tag{27}$$

$$\hat{\chi}_t = \rho_\chi \hat{\chi}_{t-1} + \varepsilon_t^\chi + \xi_{t-q}^\chi \tag{28}$$

where ε_t^k, $k \in [g, z, m, \chi]$ denotes an unanticipated shock in period t, while ξ_{t-q}^k,$k \in [g, z, m, \chi]$ denotes an anticipated shock that is realized in period t but that was announced in period $t-q$.

2.8 Calibration

The sign restrictions imposed on our VAR model were set on the basis of the IRFs derived from the above theoretical model. In order to determine the robust sign restrictions, the IRFs were computed by stating the ranges for certain parameters. By doing so, those IRFs that correspond to various economic situations can be obtained as a combination of these parameter values. Only robust signs were then adopted as the restrictions imposed on the empirical model. The values of the calibration parameters were selected based on the results estimated in previous studies or on the values used in the calibration exercises.

In this paper, a quarter was chosen as the unit period so that it would match the frequency of the data used in the empirical analysis. Previous studies have estimated the degree of risk aversion γ to be in the range from 1.25 (Sugo and Ueda, 2008) to 1.91 (Iiboshi, Nisiyama and Watanabe, 2008). Thus, we restricted γ to the interval $[1, 2]$. The inverse of labor supply substitution λ was estimated to be 2.08 in Iiboshi, Nisiyama, and Watanabe (2008) and 2.15 in Sugo and Ueda (2008), while Galí, López-Salido, and Vallés (2007) adopted 0.5. Thus, in this paper, we restricted λ to the interval $[0.5, 2]$.

The parameter μ indicates the proportion of non-Ricardian households and determines the dynamics of aggregate consumption, as presented in Galí, López-Salido, and Vallés (2007). The value of μ for Japan has been estimated to be 0.3 in analyses that used macro time-series data (Hatano, 2004; Iwata, 2009), but $0.08 - 0.15$ with micro data (Kohara and Horioka, 2006). In consideration of these results, in this study, we limited μ to the interval $[0.1, 0.4]$. The lower and upper bounds of the stickiness of prices and wages were chosen to be 0.2 and 0.9, respectively. The upper was set to be somewhat larger than the value estimated in Iiboshi, Nisiyama, and Watanabe (2008) and Sugo and Ueda (2008), while the lower was set to be consistent with the value in Pappa (2009). Also, the interval for the investment adjustment cost κ was set to be $[0, 0.3]$, centered on the value of 0.15 used in Sugo and Ueda (2008).

The elasticity of taxes to government spending and bonds (i.e., ϕ_g,ϕ_b) were chosen on the basis given in Galí, López-Salido, and Vallés (2007). However, the calibration parameter values in Galí, López-Salido, and Vallés (2007) were based on the U.S. economy. Thus, we adopted wider intervals for these parameters to mitigate this problem. To be specific, the interval for the elasticity of tax to government spending ϕ_g was $[-0.25, 0.25]$ and that to debt ϕ_b was $[0, 0.5]$.[1] On the other hand, the elasticity of tax to output was set to be $[0.125, 0.175]$ based on the results presented in Watanabe, Yabu, and Ito (2011). The parameters that comprise the monetary policy rule were set as follows. The response of the interest rate to inflation was limited to the interval $[1.01, 1.5]$. This range fulfills the Taylor principle, and therefore it is often used in calibration exercises. On the other hand, the intervals of the coefficient on the output gap was set to be $[0, 0.2]$ based on the results in Iiboshi, Nisiyama, and Watanabe (2006) and Sugo and Ueda (2008).

The parameters for the persistency of the exogenous variables and the elasticity of substitution in production and labor were assumed to be in the ranges $[0.8, 0.95]$ and $[6, 11]$, respectively. The remaining parameters were then fixed to particular values. All parameter values and intervals are displayed in Table 1.

[1] In Galí, López-Salido, and Vallés (2007), ϕ_g and ϕ_b were set to be 0.13 and 0.33, respectively.

Table 1: Calibration parameters

Parameter	Value	Description
β	0.99	Subjective discount factor
δ	0.025	Depreciation rate
α	0.3	Share of capital
γ	$[1, 2]$	Risk aversion
λ	$[0.5, 2]$	Inverse labor supply elasticity
α_g	$[0, 0.2]$	Productivity of public capital
κ	$[0, 0.3]$	Investment adjustment cost
μ	$[0.1, 0.4]$	Share of non-Ricardians
ϵ_p	$[6, 11]$	Elasticity of substitution in production
ϵ_w	$[6, 11]$	Elasticity of substitution in labor
ρ_p	$[0.2, 0.9]$	Calvo parameter on prices
ρ_w	$[0.2, 0.9]$	Calvo parameter on wages
ϕ_g	$[-0.25, 0.25]$	Elasticity of tax to government spending
ϕ_b	$[0, 0.5]$	Elasticity of tax to bond
ϕ_y	$[0.125, 0.175]$	Elasticity of tax to output
ψ_π	$[1.01, 1.5]$	Monetary policy response of inflation
ψ_y	$[0, 0.2]$	Monetary policy response of output
ρ_k	$[0.8, 0.95]$	persistency of exogenous shocks

2.9 Sign restrictions

The theoretical IRFs in this paper were calculated as follows. Our process for finding the robust sign restrictions follows that presented by Pappa (2009). Let Θ denote the parameters in the interval $[\theta_l, \theta_u]$. Θ is assumed to be uniformly distributed in the interval $[\theta_l, \theta_u]$, namely $\Theta \sim U(\theta_l, \theta_u)$. We randomly draw Θ and calculate the IRFs. Repeating this process sufficiently many times provides the range of IRFs that corresponds to the combination of the various parameter values.

Figure 1 and Figure 2 display the 68% probability bands for the responses of government spending, deficit, and output to unanticipated (Figure 1) and anticipated (Figure 2) fiscal policy, technology, monetary policy, and labor preference shocks. Fiscal policy and technology shocks indicate a 1% increase in government spending and TFP, while monetary policy and labor preference shocks indicate a 1% decrease in interest rate and labor preference. In the

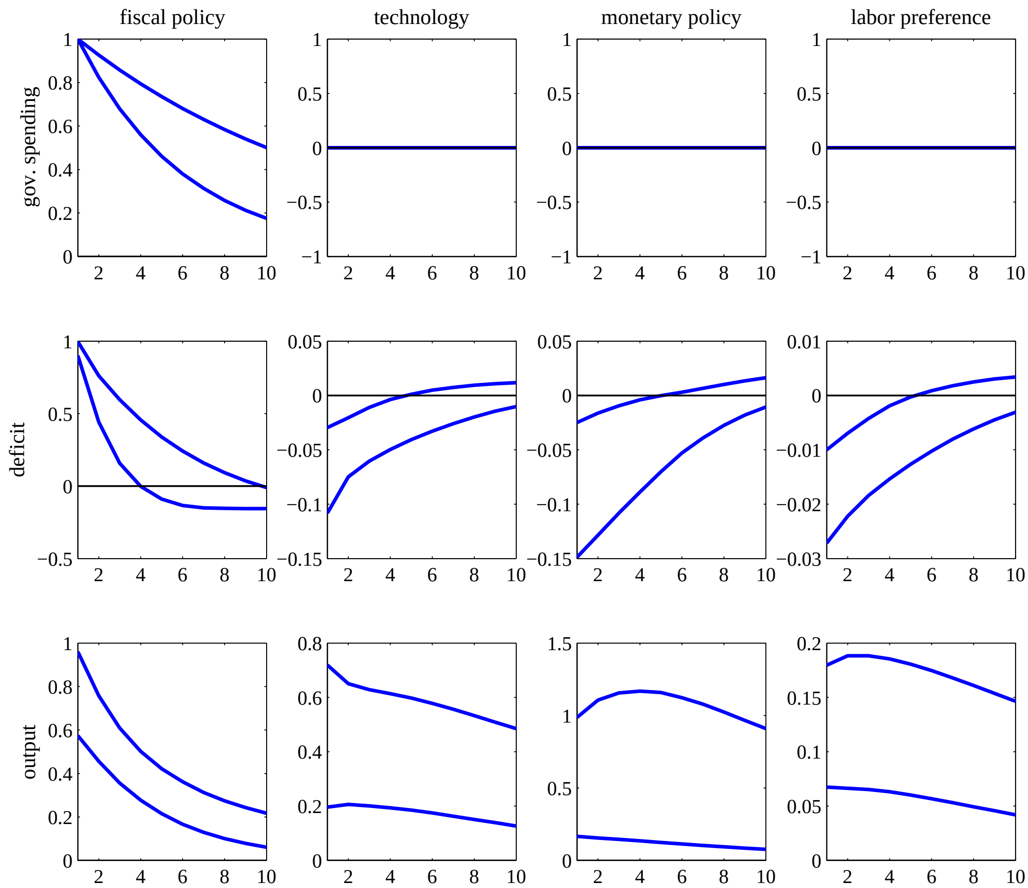

Figure 1: Responses to unanticipated fiscal policy, technology, monetary policy, and labor preference shocks

benchmark calibration, the foresight period p is assumed to be 3, namely, the news announced in the first period is realized in the fourth period. In this exercise, the number of random draws is $10,000$.

In Figure 1, we observe that a positive government spending shock that is financed by a deficit will immediately increase output. This is caused by a negative wealth effect, namely, households increase their labor supply because an increase in government spending lowers their lifetime income and raises output. Therefore, fiscal policy shocks increase deficit and output. By contrast, other structural shocks we considered raised output but decreased the deficit because

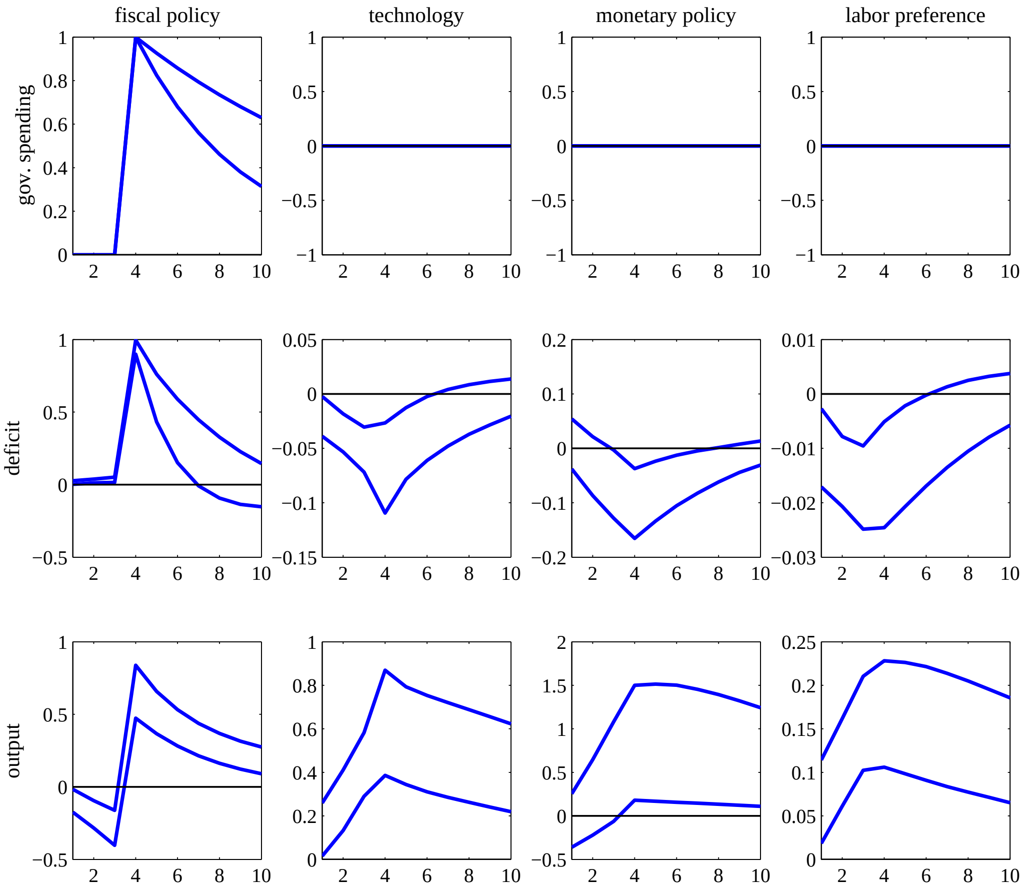

Figure 2: Responses to anticipated fiscal policy, technology, monetary policy, and labor preference shocks

an increase in the output increased the tax revenue through the tax rule. Thus, as stated in Pappa (2009), the responses to a deficit enable us to distinguish fiscal policy from other shocks. As in unanticipated shocks, anticipated fiscal policy shocks can be distinguished from other shocks by using the response to a deficit. As seen in Figure 2, the output indicates there were positive responses to four anticipated structural shocks during the period in which the news was realized. However, the deficit responded positively only to anticipated fiscal policy shocks .

Based on these results and the discussion in Section 1, we imposed sign restrictions to the path of government spending, excess stock returns, the deficit, and the GDP. Table 2 summarizes the sign restrictions that were adopted in the VAR analysis. For the unanticipated

Table 2: Sign restriction

	gov. spending	stock returns	deficit	GDP
unanticipated	> 0 for 1Q		> 0 for 1Q	> 0 for 1Q
anticipated	$= 0$ for 1Q > 0 for 4Q-6Q	> 0 for 1Q	> 0 for 4Q-6Q	> 0 for 4Q-6Q

fiscal policy shocks, the sign restrictions were imposed during the impact period. On the other hand, the restrictions characterizing anticipated fiscal policy shocks were imposed on government spending, the deficit, and the GDP, from the 4th to the 6th period. This is because there is a possibility that the duration of time from the announcement of the news until the change in policy is realized will differ for each fiscal package. Since stock returns are financial variables, a sign restriction is only imposed on stock returns during the impact period, as in Peersman (2005). We also assumed the exogeneity of government spending. In other words, we assumed that government spending was affected by unanticipated fiscal policy shocks only during the impact period. This assumption is widely employed in most of the previous studies (e.g., Blanchard and Perotti 2002, Galí, López-Salido, and Vallés 2007). In our case, this restriction eliminates the situation in which government spending immediately responds to an anticipated fiscal policy shock. If government spending rises during the period in which the news is announced, this increase in government spending is unanticipated. Therefore, this restriction on government spending to anticipated fiscal policy shocks plays an important role in distinguishing between unanticipated and anticipated shocks.

3 Estimation methodology

3.1 Sign-restricted VAR model

The sign-restricted VAR model is estimated by the following process. First, we estimate the reduced-form VAR model:

$$Y_t = B_1 Y_{t-1} + B_2 Y_{t-2} + \cdots + B_p Y_{t-p} + u_t \tag{29}$$

$$u_t = A_0 \varepsilon_t \tag{30}$$

$$u_t \sim N(0, \Sigma),\ \ \varepsilon_t \sim N(0, I) \tag{31}$$

where Y_t is a vector of endogenous variables that include (in this order) government spending, excess stock returns of the construction industry, the deficit, the GDP, private consumption, and nonresidential investment; $B = [B_1, \cdots, B_p]$ are matrices with coefficients; and u_t is a vector of the reduced-form residuals of the variance-covariance matrix, Σ. A_0 is a lower triangular matrix obtained from the Cholesky decomposition of Σ, and ε_t is a vector of structural shocks that are mutually independent and normalized to be of variance 1.

Next, we draw random samples of B and Σ from their posterior distributions. Using the noninformative Normal-Wishart family as the prior distribution, the posterior distributions of $vec(B)$ and Σ^{-1}, respectively, become $N(vec(\hat{B}), \hat{\Sigma} \otimes (X'X)^{-1})$, and $W(\hat{\Sigma}^{-1}/T, T)$, where $\hat{B}$ and $\hat{\Sigma}$ are OLS estimators, X is the matrix of the explanatory variables, and T is the sample size. For each draw, we then calculate the structural shocks and the matrix of contemporaneous relations among the endogenous variables. In this step, we randomly generate the orthogonal matrix Q, such that $Q'Q = I$. Using this matrix, eq. (30) can be rewritten as

$$u_t = A_0 Q' Q \varepsilon_t = A \tilde{\varepsilon}_t. \tag{32}$$

Then,

$$E\left[A\tilde{\varepsilon}_t\tilde{\varepsilon}_t'A'\right] = E\left[A_0Q'Q\varepsilon_t\varepsilon_t'Q'QA_0'\right] = A_0'A_0 = \Sigma. \tag{33}$$

Therefore, we construct a new set of structural shocks $\tilde{\varepsilon}_t$ and contemporaneous relations A that maintain the variance-covariance structure. Some values of the IRFs can be calculated from the set of (B, Σ) by randomly generating a Q matrix.

In order to achieve the exogeneity of government spending, we additionally impose an assumption on the elements of Q, as follows:

$$Q = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & q_1 & q_2 & q_3 & q_4 & q_5 \\ 0 & q_6 & q_7 & q_8 & q_9 & q_{10} \\ 0 & q_{11} & q_{12} & q_{13} & q_{14} & q_{15} \\ 0 & q_{16} & q_{17} & q_{18} & q_{19} & q_{20} \\ 0 & q_{21} & q_{22} & q_{23} & q_{24} & q_{25} \end{bmatrix}. \tag{34}$$

The new contemporaneous relation A obtained by multiplying Q by the lower triangular matrix

A_0 becomes

$$A = A_0 Q' = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & a_1 & a_2 & a_3 & a_4 & a_5 \\ 0 & a_6 & a_7 & a_8 & a_9 & a_{10} \\ 0 & a_{11} & a_{12} & a_{13} & a_{14} & a_{15} \\ 0 & a_{16} & a_{17} & a_{18} & a_{19} & a_{20} \\ 0 & a_{21} & a_{22} & a_{23} & a_{24} & a_{25} \end{bmatrix}. \qquad (35)$$

Under this form of A, the exogeneity of government spending is always assured.

Furthermore, the present paper generates a Q matrix using the following procedure. Let q be defined as

$$q = \begin{bmatrix} q_1 & q_2 & q_3 & q_4 & q_5 \\ q_6 & q_7 & q_8 & q_9 & q_{10} \\ q_{11} & q_{12} & q_{13} & q_{14} & q_{15} \\ q_{16} & q_{17} & q_{18} & q_{19} & q_{20} \\ q_{21} & q_{22} & q_{23} & q_{24} & q_{25} \end{bmatrix}. \qquad (36)$$

This matrix is also an orthogonal matrix similar to Q. In order to generate q, we use the method adopted in Peersman (2005). For a 5×5 Givens matrix Q_{12}, Q_{13}, Q_{14}, Q_{15}, Q_{23}, Q_{24}, Q_{25}, Q_{34}, Q_{35}, Q_{45}, where $Q_{ij}(\theta)$ is a matrix with $cos(\theta)$ as the (i,i)-th and (j,j)-th elements, $-sin(\theta)$ as the (j,i)-th element, and $sin(\theta)$ as the (i,j)-th element. The diagonal element of this matrix is one, while the off-diagonal elements are equal to zero. Then, the Q matrix is defined as

$$Q = \prod_{i,j} Q_{ij}(\theta_k)$$

where $\theta_k, k = 1, \cdots, 10$, are drawn randomly from a uniform distribution $U(0, 360)$.

Finally, the IRFs are calculated based on each draw (B, Σ, A). If they satisfy the sign restriction in Table 2, they are valid IRF candidates and are preserved; otherwise, they are discarded. By repeating the above processes, the IRFs that are consistent with the sign restriction imposed in Table 2 are obtained. In this paper, there were 300 random draws for generating B and Σ, and 500 for generating A.

3.2 Data and Specification

We used quarterly data of government spending, GDP, private consumption, nonresidential investment, tax revenue, and excess stock returns of the construction industry for the period 1980Q1-2013Q2. The series, except for the excess stock returns, are real, seasonally adjusted per capita, and logarithmized. The first five variables were downloaded from the System of National Accounts (SNA) database in Japan. The series of tax revenues were obtained from the Monthly Finance Review issued by the Ministry of Finance, Japan. The deficit in the VAR model is defined as the log differential of government spending and tax revenue. The data on excess stock returns was calculated as follows. First, the quarterly average of the stock prices in both the construction industry and the whole market were computed by using the closing prices of the daily data. We then obtained the series of stock returns as the growth rate of stock prices, based on this quarterly data. Finally, following Fisher and Peters (2010), we constructed the excess stock returns by subtracting the returns of the construction industry from the returns of the whole market. Similar to the method in Fisher and Peters (2010), the accumulated excess stock returns were employed to discern noise and low-frequency movements. The data used in this study is described in Figure 3.

The estimated system is a six-variable VAR that includes linear and quadratic time trends as well as a constant term. In order to detrend the data series so that it is consistent with the DSGE model presented above, we incorporated the time trends into the estimation system. Based on the claim of Sims, Stock, and Watson (1990) that taking the differences in a time series may result in the loss of important information, the estimation was carried out in levels.

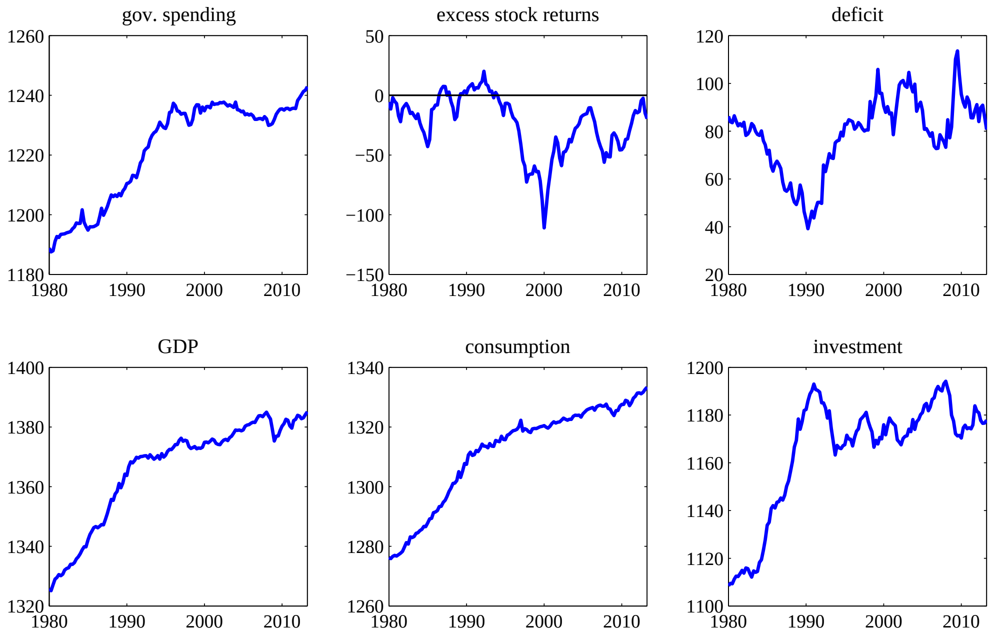

Figure 3: The data used in VAR model

Although the Akaike information criterion suggests two lags, we set the number to four in order to sufficiently capture the effects of fiscal policy on the dynamics. In this framework, we identified two types of fiscal policy shocks: unanticipated and anticipated.

4 Empirical results

4.1 Estimated structural shock

Figure 4 shows a plot of the estimated series of anticipated fiscal policy shocks, where the solid blue line and dotted red line denote the estimated series and one standard deviation, respectively. We first confirm that our identification method correctly captures the news shock about fiscal policies.

Fukuda and Yamada (2011) reported the dates of the announcements of fiscal stimulus packages between 1992 and 2010. We compared the series of anticipated fiscal policy shocks and the dates of announcement. In the estimated series of anticipated fiscal policy shocks,

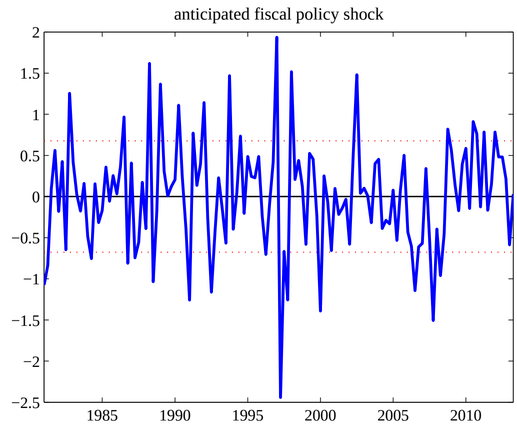

Figure 4: The series of structural shocks

between 1992 and 2010, there are eleven positive shocks that exceed one standard deviation. Among them, five shocks (in 1992Q1, 1998Q1, 2008Q4, 2010Q3, and 2010Q4) correspond to the date reported in Fukuda and Yamada (2011), and two shocks (in 1993Q4 and 2002Q3) only roughly correspond to the reported dates. Moreover, for these latter two shocks, the fiscal stimulus packages were announced in the period after these shocks were observed . Since the date reported in Fukuda and Yamada (2011) is the day that the outline of a fiscal package was published in a newspaper, there is a possibility that people foresaw the implementation of the fiscal policy prior to that day. Taking this possibility into account, we can consider that the latter two shocks also correctly capture the news shock about a fiscal policy. Therefore, it seems that our identification method adequately captures anticipated fiscal policy shocks, as far as the estimated series of the shock is observed .

4.2 Impulse response function

The impulse response functions for unanticipated and anticipated fiscal policy shocks are displayed in Figure 5 and Figure 6, respectively. The solid blue lines and shaded areas indicate the median of sampled IRFs and the 68 percent credible intervals, respectively. In addition, we plotted the IRFs that were the closest (in terms of minimizing the sum of the squares of the differences) to the median responses among those obtained in each admissible rotation, as shown by the red dotted line, in order to overcome the following problem. As pointed out by Fry and Pagan (2011) and Inoue and Kilian (2011), the median responses in the sign-restricted VAR model summarize the information from different structural models because each IRF is computed based on a different rotation matrix. In other words, the response that fully corresponds to the median might not exist in the set of admissible structural models, and thus the inferences using the median response might fail to lead to correct results. However, in our case, this problem is deemed to be less serious because the median responses and the closest ones share similar dynamics. In addition, the ratio of valid draws to all draws is 1.62% in this estimation.

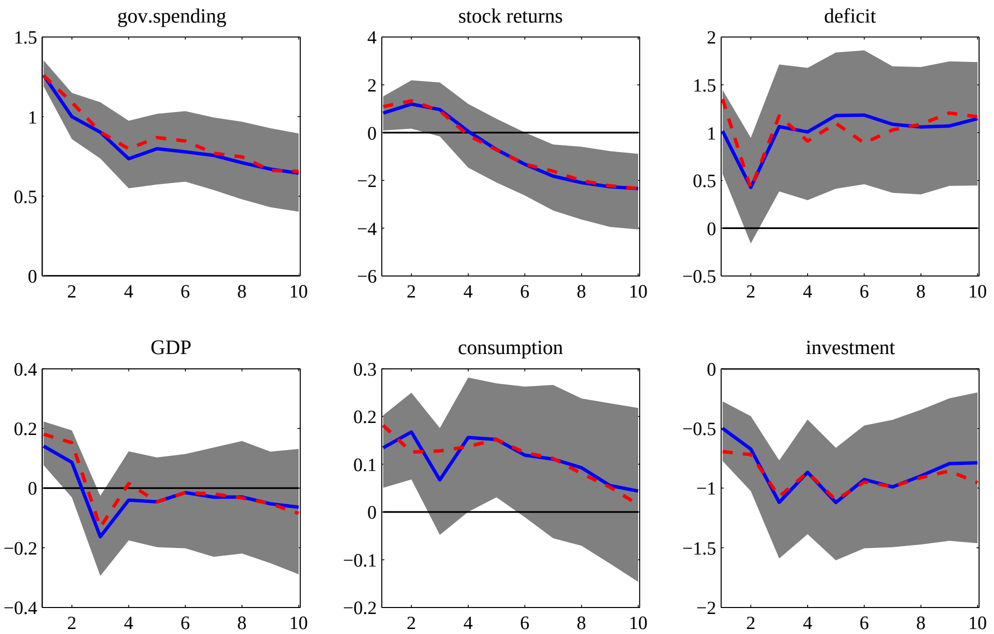

Figure 5: Responses to unanticipated fiscal policy shock

In Figure 5, we see that government spending and the deficit both rose persistently beyond the first period in which the restrictions were imposed. This means that government spending was financed by issuing the debt. According to the sign restrictions, output has a positive sign during the impact period, but there is no persistency in its responses. The response of consumption also indicates a positive sign in response to unanticipated fiscal policy shocks.

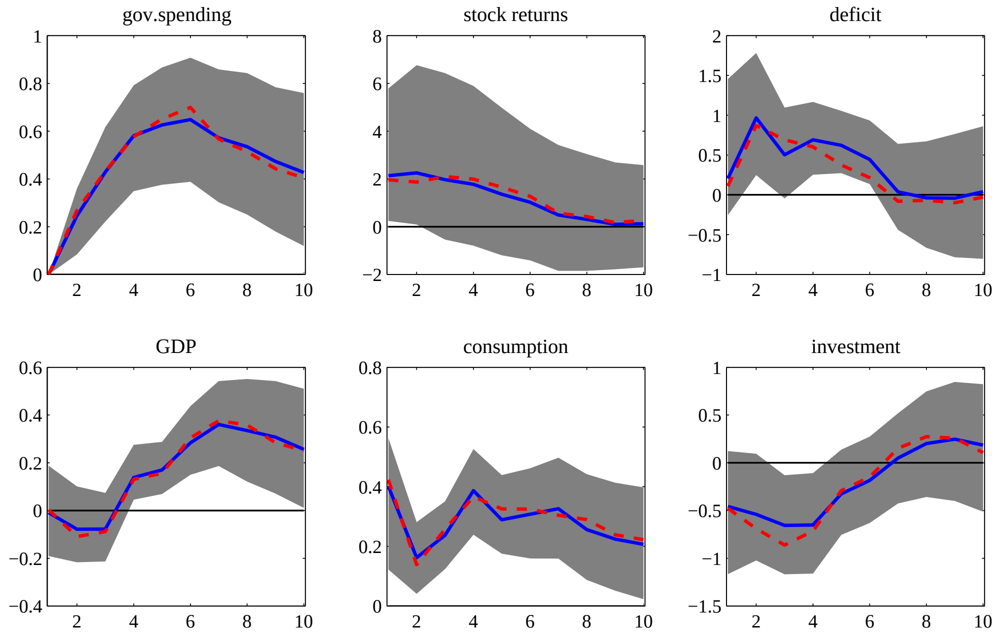

Figure 6: Responses to anticipated fiscal policy shock

Contrary to output, however, consumption rises persistently in response to unanticipated fiscal policy shocks. It increases significantly for about one year, except for the third period. These positive responses of consumption are in accord with the findings for the U.S. that are presented in Blanchard and Perotti (2002) and Galí, López-Salido, and Vallés (2007). In return, investment is crowded out by an increase in government spending, as predicted by the theory. It is considered that the reductions in investment cause the transitory effects in output. In addition, the excess stock returns rise significantly for the first two quarters.

Figure 6 shows the impulse response functions for anticipated fiscal policy shocks. Unlike the case of unanticipated fiscal policy shocks, government spending gradually increases and peaks during the sixth period, and thus describes a hump-shaped response. The deficit and stock returns are confirmed to be following the sign restrictions. During the impact period, consumption rises but investment falls, and thus output hardly changes in response to the shock. Output has a positive sign from the fourth to the sixth periods following the restriction, and then it rises significantly after the sixth period. The response of consumption to an anticipated fiscal policy shock is most interesting. In response to good news about a future fiscal policy, consumption rises immediately and remains significantly positive. Compared to an unanticipated fiscal policy shock, the persistency of response in consumption is pretty high. These findings are consistent with those in Fisher and Peters (2010), but they are inconsistent with those in Ramey (2011). Finally, investment falls, as is also seen in unanticipated fiscal policy shocks. However, its responses are insignificant except for during the third and fourth periods. Unlike the case with consumption, therefore, it seems that unanticipated fiscal policy shock plays an important role in the dynamics of investment.

4.3 Forecast error variance decomposition

The results of FEVD are summarized in Table 3 and Table 4. The estimated time horizon is 10 quarters, as in the earlier IRF analysis. This table shows the relative importance of each shock in terms of the variations in each variable. To overcome the problem mentioned above, we performed the FEVD for every admissible rotation and then took their medians. Therefore, the presented results indicate the median value across all decompositions.

Table 3: Forecast error variance decomposition -unanticipated fiscal policy shock-

	gov. spending	stock returns	deficit	GDP	consumption	investment
1	100.0	1.2	5.3	2.3	2.4	3.6
2	94.0	1.9	4.1	2.1	4.4	5.4
3	83.7	1.7	5.7	3.4	4.1	8.0
4	72.3	2.1	6.0	3.0	4.1	8.2
5	65.8	2.3	7.1	2.9	4.1	8.6
6	61.3	2.8	7.6	2.7	3.7	8.4
7	58.1	3.3	8.1	2.7	3.7	8.9
8	55.3	4.1	8.4	2.6	3.7	9.3
9	53.4	5.1	8.7	2.5	3.5	9.2
10	52.9	6.3	9.3	2.4	3.6	9.0

The principal finding is that anticipated fiscal policy shocks explain about 15% to 20% of the forecast error variances in consumption. Anticipated shocks play a greater role in the variation

Table 4: Forecast error variance decomposition -anticipated fiscal policy shock-

	gov. spending	stock returns	deficit	GDP	consumption	investment
1	0.0	9.3	1.1	1.6	21.6	4.0
2	2.1	8.0	3.5	2.1	17.7	4.8
3	6.3	7.1	3.5	2.3	17.1	4.6
4	10.7	7.1	3.9	2.9	19.0	4.6
5	14.0	7.1	3.9	3.6	18.5	4.1
6	16.3	7.9	3.8	4.9	17.8	3.8
7	17.4	8.4	3.6	6.3	17.7	3.6
8	18.0	8.9	3.6	7.0	16.6	3.7
9	18.3	9.5	3.8	7.2	15.8	3.8
10	18.1	9.7	4.1	7.3	15.1	3.8

of consumption than do unanticipated shocks. As with consumption, the variation of output is also explained by anticipated shock rather than by unanticipated shock. In particular, this tendency becomes clearer after the fourth period, when the news shock is realized. Investment is affected by unanticipated shocks. This is consistent with the result of the IRFs, in which unanticipated fiscal policy shocks significantly crowd-out investments.

Most of the variation in government spending can be explained by unanticipated fiscal policy shocks, but the ratio explained by anticipated shocks increases after the news shock has been realized. Finally, about 10% of the variation in stock returns is explained by anticipated fiscal policy shocks. In other words, not all of the variations in stock returns are caused by news shocks about fiscal policy. Therefore, this result justifies our identification method, which combines sign restrictions with the ideas presented in Fisher and Peters (2010).

4.4 Historical decomposition

Finally, we present the results of a HD in order to clarify the effects of Abenomics, especially with anticipated fiscal policy shocks. Figure 7 shows the HD of the data before 2012Q2 for government spending, stock returns, the deficit, the GDP, consumption, and investment conditioning. Similar to the FEVD, the presented results are the median values across all decompositions. In

Figure 7, the blue and red bars indicate the contribution of the unanticipated and anticipated shocks, respectively.

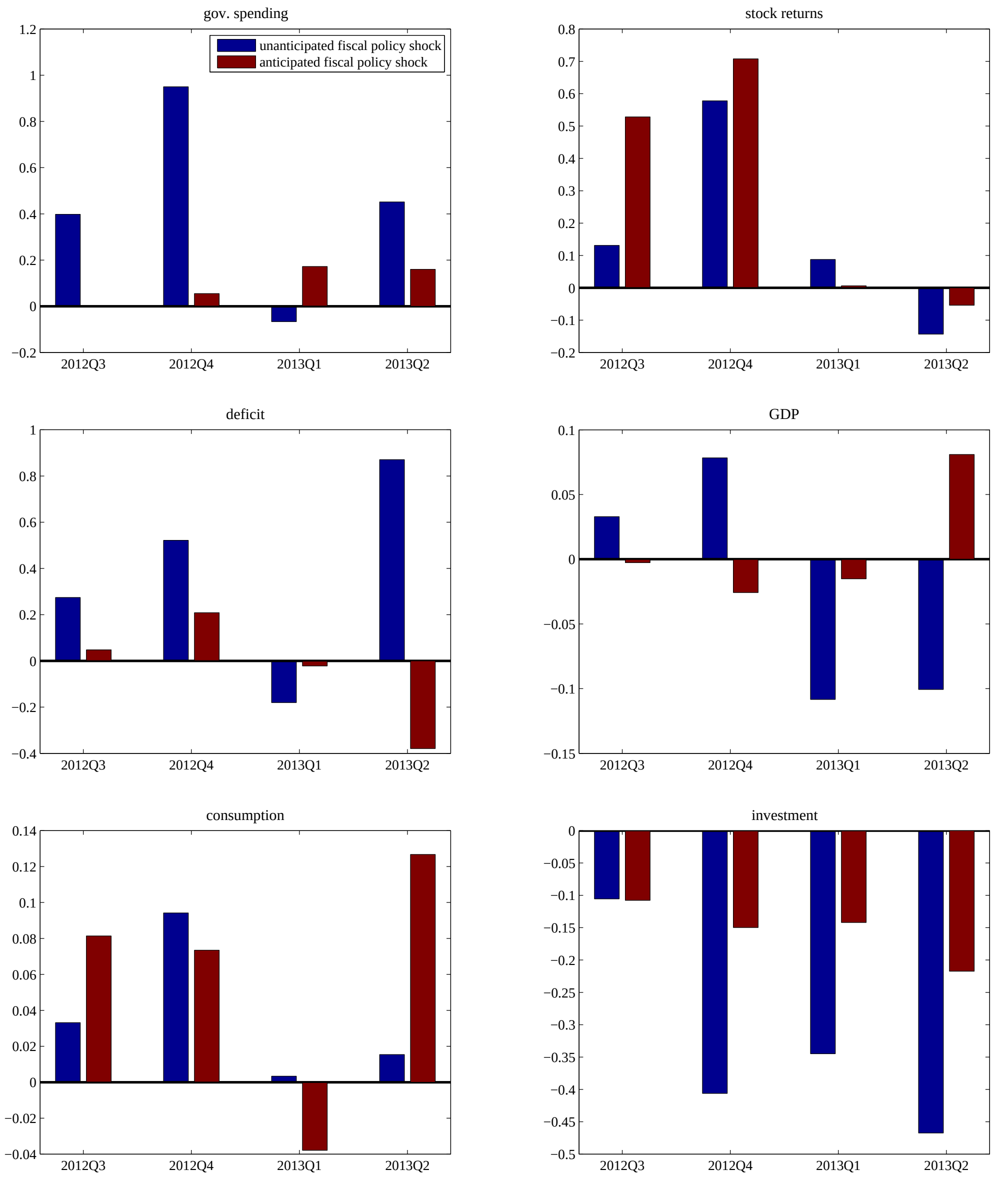

Figure 7: Historical decomposition conditioning on the data before 2012Q2

First of all, we observe the positive contributions of anticipated fiscal policy shocks to the stock returns during 2012Q3 and 2012Q4, when Prime Minister Shinzo Abe won the presidency of the Liberal Democratic Party (LDP) and the general election in the Lower House. Not surprisingly, government spending was not much affected by the anticipated shock during this time. Moreover, the anticipated fiscal policy shocks that occurred in 2012Q3 and 2012Q4 positively and immediately contributed to the dynamics of consumption. On the other hand, the effect on output shows up gradually, and the positive contribution was observed in 2013Q2. The results that were observed in both consumption and output conform to the findings in the IRF and FEVD. Investment showed negative effects of influence during the estimated periods. Finally, we found that the variation in the deficit is affect by unanticipated fiscal policy shocks in the same way as in government spending and investment.

5 Conclusion

This study analyzed the effects of fiscal policy in Japan, in particular, shedding light on the effects of anticipated fiscal policy shocks. We identified anticipated increases in government spending by using excess stock returns in the construction industry and by employing the robust sign restrictions based on a variant of the NK model of Galí, López-Salido, and Vallés (2007).

We summarize the main results as follows. First, the identification method presented in this study is likely to capture anticipated fiscal policy shocks because the estimated series of anticipated shocks roughly corresponds to the date of announcement for fiscal packages. Second, we discovered that consumption persistently shows a positive sign in response to anticipated fiscal policy shocks. This finding is evidence that people react to fiscal news shocks immediately, and it emphasizes the importance of taking fiscal foresight into consideration. Third, the results of FEVD also show the importance of anticipated fiscal policy shocks in the movement of consumption. In addition, the result that not all variations in stock returns can be explained by that shock justifies our hybrid method that incorporates the ideas in Fisher and Peters (2010) into a sign-restricted VAR. Finally, the results of the HD featuring the Abenomics period reveals that a positive anticipated fiscal policy shock occurred in 2012Q3 and 2012Q4, and that it immediately contributed to consumption. Moreover, that shock had a positive effect on the GDP in 2013Q2.

In conclusion, our results imply that anticipated fiscal policy shocks have expansionary effects on consumption, and previous works that ignored fiscal foresight may have underestimated the effects of fiscal policy. Therefore, future evaluations of macroeconomic policy should take fiscal foresight into consideration in order to obtain the true effects. Finally, a detailed investigation of the effects of Abenomics using more sample periods remains as an area of future research.

References

[1] Bayoumi, T., "The Morning After: Explaining the slowdown in Japanese growth in the 1990s," *Journal of International Economics* 53(2) (2001), 241-259.

[2] Blanchard, O.J., and R. Perotti, "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *Quarterly Journal of Economics* 117(4) (2002), 1329-68.

[3] Calvo, G.A., "Staggered Prices in a Utility-Maximizing Framework," *Journal of Monetary Economics* 12(3) (1983), 383-98.

[4] Christiano, L., M. Eichenbaum, and C.L. Evans, "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy* 113(1) (2005), 1-45.

[5] Colciago, A., "Rule-of-Thumb Consumers Meet Sticky Wages," *Journal of Monetary, Credit and Banking* 43(2)-(3) (2011), 325-53.

[6] Dedola, L., and S. Neri, "What Does a Technology Shock Do? A VAR Analysis with Model-based Sign Restrictions," *Journal of Monetary Economics* 54(2) (2007), 512-49.

[7] Fisher, J.D.M., and R. Peters, "Using Stock Returns to Identify Government Spending Shocks," *Economic Journal*, 120(544) (2010), 414-36.

[8] Fry, R., and A. Pagan, "Sign restrictions in Structural Vector Autoregressions: A Critical Review," *Journal of Economic Literature*, 49(4) (2011), 938-60.

[9] Fukuda, S., and J. Yamada, "Stock Price Targeting and Fiscal Deficit in Japan: Why Did the Fiscal Deficit Increase during Japan's Lost Decades?" *Journal of the Japanese and International Economies* 25(4) (2011), 447-464.

[10] Galí, J., D. López-Salido, and J. Vallés, "Understanding the Effects of Government Spending on Consumption," *Journal of the European Economic Association* 5(1) (2007), 227-270.

[11] Hatano, T., "The Macroeconomic Effects of Deficit," *Financial Review* 74, 65-91 (In Japanese).

[12] Iiboshi, H., S. Nishiyama, and T. Watanabe, "An Estimated Dynamic Stochastic General Equilibrium Model for the Japanese Economy: A Bayesian Analysis," Mimeo, 2008.

[13] Inoue, A., and L. Kilian, "Inference on Impulse Response Functions in Structural VAR model," CEPR Discussion Papers 8419, 2011.

[14] Iwata, Y., "Fiscal Policy in an Estimated DSGE Model of Japanese Economy: Do Non-Ricardian Households Explain All?" ESRI Discussion Paper Series No.216, 2009.

[15] Kohara, M., and C.Y. Horioka, "Do Borrowing Constraints Matter? An Analysis of Why the Permanent Income Hypothesis Does Not Apply in Japan," *Japan and the World Economy* 18(4) (2006), 358-77.

[16] Kuttner, K.N., and A.S. Posen, "Fiscal Policy Effectiveness in Japan," *Journal of the Japanese and International Economies* 16(4) (2002), 536-58.

[17] Mertens, K., and M.O. Ravn, "Measuring the Impact of Fiscal Policy in the Face of Anticipation: A Structural VAR Approach," *Economic Journal* 120(544) (2010), 393-413.

[18] Mountford, A., and H. Uhlig, "What are the Effects of Fiscal Policy Shock?" *Journal of Applied Econometrics* 24(6) (2009), 960-92.

[19] Pappa, E., "The Effects of Fiscal Shocks on Employment and the Real Wage," *International Economic Review* 50(1) (2009), 217-44.

[20] Peersman, G., "What Caused the Early Millennium Slowdown? Evidence Based on Vector Autoregressions" *Journal of Applied Econometrics* 20(2) (2005), 185-207.

[21] Ramey, V., "Identifying Government Spending Shocks: It's All in The Timing," *Quarterly Journal of Economics* 126(1) (2011), 1-50.

[22] Sims, C.A., J. Stock, and M. Watson, "Inference in Linear Time Series Models with Some Unit Roots," *Econometrica* 58(1) (1990), 113-44.

[23] Sugo, U., and K. Ueda, "Estimating a Dynamic Stochastic General Equilibrium Model for Japan," *Journal of the Japanese and International Economies* 22(4) (2008), 476-506.

[24] Tenhofen, J., and G.B. Wolff, "Does Anticipation of Government Spending Matter? The role of (non-) Defense Spending," Bonn econ discussion papers No.12, 2010.

[25] Uhlig, H., "What are the Effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure," *Journal of Monetary Economics* 52(2) (2005), 381-419.

[26] Watanabe, T., T. Yabu, and A. Ito, "Estimation of Fiscal Multiplier based on Institution Information," Ihori, T. *Fiscal Policy and Social Insurance*, Economic and Social Research Institute, Cabinet Office, Government of Japan (2011) (in Japanese).