Time-Varying Effects of Japanese Corporate Tax Changes

Yang, Ranran

(Citation)
国民経済雑誌,227(5):1-14

(Issue Date)
2023-09-10

(Resource Type)
departmental bulletin paper

(Version)
Version of Record

(JaLCDOI)
https://doi.org/10.24546/0100483201

(URL)
https://hdl.handle.net/20.500.14094/0100483201

ISSN 0387-3129

国民経済雑誌

THE
KOKUMIN-KEIZAI ZASSHI
(JOURNAL OF ECONOMICS & BUSINESS ADMINISTRATION)

Time-Varying Effects of Japanese Corporate Tax Changes

Ranran Yang

Refereed Article
Received 11 March 2022 Accepted 13 February 2023

The Kokumin-Keizai Zasshi
(*Journal of Economics & Business Administration*)
Vol. 227, No. 5 (September, 2023)

神戸大学経済経営学会

The Kokumin-Keizai Zasshi (*Journal of Economics & Business Administration*)
Vol. 227, No. 5 (September, 2023), 1-14

Time-varying effects of Japanese corporate tax changes

Ranran Yang[a]

Refereed Article
Received 11 March 2022 Accepted 13 February 2023

This paper uses data from 1994 to 2019, when corporate tax cut policies were implemented in Japan, aiming to examine and clarify the effect of corporate tax cuts on the Japanese economy. The estimation used in this study is based on a time-varying parameter vector autoregression (TVP-VAR) model. This enables estimating the effect of corporate tax shocks over time and identifying corporate tax rate reductions at different periods to test the shape and size of the shocks in these specific periods. The empirical results demonstrate that the effects of corporate tax vary over time. Overall, corporate tax shocks affect corporate R&D investment, corporate equipment investment, and GDP positively, while providing evidence for the Keynesian economic theory that the expansionary fiscal policy positively impact output. Furthermore, based on the estimation of the cumulative corporate tax multiplier, the result indicates that it does not fully vary over the Japanese business cycle.

Keywords Japanese corporate tax, fiscal policy, TVP-VAR

1 Introduction

1. 1 Background

Since the early 1990s, Japan has experienced low economic growth for 20 years. This period is also known as the "two lost decades"[1)]. In the early 1990s, the Japanese bubble economy, which was caused by the asset price bubble, collapsed resulting in low economic growth. In the 2000s, as the balance sheets were adjusted, the Japanese economy showed a sustainable recovery. However, Lehman Brothers bankruptcy hit the world's financial markets hard in 2008, and

a Graduate School of Economics, Kansai University, yangmumugo@gmail.com

then the global financial crisis has swept the world. Because of the global financial crisis, Japan's economy fell sharply again, and economic growth was sluggish. Thus, in December 2012, the Abe Cabinet advocated Abenomics[2)], which was based on "three arrows". The third arrow in "three arrows" refers to "a growth strategy to stimulate private investment", one of which is corporate tax cuts. Corporate tax refers to the taxes levied on income generated by the activities of a corporation. In September 2015, the Abe Cabinet announced implementation of the "new three arrows" as the second stage of Abenomics, and "three arrows" is included the "new three arrows". This demonstrates that the corporate tax cut policy is an important measure for the government to regulate the economy.

1. 2 Japan's economic situation and corporate tax cut policy

Figure 1. GDP and GDP growth rate in Japan

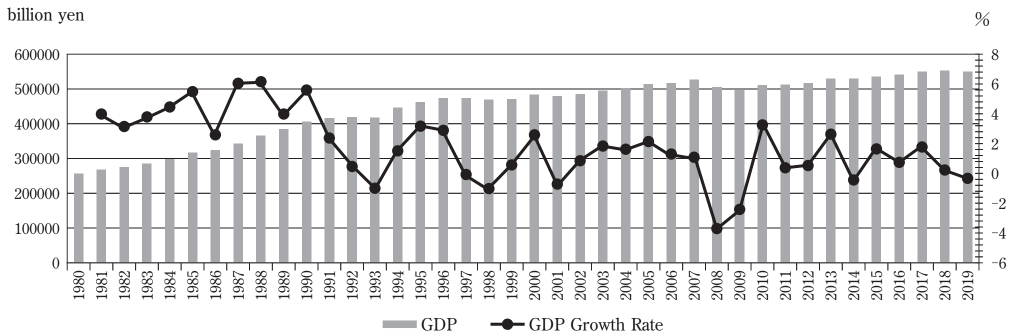


Figure 1 shows the changes in GDP (fiscal year) and the GDP growth rate (fiscal year) from 1980 to 2019 in Japan. Before the 1990s, GDP was growing significantly. Since the 1990s, it has grown slowly. From the GDP growth rate, we can clearly see the growth in GDP. Prior to 1990, the growth rate was relatively high. Japan's economy had developed during this period. However, from 1990 to 1993, from 1996 to 1998, and from 2007 to 2008, three significant drops in GDP growth occurred. The bursting of the bubble economy in Japan largely explained the sharp decline from 1990 to 1993. Moreover, the significant drop in GDP from 1996 to 1998 was mainly caused by the Asian financial crisis, and the consumption tax hike in 1997 may also be the cause. Furthermore, regarding the significant drop in GDP from 2007 to 2008, it is thought that the global financial crisis was the cause of it. The global financial crisis around 2008 caused the economic collapse of the nations around the world, including Japan. After the global financial crisis, the Japanese economy began to recover and has been growing at a low and intermittent rate.

Furthermore, the corporate tax cut policy has been implemented to regulate the economy, as shown in Table 1. The table is based on Uematu (2020).

Table 1. The change of corporate tax rate

Period	Corporate tax rate
1990.4	37.5%
1998.4	34.5%
1999.4	30.0%
2012.4	25.5%
2015.4	23.9%
2016.4	23.4%
2018.4	23.2%

From Table 1, we can see that the corporate tax rate has been reduced from 1990 to 2018. According to Keynesian economic theory, corporate tax cuts are an expansionary fiscal policy that simulates the economy.

Moreover, corporate equipment investment plays an important role in GDP. The corporate tax cut would firstly have the effect of boosting the macro-economy by increasing corporate equipment investment, as it would be accompanied by a reduction in the cost of funds. The corporate tax cut is also likely to boost the investment in R&D, and technological progress depends on investment in R&D.

Hence, it is necessary to clarify and quantify the effects of the corporate tax cuts on corporate R&D investment, corporate equipment investment, and gross domestic product (GDP). The time-varying parameter vector autoregression (TVP-VAR) model enables us to capture the pattern and size of the time-variation in the corporate tax effects and study the effects of corporate tax rate reductions in different periods.

1. 3 Literature review

Kuttner and Posen (2002) examines the effectiveness of fiscal policy in Japan from 1976 to 1999 by analyzing real GDP, tax revenues, and public expenditures based on a structural VAR model. The estimation results suggest that the expansionary fiscal policy has a significant positive effect, especially tax cuts, as the tax cut multiplier is 25% higher than the public works spending multiplier. According to a historical decomposition, fiscal policy in Japan is contractionary for most of the 1990s. Fiscal policy shocks contribute significantly to the change in economic growth, thus showing that most of the rise in public debt is caused by the decline in tax revenue caused by the economic downturn around 1997.

Primiceri (2005) first introduced time-varying parameters into a VAR model to study the role of monetary policy in the US economy through three variables: inflation rate, short-term nominal interest rate, and unemployment rate. The stochastic volatility in the model describes the time-varying characteristics of the system, and this study demonstrates the importance of time-varying parameters. Subsequently, the method became prevalent as a macroeconomic analysis tool.

Hauzenberger (2011) studies the impact of fiscal policy by highlighting the time-varying transmission of government spending and tax shocks using data on output, government spending, net taxes, and federal debts over last four decades, based on the TVP-VAR model proposed by Primiceri (2005). The main results are consistent with the conventional view of the declining effectiveness of fiscal policy changes, and there is a qualification for taxes. Unlike other periods, in the late 1980s and early 1990s, tax policy is found to be the most effective, especially in reducing debt levels. In addition, this study uses counterfactual policy simulations and provides evidence for the positive longer run impact on output when debt levels are actively reduced through government spending cuts. Overall, since the TVP-VAR model can observe the amount and pattern of time variation, it can help explain fiscal policy changes better.

Nakajima (2011) analyzes the Japanese economy in 2011 using three-variable and four-variable TVP-VAR models, respectively. In addition, Nakajima (2011) compares TVP-VAR model with the VAR model by examining the relationship between three macroeconomic variables: inflation rate, output, and interest rate. The results show that the TVP-VAR model is more appropriate for Japanese macro data and reflects the time-varying relationships between economic variables.

Moreover, there are many papers that study the effects of fiscal policy based on the TVP-VAR model, for example: Gupta, Jooste, and Matlou (2014) examines the impact of fiscal policy on asset prices. Therefore, this paper will investigate and analyze the dynamic relationships between corporate tax, corporate R&D investment, corporate equipment investment, and GDP based on a TVP-VAR model using the OxMetrics 8.

2 Methodology and data

2.1 TVP-VAR model

According to Nakajima (2011), a time-varying parameter vector autoregression (TVP-VAR) model with stochastic volatility can be formed as follows:

$$Y_t = B_{1,t} Y_{t-1} + \cdots + B_{s,t} Y_{t-s} + e_t,\ e_t \sim N(0, \Omega_t) \qquad (1)$$

where Y_t is a $k \times 1$ vector of observed variables, $Y_t = [TAX_t, RAD_t, EQU_t, GDP_t]'$; $B_{1,t}, \ldots, B_{s,t}$ are $(k \times k)$ matrices of time-varying coefficients, and Ω_t is a $(k \times k)$ time-varying covariance matrix. A recursive identification through decomposition of $\Omega_t = A_t^{-1} \Sigma_t \Sigma_t A_t'^{-1}$ is assumed for identifying the simultaneous relationship of the structural shocks, where A_t is a lower triangular matrix, with diagonal elements equal to 1, and Σ_t is as follows:

$$\Sigma_t = \begin{pmatrix} \sigma_{1,t} & 0 & \cdots & 0 \\ 0 & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \cdots & 0 & \sigma_{k,t} \end{pmatrix}$$

β_t is defined as the stacked row vector of $B_{1,t}, \ldots, B_{s,t}$. a_t is the stacked row vector of the elements in the lower-triangular A_t, and $h_t = (h_{1,t}, \ldots, h_{k,t})$, where $h_{jt} = log \sigma_{jt}^2$. The time-varying parameters in the model are assumed to follow a random walk process:

$\beta_{t+1} = \beta_t + \mu_{\beta t},\ a_{t+1} = a_t + \mu_{at},\ h_{t+1} = h_t + \mu_{ht}$

$$\begin{pmatrix} \epsilon_t \\ \mu_{\beta t} \\ \mu_{at} \\ \mu_{ht} \end{pmatrix} \sim N\left(0, \begin{pmatrix} I & 0 & 0 & 0 \\ 0 & \Sigma_\beta & 0 & 0 \\ 0 & 0 & \Sigma_a & 0 \\ 0 & 0 & 0 & \Sigma_h \end{pmatrix} \right)$$

for $t = s+1, \ldots, n$, with $e_t = A_t^{-1} \Sigma_t \epsilon_t$, where Σ_β, Σ_a and Σ_h are diagonal, and $\beta_{s+1} \sim N(\mu_{\beta 0}, \Sigma_{\beta 0})$, $a_{s+1} \sim N(\mu_{\alpha 0}, \Sigma_{\alpha 0})$, and $h_{s+1} \sim N(\mu_{h0}, \Sigma_{h0})$.

The model is estimated by Bayesian inference via the Markov chain Monte Carlo (MCMC) method, as this method could help to examine the joint posterior distribution of the parameters under certain prior probability densities.

According to Nakajima (2011), the following priors are assumed: $\Sigma_\beta \sim IW(25, 0.01)$, $(\Sigma_\alpha)_i^{-2} \sim Gamma(4, 0.01)$, $(\Sigma_h)_i^{-2} \sim Gamma(4, 0.01)$. IW is defined as the inverse Wishart distribution. Flat priors in this model are set as follows: $\mu_{\beta 0} = \mu_{\alpha 0} = \mu_{h0} = 0$, and $\Sigma_{\beta 0} = \Sigma_{\alpha 0} = \Sigma_{h0} = 10 \times I$.

2.2 Data sources and data properties

2.2.1 Data sources

The Japanese time series data used for the estimation are quarterly data from 1994 to 2019. The four data series used in this study are real values adjusted to billions of chained 2015 yen.

As for the sources of data, GDP and corporate equipment investment were obtained from the Cabinet Office of Japan. The corporate tax was taken from the National Tax Agency of Japan. Lastly, corporate R&D investment was drawn from a survey of research and development provided by the Statistics Bureau of Japan. The corporate tax and corporate R&D investment are fiscal year data and converted quarterly by the quadratic method for this paper; and these two data series were completed by seasonal adjustment (X-13ARIMA-SEATS). All data are expressed in logarithmic form. Lastly, the growth rate of each variable from 1994Q2 to 2019Q4 is used to ensure stationarity for the data series.

2. 2. 2 Data properties

Figure 2. Data series

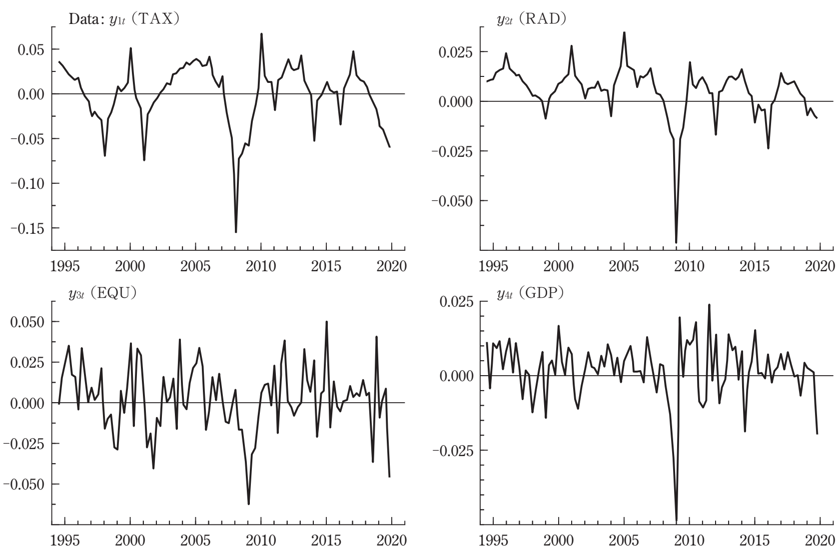


Figure 2 depicts the four data series.[3] Also, in all figures in this paper, TAX refers to corporate tax, RAD refers to corporate R&D investment, and EQU refers to corporate equipment investment. In Figure 2, each data series is characterized by a large fluctuation around 2008 due to the financial crisis.

3 Empirical results

To compute the posterior estimates for the TVP-VAR model, 20,000 samples were drawn, and the initial 2,000 samples were discarded during the burn-in period. Furthermore, one lag is selected according to the Hannan-Quinn criterion and Schwarz information criterion through estimating a constant parameter VAR.

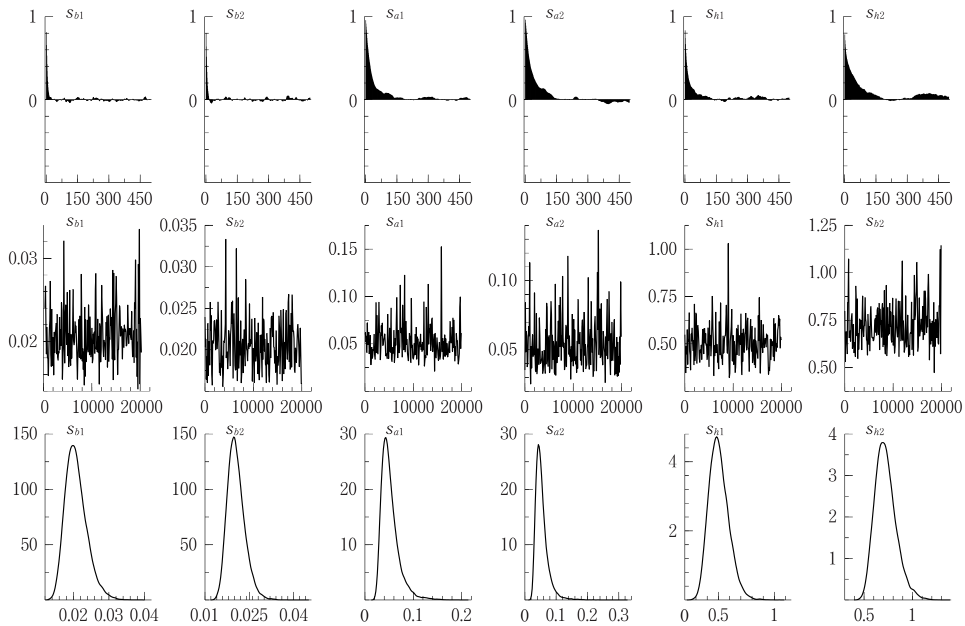
3. 1 MCMC estimation results

Table 2. Estimation Results of Parameters in the TVP-VAR model

Parameter	Mean	Stdev	95%L	95%U	CD	Inef
$(\Sigma_\beta)_1$	0.0208	0.0031	0.0158	0.0278	0.619	8.63
$(\Sigma_\beta)_2$	0.0206	0.0029	0.0158	0.0272	0.361	8.10
$(\Sigma_\alpha)_1$	0.0519	0.0187	0.0287	0.0996	0.366	55.67
$(\Sigma_\alpha)_2$	0.0537	0.0208	0.0288	0.1054	0.897	64.26
$(\Sigma_h)_1$	0.5043	0.0882	0.3559	0.6967	0.411	32.95
$(\Sigma_h)_2$	0.7225	0.1102	0.5403	0.9729	0.681	61.20

Table 2 shows the estimation results of selected parameters for posterior means, standard deviations, the 95% credible intervals, the convergence diagnostics (CD) proposed by Geweke (1991) and the inefficiency factors. In the estimated results, the standard deviations of parameters are small, and the 95% credible intervals include the estimates for posterior means. Ac-

Figure 3. Estimation results of parameters in the TVP-VAR model

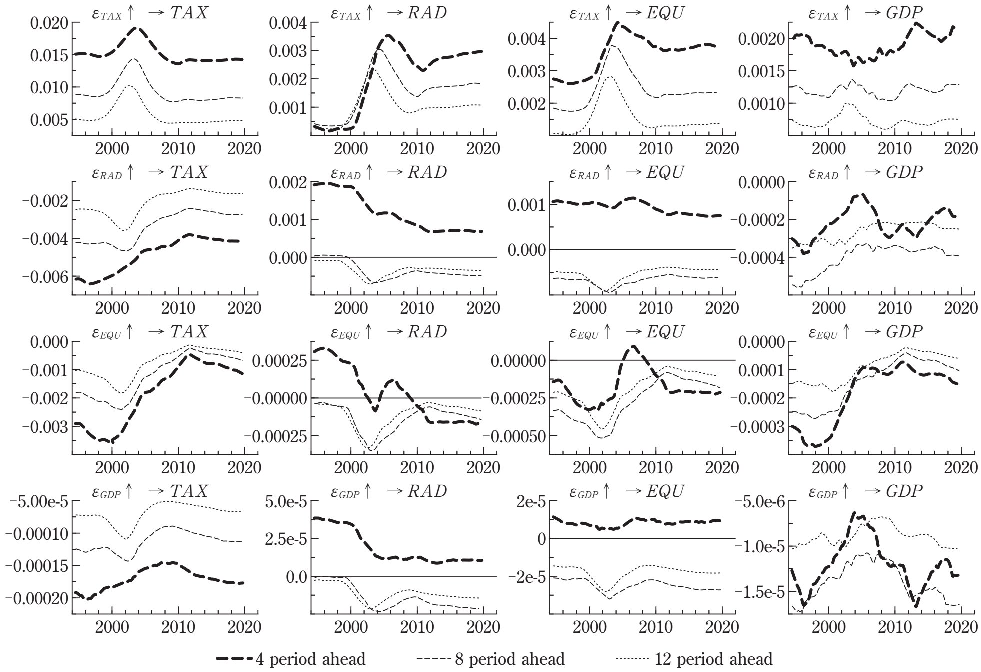


Note: sample autocorrelations (top), sample paths (middle), and posterior densities (bottom) cording to CD statistics obtained, it can be observed that the null hypothesis of the convergence to the posterior distribution is not rejected for the parameters at the 5% significance level. Moreover, the inefficiency factors are small and less than 100, indicating that the MCMC algorithm is effective.

3. 2 Results of time-varying impulse response

Figure 4 depicts the time-varying response of each variable to capture the dynamic relationship between them.

Figure 4. Time-varying impulse responses in the short, medium and long term



The responses of corporate R&D investment, corporate equipment investment, and GDP to the corporate tax shock vary over time. Overall, the corporate tax shock has a positive effect on each variable. The effects of corporate tax shocks are stronger in the short period (4 periods ahead) than in the medium period (8 periods ahead) and long period (12 periods ahead). The positive effects of corporate tax shocks may be temporarily weakened as a result of the Asian financial crisis in 1997 and the global financial crisis around 2008. Furthermore, the effect of corporate tax shock on corporate equipment investment and corporate R&D investment is greater than the effect on GDP. On the other hand, the response of GDP to the corporate R&D

investment shock and the corporate equipment investment shock does not appear to be significant in the 4, 8 and 12 periods ahead, therefore, the response of GDP to the corporate R&D investment shock and the corporate equipment investment shock will be analysed in another way later.

The corporate tax rate reductions in 1998, 2012, 2015 and 2016 have been selected to examine their impact, as shown in Figure 5.

Figure 5. Time-varying impulse responses at various times

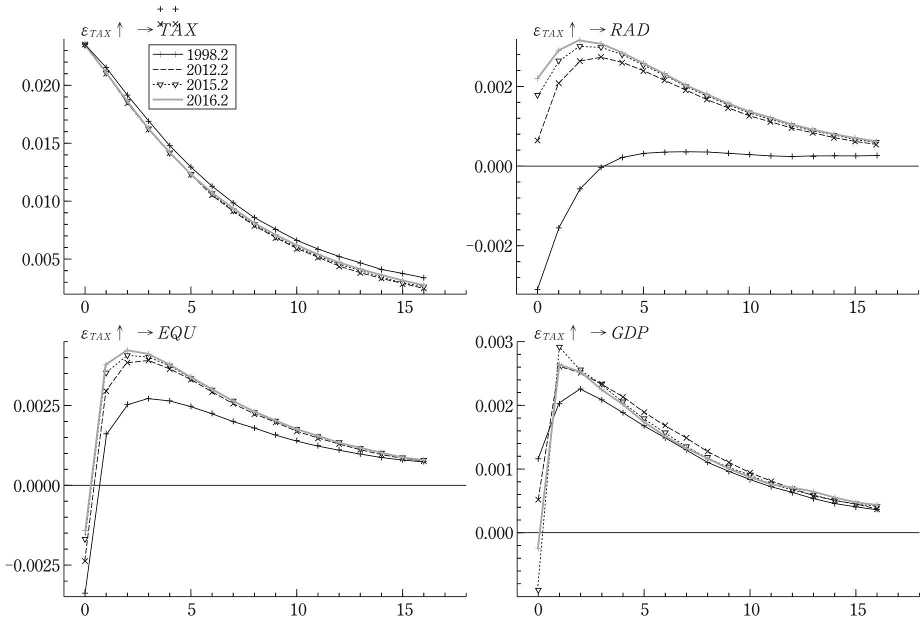


Figure 5 shows the effect of the corporate tax shock in 1998, 2012, 2015, and 2016 using different line types, Generally, the shape of the response of each variable to the corporate tax shock at different times is similar.

Regarding the response of corporate R&D investment to the corporate tax shock in 2012, 2015 and 2016, they peak in about the second quarter. The response of corporate R&D investment to the corporate tax shock in 1998 turns positive from the fourth quarter. In general, the difference in the effects of the corporate tax shock at different times is not small. Regarding the response of corporate equipment investment to the corporate tax shock in 1998, 2012, 2015 and 2016, they peak around the second quarter and then fade away. The response of GDP to the corporate tax shock in 1998, 2012, 2015 and 2016 is most significant around the first quarter. There is small difference in the effects of corporate tax shocks on corporate equipment investment and GDP at different times.

Overall, the effects of the corporate tax shock in 1998, 2012, 2015 and 2016 on corporate R&D investment, corporate equipment and GDP are positive and relatively significant, indicating that the corporate tax cut policy is effective.

Using the cumulative impulse response of GDP to the corporate R&D investment shock and the corporate equipment investment shock, their impact is evaluated.

Figure 6. Cumulative impulse response of GDP

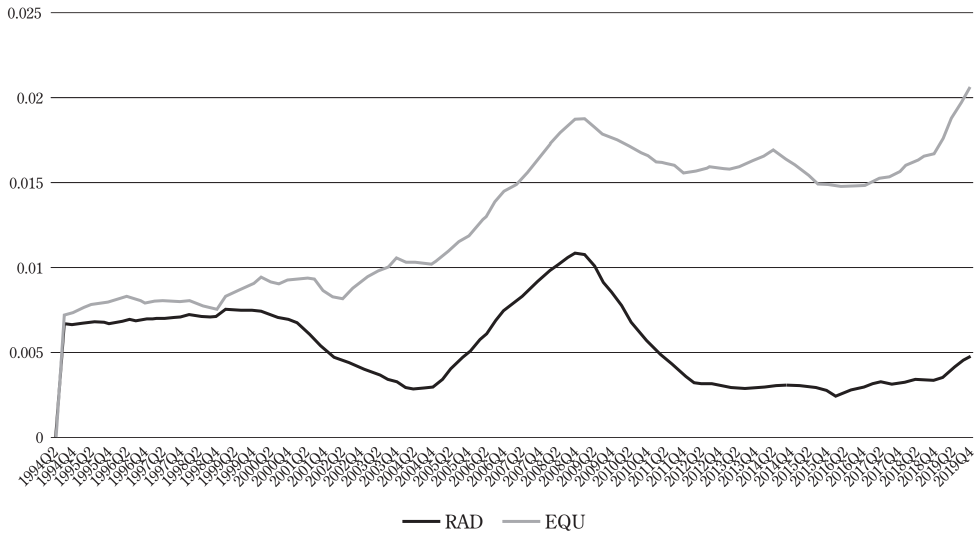


Figure 6 shows the cumulative impulse response of GDP to the corporate R&D investment shock (black line) and the corporate equipment investment shock (gray line). Given that investment, especially equipment investment, plays an important role in both the demand and supply sides of GDP, the cumulative impulse response for two years of GDP is used in this paper. From this figure, we can see that the cumulative impulse response of GDP to the corporate R&D investment shock and the corporate equipment investment shock varies over time. Meanwhile, the impact of corporate equipment investment shock and R&D equipment shock on GDP is positive.

Comparing the impact of the corporate equipment investment shock on GDP, the impact of the corporate R&D investment shock is weaker. To some extent, this result is in line with Obinata (2016), which is a study about the impact of research and development investment on GDP growth based on the vector error correction model (VECM).

Furthermore, in the fourth quarter of 2008, the impact of corporate equipment investment and corporate R&D equipment on GDP has been greater. It may be one of reasons why corporate investment has played a role in the supply side. In terms of the impact of the corporate equipment investment shock, there is an increasing trend, while the impact of the corporate R&D investment shock appears to show a decreasing trend. Corporate equipment investment devotes more and more significantly to GDP, to some extent, reflecting the role of the economic growth engine.

3.3 Time-varying corporate tax multiplier

In this section, the Japanese corporate tax multiplier is calculated by the cumulative response of the output to corporate tax. According to Iwata and Iiboshi (2017)[4] and Glocker, Sestieri, and Towbin (2019), the cumulative corporate tax multiplier is defined as

$$CM_{H|t}=\frac{\Sigma_{i=0}^{H}\Delta y_{t+i}}{\Sigma_{i=0}^{H}\Delta T_{t+i}}=\frac{\Sigma_{i=0}^{H}e_y' IR_i(A_0, A_+)q_s}{\Sigma_{i=0}^{H}e_T' IR_i(A_0, A_+)q_s}\cdot\frac{1}{\mu_t} \tag{2}$$

where H represents the number of the horizon to measure the effect of the corporate tax shock; here, $H=4$. $\frac{1}{\mu_t}$ represents a conversion factor that rescales the impulse response of GDP to a corporate tax shock and is the inverse of the share of corporate tax with respect to GDP.

Figure 7. The time variation of the corporate tax multiplier

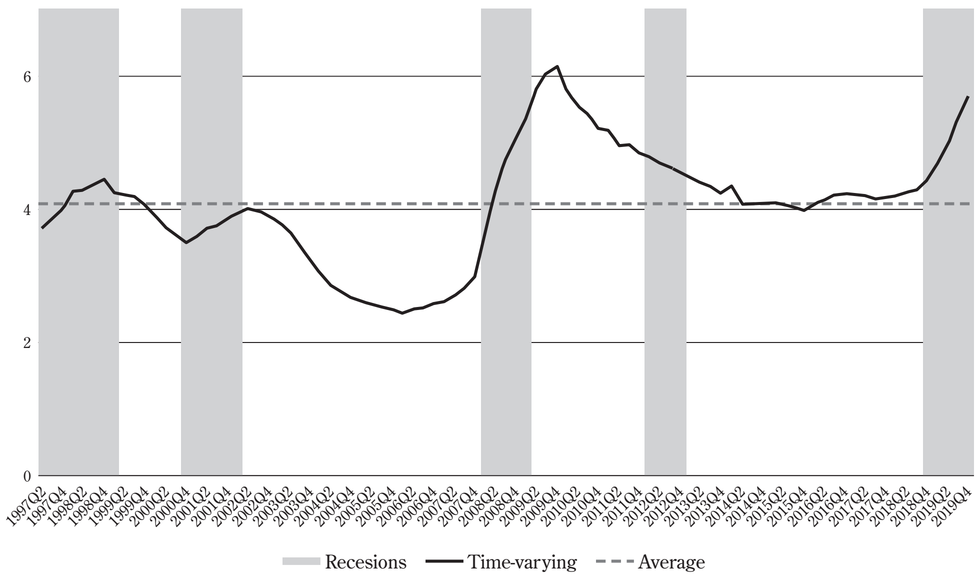


Figure 7 depicts the cumulative corporate tax multiplier for one year from 1997Q2, which is the first recession in the sample period. The solid black line represents the time variation of the cumulative corporate tax multiplier, and the dashed line shows the average value of the cumulative corporate tax multiplier. The areas shaded light gray indicate periods of recession, based on the report on the Business Cycle Indicators in the Japanese Economy by the Cabinet Office of Japan.[5)]

Figure 7 indicates that the corporate tax multiplier is time-varying and ranges from 2.45 to 6.15. The average of the multiplier is 4.09. In addition, the corporate tax multiplier shows cyclical variations, but not all spikes are in recessions. Furthermore, Batini, Eyraud, and Weber (2014) points out that “spending and taxes typically react automatically to the business cycle through so-called ‘automatic stabilizers’. Fiscal multipliers are generally found to be larger in downturns than in expansions.” The corporate tax multiplier increases automatically in recessions from 2000Q4 to 2002Q1, from 2008Q1 to 2009Q1 and 2018Q4 to 2019Q4, but it does not increase automatically in recessions from 1997Q2 to 1999Q1 and from 2012Q1 to 2012Q4. Furthermore, the multiplier in from 2009Q2 to 2011Q4 is larger than the average value, implying that the corporate tax multiplier in recessions is not always greater than in expansions. Therefore, this result is not entirely in line with Batini et al. (2014).

4 Conclusion

The estimated results presented above indicate that the corporate tax cut policy as a means for the government to regulate the economy plays a positive role. To some extent, the results are consistent with Kuttner and Posen (2002). The positive effects of corporate tax cuts in the short term are more significant than in the long term. Moreover, it implies that domestic and international events influence the effects of corporate tax cuts.

On the other hand, the empirical results show that the corporate R&D investment does not affect GDP significantly. To some extent, the effect of corporate R&D investment on GDP is consistent with Obinata (2016). Regarding the effect of corporate equipment investment on GDP, it is relatively significant and positive even during the financial crisis.

According to Keynesian economic theory, expansionary fiscal policy has a positive effect on output. This paper presents empirical evidence for the positive effect of corporate tax cuts as an expansionary fiscal policy on output, supporting this principle of Keynesian economic theory. Furthermore, this paper indicates that the corporate tax multiplier varies over time. However, the corporate tax multiplier does not fully vary over business cycle.

In summary, this paper presents a comprehensive and detailed study of the role of corporate tax based on the TVP-VAR model, in the hope that it will provide a good basis for policy makers to make decisions. Finally, I would like to give some of my suggestions or thoughts. Since Japan faces a huge fiscal deficit and tax revenue is the means of financing government spending, the corporate tax cut policy is best combined with other policies to ease the fiscal deficit situation and boost the economy.

Notes

The author would like to express deep gratitude to Professors Akira Maeda and Mitsuhiko Satake. The author wishes to thank the professors and staff at Kansai University. This paper was completed with their helpful advice and support. Moreover, this paper was partially supported by the Otsuka Toshimi Scholarship Foundation. The author is very grateful to the Otsuka Toshimi Scholarship Foundation for their generous financial support. The author would like to thank the referees for their helpful comments. Needless to say, any errors in this paper are attributed fully to the author.

1) Regarding "two lost decades", it is shown in the Annual Report on the Japanese Economy and Public Finance 2015 by the Cabinet Office and Kakinuma and Nakanishi (2013). The report of Cabinet Office is available at: https://www5.cao.go.jp/j-j/wp/wp-je15/h03-01.html (accessed January 23, 2021)

2) Regarding "Abenomics", it is shown in the document about Abenomics by the Cabinet Office and Kakinuma and Nakanishi (2013). The document of Cabinet Office is available at: https://www5.cao.go.jp/keizai1/abenomics/abenomics.html (accessed January 24, 2021)

3) The four data series are quarterly data. Figure 1 is a little different from the fourth graph in Figure 2.

4) According to Iwata and Iiboshi (2017), The impact fiscal multiplier at horizon i of structural shock s on endogenous variables y is defined as

$$IFM \equiv \frac{\Delta y_{t+i}}{\Delta_{g_t}} = \frac{e_y' IR_i(A_0, A_+)q_s}{e_g' IR_0(A_0, A_+)q_s} \frac{1}{G/Y}$$

Where G represents government expenditure. In the present paper, T denotes the corporate tax.

5) The report of the Cabinet Office of Japan is available at:
https://www.esri.cao.go.jp/jp/stat/di/hiduke.html (accessed August 9, 2021)

References

Batini, N., L. Eyraud, and A. Weber (2014), "A simple method to compute fiscal multipliers," International Monetary Fund Working Paper 14-93.

Geweke, J. (1991), "Evaluating the accuracy of sampling-based approaches to the calculation of posterior moments," Federal Reserve Bank of Minneapolis 148.

Glocker, C., G. Sestieri, and P. Towbin (2019), "Time-varying government spending multipliers in the UK," *Journal of Macroeconomics*, 60, 180-197.

Gupta, R., C. Jooste, and K. Matlou (2014), "A time-varying approach to analyzing fiscal policy and asset prices in South Africa," *Journal of Financial Economic Policy*, 6(1), 46-63.

Hauzenberger, K. (2011), "A time-varying structural VAR model to estimate the effects of changes in fiscal policy," Deutsche Bundesbank Working Paper.

Iwata, Y. and H. Iiboshi (2017), "Time-varying fiscal multipliers identified with sign and zero restrictions: A bayesian approach to TVP-VAR-SV model," Research Paper Series 184.

Kakinuma, S. and S. Nakanishi (2013), "Changes in the Japanese economy and its pillars as measures to secure future growth," Economic Prism 111.

Kuttner, K. N. and A. S. Posen (2002), "Fiscal policy effectiveness in Japan," *Journal of the Japanese and International Economies*, 16, 536–558.

Nakajima, J. (2011), "Time-varying parameter VAR model with stochastic volatility: An overview of methodology and empirical applications," *Monetary and Economic Studies*, 29, 107–142.

Obinata, T. (2016), "The contribution of research and development investments by sectors to GDP growth," Center for Advanced Research in Finance (CARF) CARF-J-105.

Primiceri, G. E. (2005), "Time varying structural vector autoregressions and monetary policy," *The Review of Economic Studies*, 72(3), 821–852.

Uematsu, T. (2020), *Illustrated Tax System in Japan*, Tokyo: Zaikei Shohosha.