Effectiveness of Fiscal Policy in Aging Economies*

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Abstract

This paper examines how population aging affects the effectiveness of fiscal policy. We estimate the fiscal multipliers for both aging and non-aging economies by using the panel data of OECD countries. We find that population aging weakens the output-boosting effects of fiscal policy. That is because in aging economies, the responses of private consumption and employment to fiscal stimulus become weak, resulting in a decline in the fiscal multiplier. Our analysis suggests that in aging economies, to sustain domestic demand, other economic policies and structural reforms need to play a more important role.

Keywords: population aging, fiscal policy, fiscal multiplier
JEL Classification: E62, H30, J10

I. Introduction

The world is aging rapidly. Due to declining fertility and rising life expectancy, many countries are facing the aging of their populations. According to the United Nations' World Population Prospects 2019, there are about 700 million old people aged 65 years and older in the world, accounting for about 9% of the world's population. The number of old people will increase significantly, and it is expected that by 2050, about 1.56 billion people, 16% of the total population, will be 65 years old or older[1]. Against this background, an increasing number of studies have examined the macroeconomic implications of population aging.

This paper examines how population aging affects the effectiveness of fiscal policy. While a number of studies examine the effect of population aging on macroeconomics and public finances, little attention has been paid to the impact of population aging on the effectiveness of macroeconomic policy. Recently, some studies have analyzed the impact of pop-

* This article is based on a study first published in the Financial Review No.145, 49-67, Hiroaki Miyamoto and Naoyuki Yoshino, 2021, Effectiveness of Fiscal Policy in Aging Economies written in Japanese.

[1] Aging is generally considered an issue in developed countries, but it is not. In emerging economies, women are advancing into society and getting married late due to rapid economic development, and as a result, the aging of the population is expected to accelerate faster than in developed countries.

ulation aging on the effectiveness of monetary policy[2], but the literature provides little empirical evidence as to how population aging affects fiscal policy effects.

Analyzing the effect of population aging on fiscal policy effects is important for not only economists but also policy makers. In recent years, advanced economies have faced long-term stagnation, which cannot be overcome by monetary policy alone, so the importance of fiscal policy has been increasing. The economic crisis caused by the pandemic of COVID-19 further increases the need for fiscal policy[3]. Under these circumstances, it is important to access the effectiveness of fiscal policy.

We examine how population aging alters the output effects of government spending shocks by using a panel data of OECD countries. The government spending shocks are identified as forecast errors of government spending by using the approach of Auerbach and Gorodnichenko (2012, 2013). With the identified government spending shock, we split our sample into two groups by using the old age dependency ratio (the ratio of people 65 and older to those between 15 and 64 years old) and estimate the output effects of government spending shocks by employing the local projection method of Jordà (2005). As the recent studies find that the output effects of government spending shocks depend on the state of the business cycle (Auerbach and Gorodnichenko, 2012, 2013; Blanchard and Leigh, 2013; Dell'Erba et al., 2014), we also estimate the state-dependent fiscal multipliers in both aging and non-aging economies.

We find that population aging weakens the output effects of fiscal stimulus. While in non-aging economics, the government spending shock increases output significantly in both short-and medium-terms, output responses are not statistically significant in aging economies. Our analysis also finds that there is no effect of population aging on output effects of fiscal spending shocks in expansionary times, whereas in recessions the output effects of fiscal spending shocks are weakened as the population ages.

The possible channels through which population aging weakens the effectiveness of fiscal stimulus are the responses of private consumption and employment to government spending shocks. We find that effects of government spending shocks on private consumption and employment during recessions, are weaker in aging economies. As Basso and Rachedi (2020) discuss, young individuals have higher marginal propensity of consumption. In this vein, recessionary times make the grip of the higher marginal propensity of consumption of young people more relevant. Our results are also consistent with the mechanism of Yoshino and Miyamoto (2017), which show that population aging could weaken the multiplier effects of fiscal policy by increasing retired persons.

The remainder of the paper is organized as follows: Section II presents the recent developments associated with population aging and reviews the existing literature. Section III presents the empirical methodology. Section IV presents the main results. Section V discusses possible channels through which population aging affects the effectiveness of fiscal stim-

[2] See, for example, Imam (2013), IMF (2017), and Wong (2018)
[3] IMF (2020a) discusses the impact of the pandemic on public finances.

ulus. Finally, Section VI concludes and draws policy implications.

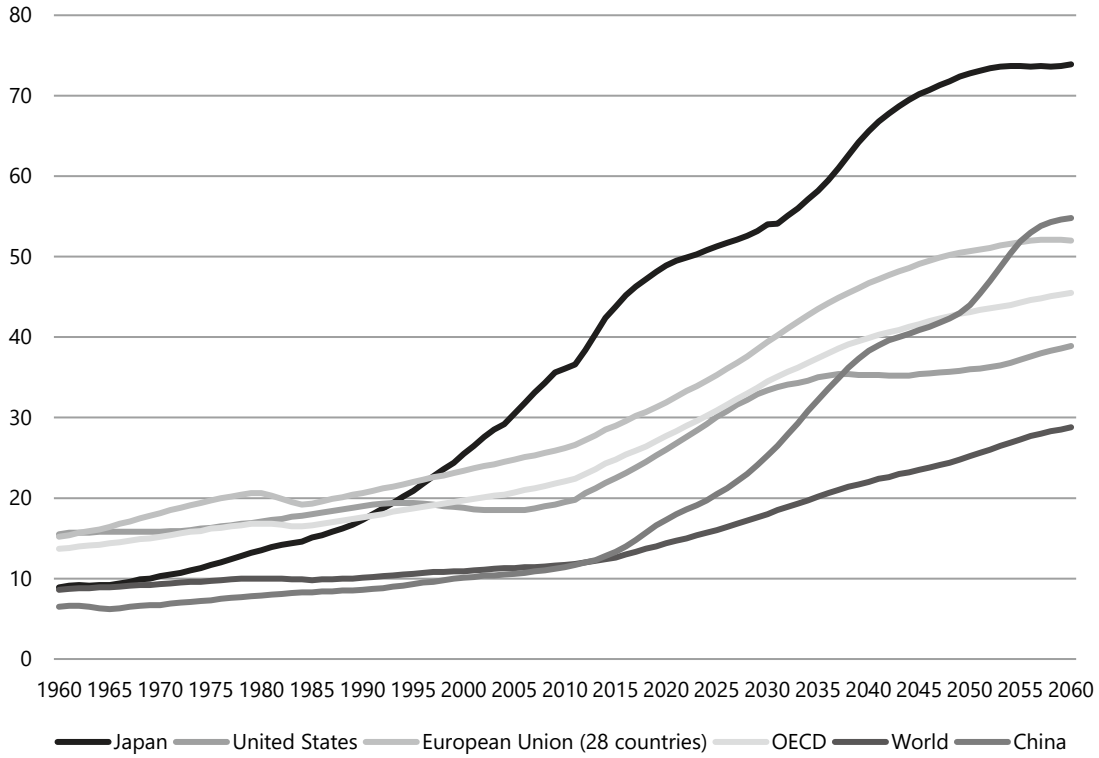
II. Stylized facts and literature review

In this section, we first look at recent developments associated with population aging. As a measure of population aging, we use the old-age dependency ratio. We then review existing studies on the macroeconomic impact of population aging.

II-1. Stylized facts

Figure 1 shows that old-age dependency ratios have been raising for several decades and are projected to increase further. Until the latter half of the 20th century, Europe and the United States were the center of population aging, but Japan is now at the forefront. At 47.2% in 2018, Japan had the highest old-age dependency ratio in the world, and this is projected to reach an even higher level, 72.8%, by 2050. China and Korea, which have lower old-age dependency ratios than Europe and the United States, are also expected to age rapidly in the coming decades.

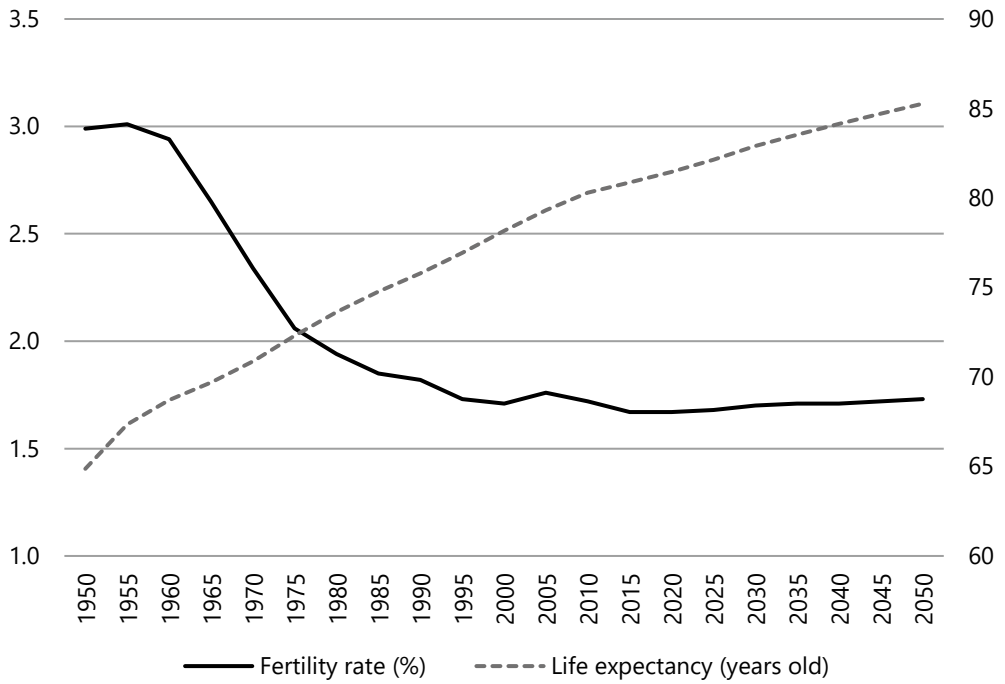
Figure 1. Old-age dependency ratio (%)



Source: United Nations.

These developments are driven by declining fertility rates and increasing longevity. Figure 2 shows changes in the fertility rate and life expectancy in high-income countries. The fertility rate was about 3 in 1950, then declined rapidly, falling below the fertility rate required to sustain the population (about 2.1) in the mid-1970s. The fertility rate has continued to decline since then, and is now around 1.7. On the other hand, life expectancy continues to rise, reaching 65 in 1950, now over 80, and is expected to rise to 85 in 2050. The combination of these development would lead to large increases in old-age dependency ratios.

Figure 2. Fertility rates and life expectancy in high income countries



Source: United Nations

II-2. Literature review

Effects of population aging on macroeconomics and public finances have been studied. Standard growth models predict that holding all else constant, population aging would reduce per capita GDP growth. Aging increases the number of retirees and thus reduces the proportion of workers in the population. As a result, even if the growth rate per worker does not change, per capita GDP will decrease as its denominator increases. IMF (2019) expects that aging would exert downward pressure on GDP per capita growth for the G20 economies by an average of about 0.4% between 2018 and 2030.

Previous studies point out that aging could cause a decline in aggregate potential output. A simple production function illustrates that output is determined by labor, capital, and tech-

nology (productivity). The fall in labor input due to aging directly reduces output. Aging may further reduce output through lower participation rates[4]. In aged economies, the composition of the workforce shifts from relatively young to relatively old workers. As the elderly tends to participate in the labor force at much lower rates, this will further reduce the workforce and thus aggregate output.

Aging also affects saving (Mirer, 1979; Horioka, 1992; Braun et al., 2009; Goh et al., 2020). Saving rates tend to vary over the life cycle. As saving rates tend to be high in early stages of life and decline as people age, the aggregate saving is more likely to be lower in aging economies.

Many studies have examined the impact of aging on public finances and social security. To save space, we only introduce some studies related to Japan. Kawai and Morgan (2013) point out that in Asian countries, aging will put a great strain on public finances as it leads to substantial increases in old-age-related spending. Oku et al. (2017) draw lessons for Asian countries by analyzing the relationship between aging and social security in Japan. Braun and Joines (2015), Hoshi and Ito (2014), Kitao (2015), Imrohoroglu et al. (2016) point out that the rapid aging creates a fiscal burden and increases in taxation would be needed to finance the demographic transition without any reform.

A few studies examine the impact of population aging on fiscal policy effects. Yoshino and Miyamoto (2017) find that the effectiveness of fiscal and monetary policies to boost output is weakened when the proportion of aged population becomes larger by developing a New Keynesian dynamic stochastic general equilibrium (DSGE) model with heterogeneous households. They find that less labor supply due to population aging weakens the effectiveness of fiscal stimulus.

Similar to this paper, Basso and Rachedi (2020), Honda and Miyamoto (2020, 2021), Miyamoto and Yoshino (2020) empirically analyze the impact of population aging on the effectiveness of fiscal policy. Basso and Rachedi (2020) find that local fiscal multipliers are larger in economies with higher shares of young people in the total population by using the U.S. state-level data. They rationalize this finding with a life-cycle open-economy New Keynesian model. Miyamoto and Yoshino (2020) estimate fiscal multipliers at the country level. By using the panel data of OECD countries, they find that in non-aging economies, government spending shocks increase output, while output responses are not statistically significant in aging economies. Honda and Miyamoto (2020, 2021) assess the impact of population aging on fiscal policy effectiveness over the business cycles. They find that there is no effect of population aging on output effects of fiscal spending shocks in expansionary times, whereas in recessions the output effects of fiscal spending shocks are weakened as the population ages.

[4] See for example, Bloom et al. (2010), Maestas et al. (2016), IMF (2017), and Aksoy et al. (2019).

III. Empirical methodology and data

This section describes the empirical methodology and data.

III-1. Empirical methodology

We examine how population aging affects the output effect of government spending shocks by using the local projection method (LPM) of Jordà (2005)[5]. Following Auerbach and Gorodnichenko (2012, 2013), the government spending shocks are identified as forecast errors of government spending.

The forecast error of government spending is defined as follows:

$$FE_{it} = \%\Delta G_{it} - E_{t-1}[\%\Delta G_{it}],$$

where $\%\Delta G_{it}$ represents the percent change in actual government consumption G_{it} and $E_{t-1}[\%\Delta G_{it}]$ is the forecast for government consumption growth for year t projected in *t-1*. Forecasts errors have desirable properties since they are serially uncorrelated and unanticipated. This identification method also overcomes two challenges often associated with the estimation of fiscal multipliers, namely the "fiscal foresight" problem (Leeper, Richter, and Walker, 2012; Leeper, Walker, and Yang, 2013) and the potential feedback from the state of the economy to fiscal policy.

As in IMF (2020) and Honda and Miyamoto (2021), we use forecasts from the spring issue of the OECD's Economic Outlook, but the results are robust to using the fall ones. The forecasts errors FE_{it} are winsorized excluding the bottom 1st and top 99th percentiles to eliminate extreme observations. They are also normalized to transform the shocks into a percent of GDP using each country sample average of government consumption as a share of GDP. Thus,

$$share_i^g = \overline{\left(\frac{G_{it}}{GDP_{it}}\right)},$$

$$Shock_{it} = FE_{it} \times share_i^g .$$

Figure 3 shows the distribution of the government spending shocks. Shocks are distributed between -1.7 and 2.0, most of which (90%) are between -0.96 and 1.12. The average is 0.07 and the median is 0.65.

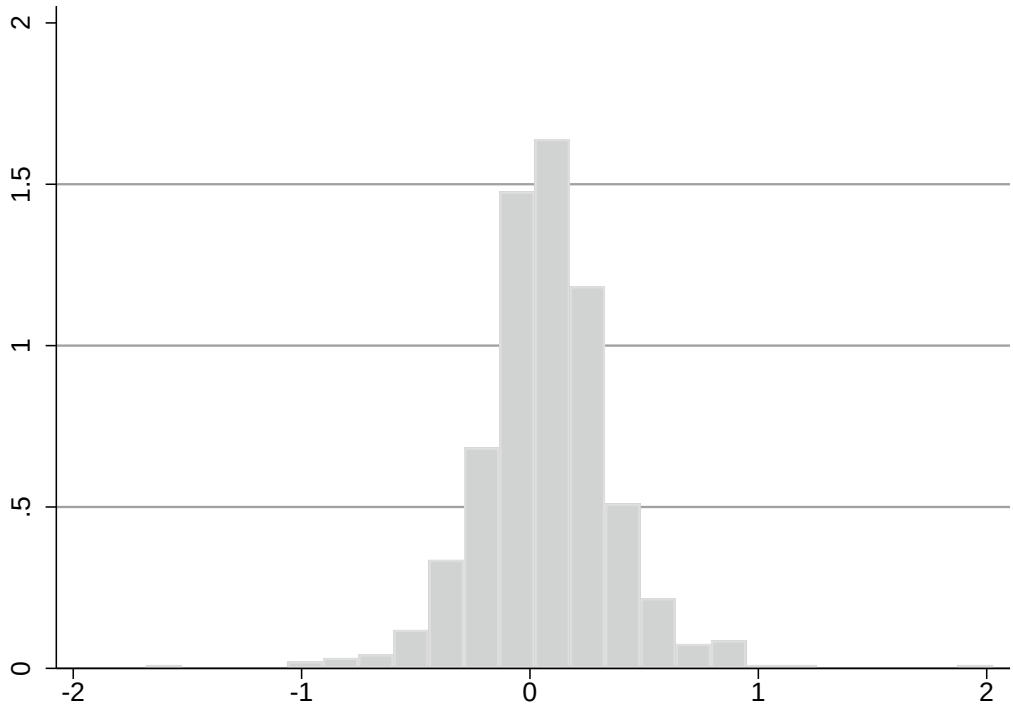
The identified government spending shocks are used to estimate the output effects of government spending shocks. Our benchmark specification is as follows:

$$\frac{Y_{i,t+h} - Y_{i,t-1}}{Y_{i,t-1}} = \beta_A^h I_{i,t} Shock_{i,t} + \beta_N^h (1 - I_{i,t}) Shock_{i,t} + \theta^h X_{i,t} + \alpha_i^h + \gamma_t^h + \varepsilon_{i,t}^h , \quad (1)$$

where $Y_{i,t}$ is the real GDP of country i in year t, *Shock* is the government spending shock, and I is a dummy variable that indicates the aging state of the economy. It takes the value of

[5] The LPM is flexible in estimating state-dependent impulse responses. The LPM does not limit the shape of the impulse response functions and is therefore less sensitive to misspecification than estimates obtained from vector autoregressive (VAR) models. See Jordà (2005) for the details.

Figure 3. Distribution of government spending shocks



1 for the aging economies and 0 otherwise. X is a vector of control variables, which include two lags of government spending shocks and GDP growth, and a linear trend. α_i^h is the country fixed effect, γ_t^h is the time fixed effect, and $\varepsilon_{i,t}^h$ represents the stochastic residual. As all coefficients vary with the horizon h, a separate regression is estimated for each horizon. We estimate equation (1) for each $h = 0, \ldots, 4$, where $h = 0$ is the year when the government spending shock occurs.

This paper uses the old-age dependency ratio as a measure of the aging state of an economy. We define an economy to be aging when the old-age dependency ratio is above a certain threshold. For our baseline results, an economy is regarded as aging if its old age dependency ratio exceeds the sample median of 23.5%.

III-2. Data

The data used in the analysis comes from the OECD's Statistics and Projections Database and the World Population Prospects of the United Nations. The macroeconomic series are taken from the OECD's Economic Outlook. Our sample covers an unbalanced panel of 19 OECD countries over the period of 1985-2018.

IV. Results

IV-1. Baseline

We first look at the output effects of government spending shocks without controlling for the aging states of economies. Figure 4 shows the output responses to a positive government spending shock. In this and subsequent figures, horizontal axes measure years after the shock which occurs at time 0[6]. Dashed lines indicate 90% confidence bands.

Positive government spending shocks raise output. The estimated fiscal multiplier is about 0.7 in the same year and 1.6 in the fourth year after the shock. These values are in line with other estimates of the fiscal multiplier in advanced economies[7].

We next examine how population aging affects the effectiveness of fiscal stimulus. Figure 4 shows the fiscal multipliers in both aging and the non-aging economies obtained from estimation of (1). In non-aging economies, a positive government spending shock increases output. The estimated fiscal multiplier is 0.9 in the same year and 2.4 four years after the shock. In contrast, in aging economies, the response of output to the shock is not statistically significant.

IV-2. Robustness

Before proceeding to the next analysis, we present several robustness checks on the baseline results. Table 1 shows the results. Columns (1)-(2) in Table 1 report the impact fiscal multiplier (the multiplier at time 0) in the benchmark model as a reference.

We first check whether our results are sensitive to a measure of the age composition. Instead of using the old-age dependency ratio as the measure of population aging, we now use

Table 1. Robustness check

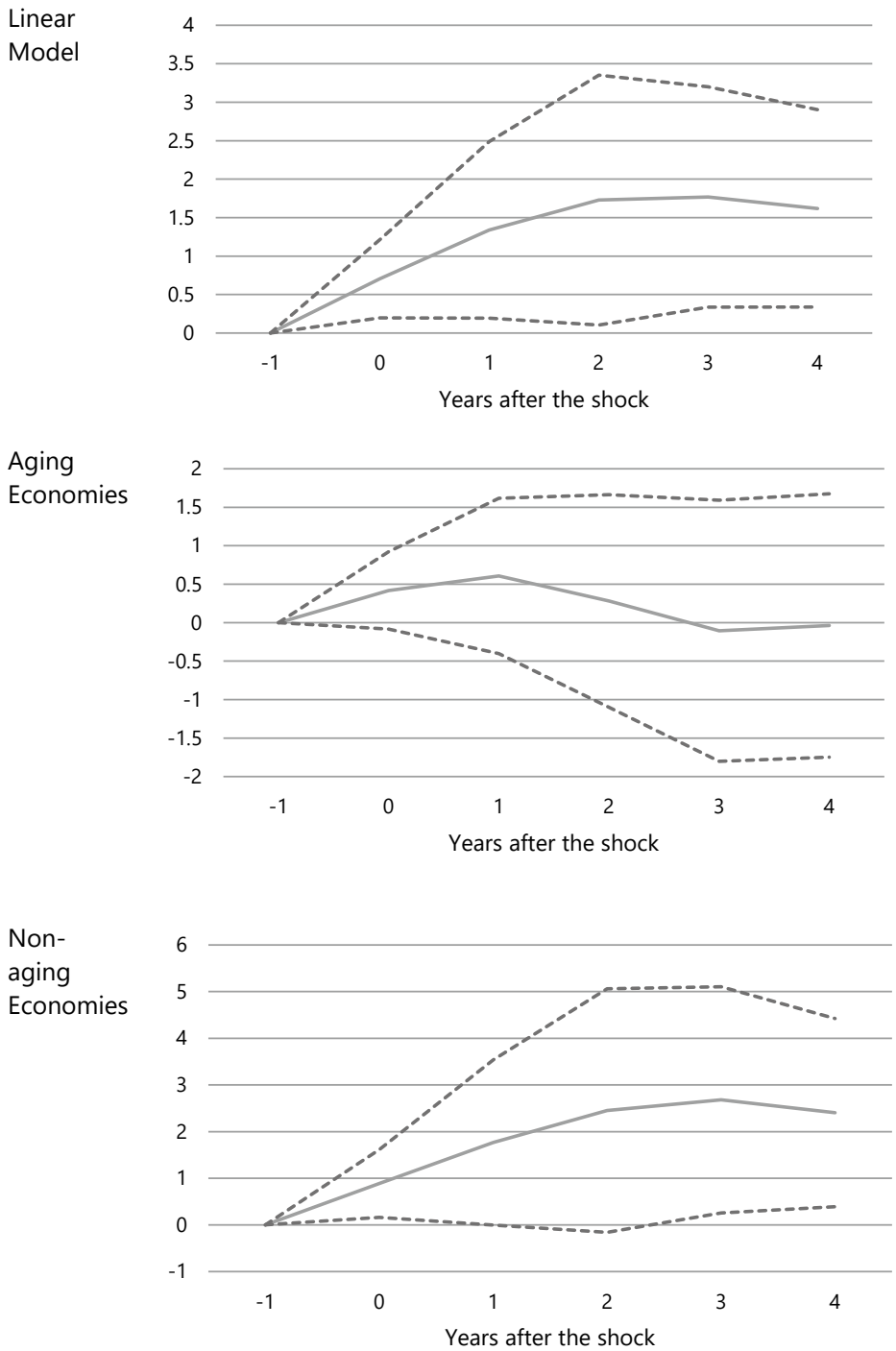
	Baseline		Share of old pop.		Share of youth		Alternative shock		Alternative specification	
	AE (1)	Non-AE (2)	AE (3)	Non-AE (4)	Low (5)	High (6)	AE (7)	Non-AE (8)	AE (9)	Non-AE (10)
Multiplier	0.419	0.888	0.473	0.859	0.567	0.877	0.085	0.907	0.422	0.795
	(0.441)	(0.252)	(0.306)	(0.436)	(0.259)	(0.446)	(0.410)	(0.427)	(0.252)	(0.406)
Country FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
Controls	Baseline		Baseline		Baseline		Baseline		Baseline	
Shock	Spring		Spring		Spring		Fall		Spring	

Note: Standard errors are in parentheses. AE and Non-AE stand for Aging Economies and Non-Aging Economies, respectively.

[6] Note that in the analysis using the economic growth rate as the explanatory variable, the vertical axis represents the fiscal multiplier.

[7] IMF (2014) and Ramey (2016) provide broad surveys of the literature estimating fiscal multipliers.

Figure 4. Output effects of the government spending shock (fiscal multipliers)



Note: t = 0 is the year of the shock. Solid lines present the responses to an unanticipated shock to government spending (fiscal multipliers). Dashed lines denote 90% confidence bands. An economy is regarded as aging if its old age dependency ratio exceeds the median of 23.5%.

the share of old population (65 and older) in total population and estimate equation (1). We find that the results (columns (3)-(4)) are similar to those in the baseline case. We also use the share of young people aged 20-35 to total population as the measure of the age composition. We find that the main results remain broadly unchanged (columns (5)-(6)).

We next check whether our results hold for alternative measures of government spending shocks. Instead of using the forecasts made in spring of the same year, we now use the forecasts from fall of the same year to compute the forecast errors of government spending. The results are shown in columns (7)-(8). We find that our baseline results hold for an alternative measure of government spending shocks.

Although the local projection method is robust to misspecification (Jordà, 2005), we consider different combinations of control variables. Based on IMF (2014), which discusses potential determinants of fiscal multipliers, we add the first difference of government revenues, and of government transfers, the short-term policy rate, and the degree of trade openness into our control variables. Columns (9)-(10) in Table 1 show that the main results broadly remain unchanged with the regressions using these variables.

IV-3. Business cycles

We next examine how population aging affects the effectiveness of fiscal policy over the business cycle. The recent literature on fiscal multipliers finds that the impact of fiscal policy shocks crucially depends on the state of business cycle (Auerbach and Gorodnichenko, 2012, 2013; Blanchard and Leigh, 2013; Dell'Erba et al., 2014; Ramey and Zubairy, 2018). Thus, it is important to examine whether population aging would affect the state-dependent output effects of government spending shocks. For this purpose, following Auerbach and Gorodnichenko (2012, 2013), we allow the response of output to vary with the state of the economy:

$$\begin{aligned}\frac{Y_{i,t+h}-Y_{i,t-1}}{Y_{i,t-1}} &= I_{i,t}\left[\beta^h_{R,A}G(z_{i,t})Shock_{i,t}+\beta^h_{B,A}\left(1-G(z_{i,t})\right)Shock_{i,t}\right]\\ &+(1-I_{i,t})\left[\beta^h_{R,N}G(z_{i,t})Shock_{i,t}+\beta^h_{B,N}\left(1-G(z_{i,t})\right)Shock_{i,t}\right]\\ &+\theta^h X_{i,t}+\alpha^h_i+\gamma^h_t+\varepsilon^h_{i,t}\end{aligned} \tag{2}$$

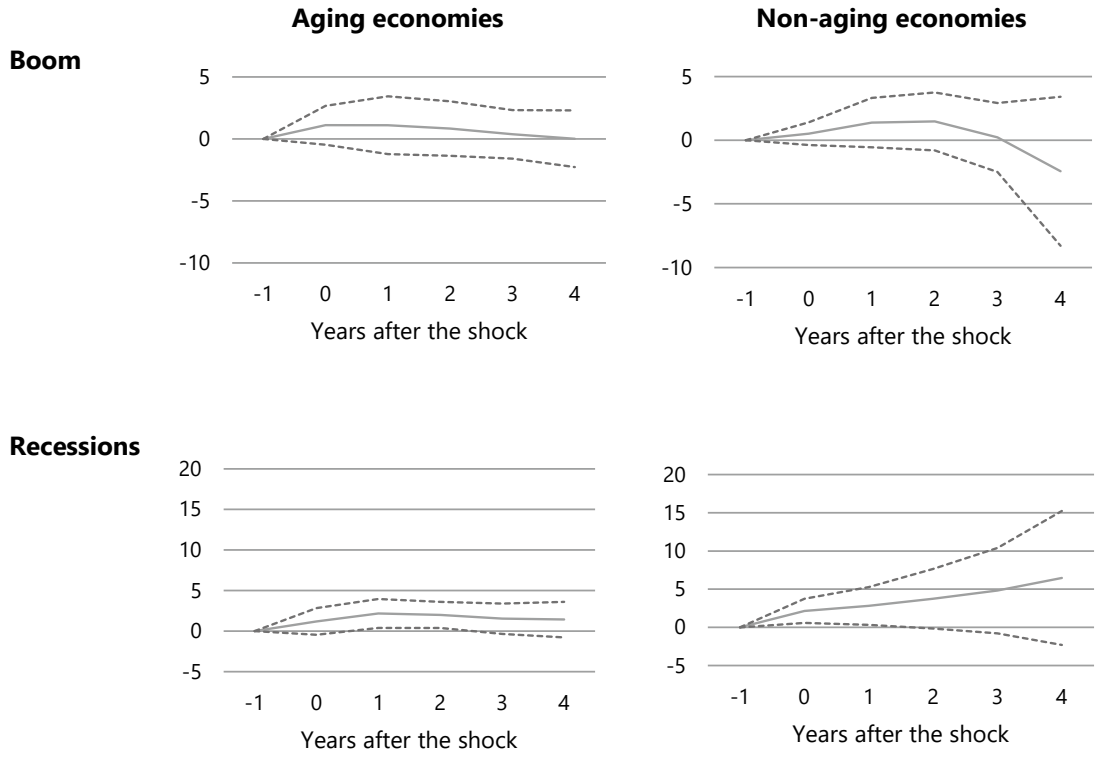
with

$$G(z_{i,t})=\frac{\exp(-\delta z_{it})}{1+\exp(-\delta z_{it})},\ \delta>0,$$

where z is an indicator of the business cycle normalized to have zero mean and unit variance, and $G(\cdot)$ is the corresponding smooth transition function. The transition function can be interpreted as the probability of the economy being in recession. $G=1$ corresponds to a situation in which the economy is in a deep recession, while $G=0$ corresponds to the economy being in a strong expansion. Following Auerbach and Gorodnichenko (2013) and IMF (2014), we use real GDP growth as a measure of the business cycle and set the parameter $\delta=1.5$[8].

Figure 5 shows the state-dependent impulse responses of output to the government spending shock. For both aging and non-aging economies, we present impulse responses in booms and recessions. As in the literature, the output responses are significantly different with the state of an economy. Population aging weakens the positive output effects of government spending shocks during recessions. On impact, in non-aging economies, the fiscal multipliers during recessions is 2.2, whereas the output effect of the government spending shock is not statistically significant in aging economies. In the medium term (t=1, 2), fiscal multipliers during recessions in non-aging economies are also larger than those in aging economies.

Figure 5. State-dependent fiscal multipliers



Note: t = 0 is the year of the shock. Solid lines present the responses (in percent) to an unanticipated shock to government spending. Dashed lines denote 90% confidence bands. An economy is regarded as aging if its old age dependency ratio exceeds the mean of 23.5%.

[8] Auerbach and Gorodnichenko (2013) set δ=1.5 so that a typical economy spends about 20% of the time in a recession regime, which is consistent with the fraction of recessionary periods in the U.S.

V. Discussion

In this section, we first explore possible channels through which population aging affects the effectiveness of fiscal stimulus and then examine if the level of public debt would affect the fiscal multipliers.

V-1. Transmission channels

According to macroeconomics textbooks, fiscal stimulus creates more demand than that amount due to its derivative effects. Fiscal stimulus increases employment opportunities and production, which in turn raises people's income. As a result, consumption will increase and thus total demand will increase. To meet the increased demand, companies expand their production, which further increases their income. Thus, increased government spending can boost output even more. This is called the "multiplier effect" of fiscal policy, and is the basis of fiscal policy as an economic stimulus measure.

Given this, we now explore possible channels through which population aging affects the output effects of government spending shocks, focusing on private consumption and employment. We estimate the effects of government spending shocks on private consumption and employment in aging and non-aging economies, based on the empirical model (2).

We first examine the consumption effects of government spending shocks over business-cycles in aging and non-aging economies. Figure 6 shows the results. The responses of private consumption to the government spending shocks during booms are not statistically significant in both aging and non-aging economies. In contrast, the responses of private consumption during recessions differ between two economies. While the positive government spending shock increases private consumption in non-aging economies, it has no statistically significant effect on private consumption in aging economies. This result would be in line with the mechanisms of Basso and Rachedi (2020), in which young individuals have higher marginal propensity of consumption. In this vein, recessionary times make the grip of the higher marginal propensity of consumption of young people more relevant.

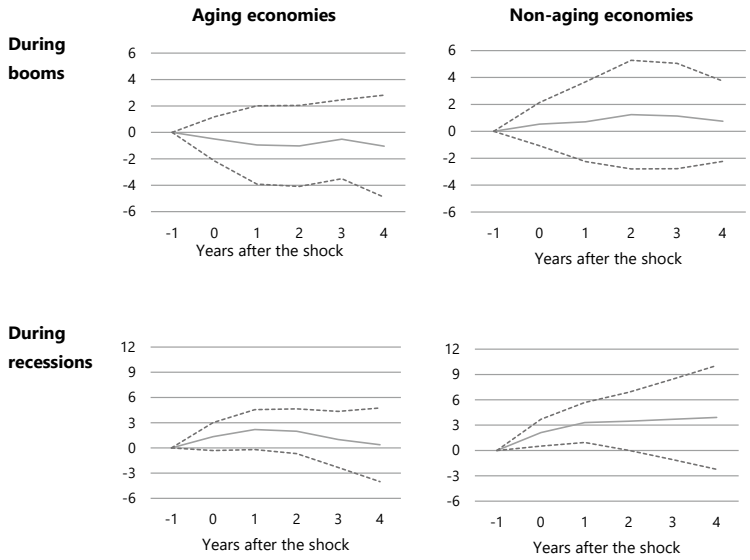
We next look at the state-dependent employment effect of the positive government spending shock. Figure 7 shows the results. While the positive fiscal policy shock increases employment during recessions in non-aging economies, it does not in aging–economies. This result is consistent with Yoshino and Miyamoto (2017). They show that the multiplier effects of fiscal policy would be weakened in aging economies as fiscal stimulus does not affect retired elderly persons and thus their income.

V-2. Public debt

We next examine if the level of public debt would affect the output effects of fiscal stimulus.

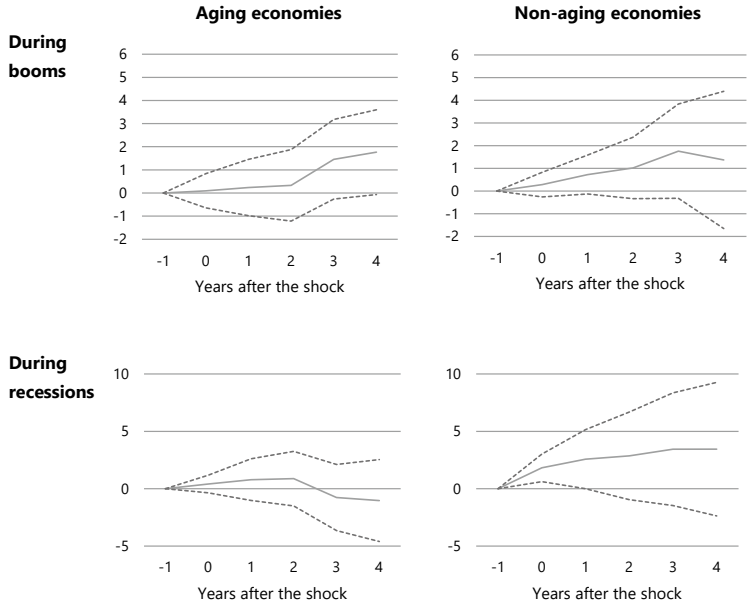
Figure 8 shows that population aging is positively associated with high public debt. This

Figure 6. Response of private consumption to government spending shocks



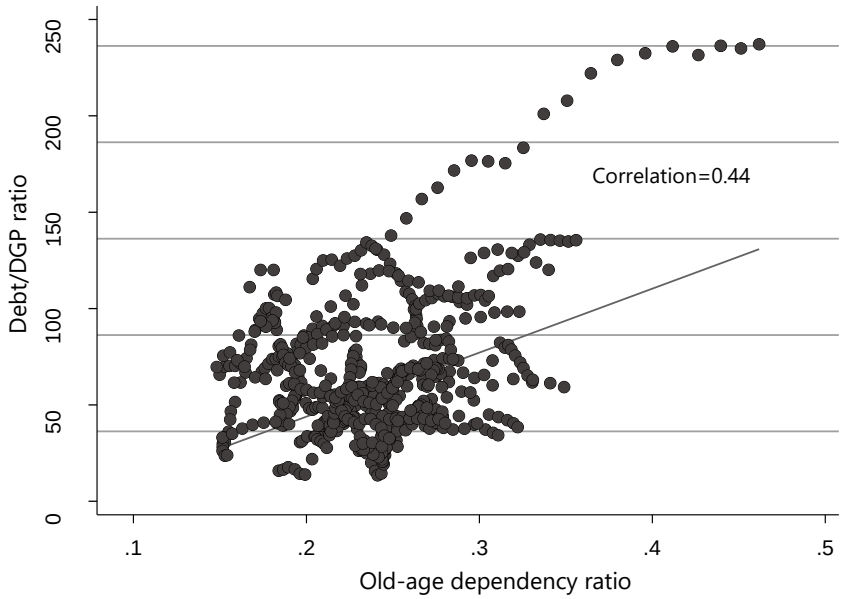
Note: $t = 0$ is the year of the shock. Solid lines present the responses to an unanticipated shock to government spending. Dashed lines denote 90% confidence bands. An economy is regarded as aging if its old age dependency ratio exceeds the mean of 23.5%.

Figure 7. Response of employment to government spending shocks



Note: $t = 0$ is the year of the shock. Solid lines present the responses to an unanticipated shock to government spending. Dashed lines denote 90% confidence bands. An economy is regarded as aging if its old age dependency ratio exceeds the mean of 23.5%.

Figure 8. Public Debt and Population Aging



may reflect the consequence of increased social security costs (e.g. pension and health). As highlighted in IMF (2015, 2016), in many advanced and emerging economies, an increase in the elderly population will boost government spending on pensions and health care, while population aging has adverse impact on economic growth and government revenues.

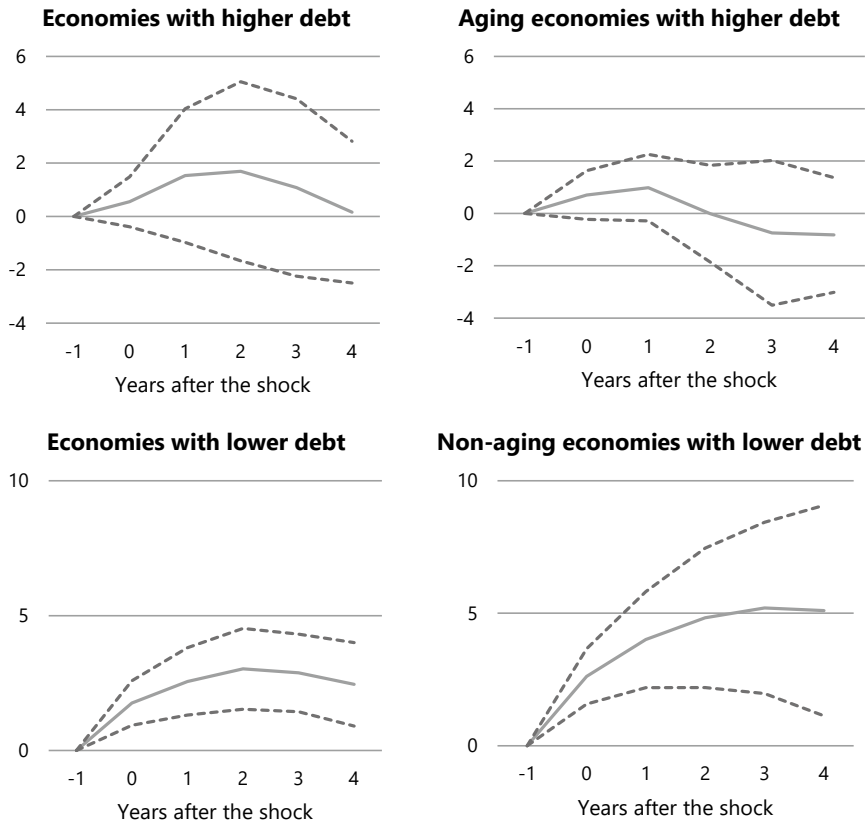
The level of public debt tends to be high in the aging economy, while it is more likely to be low in the non-aging economy. In our sample, about 54% of observations in aging economies are associated with above-median public debt ratios, while about 53% of the non-aging economies are associated with below-median debt.

This may imply that our results (the weaker output effects in aging economies) could be driven by high public debt. Thus, it is important to check whether our results are really driven by high public debt. We first examine how the level of public debt affects the output effect of government spending shocks. If it is found that the public debt level has a significant effect on the fiscal policy effect, we reconsider the effect of population aging on fiscal multipliers by taking the public debt level into account.

To examine how the public debt level affects fiscal policy effects, we estimate equation (1) by splitting the sample by the level of public debt, instead of old-age dependency ratios. The sample median of the public debt level is 63.7% of GDP. Thus, the dummy variable in (1) takes value 1 if the debt is above the median value in the sample and 0 otherwise.

Figure 9 shows the results. The output effects of government spending shocks depend on the public debt level. In economies with lower public debt, the shocks have positive and significant impacts on output. In contrast, in economies with higher public debt, the impact of fiscal policy shocks on economic growth is not statistically significant. Such adverse impacts of high public debt on fiscal stimulus are consistent with the literature (Ilzetzki et al.,

Figure 9. The role of public debt level



Note: t = 0 is the year of the shock. Solid lines present the responses (in percent) to an unanticipated shock to government spending. Dashed lines denote 90% confidence bands.

2013; Kirchner et al., 2010).

Taking into account the tendency of a higher level of debt with population aging, the weaker effects with higher debt may have contributed to the weaker output effects in aging economies. In order to make this distinction more clear, we estimate output effects of government spending shocks in aging economies with higher debt and non-aging economies with lower debt by using the following formula:

$$\frac{Y_{i,t+h} - Y_{i,t-1}}{Y_{i,t-1}} = I_{i,t}\left[\beta_A^h D_{i,t} Shock_{i,t} + \beta_N^h (1 - D_{i,t}) Shock_{i,t}\right] + (1 - I_{i,t})\left[\beta_A^h D_{i,t} Shock_{i,t} + \beta_N^h (1 - D_{i,t}) Shock_{i,t}\right] + \theta^h X_{i,t} + \alpha_i^h + \gamma_t^h + \varepsilon_{i,t}^h ,$$

where D is a dummy variable that takes value 1 if the public debt level is above the median values in the sample, and 0 otherwise.

The results show that while in non-aging economies with lower debt, the output respons-

es are statistically significant, while they are not in aging economies with higher debt. In addition, the analysis shows that the fiscal multiplier tends to be low in a high-debt economy, but the effect of fiscal policy on economic stimulus is even lower in high debt-aging economies.

VI. Summary and policy implications

Many countries are experiencing unprecedented population aging. Japan is at the forefront of population aging, and the old-age dependency ratio of 47% is by far the highest in the world. The old-age dependency ratios are expected to rise in many countries. By 2050, the ratio will exceed 50% in more than 20 countries around the world, and will exceed 70% in Japan, South Korea, and Spain. Under these circumstances, dealing with an aging society has become a policy issue facing many countries.

This paper examines how population aging affects the effectiveness of fiscal stimulus. Our empirical analysis using the panel data of OECD countries shows that population aging weakens the output effect of fiscal stimulus. For the weaker output effects in aging economies, our analysis suggests possible channels: less responses of consumption and employment to fiscal stimulus.

We can draw some important policy implications for aging economies from our findings. In aging economies, policymakers should account for the weaker demand-supporting effects of fiscal policy. In aging economies, larger fiscal stimulus may be required to support aggregate demand during recessions. This means that sufficiently large fiscal space should be secured during booms. Otherwise, large-scale fiscal stimulus would raise concerns about excessive debt growth and fiscal sustainability. In addition, given the weaker power of fiscal stimulus, other economic policies such as structural reforms need to play a more important role in supporting domestic demand.

The results of this paper also have important implications for analyzing the relationship between public debt and fiscal policy effects. This study finds that the output effect of fiscal stimulus weakens as public debt increased, and high-debt aging economies face even weaker fiscal multipliers. This means that the degree of aging needs to be considered when considering the relationship between debt and fiscal policy.

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