Aging and Deflation: A *Politico-Economic* Perspective

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February 15, 2017

Extended Abstract

Introduction

Societal aging is widely observed phenomena in developed countries. This recent trend has two aspects: longer life expectancy and decrease in the share of labor force. In the last 30 years, life expectancy at birth has increased approximately by 9 years in Japan. The share of more than 65 years old population is 27.3% in 2016 while it was 9.1% in 1980.

These demographic changes have significant impact on macroeconomy and potentially have implications for monetary policy.[1] First, the change in population decomposition affects political power of generation. This is sometimes called as gray democracy and used to explain downward pressure on inflation; the theory claims that provided that retirees prefer lower inflation rate compared to workers, a rise in share of retirees results in lower inflation through political decision making. The validity of this claim is unclear. Second, the increased longevity can alter the individual saving decision. It is well known that overaccumulation arises as a source of inefficiency under the environment with age heterogeneity. While Bullard et al. (2012) and Oda (2016) investigate the optimal inflation rate in neoclassical overlapping generation (OLG) model, the optimal inflation rate in New Keynesian framework is unknown. Additionally, the optimal inflation rate under different demographic is another open question.

We ask two questions: first, what the optimal inflation rate is and how it varies according to the change in demographics; second, whether historical inflation rate in Japan, which experience long lasting deflation and societal aging, was optimal. In contrast to the existing literatures examining the effect of aging on monetary policy effectiveness such as Fujiwara and Teranishi (2008), Imam (2015), or Wong (2015), our focus is optimal policy.

If possible, we would like to consider the potential loss from zero lower bound constraint and the optimal simple monetary policy rule under various demographic structures.

The Model

In order to investigate the effects of societal aging on the optimal inflation rate, we use the overlapping generation (OLG) model analyzed in Fujiwara and Teranishi (2008). Fujiwara and Teranishi (2008) extend the analytical framework in Gertler (1999) to incorporate nominal rigidities and monetary policy. Unlike the standard overlapping generation model, the transition from young (worker) to old (retiree)

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[1]There are some debates about this issue. See Bean (2004) and Shirakawa (2012), for example.

follows a Markov process with the latter being the absorbing state.[2] Consequently, without resort to numerical analysis with the large number of, say 50x4=200, generations, the analysis over the quarterly frequency, where monetary policy is considered to be effective, becomes possible in a tractable as well as analytical framework.

There are five agents in this model economy: two types of consumers: worker and retiree; firms; a capital producer; the central bank. Workers supply one unit of labor inelastically whereas retirees do not work. Both invest in the asset issued by capital producer. Capital producer produces capital and lends it to firms. The central bank sets the inflation rate so that the welfare (defined later) is maximized given the initial state variables. Intermediate firms faces Rotemberg price adjustment cost and produce goods using the capital. Assuming the appropriate tax subsidy collected from households in a lump sum manner, the distortion stemming from monopolistic competition is eliminated.

Optimal Inflation Rate

We consider optimal inflation rate under stationary distribution. The result is summarized in the following Figure. The horizontal axis shows life expectancy of retiree computed from survival rate. The vertical axis is optimal annual inflation rate.

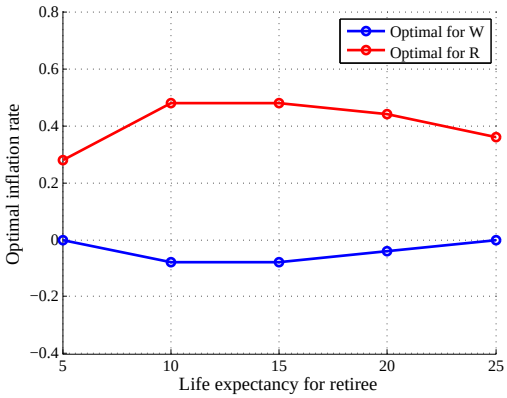

Figure 1: Life expectancy for retiree and Optimal inflation rate

The optimal inflation rate for worker is is lower than that for retiree. Under our calibration where the elasticity of intertemporal substitution is less than one, higher real interest rate lowers saving rate. In order to avoid worker's overaccumulation of assets, lower inflation and higher real interest rate is preferred by workers. On the other hand, retirees want worker to save more because the asset is carried over to retirees. To this end, inflation rate should be raised. Although retirees rely more on capital income and, from this perspective, have stronger incentive for high real interest rate than workers do, this channel is not dominant.

The effect of varying life expectancy is non-monotonic. When it increases from 5 to 10 years, workers prefer lower inflation, while retirees prefer higher inflation. In this case, the longer life expectancy strengthens the saving for retirement motive and reduces real rate of return significantly, inducing further accumulation. Thus, in order to avoid such intensified overaccumulationm and improve the welfare of worker, inflation should be lowered and real interest should be hiked. In contrast, the longer life has upward pressure on optimal inflation for retiree. Longer life makes retiree to hope that workers save more for the extended life. However, since retirement is uncertain, the amount of additional saving is

[2]The overlapping generation model by Gertler (1999) can be considered as the generalized Blanchard-Yaari model *a la* Blanchard (1985) and Yaari (1965).

not enough to fully cover the additional 5 years. Thus, in order to promote worker's saving, retirees prefer higher inflation rate in 10 year life expectancy case.

However, when the average duration of retirement life gets sufficiently longer, the optimal inflation moves in an adverse direction. Now, workers already have sufficiently high saving rate. Then, workers desire to save further by obtaining more labor income to prepare for the future no labor income life, which makes them to prefer higher wage rate because a rise in inflation rate raises saving rate and marginal productivity of labor rises. For retiree, the longer life gets, the more important the contribution of capital income is. Thus, to obtain high real return from asset, central bank should lower inflation rate.

Historical Optimal Inflation Rate

In order to study the possibility to rationalize the historical inflation rate of Japan, we will conduct the following analysis. First, utilizing the data of retirement age and life expectancy, construct the path of retirement rate and death rate for retiree. Next, construct the retiree to worker ratio from population data. Finally, given the exogenous path of retirement rate, death rate, and retiree to worker ratio, compute the year by year optimal inflation rate. We are now running the code to compare the optimal inflation rate and actual inflation rate.

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