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A Theoretical Study on Emigration and Pension Design

Ella Belle C. Choa[1*], Venz Luis D.M. Delos Reyes[1], Ruth Elizabeth O. Obsioma[1], Ashley Patricia G. Sotero[1], Dickson A. Lim[1], and Mariel Monica R. Sauler[1]

1 School of Economics, De La Salle University

**Corresponding Author: ella_choa@dlsu.edu.ph*

Abstract: Labor emigration and demographics may play a role in a country's pension system. We extend an overlapping generations (OLG) model by Cipriani (2016) to take into account emigration and the fertility rate, and aim to provide insights that may be useful in designing a pension system for the Philippines. We find that when output is inelastic to changes in capital, there is a negative relationship between the optimal pension benefit per pensioner and the emigration rate. The relationship between the optimal pension benefit per pensioner and the tax rate is ambiguous. Through a calibration exercise, we find that if the tax rate is below a certain level, then the higher the tax rate, the higher the optimal benefit the retired worker will receive.

Key Words: pension design; migration; overlapping generations

1. INTRODUCTION

The Philippines is one of the biggest exporters of labor in the world. This started in the 1970s, where economic gains could not keep up with the pace of population growth, which made it hard for the country to provide decent wages and jobs, and at the same time, foreign countries needed workers to help make and build their projects (Asis, 2017). According to the Philippine Statistics Authority (2019), 2.3 million Filipino workers were listed as Overseas Filipino Workers (OFW) for the year 2018. Being a labor exporter has a possible implication on the pension system which financially supports the elderly and retirees in the country. We note that remittances reached approximately 235.9 billion pesos in the same year. Out of 235.9 billion pesos, 6.35 billion pesos were invested in their pension

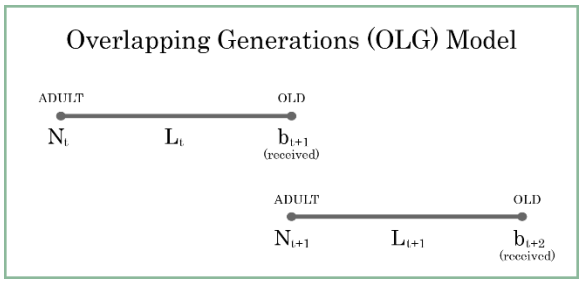
plans since the Social Security System (SSS), the pension institution for private workers in the Philippines, did not require them to contribute last 2018. As a remedy, the newly created law, Republic Act 11199, is expected to give rise to a mandatory contribution scheme for the OFWs. Under the new law, without a bilateral agreement between the host country and the Philippines, sea-based OFWs must pay up to Php800 per month, whereas land-based OFWs who are classified as self-employed will have to pay up to Php2,400 per month (Torres-Tupas, 2019). It is estimated that it will generate 13 billion pesos of contributions coming from the OFWs alone (Vidal, 2019).

According to Barr and Diamond (2006), the purpose of pensions is to let people continue their ability to consume goods and services even if they have stopped working. In the case of the Philippines, pensions are financed by the government and paid with current income through a pay-as-you-go (PAYG) system, where the current generation is the one that funds or finances the benefits given to the previous generation. Today, the current social pension is Php500 per month and this amount is insufficient to cover basic needs (Javier Jr et al., 2019). Furthermore, Knox-Vydmanov, Horn, and Sevilla (2017) stated that expanding pension coverage is unlikely in the near future since the majority of Filipino workers have informal employment and many workers do not have enough disposable income for a pension.

By 2032, the Philippines may transition into an aging society, wherein the elderly (aged 65 and older) consists of at least seven percent of the total population (Abrigo et.al., 2018). The decreasing fertility rate and increasing labor emigration rate may lead to a demographic shift that imposes a huge burden on the future society and workforce of the country which may be a challenge to the Philippine pension system. Therefore, the purpose of this study is to generate insights for a pension design that suits the Philippine economy using an overlapping generations model. The factors to be considered are labor emigration and the fertility rate of the Philippines.

2. METHODOLOGY

The OLG model is often applied to studies with implications on the allocation of resources across generations, such as social security, on the income per capita in the long-run (Imrohoroglu et al., 1999). We use the OLG model introduced by Cipriani (2016) and extend the model by adding a labor emigration rate and removing the retirement decision variables in the equation since the old are forced to retire in the extended model. Individuals in this model live for two periods. First, working as an adult and then retiring when they become old. However, the working adults may choose to emigrate and work abroad resulting in a labor force that consists of working adults who stay in the country which is represented by $L_t = N_t(1-m)$ where L_t is the labor force at period t, N_t is the number of adults at period t, and m is emigration rate with a value between 0 to 1. As the working adults in the labor force grow old and retire and die at the end of the second period, their children become the new working adults. This is represented by $N_{t+1} = [N_t(1-m)](1+n)$ wherein n is the fertility rate with a value greater than 0 and when some emigrate, the labor force becomes $L_{t+1} = N_{t+1}(1-m)$. Therefore, the rate at which the labor force changes is $(1-m)^2(1+n)$.



To find the optimal pension benefit for retired workers, the individuals' expected utility

must be maximized which is limited by their capability to consume. The expected utility which needs to be maximized is given by:

$$U_t = \ln c_t^a + \beta(\ln c_t^o)$$

Wherein t is the period, c_t^a is the consumption of the working adult, c_t^o is the consumption when the adult becomes old, and β is the utility discount factor which should have a range of 0 to 1. The utility function is subject to two constraints:

$$c_t^a = (1-\tau)w_t - s_t \; ; \; c_t^o = R_{t+1}s_t + b_{t+1}$$

Wherein τ is the PAYG income tax rate, w_t is the domestic wage at period t, s_t is the savings of the individual, R_{t+1} is the rate of return on savings, and b_{t+1} is the pension benefit at period $t+1$ which is what they receive when they retire. The pension benefit is based on the pension contributions of the labor force and the rate of change of labor and is given by:

$$b_{t+1} = \tau w_{t+1}(1-m)^2(1+n)$$

The production side of the model will be the same with Cipriani's (2016) model wherein he used the Cobb-Douglas production function.

$$Y_t = AK_t^{\alpha}L_t^{1-\alpha} \text{ where } A > 0 \text{ and } 0 < \alpha < 1$$

Furthermore, the profit maximizing conditions are also the same with Cipriani's (2016) model.

$$w_t = (1-\alpha)Ak_t^{\alpha} \text{ and } R_t = \alpha Ak_t^{\alpha-1}$$

In addition, the savings of the individuals or households from the consumer side are invested as new capital for the production side. This new capital for savings can be divided by the rate of change in the labor force to get capital per worker. Knowing the capital per worker function at time $t+1$, the solution for the steady state can be defined as:

$$k^* = \left[\frac{A\alpha\beta(1-\alpha)(1-\tau)}{[\alpha(1+\beta)+(1-\alpha)\tau](1-m)^2(1+n)}\right]^{\frac{1}{1-\alpha}}$$

Given the pension benefits at time $t+1$, we then solve for the optimal pension benefit that can maximize the utility of the retired workers. The pension benefits per pensioner in the steady state is shown by:

$$b^* = A\tau(1-\alpha)\left[\frac{A\alpha\beta(1-\alpha)(1-\tau)}{\alpha(1+\beta)+(1-\alpha)\tau}\right]^{\frac{\alpha}{1-\alpha}}[(1-m)^2(1+n)]^{\frac{1-2\alpha}{1-\alpha}}$$

3. RESULTS AND DISCUSSION

We focus on the effects of changes in the emigration rate and contribution or tax rate on the pension benefit per pensioner in the steady state. These variables play an important role in pension design because it affects the sustainability of the whole system.

To find the effects of emigration rate on the pension benefit per pensioner in the steady state, we solve for the partial derivative of the pension benefit per pensioner in the steady state with respect to m. Thus, the first order partial derivative is given as follows:

$$\frac{\partial b^*}{\partial m} = A\tau(1-\alpha)[-2(1-m)(1+n)]\left(\frac{1-2\alpha}{1-\alpha}\right)\left\{\frac{A\alpha\beta(1-\alpha)(1-\tau)}{(1-m)^2(1+n)[\alpha(1+\beta)+(1-\alpha)\tau]}\right\}^{\frac{\alpha}{1-\alpha}}$$

The sign of the partial derivative is ambiguous in general. Hence, conditions are set with α to find the effect of emigration rate. If α is greater than 0.5, or $(1-\alpha)$ is less than 0.5, then b^* and m have a positive relationship. On the other hand, if α is less than 0.5, or $(1-\alpha)$ is greater than 0.5, then b^* and m have an inverse relationship. For the positive relationship, it means that, at steady state, output or income is more inelastic with labor so every time there is an increase in emigration, the government should also increase the pension benefit since emigration rate has a minimal effect on the total output or income of the country. For the negative relationship, it means that output or income is less inelastic with labor so every time there is an increase

in emigration rate the government should decrease the amount of pension benefits that it gives to its citizens.

To find the effects of PAYG income tax rate or the contribution rate on the pension benefit per pensioner in the steady state, we solve for the partial derivative of the pension benefit per pensioner in the steady state with respect to τ. Thus, the first order condition is given as follows:

$$\frac{\partial b^*}{\partial \tau} = A(1-\alpha)[(1-m)^2(1+n)]^{\frac{1-2\alpha}{1-\alpha}} \left[\frac{A\alpha\beta(1-\alpha)(1-\tau)}{\alpha(1+\beta)+(1-\alpha)\tau}\right]^{\frac{\alpha}{1-\alpha}} \left\{1-\tau\left(\frac{\alpha}{1-\alpha}\right)\left\{\frac{(1-\alpha)(1-\tau)+\alpha(1+\beta)+(1-\alpha)\tau}{(1-\tau)[\alpha(1+\beta)+(1-\alpha)\tau]}\right\}\right\}$$

The result shows that the PAYG income tax rate and pension benefit have an ambiguous relationship. We conduct a calibration exercise to determine the relationship between PAYG income tax rate and pension benefit per pensioner by setting the following parameters: $\alpha = 1/3$ and $\beta = 0.99$. We find that the tax rate and pension benefit have a direct relationship if the tax rate is less than approximately 61.787 percent. This represents the tax rate that can yield the highest amount of optimal pension benefit while still retaining a maximized total utility. An increasing tax rate would result in increasing optimal pension benefits until 61.787 percent tax rate. Then, as tax rate increases, exceeding 61.787 percent, the resulting optimal pension benefit declines. Hence, as long as the tax rate is below a certain level, when there is an increase in tax rate, the government may also increase the pension benefit given to its pensioners.

4. CONCLUSIONS

In order to assess the impact that labor emigration and changing demographics may have on the Philippine pension system, we use an Overlapping Generations model introduced by Cipriani (2016) and assess the effects of these factors at steady state.

We find that if the output elasticity of capital is less than 0.5, then there is a negative relationship between the optimal pension benefit per pensioner and emigration rate. Through the calibration exercise, we find that if the tax rate is below approximately 61.787 percent, optimal pension benefit per pensioner and the tax rate have a positive relationship.

Given this simple theoretical exercise where we aimed to generate insights, policymakers may consider a policy that incentivizes individuals to stay and work in the Philippines to be able to maintain or increase current pension benefits. Moreover, the government may increase pension benefits every time it increases the tax rate. One example is the Reintegration Program, which helps mainstream returning OFWs into Philippine society, wherein they are given livelihood training and grant money to start their own businesses (Overseas Workers Welfare Administration, n.d.). Another example is expansionary fiscal policy, which may be targeted to generate new jobs through an increase in economic activity, making them stay in the country (Simpao, 2018).

Future research could assess empirically different kinds of pension schemes to see if the results are consistent. The emigration rate and fertility rate may also be considered as endogenous factors in future research since the researchers assumed that these factors are constant in this study.

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