

## **CHAPTER 2:        METHODOLOGY        AND        LITERATURE REVIEW**

### **2.1    Introduction**

The extensive literature on Overlapping Generations (OLG) models is rich and productive. This model is distinguished from other dynamical general equilibrium structures by its realistic assumptions of demography which prevent living individuals from trading with the unborn or the dead. This model has been empirically implemented elsewhere to study the consequences of ageing population, existence and stability of rational expectation, and pension insurance system and has also been used to study the effect of social security on fertility and savings.

### **2.2    Methodology**

#### **2.2.1    Modeling**

Economic model building is a method of study by dropping details and concentrating only on certain essential characteristics. By omitting details and abstract from the mass of detail, and concentrating only on the most important elements, to construct a simple OLG based-model.

The question of whether this model is good or bad depends on whether it retains the important characteristics of the phenomena under study. In the process of modeling, I find it easier to start with a simplified version of the model, by adapting circular flow and OLG model without social security. I have modified the original circular flow diagram to include transfer payments of social security to see the impact. Even though

there are far more elaborate models of the economy than the one discussed here, I have made a crucial analysis by referring to some of their elements at different stages along the way.

We begin from the root of analysis by understanding some of the phrases quoted. First, function is the basis of most mathematical and economic analysis. A **function** tells us one number when we know one or more other elements, which are called function variables. In social security modeling, savings are dependent on the desired lifetime consumption profile and disposable income of each generation, mirroring developments in factor returns.

By adding a function, which simply states the value of the variable, we called these variables as **exogenous** variables and those that we explain **endogenous**. We can trace the influence of exogenous variable on others. Sometimes, variables (such as interest rates) that have been treated as exogenous in earlier chapters may be treated as endogenous in later chapters, as the analysis becomes more extended. Somehow, the distinction between exogenous and endogenous variables is merely a description of the self-imposed limitation of our analysis, and they are not a property of the real world.

### **2.2.2 Simulation of an OLG Social Security Model**

In the OLG framework, as in real life, household decisions are made sequentially: in any given period, decisions regarding saving, capital accumulation, consumption and intergenerational transfers of past generations and of the currently alive old generation (that are made in the past) are known to the current decision makers. [Raut (1992)]

Simulations based on **overlapping generations model (OLG)** are defined as a tool solely used in this research to study various social security effects. The OLG model of **Diamond (1965)** (also called the 'Diamond model') is a basic model used in macroeconomics. Hence, it is widely used in this paper because it makes it feasible and possible to study the aggregate implications of life cycle savings and capital accumulation by individuals.

Modeling the social security using a **general equilibrium** model within an overlapping generations (OLG) framework will perform simulations. Starting from identifying what the basic sub-routines, which are just sub-programs with the main Mat Lab program that perform certain functions such as generating parameters and variables in the OLG model. Then, several Mat Lab programs were written separately to test the model. It is very difficult to determine the dynamic properties of an OLG - model economy. Often, very specific assumptions must be introduced in order to be able to derive meaningful results.

## **2.3 Literature Review**

### **2.3.1 Social Security in Malaysia**

There are very few studies on the social security system in Malaysia. Karto (1986) provides a discussion of twelve types of social security protection in Malaysia. Mohamad (1996) examines a limited number of risks - those associated with unemployment, illness, and the risk of being unable to support oneself in old age (through for example disability, skill obsolescence, or having inadequate non-labour income) for a Malaysian in facing Vision 2020. Social insurance is part of the overall economic

security programmes. The similarity of the chief characteristics of social insurance and social security is that both are financed in large part by special contribution from employers, employees, or both. In this paper, Malaysia was listed as having one or more programmes of social insurance, such as old age, disability, survivorship and workmen's compensation. This author concludes that our preparation for the nation's future economic development activities must be demonstrated by our concomitant to social security reform as a whole.

Shome and Saito (1980) argue that Malaysia had chosen an investment-oriented growth pattern with the use of social insurance funds. This descriptive essay concludes that the social security schemes in Malaysia play a crucial role in resource mobilization and allocation.

### **2.3.2 OLG Simulation of Social Security**

In the second section, we would like to have a review on the aspects of OLG simulation. The literature on OLG simulation of social security is fairly recent. Hurd (1997) discusses the effect of social security on retirement by conducting empirical research based on US data. This author discusses ageing in a two-period OLG model with social security. Hurd concludes with some unanswered research questions and direction for future research.

With data from seven (Organisation for Economic Co-operation and Development) OECD countries, namely, the United States, Japan, France, Canada, Italy, the United Kingdom and Sweden, Hviding and Merette (1999) investigate the macroeconomic impact of pension reform using OLG simulations. These OLG simulations were carried out to

include a reduction in the pensions level, phased abolition of PAYG schemes and general fiscal consolidation. They concluded that Gross Domestic Product (GDP) levels are higher by raising the national savings rate, but not sufficient to offset the effects of ageing.

Peter (1987) provides the information on the effects of neoclassical growth patterns on the capital accumulation of the pension insurance. He also intended to show the advantages and disadvantages of the level premium system and the Pay-As-You-Go (PAYG) method of financing the system. This finding has become an essential reference in building up a basic micro-economic model from which the optimum decisions within the life-cycle framework are derived in our research.

Drissen and van Winden (1990) concentrate on the effects of an ageing population on expenditures and levels of social security benefits. This author quotes a conclusion from Thompson (1983), that "economic theory cannot predict the effects of Social Security on saving and the empirical work to date provides little firm support for the contention that the effect has been substantial". It is stated that an (analytical) political economic model seems to be a more fruitful starting point for establishing more complex (simulation) models to investigate a general equilibrium model.

Blanchet and Kessler (1990) explore some optimal funding policies for pension systems in a general equilibrium setting, where funding affects returns on investment and wages, through its impact on capital formation. They used the simplest analytical framework, namely, the neo-classical one-factor growth model with two overlapping generations to conclude that besides pension funds, there is some other source of capital

accumulation in the economy. By conducting simulations based on Cobb-Douglas production function, the results show that the PAYG social security system and some funding is the only way to achieve high levels of intergenerational equity.

By specifying utility function and Cobb-Douglas production function with certain parameter values, Peters (1990) conducts illustrative simulations to reach a conclusion that, in the absence of public pensions, the economy will in the long run converge to a steady state which is not optimal in the sense of golden rule. This author also states that if the PAYG system influences the savings ratio of the economy, public pensions can be seen as an instrument to implement a modified golden rule.

Johansson (1998) examines the properties of different types of health insurance within an overlapping generations model framework. This paper is motivated by the assumption that the aged-dependency ratio continues to grow in the OECD countries. It seems to be an important task to examine the long-run properties of different systems for the financing of health care for the elderly. By using an OLG model which individuals live for two periods, this paper has compared between actuarial health insurance and Pay-As-You-Go (PAYG) fixed fee pension system, and thus demonstrated that mixed public or private insurance is unable to remove the second best property inherent in public health insurance. We will see whether Malaysia has the trend of increasing aged-dependency ratio.