Introduction

1. The aims of this research project

The aims of this research project are fivefold. The first is to understand trends in the changes of population structures at a global level. The second is to consider how demographic changes affect economic growth. The third is to develop a numerical model that explicitly incorporates the demographic changes over time of different countries and regions. The fourth is to conduct simulation analysis using the aforementioned model. The fifth is to make policy recommendations for countries and regions with different aspects of demographic change in order to maintain sustainable economic growth together through international trade and capital flow.

Until now, the debate on the relationships between demographic structure and economic growth has a tendency to differentiate industrialized countries from developing countries. For example, in developing countries, their birthrates are prone to be high and the juvenile population (0 to 14 years) ratio overwhelmingly high, making savings difficult, and it has been pointed out that this is one reason why these countries fall into the “vicious cycle of poverty”. In order to break this vicious cycle, some developing countries have introduced family planning and other measures to restrain high population growth.

On the other hand, in the industrialized countries, as is in the case of Japan, the rapid growth of the elderly population (65 years and over) has been identified as a factor inhibiting economic growth and, in contrast with the developing nations, there is a debate on what kinds of promotional measures for population growth will effectively improve the low birth rates.

However, these two classifications alone are not enough to provide us with a full understanding of the realities of the global demographic and economic situation. One reason for this is that, even among the developing countries, there are now many countries whose birth rates are declining rapidly, and whose economic growth rates are high. It has been pointed out that falling birthrates in developing countries have beneficial effects on economic growth, as the declining juvenile population brings a

reduction in the child-rearing burden, and the increase in the working-age population (15 to 64 years) results in increased labor input and a higher savings rate. This creates the *demographic dividend* framework, the subject of much lively debated since 2000.

The demographic dividend is a framework that was originally used to explain the economic growth in East Asian countries. Today, it is used in the debate on the growth potential of the middle income countries like India and Brazil. Additionally, in the middle income countries in the East Asian region, such as China and some ASEAN countries, the issue of post-demographic dividend, in which population aging becomes a serious problem before a country's income levels have risen sufficiently, has been identified, and remedies to the issue are now the subject of discussion.

Thus, examination of regional differences in demographic change and economic growth reveals three categories: low income economies where the juvenile population ratio is high but economic growth remains low, middle income economies where the working population ratio is high and high economic growth has been achieved, and high income economies that have a high elderly population ratio and restricted economic growth. The main purpose of this research project is to consider the potential for co-existence among these different groups of countries and regions with divergent population structures, through the reinforcement of complementary relationships.

The structure of this chapter is as follows. In Section 2, an explanation of the demographic dividend that is the basic premise of this research project is given. Section 3 is an explanation of the significance of this research project and an overview of its methodology. Section 4 will provide an overview of the subsequent chapters. Section 5 will discuss remaining issues and future prospects.

2. Demographic dividend

This research project takes demographic dividend as its basic premise for analysis. Conventionally, in the study of the impact of population dynamics on economic activity, the prevailing method of research has been to take population size and population growth rate as the explanatory variables. In recent times, however, there has been a growing trend for theories to take the population composition ratios of different age groups, such as the elderly population and working-age population, as the explanatory variables, and to discuss how the changes in these groups affect economic

growth. The demographic dividend theory is one of these.

However, the history of research that focuses on how changes in population structure affect macro-economics, including economic growth, is short. Certainly, in the 1980s, the effects of changes in population structure on economic growth were studied at the comparatively early stage by the Organization for Economic Cooperation and Development (OECD). On the other hand, it was not until the late 1990s that demographic dividend began to be discussed more widely with regard to the relationship between demographic structure and economic growth in developing countries, particularly as an effect of falling birthrates and growing working-age population size.

The prototype for the concept of demographic dividend first appeared in 1997 in “Population and the Asian Economic Miracle”, by Dr. Andrew Mason (Mason 1997). This paper praised the positive effects of family planning and other population control measures. Its achievement was significant in adding new meaning to family planning and other population control measures, positioning falling birth rates in the developing countries not only as an opportunity to escape from low economic development, but also as a means of promoting economic growth.

The following year, in 1998, the United Nations’ Population Fund (UNPF 1998), in its *The State of World Population*, stated that the falling birthrates in the developing countries would promote “a workforce bulge”, resulting in an opportunity for economic growth. From this the concept of demographic dividend, in which falling birthrates promote economic growth, spread quickly around the world as a new perspective from which to view the developing countries.

In the work of the empirical analysis (quantitative analysis) of the effects of demographic dividend, significant contributions were made by the research team of Dr. David E. Bloom *et al*. at Harvard University, and the research team of Dr. A. Mason at the University of Hawaii. Particularly, Dr. Bloom’s 1998 paper “Demographic Transitions and Economic Miracles in Emerging Asia” provided quantitative analysis of various Asian economies through the years 1960 to 1990, concluding that a third of this economic growth stemmed from the demographic dividend, a conclusion that drew global attention (Bloom and Williamson 1998). It was further shown that the effects of demographic dividend had played a significant role in high levels of economic growth in Asia since 1990 (Bloom, Canning, and Malaney 1999).

The continuing research by Dr. Bloom’s team not only uncovered a positive

correlation between economic growth and the rate of increase in the working-age population, but also empirically considered the influences of various other factors. For example, factors such as access to ports, geographical environment, institutional quality, openness, and growth in the number of years of enrollment in higher education were studied as variables (Bloom *et a*l. 2010).

Demographic dividend represents an excellent opportunity for developing countries to catch up with industrialized ones, and that is the preparation period for the aged society to come. In other words, the developing countries need to absorb the effects of the dividend sufficiently and build an economic social base so that they can realize a wealthy aged society. However, the benefits of demographic dividend can only be enjoyed by those countries whose systems and policies have been able to respond to demographic change, and are not a given.

What needs to be pointed out here is that, as indicated by Bloom's papers, the effects of demographic dividend are not a given but require a country's social, economic and political systems have been developed so that the benefits may manifest themselves, and that the implemented policies are suited to demographic change. In other words, only those countries that have systems and policies appropriate to demographic change will be able to enjoy economic growth as a dividend. On the other hand, it has been noted that, in contrast to East Asia, Latin America has not been able to enjoy the benefits of demographic dividend (Bloom, Canning, and Sevilla 2003).

It also needs to be realized that countries that have enjoyed the benefits of demographic dividend will eventually transition to the stage of *demographic tax*, as their populations structure begin to age. As large number of baby boomers reach retirement age, the labor input rapidly dwindles and savings rates fall. Furthermore, the expanded burden of social welfare related expense, such as pensions, medical care and welfare are factors that slow economic growth.

3. Significance and methodology of this research

In recent years, there has been growing international concern over effects of falling birthrates and ageing populations among the developing countries. In addition to population forecasts in the developing countries, there have also been analyses of the particular problems faced by these countries, as well as the special characteristics and trends among the elderly who live in these countries, and policy recommendations

based on these analyses.

However, due an overwhelming lack of human resources, capital and technology in comparison with the industrialized countries, the issue of aging societies in developing countries is a difficult problem to tackle. In order to overcome these limitations, Oizumi, Kajiwara, and Aratame (2006) and Oizumi (2007) hold that it is important to begin preparations for the human resources, capital and technology that will support aged societies from now, and that international cooperation in this respect must begin immediately.[1]

When considering the aging of the populations of developing countries, in addition to preparations for this stage, it is also important to raise income levels as high as possible before population aging becomes a serious issue. In that sense, the formulation and implementation of policies that will allow the benefits of demographic dividend to be enjoyed fully is extremely important, as is international cooperation to promote this.

As stated above, demographic dividend has been used as a framework from which to explain economic growth factors in developing countries that have achieved high levels of economic growth. However, there is no guarantee that these countries will pass through the stage of demographic dividend to become high income countries. In fact, in recent years there is evidence of developing countries moving more rapidly than the industrialized countries into the stage of falling birthrates and aging population, and there are many examples of alarm bells being sounded that an economy is facing serious aging issues before it can become a high income economy.

Nevertheless, there is a strong tendency for the development programs of developing countries, and the support of international agencies, to allocate large portions of available budgets into urban infrastructure development and sectors related to the education and labor of younger generations, and there seem to be few policies that are aware of the need to reduce the burden of population aging and maximize the benefits of demographic dividend. In addition, there has been almost no consideration of frameworks that would involve cooperation among nations through trade, investment and aid policies that would help to enhance the benefits of demographic dividend.

From this point of view, the final aim of this research project has been to focus upon regional differences in the degrees of falling birthrates and aging

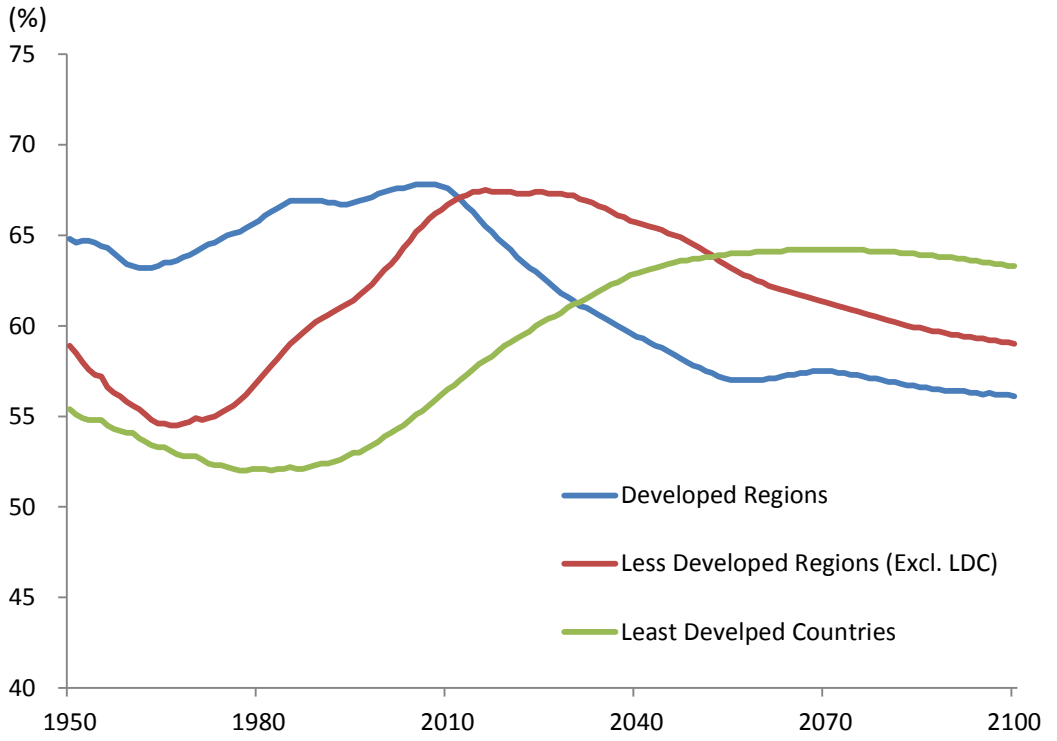
[1] Case studies of "community welfare" in Japan are presented as suggestions for the consideration of how minimum levels of social security can be provided for the elderly.

population, to conduct comprehensive analyses from both domestic and overseas perspectives, and to make policy suggestions based on these analyses.

In particular, today, as economic globalization advances and initiatives towards the liberalization of international trade and investment are implemented throughout the world, the effects of population structure on economic growth need not only to be addressed by domestic initiatives, but also debated from an international perspective.

In view of the foregoing, this research project aims to propose a framework whereby regional differences in demographic change can be utilized and different countries can cooperate with each other in order to maximize the benefits of democratic dividend in the developing countries, as well as a framework for the realization of sustainable global overall economic development through trade and capital movement among these countries.

Figure 0.1: Working-Age Population Ratio



Source: UN, *World Population Prospects: The 2010 Revision*

For example, it is known that changes in the working-age population ratio, which exerts considerable influence on demographic dividend, can be grouped by income level. Figure 0.1 illustrates regional changes in working-age population ratios, based on UN definitions. The rise in the working-age population ratios of the more developed regions has been the soonest and has already peaked. Meanwhile, the working-age population ratio in the less developed regions (excluding least developed countries) is trending upwards, and its level increasing. The same ratio of the least developed countries is still low, but is expected to begin to increase in the years to come.

If a system of cooperation can be established to mutually complement the time difference in the manifestation of demographic dividend, economic growth in the developing countries could be promoted, and the industrialized countries would be able to benefit from this. In order to enhance the demographic dividend effect in regions of least developed countries such as African countries, the transfer of capital from the more developed regions and less developed regions, excluding least developed countries would play an important role. Such capital may be in the form of aid, and can also be in the form of direct investment by private sectors.

In any case, in order to consider this kind of cooperative system, it will be necessary to have a framework of analysis that reflects the inter-relationships among several regions with different population structures.

In this research project, in order to gain a full understanding of these policy effects and their scale, economy “model-based” analysis will be carried out. In this analysis, the market conditions and institutional peculiarities of the economies to be analysed will be expressed using mathematical formulae, and then shown as systems of simultaneous equations, based on the assumption of the optimal behavior of these economic agents. This is because we believe that, by further analyzing these systems of simultaneous equations, the socio-economic nature and characteristics of the subjects under analysis can be clarified, and the consideration of policy effect and scale can be made possible.

An “overlapping generations (OLG) model” will be used as a basic tool of concrete analysis. The OLG model is frequently employed in cases that focus attention on income transfer and the distribution of resources among generations within demographic changes that occur over time, such as falling birthrates and population aging. The fundamentals of the model were developed by Allais (1947) and Samuelson (1958), and applied and further developed by Diamond (1965) and Lucas (1972).

However, until now, the research subjects of overlapping generation models, since such research has been intended to provide governments with information and policy recommendations, have tended to be those specific countries only. Additionally, such research is commonly focused on the analysis of domestic policies, such as tax reform, social security reform and fiscal reconstruction, and gives little consideration to how multiple nations can affect each other in an open economy (Börsch-Supan, Ludwig, and Winter 2006)[2]. In this research project, we worked on developing the overlapping generations model in a multilateral context.

Nevertheless, in analysis using the overlapping generations model, the greater the number of elements incorporated, such as subdividing sectors like generations, household accounts and production, the more complex the simultaneous equations systems becomes, and the more difficult the analysis becomes. Therefore, this research project will include the reform of social security systems and fiscal systems, and international trade and investment policy and aid policy, but this will give rise to the problem of greater complexity in the model.

For this reason, as described later, in the OLG model employed in this research project, "quantitative analysis using numerical model simulation" will be conducted. And, when conducting quantitative analysis, in addition to theoretical frameworks, it is also necessary to have empirical frameworks in order to reflect actual economic conditions into the analytical model. However, given that multiple countries and regions need to be covered, including developing countries from which obtainable data are limited, this research project has not employed macro-econometric models that require a large volume of time-series data, but has created models using a technique called "calibration", in which parameters are derived based on theories under limited data (such as the optimization activities of economic agents).

4. Motivation and features in the OLG/AGE model

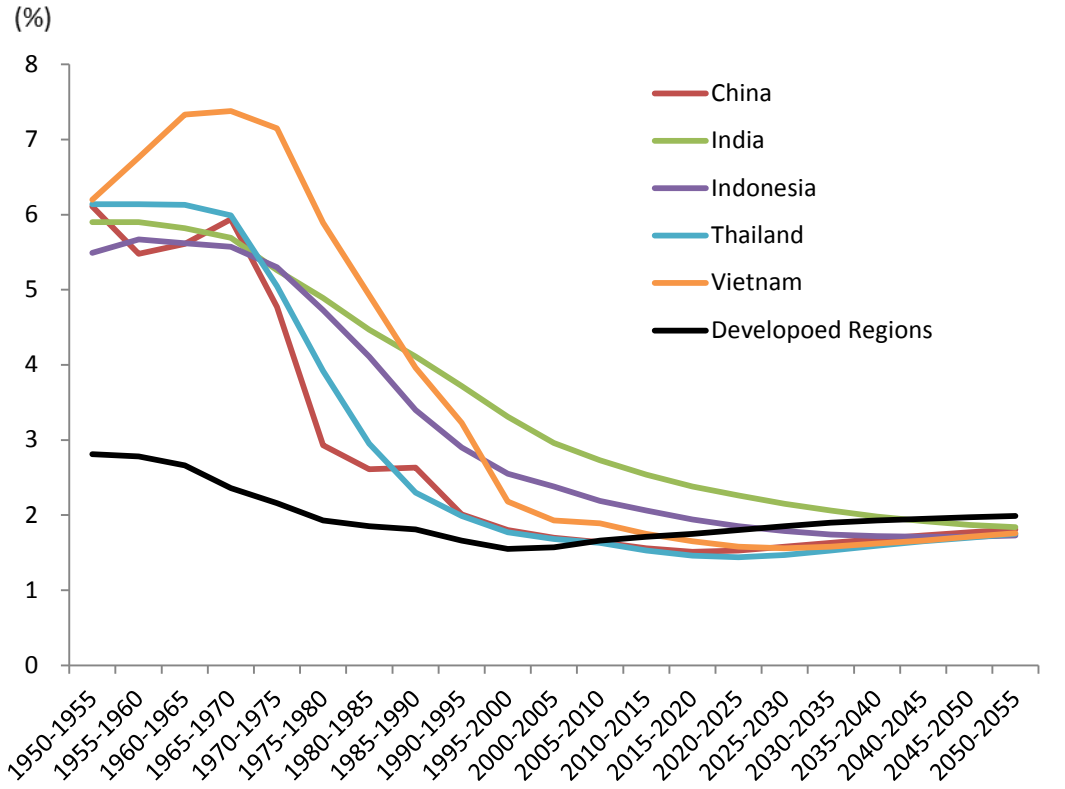
4.1. Motivations for the modeling

Our main objective is to analyze the impact of aging in one country on the other

[2] As for research that deals explicitly with open economies and employs simulations to analyze the effects of ageing, there is Boersch-Supan *et al*. (2003). This study reveals that capital flow is generated among countries with different population structures, and that this has the potential to alleviate significantly the financial issues arising from ageing.

countries by focusing on international transactions such as capital movements and trade among them. Our research intent is to capture that repercussion arising from the shift of demographic structure as well as policy changes in developing countries, for example, introduction of a pension system. To attain these objectives, our research project endeavor to develop a multi-region, multi-sector, endogenous growth model with overlapping generations in the framework of applied general equilibrium analysis[3] (OLG/CGE).

Figure 0.2: Fertility Rates (%)



Source: UN, *World Population Prospects: The 2010 Revision*

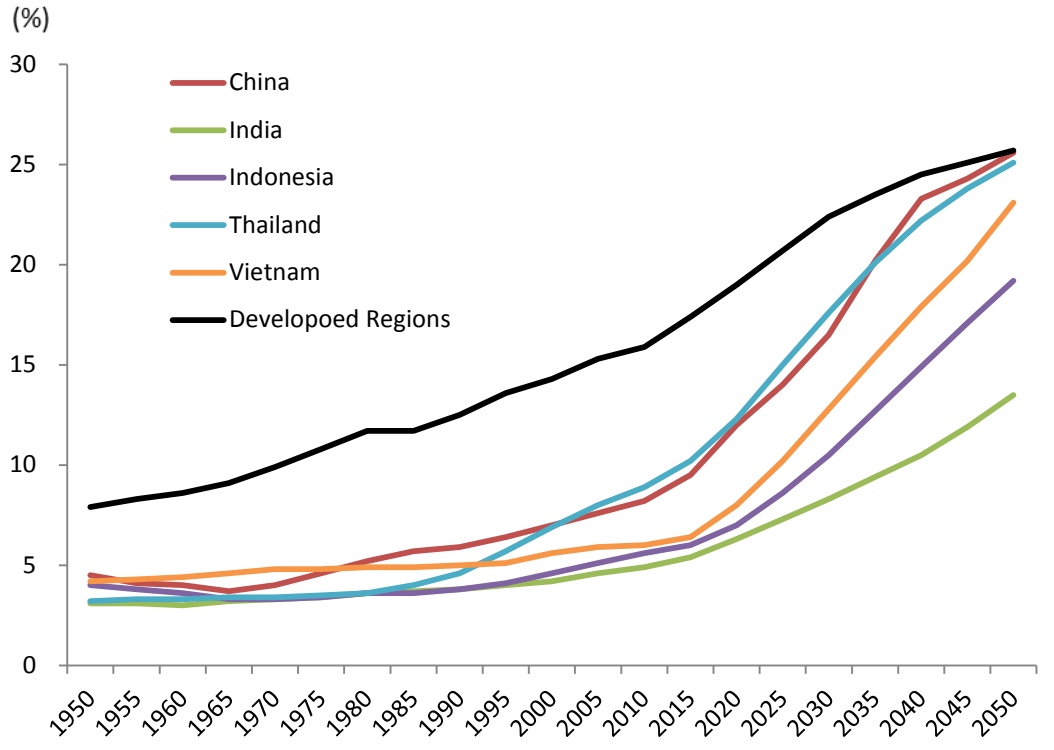
Motivation behind the objectives is coming from the demographic changes we observed all around the world. For example, many developing countries are likely to face serious population aging problems. We also observed in empirical data that the

[3] Also called computable general equilibrium (CGE), we use them interchangeably.

speed of aging in developing countries tends to be faster than developed countries. However, these developing economies are still in the process of development and their preparations for the coming aging issues are not sufficient both economically and institutionally.

Data from United Nations (2011) empirically confirmed the dynamic demographic transition of developing countries. China, India, Indonesia, Thailand, and Vietnam, taken as an illustrative example, have experienced a remarkable decline in fertility rate in the past, and by the beginning of 21 century their fertility rates have come down to the level of developed regions' average fertility (see Figure 0.2). These faster declines in fertility rate will have visible consequences in the future, appearing as faster catching-up trend in old dependency ratio (see Figure 0.3).

Figure 0.3: Old Dependency Ratio (%)



Source: UN, *World Population Prospects: The 2010 Revision*

As another motivation in our project, we are interested in economic growth

aspect of demographic change. Thus, it can boost economic growth at the earlier stage of population growth, because there is more working-population available to economy. Such positive phase in the demographic change, researchers often call it demographic dividend. To fully capture the demographic dividend in the developing countries, there is an urgent need to find a way to support them. We ask ourselves if there is any role for developed counties to play in such area of cooperation. These motivations led us to develop and design the features built in our OLG/AGE model.

4.2 Features in the OLG/AGE model

Endogenous saving

Given the future state of economy, there is an economic incentive to save more during younger generations to prepare for the retirement generations to come. Consequently, saving rate will change along the aging. To reflect this behavioral change in saving, we need to construct a model with varying saving rate that is endogenously determined. This is done with forward-looking decision behavior of the agents. Thus, consumers will face with an intertemporal optimization problem. Although there are abundant theoretical models with endogenous saving decision under intertemporal optimization framework, there are very few AGE models with this feature. Even rare, if the endogenous saving is built into an OLG/AGE model.

Demographic structure

We have five overlapping generations in the model. The first generation is a childhood, age 0–19. The second and the third generations are working-age generations, age 20-39, and age 40-59, respectively. People in the model live in retirement at the age of 60-79, and at the final generation is age 80 - 99.

During childhood, an agent chooses how much time to allocate on schooling or leisure. Knowledge and skills obtained from the schooling will embody in her human capital. Time spent on schooling fosters accumulation of human capital, and then its accumulation determines her labor productivity once she joins the labor market at the second generation.

Working generations allocate time for raising their offspring, for working,

and for schooling. This pertains to endogenous determination of number of children in the model. At the end of working age, an agent decides the amount of bequest to younger generations. After the retirement, the agent lives on her savings and pension.

Government

In each country, government makes public investments in two types of infrastructures. Social infrastructure such as school affects labor productivity through personal human capital accumulation. Having a good schooling system facilitates agent's efficiency in human capital accumulation at school, and then later on influences her labor productivity. The other type of public investments is made in economic infrastructure such as roads, ports and so on. Economic infrastructure alters production efficiency directly through the growth of total factor productivity.

Tax revenue is collected via 14 policy instruments stemming from tariffs, consumption tax, income tax, production tax, and to corporate tax. Government expenditure items are investments for social and economic infrastructure, government consumption, foreign aid, and compensation payments to pension system. Imbalance in fiscal budget is covered by public bond.

Pension

Two different pension systems are introduced into the model, namely Pay-As-You-Go (PAYG) system and fully funded pension system. As mentioned before, many developing countries do not have any pension system. Hence, it is likely for these countries to come to the phase of introducing a pension system. To consider potential impact of such event, our model with pension module is able to implement a simulation of establishing a pension system. Furthermore, alternative choice or mixture of the two pension systems can be simulated in the model as well. If the PAYG system becomes deficiency, then we can examine the effectiveness of government's compensation to the PAYG as a policy instrument.

Interdependency of the global economy

To fully capture the demographic dividend, there is a scope for international capital flows to fill the gap between working population growth and capital accumulation.

Since the demographic dividend firstly emerges as an increase in the working-age generations, capital accumulation supported by capital imports to the economy would benefit further from the demographic dividend. Therefore, modeling international capital flow is a key feature to our model.

Degree of the capital mobility is modeled by assuming imperfect capital mobility. If we assumed a perfectly mobile capital flows, then there would not exist the gap between the profusion of working population and the growth in capital stock. Given the characteristic of developing countries, assuming a perfectly efficient capital market would sidestep the problem we would like to address the problem in our study. Following the methodology of Rosensweig and Taylor (1990), we modeled international capital market with friction in where a bundle of public bonds and corporate capitals is traded.

Having modeled international capital flows, international trade, another channel transmitting a change in one country to others, is built into the model with flexibility. Three different specifications of international trade are designed with varying degree of product differentiation. Since Armington (1969) introduced a concept of product differentiation by place of production, so-called Armington structure has been widely adopted in applied economic models, most popularly in AGE models. New trade theory as in Krugman (1980) founded firm-level product differentiation under monopolistic competition. Farther development in the new trade theory has been made by Melitz (2003) for incorporating firm level productivity differences extended to Krugman (1980).

Demographic dividend benefitting from capital inflow would stimulate economic activities in the recipient country, leading to acceleration in international trade. This positive causation can be transmitted back to trade in goods and services across the countries. Out interest is to study on what extent the three different trade specifications would generate such repercussions.

Basic set-up of the OLG/AGE model

The OLG/AGE model developed for our study has a multi-region, multi-sector framework. To simplify and facilitate the basis analyses we intended to conduct by simulations, regional and sectoral dimensions are restricted to three regions and two sectors. The three regions are distinct in income level, proxy to the stage of development process. The two sectors differ in their production technology

characterized by constant returns to scale on the one hand and increasing returns to scale on the other hand.

One period to time specified in the model is equal to 20 years, and the horizon in the model simulation reaches to 50 periods. There are five generations; a childhood, two working-age generations, and two after-retirement generations. Survival rate differs across generations to reflect change in size of each cohort along the time path. Demographic change is predetermined outside of the model and given exogenously to simulation analysis.

4.3. Overview of agents' behavior and equilibrium conditions

Outline of the firms' behavior

The OLG/AGE model in our study implements a nested production structure to reflect the assumption made for firms' production technology. A firm's decision is formulated as an intertemporal optimization problem with three segments. Firstly, the investment segment makes dynamic investment plan to maximize the value of the firm by assuming putty-clay type of investment with adjustment cost. Secondly, the production segment is to choose the optimal level of output and factor inputs to maximize the firm's temporal profit. Lastly, only applicable to the firms with increasing returns to scale production technology, the sales segment is to choose markup price with market power to maximize temporal profit. All the choices are determined simultaneously by solving the intertemporal optimization problem.

Outline of the consumers' behavior

We assume a representative consumer in each generation of each region to choose a time path of savings that will maximize her felicity defined for the life cycle. Consumer's utility is defined over leisure, number of children, sequence of aggregated consumption, and bequest. Utility function is homogeneous and additively separable with constant elasticity of marginal utility. The representative consumer also chooses a time path of schooling to accumulate person human capital, which later affects her wage income during working-age generations. Saving decision made by the consumer distinguishes saving behavior by generations, more savings at younger generations less

at older. By the retirement, agents make a bequest to younger generations. Although a child augments her parents' utility, having more children reduces time allocated for working and schooling at working-age generations.

Sketch of equilibrium conditions

Equilibrium condition assumed in the model can be described as market clearings in goods, production factors, and assets. By Walras-law, we can drop an equilibrium condition for one arbitrarily selected market, giving a price exogenously. Steady state is defined as following. At the terminal period of simulation, economies must be in a steady state in where all quantity variables grow at the same endogenously determined rate while all price variables stay at a constant level.

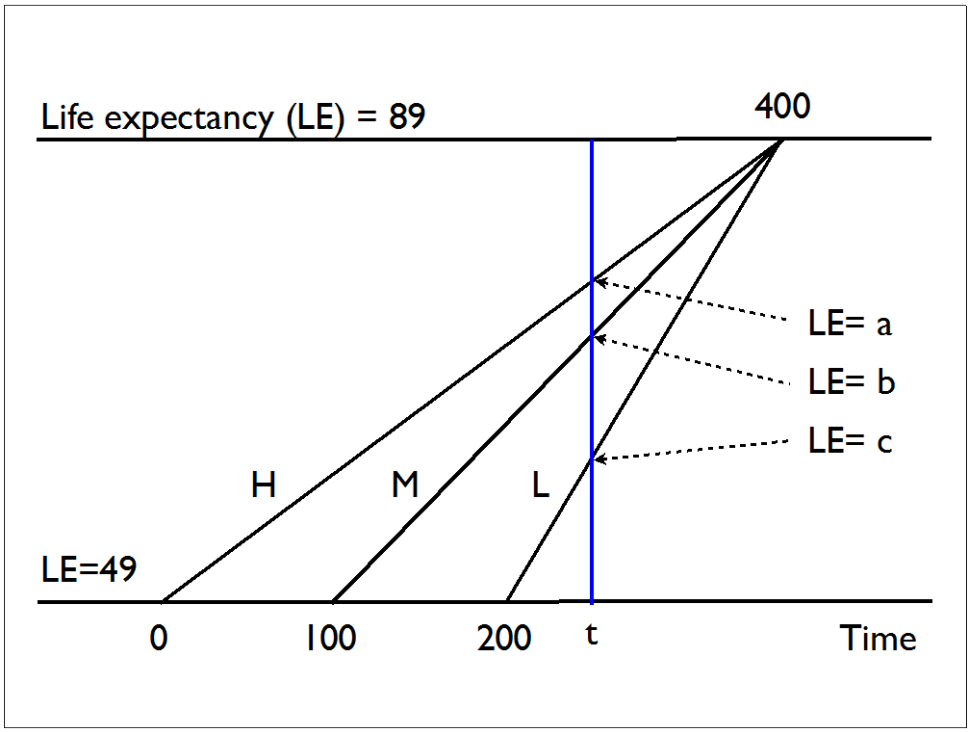
4.4 Design for the basic simulation analysis

Once the OLG/AGE model has successfully calibrated to the steady state we described earlier, the next step is to design and prepare for a basic simulation. The first simulation we will implement with the model sets the stage for analyzing fundamental mechanism interplayed within the model. As the first basic simulation analysis, we opt to investigate how the OLG/AGE model behaves with response to exogenously given changes in life expectancy.

Figure 0.4 shows the schematic design for the basic simulation. Two horizontal lines indicate life expectancies along the passage of time, 49 year old at the bottom and 89 year old at the top. The two numbers are arbitrarily selected for the matter of a simplified experiment. The model is calibrated to a steady state with life expectancy of 49, so as for all the three regions in the model starts at the left end of the bottom line.

Suppose a medical innovation unexpectedly takes place in the region H at time 0. The region H's life expectancy begins to rise toward the higher age of 89, as shown at the top line. It will take 400 periods for the region H to reach the higher life expectancy, but note again the number is arbitrarily set. Delayed by 100 periods, the region M and then the region L start improving their life expectancy. There exits an advantage for the late starters to have "catching-up" effect, a faster improvement in life expectancy.

Figure 0.4: Schematic Design of the Simulation



By design of this basic simulation, all the regions attain the higher life expectancy at the time period of 400. Their arrival at the top line does not necessarily mean that the three regions are in a steady state; it may require more time periods. This transition from a steady state with life expectancy of 49 to another steady state with the higher life expectancy is the first basic simulation. In the transition, we can set a target for the life expectancies for the regions, say, “a” for the life expectancy in the region H, “b” for the region M, and “c” for the region L.

Our research interest in the basic simulation lies in the transition rather than the steady states. Thus, at the time period t, we care for each region’s economic conditions characterized by resulting variables computed in this basic simulation. For example, since the model has a capability to determine the interregional transactions of trade and investment, we are interested in the pattern of them; which flows coming from where.

By focusing on the transition, our aim is to identify potential economic

problems arising from the basic simulation. Possible cases can be a question whether a shortage of capital stock to working-population constrains a region's potential to grow, or an issue relating to insufficient investment coming from oversea, or an excess savings in the aged region, or a shortfall in fiscal budget to sustain a pension system.

Once we identified the problems emerging in the basic simulation, we need to seek a set of policy instruments to mitigate their negative impacts under policy scenarios. For instance, we can test the effectiveness of foreign aid by contrasting the condition attached to it; if tied foreign aid to public investment might be more beneficial than untied aid, or if granting aid might be advantageous over lending. As other policy scenario, to responding to the identified problem in aging economy, pension reform or introduction can be investigated. Also, we can implement experiments alternating or combining PAYG and fully funded pension system. Liberalization of interregional transaction can be another set of policy scenarios.

We need to reveal the fundamental workings in the model by conducting numerous simulations with artificial environment. This is the first and the top priority for us at this stage of our research project.

5. Structure of the book

This book consists of two parts, Part I focuses on the basic information to support this research project and the Part II emphasizes the basis of building the OLG/AGE model.

In the following Part I, Chapter 1 introduces the process of the expression of demographic dividend, and explains the benefits of demographic dividend dividing it into the "first demographic dividend", which is brought about by increased labor input, and the "second demographic dividend", which results from a rising domestic savings rate. Then, the fact that the timing with which the benefits of demographic dividend can be expected differ from region to region will be observed using UN regional divisions. Chapters 2 and 3 review existing literatures by distinguishing their study focus on domestic and international point of views respectively. Needles to say, our literature reviews are by no means exhaustive, rather we selected a set of literatures guiding this research project.

In Part II, Chapter 4 explains the basic structure and the major assumptions of the three-region, two-sector endogenous growth model with overlapping generations developed for this research project. Then, it

revealed that there are possibilities to face problems and difficulties during coding works. Since a benchmark data set should be consistent with the system of a model, incorporating a complicated structure increases requirements on data to strictly satisfy constraints and conditions included in a model. Chapter 5 summarizes the problems we faced in the parameterization process of building the model. The problems are still there and have not yet been overcome. One of the purposes of this book is to share our experience with model builders in the AGE community, and start exchanging ideas to tackle the difficulties. We hope this note will motivate experienced model builders to start discussions to find a solution.