How can Promoting "Desirable" Elderly Employment Opportunities Alleviate the Shortfalls of Thailand's Ageing Society?[*]

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ABSTRACT

This research article considers a simulated scenario in which there exists policy infrastructure that promotes employment options to support desirable life after retirement with fiscal sustainability. Two proposed "demo" policy tools, among many others, include (1) legislative flexibility in employment and (2) tax incentives for employers. These measures aim at encouraging employment structure with working conditions favorable for elderly workers. The results of the simulation imply that, given suitable working conditions, a minimum of 50% of the potential elderly workforce participating in the market can yield marginal annual income of approximately 44,268 - 165,295 Baht per elderly worker and approximately 4.74 - 9.35% GDP increase from the baseline GDP growth with ageing population structure. Moreover, the estimated possible minimum marginal net tax revenue is approximately 33,279- 65,994 million Baht. This marginal government revenue, if allocated to old-age expenditure, amounts to approximately 4,000 Baht per elderly per year. The proposed scenario with policy infrastructure that encourages elderly labor participation in the economy constitutes a self-funded model with fiscal sustainability and represents a win-win scenario. Nevertheless, the success of implementing such policy tools depends on the understanding, co-operation and synchronization among the Thai public institutions as well as all parts of the society.

Keywords: ageing society, policies for old-age employment options, fiscal sustainability

JEL Classification: H53, H55, C53

1. Introduction

The question that sparks this research paper relates to how Thailand's ageing society can be structured to become a desirable one. In the first instance, a desirable ageing society that one can imagine can be a society in which both the elderly and working population are happy, and there is fiscal sustainability to support their living at least at the subsistence level. Nevertheless, the value of subsistence level varies considerably from person to person; ranging from a level of "just enough" at 5,000 baht per month (Tankulrat, 2015a)[1] and 6,000 baht per month (Hempornwisan & Akarachanon, 2014) for the Thai formal labor force to a "sufficient" level at 16,000 baht per month for Thai civil servants (Tankulrat, 2015b)[2].

With that said, what can be done particularly to enable the elderly access this desirable condition? Based on literature in the past, a body of research tries to examine the trend, sustainability and management of the pension funds, the old age funds, and the other forms of old age allowances, which pressed for the need to increase saving for retirement at national as well as local levels. Other studies analyzed the extension of working tenure under the existing structure of society, culture and law. The recommendations from both groups of research are restricted to specific context in practice. As for the first group, policy implications encounter limitations regarding budget constraint and fiscal space. It is widely accepted that with limited budget and other governmental expenditures that lack flexibility, it is difficult to achieve efficient distribution of sufficient amount of money or create a desirable condition for the elderly. For the second group,

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[1] The article refers to the research "Adequate Minimum Lump sum for retirement", Chulalongkorn University

[2] The article refers to the study by Thailand's Government Pension Fund.

extension of working tenure (or retirement age) in such a way that "requires completion of task unto one's last breath" may be excruciatingly brutal. This also faces limitations, at least, pertaining to the physical aspect of old age that requires them to continue with their usual task which do not seem to be beneficial for the physical and mental wellbeing of the elderly in the case that it is mandatory for them to work in the same quantity as their younger colleagues. Such stress and time constraint lacks the flexibility for living a desirable elderly life.

As of now, Thai society still lacks policy infrastructure to create an old-age employment option to support a desirable life after retirement, which encourages elderly of all backgrounds and education level to maintain "vigor" in the organization and at the same time, gives them flexibility in living their lives as an elderly. The example of such flexibility includes scheme that requires old age labor to work fewer days per week with work condition that is suitable with their age. As Serge Volkoff, a statistician and ergonomist[3] at Centre d'etudes de l'emploi in France, suggested that sustainable work over the life course[4] need to have 3 main characteristics namely; (1) the work should be suitable with human's bodily caliber and adjust with life's timeline (bio-compatible), (2) the work should encourage development of efficiency that determines working strategy (ergo-compatible) and (3) the work should strengthen balance between working, personal and familial life (socio-compatible) (Fric, 2014). In addition, the by-products are "pocket money" in addition to the existing saving and old-age pension provided by government, sense of dignity that they are

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[3] Ergonomics is derived from Greek "*ergon*" meaning work and "*nomos*" meaning natural laws, which when combined may be interpreted as law of work. This is a science concerning with adjustment of work conditions to suit the undertaker or a systematic adjustment of work conditions.

[4] Life course here implies increase in one's age or simply retirement.

valuable to society, physical and mental wellbeing as they are required to exert an appropriate level of workload and increased social activity which prevents depression.

This article presents a simulation analysis with concrete policy implications to offer Thai society with alternatives to promote a desirable life after retirement. It is also crucial for all concerned parties to understand different policy choices and their mechanisms in order to create an appropriate employment scheme that is both suitable and beneficial for the physical and mental wellbeing of aged population. This research employs scenario analyzes by using two government "demo" policy tools namely; (1) labor laws and (2) tax incentives to stimulate appropriate employment scheme for the potential population aged 60-79 years, while maintaining the existing level of old age benefits provided by the government. The scope of this research includes analysis of economic growth, income of the elderly labor force and tax revenue accrued to the government based on Thailand's demographic forecast in 2010 by Office of the National Economic and Social Development Board (NESDB) under medium-variant scenario. Economic parameters in the simulation are set as in the real situation, which varies according to the demographic conditions and average trends in the past. It is important to note that this simulation analysis does not include other social transfers, the macroeconomic multiplier effects that might occur in Thailand, and the effect of new taxes to be levied in the future.

The rest of this article is structured as follow; section 2 discusses statistical information and the conditions of Thai ageing society. Section 3 reviews related literature pertaining to the management of ageing society. Section 4 outlines the conceptual framework, methodology and scope of the research. Section 5 discusses the estimates from the simulation scenarios in which government tools are used to induce employment scheme for the potential elderly population aged 60-79 years.

Section 6 concludes empirical evidence supporting policy implications that open up choices for the implementation of old age employment scheme for a better quality of life after retirement.

2. Statistical information and conditions of Thai ageing society

This section discusses specific characteristics and working conditions of the elderly population in Thailand with the aim of supporting the implementation of alternative measures for the employment scheme to be discussed in Section 4. As for the overview, the data from NESDB indicates that population aged over 60 years is on an increasing trend in a significant way; from 11.9% of total population in 2010 to 25.2% in 2030. In other words, one-fourth of total population will be aged population. The main reason for this phenomenon owes to the reduction in fertility rate below a replacement level. At present, it is estimated that on average one woman of childbearing age gives birth to around 1.6 children in her whole life cycle, compared to a rate of 4.9 children 40 years ago. In addition, there is a tendency for the population to live longer. Life expectancy for Thai population has increased continuously and in the next 30 years, it is estimated that life expectancy for male and female will increase to 75.3 and 81.9 years, from the present levels of 71.6 and 78.4 years respectively.

If we specifically examine the demographic structure of Thai aged population, survey report of the older persons in Thailand in 2007 by the National Statistical Office points out that around 34.13% of aged population have an average monthly income of 1,250 Baht or lower, which is below a poverty line in 2007, set at 1,443 Baht per head per month. 83.51% of the aged population have an average monthly income of 6,250 Baht or lower, which is close to the sufficient

level of 6,000 Baht per person per month. (Hempornwisan & Akarachanon, 2014).

Regarding sufficiency, 42% reported that their income is sufficient at times or insufficient. Table 1 reflects the fact that major portion of income for the elderly come from their children (which is in line with Chawla (2008) and United Nations (2013)) and working. A minor portion comes from pension and old age allowances. However, based on the reduction in potential old-age support ratio, which is the number of population aged 15-59 years to the number of aged population, from 5.08 in 2010 to 4.15 in 2015, together with the population estimate by Office of the National Economic and Social Development Board, the potential old-age support ratio in 2040 will be reduced to 1.71. Hence, the role of income from children as seen in the past will become subdued. Nevertheless, the role of old age allowance is becoming more significant. With no policy restructuring that corresponds with the fiscal conditions, these support measures will encounter limitations imposed by budget constraint.

Table 1. Sources of income for Thai aged population (% of total aged population)

Sources of income	2007	2011	2014
Working	28.86%	35.10%	33.80%
Pension	4.36%	6.00%	4.80%
Old age allowance	2.79%	11.40%	14.90%
Interest	2.87%	2.60%	3.80%
Spouse	6.09%	3.10%	4.30%
Children	52.27%	40.10%	36.80%
Relatives	2.26%	1.50%	1.40%
Others	0.50%	0.20%	0.20%

Source: The survey of the older persons in Thailand 2007, The National Statistical Office, Thailand; analysis for 2011 and 2014 from Suwanrada (2015) who referred to Knodel et al. (2013) and Knodel et al. (2015).

As for the working condition for Thai elderly, 2,636,083 elderly workers or 37.55% of total aged population want to work but only 2,509,444 persons or 35.74% of the total aged population are employed. Two main reasons for working owe to the need to earn income for family or personal consumption (56.81%) and maintain good health condition or employability at old age (30.72%). For those who are not working, two main reasons owe to agedness (55.51%) and the need to look after home or family (17.80%). If we consider the physical aspect of the elderly, Table 2 indicates that on average more than 76% of aged people evaluate their health status as moderate to good condition and Table 3 indicates that on average, most elders can see (78%) and hear (85%) clearly. Hence, if we consider the net potential elderly workforce in Thailand, excluding those who are disabled and in long-term care as estimated in Prasitsiriphon et al. (2013), it can be said that this group of workforce has the potential in driving the economy and relieve fiscal constraints in the future.

Table 2. Self-evaluation of health status by the elderly, distributed in age groups.

Health status	Total	60-69 years	70-79 years	80 years and above
Good to moderate	75.65%	81.44%	70.05%	58.58%
Bad	24.20%	18.35%	29.88%	41.35%
Cannot evaluate	0.15%	0.21%	0.07%	0.07%

Source: The survey of the older persons in Thailand, 2007, The National Statistical Office, Thailand

Table 3. Ability to see and hear among the elderly, distributed in age groups

	Total	60-69 years	70-79 years	80 years and above
Seeing				
Clear without the use of spectacles or lenses	53.57%	60.52%	46.68%	33.60%
Clear with the use of spectacles or lenses	25.34%	26.25%	25.07%	20.69%
Not clear - cannot see	20.89%	13.01%	28.04%	45.66%
Cannot evaluate	0.20%	0.22%	0.21%	0.05%
Hearing				
Clear without the use of hearing aid	84.20%	91.48%	78.91%	56.94%
Clear with the use of hearing aid	1.19%	1.07%	1.33%	1.46%
Not clear - cannot hear	14.42%	7.26%	19.57%	41.39%
Cannot evaluate	0.19%	0.19%	0.19%	0.21%

Source: The survey of the older persons in Thailand, 2007, The National Statistical Office, Thailand

With regards to working status of the working elderly, 63.19% operate business on their own without employee while 17.22% and 12.74% assist in household enterprise with no compensation and work for private company, respectively. Such employment structure suggests that people who are willing to work after the age of 60 have limited job opportunities, and thereby are compelled to conduct own business. This is in line with the case of self-employment due to "necessity" as seen in many other countries because they cannot continue their tenure in formal organization despite the desire to do so (Block & Koellinger, 2009). Moreover,

investment of lifetime saving in business while lacking expertise further exposes old-age people to higher level of financial risk. Kilenthong and Rueanthip (2015) observed one fact from Thailand's Socio-Economic Survey (SES) data during 2005-2012 which indicates that around 78% of business startups by entrepreneurs aged over 50 years are more likely to shut down within 6 years and this particular group who shuts down their business chooses to exit from the labor force altogether. Thus, policy restructuring, that creates more job opportunities for elderly workers so that they have alternatives to work in formal organizations (with a more flexible workload compared to young workers) instead of bearing risk from personal investment, can create financial flexibility for them to a great extent.

Furthermore, if we closely examine the "quality of life" from working or the working condition for Thai seniors based on work hours, Table 4 shows the average number of work hours per week for Thai labor by age group, indicating that active workers in 60-69 years, on average, work for 42 hours per week. In other words, if they work for 8 hours a day, it implies that they need to work 5 hours a week which requires them to live life the same way as they do during their working life. As for labor aged 70-79 years and above 80 years, the number of work hours decreased marginally to 40 and 38 hours per week respectively. However, the inflexibility in the reduction of work hours is significant when compared to the number of work hours for old age workers in other countries like UK (See Table 5). It can be observed that the actual work hours per week for old age workers in UK is between 17-33 hours which is significantly lower when compared to that of Thailand. Nevertheless, from the survey on desired number of work hours for old age workers in UK, it was found that senior workers still have the desire to reduce the number of work hours to around 7-21 hours per week. Put it differently, if they

work for 7-8 hours a day, they will be working for 2-3 days a week, which would allow them to live life with more flexibility while giving them social space in organization with better physical and mental health. This is in line with the research by Wivatvanit et al. (2008) who found that when old age people engage in activities for supplementary income, they gain more pleasure from having friends of their own age, supporting each other through hard times which make them feel valuable and stay healthy.

Table 4. Number of working hours per week for Thai labor, by age group

Age group	Average number of working hours per week
15-50	45.24
51-59	43.89
60-69	42.07
70-79	39.52
80+	37.83

Source: Labor Force Survey, 2013, The National Statistical Office, Thailand and processed by researcher

Table 5. Number of actual working hours per week and number of desired working hours per week of labor force in UK, by age group and working status

	Number of actual working hours		Number of desired working hours	
Age group	Employee	Employer	Employee	Employer
50-64	31.60	32.80	20.90	19.30
65-69	22.00	22.80	10.70	8.90
70+	17.20	19.50	6.90	8.40

Source: Bell and Rutherford (2013) Table 3 and Table 5b, processed from UK Labor Force Survey, 2012 and summarized tabulation by the author

3. Literature review: Management of ageing society and policy guidelines in Thailand

In the past, Thailand prepared the 1st National Plan on the Elderly (1982-2001) and the 2nd National Plan (2001-2021), based on the following basic principles namely; (1) creation of security for the elderly, which in turn creates stability for the society, (2) elders are valued, have potential and should be encouraged to contribute to the society, (3) elders have dignity and are capable of living in their own community in an appropriate manner as their age requires, and (4) most elders are not people who lack opportunities or are burden to the society despite the fact that some elderly encounter hardship and need support from society and government for certain period of old-age life (National Board of Promotion and Coordination for the Elderly, 2002).

On account of the preparation of the 2nd National Plan on the Elderly, Jitapunkul and Wivatvanit (2009) observed that the 2nd plan has more impact on society compared to the first because of two main reasons. The first reason is that pushing for the inclusion of old age issue in the constitution creates strong mobilization through political process. The second reason is the response to the request of United Nations in realizing the transition to a society with rising number of old people, which is how the current trend at the international level is used to increase additional awareness at a domestic level. These research suggested creation of an indicator which can be used by Thailand and, at the same time, other countries can learn from Thailand's experience in choosing the model and management strategy for ageing society in the future. Suwanrada (2015), who cited the result of evaluation plan by Prajuabmoh et al. (2009), found that Thailand's preparation for ageing society in accordance with the strategy to create quality old age population together with the creation of social security system for the elderly has not yet fulfilled the objective set by

the indicator. Nevertheless, in the past 5 years, welfare for the elderly has been continuously mobilized through policy at national level. One example is the promotion of saving for old age by the National Saving Fund Act B.E. 2554, which officially came into force on 20th August 2015 (Suwanrada, 2015).

The fact that Thai society is transiting to an ageing one together with problems regarding income structure, opportunities, distribution and saving that have long plagued majority of old age population in the country who still lack subsistence for expenditure at old age has created widespread concerns as old-age dependency ratio has risen. As of now, population estimate by NESDB indicates the ratio to be around 1:4 with tendency to rise further. This phenomenon has created fiscal pressure in the form of old age expenditure, which is increasing with the growing number of old people, and also tax revenue, which is expected to decrease on account of the reduction in taxable incomes and taxable consumption as economic growth tends to slow down with lower number of working population.

Literature in the past made effort to offer guidelines to the contemporary questions; where do we get the money from and how? (Who will pay? How will government get the money?) and how to manage and distribute welfare provision? (Who gets the benefit and how?). Based on how the questions are answered, past literature can be divided into 2 categories. The first emphasized on analyzing the source of finance and method to raise money to be used during old age in terms of efficiency, fiscal impacts and fiscal sustainability in the implementation of various policy alternatives by considering exogenous factors which only focus on inactive current elderly contributions. On the other hand, the second group of literature brought factors that include active current elderly contributions, which are endogenous factors within ageing

population, into consideration. There have already been studies that examined the feasibility and appropriateness of old-age provisions, change perception about old people, extend age of retirement and provide job opportunities for the elderly at both national and regional level with the aim of generating additional income and complementing physical and mental health for old people who are still capable of working. This can be thought of as a way to augment old age welfare under the existing fiscal pressure.

In the first group of literature, many studies examined various relief schemes to assist the elderly through cooperation with other concerned agencies (Department of Local Administration, 2005; Pukdeeamnut & Likitthammarot, 2014) and also the granting of basic rights for old people in the name of humanity such as old age pension (Suwanrada, 2007), healthcare provision under the national health security for which Sakunpanit (2012) concluded that the fiscal situation for the country can still support the health security system. According to Sakunpanit (2012), if the society believes that the nation health security is in need, an increase in tax imposition and contribution to the national health security is a suitable fiscal restructuring that will offer accessible healthcare provision for all. In addition, there are studies that examined the restructuring and management of pension funds and fiscal sustainability under different systems. Phananiramai (2003) analyzed the development of Thailand's national health security. Suwanrada (2015) estimated the overall fiscal burden for the government under different pension schemes that have been employed so far and concluded that in 2017, accumulated fiscal burden will be around 266,760 million Baht which will increase to around 473,439 million Baht in 2040 (around 3.69% per annum on average). Moreover, there is also legal obligation in the form of subsidy that may arise in the case that the national health security is depleted. This is in line with the

analysis by Phijaisanit (2011a) who estimated that the pension fund in the social security system is likely be used up in the year 2039.

On the other hand, the second group of literature which considered active current elderly contributions into account contributed to the modelling and appropriateness of old age employment promotion, development of skills among capable and quality seniors (See Phuangsaichai (2008); Soonthornchawakan & Cintakulchai (2009); Institute for Population and Social Research, Mahidol University. (2010); Sombat et al. (2011); Raksasub et al. (2010) for some examples). Growing number of old age population spawned new policy options that encourage the elderly to support themselves and live optimistically. Some examples are provision of assistive equipment, improvement in the environment and physical wellbeing of old people so that they can move on their own and provision of flexible work hours, etc. (United Nations Population Fund, 2009; Suwanrada & Chandoevwit, 2010).

Developing learning process to support ageing society in the long run is also another important aspect. A study by Advisory council on National Labor Development (2013) tried to point out that promotion of job opportunities for old people is to be considered by all concerned parties namely; employer, employee and the Ministry of Labor. Nevertheless, employment conditions, conditions related to benefits from national health security, potential of workforce and policies by government are factors that contribute to the success of creating job opportunities for the elderly. Thus, policy recommendations are to be classified according to potential and decision regarding various benefits. Moreover, Thailand Development Research Institute (2008) had once recommended that if the extension of retirement age from 60 to 65 years had been implemented in 2008, expenditure

pertaining to pension fund would have been reduced by around 32 billion Baht in the period of 5 years. However, extension of retirement age under the existing work structure without structural reform to create employment options for old workers calls for further argument in the Thai society.

It can, however, be concluded that policy recommendations in both groups of literature are in line with those abroad. Change in the demographic structure caused many countries around the world to enter an ageing society with a low level of fertility rate and higher life expectancy which in turn caused them to face problems regarding insufficient budget and economic slowdown at a macro level. Many measures have been undertaken to increase fiscal stability; for instance, increased tax to generate more revenue for the government, reduction in budget that covers unnecessary expenses, public debt management by limiting the borrowing power within the predetermined public debt ceiling or long-term budget management. Nevertheless, the change in demographic structure surrounding each country is surmounting and these measures, eventually, encounter with many practical limitations which further caused the budget to be insufficient to support all aged population in an appropriate manner. The fact that the number of ageing population is increasing indicates important policy implication that it is necessary to restructure the overall picture of welfare and undertake reforms concerning pension funds (Floden, 2001). Hence, in many countries like OECD (Organization for Economic Co-operation and Development), ageing and employment policies have been linked with the main objective of encouraging "greater labor market participation at an older age" through promoting job opportunities and increased flexibility in terms of employment (OECD, 2006; Sonnet et al., 2014).

In the past decade, many countries have implemented policies to extend employment tenure and to encourage old workers to continue their tenure. Eichhorst (2011) found that Germany is the country that has succeeded in employing old age workers in the recent decade by eliminating incentive for early retirement, using various strategies to stimulate work participation, increasing skill training and reducing compensation for part-time job as early retirement imposes high cost for Germany's pension fund (see also Borsch-Supan & Schnabel, 1998; Borsch-Supan & Schnabel, 2010). In Japan, around 34% of the total population, which is around 127.6 million people, is considered as old age population (above 65 years of age) in 2004. Japan had undertaken fiscal and financial reforms concerning old age population by creating balance with the decrease in the number of labor force and population that lives longer makes replacement rate fall from 60% to a minimum ceiling at 50% of salary before retirement. In addition, in 2013, law and regulations were amended which required employers to gradually extend the retirement age to 65 years with employment scheme after retirement (International Longevity Center, 2013). This policy corresponds with the recommendation by Gruber and Wise (2005) who used data from Japan and 11 OECD countries. They found that extension of retirement age by 3 years will help in reducing government expenditure regarding welfare by 27% of total expenditure or around 0.72% of GDP, depending on the adjustment of welfare in accordance with the actuarial calculation.

There are many reasons as to why old people exit labor market; for instance, belief that productivity has fallen with age, relationship between employer and employee, environment and working conditions (Myck, 2015). In many countries, old workers often have the feeling that they are unwanted in an organization, which makes them work from

day to day (Meadows, 2003). This leads to involuntary resignation and for those who still want to continue working but face unemployment situation owing to work redundancy, they are forced to resign and work independently without other alternative (Block & Koellinger, 2009). The need to work independently is partly due to age discrimination and inflexible labor legislatives as employers do not want to risk hiring old workers with additional expenditure on employee welfare (Adams, 2004; Lahey, 2006). In many countries, there have been pressures to support employment scheme with work nature that is more suitable for old workers (Eurofound, 2012). Many studies such as Hellerstein et al. (1999), Mahlberg et al. (2013) Borsch-Supan and Weiss (2013), and Zwick and Gobel (2013) have shown some empirical evidence that old age does not always bring about lower productivity.

From an overview of literature in Thailand, many useful policy recommendations for ageing society have been made and are in line with those abroad. Majority of Thai society agree with the recommendations. However, there still lacks a research that explicitly presents government "demo" policies and the empirical analysis of the impact which is anticipated to occur as a result of the policies discussed. Such research has to also show the link between the measures implemented and the eventual impacts on the economy in general. Along this line, this article tries to fill the research gap between both groups of literature discussed by implementing two demo tools namely; labor laws and tax incentive, in order to create an employment scheme that is suitable for old workers that is in line with the objective that other research papers in the past have aimed at but have not yet exhibited the impact empirically.

4. Conceptual framework, methodology and scope of this research

In this simulated study, old age labor force implies workers aged 60-79 years while working age labor force implies workers aged 15-59 years.

Figure 1. Relational framework of different elements in the simulation
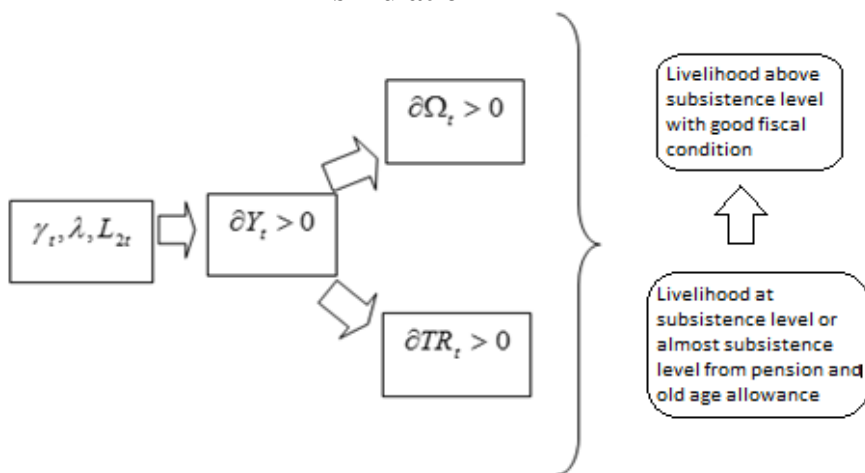
Source: Author's illustration

Figure 1 shows the conceptual framework and the relational framework between different elements in the simulation, consisting of participation rate (γ_t) of the potential elderly labor force which is stimulated by the "demo" measure (with λ_t being the ratio of productivity of old age labor compared to that of working age labor and L_{2t} being population aged 60-79 years that can work), economic growth (∂Y_t), difference between income and expenditure for old age (Ω_t), net marginal tax revenue accrued to the government due

to increase in consumption and (in simulation 2) tax incentive for employers (∂TR_t). In the end, we have the impact on the welfare of elderly and society in general under sustainable fiscal condition, which is the ultimate goal of various policies.

The conceptual framework is based on the idea of Neoclassical Growth Model using Solow growth model with Cobb-Douglas production function as seen in Equation (1), which is appropriate for our analysis of the impact on economic growth due to changes in factors of production such as changes in capital goods or in the number of labor force for our preliminary analysis in the short run (Solow, 1956). Nonetheless, to consider other dynamics in the long run, the analysis should use Endogenous growth model which is appropriate when one wants to analyze the impact on economic growth as a result of changes in total factor productivity (TFP). Such analysis seeks to examine relationship between factors of production and TFP, which determines productivity per head in the long run. However, the scope of this article does not include TFP in our estimation but can be extended in the future.

$$Y_t = A_t K_t^{\alpha} (L_{1t} + \gamma \lambda L_{2t})^{1-\alpha} \tag{1}$$

With $K_{t+1} = (1-d)K_t + sY_t$

Y_t is country's gross domestic product (GDP)

A_t is technology

K_t is level of capital

L_{1t} is economically active persons (EAP) which is defined as the number of population aged 15-59 years in labor market

L_{2t} is the number of potential population aged 60-79 years, excluding disabled and patients requiring long-term care

λ is ratio of productivity of L_{2t} to that of L_{1t} as a result of different workloads

γ is participation rate in labor market by L_{2t}

d is depreciation of capital

s is saving

In the simulation, technological growth rate is set at 3.3% with $\alpha = 0.352$ as in Pholphirul (2005) and $d = 0.06$ as in Bosworth (2005). The estimation period is 2014-2040 with macroeconomic variables and the initial value of K set equal to the actual data provided by NESDB in 2014. Change in the demographic structure depends on the latest population estimate by NESDB in 2010. At glance, the result of evaluation of economic growth according to the model in equation (1) based on the unique characteristics of Thai labor market by adapting the International Labor Organization's (ILO) Rapid Assessment Protocal (RAP) (Schmitt, 2011) is compared with the estimation of economic growth by IMF (2015) and TDRI in the case of moderate economic growth in Prasitsiriphon et al. (2013), in order to consider the appropriateness of the model in this research (See Figure 2). It can be said that the estimated result from the economic growth model in this research is consistent, with projected value lying in between the estimates forecasted by these two organizations and hence is acceptable for the purpose of our analysis.

The evaluation in the model aims to exhibit empirical impact on the country's GDP, additional income to the elderly, and the government's fiscal condition by comparing with the baseline scenario, which is the case where Thailand is transiting to an ageing society without any additional measures. This paper sets all old age welfare initiatives that are being currently provided by the government constant. In this regard, we examine whether we can encourage those who can

still work[5] in 60-79 age group (L_{2t}), or the potential elderly labor force, to participate more in the market (which implies a rise in γ) with different stimulus packages by the government depending on the scenario of the simulation. The detail of simulation scenarios is as follow:

Simulation 1: Old age welfare provided by the government is set equal to the present package irrespective of whether a person is employed or not. Adjustment with labor legislatives for employers is made to create more flexibility by reducing obligation regarding welfare for old age workers under the condition that the workload for old age workers must be lower than those in the working age. In this simulation, the maximum workload for old age workers is set at 3 working days per week, which has been calculated from the desired work hours for old age workers ranging between 7-21 hours per week (meaning that if one works for 7-8 hours per day, one has to work for 2-3 days per week) as in Bell and Rutherford (2013). The objective of this is to give elders, who decide to continue working, an old age life with flexibility while giving them social space in the organization with better physical and mental health.

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[5] Potential elderly labor force excludes disabled and patients in need of long-term care based on Prasitsirphon et al. (2013).

Figure 2. Estimates of economic growth (Currency: Baht)
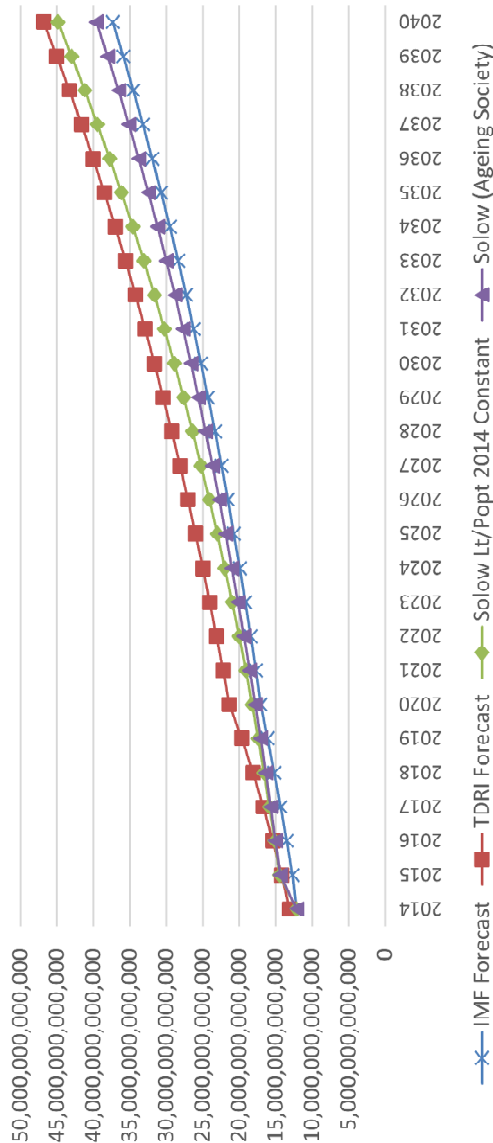
Source: IMF (2015), Prasitsiriphon et al. (2013) and calculation by the author.

Simulation 2: The labor legislatives are same as in Simulation 1. In addition, tax incentive for employers who hire old age workers is in place. In this research, employers can use additional expenditure incurred on hiring old age workers in deducting tax at the additional cost reduction of 50% for taxable corporate profit calculation[6]. For instance, before tax incentive is in place, employers can deduct expenditure incurred on hiring by 1 time. When the aforementioned tax incentive is in place, tax deduction from expenditure incurred on hiring the elderly is by 1.5 times. Consequently, as GDP changes according to the estimation of each period, the model evaluates the impact on the average income of the elderly (w_{L2t}).

In the case that labor market functions effectively, marginal productivity of labor (MP$_L$) is reflected in the wage rate for labor as in equation (2). Thus, wage rate for the elderly should follow equation (3).

$$\frac{\partial Y_t}{\partial L_{2t}} = \frac{(1-\alpha)\gamma\lambda A_t K_t^{\alpha}}{(L_{1t} + \gamma\lambda L_{2t})^{\alpha}} \tag{2}$$

$$w_{L2t} = MP_{L2t} = (1-\alpha)\gamma\lambda A_t \left(\frac{K_t}{L_{1t} + \gamma\lambda L_{2t}}\right)^{\alpha} \tag{3}$$

Subsistence level for old age labor can be shown as the difference between income and expenditure as in equation (4).

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[6] Owing to the fact that the recommendation has not been explicitly implemented in any country, future research can analyze for the optimal cost reduction rate to further the literature in this topic. Nonetheless, the rate of 50% as used in this study is a mere "demo" to depict a concrete scenario.

$$\Omega_t = B_t - E_t \qquad\qquad (4)$$

With

Ω_t = difference between all income and expenditure on average

E_t = all expenditures on average

$B_t = f[\zeta_t, \eta_t(r_t), \upsilon_t(w_{L2t}, \gamma, \lambda, L_{2t})]$, which is all incomes on average

ζ_t = pension and other old age allowances

η_t = interest from investment or savings before retirement

r_t = interest rate

υ_t = income after retirement (for any income earned from work)

If ζ_t, η_t and E_t are kept constant, equation (4) implies that $\dfrac{\partial \Omega_t}{\partial \gamma_t} > 0$ and if $\Omega \geq 0$ for majority of the elderly, they are said to be "beyond" subsistence level (See Figure 1).

From the government's point of view, there will be marginal tax revenue from an increase in GDP. People's income increases as $\dfrac{\partial \Omega_t}{\partial \gamma_t} > 0$, which caused more tax to be levied on marginal consumption. Following this, value-added tax (VAT) follow equation (5).

$$TR_{VAT} = f(Y_t, (1-s), t_{VAT}) \qquad\qquad (5)$$

where

TR_{VAT} = Value Added Tax revenue

Y_t = GDP

s = saving rate

t_{VAT} = VAT rate

and $\left(\dfrac{\partial TR_{VAT}}{\partial Y_t}\right)\left(\dfrac{\partial Y_t}{\partial \gamma}\right) > 0$.

In Simulation 2, where tax incentive for employers hiring old age workers is implemented (additional cost reduction for taxable corporate profit calculation, ρ_t), the tax revenue from corporate tax (CT) should follow equation (6).

$$TR_{CT} = f\left(Y_t, t_{CT}, \rho_t\right) \qquad (6)$$

With

TR_{CT} = revenue from corporate tax

t_{CT} = rate for corporate tax

ρ_t = additional cost reduction for taxable corporate profit calculation

From equation (6), it can be found that $\dfrac{\partial TR_{CT}}{\partial Y_t} > 0$ and $\dfrac{\partial TR_{CT}}{\partial \rho_t} < 0$ in practice. Government revenue from corporate

tax tends to be positive[7] because marginal revenue from corporate profit as a result of economic growth $\dfrac{\partial TR_{CT}}{\partial Y_t}$ is more likely to be larger than revenue foregone from allowing business enterprises more cost reduction (only for the cost of hiring old age workers) $\dfrac{\partial TR_{CT}}{\partial \rho_t}$ which is smaller than other costs in conducting business. Hence, net tax revenue $\dfrac{\partial TR}{\partial \gamma \partial \rho}$ in the simulation is limited to the outcome of marginal revenue from VAT and the revenue lost from allowing more cost reduction for corporate tax (See equation 7), which is the "potential minimum marginal tax revenue". This implies the possibility that net marginal tax revenue can be larger than this minimum threshold.

$$\frac{\partial TR}{\partial \gamma \partial \rho} = \left(\frac{\partial TR_{VAT}}{\partial Y_t} \right) \left(\frac{\partial Y_t}{\partial \gamma} \right) - \frac{\partial TR_{CT}}{\partial \rho} \qquad (7)$$

5. The results of simulated scenarios

Statistical synthesis by the National Statistical office in section 2 reported 2,509,444 old age workers or around 35.74% of the total potential old age population in Thailand. This statistic is in accordance with cross-check calculation. This is done by taking the number of total elderly estimated by NESDB and deducting the number of disabled and patients requiring long-term care from Prasitsiriphon et al. (2013) which eventually yields the number of potential elderly labor force. If we calculate the number of elderly workers (which is

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[7] However, this figure can be negative in theory as well depending on the rate at which cost reduction for taxable corporate profit calculation is set.

around 2.5 million according to the National Statistical office) as a ratio of potential elderly labor force, the figure comes to around 32% which implies that there are around 32-35% of potential elderly labor force who are working in the economic system but bear the same workload as labor force aged 15- 59 years. If the government can support the elderly labor force who are already in the market to continue working and promote the other 65% of elderly labor force who lack the opportunity or incentive to participate in the market, the government can increase the number of labor force to the fullest.

In the simulation, the elderly still receives basic old age welfare according to what the government is currently giving irrespective of employment status. The structure of labor law is adjusted, reducing the burden regarding welfare benefits for old age workers under the condition that workload of elderly workers must be lower than those in working age. Moreover, the maximum workload for the elderly is set at 3 days per week while working age person work for 5 days per week on average. Hence, in calculating productivity, it is assumed that 1 elderly person is equivalent to 3/5 of working age person. Figure 3 shows the number of potential labor force which varies according to the rate at which elderly workers participate in the labor market. Figure 4 shows the additional number of potential labor force that varies according to the rate at which elderly workers participate in the labor market.

Table 6 shows the impact on GDP as a result of an increase in the number of elderly population in the demographic structure compared with the baseline case where working population is constant. It should be noted that if no measure is undertaken to stimulate elderly labor force to participate in the market, the growth of elderly population will drag down the rate of economic growth.

Figure 3. Estimated number of elderly labor force, which varies according to the participation rate (γ_t) in the labor market (Unit: number of working age labor force equivalent to 1 elderly labor)
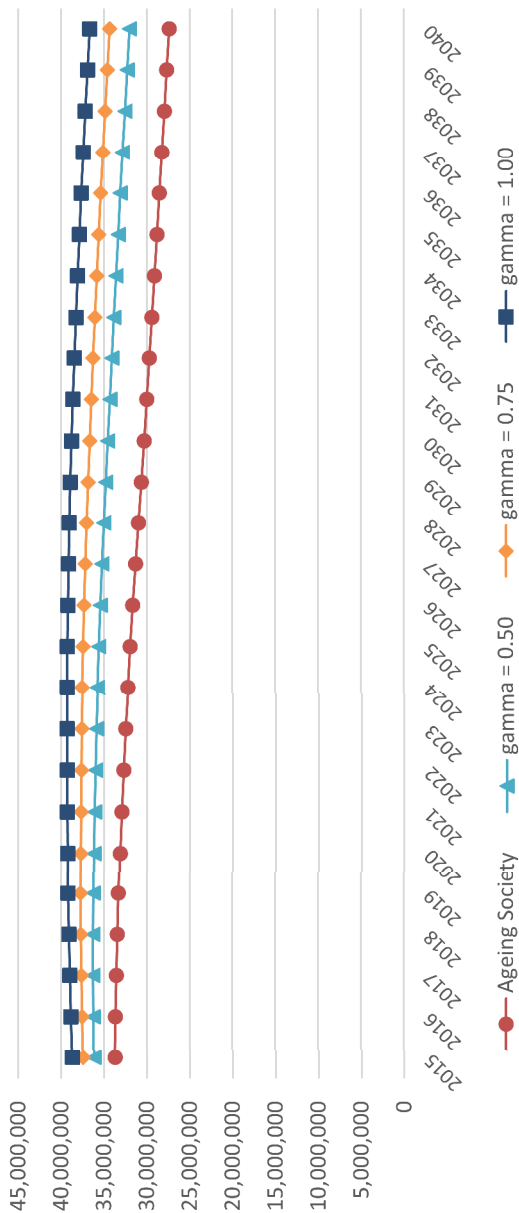
Source: Author's calculation

Figure 4. Estimated number of additional potential labor force, which varies according to the participation rate of elderly labor force (Unit: Percentage)
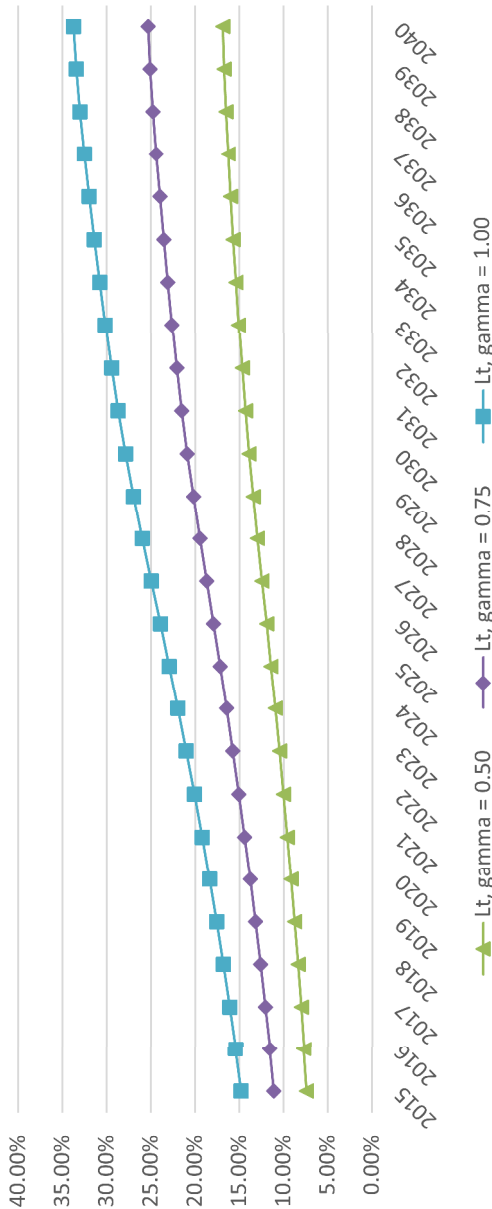
Source: Author's calculation

Nonetheless, if measures are undertaken to increase participation rate among the elderly labor force, economic growth will be boosted when compared with the baseline case where participation in the market is not stimulated. From Table 7, it can be noted that if, at least, 50% of potential elderly labor force participate in the labor market, GDP can increase by around 4.74-9.35% from the present case where no elderly labor force is employed.

Table 6. Estimated impact of ageing society on GDP, compared to the baseline case with working population constant at 2014.

|	2015	2020	2525	2030	2035	2040
Impact of ageing society	-0.32%	-2.28%	-4.97%	-7.95%	-10.19%	-11.78%

Source: Author's calculation

Table 7. Estimated increase in the growth of GDP from that of the baseline case where elderly labor force is not employed, according to variation in participation rate among elderly labor force.

	2015	2020	2525	2030	2035	2040
DGDP, gamma = 0.50	4.73%	5.88%	7.30%	8.83%	9.91%	10.63%
DGDP, gamma = 0.75	7.05%	8.75%	10.85%	13.11%	14.68%	15.74%
DGDP, gamma = 1.00	9.35%	11.58%	14.34%	17.30%	19.35%	20.73%

Source: Author's calculation

Figure 5. Estimated additional average income for elderly labor force who participate in the labor market (Unit: Baht per person per annum)
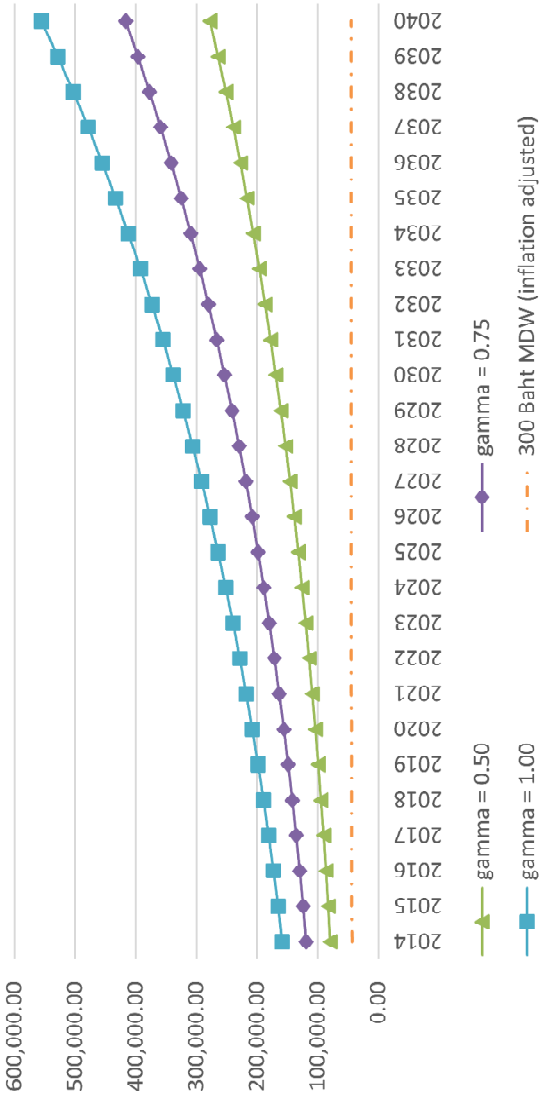

Source: Author's calculation

As for the marginal income for elderly labor force (See Figure 5), if one participates in the labor market, one can earn additional income of 44,268 Baht per person per annum (in the case of minimum wage rate at 300 Baht adjusted according to 3/5 workload of working age person) to 165,294.74 Baht per person per annum (calculated according to equation (3) in the case of perfect market) or around 3,689-13,775 Baht per person per month. In the year 2040, additional income adjusted with inflation will be around 44,496-555,632.77 Baht per person per annum or around 3,708-44,061 Baht per person per month, which varies according to one's ability and knowledge. This amount is an additional income after retirement, which can uplift the standard of living for the elderly above subsistence level as seen in Figure 1.

In Simulation 1, the increase in GDP growth as a result of stimulating participation in labor market among elderly labor force, coupled with an increase in the marginal income of elderly labor force cause consumption to increase. Fixing revenue from other taxes constant and VAT rate at 7%, revenue from VAT is estimated to increase significantly. Figure 6 shows marginal tax revenue which varies according to the participation rate among elderly labor force in the economy. Table 8 shows an increase from the estimated tax revenue in the case of upward adjustment of the past rates as in *Thailand's Budget in Brief*) Bureau of the Budget, 2004-2014(. If the government can encourage at least 50% of the potential elderly labor force to participate in the market, it will be able to generate marginal VAT revenue around 33,279 - 66,994 million Baht in the present and around 206,294 - 402,326 million Baht in 2040, which implies that marginal VAT revenue increases by about 1.38 – 2.73% from the estimated tax revenue in the present baseline case where

Figure 6. Estimated marginal VAT revenue which varies according to the participation rate among elderly labor force (Unit: Baht)
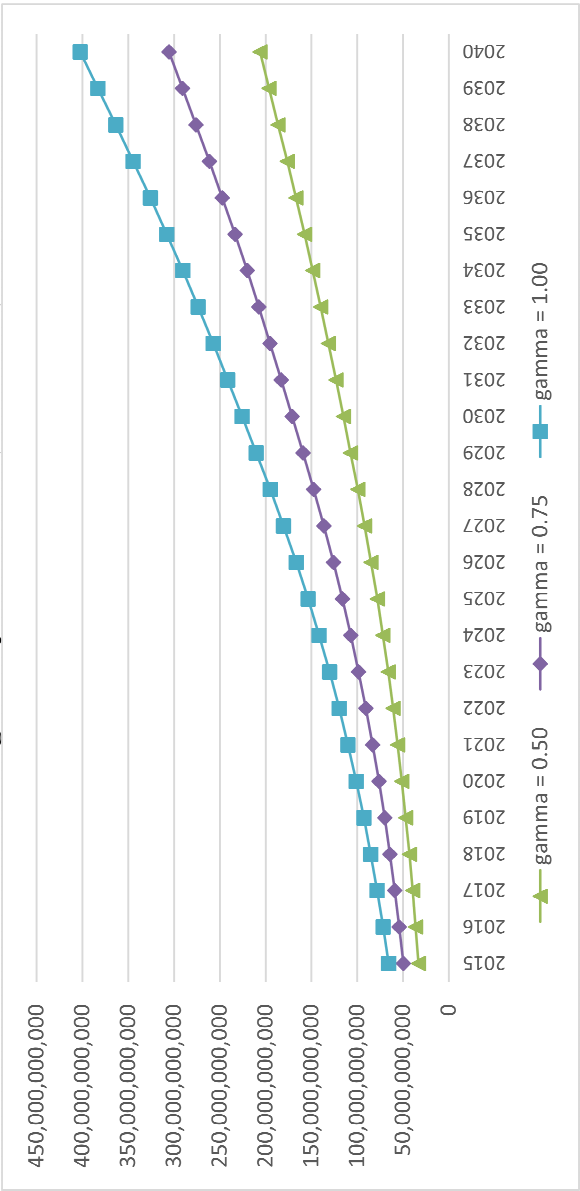
Source: Estimated by Author with baseline case data from *Thailand's Budget in Brief* (2004-2014), Bureau of the Budget.

no aforementioned incentive is implemented and around 1.57 – 3.06% in 2040.

Table 8. Estimated increase in marginal VAT revenue from that of the baseline case where participation rate among elderly labor force is not stimulated, which varies according to the participation rate among elderly labor force

	2015	2020	2525	2030	2035	2040
gamma =0.50	1.38%	1.51%	1.64%	1.73%	1.68%	1.57%
gamma =0.75	2.06%	2.25%	2.44%	2.56%	2.49%	2.33%
gamma =1.00	2.73%	2.98%	3.23%	3.38%	3.29%	3.06%

Source: Estimated by Author with baseline case data from *Thailand's Budget in Brief* (2004-2014), Bureau of the Budget

In Simulation 2, labor legislative is assumed to be the same as in Simulation 1, which is reinforced with tax incentive for employers who hire elderly labor force. This research assumes that employers can submit expenses incurred on hiring elderly workers as tax rebate at the additional rate of 50%[8] cost reduction for taxable corporate profit calculation. For instance, before this tax incentive is implemented, employers deduct expenses incurred on hiring by 1 time but when the incentive scheme is implemented, employers can use the expenditure incurred on hiring elderly workers as rebate by 1.5 times. Tax rate which is used for the calculation is the effective tax rate (ETR) as employed in Phijaisanit (2011b). From the simulation, it is found that the aforementioned

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[8] As explained in 7.

measure partly causes the increase in the marginal revenue from corporate tax to be negative[9] (See Figure 7). However, after considering the net tax revenue from Figure 6 and 7 (as shown in Figure 8), net marginal revenue from both taxes is still positive, which is around 18,061 – 35,322 million Baht in the present and around 177,863 – 345,463 million Baht in 2040.This increase in the marginal tax will eventually lead to a minimum increase in government revenue by around 0.75 – 1.46% in the present and 1.35 – 2.63% in 2040, when compared to the estimated tax revenue in the case of no stimulus measure (See Table 10). The government can use this marginal revenue to support budget for old age welfare, which accounts for around 4,000 Baht per person per annum on average in the present. This estimated figure for the year 2040 is around 22,000 Baht per person per annum on average (See Table 11). This amount of money is likely to play a role in uplifting the quality of life for the elderly, which also have other external impacts discussed in the literature review in section 2 and 3 such as good physical and mental health. And at the same time, the aforementioned mechanism will strengthen the financial and fiscal system which will further sustain the economic system. Nevertheless, this estimation has not included other governmental expenditures that will come along with the growth of the economy. Hence, it should be noted that this is only a potential "minimum" marginal tax revenue gain which fulfills the goal of this research; an endeavor to pioneer an integrated analysis to exhibit the impact empirically. In other words, if we look at the overall system, incentive measures to stimulate the elderly labor force to participate in the labor market is a self-funded model which is fiscally sustainable- a win-win scenario for all.

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[9] Only for the calculation of minimum marginal tax revenue in this study. Please see explanations in Equation (6) and (7).

Figure 7. Estimated marginal revenue from corporate tax (excluding marginal revenue from increased corporate profit), which varies according to participation rate of elderly labor force in the market. (Unit: Baht)
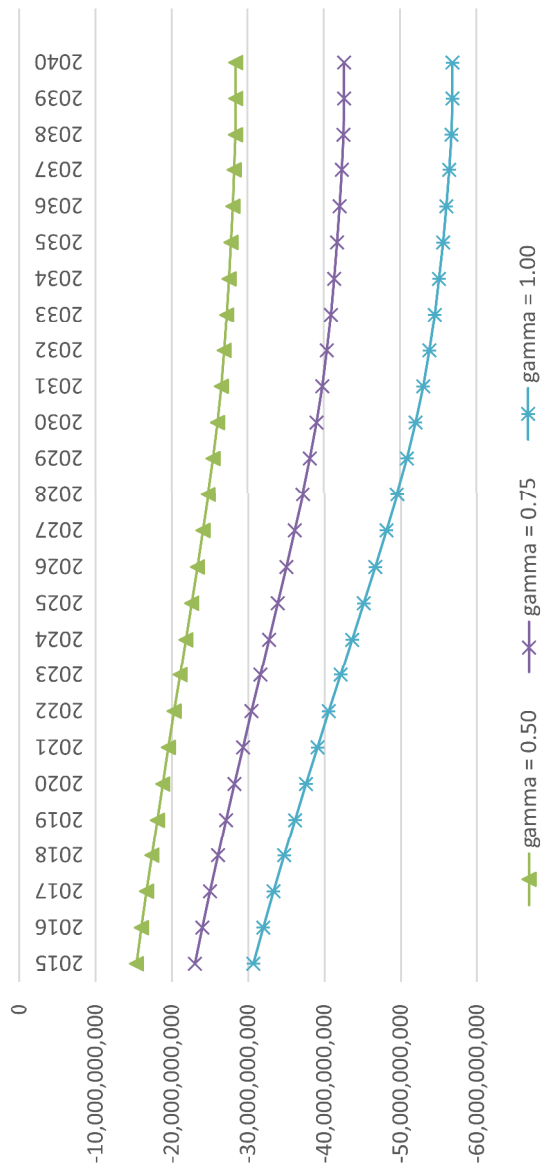
Source: Author's calculation

Table 10. Estimated rate of increase in the minimum

Figure 8 Estimated minimum potential marginal tax revenue (VAT and corporate tax), which varies according to participation rate of the elderly labor force in the market. (Unit: Baht)
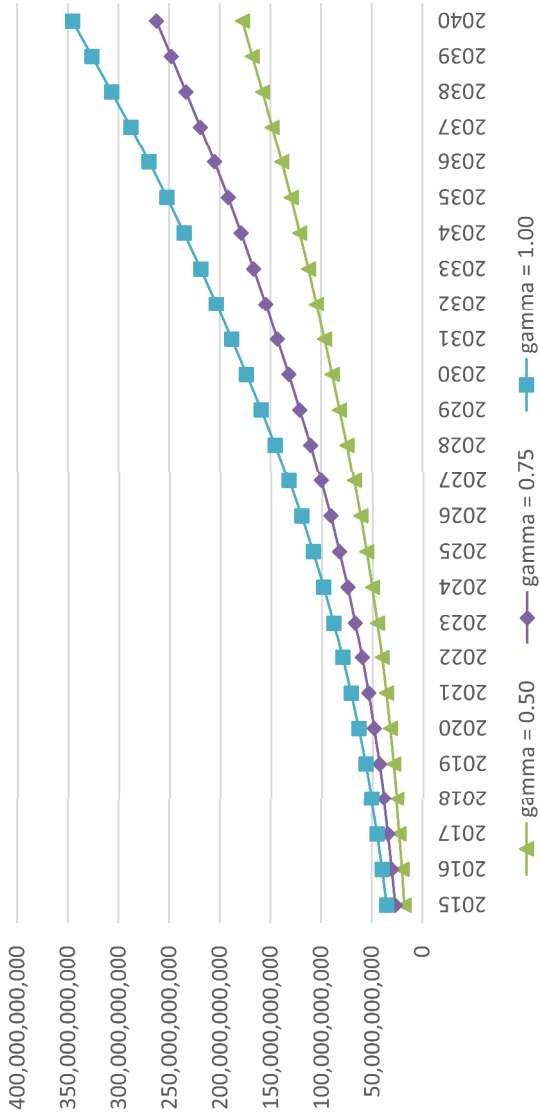
Source: Author's calculation

marginal tax revenue from that of the baseline case where no measure to stimulate the elderly labor force to participate in the market is implemented, according to variation in participation rate

	2015	2020	2525	2030	2035	2040
gamma = 0.50	0.75%	0.96%	1.17%	1.34%	1.39%	1.35%
gamma = 0.75	1.11%	1.42%	1.73%	1.98%	2.05%	2.00%
gamma = 1.00	1.46%	1.87%	2.28%	2.60%	2.69%	2.63%

Source: Author's calculation

Table 11. Estimated average net marginal revenue per elderly labor force that enters the market.

	2015	2020	2525	2030	2035	2040
gamma = 0.50	4,530.80	6,654.88	9,428.98	12,951.89	17,383.09	23,090.25
gamma = 0.75	4,479.84	6,576.57	9,308.10	12,770.20	17,128.91	22,746.75
gamma = 1.00	4,430.41	6,501.12	9,192.55	12,597.96	16,889.28	22,424.09

Source: Author's calculation

6. Conclusions and further research implications

This research employs 2 "demo" policy tools for consideration; labor legislatives and tax incentive with the aim of creating a more flexible employment structure with more alternatives for elderly labor force in accordance with the policy that other papers in the literature have tried to propose but have not shown the impact empirically through simulated scenarios. If there is no measure to stimulate the elderly labor force to participate in the market, the impact of ageing society will deteriorate economic growth. In Simulation 1, with old

age employment incentives, economic growth will be boosted when compared with that of the baseline case where there is no stimulus measure. If participation rate among the potential elderly labor force is raised by a minimum of 50%, GDP will grow at the rate of 4.74 – 9.35% compared with that of the baseline case. Regarding marginal income for the elderly participation in the market, an average marginal income of approximately 44,268 Baht to 165,294.74 Baht per person per annum or around 3,689 – 13,775 Baht per person per month can be earned at present, depending on one's ability and knowledge. This amount of marginal income can be used to support income after retirement. With regards to the tax revenue for the government as a result of economic growth, combined with an increase in income among elderly workers, overall consumption is expected rise. Under the assumption that revenue from other taxes and 7% VAT rate fixed, if the stimulus measure is able to induce participation in the market by a minimum of 50% of the potential elderly labor force, marginal tax revenue for government will increase around 33,279 – 65,994 million Baht, which implies that marginal tax revenue increases by around 1.38 – 2.73% compared with that of the baseline scenario without any stimulus.

In Simulation 2, tax incentive for employers is implemented, which allows cost deduction using expenditures incurred on hiring elderly workers by 1.5 times in taxable corporate profit calculation. With implementation of this incentive scheme, minimum marginal revenue from both taxes (VAT and corporate tax) will be around 18,061 – 35,322 million Baht. This marginal tax revenue will increase the government revenue by a minimum of 0.75 – 1.46% when compared with that in the baseline scenario where no stimulus measure is implemented. The government can use this tax revenue in supporting expenditure related to basic old age

welfare, which accounts for around an average minimum of 4,000 Baht per person per annum.

It can be preliminarily implied that by implementing the "demo" stimulus measures proposed in this article, the marginal income earned and the additional welfare benefits funded by the marginal tax revenue will play a significant role in the improvement of the quality of the elderly life. In addition, there can be other positive externalities generated from working at old age; for instance, good physical and mental well-being. Concerning fiscal sustainability, the simulated scenarios show that the aforementioned mechanism will strengthen the financial and fiscal system. It is to be noted that the government revenue in this study only reflects the potential "minimum" marginal tax revenue gain. This implies that it is possible for marginal revenue to be higher, taking other taxes into account in the future. Some examples for future research avenues include general equilibrium analysis for the policy discussed in this paper, sectoral analyses, preparation for long-term skills required for ageing society and infrastructure for ageing society. Nevertheless, presenting an overview of an empirical impact of demo measures on the economy achieved the major objective of this research paper. It can be said in general that appropriately stimulating elderly participation in the labor market is healthy, self-funded and fiscally sustainable, which is a win-win scenario for all. However, the success of these policies depends on the cooperation among government organizations and the mechanism that mobilize every sector in the society.

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