THE IMPACT OF SAVING SCHEMES ON SAVING BEHAVIOUR: EVIDENCE FROM THAILAND

Siam Sakaew

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Siam Sakaew
School of Development Economics

..... Major Advisor
(Associate Professor Amornrat Apinunmahakul, Ph.D.)

..... Co-Advisor
(Professor Direk Patmasiriwat, Ph.D.)

..... Co-Advisor
(Assistant Professor Wisit Chaisrisawatsuk, Ph.D.)

The Examining Committee Approved This Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy (Economics).

..... Committee Chairperson
(Professor Nattapong Thongpakde, Ph.D.)

..... Committee
(Assistant Professor Wisit Chaisrisawatsuk, Ph.D.)

..... Committee
(Assistant Professor Niramol Ariyaarpakamol, Ph.D.)

..... Committee
(Associate Professor Amornrat Apinunmahakul, Ph.D.)

..... Dean
(Associate Professor Amornrat Apinunmahakul, Ph.D.)

_____/_____/_____

ABSTRACT

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Thailand has many compulsory saving schemes for income security at old age. A crucial question is whether how different saving schemes affect saving behavior of workers with different working status. Whether the dissimilar in saving is related to the observable characteristics of workers or is due to the effect of benefits in different saving schemes. It is essential to determine that compulsory saving schemes encourage formal workers to save more or discourage saving. At the same time, it must be determined whether informal workers who do not have compulsory savings have a higher saving incentive to compensate for the lack of compulsory savings.

This paper employs the Blinder-Oaxaca decomposition method to answer the above questions. Because this method allows us to decompose the causes of savings difference. The endowment effect is described by differences in the observable characteristics of workers or by differences in the determinants of saving, such as age, income, education, and other characteristics. The discrimination effect evaluates the distortionary effect of the compulsory saving scheme on saving behaviors.

The empirical result of saving determinations is in line with past studies. For instant, the total individual income, educational attainment, consistently saving behavior, and saving motive for retirement and precautionary saving are crucial factors in determining savings. However, the decomposition methods provide more information on saving differences. For the formal workers and the informal workers, the study indicated that the discrimination effect is higher than the endowment effect. But the formal workers have a motive to save for precautionary and retirement (which is the endowment effect). Moreover, compulsory saving systems force formal workers to save more than informal workers also. Because compulsory saving is one of the saving channels that offers a high rate of return to saving and provides the other social welfares that reduce the cost of living of formal workers.

Nevertheless, low-income informal workers have an advantage in the coefficient contribution (coefficient part). The reason is due to low-income informal workers do not participate in any compulsory saving schemes and have no other fringe benefits that help to reduce the cost of living, unlike the formal workers. Informal workers, therefore, have to save their own uncertainty and for old age.

The causes of saving differences between government employees and private employees contributed to the endowment effect rather than the discrimination effect. But the coefficient contribution is in favor of private employees. The reason that employees save more is due to preventing the emergence of sickness for the social security benefit that does not cover all medical care expenditures. Moreover, the pension benefit of private employees is relatively low compared to that of government employees.

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CHAPTER 1

INTRODUCTION

1.1 Statement of the Problem and its Significance

There are at least three reasons why people save. Firstly, the Life-Cycle motive arises from temporary imbalances between income and expenditures at different stages of life. The motive includes saving for retirement, marriage, purchasing a house, and durable goods, and providing for children's education. Secondly, the precautionary motive occurs to prevent the risks regarding future income and expenditures. This motive includes saving for income fluctuations, job loss, sickness, accidents, and longevity risks. Lastly, the bequest motive arises from the need to leave the wealth to children.

Since 2000, Thailand has entered into an aging society caused by a decrease in the fertility rate of the young female population and by higher life expectancies due to the advancements of medical science and public health systems. As a result, saving for retirement and the compulsory saving scheme becomes crucial in various dimensions. At the household or individual level, adequate saving for old age can ensure future consumption and can help them escape from poverty in the long run. Adequate savings can also support their children's education and can be left as bequests to descendants. At the national level, the funding method of the system might have a significant effect on the capacity of national savings. Additionally, saving is the most important implication for sustainable economic growth.

Moreover, the change in the population structure to the aged society has effects on the annual government budget. In the fiscal year 2019, the government allocated the budget to various compulsory saving schemes which made up a total of 379,829 million baht or 12.66 percent of the annual budget, (Budget, 2019). The aged society is also expected to affect future revenue collection due to a reduction in the labor force which will result in lowering the Gross Domestic Product (GDP).

Additionally, some saving schemes are not financial sustainable because some are the defined benefits system such as the Civil Servant Pension system and the Social Security Fund.

The participation rate in the pension system of the workers who work in the informal production sectors (informal workers) is still too low. Currently, only 13 percent of the total informal workers have joined in the voluntary saving schemes, 2.24 million informal workers are a member of the Social Security System, and 0.53 million have applied to be a member of the National Saving Fund. However, while some informal workers are volunteering to be a member of the private saving schemes, this is a very small portion. The remaining 87% of informal workers are not covered by public and private pension systems. When comparing participation with neighboring countries, Thailand is found to have a total coverage level of only 23 percent of the labor force, while Singapore and Indonesia have a coverage level of 86 and 79 percent, respectively.

The majority of the elderly are not financially secure. They still have the primary income from their dependents and work, and a small portion of the elderly have their primary income from savings and pensions. Moreover, one-third of the elderly have a lower income than the poverty line and still have debts. The Survey of Elderly in Thailand (T. N. S. Office, 2014) found that the primary source of income for the elderly was received from their children (36.7%), working (33.9%), pensions and interest (19.7%), and the spouse (4.3%). Additionally, there are between 21.6% to 46.8% of the elderly who are under the poverty line. The survey also found that some older adults have debts and some of which are households' debts that may lead to restrictions on the lives of the elderly because most of them live with other members of the household.

The pension payment is often not enough to maintain the quality of life as well as the working age. The sufficient income for the elderly after retirement to preserve the standard of living should have an approximate replacement rate between 50 to 60 percent of the salary before retirement, (T. F. P. Office, 2005). The only people in this group are the government officials who have the old age income as high as 70 percent of salary before retirement. Meanwhile, members of the Social Security System will

receive a pension in the highest case of roundly 6,375 baht per month[1]. If the pension is adjusted for future inflation, it may be lower than the poverty line. As a result, the members of the SSF will tend to fall under the poverty line in old age.

At present, the family support system is the most significant income support of the elderly, but its critical role will be reduced in the future. This is because in the past, Thai households largely consisted of extended families that included grandparents, parents, and children. However, with the population structure changing, Thai households are increasingly becoming more nuclear families. This means that the household will have fewer family members to take care of the older adults.

Since the mid-1980s, the World Bank has been concerned with the burdens of global population aging, the deterioration of the traditional family support system, and the lack of strength in the administration of current pension systems. The Bank has responded by encouraging the countries to establish comprehensive social insurances and public pension systems that provide old-age income support to their citizens, especially in developing countries. The Bank's policy framework proposes a five-pillar model designed to be suitable for a country's specific circumstances. The five pillars are as follows:

The zero pillar is a non-contributory social pension or social assistance generally financed by the budget of the local or central government. The objective of this pillar is to alleviate poverty in all the older adults with a minimal level of security and redistributed income among people. The possible beneficiaries are people participating marginally in both the formal and informal economy. This system may provide both universal and means-tested methods. Moreover, the benefit is designed depending on the necessary needs of the vulnerable elderly and the capability of budgetary resources.

The first pillar is mandatory with public management. It may be the defined benefit as well as the defined contribution in which the contribution rate is related to varying degrees of earnings. The objective is to offer a substitute for some amount of the pre-retirement income. This pillar is assigned to deal with the risks of individual's

[1] If they are a member of the fund for 30 years and have a salary more than 15,000 baht before five years retirement.

myopia, low incomes, and inappropriate planning horizons because of unexpected occurrences in the life expectancies, and the absence or risks of financial credit markets. A pay-as-you-go (PAYG) basis usually funds the beneficiaries, and thus depends on demographic and political uncertainties.

The second pillar is the occupational mandatory or personal pension plans with an individual saving account. The mandatory may be the defined contribution or defined benefit. The persons can choose between an active or passive investment policy, the choice parameters for choosing investments, investment managers, and choices for the removal phase. The defined contribution plan is founded with a clear linked between contributions, investment performance, and benefits. This system may be supportive of financial market development. However, the defined benefit plan depends on the financial and agency risks related to private asset management, the jeopardy of the high transaction and administrative cost, and longevity risks unless they involve mandatory annuitization.

The third pillar is voluntary occupational or personal pension plans with defined benefits or contributions of informal and formal workers. The goal is to compensate for inflexibilities in the design of other pension systems but contains similar risks as the second pillar. This pillar takes many forms, such as individual voluntary savings for retirement, disability, and uncertain circumstances in the future.

A final voluntary non-financial pillar contains the ability to access informal support (such as traditional family support systems), formal social insurances (such as health care), and other individual wealth accumulation (including financial and non-financial assets, homeownership and reverse mortgages).

In Thailand, all Thai citizens can access saving or pension schemes through two systems. One is the compulsory saving system which is offered to formal workers[2]. Most of them are government employees, state enterprise employees, and private company employees. The other is the voluntary pension system that is proposed for informal workers including employers, own-account workers, and

[2] The formal worker is referred to as employed persons who have social security from work. While, the informal worker is referred to employed persons who do not have social security from work like formal employment, (T. N. S. Office, 2012).

unpaid family workers. Persons who are unemployed or not participating in the labor force can also access the voluntary pension system just like formal workers.

The compulsory saving schemes have a difference in target groups, financing methods, and benefit payments. The Old-Age Allowance System[3] (the zero pillar) is a non-contributory scheme financed them by the annual government budget. The Old Age Allowance system is purposed to guarantee a basic income for the elderly aged 60 or above who do not receive any public pensions and offers a monthly pension payment that varies by the age of the recipients. The older adult aged 60–69, 70–79, 80-89 and above will receive 600, 700, 800 and 1000 baht/month respectively.

The Civil Servant Pension scheme (CSP: the zero pillar) is provided for central and regional government officials. The CPS is a non-contributory defined benefits scheme financed by the annual government budget. It provides for the government officials by guaranteeing retirement income with a generous benefit. The amount of monthly pension is highest at 70 percent of the average salaries for the last 60 months, but the officials must have at least 25 years of service.

The Social Security Fund (SSF: the first pillar) is offered to employees working in the private sector. This system is a mandatory contributory system. It secures not only for an old-age pension but also ensures against unknown emergencies such as unemployment, child allowance, death, sickness, disability, and assistance for the family. In the case of the pension benefits, the insured members will receive the monthly pension computed as 20% of the average continued monthly salary for the last five years which is roughly 3,000 to 6,375 baht per month.

The Government Pension Fund (GPF: the second pillar) is a mandatory defended contribution plan. It is offered to the civil servants who were hired before the establishment of the fund to be a voluntary member of the GPF system and to whom that were hired after the year of establishing the fund. Under the GPF system, the government contributes three percent of the official's monthly salary, and the officials contribute not more than 15 percent of their monthly salary. When the officials retire, they gain a lump-sum retirement from GPF. However, the pension

[3] This pillar covers all informal workers and the private employees but does not cover government officials.

payment from CPS scheme is a less generous formulation than the government employees who are not a member of the GPF.

The Teachers' Provident Fund (TPF: the second pillar) is one of the mandatory defined contributions. This fund is organized particularly for teachers and head of private schools. The member needs to contribute three percent of their salary, the school has to contribute three percent, and the government must provide a co-contribution of six percent. The contribution from the government cannot be allocated into an individual account, and is instead held in a separated account. It provides welfare benefits for members and their families.

The Provident Fund (PVD: the third pillar) is a voluntary defined contribution system and is an occupational pension. It is established under the contract between workers and employers for the purpose of saving for retirement of workers. When the fund is established, both employees and employers must jointly contribute to the fund. The employee must contribute at least three percent but cannot exceed 15 percent of their salary. The employer has to contribute not less than the employee's contribution. Concerning termination, the worker will obtain a lump sum upon their resignation, retirement, or death.

The mutual fund management companies offer the Retirement Mutual Fund (RMF: the third pillar) to investors/ workers who want a voluntary saving option for retirement. The persons must continuously save in the RMF until the age of 55, except for the years they do not have any income. The saving rate needs to at least 3 percent of monthly income or 5,000 baht, whichever is lower. Additionally, the RMF is principally appropriated for those who are not eligible for a member of PVD or wish to have an additional savings for retirement. The persons who invest in an RMF will obtain a tax exemption up to a maximum of 15 percent of the annual taxable income. However, the amount of the allowance must be combined with GPF, PVD, TPF, and other pension insurances and the total allowance in RMF cannot exceed 500,000 baht.

The Social Security Fund with chapter 40 (SSF; third pillar) permits informal workers to enroll in this voluntary system. This scheme is a voluntary basis in which members can choose one of two options. For the first option, the member must contribute 70 baht/month, and the government will contribute 30 baht/month. Members will gain a benefit, including compensation in disability, sickness, and

death. In the second option, the member must contribute 100 baht/month, and the government will contribute 50 baht/month. This option will provide the above benefits added to old-age savings.

Recently, there is a newly launched pension scheme namely the National Pension Fund (NPF; the third pillar). It is intended to mainly cover informal workers. In terms of membership, the eligible members are Thai citizens aged 15 to 60 who are not protected by any other pension schemes established by the central and local government or by public enterprise. Under this scheme, the member has to contribute 50 to 13,200 baht per year and the government will be a co-contributor with the member. This scheme provides a lump-sum or monthly payment to members.

1.2 Objectives of the Study

The objective of this study is to consider the effect of compulsory saving schemes or pension systems on the saving behavior among persons[4] that differ in saving schemes and income levels. Moreover, it is necessary to determine if compulsory saving schemes encourage the formal workers to save more or discourage saving. At the same time to investigate whether the informal workers who do not have the compulsory pensions have a higher saving incentive to compensate for the lack of compulsory savings. These questions are still a matter of debate both theoretically and empirically in the public economic literature. As in the standard of the life cycle hypothesis, the ambiguity depends on the degrees of substitution effect and income effect (M. Feldstein, 1974). The net effect is subject to the relative strength of the two forces. For instance, if the substitution effect is stronger than the income effect, it will result in lower savings. However, measuring the consequences is difficult, even when applying a simple theoretical framework, because the degree of substitutability between pension benefits and the savings depends on a variety of factors, such as the incidence of liquidity constraints, bequest motives, and the distortionary effects on labor supply.

[4] This paper uses the word persons as having the same meaning as workers or individuals.

It is necessary to determine such a perspective for a variety of reasons. First, the persons differing by compulsory saving systems lead to differences in saving behavior. Because the Life Cycle Hypothesis states that people decide to consume and save by considering the highest satisfaction based on income throughout the life span, the pension benefit is considered as one of the factors that determine the current consumption and savings.

In Thailand, work status is associated with social security systems. The formal workers are covered by the public social security system which offers financial support when they retire. On the other hand, informal workers do not participate in the compulsory savings. They need voluntary own savings to maintain their consumption after retirement. It implies that they lack risk-sharing mechanisms which can help ensure their income and longevity risks adequately.

Second, there is a significant income gap and a substantial degree of income volatility among persons which leads to different saving behaviors. (O. P. Attanasio & Brugiavini, 2003) found that liquidity constraints might cause a lower discrimination effect among poor households. Likewise, Engelhardt and Kumar (2011) found that the discrimination effect is more significant at higher wealth quintiles.

In Thailand, the workers in the informal sector regularly suffer from unpredictable income patterns. Because their income is irregular, it depends on the business cycle and other economic conditions. When they lose their labor income, they may not be able to save. This is significantly different from the workers in formal employment who earn a stable income from a monthly wage and can plan to save over long periods.

Next, there is a substantial difference in education levels among workers that can induce different saving behaviors. Dah and Fakih (2016), Bozio, Emmerson, O'Dea, and Tetlow (2013) and Gandelman (2015) showed that education level strongly influences household savings. In Thailand, the survey data reports that most workers in the formal sector achieve an education level equal to or higher than a bachelor degree. In contrast, most of the workers in the informal sector attain only a primary level.

Finally, there are several policy reforms in Thailand. A target group for these reforms is only the workers in the formal sectors. Moreover, they enjoy additional

social security benefits such as unemployment compensation, child allowance, death, sickness, disability, and assistance for the family, while the informal workers have fewer additional benefits. All these benefits can lead to differences in saving behavior among workers. Moreover, Chou, Liu, and Hammitt (2003) examined the effect of the introduction of universal healthcare insurance on household saving behavior in Taiwan. They found that the extensive program can considerably reduce household saving because of the comprehensive universal healthcare insurance. This program decreases the household's incentive to engage in precautionary motives. Additionally, these findings are consistent with the studies that examined the extension of other social benefits in Taiwan, such as inability insurance (Kantor & Fishback, 1996), medical insurance (Gruber & Yelowitz, 1999) and unemployment allowance (Engen & J., 2001). These can all cause a deterioration in household savings.

Given the above reasons, this paper raises the following questions and will look for answers to be explored further:

- What are the main saving determinations of workers?
- Can the difference in the observable characteristics or the difference in saving schemes explain the differences in savings behavior?
- How can the policy implications enhance household savings?

1.3 Methodology

This paper employs the Blinder-Oaxaca decomposition method to complete the study's objectives. Since this method allows us to decompose the causes of savings difference, it can be separated into two portions. A first portion is called the endowment effect. It describes the differences in the observable characteristics of persons or the differences in the determinants of saving such as age, income, education, and other characteristics. A second portion is called the discrimination effect. This part commonly evaluates the discrimination effect of the compulsory pension's effect on savings.

1.4 Statement of Contributions

The contribution of this paper is threefold. First, the data of this study allow us to identify the discrimination effects in a much more robust manner than previous studies. Using the saving rate[5] and non-pension wealth induces measurement errors that are sensitive to the discrimination results which Engen and Gale (1997) found create large estimated offsets for broader measures of wealth. Second, this paper explores new rich administrative datasets. A novelty of this survey is that it collects the information of the repeated representative-household and a member of the household throughout eight years. Moreover, the survey includes not only income, expenditure, and characteristics, but also the level of assets, liabilities, and the various other determinants of savings. This dataset allows for the observation of the causes of differences in the savings in more detail, by using dynamic saving determination, than previous studies. Finally, this paper further investigates the discrimination effect. More information can offer guidance to policymakers to help vulnerable groups better prepare for retirement or to make the saving systems more potent in light of the aging society.

1.5 Organization

This paper is organized as follows: Chapter 2 presents the economic framework for analyzing consumption and savings, reviewing the concept of the pension system based on the conceptual framework of the World Bank, and discussing the pension system in Thailand. Chapter 3 reviews the literature associated with the determinants of household and personal savings and the literature correlated to the impact of the compulsory saving system on household savings. Chapter 4 explains the econometric methodology. Chapter 5 displays and discusses the empirical results. A final section provides a conclusion.

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[5] The household disposable income minus total consumption over household disposable income (Feng, He, & Sato, 2011).

CHAPTER 2

CONCEPTUAL FRAMEWORK

This chapter includes three sections. The first section summarizes the economic framework for analyzing consumption and savings, which is explicitly described in the life-cycle hypothesis. The second section reviews the concept of the pension system based on the conceptual framework of the World Bank to illustrate the notion of the international standard. The last section discusses the pension system in Thailand to identify the current status and evaluates the performance.

2.1 The Life Cycle Hypothesis

The life-cycle model is an economic framework used in this study. Economists widely accept this model for analyzing the consumption and saving patterns of households and members of the household. The model based on the ideas of two economists, Milton Friedman and Franco Modigliani. Their contributions can help to describe how people choose the level of consumption and saving over their lifetime. The fundamental assumption is that the person is forward-looking and decides to choose the current consumption and saving based on their expectation of the future.

A critical intuition of this model is that these individuals decide to choose their current consumption depending on the expected available resources over their lifetime; this is known as the permanent income. More precisely, people aim to smooth their lifetime consumption in a way that they can preserve a constant consumption profile, despite the presence of unexpected factors affecting income. The desired level of consumption depends on their preferences and the amount of expected income over life. The model recommends that the consumption level may change only to respond to permanent income, but not temporary income, because permanent income will affect the lifetime wealth.

This means that the temporary rise of the income shock, such as a one-time tax rebate, will not affect the consumptions and savings decision because such changes do not change people's expectations about their income over-time. On the other hand, the change that modifies an individuals' expectations, such as an unanticipated increase in deposit rate leading to higher earning, will affect consumption and savings.[6]

The level of consumption implies an amount of saving, which is the remaining income after their consumption spending. Insofar as the younger and older tend to have relatively low incomes, then, the young worker tends to have less income than consumption spending. Most of them will usually borrow. They will save money during the prime working years when income is high, enough to pay off debts and have some remaining. The saving of money during the excess time will be used for spending in old age when income falls (Figure 2.1).

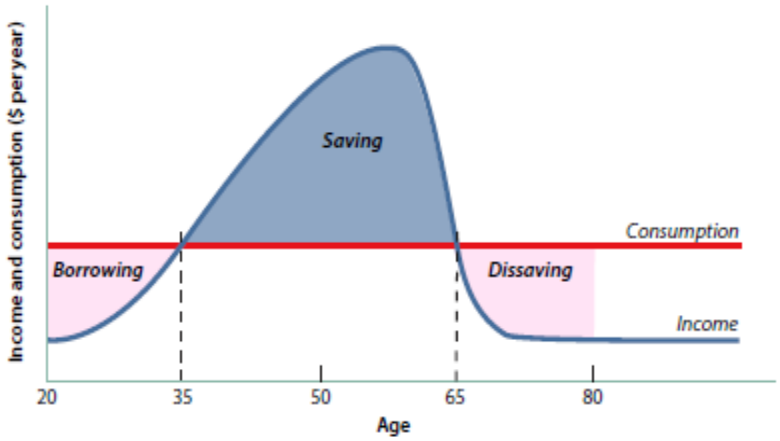

Figure 2.1 Lifecycle of Income and Consumption Smoothing
Source: Lamman, Palacios, and Clemens, 2013.

6 The change in deposit rate may be predicted or not predicted. If a change is entirely predicted, its effects on income will be included in the estimated permanent income. If a change does is not predicted, it will not affect the consumption and savings.

Thai households save for different reasons such as retirement, family security, buying assets or property, and for earning interest/dividends. Saving for retirement occurs through many channels, including compulsory saving, voluntary saving, unregistered savings, and home equity. The life cycle model explains that each of these channels for savings is substitutable. The reason is that people increase their saving in one channel without a change in the permanent income tending to decrease savings in another channel with little impact on the overall level of savings. So, it can be said that lifetime income and the desired consumption level dictates the amount of money left over for savings.

Let's turn to the real-world implications of the life-cycle model to understand how it affects saving behavior. There are fundamentally two types of individuals. One is someone who currently saves for retirement outside the compulsory saving system. It can be said that the compulsory saving system will be substituted entirely with those groups. That saver will respond to compulsory retirement savings by reducing their voluntary retirement savings elsewhere. Second, for those who do not have alternative savings, raising in the compulsory saving would compel them to save when they have chosen to consume today rather than save. For this group, total savings may increase with the compulsory saving system.

To understand how Universal Health Insurance (UHI) affects saving behavior, we can consider a stochastic life-cycle model. The person or household is assumed to be uncertain about future medical expenditures. In each period, they plan not only to choose the current and future consumption to maximize their expected utility subject to the budget constraint, but also, they suffer from out-of-pocket expenditures. In optimal outcomes, there are three channels through which the UHI might affect savings and consumption decisions.

The first is precautionary holding by decreasing medical expense risks for an eligible person. It will increase consumption and lower wealth accumulation because the UHI lowers their need for precautionary savings. This notion is explicitly explained by Kotlokoff (1989) who presented a simulations model that demonstrates that the wealth accumulation will be much more in an economy with the individual using the savings as self-insurance against their medical risk than in an economy without the public insurance available.

The second is the redistributive effect. Medicaid increases the net income of a person who becomes eligible and ineligible for the program. It will decrease the expected expenses for both out-of-pocket spending and individual insurance payments, but this redistributive transfer is temporary. It persists only as long as the person is eligible for Medicaid. Because that person decides on consumption and saving based on a forward-looking life-cycle framework, the transfer will be saved and will offset the precautionary saving effect.

The third channel is asset testing. The person who is made entitled to asset criteria may reduce their saving to qualify for the program. However, this effect may be anticipated to be trivial because a significant portion of the population does not consider the UIH to be an appropriate option. As a result of the net across all effects, the UIH has an ambiguous effect on savings but an unambiguous effect on raising consumption.

2.2 The World Bank Pension Conceptual Framework

Since the mid-1980s, the World Bank has been concerned with the burdens of global population aging, the deterioration of the traditional family support system, and the lack of strength in the administration of the current pension system. The Bank has responded to these dangerous threats by encouraging countries to establish comprehensive social insurances and public pension systems that provide an old age income to support their citizens, especially in developing countries. Even though the Bank’s recommendations are not universal solutions to handle the complexities of pension issues nor a simple model that can be implemented in all situations, they have provided a conceptual framework to guide the countries and recommended the main criteria to develop pension systems such as target groups, characteristics, participation, and funding (See Table 2.1).

The Bank's policy framework proposes a five-pillar model that needs to be designed to be suitable for a country’s specific circumstances. The whole range of the possible model is based on the perspective that a diversified system can allocate income for retirement more effectively and efficiently. Multi-pillar outlines support more adaptability than mono-pillars because they can address the requirements of the

core target groups and ensure more safety against the uncertainties in the future, such as the economics, demographics, and political risks. The five pillars are as follows:
The non-contributory zero pillar

The zero pillar is non-contributory of a social pension or social assistance generally financed by the budget of the local or central government. The objective of this pillar is to alleviate poverty in all the older adults with a minimal level of security and redistributed income among people. The pillar guarantees the elderly are provided with the necessary protection in the retirement period. The possible beneficiaries are people participating marginally in both the formal and informal economy. This system may provide either universal or means-tested methods. Moreover, the benefit is designed depending on the necessary needs of vulnerable elderlies, availability of budgetary resources, and the complementary elements of the pension system.

2.2.1 The mandatory first pillar

The first pillar is mandatory with public management. It may be the defined benefit as well as the defined contribution in which the contribution rate is related to varying degrees of earnings. The objective of this pillar is to substitute some amount of the pre-retirement income. This pillar is assigned to deal with the risks of individuals' myopia, low incomes, inappropriate planning horizons because of unexpected changes in life expectancies, and the absence of risks of financial credit markets. A pay-as-you-go (PAYG) basis usually funds the beneficiaries, and thus depends on demographic and political uncertainties.

2.2.2 The mandatory secondary pillar

The second pillar is the occupational or personal pension plans with an individual saving account. The mandatory may be the fully funded defined contribution or fully funded defined benefit. The savers can choose between an active or passive investment policy, the choice parameter for choosing investments, investment managers, and choices for the removal phase. The defined contribution plan is founded with a clear link between contributions, investment performance, and received benefits which may be supportive of financial market development. However, the defined benefit plan is subject to financial and agency risks because of

private asset management, the jeopardy of the high transaction and administrative costs, and longevity risks unless they involve mandatory annuitization.

2.2.3 The voluntary third pillar

The third pillar is occupational or personal pension plans with partially or fully funded defined benefit or fully funded defined contribution based on the voluntary decisions of both informal and formal workers. The goal of this pillar is to compensate for inflexibilities in the design of other pension systems but contains similar risks as the second pillar. The voluntary pillar takes many forms, such as individual voluntary saving for retirement, disability, and uncertain circumstances in the future. Nonetheless, this pillar is principally flexible and discretionary.

2.2.4 The voluntary fourth pillar

A final non-financial pillar contains the ability to access informal support (such as traditional family support systems), the formal social insurances (such as health care), and other individual wealth accumulation (including financial and non-financial assets, homeownership and reverse mortgages).

Table 2.1 Multi-Pillar Pension Taxonomy

Pillar	Target groups	Main criteria		
		Characteristics	Participation	Funding
0	Informal workers Formal workers	"Basic" or "Social Pension" at least social assistance (universal or mean tested)	Universal or residual	Budget or general revenue
1	Formal workers	The public pension plan, publicly managed (defined benefit or defined contribution)	Mandated	Contributions,
2	Formal workers	Occupational or personal pension plans (fully funded defined benefit or fully funded defined contribution)	Mandated	Financial assets
3	Informal workers Formal workers	Occupational or personal pension plans (partially or funded defined benefit or fully funded defined contribution)	Voluntary	Financial assets
4	Informal workers Formal workers	Access to informal support (family), other formal social program (health care), and other individual financial , nonfinancial assets (homeownership)	Voluntary	Financial and nonfinancial assets

Source: Holzmann, Hinz, and Dorfman, 2008.

2.3 The Pension System in Thailand

King Rama V initiated the initial public pension system in Thailand in 1902. The purpose was for raising the well-being of all government officials after their retirement. All officials obtained the defined benefits scheme based on the last month salary funded by a central government's annual budget. This pension scheme has been continually implemented for almost a century. Nevertheless, it inherently increased the fiscal burden of the Thai government. In the 1990s, the government also agreed to adopt the World Bank's Multi-Pillar of Old Age Security to strengthen its sustainability.

In the late 1990s, the pension system was entirely reconstructed (Figure 2.2). The zero pillars are comprised of the Old-Age Allowance System (OAA) for informal workers. The first pillar is the Civil Servant Pension scheme (CSP) and the Social Security Fund (SSF) with the goal of securing basic needs. The second pillar covers the Government Pension Fund (GPF), which is a mandatory defined contribution pension system designed for civil servants, and the Teachers' Provident Fund (TPF) for teachers in private schools.

The third pillar consists of a voluntary privately financed provision. The Provident Fund (PVD) is an occupational pension, and it is encouraged with tax advantages. Additionally, the Retirement Mutual Funds (RMF) can be made through personal saving plans. It covers all employees that are covered or not covered by the Provident Fund. Moreover, the Social Security Fund with chapter 40 permits informal workers to enroll in this voluntary system. Recently, the Thai government launched a new voluntary retirement saving system called the National Saving Fund (NFS). It is proposed to cover all Thai citizens who are not covered by any existing pension scheme, especially those who work in the informal sectors.

In conclusion, currently the Thai pension system consists of four pillars including 1) a non-contributory pillar, 2) a mandatory defined benefits pillar, 3) a mandatory defined contribution pillar, and 4) a voluntarily defined contribution pillar (see figure 2.2). Thus, the Thai government has financed the public pension system for the annual national budget, which has increased from 2014 to 2019. It can also be

stated that the yearly government budget on old age is nearly 12.66 percent on average as the percentage of the national budget (see Table 2.2).

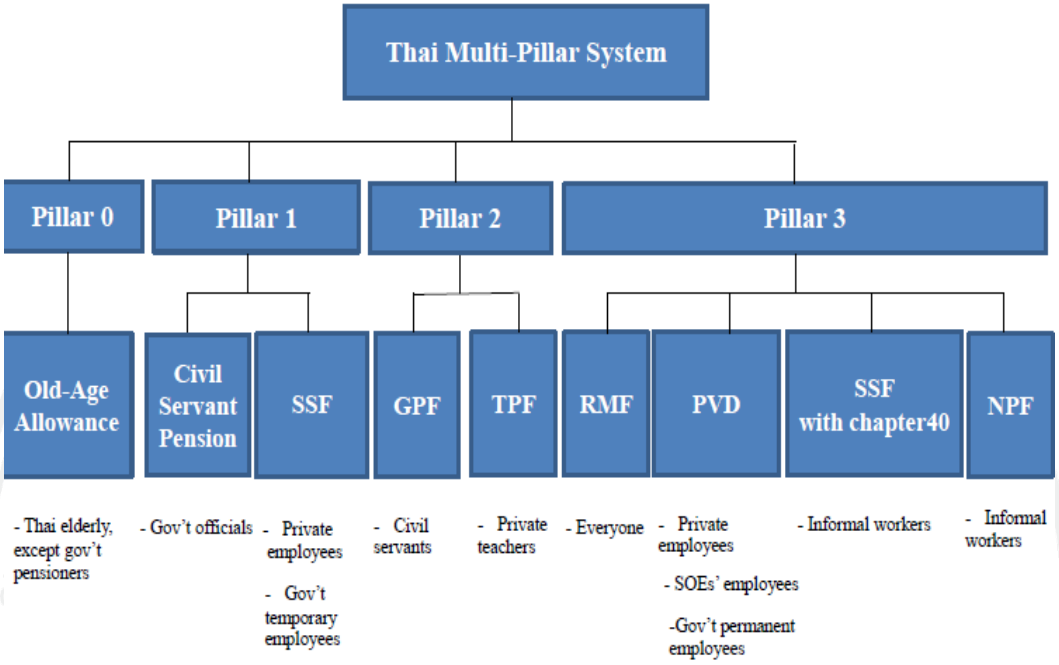

Figure 2.2 the Pension System in Thailand

Source: Chumjai, 2017.

Table 2.2 Government Budget Allocation on Old-Age Income Security for the Fiscal Year 2014 to 2019

Pension Schemes	2014	2015	2016	2017	2018	2019
Old Age Allowance	61,407	61,879	63,219	64,770	66,598	71,912
Old Civil Service	132,277	144,842	175,693	179,167	191,223	223,762
Social Security Fund	23,935	27,175	27,199	25,784	27,550	29,010
Government Pension Fund	47,000	45,411	46,053	45,924	47,623	54,845
National Saving Fund	-	-	633	646	145	300
Total (Million Baht)	264,619	279,307	312,798	316,291	333,138	379,829
National Budget	2,275,000	2,325,000	2,386,000	2,370,078	3,050,000	3,000,000
% of the National Budget	11.63	12.01	13.11	13.35	10.92	12.66

Source: Author compiled the data from Thailand's Budget in the brief Fiscal Year 2014-2019, Bureau of the Budget.

Note: The social security fund includes seven funds, namely: illness or accident; physical disability; death not related to the performance of work, child delivery; old age, child assistance, and unemployment.

2.3.1 Pillar 0: The Non-Contribution Pillar

1) Old-Age Allowance (OAA)

The elderly allowance is a non-contributory social protection scheme. The purpose of this scheme is to guarantee the old-age income for the elderly low-income people aged 60 years and above. At present, this scheme has enlarged the qualification to obtain the allowance to the elderly who are not members in any public pension established by the central or local government, or state enterprise.

After the year of expansion qualification, the number of recipients has increased suddenly. Moreover, the old-age allowance was changed in the year 2012 from a flat pension rate to a multiple rate system. The monthly pension amount is different by the age of beneficiary; 600 baht/month for those aged 60 to 69 years, 700 baht/month for 70 to 79 years, 800 baht/month for 80-90 years and 1,000 baht/month for those 90 years and above. The number of beneficiaries is approximately 8.4 million people, with 71,912 million baht on budget allocation in 2019.

This allowance is a supplementary pension system that guarantees almost elderly Thai citizens to have an old age income. However, the monthly payment based on the age of recipients ranging from 600 to 1,000 baht is not enough for minimum subsistence because it is less than the poverty line measuring expenditures which is equal to 2,710 baht/month in 2018. Moreover, considering the sustainability perspective, this scheme is likely to be an unsustainable system. Since the expansion qualification, the annual government budget allocation has increased steadily from 37,893 million baht in 2012 to 71,912 million in 2019. Similarly, the number of eligible people has increased from 6.52 million (65.55 percent of all older adults) to 8.40 million (65.93 percent) at the same time. Additionally, this system is approximately 2.39 percent of the annual government budget and tends to increase continually over time, which will unavoidably affect the sustainability of the fiscal budget.

2.3.2 Pillar 1: A Mandatory Defined Benefits Pillar

1) The Civil Servant Pension Scheme (CSP)

The civil servant pension scheme is a non-contributory defined benefits scheme financed by the annual government budget. It provides for the government officials to guarantee retirement income with a generous benefit. There are two types of pension systems for the officials. One is the old Civil Servant Pension Scheme for the civil servants entering the system before 1997[7] and who did not choose to join the Government Pension Fund (GPF). The second is the new Civil Servant Pension Scheme for civil servants entering the system before 1997 but who voluntarily choose the GPF and civil servants entering service after 1997 (see Table 2.3). Under the Civil Servant Pension Scheme, eligible officials who will receive a monthly pension payment must have at least 25 years of service.

As of September 2019, 629,638 officials receive the pension payment. It is approximately 223,762 million baht or is approximately 29,615 baht/pensioner/year (the Comptroller General's Department). The pension payment is sufficient to maintain the quality of life equivalent to pre-retirement. The officials do not have to contribute to the system, and the pension received will be subsidized from the annual tax revenue at those years. As a result, this scheme is not a sustainable system.

There are also numerous risks in the future. First, this system is a pay-as-you-go basis. Thailand is entering an era of an aging population. This results in a lower tax base in which the government may have an insufficient budget to pay the pension. Second, if the government has the policy to raise the official's salaries, it will increase the burden on the government pension budget because this scheme has a formula for calculating pensions based on salaries of the officials. Third, the advancement of medical technology and self-care of the officials will result in longer life expectancy than the past. The government will have a longer time to pay the pension to the officials. Finally, if the government has the policy to allow the officials

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[7] On March 27, 1997, the year the second pillar was established, the government officials were given an option to join and if they chose not to join GPF, they would be entitled to the original pension system with the old generous formula.

that are the membership of GPF to return to the old pension system, it will result in a higher pension budget.

Table 2.3 Pension Calculation

Type	Pension Calculation
Old Civil Servant Pension Scheme (Government Pension)	**Monthly Pension** = Last month salaries*official term (years)/50 The amount of monthly pension shall not exceed 100% of last month' salary
New Civil Servant Pension Scheme (Government Pension Fund)	**Monthly Pension** = Average salaries for the last 60 months* the official term (years)/50 The amount of monthly pension shall not exceed 70% of the average salaries for the last 60 months **Lump-sum payment (Gratuity)** =Salary of the last month*the official term (year)

Source: Government Pension Fund as of August 20th, 2018.

2) Social Security Fund (SSF)

The SSF is a compulsory defined benefit pension scheme providing for the workers in the private sectors. This scheme was founded on 31 December 1998 according to the Security Act 1990, which is revised by the Social Security Act (No.2) in 1994 and (No.3) in 1999. It is managed by the Social Security Office. Regarding the funding, this scheme is financed by tripartite contributors. The private worker and employer must each contribute three percent of the worker's salary, but it is limited to 450 baht per month, and the government's contribution is one percent. However, the salary-based calculation is in the range between 1,650 and 15,000 baht per month.

The SSF scheme provides a benefit under a partially funded defined benefit system. When retired, the workers can choose what they desire to receive between a monthly payment, or a lump-sum payment. The pension payment is computed as the following conditions (Table 2.4).

(1) If the members contribute for 180 months, they will receive pension payment at the rate of 20 percent of the average salary of the last sixty months.

(2) If the members contribute more than 180 months, they will receive a retirement pension at (1) and get an extra 1.5 percent for every additional 12 months of the contributions.

(3) If the members contribute less than 180 months, they will receive a lump-sum payment which equates to the total amount of the contributions for retirement saving plus the benefits of return on investment.

(4) If the members contribute between 12 to 180 months, they will receive a lump-sum payment which equates only to the amount of their and government contribution.

(5) If the member contributes less than 12 months, they will receive a lump-sum payment which equates only to the amount of their contribution.

In the fiscal year 2019, SSF has about 13.01 million members (the member of section 33 and 39), the active contributor is approximately 18.58 percent of the overall population and 32.22 percent of the working population. The maximum monthly pension is 6,375 baht[8] (50 percent of salary based 15,000 baht). This payment is a quite small amount when compared to the basic subsistence income. Moreover, the pension payment is quite low if it is discounted with inflation in the future.

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8 The calculation is based on the member starting to work at age 25 years old continually to age 60 years old with the monthly salary of 15,000 baht in the last five year's average salary.

Table 2.4 The Benefit for a Member based on the Duration of Contribution

Contribution	Pension Calculation
Less than 12 months	Lump-sum consisting of the employee' contribution only
12 months to less than 180 months	Lump-sum consisting of the employer and employee contributions
180 months (15 years) or longer	Lifetime annuity Monthly pension= 20%* average salary for the last 60 months moreover, increase by 1.5%* average salary for every year that the member contributed beyond 15 years. Or monthly pension = (20%+1.5%*(year of contribution -15)) * the average salary for the last 60 months

Source: Bureau of Saving and Investment Policy, Fiscal Policy Office, 2005.

2.3.3 Pillar 2: A Mandatory Defined Contribution Pillar

1) Government Pension Fund (GPF)

This scheme is a mandatory defended contribution plan established on 27 March 1997. It is offered to the civil servants who were hired before the establishment of the fund to be a voluntary member of the GPF system and to those who were hired after the year of establishing the fund. This system covers the twelve categories of officials including Civil, Judicial, State University officials, Public prosecutors, Public teachers, Ordinary parliamentary, Police, Military, Constitutional court, Administrative Court, Counter Corruption Commission, and Auditor General.

Under the GPF system, the government contributes three percent of the official's monthly salary, and the officials cannot contribute more than 15 percent of their monthly salary. When the official retired, they gain a traditional pension, which is the less generous formulation, and composed with the lump-sum retirement allowance. The lump-sum includes the five components as (1) the officials' contribution (2) the government's three percent contribution (3) two percent of monthly salary paid by the government for those who choose to obtain annuity pension payments (4) a lump sum award fund, acting as motivation for officials hired

before 27 March 1997 and choose to participate in the GPF scheme, and (5) the return on investment.

The GPF members receive a substantial tax deduction as the contribution of up to 300,000 baht per year, and the return on the wealth accumulation in GPF are wholly tax exempt. Additionally, this scheme provides loans for housing as well as non-contributory medical benefits until death.

As of February 2019, the total number of members is 1.07 million. The amount of payment is expected to be sufficient for preserving the quality of life equivalent to pre-retirement and the rate of contributions of both officials and the government are affordable. The establishment of the GPF also results in a more sustainable government budget because the pension payment is associated with the contribution and investment benefits. Hence, it is a defined contribution system.

2) Teachers' Provident Fund (TPF)

The Teacher' Provident Fund is one of the mandatory defined contributions managed by the Ministry of Education under the Private School Act. This fund is organized particularly for teachers and headmasters of private schools. The member and the school each need to contribute three percent of the member's salary while the government must provide a co-contribution of six percent. The contribution from the government cannot be allocate into an individual account but is instead held in a separated account, and it provides welfare benefits for members and their families.

The teacher will receive a lump sum payment when they leave the job in the private school. In September 2011, there were 100,000 teachers and headmasters in 7,688 private schools with the value of fund approximately 14,000 million baht. The member will obtain a lump-sum payment equivalent to the total collected amount of benefit from investment, which is expected to be enough to sustain the quality of life that is equivalent to the pre-retirement level. Moreover, the contribution rate is not too high, and it is unlikely to obstruct the member to contribute to the fund. The TPF is a very sustainable system due to the payment based on the member's contribution.

2.3.4 Pillar 3: A Voluntary Defined Contribution Pillar

1) Provident Fund (PVD)

In 1987, the Provident Fund was decreed to encourage private workers to save for old age. The PVD is a voluntary defined contribution system and is an occupational pension. It is established under the contract between worker and employer for the goal of offering to save for retirement to the worker. Both agree to assign the Fund Committee to manage the PVD, and the committee will choose the funded manager. The fund manager will offer the members investment choices which are specific, clear investment policies for each option. However, regulation is under control of the Security and Exchange Commission (SEC).

When the fund is established, both workers and employers must contribute to the fund together. The employee must contribute at least three percent of his salary but cannot exceed 15 percent of the salary. The employer has to contribute not less than the employee's contribution. Concerning termination, the worker will a obtain lump sum at their resignation, retirement, or death. Moreover, the contribution paid to the PVD is tax-deductible for both employee and employer, and the benefit received is tax exempt.

In Thailand, PVD is usually founded in large companies. As of December 1999, PVD covered 1.03 million employees in 4,005 companies, and the total value was estimated at nearly 182,735 million baht. At the end of 2017, PVD covered 2.97 million employees in nearly 10,000 companies with the total value of the fund approximately 1,082,619 million baht. Moreover, the member' saving rate in the PVD is still too low. By November 2017, more than half of the employee and employer contributions to the PVD were less than five percent. The average contribution rate of the employees was 4.89 percent, and of the employers was 5.23 percent. The average saving per person was 365,014 baht. If they need to spend this received pension for 20 years after retirement, they will receive only 1,520 baht per month. Thus, it can be stated that the pension payment is not enough to survive because the contribution rate is too low. However, this system is very sustainable because it is based on the individual's ability to save.

2) Retirement Mutual Fund (RMF)

The mutual fund management companies offer the Retirement Mutual Fund (RMF: the third pillar) to investors/ workers who want a voluntary saving option for retirement. The savers must continuously save in the RMF until the age of 55, except for the years they do not have any income. The saving rate needs to at least 3 percent of monthly income or 5,000 baht, whichever is lower. Additionally, the RMF is principally appropriated for those who are not eligible for a member of PVD or wish to have an additional savings for retirement. The savers who invest in an RMF will obtain a tax exemption up to a maximum of 15 percent of the annual taxable income. However, the amount of the allowance must be combined with GPF, PVD, TPF, and other pension insurances and the total allowance in RMF cannot exceed 500,000 baht.

At the end of 2003, there were 46 RMF with combined assets of about 7,282 billion baht. At the end of 2017, there were 180 RMF with total assets of 257,440 million baht. The savers who save money in the RMF are in the high-income group, and they do not have the problem with insufficient saving for retirement.

3) Social Security Fund with chapter 40

The Social Security Act permits informal workers to enroll in this voluntary system. This scheme is the voluntary basis in which members can choose one of two options. For the first option, the member must contribute 70 baht/month, and the government will contribute 30 baht/month. Member will gain a benefit, including compensation for disability, sickness, and death. For the second option, the member must contribute 100 baht/month, and the government will contribute 50 baht/month. This option will provide the above benefits added to old-age savings. Because of the uncertainty in the policy direction, there has been a slight increase in membership. In 2019 (February), there are 2,919,126 members, and most select option 2, which can be obtained as a lump sum payment at age 60.

4) National Saving Fund (NSF)

This is a new voluntary retirement saving program operated by the government beginning in 2015. It intends to mainly cover informal workers. This scheme focuses on the workers who lack a long-term retirement program, which is

approximately 24 million people. In terms of membership, an eligible member is a Thai citizen who is aged between 15 to 60 and is not covered by any other pension schemes established by the central, local government, and by public enterprise.

Under this scheme, the member has to contribute 50 to 13,200 baht per year and the government will be a co-contributor with the member. The contribution rate is related to the amount of the member's contribution and age with a ceiling as the conclusion in **Table 2.5.** The NFS benefit will disburse as a monthly payment, and the amount of the pension varies according to the amount of contribution. The challenge of the NFS system is that both contribution rates are too low to secure the life in retirement period to be equivalent to the pre-retirement level. Moreover, the government's contribution is too low to encourage informal workers to join the system. The NFS has been in practice for about four years. There are only 618,526 registered fund members with a total fund of 3,927 billion baht

Table 2.5 The Ceiling of Co-Contribution from the Government by Age

Age of member	Co-contribution from the government
15-30	50% with a ceiling of 600 baht per year
30-50	80% with a ceiling of 860 baht per year
50 and above	100% with a ceiling of 1,200 baht per year

Source: National Saving Fund as of August 20th, 2018.

2.3.5 Pillar 4: A Non-Financial System

According to a 2016 survey of the elderly in Thailand, their primary source of income is the income from their dependent, which is roughly 52.30 percent. The second is the income from their spouse at roundly 6.1 percent. Meanwhile, the pension payment accounts for only 7.2 percent. These survey's results show the importance of an informal income support system for the elderly in Thailand, especially through family support because Thailand has a culture of parental care. However, family support is a source of income that faces high uncertainty and diversity between households, especially with changes in the economic and social condition.

Table 2.6 Multi-Pillar Pension System in Thailand

Pillars	Thailand's Schemes	Funding	Participation	Benefit type
0	Old Age Allowance	Pay-as-you-go/Unfunded Scheme	Universal or residual (8,408,498)	Pension
	The Civil Servant Pension (before 1997)	Pay-as-you-go/Unfunded Scheme	Mandated: Central civil servant (1,721,772) Government employees (221,553) Local civil servants (215,873)	Pension or lump-sum
1	Social Security Fund (Chapter 33,39)	Partially Funded Scheme	Private employees (12,297,887)	
2	Government Pension Fund	Funded Scheme	Mandated: Central civil servants (1,172,753)	
	Teachers' Provident Fund		Private school teachers (152,576)	
3	Provident Funds	Funded Scheme	Voluntary: PVD's members (2,965,961)	Lump-sum
	Retirement Mutual Fund			
	Social Security Fund (Chapter 40)		Informal workers (2,503,572)	
	National Saving Fund		Informal workers (508,207)	
4	Private insurance; Welfare housing; low-cost housing	Funded Scheme	Voluntary	Return to investment

Source: Adapted from Holzmann et al., 2008 and * figures in parenthesis are the updated number of members.

CHAPTER 3

LITERATURE REVIEW

This chapter reviews the literature related to the purposes of this study. The chapter is organized into two parts. The first is correlated to the determinants of household and individual savings. The second is associated with the impact of the compulsory pension system on savings and wealth accumulation.

3.1 The Determinants of Household and Individual Savings

This section will briefly review the determinants of saving documented in the literature. For more than the last half-century, a large number of studies have developed their analysis within the canonical life cycle model and the permanent income hypothesis. Within these frameworks, individuals or households have a decision to consume and save within the principle of the intertemporal utility maximization framework. An individual chooses current consumption and saving to the smooth utility over time, and they decide how much to consume and how much to save, which keeps information in mind in their future expectations. However, the fundamental difference between the life cycle and the permanent income model is the time horizon perspective. The life cycle model is a finite horizon model, while the permanent income model is an infinite horizon model.

As suggested by the theories, many studies (Bebczuk, Gasparini, Amendolaggine, & Garbero, 2015; Chyi & Liu, 2007; A. Lusardi, 1997) confirmed that the relationship between savings and age is likely to be an inverted U curve or the concave function. This means that the relationship is to be positive and negative. It indicates that the savings will increase with age, but the rate of growth increases at a declining rate.

Moreover, Feng et al. (2011) determined the effects of observable characteristics on savings. They found that, in general, males save more than females. This is because males may have a higher level of wage income than females. Nonetheless, Beckmann, Hake, and Urvová (2013) found that females save more. They claimed that this relationship might be due to the fact that women have a higher life expectancy than men and then need to save more to maintain their more extended consumption periods. Therefore, they have a higher propensity to save.

Furthermore, Alessie, Angelini, and Santen (2013) recommended that marital status is another critical variable in determining savings. They found that those who are married save more than the single because the married have several sources of income and also have the economies of scale of spending on necessary goods in their household. However, Mosk (2010) found that the widowed save more than the married and unmarried because they face more unanticipated and extra risks in life, such as rearing children alone.

The members of the household should be investigated as a proxy of family size. The vast literature believes that the large size of the household is naturally related to higher saving sates. Mishra, Uematsu, and Powell (2012) and Pan (2016) found that households with large family sizes in the USA and China save more. Moreover, Kraay (2000) gives a further reason that if the size of households reflects a large number of children, it creates a household with strong bequest motives.

Education is one of the essential determinants of saving. Education directly affects income and saving behaviors because it increases labor productivity, thereby increasing personal income as well as savings. Moreover, education can affect saving indirectly through financial literacy as having higher financial literacy also will result in higher savings (A. Lusardi, 2008). Financial literacy also enables people to know the risk and return characteristics of the different financial products, and it enables them to save and to secure a comfortable retirement. Therefore, most studies found that higher educational level strongly induces higher savings (Alessie et al., 2013; O. P. Attanasio & Brugiavini, 2003; Feng et al., 2011; A. Lusardi, 1998).

To further investigate wealth effects on saving, homeownership offers itself to various inconsistent effects on saving. First, once the households do not become homeowners, they have to pay rent, which may discourage to save. Second, once

households plan to buy a house, the frugal attitude induces them to save more. Finally, a house as real estate can serve as collateral. They may loosen financial constraints and reduce household saving efforts for precautionary motive. Moreover, there are some empirical studies such as Chandavarkar (1993) showing that homeownership encourages the household to save more. Like Singapore, the government enforces mandatory saving for citizens buying a house or apartment, which is a positive effect on household saving.

The substantial evidence of Bozio et al. (2013), Dynan, Skinner, and Zeldes (2004) found a high correlation between labor income and savings. However, the labor income is an endogenous variable, and hence the estimated coefficient would be an overestimation on the essential saving-income relationship. To avoid these pitfalls, past studies have suggested correcting the problems using the following methods: (1) deleting the current income from the explanatory variable, (2) finding the instrument variable as proxies for permanent income, (3) creating dummy variables for the income quintiles.

Another reason to save is the precautionary motive. Browning and Lusardi (1996) pointed out that one of the most critical features of precautionary saving is associated with the uncertainty on future income. For example, households having a higher variance in future income will have higher saving. In other words, the uncertainty harms consumption, but is a positive effect on savings because it creates demand for precautionary saving.

The assumption of perfect capital markets implies that agents can transfer resources through different periods in life with no transaction costs and a constant interest rate. That is, the individual can borrow or lend as much as they wish. This assumption has been broadly questioned. In practice, the individual often faces liquidity constraints due to their limited access to borrowing. Browning and Lusardi (1996) argued that the behavior of agents facing liquidity constraints could be similar to that observed in individuals with precautionary saving motives, and it is hard to disentangle both motives. Moreover, Deaton (1991) showed how the presence of liquidity constraints reinforces the precautionary motive. The liquidity constraint is especially relevant in countries with underdeveloped financial systems.

Table 3.1 Summary of Past Studies of the Determinants of Household and Individual Savings

Author (s)	Variable(s)	Expected sign (s)	Explanation
Lasardi (1997)	age and age square	positive and negative	Savings will increase with age, but the rate of growth increases at a declining rate.
Chyi and Liu (2007)			
Bebczuk et al. (2015)			
Feng et al. (2011)	male	positive	Males may have a higher level of wage income than females.
Beckmann et al. (2013)	female	positive	Woman have a higher life expectancy than men, therefore, they need to save more to maintain their more extended consumption period.
Alessie et al. (2013)	married	positive	Married have many sources of income and have economies of scale for necessary expenditures in their household.
Mosk (2010)	divorced	positive	They face more unanticipated and extra risks of life such as rearing children alone.
Kraay. (2012)	household size	positive	If the high values reflect a large number of children, it creates a household with strong bequest motives.
Lusardi (2008)	education	positive	Financial literacy enables people to know the risks and returns
Lusardi (1998)		positive	Characteristic of financial products.
Attansio and Brugiavini (2003)			Education can affect saving indirectly through financial literacy.
Feng et al. (2011)			
Alessie et al. (2013)			
Chandavarkar (1993)	homeownership	positive	If people plan to buy a house, their frugal attitude induces to save more.
Dynan et al. (2004)	labor income	positive	
Bozio et al. (2013)			
Gaudelman (2015)			
Browning and Lusardi (1996)	saving for	positive	People save for precautionary reasons to spend during times of

Author (s)	Variable(s)	Expected sign (s)	Explanation
	precautionary motive		hardship such as illness or drought.
Deanton (1991)	liquidity constraints	negative	The presence of liquidity constraints reinforces the precautionary motive

Source: Compiled by Author.

3.2 The Effect of Compulsory Pension Systems on Household Savings and Wealth Accumulation

The attempts to examine the impact of compulsory pensions on voluntary savings have received considerable attention in the empirical literature on public finance. However, the results of those studies have been inconclusive on whether compulsory savings encourage the household to save more or distort the saving behavior. M. Feldstein (1974) was the first author who examined the relationship between social security wealth and private savings in the United States of America (USA). Based on the time-series of macroeconomic data, the Ordinary Least Square (OLS) estimation indicates a significantly adverse effect of social security wealth on savings. Social security wealth decreases private savings by 30-50 percent.

Feldstein suggested that the benefits of the pension affect the decision of household saving through two channels: (1) the pensions decrease saving because of substituting for overall wealth accumulation, as the canonical life cycle hypothesis expected that public pension wealth perfectly substitutes private saving. Nevertheless, (2) the pension also rises saving because it extends the retirement period, which wealth accumulation prolongs. Therefore, the net effect depends on the relative strength of the two forces. In this study, the effect of wealth substitution is more significant than the retirement effect; therefore, it results in lower private savings.

However, estimates made using macroeconomic data might produce inconsistent results because the data on the National Account cannot observe the heterogeneities among households. Therefore, various studies have instead employed survey data. Most papers confirmed that pensions decrease household savings, but the estimated results vary substantially depending on the method and pension specifications. For instance, M. Feldstein and Pellechio (1979) indicated that social security wealth completely substitutes non-pension wealth. A one-dollar increase in pension wealth would reduce other wealth by one-dollar. A later study by A. S. Blinder, Gordon, and Wise (1981) found a smaller substitution effect of pension wealth for private wealth, and the offset effect is approximately thirty-nine percent. Likewise, the evidence in Diamond and Hausman (1984) indicated that if the pension wealth increases by one dollar, it causes the non-pension wealth to decrease in the

range of thirty to fifty cents. Similarly, King and Dicks-Mireaux (1982) pointed out that the offset effect is around thirty percent.

Moreover, Hubbard (1986) proposed a new estimation method to access the impacts of changes in the holding of public pension and private pension wealth on the non-pension wealth. The estimated coefficients suggested that an increase in public pension wealth by one percent declines the net wealth by thirty-three percent, while an increase in private pension wealth by one percent declines the net wealth only sixteen percent. The difference might be accounted for by insecurity over receiving private pension benefits and by the fact that private pension wealth is not permanently indexed against inflation.

Gale (1998) was concerned with the differential effects across households. Because each household may have other factors affecting savings behavior such as knowledge in financial literacy, borrowing constraints, and precautionary saving, he addressed the problem by separating households into two groups whose pension offset may be anticipated to differ. A first group is based on saving motivations. The results showed that the household that has the saving incentive for retirement would have more of an offset effect than others. The household with retirement saving incentives is less likely to face borrowing constraints. A second group is based on years of education. The results revealed that the households that have higher education level would have more of an offset effect than others. More educated households may be more likely to be familiar with financial literacy and face higher relative demand for retirement saving.

Rather than using the data on wealth accumulation, O. P. Attanasio and Rohwedder (2003) considered the effect of different levels of pension wealth on saving rates. They employed the differences-in-differences estimations to examine the impact of pension reform on household saving rates in the United Kingdom. The benefits from the Basic State Pension (BSP) and the State Earning-Related Pension Scheme (SERPD) are the reductions. The empirical results showed that wealth accumulation in the SERPD is highly substitution because the scheme covers the most high-income households. However, the result of BSP is the relative difference; the change in the BSP wealth does not have any significant effect on the saving rate. One possible explanation might be the fact that the low-income household is usually

entitled to the BSP. In other words, when the poorer are likely to face the income constraint, the substitution of public pension wealth on saving rate is relatively small.

Furthermore, O. P. Attanasio and Rohwedder (2003) considered the degree of substitutability across age-cohorts. They obtain a degree of substitutability around 0.65 for 43 to 53-year-olds and 0.75 for 54 to 64-year-olds. This finding implies that a reduction in future pension benefits affects the savings rate of a younger cohort less than an older cohort because the young have more time to absorb the change before retirement. However, Feng et al. (2011) found that the pension reform induced the household saving rate to rise by about 6 to 9 percent for workers age 25 to 29 and by roughly 2 to 3 percent for workers age 50 to 59. A reason that the offset effect of the younger cohort is larger than the older cohort is likely because policy reform reduced the replacement ratio, which devotes the younger cohort to the rise in household saving rates. The study likes O. P. Attanasio and Brugiavini (2003), considered the effect of policy change on pension benefits in Italy. They found that substitutability is mostly perfect for workers aged between 35 to 45.

A significant econometric concern of previous studies is the effect of measurement errors both on the pension wealth and the present value of earning. Commonly, two measurement errors are positively associated with other variables that might well cause a spurious positive relationship. Engelhardt and Kumar (2011) adopted an instrumental variables method to correct for measurement errors. They employed data on the working population aged 51 to 61 from the Health and Retirement Study (HRS). They found an average offset effect between 53 to 67 percent. Moreover, Alessie et al. (2013) introduced a restricted model addressing the impact of calculation on measurement errors. This was done by using the third wave of the Survey of Health, Ageing, and Retirement in Europe (SHARE) collecting the retrospective data on lifetime earnings. The estimated displacement effect in the robust regression is equal to 47.1 percent, the median regression is equal to 60.9 percent and in lower bounds obtains between 17 to 30 percent.

Using extensive Danish survey-panel data over the period 1995 to 2009, Chetty, Friedman, Leth-Peterson, Nielsen, and Olsen (2014) analyzed the impact of a Mandatory Saving Plan (MSP) that required all Danish citizens to automatically contribute one percent of their incomes to a retirement savings account. They found

that the MSP raised total savings by roughly one percent on average. Because persons are active savers, they reduce consumption when their disposable income falls. Then, the automatic contributions then raise total wealth accumulation significantly. Recently, Li, Dillingh, and Mastrogiacomo (2016) examined the offset effect of mandatory occupational pension saving on household wealth accumulation in the Netherlands. The results found that the displacement effect is approximately 33 percent for wage earners and 61 percent for the self-employed. Because the self-employed are more concerned about the pension entitlements than the wage earner, a higher awareness would cause a higher offset effect.

To investigate the effect of pension reform in China, Feng et al. (2011) applied a life-cycle model to develop the saving equation that augmented the expected public pension wealth to determine the impact on household savings. After the policy reform, it was clear that heads of household who work in the enterprise sector would see a significant reduction in pension wealth. However, there is still a small opportunity for the household head who works in the public sector. The econometric evidence shows significant offsets of the effects of pension wealth on saving rates in two worker groups. The IV estimations display a significant offset ranging from 10 to 16 percent and a reduction in pension wealth increases the household saving rate by reducing spending on education, health, and consumption goods.

Moreover, Pan (2016) investigated the causes of rinsing in the rural and urban saving rates in China during the reform across the whole saving distributions. The results revealed that there are differences in fundamental reasons to increase savings between both households. The most substantial increase in the saving rate of households in the rural area appears at lower quantile; the saving rate in a higher quantile has a negative rate. Nevertheless, the saving rate of households in urban areas increases the most at higher percentiles. The decomposition method with quantile estimation shows that a substantial portion of the rural saving rate increase is due to rising income or changes in household characteristics. However, a significant portion of the urban saving increase is likely to be encouraged by changes in the social security policy, such as tuition, housing, pension, and health care reforms. Because a series of social security schemes cover urban households, rural households generally

are not covered. The reduction in social security benefits leads the urban households to save more.

To deeply understand the question of how the public pension system influences consumption, Zhao, Li, and Chen (2016) developed a two-period panel data model based on the China Health and Retirement Longitudinal Survey (CHARLS). They provided two measurements on the public pension systems. One is a dummy variable for participation in the various pension schemes, and the second is a yearly pension benefit payment. The estimation of the enrollment equation showed that households that participate in various pension schemes tend to consume more than those that are non-participating. Furthermore, the lower-income groups tend to have a more significant marginal propensity to consume than higher-income groups. This finding implies that a reduction in pension benefits may have a higher effect on consumption for low-income households.

Table 3.2 Summary of Past Studies on the Compulsory Pension System and Savings (The Selected Studies)

Author (s)	Data source	Dependent variable	Interested variables	Methodology
Feldstein (1974)	time series data	consumer expenditure	gross social security wealth net social security wealth	OLS
Results: The social security wealth reduces personal saving by 30 to 50 percent.				
Hubbard (1986)	cross-sectional Survey Data	net wealth	anticipated public pension and private wealth	OLS with the inverse of Mill's ratio
Results: An increase in pension wealth by one percent declines the net wealth by thirty-three percent, while an increase in private pension wealth by one percent declines the net wealth only sixteen percent.				
Gale (1998)	the Survey of Consumer in Finance	non-pension wealth financial asset	pension wealth pension wealth adjustment	OLS, Median regression, Robust regression and LAD
Results: The household that has a saving incentive for retirement will have an offset effect more than others. Moreover, the household that has a higher education level will have an offset effect more than the others.				
Attanasio and Brugiavini (2003)	the Survey of Household Income and Wealth	saving rate	pension wealth to current earnings	Difference-in-difference
Results: The substitutability is mostly perfect for workers aged between 54 to 64 and the lower substitution for the younger group.				
Attanasio and Rohwedder (2003)	The U.K. Family Expenditure Survey	saving rate	pension wealth	OLS with Instrumental Variable Approach (IV)
Results: The wealth accumulation in the SERPD is highly substitution for all workers. The change in the BSP wealth does not have any significant effect on the saving rate.				
Engelhardt and Kumar (2011)	The Health and Retirement Study	non-pension wealth	Pension Wealth	OLS with IV
Results: They found an average offset effect between 53 to 67 percent decline in non-pension wealth. The most effective is concentrated in the upper quantile of wealth distribution.				
Feng, He and Sato (2011)	The Chinese Household Income Project	Saving rate	Pension Wealth	OLS with Instrumental Variable Approach
Results: Under possible scenarios, pension reform increases household saving rates by about 6-9 percent for cohort age 25-29 and about 2-3 percent				

Author (s)	Data source	Dependent variable	Interested variables	Methodology
for the cohort aged 50-59.				
Alessie et al. (2013)	the Survey of Health, Ageing and Retirement in European	non-pension wealth	pension wealth	Robust regression Median regression IV Quantile regression
Results: The estimated displacement effect in the robust regression is equal to 47.1 percent, in the median is equal to 60.9 percent and in lower bounds obtain between 17 to 30 percent.				
Chetty et al. (2014)	The Danish income tax records	total and net saving rates	pension contribution rate	Regression Discontinuity Design
Results: The mandatory pension plan (contribution) raises total saving by roughly 1 percent on average. Because persons are active savers, they reduce consumption when their disposable income falls. Then the automatic contributions rise total wealth accumulation significantly				
Li et al. (2016)	The Dutch Income Panel Study With Wealth	total household wealth	total occupational pension wealth	Fixed effect with a difference-in-differences method
Results: The results found that the displacement effect is approximately 33 percent for wage earners and 61 percent for the self-employed because the self-employed are more concerned about the pension entitlements than the wage earner.				
Pan (2016)	The Chinese Household Income Project	saving rate	pension participation	Quantile regression and Decomposition method
Results: A substantial portion of the rural saving rate increase is due to raises in income or changing in household characteristic. However, a significant portion of the urban saving increase is likely to be encouraged by changes in the social security policy.				
Zao et al. (2016)	The China Health and Retirement Longitudinal Study	consumption expenditure	pension participation pension payment	Pooled OLS, Fixed effect Random-effect regression
Results: The household who participates in the pension scheme tends to consume more than those who are non-participating. Furthermore, the lower income groups tend to have a more significant marginal propensity to consume than higher-income groups.				

Source: Compiled by Author.

CHAPTER 4

ECONOMETRIC MODELS

4.1 The Random Effect Tobit Model

Because a large number of samples in the survey data declared that they do not save at all, the saving value includes many observation variables with zero. In some cases, representative persons may have negative savings, but they report that they do not save. Consequently, the saving values in the survey data begin with zero value and strictly continuous positive values. The Ordinary Least Square (OLS) estimation will then yield inconsistent estimates of the interesting parameter and will produce misleading results. Therefore, James Tobin also originally developed the Tobit estimation concerning the censored data. In a general version of the Tobit model, the dependent variable takes on the zero value and the strictly positive value with positive probability represents a continuous random variable over that value.

Moreover, the estimation of the model is conducted by employing data from the Thai Household Socioeconomic Panel Survey data. The Random-effect Tobit model[9] is applied. The estimated regression model is adopted from the model of saving determinants founded in the previous literature. Formally, it can be written as

$$S_{it} = \beta_0 + \beta_1 X_{it} + \gamma_i + \varepsilon_{it} \quad (1)$$

For i is presented a number of persons/workers $[i = 1, \dots, N]$, t represented a period of survey years $[t = 2005,2006,2007,2010,2012]$. The random-effects[10] (γ) is i.i.d., $N(0, \sigma_\gamma^2)$, and is a time-invariant individual-specific effect. ε is i.i.d. and

[9] It does not have a command for a parametric conditional fixed-effects Tobit model (FETB) because the FETB does not exist enough statistic permitting to conditioned out of the likelihood.

[10] If the individual specific effect (γ_i) is independent of the repressors(X_{it}), the interesting parameters can be consistently estimated with a random effect model.

$N(0, \sigma_{\varepsilon}^{2})$ is independent of γ. S represents the average value of monthly savings at time t of the persons i (saving_amt). The vector X summarizes additional explanatory variables that determine the saving founding in the last section, which is concluded in Table 4.1.

Since life-cycle theory suggests that the observables' characteristics of persons influences savings decisions, this paper also includes age (ageZ), age-squared (agesqrZ), and a dummy represents the persons born between 1980 to 2006 (GenY) to capture the different saving preference between generations. Moreover, a dummy variable for the persons that are female (female) and a variable indicates the marital status in which the persons are married (married).

To control the effect of income on savings, this paper includes the total individual income (tincomeZ) that contains the labor income, profit from doing business and others such as interest and dividend. Moreover, both dummy variables indicate that persons receive the additional income such as the income from the return on asset (income_asset) and persons obtain the money or goods assistance from government or other people outside households (income_gov). Furthermore, education is one of the essential determinations of saving. This paper constructs a number of years at the highest attainment (schoolZ).

To concern the saving behavior and motivations a dummy variable represents the persons' continuous saving every survey year (saving8). For saving motives, this paper constructs a dummy variable that indicates whatever the persons have the saving for retirement motive (OldAge). Moreover, economic conceptual framework also tells us that individuals save for precautionary reasons such as for using during times of hardship, like illness or drought. A dummy variable indicates that saving for family security and spending in the household is introduced (precautionary).

This paper constructs two variables to capture the effect of the ability to access the credit market. A dummy variable indicates that the persons have the source of loan from the informal financial institution (informal_loan), and a dummy variable indicates they declare that they have a better financial status (better_financial) than the last year.

To control the households' characteristics, a variable is introduced that indicates that there are members of households engaged in the agriculture sector

(Agri). Additionally, the ratio of a member aged more than 70 years (member_elder) is included as a proxy of the dependency ratio. A homeownership dummy variable (OwnedHouse) is included concerning the wealth of the household. To capture the effect of the region on savings, there are a set of dummy variables that represent the regions (regions) and administrative areas (municipal).

Because the panel survey data used in this study do not have a question that indicates participation in the compulsory saving schemes of persons, this study uses working status of respondents (Table 4.2). Firstly, the persons who participate in the compulsory saving schemes include government employees and private employees (COM), while the persons who are not covered by the compulsory saving schemes includes employers, own-account workers, and unpaid family workers (NCOM). Secondly, the persons who join in the Government Pension Fund are the government employees (GOV), and the persons who obtain pension benefits from the Social Security Fund are the private employees (PRI). Moreover, this paper classifies persons using their average total household income. In this implementation, if the persons have an average total household less than the 50th percentile of their own group, they are considered as low-income workers. Therefore, the low-income formal workers (LowCOM) and low-income informal workers (LowNCOM) are included as well as the low-income government employees (LowGOV) and low-income private employees (LowPRI).

Table 4.1 Definition of Saving and Explanatory Variables

Variables	Description and Meaning
Dependent Variable (Y)	
lnsaving_amt	Average monthly savings (log form) 1 - 9999998
Independent Variables (X)	
ageZ	Age 0-1
agesqrZ	Age square 0-1
GenY	the saver who born between 1980 to 2006 1 = Aged between 18 to 33 0 = Male
female	Gender 1= Female 0 = Male
married	Marital status 1 = Married 0 = Single/Windowed/Divorced/Separated
tincomeZ	Total income per month (working, profit, and others) 0 - 1
qtHHtincome	Average household income per month in each quantile 1 - 5
income_gov	Receiving income from other sources 1 = Money assistance from government/other outside households 0 = Others
income_asset	Receiving income from other sources 1 = Income from asset/interest/dividend/share/bond/lottery wining 0 = Others
schoolZ	Maximum year of the highest educational achievement 0-1
saving8	Saving every year 1 = Yes 0 = No
OldAge	Saving purposes 1 = For healthcare or old age 0 = Others (expenditure, education, business, security, investments)
precautionary	Saving purposes 1 = For family security and household expenditure 0 = Others (healthcare/old age, education, business, investment)
informal_loan	Source of the loan 1 = Village/Community Fund, Relatives/Friends 0 = Other (Cooperative, Commercial bank, Other financial institutions)
better_financial	Comparing the current financial status to last year 1 = Better 0 = Same/Worse
Agri	Does any of household members work on agriculture? 1 = Yes 0 = No

Variables	Description and Meaning
member_elder	The ratio the member aged 70 to the total membership of the household '0-1
OwnedHouse	Tenure 1 = Owned 0 = Hire-purchase, Rented, Occupied rent-free
municipal	Municipal areas 1 = Municipal area 0 = Non-Municipal area
bkk (reference)	Region 1 = Bangkok Metropolis, Nonthaburi, Pathum Thani and Samut Prakan 0 = Others
center	Region 1 = Central (Exclude bkk) 0 = Others
north	Region 1 = North 0 = Others
esan	Region 1 = Northeast 0 = Others
south	Region 1 = South 0 = Others
COM	The workers participating in the compulsory saving schemes 1 = The government employees and private company employees 0 = The employers, own account workers, unpaid family workers
NCOM	The workers outside the compulsory saving schemes 1 = The employers, own-account workers, unpaid family workers 0 = The government employees and private company employees
LowCOM	The low-income formal workers 1 = The low-income formal workers (the average total household income is less than 50 percentiles) 0 = Others (the low-income informal worker)
LowNCOM	The low-income informal workers 1 = The low-income informal workers (the average total household income is less than 50 percentiles) 0 = Others (the low-income formal worker)
GOV	The government employees 1 = The government employees 0 = Others (the private employees)
PRI	The private employees 1 = The private employees 0 = Others (the government employees)
LowGOV	The low-income government employees 1 = The low-income government employees (the average total household income is less than 50 percentiles) 0 = Others (the low-income private employees)
LowPRI	The low-income private employee 1 = The low-income private employees (the average total household income is less than 50 percentiles)

Variables	Description and Meaning
	0 = Others (the low-income government employees)

Source: The author's classification.

4.2 The Blinder-Oaxaca Decomposition

To consider the causes of saving differences between persons who are using different pension schemes, we must examine the observable characteristics or enrollment in pension schemes. This paper employs the Blinder-Oaxaca decomposition method to complete this objective. This method allows us to decompose the differences in savings between persons, which can be separated into two portions. A first portion is called the ***endowment effect,*** which is described by differences in the observable characteristics of persons such as age, income, education, and others. A second portion is called the ***discrimination effect***, which is an unexplained part that cannot be described by differences in the observed characteristics of persons. The differences in unobserved determinants that is considered as discrimination. This portion commonly evaluates the impact of different compulsory saving schemes on savings behavior.

A. S. Blinder (1973) and Oaxaca (1973) developed the decomposition method, and it has generally been applied as the most extensive method in the empirical economic study for many years. For instance, Bauer and Sinning (2010), Dah and Fakih (2016) and Magnani and Zhu (2012) applied the decomposition method to analyze the gender wage differential among workers. Moreover, this method is also useful to assess the causes of savings differences. The most prominent examples are focusing on the sources of differences in many aspects such as gender (Sierminska, Frick, & Grabka, 2015), nationalism (Borgo, 2019), migration status (Bauer & Sinning, 2011), and social security systems (Pan, 2016).

For the methodology details, the most common way to study discrimination on individual saving behavior is to estimate it as regression (A. S. Blinder, 1973):

$$S_{it} = \beta_0 + \beta_i X_{it} + \varepsilon_{it} \quad (2)$$

This study is particularly interested in comparing the saving differences of two groups, and it will estimate the saving equation like (2) for each group at stage one:

$$S_{it}^1 = \beta_0^1 + \beta_i^1 X_{it}^1 + \varepsilon_{it}^1 \quad (3)$$

$$S_{it}^2 = \beta_0^2 + \beta_i^2 X_{it}^2 + \varepsilon_{it}^2 \quad (4)$$

Given (3) and (4), it is a simple matter to compute the portion of the differential in saving of two groups as (5)

$$T = \beta_i^1(X_{it}^1 - X_{it}^2) + X_{it}^2(\beta_i^1 - \beta_i^2) + (\beta_0^1 - \beta_0^2) \quad (5)$$

The decomposition of equation (5) is a "Twofold." That is, the differential is divided into two portions: [T=E+(C+I)]. A first portion is the endowment effect (E), which is an amount to be the part of the differential that is due to differences in the persons' characteristics.

$$E = \beta_i^1(X_{it}^1 - X_{it}^2) \quad (6)$$

It is the value of the advantage in endowments possessed by the first group as evaluated by the first saving equation. It is the sum of the coefficient vector of the regressors of the first group times the difference in mean characteristics between the first group and second group for the vector of regressors. Then, this part would measure the expected change in the mean of the second group if they had the same coefficients of saving equation as the first group.

A second portion is the discrimination effect (C+I). The coefficient part (C) of the differential is measured by the contribution of difference in the estimated coefficient.

$$C = X_{it}^2(\beta_i^1 - \beta_i^2) \quad (7)$$

It sums the difference between how the first-saving equation would value the characteristics of the second-saving group and how the second-saving equation values them. It is the sum of the difference between the regression coefficients of the first group and the second group time, the mean of the observable characteristics of the second group. Then, the coefficient part measures the expected change in the mean of the first group if they have the same observable characteristics as the second group.
Another is the unexplained part of the differential (I), which is the difference in intercept between the first group and the second group.

$$I = (\beta_0^1 - \beta_0^2) \quad (8)$$

For brevity, the first sum is "attributable to the endowment," while the second is "attributable to the coefficients."

The questions of this study are to determine the effect of compulsory saving systems on the saving behavior among workers that differ in their saving schemes and income levels. Therefore, the persons can be classified by their saving schemes and income levels into four groups (Figure 4.1). The first group consists of the formal workers (COM) who participate in the compulsory saving schemes and the informal workers (NCOM) who do not participate in any compulsory saving schemes. The second group contains low-income formal workers (LowCOM) and low-income informal workers (LowNCOM). The third group comprises of the government employees (GOV) who join in the Government Pension Fund and the private employees (PRI) who obtain pension benefits from the Social Security Fund. Both obtain mandatory saving systems, but the difference is in the pension benefits. The fourth group contains low-income government employees (LowGOV) and low-income private employees (LowPRI) respectively.

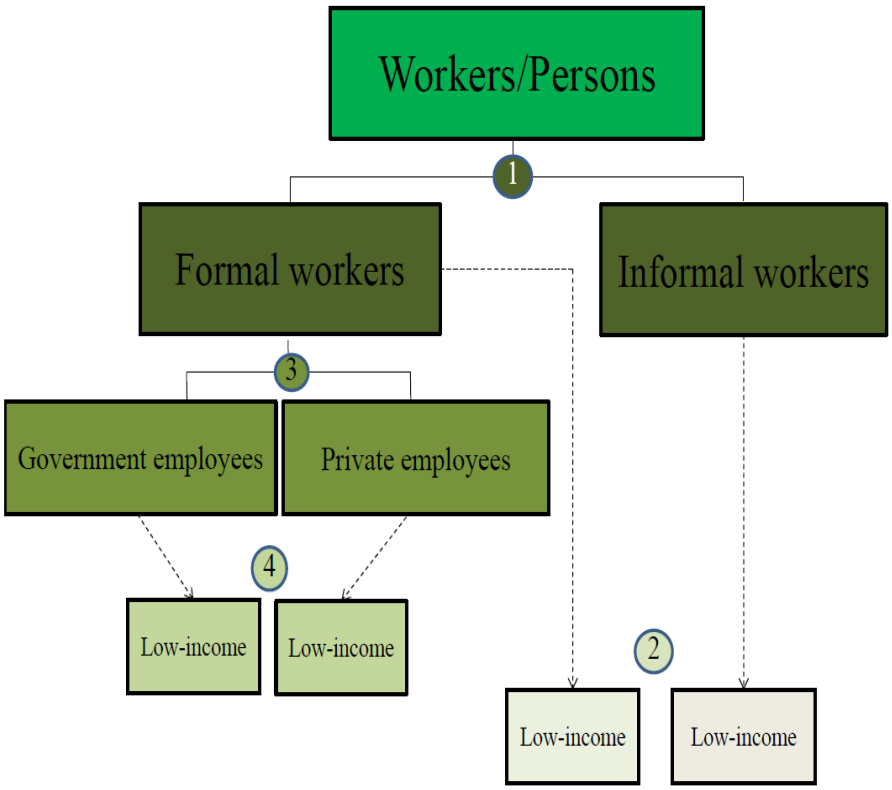

Figure 4.1 The Servers Classified by Saving Schemes and Income Levels
Source: Classified by author.

4.3 Data

The estimation of the model is conducted by employing data from the Thai Household Socioeconomic Panel Survey data, which is collected by the office of the National Statistics Office (NSO). The survey is a continuous series of national longitudinal data that began in 2005 and continues to 2006, 2007, 2010, and currently 2012. The data covers both inside and outside administration areas of 77 provinces in Thailand. Approximately 21,450 samples were chosen in the first round, and these samples were about 24,651 24,502 21,963 and 21,023, respectively.

Repeated household is observed over time through questionnaire on individual characteristics, health, employment, earning, expenditure, debt, savings, and financial status. The sample is restricted to individuals aged between 18 to 60 years and reports their work status or participation in the compulsory saving schemes. Moreover, the

sample is limited to the individual who has a total individual income larger than 5,000 baht per month. Additionally, most of the variables used in the study are dummy variables, except age (ageZ and agesqrZ), the total individual income (tincomeZ), and number of years in school (schoolZ). So, this study is conducted normalization of these variables by the standardization method to the comparable size of coefficients. Therefore, the total observations are 21,152 samples, including 16,023 who participate in the compulsory saving schemes and 5,129 who do not participation in any compulsory saving plan.

4.4 Data Description

The data described in Table 4.2 can be described as the followings

The average age (ageZ) of all samples is 38 years old. The informal worker is the oldest, (43 years), and the government official is 41 years old. All the example who aged between 18-33 years (GenY) is relatively small with a proportion of 25 percent. The formal worker has a higher percentage of GenY than the informal worker (29% vs. 10%). Most Gen Y work in private sector than public sector (34% vs. 16%). The percentage of GenY is relatively high among low-income workers.

The female (female) has slightly less than male in all groups, and an average proportion represents 45 percent. In this regard, the percentage of females to males is not significantly different between groups. Regarding the marital status (married), it is found that most of the samples are married (66 %). The proportion of married is higher among informal workers than formal workers (77% vs. 62%), and higher among government officials than among private employees (68% vs. 61%).

The average total monthly individual income (tincomeZ) in all samples is 18,457 baht. However, the informal worker has the highest average monthly income, 26,687 baht, which is higher than the formal worker, with an average monthly income of only 16,782 baht. Meanwhile, the government official earns more the average total monthly income than the private employee (20,842 baht vs. 15,495 baht).

All samples have a proportion of financial assistance from the government or relatives (income_gov) nearly 12 percent and proportion have quite the same between groups in the range of 11 percent to 12 percent. For persons who have the source of

income from return on assets (income_asset), it is found that the proportion is an average of 16 percent. Moreover, the informal and formal worker does not have significantly different in the portion. It is interesting to note that the government official earns 31 percent of their income from return on assets, while the private employee earns only 12 percent. However, the difference between the low-income government official and the low-income private employee is relatively low (19% vs. 17%).

All samples have a maximum year of the highest schooling (schoolZ) is equal to 10 years (Grade 10). The formal worker has the highest education achievement, and they almost completed high school education (11 years). While the informal employee completed only in grade 8 of secondary school (8 years). The Government official has the highest educational, which is higher than upper secondary school (13 years), which is higher than the private employee who graduated from grade 10 of secondary school (10 years). The low-income employees have a lower educational level than other people in the same group.

The sample in all groups saves an average of 2,560 baht/month (saving_amt), which is nearly equal to the formal employee who saves an average of 2,375 baht/month, but it is lower than the informal employee who saves 3,138 baht/month. Interestingly, the informal employee tends to save steadily, unlike the informal employee whose savings tend to decrease continuously. In 2005, they saved an average of 3,450 baht/month and reduced to 2,383 baht/month in 2012. The average growth rate of saving decreases by 7.68 percent. However, considering only 2009 to 2012, the formal employee saves their average monthly savings like the informal employee (Figure 4.2).

The average saving of the low-income formal employee is 773 baht/month, which is less than the low-income informal employee that saves an average 1,192 baht/month. Moreover, the low-income formal employee tends to have a stable monthly saving similar to the formal employee, but the low-income informal employee tends to increase their savings. In 2005, they saved an average 1,086 baht/month and increased to 1,284 baht/month in 2012. The growth rate of savings increased by an average of 5.36 percent (Figure 4.3).

While the government official saves money per month higher than the private employee. In 2005, the government official saved an average of 3,138 baht/month and increased to 3,546 baht/month in 2012. The growth rate of saving increases, on average, 4.86 percent, as opposed to the private employee whose monthly savings tend to decrease by an average of 3.39 percent. In 2005, the average savings was 2,027 baht/month and reduced to only 1,587 baht/month in 2012 (Figure 4.4).

The low-income government official saves an average of 1,689 baht/month, which is higher than the low-income private employee who saves an average of 632 baht/month. The low-income government official tends to have a stable monthly saving, but the low-income private employee has a slightly increased average savings of 1.73 percent (Figure 4.5).

When considering consistency saving behavior (saving8), it is found that all groups have an average only 30 percent of the number of persons having continuous saving every year, which is lower than the person having the non-consistency saving behavior. Surprisingly, the low-income informal worker has a higher proportion than the low-income formal employee (22% vs. 19%), but the formal worker has a higher percentage than the informal worker (32% vs. 26 %). The government official has consistency saving behavior higher than the private employee (52% vs. 25%). However, the difference between the low-income government official and the low-income private employee reduced to only 37 percent to 16 percent.

All groups have approximately 21 percent of the number of people saving for old age (OldAge). It does not have the significant differences between the formal employee and the informal employee (22% vs. 19%), but the government official and the private employee is significantly different (31% vs. 18%).

Likewise, the number of persons that save for spending in precautionary (precautionary), it is found that all groups save approximately 26 percent for this purpose. There are no significant differences between formal and informal employees (27% vs. 23%), but the government official and private employees are quite significantly different (32% vs. 25%).

Debt

The informal worker has the highest proportion of having the source of loans from informal financial institutes (informal_loan), especially the low-income informal

worker has the percentage is up to 11 percent, while the low-income formal worker is only 5 percent. Likewise, the low-income private employee has a higher proportion than the low-income government official, but the difference is not significant (6% vs. 4%).

When considering the financial status (better_financial), it found that on average, only 20 percent of all groups have better financial status than last year. The differences between groups are not significant, except the government official and the private employee is equal to 28 percent and 19 percent.

All groups of people have an average of 15 percent of household members who are in an agricultural occupation (Agri). However, the difference between the formal employee and informal employee is not significant (15% vs. 14%). Only the government official and the private employee is slightly different (18% vs. 14%).

While the average number of household members aged over 70 years (member_elder), it is found that all groups have an average proportion of only 5 percent, and the difference between groups is not significant.

When considering homeownership status (OwnedHouse), it is found that the average of all groups owns a house is 67percent. This does not have a significantly different between those groups, except the low-income government official and the low-income private employee, which account for 73 percent and 64 percent.

Considering the municipal areas (municipal), most of the samples in the study area in the urban area, which is 61 percent higher than the rural area. The difference in municipal regions in each group is not significant.

The highest of samples still live in Bangkok and vicinity (bkk); it is equal to 43 percent. The central region (center) is followed by nearly 24 percent. The northeastern region (esan) and the north (north) have a similar proportion, 12 percent, and 11percent, respectively. Southern region (south) has the smallest percentage (10%). The differences in home areas between the formal and informal workers are not significant, but the differences between the government official and the private employee are quite substantial. The distribution in home areas of government officials in Bangkok, northeastern, and central regions is relatively similar (27%, 24%, and 21%, respectively). The proportion of the northern region is relatively similar to the southern region (17% and 12%)

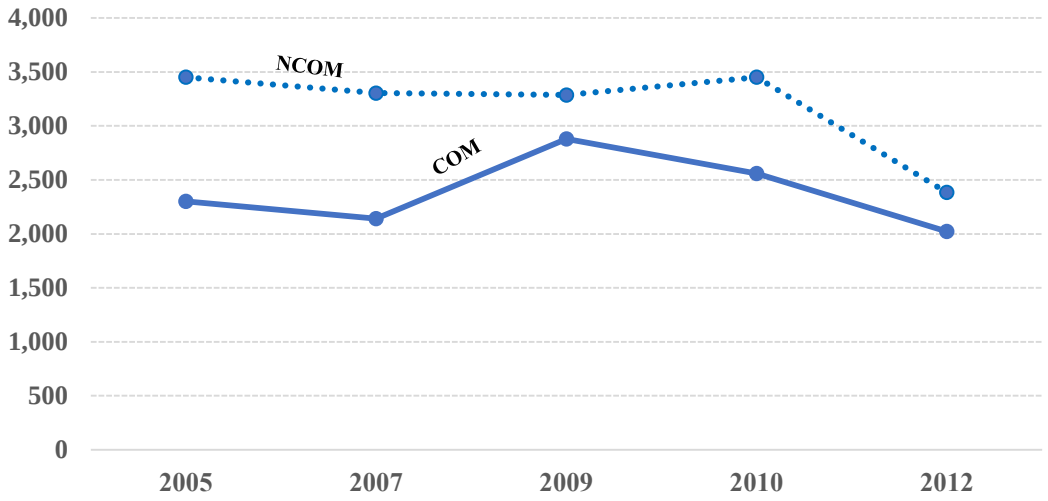

Figure 4.2 The Average Monthly Savings of Formal Workers and Informal Workers (Baht/Month)

Source: The author's calculation.

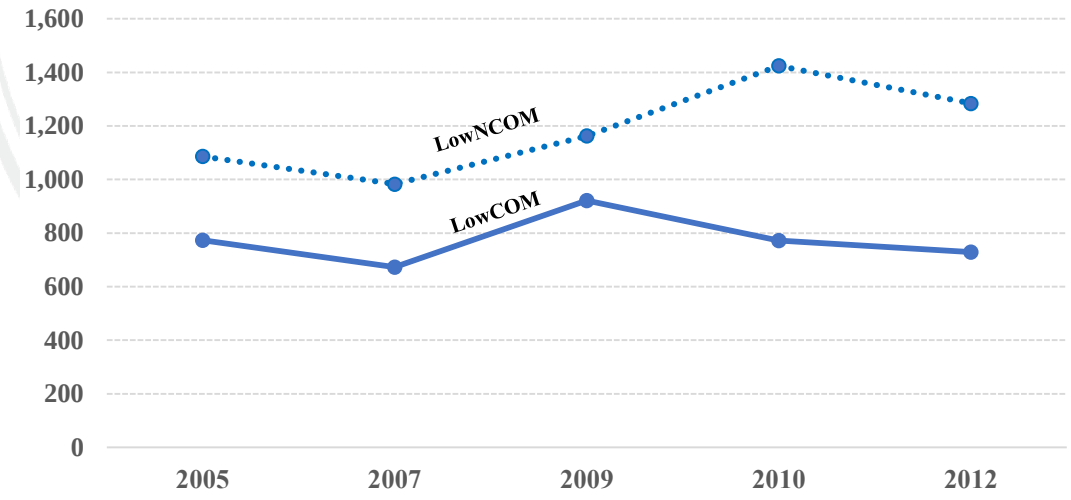

Figure 4.3 The Average Monthly Savings of Low-Income Formal Workers and Low-Income Informal Workers (Baht/Month)

Source: The author's calculation.

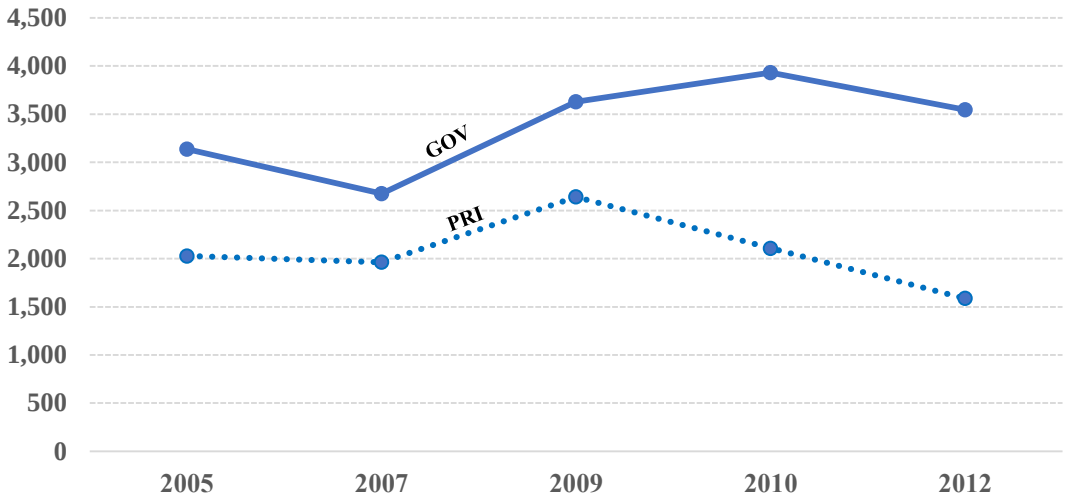

Figure 4.4 The Average Monthly Savings of Government Employees and Private Employees (Baht/Month)

Source: The author's calculation.

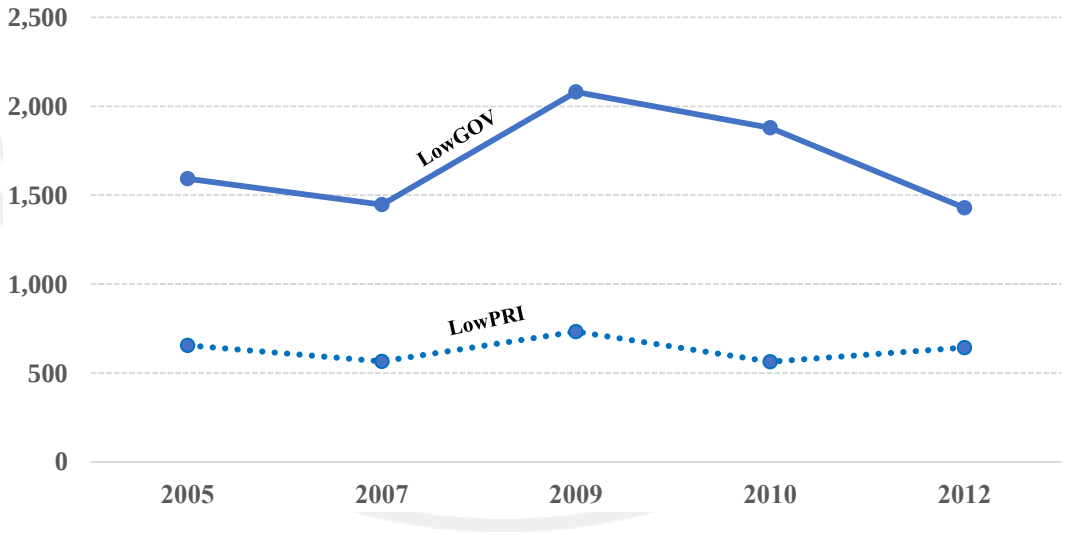

Figure 4.5 The Average Monthly Savings of Low-Income Government Employees and Low-Income Private Employees (Baht/Month)

Source: The author's calculation.

Table 4.2 Summary Statistics

Variables	ALL	Model 1		Model 2		Model 3		Model 4	
		COM	NCOM	LowCOM	LowNCOM	GOV	PRI	LowGOV	LowPRI
saving_amt (Baht/Month)	2560	2375	3138	773	1192	3408	2048	1689	632
saving_amt (>0: Baht/Month)	4339	4044	5247	1777	2286	4431	3865	2542	1588
lnsaving_amt	4.5220	4.4805	4.6518	3.0450	3.7776	6.0081	3.9960	4.8517	2.7584
age	38.2635	36.7250	43.0698	34.2706	43.1213	41.2595	35.2869	36.8904	34.1802
ageZ	0.0000	-0.1472	0.4597	-0.3832	0.4641	0.2899	-0.2858	-0.1277	-0.3926
agesqr	1,574	1,455	1,945	1,275	1,955	1,805	1,344	1,456	1,273
agesqrZ	0.0000	-0.1444	0.4511	-0.3647	0.4635	0.2845	-0.2804	-0.1388	-0.3687
GenY (dummy)	0.2459	0.2941	0.0951	0.3754	0.1009	0.1597	0.3368	0.2634	0.3838
female (dummy)	0.4551	0.4545	0.4568	0.4374	0.4980	0.4899	0.4433	0.4639	0.4252
married (dummy)	0.6591	0.6230	0.7719	0.6233	0.7504	0.6770	0.6059	0.6343	0.6341
tincome	18457	16782	23687	8227	9574	20842	15495	11280	7744
tincomeZ	0.0000	-0.0592	0.1849	-0.3651	-0.3172	0.0827	-0.1042	-0.2560	-0.3824
qt1HHtincome (Baht/Year)		0.21	0.2035			0.2009	0.2035		
qt2HHtincome (Baht/Year)		0.20	0.1981			0.2011	0.1972		
qt3HHtincome (Baht/Year)		0.20	0.2004			0.1988	0.1999		
qt4HHtincome (Baht/Year)		0.20	0.203			0.2001	0.1998		
qt5HHtincome (Baht/Year: reference)		0.20	0.195			0.1991	0.1996		
income_gov (dummy)	0.1171	0.12	0.1127	0.12	0.1084	0.1078	0.1219	0.1164	0.1183
income_asset (dummy)	0.1643	0.17	0.1575	0.08	0.1025	0.309	0.1212	0.1855	0.0722
school	10.4726	11.13	8.4307	9.14	7.5978	13.4362	10.3937	12.1901	8.4996
schoolZ	0.0000	0.1392	-0.4348	-0.2864	-0.6120	0.6350	-0.0181	0.3674	-0.4233
saving8 (dummy)	0.3047	0.3180	0.2634	0.1864	0.2160	0.5231	0.2529	0.3678	0.1614
OldAge (dummy)	0.2092	0.2154	0.1897	0.1214	0.1624	0.3149	0.1839	0.2369	0.1066
precautionary (dummy)	0.2582	0.2672	0.2301	0.2366	0.2167	0.3167	0.2515	0.2935	0.2232
informal_loan (dummy)	0.0489	0.0354	0.0912	0.0519	0.1115	0.0262	0.0383	0.0364	0.0565
better_financial (dummy)	0.2032	0.2124	0.1743	0.1808	0.1565	0.2828	0.1901	0.2551	0.1698

Variables	ALL	Model 1		Model 2		Model 3		Model 4	
		COM	NCOM	LowCOM	LowNCOM	GOV	PRI	LowGOV	LowPRI
Agri (dummy)	0.1466	0.1469	0.1454	0.1888	0.1721	0.1846	0.1350	0.2442	0.1802
member_elder (proportion)	0.0485	0.0505	0.0420	0.0447	0.0425	0.0659	0.0456	0.0583	0.0434
OwnedHouse (dummy)	0.6703	0.6744	0.6574	0.6471	0.6698	0.7395	0.6538	0.7278	0.6370
municipal (dummy)	0.6076	0.6034	0.6206	0.5220	0.5826	0.5871	0.6086	0.5569	0.5026
bkk (dummy: reference)	0.4309	0.4385	0.4071	0.3478	0.3462	0.2711	0.4916	0.2665	0.3431
center (dummy)	0.2439	0.2473	0.2334	0.3030	0.2641	0.2055	0.2606	0.2208	0.3185
esan (dummy)	0.1170	0.1163	0.1191	0.1226	0.1291	0.2338	0.0791	0.2327	0.1100
south (dummy)	0.0991	0.0924	0.1203	0.1069	0.1318	0.1177	0.0843	0.1091	0.1123
north (dummy)	0.1090	0.1055	0.1201	0.1198	0.1287	0.1719	0.0844	0.1709	0.1160
Number of observations	21152	16023	5129	8000	2556	3858	12165	1925	6053

Source: The author's calculation.

CHAPTER 5

EMPIRICAL RESULTS

This section presents the empirical results of saving determinations and analyzes the causes of savings differences among persons differing in the mandatory saving schemes.

5.1 The Empirical Results of Saving Determinations

The estimated results of observable characteristic variables are shown in Table 5.1 The coefficient sign of age (ageZ) and squared age (agesqrZ) is positive and negative, respectively. The relationship indicates that average monthly savings will increase with age, but the rate of growth increases at a declining rate. It is interesting to note that this is not true to the informal workers (NCOM). One reason may be due to the earning of informal workers depends on experiences and marker competition rather than age profiles.

Moreover, public officers (GOV) who were born between 1980 to 1997 (GenY) have a negative and significant saving. This may imply that they were born during a time of many changes, including changing values, technology, the internet, and easy to access credit cards. This generation is therefore provoked to have low tolerance. Another possible explanation may be due to the different saving preferences between generations. Although GenY in private firms also have low saving but the estimated coefficient is not significant.

Further, females (female) will save between 0.0988 to 0.6772 percent more than male — the reason due to the nature of Thai-women to not spend as extravagantly as men. Females also have a longer life expectancy than males, so they require an extended retirement period and need to save more to have sufficient income for a longer life (Beckmann et al., 2013). Moreover, married status (married)

has a statistically positive significant effect on savings. One reason is due to married life having the economies of scale for necessary expenditure in the household.

The total individual income (incomeZ) still plays a crucial role in determining savings in all groups. It found that the Marginal Propensity to Save (MPS) is equal to approximately 0.1241 to 3.4700 percent. This relationship implies that, if other things held constant (Ceteris paribus), the total individual income increases by 1 percent, the saving will increase by 0.1241-3.4700 percent. The estimated coefficients among income quintiles (qtHHtincome) also indicate that MPS is the significant difference between particular income groups. The MPS has a trend towards increasing with the average household income.

Additionally, the receiving of income transfers from the government, such as subsidies or the income grants from relatives/friends (income_gov), also affects saving behavior. However, it is significant only for the government employees (GOV) because they have a probability of getting the most aids from the government. Moreover, this result shows that the persons having other sources of income, such as interest or dividends (income_oth), will save more than others in all groups. This founding may be indicated that the return on asset is the additional determinant to savings.

Another critical variable affecting saving is educational attainment. The number of years until highest education achievement (schoolZ) are significant to encourage savings behavior. This is due to people with higher education having greater financial knowledge. Moreover, A. Lusardi (2008) found that persons with low financial knowledge will lack information on financial planning and this will result in lower savings. Similarly, A. Lusardi and Mitchel (2007) found the reason for the low assets of people near retirement is because they do not have good financial knowledge or are not familiar with the economic concepts of saving and investment decisions. Nonetheless, these reasons cannot apply to low-income government officials (LowGOV).

When considering the saving incentives, the study found that persons who consistently save every survey-years (saving8) save more than others in all groups. Moreover, these results show that persons having the saving incentive for retirement (OldAge) save at the higher than other purposes in all groups. Additionally, persons

having the saving for precautionary motives (precautionary) save more than other objectives in all groups as well. The results of this study are in line with Sirisankanan (2013), who investigated the capabilities of Thai farmers in preventing the effects of income uncertainty on consumption and savings. The results indicated that Thai farmers had savings behaviors to prevent risks arising from income.

When considering financial status, it is worth noting that only persons who work in the informal sector (NCOM) who have the source of loans from non-financial institution systems (informal_loan) save significantly less than others. However, the private employees who have the source of loans from non-financial institution systems save significantly more than others. The results of this study, similar to Zeldes (1989), who found that persons who cannot access loans from financial institutions, tend to reduce consumption levels and increase savings. Moreover, the variable represents the persons report that they have better financial status than last year (better_financial). The results show that there is a positive and significant correlation with savings in all groups.

To control for the household characteristics, a variable represents having any household members working on agriculture (Agri). It does not have statistical significance and consistently signs to savings in all groups. Whereas the old-age dependency ratio (member_elder), the ratio of household members aged more than 70 years, is negative and significant only for the persons in the compulsory saving scheme (COM). Moreover, the low-income formal workers (LowCOM) who have home-ownership trend to save higher than others because they don not to pay rent. This founding is consistent with O. Attanasio (1994) and Butelmann and Gallego (2000) who found that it is highly significant with a positive sign.

For the home location, this study found that the private employees in the municipal area (municipal) have a significant effect to save less than others, which is consistent with Pootrakool, Ariyapruchya, and Sodsrichai (2005). They reason that municipal areas have higher costs of livings than rural areas, and rural households have several more sources of income than urban households. However, it cannot be applied to the government employees (GOV) who have their home in the urban area and save more than others. Finally, persons who live in Bangkok and its vicinity (bkk) save significantly higher than other regional areas.

Table 5.1 The Random-Effects Tobit Estimation Results

Variables	Model 1				Model 2				Model 3				Model 4			
	COM		NCOM		LowCOM		LowNCOM		GOV		PRI		LowGOV		LowPRI	
ageZ	1.0949	***	0.7218		0.4325		1.5983		0.6275		0.9855	***	1.6603	*	0.1474	
	(0.3004)		(0.7813)		(0.4716)		(1.1131)		(0.5625)		(0.3620)		(0.8730)		(0.5480)	
agesqrZ	-1.0008	***	-0.8282		-0.3857		-1.6070		-0.6414		-0.8063	**	-1.8144	**	0.0446	
	(0.2805)		(0.6887)		(0.4556)		(0.9786)		(0.5030)		(0.3451)		(0.8116)		(0.5297)	
GenY	-0.2001	*	-0.1524		-0.2425		-0.1160		-0.4749	**	-0.1107		-0.3690		-0.0752	
	(0.1193)		(0.3504)		(0.1854)		(0.5203)		(0.2185)		(0.1410)		(0.2988)		(0.2261)	
female	0.1403	**	0.4035	***	0.2759	***	0.6772	***	0.0988		0.1877	**	0.1594		0.4123	***
	(0.0640)		(0.1362)		(0.1035)		(0.1916)		(0.1011)		(0.0786)		(0.1683)		(0.1233)	
married	0.3327	***	0.3119	*	0.2976	***	0.4984	**	0.1898	*	0.3950	***	0.1088		0.3834	***
	(0.0668)		(0.1588)		(0.1074)		(0.2220)		(0.1087)		(0.0816)		(0.1754)		(0.1288)	
tincomeZ	0.3126	***	0.1241	***	3.4700	***	2.4655	***	0.2306	**	0.3358	***	2.9448	***	2.8666	***
	(0.0453)		(0.0441)		(0.5549)		(0.7806)		(0.0920)		(0.0519)		(0.5378)		(0.7832)	
qt1HHtincome	-1.5045	***	-2.0110	***					-1.2792	***	-1.4808	***				
	(0.1234)		(0.2295)						(0.2048)		(0.1465)					
qt2HHtincome	-1.0790	***	-1.7610	***					-0.5208	***	-1.2349	***				
	(0.1156)		(0.2231)						(0.1836)		(0.1373)					
qt3HHtincome	-0.6217	***	-1.2390	***					-0.5278	***	-0.7972	***				
	(0.1058)		(0.2134)						(0.1672)		(0.1265)					
qt4HHtincome	-0.2304	**	-0.8120	***					-0.1767		-0.2666	**				
	(0.0951)		(0.2038)						(0.1513)		(0.1149)					
income_gov	0.1391		0.1763		0.0473		0.3200		0.3359	**	0.0769		0.5644	**	-0.0279	
	(0.0874)		(0.1957)		(0.1429)		(0.2903)		(0.1479)		(0.1058)		(0.2387)		(0.1732)	
income_asset	0.8030	***	1.2647	***	0.9167	***	0.7638	***	0.5065	***	1.0008	***	0.4620	**	1.0308	***

Variables	Model 1		Model 2		Model 3		Model 4	
	COM	NCOM	LowCOM	LowNCOM	GOV	PRI	LowGOV	LowPRI
	(0.0760)	(0.1675)	(0.1557)	(0.2883)	(0.1070)	(0.1010)	(0.1998)	(0.1946)
schoolZ	0.2431 ***	0.2242 ***	0.3107 ***	0.2129 *	0.1097 *	0.2878 ***	0.0484	0.3738 ***
	(0.0365)	(0.0804)	(0.0631)	(0.1265)	(0.0584)	(0.0468)	(0.0928)	(0.0808)
saving8	2.6418 ***	3.3912 ***	2.7159 ***	3.4002 ***	2.6524 ***	2.6194 ***	2.6972 ***	2.7413 ***
	(0.0719)	(0.1511)	(0.1217)	(0.2241)	(0.1104)	(0.0888)	(0.1791)	(0.1481)
OldAge	6.5913 ***	6.2426 ***	8.4718 ***	7.2788 ***	4.2348 ***	7.4431 ***	5.4250 ***	9.0070 ***
	(0.0797)	(0.1668)	(0.1470)	(0.2556)	(0.1244)	(0.1003)	(0.2081)	(0.1809)
precautionary	6.8024 ***	6.1442 ***	8.4981 ***	7.0145 ***	4.3508 ***	7.6182 ***	5.5785 ***	8.9602 ***
	(0.0732)	(0.1559)	(0.1242)	(0.2363)	(0.1204)	(0.0903)	(0.1939)	(0.1499)
informal_loan	0.2005	-0.5307 **	0.5066 **	-0.2057	-0.2434	0.3526 *	0.0414	0.5158 **
	(0.1595)	(0.2229)	(0.2130)	(0.2943)	(0.2940)	(0.1885)	(0.4135)	(0.2435)
better_financial	0.5596 ***	0.4488 ***	0.7559 ***	0.7950 ***	0.2842 ***	0.7024 ***	0.4041 **	0.9955 ***
	(0.0687)	(0.1613)	(0.1190)	(0.2444)	(0.1037)	(0.0869)	(0.1767)	(0.1435)
Agri	-0.0218	-0.2674	-0.1649	0.1648	-0.0808	-0.0349	-0.1602	-0.1938
	(0.0931)	(0.1980)	(0.1381)	(0.2627)	(0.1332)	(0.1209)	(0.2045)	(0.1670)
member_elderly	-0.6828 ***	-0.6777	-0.7907 **	-0.6181	-0.7100 ***	-0.6349 **	-1.4461 ***	-0.4791
	(0.1964)	(0.4687)	(0.3524)	(0.6705)	(0.2686)	(0.2585)	(0.4770)	(0.4304)
OwnedHouse	0.0238	-0.1126	0.2292 *	0.0263	0.1789	-0.1155	0.4573 **	0.2638 *
	(0.0679)	(0.1479)	(0.1158)	(0.2195)	(0.1132)	(0.0826)	(0.1862)	(0.1389)
municipal	-0.1135	-0.0441	-0.0148	0.0260	0.1325	-0.2324 **	0.3473 *	-0.1927
	(0.0731)	(0.1541)	(0.1194)	(0.2154)	(0.1064)	(0.0927)	(0.1790)	(0.1431)
center	-0.3215 ***	-0.3092	-0.3794 ***	-0.2290	-0.2075	-0.3064 ***	-0.2941	-0.5092 ***
	(0.0866)	(0.1891)	(0.1417)	(0.2679)	(0.1449)	(0.1066)	(0.2391)	(0.1694)
north	-0.3459 ***	0.3951 *	-0.1819	0.5009	-0.2253	-0.2692 *	-0.2662	-0.2889
	(0.1133)	(0.2289)	(0.1839)	(0.3265)	(0.1560)	(0.1535)	(0.2609)	(0.2228)

Variables	Model 1			Model 2			Model 3			Model 4		
	COM	NCOM		LowCOM	LowNCOM		GOV	PRI		LowGOV	LowPRI	
esan	-0.5662 ***	0.0298		-0.5753 ***	-0.2534		-0.2831 *	-0.7227 ***		-0.7202 ***	-0.7480 ***	
	(0.1110)	(0.2369)		(0.1878)	(0.3389)		(0.1453)	(0.1621)		(0.2503)	(0.2349)	
south	-0.1160	0.4833 **		0.1483	0.4098		-0.1011	-0.0580		-0.1746	0.0818	
	(0.1163)	(0.2294)		(0.1852)	(0.3221)		(0.1704)	(0.1497)		(0.2930)	(0.2184)	
_cons	-0.4583 ***	0.4788		-1.8659 ***	-1.6069 ***		1.5244 ***	-0.9858 ***		0.3404	-2.4410 ***	
	(0.1392)	(0.3082)		(0.2788)	(0.4666)		(0.2409)	(0.1653)		(0.3392)	(0.3814)	
Number of observations	16,023	5,129		8,000	2,556		3,858	12,165		1,925	6,053	
Number of groups	7,505	2,764		4,893	1,736		1,610	6,205		1,042	3,950	
Log likelihood	-27,685	-9,914		-10,854	-4,387		-7,921	-19,428		-3,685	-7,549	

Note: The observed information matrix (OIM) standard errors are in parenthesis.

Asterisks*, **, and *** denote significant level of 10%, 5% and 1% respectively.

5.2 Decomposition Analysis

The causes of saving differences between the formal workers and the informal workers (Model 1). The results of decomposition analysis between the formal workers (COM) who participate in the compulsory saving scheme and the informal workers (NCOM) who do not participate in any compulsory saving scheme are presented in Table 5.2. It indicates that there is only 6.82 percent of the total saving difference (T) in favor of the informal workers.

However, 50.06 percent (E) can be attributed to the formal workers' advantage in the endowments to saving. It means that the formal saves 50.06 percent more than the informal workers. In other words, 50.06 percent of saving differences are due to the formal workers have higher saving endowments, and it relates to the saving motives and the education levels such as the saving motives for precautionary (precautionary) and retirement (old age), having consistent saving behavior (saving8) and education attainment (schoolZ).

Moreover, the coefficient contribution reflects 36.83 percent (C) in favor of the formal workers. It means that if the formal workers have the same observable characteristics as the informal workers, they will save 36.83 percent more than the informal workers. The reason is due to the compulsory saving scheme being one of the saving channels that offers a high rate of return to saving, and the employers must contribute together with the employees. For example, the government officials who are a member of the Government Pension Fund can voluntarily save up to 15 percent of their salary because the saving return of the GPF is quite high (5-6%) when compared with others. Beyond this, private employees can contribute the saving to the Provident Fund up to 15 percent of the salary, and the employer has to contribute not less than the employee' s contribution. These incentives can then induce the formal workers to save more.

Additionally, the formal workers also have other forms of social welfare such as medical treatment, child education allowance, house rent, maternity benefits, and disability, death, and unemployment benefits. These benefits reduce their cost of living, thus allowing them to save more than informal workers. This finding is in line

with Pan (2016), who found a similar effect on the effect of social security on household savings in China.

Surprisingly, there is a lot of saving differences due to the other factors outside the saving equations. It reflects the 93.71 percent (I) differential in favor of the informal workers. Therefore, 834.54 percent of the total saving difference (D/T) is attributed to the discrimination effect which is dominated by the unexplained part. While 734.54 percent (E/T) is due to the endowment effect.

The causes of saving differences between the low-income formal workers and the low-income informal workers (Model 2). The result of the decomposition analysis between the low-income formal workers (LowCOM) and the low-income informal workers (LowNCOM) is shown in Table 5.3. It indicates that the overall saving difference is 123.46 percent of the saving difference (T) in favor of the low-income informal workers.

It can be pointed out that 52.99 percent (E) can be attributed to the low-income informal workers' advantage in the endowments to saving. It means that if the low-income informal workers have the same coefficients of saving equation as the low-income formal workers, they will save 52.99 percent more than the low-income formal workers. In other word, 50.06 percent of saving differences is due to the low-income informal workers having higher saving endowments. The primary endowments contribution to the saving differential is related to the saving motives for retirement (OldAge) and the total income (tincomeZ). All of this difference accounts for nearly 97 percent of the saving differential that contributes to the difference in the saving endowments.

Moreover, the coefficient contribution reflects 44.57 percent (C) in favor of low-income informal workers. It means that if the low-income informal workers have the same observable characteristics as the low-income formal workers, they will save 44.57 percent more than the low-income formal worker. The reason is due to the low-income informal workers do not participate in any of the compulsory saving scheme and not having security benefits such as medical treatment, child education allowance, house rent, maternity benefits, disability, death, and unemployment benefits that can help to reduce the cost of living equivalent to the formal workers. They therefore have to voluntarily save to spend during old age or in an emergency.

Surprisingly, there is a saving differences due to other factors outside the saving equations. It reflects the 25.90 percent (I) in favor of the low-income informal workers. Therefore, 42.92 percent of the total saving difference (E/T) is attributed to the endowment effect. While, 57.08 percent (D/T) is due to the discrimination effect which is supplemented by the differences in how the endowment is rewarded.

The causes of saving differences between the government employees and the private employees (Model 3). The results of the decomposition analysis between the government employees (GOV) who participate in the Government Pension Fund and private employees (PRI) who participate in the Social security fund in Table 5.4 is clear that the overall saving differential is equal to 332.66 percent of the saving difference (T) in favor of the government employees.

One outstanding result is that the regression accounts only for 81.64 percent (R) in the advantage of the government employees. That is to say that if the government employees kept their current endowments to saving, including their higher advantageous in the saving behavior and saving motives, and kept the same saving equation as they now, they would save 81.64 percent more than the private employees.

Moreover, the result also shows that 184.52 percent (E) can be contributed to the government employees' superior endowments to saving. In other words, 184.52 percent of saving differences is due to the government employees have a higher saving endowment. The essential advantage of endowments to saving of the government officials is related to the saving behavior such as the consistent saving behavior (saving8) and the saving motives for retirement (OldAge) and precautionary (precautionary).

However, the coefficient contribution is another 102.88 percent (C) in favor of private employees. It means that if the private employees have the same observable characteristics as government employees, they will save 102.88 more than government employees. The main reason why the regression shows for higher savings for the private employees is that they need to save more in order to have sufficient income to live after retirement because the pension benefit of private employees is

relatively low[11]. Moreover, they need to save more to prevent the emergence of illnesses that the social security benefit does not cover all the related medical care expenditures. They then have a higher awareness about saving motives for precautionary (precautionary) and retirement (OldAge). All of this difference accounts for nearly 85 percent of saving differential that contributes to the difference in the coefficients.

Nevertheless, the government officials have a higher constant reflecting 251.02 percent (I). In sum, 55.47 of the total saving differences (E/T) is due to the endowment effect, while 44.53 (D/T) percent can be attributed to the discrimination effect, which is offset by the differences in how the endowment is unrewarded.

The causes of saving differences between the low-income government employees and the low-income private employees (Model 4). The differences in savings of low-income government employees (LowGOV) and low-income private employees (LowPRI) in Table 5.5 indicates that the total of the saving difference is equal to 398.96 percent (T). The regression itself, not including the constant term, mostly accounts for a 120.82 percent (R) in the advantage of the low-income government employees, and most of this arises from a larger of saving endowments rather than from more substantial coefficient contribution.

The total endowment to saving is contributed to 224.19 percent (E) in favor of the low-income government employees. This means that if the low-income government employees have the same coefficients of saving equation as the low-income government employees, they will save 224.19 more than the private employees. In other words, 224.19 percent of saving difference is due to the low-income government employees having a higher savings endowment. The dominant endowment to saving is associated with the total income profile (incomeZ) and personal characteristics such as the saving motive for retirement (OldAge),

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[11] When considering the monthly pension payment, the official will receive pension payments in the highest cases at roundly 60-70 percent of the average salary for the last five years. In the 2018 fiscal year, the government officials received an average monthly pension of around 26,000 baht. Whereas, the private employees will receive a maximum pension of not more than 6,375 baht (if they are being a member of the Social Security Fund for 30 years and have salary more than 15,000 baht before five years retirement).

precautionary (precautionary), and the consistency saving behavior (save8). This endowment differential accounts for nearly 74 percent.

However, the coefficient contribution is 103.37 percent (C) in favor of low-income private employees. It means that if the low-income private employees have the same observable characteristics as the low-income government employees, they will save 103.37 percent more than the low-income government employees. A reason that the-low income private employees save more is due to preventing the emergences such sickness that the social security benefit does not cover all medical care expenditures. Moreover, the pension benefit of private employees is relatively low. They need to save more to have sufficient income to live after retirement. Moreover, they then have a higher awareness about saving motives for precautionary (precautionary) and retirement (OldAge).

Nevertheless, the exogenous variables outside the model can explain why the saving differential is equal to 278.14 percent (I) in favor of the low-income government employees. In sum, 56.19 of the total saving differences (E/T) is due to the endowment effect, while 43.81 percent (D/T) can be attributed to the discrimination effect, which is offset by the differences in how the endowment is unrewarded.

Table 5.2 Decomposition Result of the Saving Differential between the Formal Workers and the Informal Worker

Variables	Amount Attributable	Amount Attributable to Endowments (E)	Amount Attributable to Coefficients (C)
ageZ	-49.30	-66.45	17.15
agesqrZ	51.81	59.60	-7.78
GenY	-4.44	-3.98	-0.45
female	-12.05	-0.03	-12.02
married	-3.34	-4.95	1.61
tincomeZ	-4.15	-7.63	3.49
qt1HHtincome	10.09	-0.22	10.31
qt2HHtincome	13.58	0.07	13.51
qt3HHtincome	12.53	0.16	12.37
qt4HHtincome	11.87	0.06	11.80
income_gov	-0.34	0.08	-0.42
income_asset	-6.56	0.72	-7.27
schoolZ	13.13	13.95	-0.82
saving8	-5.32	14.42	-19.74
OldAge	23.58	16.96	6.62
precautionary	40.39	25.25	15.14
informal_loan	5.55	-1.12	6.67
better_financial	4.07	2.13	1.93
Agri	3.57	0.00	3.57
member_elderly	-0.60	-0.58	-0.02
OwnedHouse	9.01	0.04	8.97
municipal	-4.11	0.19	-4.31
center	-0.74	-0.45	-0.29
north	-8.73	0.10	-8.83
esan	-5.59	1.58	-7.17
south	-7.03	0.17	-7.20
Subtotal	**86.89**	**50.06**	**36.83**
Summary of decomposition results (as %)			
Amount attributable	86.89		
'- due to endowments [E]	50.06		
'- due to coefficients [C]	36.83		
Shift coefficient [I]	-93.71		
Raw differential [T=E+C+U]	-6.82		
Adjusted differential [D=C+U]	-56.88		
Endowment as % total [E/T]	**-734.54**		
Discrimination as % total [D/T]	**834.54**		

Source: Author's calculation.

Table 5.3 Decomposition Result of the Saving Differential between the Low-Income Formal Workers and the Low-Income Informal Workers

Variable	Amount Attributable	Amount Attributable to Endowments (E)	Amount Attributable to Coefficients (C)
ageZ	-90.74	-36.64	-54.10
agesqrZ	88.56	31.95	56.61
GenY	-7.93	-6.65	-1.28
female	-21.66	-1.67	-19.99
married	-18.85	-3.78	-15.06
tincomeZ	-48.48	-16.62	-31.86
income_gov	-2.89	0.07	-2.96
income_asset	-0.20	-1.77	1.57
schoolZ	4.13	10.12	-5.99
saving8	-22.81	-8.04	-14.78
OldAge	-15.35	-34.72	19.37
precautionary	49.05	16.89	32.16
informal_loan	4.92	-3.02	7.94
better_financial	1.22	1.83	-0.61
Agri	-5.95	-0.27	-5.68
member_elderly	-0.91	-0.17	-0.73
OwnedHouse	13.07	-0.52	13.59
municipal	-2.28	0.09	-2.37
center	-5.45	-1.48	-3.97
north	-8.70	0.12	-8.82
esan	-2.81	1.44	-4.24
south	-3.50	-0.13	-3.37
Subtotal	**-97.56**	**-52.99**	**-44.57**
Summary of decomposition results (as %)			
Amount attributable	-97.56		
'- due to endowments [E]	-52.99		
'- due to coefficients [C]	-44.57		
Shift coefficient [I]	-25.90		
Raw differential [T=E+C+U]	-123.46		
Adjusted differential [D=C+U]	-70.47		
Endowment as % total [E/T]	**42.92**		
Discrimination as % total [D/T]	**57.08**		

Source: Author's calculation.

Table 5.4 Decomposition Result of the Saving Differential between the Government Employees and the Private Employees

Variable	Amount Attributable	Amount Attributable to Endowments (E)	Amount Attributable to Coefficients (C)
ageZ	46.36	36.13	10.23
agesqrZ	-40.85	-36.23	-4.63
GenY	-3.85	8.41	-12.26
female	-3.48	0.46	-3.94
married	-11.08	1.35	-12.43
tincomeZ	5.40	4.31	1.10
qt1HHtincome	4.43	0.33	4.10
qt2HHtincome	13.88	-0.20	14.08
qt3HHtincome	5.44	0.06	5.39
qt4HHtincome	1.79	0.00	1.80
income_gov	2.68	-0.47	3.16
income_asset	3.52	9.51	-5.99
schoolZ	7.48	7.16	0.32
saving8	72.48	71.65	0.84
OldAge	-3.50	55.49	-59.00
precautionary	-53.76	28.40	-82.16
informal_loan	-1.99	0.30	-2.28
better_financial	-5.32	2.63	-7.95
Agri	-1.02	-0.40	-0.62
member_elderly	-1.78	-1.44	-0.34
OwnedHouse	20.78	1.53	19.25
municipal	21.92	-0.29	22.21
center	3.72	1.14	2.58
north	-3.14	-3.49	0.35
esan	2.76	-0.94	3.71
south	-1.25	-0.88	-0.36
Subtotal	**81.64**	**184.52**	**-102.88**
Summary of decomposition results (as %)			
Amount attributable	81.64		
'- due to endowments [E]	184.52		
'- due to coefficients [C]	-102.88		
Shift coefficient [I]	251.02		
Raw differential [T=E+C+U]	332.66		
Adjusted differential [D=C+U]	148.14		
Endowment as % total [E/T]	**55.47**		
Discrimination as % total [D/T]	**44.53**		

Source: Author's calculation.

Table 5.5 Decomposition Result of the Saving Differential between the Low-Income Government Employees and Low-Income Private Employees

Variable	Amount Attributable	Amount Attributable to Endowments (E)	Amount Attributable to Coefficients (C)
ageZ	-15.41	43.98	-59.39
agesqrZ	26.84	-41.71	68.54
GenY	-6.83	4.44	-11.28
female	-10.14	0.62	-10.75
married	-17.40	0.00	-17.41
tincomeZ	34.22	37.21	-2.99
income_gov	6.90	-0.11	7.01
income_asset	1.13	5.23	-4.11
schoolZ	17.60	3.83	13.78
saving8	54.95	55.67	-0.71
OldAge	32.53	70.70	-38.17
Precautionary	-36.26	39.22	-75.48
informal_loan	-2.76	-0.08	-2.68
better_financial	-6.60	3.44	-10.04
Agri	-0.42	-1.02	0.61
member_elder	-6.35	-2.15	-4.20
OwnedHouse	16.48	4.15	12.33
municipal	29.02	1.89	27.14
center	9.73	2.87	6.85
north	-3.02	-3.27	0.25
esan	0.55	0.23	0.31
south	-3.93	-0.96	-2.97
Subtotal	**120.82**	**224.19**	**-103.37**
Summary of decomposition results (as %)			
Amount attributable	120.82		
'- due to endowments [E]	224.19		
'- due to coefficients [C]	-103.37		
Shift coefficient [I]	278.14		
Raw differential [T=E+C+U]	398.96		
Adjusted differential [D=C+U]	174.77		
Endowment as % total [E/T]	**56.19**		
Discrimination as % total [D/T]	**43.81**		

Source: Author's calculation.

Table 5.6 Summary of Decomposition Results

Summary of decomposition results	**Model 1 (COM vs NCOM)**		**Model 2 (LowCOM vs LowNCOM)**		**Model 3 (GOV vs PRI)**		**Model 4 (LowGOV vs LowPRI)**	
(as %)	**%**	**%T**	**%**	**%T**	**%**	**%T**	**%**	**%T**
Total differential (T=E+C+I)	-6.82		-123.46		332.66		398.96	
Endowments (E)	50.06	-734.54	-52.99	42.92	184.52	55.47	224.19	56.19
Discrimination (D=C+I)	-56.88	834.54	-70.47	57.08	148.14	44.53	174.77	43.81
due to coefficients (C)	36.83		-44.57		-102.88		-103.37	
due to intercept (I)	-93.71		-25.90		251.02		278.14	

Source: The author's calculation.

CHAPTER 6

CONCLUSION AND POLICY IMPLICATION

6.1 Conclusion

Since 2000, Thailand has entered into an aging society caused by a decrease in the fertility rate of the young female population and by higher life expectancies. As a result, saving for retirement and the compulsory saving scheme becomes a crucial issue in various dimensions. However, all Thai citizens can access the saving schemes through two systems. The first is the compulsory saving system, which is offered to formal workers. The other scheme is the voluntary saving system, which is proposed for informal workers. It implies that they lack risk-sharing mechanisms, which can help them to ensure their income and longevity risks adequately. Nevertheless, formal workers can access the voluntary saving system as well.

The compulsory saving schemes have differences in target groups, financing methods, and benefit payments. The Old-Age Allowance System is purposed to guarantee a basic income for the elderly aged 60 or above who do not receive any public pensions, including informal workers and private employees. The monthly pension payment offered varies by the age of the recipients but less than 1000 baht/month. The Civil Servant Pension scheme is provided for government employees with a guaranteed retirement income generous benefit. However, the monthly pension amount cannot exceed 100 percent of last month's salary, and the officials must have at least 25 years of service.

The Social Security Fund is offered to employees working in the private sector. This system is a mandatory contributory system. For pension benefits, the insured members will receive the monthly pension roughly 3,000 to 6,375 baht per month, and they need to be a member more than 15 years. The Government Pension Fund is a mandatory defended contribution plan. It is offered to government employees who are a member of the GPF system. When the officials retire, they gain

a lump-sum retirement allowance from the GPF together with a traditional pension from the CSP scheme. However, the monthly pension amount is highest at 70 percent of the average salaries for the last 60 months. The Teachers' Provident Fund is one of the mandatory defined contributions. It provides a lump-sum retirement income and the welfare benefits for members and their families.

The voluntary saving schemes have many systems. The Provident Fund is a voluntary defined contribution system. Concerning termination, the worker will obtain a lump sum at their resignation, retirement, or death. The Retirement Mutual Fund is offered to investors/ workers who want voluntary savings for retirement. The RMF is principally appropriated for those who are not eligible to be a member of PVD or wish to have additional savings for retirement.

The Social Security Fund with chapter 40 permits informal workers to enroll in this voluntary system. For the second option, members will gain a benefit, including compensation in disability, sickness, death and old-age savings. Recently, the National Pension Fund is mainly intended to cover informal workers. This scheme provides a lump-sum or monthly payment to members.

The objective of this study is to consider the effects of compulsory saving schemes or pension systems on saving behavior, and it is related to the observable characteristics or the effect of benefits in saving schemes. In another word, this study aims to analyze the causes of savings differences among persons who differ in the savings schemes. It is essential to determine that compulsory saving schemes encourage formal workers to save more or discourage to save. At the same time, it must be determined that informal workers who do not have compulsory savings have a higher saving incentive to compensate for the lack of compulsory savings.

This paper employs the Blinder-Oaxaca decomposition method to complete the objectives. Since this method allows us to decompose the causes of savings difference. The endowment effect is described by differences in the observable characteristics of workers or by differences in the determinants of saving, such as age, income, education, and other characteristics. The discrimination effect evaluates the distortionary effect of the compulsory saving scheme on saving behaviors.

The empirical result of saving determinations is in line with past studies. For instant, the total individual income, educational attainment, consistently saving

behavior, and saving motive for retirement and precautionary saving are crucial factors in determining savings. However, the decomposition methods showing the results are differences. The causes of saving differences between the formal workers and the informal workers can be concluded that the discrimination effect is higher than the endowment effect, which is dominated by the unexplained part. However, the formal workers have an advantage in the endowments to saving, which relates to the saving motive for precautionary and retirement (the endowment effect).

Moreover, compulsory saving systems induce formal workers to save more than informal workers (coefficient part). Because compulsory saving is one of the saving channels that offers a high rate of return to savings and provides the other social welfares that reduce the cost of living. However, low-income informal workers have an advantage in the coefficient contribution (coefficient part). A reason is due to the low-income informal workers not participating in any compulsory saving schemes and not having the other security benefits that can help to reduce the cost of living equivalent to the formal workers. They then have to voluntarily save to spend during old age or in an emergency.

The causes of saving differences between government employees and private employees are a contribution from the endowment effect higher than the discrimination effect. However, the coefficient contribution is in favor of private employees (coefficient part). A reason that the private employees save more is due to preventing the emergence of sickness that the social security benefit does not cover all medical care expenditures. Moreover, the pension benefit of private employees is relatively low.

6.2 Policy Implication

This study has policy recommendations as follows. **First,** the government should raise the earning of low-income workers, especially for the low-income informal workers due to the results of this study found that they have a higher the marginal propensity to save which lead them to have enough savings for consumption in a retirement period. **Second,** the government should improve the social welfare of informal workers to be equal to formal workers in order to reduce the cost of living,

and then they will have enough money to save. **Third,** the government should encourage the employees to have consistency saving behavior. For an instant, the government should increase the contribution rate of various funds such as the Social Security Fund, the Government Pension Fund, and the National Saving Fund to encourage the members to save. Moreover, an increase in the contribution rate in the National Saving Fund can induce informal workers to be willing to be members of the NSF. Furthermore, the government should provide financial literacy for all employees through the education system. **Finally,** the government should provide information about the overall savings that each person should have for using in old age, which can create a person aware of the importance of the saving incentive for old age and emergency.

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BIOGRAPHY

NAME	Siam Sakaew
ACADEMIC BACKGROUND	B.B.A (International Business) The University of the Thai Chamber of Commerce, Thailand, 2006
	M. Econ. (Business Economics), National Insitute of Development Administration, Thailand, 2010
EXPERIENCES	International Economic Relationship Development, Thailand Development Research Institute, 2010-2012
	Research Center, National Institute of Development Administration, 2012-2014
	Parliamentary Academic Support Office, King Prajadhipok's Institute, 2014-2016
	Research Center, National Institute of Development Administration, 2016-2019