



**The Role of Multipillar Scheme Reform on
Pension Financial Deficit in Indonesia:
Simulation Study of 2016-2045 Projection**

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Disclaimer:

This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

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List of Acronyms

APS	Solidarity Pension Payment
AFP	Pension Fund Administration
APVC	Collective Voluntary Pension Savings
BPJS	Social Security Administrative Bodies
DB	Defined Benefit
DC	Defined Contribution
DJSN	National Social Security Council
IA	Individual Account
SJSN	National Social Security System
LFA	Logical Framework Analysis
PAYGO	Pay-As-You-Go
PBS	Basic Solidarity Pension
UUD	Indonesia Constitution Regulation

Abstract

Indonesia's current pension scheme has been continuously generating rising financial deficit. By projecting forthcoming challenges, this research examines the role of parametrical and multipillar pension scheme reform in overcoming the future deficit. It is found that the former modification could reduce the shortage but not able to distort its upward trend. Meanwhile, the latter improvement could both lower the financial insufficiency and reverse its financial trend, depending on the investment performance. Compared to Chile's pension reform in 1981, multipillar reform also has advantage in terms of the absence of transitional cost.

Relevance to Development Studies

This study focuses on attempts to restore the old-age society welfare provision from fiscal downfall in the middle of persistent demographic transition. It is worthy of huge attention since pension has socio-economic role in preserving society's welfare. Beside smoothing old-age's consumption pattern and stimulating workers to be more productive, it also preserves social values of elder's care and lessens the market's tendency in treating workers merely as economic commodity (Bertocchi, 2010; Turner, 2011; Esping-Andersen, 1990). Due to demographic transition and increasing longevity, PAYGO-scheme mechanism alone could not hinder the possibility of future severe financial deficit (Holzmann and Guven, 2009). Thus, financial sustainability should be considered as one of the main concerns in formulating pension design. In relation to that, this study aims to provide lenses that could be of thought in reflecting ideas of what outcome pension reform might gives, especially in its ability to surmount financial issues. It offers further discussion on what ideal reform should be taken.

Keywords

Pension reform, multipillar scheme, deficit, welfare state, retirement, simulation

Chapter 1

Introduction

1.1. Background

Study on pension reform has been extensively and continuously conducted worldwide, yet Indonesia is still reluctant to implement such policy. With the enactment of centralised pension management in Social Security Administrative Bodies (BPJS) to run in 2015, the government has intended to universalized the pension coverage to all citizens. However, the inherited old social security system still dominates the current pension scheme, where the government perform as the main spender to finance old-age benefit. Despite the yielded financial deficit has been arising since 2000s – long before the expansion of pension coverage –, intention to improve the current system is still yet to be implemented.

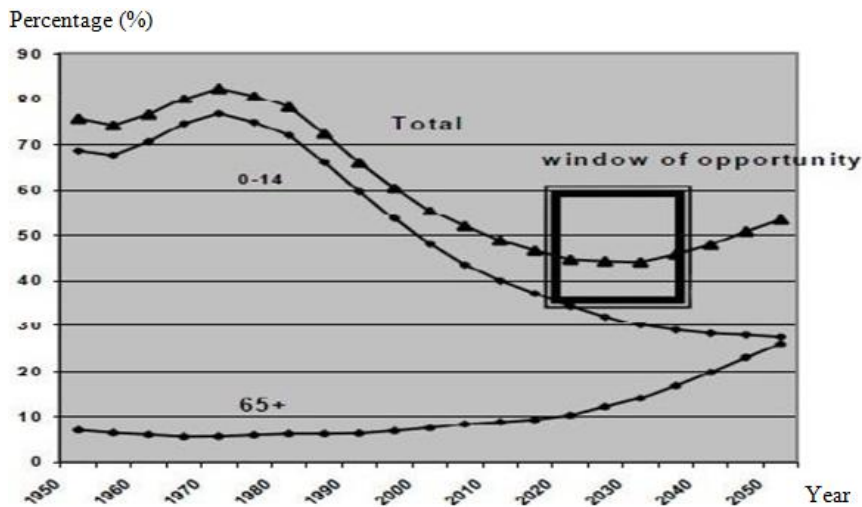
The government did consider the necessity to reform its system to maintain the sustainability for the upcoming years in 2004. Yet, the urgency of considering that option has never gotten proper attention, as steady-growing concern for preserving the social welfare has urged the Indonesian government to rather both expand the public coverage and improve the quality of social security. Through the enactment of National Social Security System (SJSN) – regulated in National Social Security System Act Number 40/2004.

– the government is in urge to work up the insurance in health, retirement, and pension. However, this noble policy requires a continuous substantial funding every year. This will undoubtedly complicate the government’s attempt in maintaining fiscal sustainability, including in pension system area.

In addition to the need of preserving a proper social security provision, social awareness for financial security in old age has been increasing, bringing an extra pressure for an adequate universal pension program. Bertocchi (2010) argued that it is due to a growing perception that when someone has retired, they should not fall into poverty and lose the standard of living they previously had. Furthermore, according to him, for those whose income is above average, the perspective on retirement has evolved. They tend to see retirement as more of an opportunity to have leisure activities that they deserve after have been working for a certain length of time in their life, rather than as a phase where they are no longer able to work due to health or physical condition.

This transformed perspective meets up with demographic transition just in time, where the number of the Indonesian elders is unstoppably increasing, while the young generation will start to decrease in several decades after passing through ‘window of opportunity’ demographic period (see Figure 1.1). This kind of population aging, as defined by Holzmann (2005), is the result of both increasing life expectancy and decreasing fertility rates. Its varieties differ among countries, but steady rising average age of population is occurred all around the world, with Indonesia about to start the period.

Figure 1.1 Indonesia Dependency Ratio Trend Estimation



Source:Adioetomo, 2005 (in Azizon, 2014)

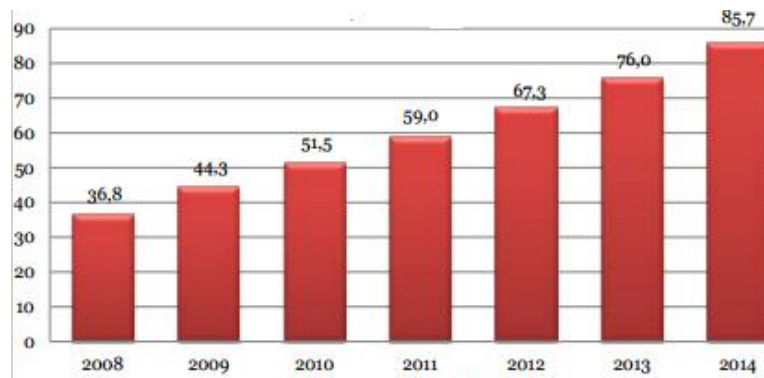
Reforming the Indonesia pension system has been under concerned since 2004. Yet, it is a delicate and risky operation for any government to modify extensive institutional arrangements defended by dense networks of interest groups emerged around social protection (pension) programs (Pierson, 2004 in Azizon, 2014). However, some institutional arrangement has been done by the government, for example the enactment of National Social Security System (SJSN) in 2004 and Social Security Administrative Bodies (BPJS) in 2011 through which the transformation structure of social security, including pension system are controlled and supervised. Furthermore, National Social Security Council (DJSN) was founded as the one who is responsible for synchronizing the administration of the SJSN system. Nevertheless, it is still not clear what their specific functions are.

Currently, the pension system is generally implemented under single mandatory schemes which is administered by state-own enterprises, where the membership is limited to civil servants and the armed forces, run by PT Taspen and PT Asabri. With the retirement age is mostly at 58, these two schemes are operated with defined benefit (DB) system and financed largely on pay as you go (PAYGO) basis. This, in turn, throws a part of the financing burden to the government.

1.2. Research Problem

Recent trend already shows that pension financial burden is rapidly increasing, indicating that it is most likely expected that current scheme would not sustainably persist in the future. The demographic transition would add the scale of the effect since fewer working-population will have to support more retirees. To overcome this issue, current pension scheme would need fundamental changes, as many other countries has previously experienced.

Figure 1.2. The Government Allocation Trend for Pension Provision (in trillion Rp)



Source: Financial Note of Ministry of Finance (2014)

The amount of funding that Indonesian government should pay significantly increases every year in nominal term (see Figure 1.2), where the allocated budget has increased more than two-fold since 2008, and claimed an average 33.26% of government employees expenditure. The allocation is expected to keep growing, and thus the future performance of current pension scheme is unlikely to be affordable.

In order to perform such reform that can produce sustainable outcome, two big factors should be considered: first, implication of population aging on pension expenditure; second, the welfare state, which represents a country's perspective on how social security should be provided, as it reflects the social identity of the nation. It is important to examine the former to know how much burden that the government would bear in the future, given the scheme options for the pension design. Related to that, one should consider also the effect of the demographic changing to the fiscal deficit, as it relies heavily to demographic structure.

To cover the financial burden, the pension financial management needs additional resources, whether it is from changing the pension scheme or improving pension investment performance. However, the former option is more feasible since current scheme only uses PAYGO system, while there is no much room for pension financial management to improve the latter. In other words, reforming pension scheme is crucial not only to directly add financial resources, but also to increase future revenues by providing more fund to be possibly invested.

In optimising the financial sustainability of pension fund, a proper scheme should be carefully selected and effectively implemented (Barr, 2009). Therefore, every related factors and their influences have to be analysed before developing new scheme. Afterwards, a proper calculation of its projection is necessary to estimate how much differences it can give, including the investment burden to cover the expenses.

1.3. Research Objective

Many researches have been conducted in formulating ideal pension scheme, resulting in various kind of design. But in principle, they are similar in a sense that pension program should be done with multipillar mechanism, under which different objectives could be covered (World Bank, 1994; Modigliani and Muralidhar, 2004; Holzmann, 2009). First pillar commonly uses defined benefit

and pay-as-you-go scheme, while second pillar works with defined contribution (DC) mechanism. Other additional pillars usually differ in every country depending on their needs and priority (see Barr, 2009).

Accordingly, the main objective of this research is to test whether a multipillar scheme can be the long-term solution in solving the financial deficit in the system. The time frame of this simulation started from 2016 until 2045, which is a year where most of the current young workers would have retired and the starting period where the dependency ratio will start to increase. In so doing, we can compare the financial performance between three scenarios: no changes in the current scheme and mechanism, changes in parametrical reform, changes in the mechanism using a multipillar scheme.

1.4. Research Hypothesis and Research Questions

Appropriately, in this research, we formulate a hypothesis which states that a multipillar scheme reform will be significant in consistently reducing the funding shortage of the current pension scheme. From this supposition, it is expected that such reforms will be crucial in dealing with factors that make the scheme burden heavier. Accordingly, we expect that parametrical reform may reduce the deficit, but cannot stop it from rising during the simulation period. Meanwhile, multipillar reform is expected to not only reduce the deficit, but also consistently lower it down in the future. From the estimated result, we can examine whether the reforms can be the solution to overcome the funding shortage.

To test the hypothesis, the related research questions that need to be answered are as follows:

1. What are the estimated financial deficits between 2016-2045 either if there would be no pension reform or there is one?
2. Can parametrical changes in the current pension scheme significantly and consistently lower pension financial deficit until 2045?
3. Can multipillar reform significantly and consistently lower pension financial deficit until 2045?

1.5. Methods and Framework Analysis

Both qualitative and quantitative methods are being used in accomplishing the objective. Mathematical approach and analysis is essential in this research as the pension program is complex in its relation with social aspects of the country and welfare state. Theoretical analysis will be the foundation in building the mathematical model, with path analysis, comparative studies and logical framework analysis (LFA) as the important tools used. As a whole, a combination of logical analysis between mathematical and theoretical framework will be applied in conducting simulation approach and examining its result.

Expectedly, there will be two different results from two kinds of reforms: first, in parametrical reform, it will be effective in reducing the funding shortage, but not sufficient enough to overcome the shortage growth, meaning that parametrical reforms is a necessary action, but do not provide adequate solution; second, in multipillar reform, as an addition to parametrical reform, will be a potent solution as an additional scheme with different mechanism and system will not only reduce the shortage, but also effective in stopping the

deficit growth in the future. These two results will be compared to the case if there would be no reform implemented as the base scenario.

1.6. Research Coverage

The focus of the research will be narrowed on pension scheme which is regulated by government, currently limited only for the civil servants (as of year 2014). Although military workforces' pension is also provided by government, I was unable to access such data, thus prevented me to expand the coverage. The timing framework of the simulation will be from 2014 to 2045, with the expected reform starts at 2016. Year 2014 and 2015 will be part of the simulation, since the data is only available up to 2013.

1.7. Organization of the Paper

This research exposure will be presented with following organization:

Chapter 1: Introduction

This chapter provide the big picture of the research which focuses on reason and motive of the study. In addition, the platform under which the objective is being approached is also well presented in this part.

Chapter 2: Theoretical Review

As the foundation and underlying logical consequence of the research, this part covers every related theories in order to build a systemic framework in the right order. Pension theory will be the basis of this part, while other related theories such as social theory and welfare state will also be given attention to provide proper explanation of the structure.

Chapter 3: Research Methodology

This part explains two parts: the sequence of methods being used in the research and the building of mathematical financial model for the pension schemes.

Chapter 4: Chile Pension System: A Comparative Study

As one of the countries that succesfully overcome financial deficit through using multipillar reform, Chile becomes our country comparison in conducting the simulation. This part explains the pension system in Chile, including its history, development, and challenges.

Chapter 5: Simulation Result and Analysis

The result will be presented with an order from which the right examination will also be thoroughly explained. Mainly, it deals to answer the research question by providing study on funding shortage result and its expected development with different mechanism of schemes. It also explains the implication to the role of pension investment and the reform result comparison with Chile's.

Chapter 5: Conclusion

It covers the main findings and explains how it answers the research question and how pension reform affects the pension financial deficit.

Chapter 2

THEORETICAL REVIEW

2.1. Pension Program's Role in Economic and Social Dimension

Pension security is basically provided by the government to smooth the consumption pattern of the elder generation. It includes cash benefit that is given monthly to the retirees until they pass away. The need of this provision comes from the labor market reality of “commodification”, which reflects how market treats worker as merely economic factor and ignores the social value, especially when workers become no longer valuable due to their decreasing productivity, whether it is because of sickness or aging (Esping-Andersen, 1990). Facing this reality, government initiates through pension benefit provision to enable them to have a decent living (see Nielsen, 2009 in Azizon, 2014).

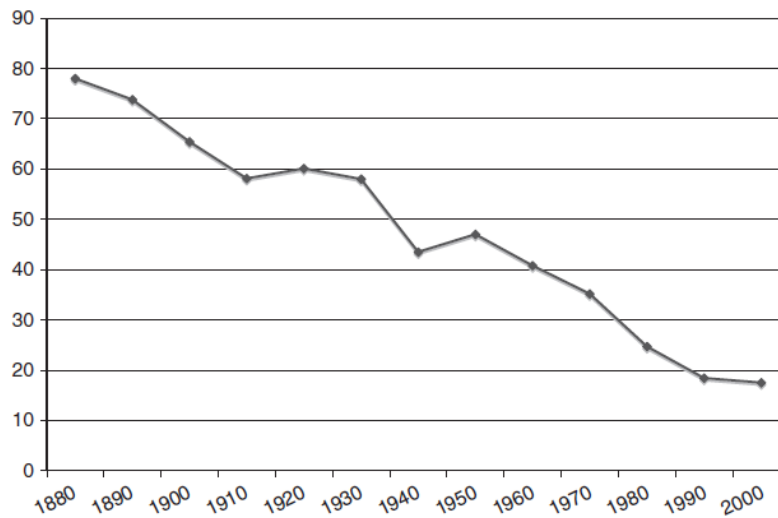
In economic dimension, pension has important role not only in maintaining the purchasing power of consumers, but also in increasing worker's productivity as well. Alcock (in Ditch, 1999) emphasizes that pension program can stabilise the consumption level of the retirees, while also boost the productivity by giving them secured feeling, knowing that their retirement time is already financially protected in the future. Besides, it also has influence toward macroeconomic stability and economic multiplier through affecting the long-term investment, especially from the pension provider institution (Subianto, 2010).

Unlike other social benefits, pension program has social effects in terms of forming society behavior and involvement in maintaining its continuity (Alcock in Ditch, 1999). While other form of benefits are held in order to solve specific problem and tend to be run momentarily, pension program is formed permanently as a reflection of social perspective and norms in treating the elder generation (Esping-Andersen, 1990). Also, the development and the success of its scheme are highly determined by the commitment of all layers of society, whether as a employer, employee, or pension benefit provider (government or private institutions).

However, nowadays, people tend see retirement more as a chance to enjoy life with a healthier body rather than as a period where they are no longer able to work. This inevitably causes the costs to sustain the elder living more expensive compared to decades ago. Previously, in early period where pension program was created by Otto van Bismarck (1881), the program supported the 70 year-old male or widow who lost their husband. Later, the retirement age was declined to 65, since only a few part of the population that can reach the previous retirement age. Globally, the retirement age experienced a gradual decrease while the life expectancy increase. In result, significant contrast condition is emerged now, where people can have 20 years in average of retirement period (OECD, 2008 in Bertocchi, 2010).

Figure 2.1

Labor Force Participation Rates of Men Age 65 and Over by decade (%)



Source: Short (2006, in Bertocchi, 2010)

2.2. The Role of Welfare State

In dealing with various challenges in maintaining the sustainability of pension program, welfare state of the country determine the path direction of its changes. It holds an influential role on both how the government would choose its action and how they perceive the impediments. Since it highly depends on the controlling political perspective on how the market should work, the role and position of government may differs (Esping-Andersen, 1990). From each welfare state, different priorities are set, as argued by Esping-Andersen (1990), and are often manifested in a form of regulation or social security design.

According to Hall and Soskice (2001), economic perspective plays an important role in shaping welfare state through influencing how market should treat individuals, especially when they are no longer productive. This then will affect how a nation values the importance of social security, in which pension benefit provision takes part (see Azizon, 2014). In general, as also argued by Hall and Soskice (2001), the viewpoint can be emerged from two approaches: liberal market economies and coordinated market economies.

The former emphasizes the responsibility of every individuals for themselves in relation to how supply and demand of social security – including pension – is emerged in the market. In this sense, it believes that the market would turn out to produce the most efficient outcome. Private institutions and individuals as workers compete with each other and treat social security as part of their action in maximising their utility. Meanwhile, the latter stresses the importance

of government in directing and coordinating every stakeholders in the market, hence the provision of pension benefit becomes their responsibility. Here, market still determines the outcome of social security provision, but coordination and collaboration among the economic actors also hold influential part (see Azizon, 2014).

Esping-Andersen (1990) argued that this different market perception of social security eventually shapes the way the government perceive on how social security should be provided. This perception – which then is known as welfare state –, as he continued, arises due to social awareness toward the importance of de commodification, which seeks to prevent workers and retirees (in terms of pension program) as a human being from being treated merely in terms of economic valuation. According to Titmuss (1974, in Azizon, 2014), there are three perspectives in the way of a country iapproaches to implement social security provision:

a. Residual model

Through this perspective, the government believes that social security provision should not disturb the market mechanism. It is best to leave the individuals and private to make decisions and create demand and supply for themselves. Then, the role of government is to be responsible for those who are not wealthy enough to contribute in the market

b. Performance model

In this model, social security provison is seen as a supportive policy in optimising market performance. Social welfare needs should be mainly fulfilled from increasing productivity of individuals, and contrariwise, social security system is provided to create incentive to boost economic output.

c. Insitutional redistributive model.

Social security provision here is treated as the main focus and priority of the government. It should be universally provided and adjusted according to each individual's need. Accordingly, the government is the one who is responsible to sustain the society's capability in delivering their needs of social provision (Titmuss, 1974 in Azizon, 2014).

Later, through sociological study, Esping-Andersen (1990) claimed that in reality, welfare sate is actually not determined by the government alone. Instead, he found that it is emerged through the interaction between government, family as individuals, and market. Through this relationship collaboration then the identity of a country's welfare state is developed. In relation to this, he categorises the welfare state into three forms:

a. Liberal model

This welfare state acknowledges the provision of pension as more of a program that should not interfere too much with the market mechanism. It allows guaranteed pension provision to only those who are poor elder but minimizes the benefit for most elders in general. In another words, pension benefit should be balancedly provided

according to the individual's contribution of payment. However, the provision from private is still supervised by the government. This form of pension scheme is implemented in US, Canada, Australia and England (see Azizon, 2014).

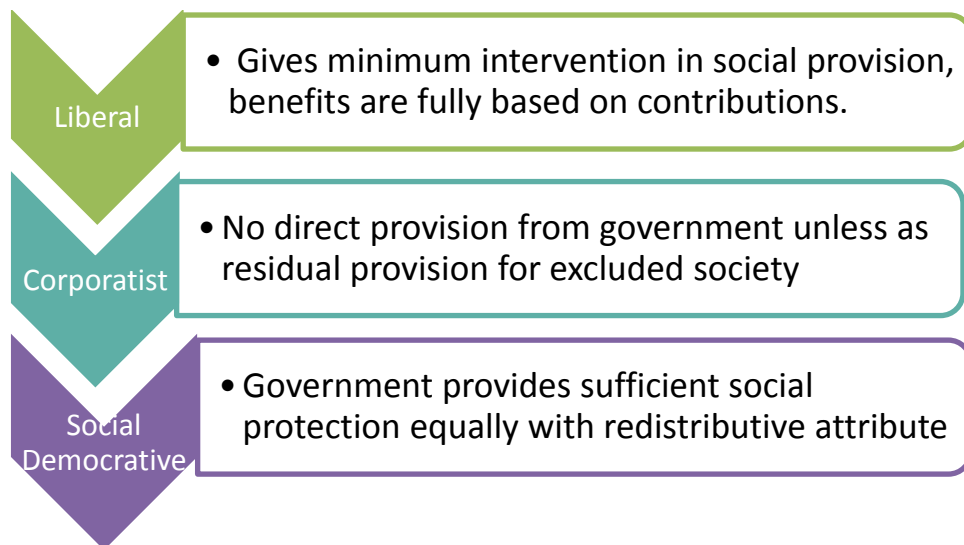
b. Corporative model

Here, corporations are entrusted to hold the social security provision. The government can not intervene too much in changing the regulations or the system, unless companies and families are no longer able to support the living cost of the retirees. This applies in most European Union countries (see Azizon, 2014).

c. Social Democratic model

Countries who hold this welfare state treat pension program as a universal policy that should be implemented in a basis of solidarity of the whole society. Both employer and employee in a formal labor market should be togetherly run their responsibility to ensure all retirees get the benefits of the program. This model of welfare state is implemented in countries like Denmark, Sweden, Finland and Sweden (see Azizon, 2014).

Figure 2.2 Welfare States Comparison



Despite its variety, according to Spicker (2000), welfare state is often “characterised as collective action for social protection”, and the difference only lies on its approach. Often, continued by him, it implies that redistributive feature should be a part of a pension program or other social securities. Accordingly, welfare state dictates how the government perceive how social protection should be provided to the citizen, and simply reflects institutional forms of social protection. Then, since social protection is one of the necessary conditions to achieve welfare in society, government should represent “a form of collective action” (Spicker, 2000).

The underlying reason of pension benefit provision starts from presumption that government's highest form of responsibility lies on its effort to achieve welfare of the society (Hobbes, 1651 in Spicker, 2000; Carmichael and Palacios, in Musalem and Palacios (eds), 2004). Spicker (2000) is also

convinced that social provision should be done collectively by all the layers of societies. However, the centrality of government is highly important, whether as the initiator, supervisor or the last resource of covering the remaining unfulfilled needs.

2.3. Pension Scheme Mechanism

Pension scheme can be categorised on two basis: funding and benefit mechanism.

2.3.1. Funding Scheme

In term of funding management, pension scheme can be divided into three forms: funded scheme, unfunded scheme, and mixed scheme (Seidman, 1999).

a. Funded scheme

In this system, the amount of the benefit is determined based on the retiree's contribution when they were still working. Pension program participants are obliged to pay the contribution for the given time, and it is accumulated in their individual account along with its investment return that will be given as pension benefit when they retire.

b. Unfunded scheme

This scheme is usually called as pay-as-you-go (PAYGO) scheme. Its mechanism works in a way that current active participants are responsible for the pension benefit of the current retirees. In other words, the accumulated premium that is contributed by the participants is then transferred to the retirees as pension benefit.

c. Mixed scheme

Mixed scheme is materialised through multipillar scheme, which commonly appeared according to three basic pillars classification (World Bank, 1994): (i) Mandatory public pillar; (ii) Mandatory private pillar and (iii) voluntary private pillar. The former uses unfunded scheme, which is usually used to guarantee pension benefit provision for low-income citizens or minimum pension benefit for all citizens.

2.3.2. Benefit Scheme

On the other side, based on explanation from Mitchell (2004), to decide the amount of pension benefit, pension provider institution uses two kind of methods: defined benefit (DB) and defined contribution (DC).

a. Defined Benefit (DB)

This scheme provides pre-determined benefit, whether in nominal or in a fraction of specified salary (Modigliani and Muralidhar, 2004). While the benefit level is guaranteed, the contribution can change over time, depends on regulation or condition. The responsibility to ensure the financial adequacy of the program thus relies on the pension provider.

The basis of determining the benefit usually lies on the latest amount of wage before a person enters her retiring period and the length of the individual's working period (Bodie et al, 1988). Then, the final amount of the benefit is fixed by the replacement rate, which is the percentage amount of benefit in terms of the latest wage. One of the advantage of this benefit is that it encourages workers to both improving their

working performance to maximize their pension benefit and lengthening the working period in the company. It also transfers the risk of fund inadequacy in providing the benefit to the employer.

b. Defined Contribution (DC)

The pension benefit under this scheme is fully determined by total contribution that comes from both employers and employee. The specified contribution can be stated whether in absolute amount or as a fraction of specified salary. In that way, the contribution level and its investment options are firstly determined, so that each retiree would have different level of pension benefits, depending on the investment performance (Modigliani and Muralidhar, 2004). The specified contribution may also change over time, especially when the accumulated fund is not sufficient to provide the desired replacement rate (Modigliani and Muralidhar, 2004).

2.3.3. PAYGO versus Funded Scheme

Preference between PAYGO and funded scheme mechanism depends on what perspective we take. In one side, from economic point of view, funded pension mechanism is more favored than PAYGO. Not only that it provides more capital stock to the economy (Muralidhar, 2001), it also gives more guarantee of fund balance as the benefit will be solely determined by the rate of the contribution and its investment performance (see Azizon, 2014). On the other side, in terms of social aspect, PAYGO mechanism reflects more of social solidarity in achieving society welfare, especially in the sense of supporting the elder (Esping-Andersen, 1990). Also, PAYGO enables the pension institution to transfer the responsibility of pension payment to the employer, or generally, the government, thus giving less anxiety to the society regarding the pension benefit provision certainty (Holzmann, 2005).

Meanwhile, financially-wise, funded scheme then may give more safety to prevent the system from severe deficit, while PAYGO mechanism tends to get underfunded in the future (Blitzstein et al, 2006). As Aaron (1966 in Modigliani and Muralidhar, 2004) suggests, when the rate of return on assets exceeds the sum of population and productivity growth, funded scheme are preferred over PAYGO one. Furthermore, it Meanwhile, PAYGO scheme is generally vulnerable to demographic changes and most of the time, government have to pay the deficit of the system.

However, funded scheme, as argued by Barr (2009), although it can give more guarantee in term of creating safe financing, it may fail in delivering adequate benefit to the retirees. It also highly depends on how the output of the workers can be sustained high enough to accumulate sufficient fund to generate the pension benefit needed. Besides, it is vulnerable to the changing of worker's size or the number of involved participants in the countries, as the size of accumulated funds is also essential in determining its investment return (Mackenzie, 2010).

Therefore, although funded mechanism could ideally give more promising results, it has three conditions that should be satisfied. First, it should have sufficient management capability of the pension institutions and market stability (Barr, 2009). Second, continued by Barr (2009) the institution management must be capable to deal with changing individual's life

expectancy, which would affect the level of benefit as there is no provision guarantee to the retirees. Third, as argued by Manchester (2010), gaining the expected outcome requires participants' financial literacy in making appropriate decisions for themselves. These three circumstances will determine the performance of investment, which is crucial in delivering expected necessary return in the future.

Barr (2009) emphasizes that differences in constraints and priorities among countries lead to conclusion that there is no single best pension mechanism for every country. Countries with strong fiscal capacity can hold more financial responsibilities with relatively lower contribution and higher benefit, while countries with low fiscal capacity hold the opposite. Stronger institution and human resource capacity also mean that funded scheme with DC mechanism could be more applicable compared in the weaker ones. Meanwhile, countries prioritising poverty over financial sufficiency tend to rely more on low or non contributory scheme rather than funded scheme. In the end, different combinations of constraints and priority weighings imply different ideal pension design.

In the relation with achieving the objective priorities, as Barr (2009) emphasizes, one should also note that it will link to different kind of risk, hence it should be adjusted to the objective priority of the country. New Zealand is one example who prioritises on poverty prevention for elder generation. They pursue the objective by using pension design which relies on non-contributory scheme. Meanwhile, Chile, Sweden, and USA use mechanism which is more dominated with mandatory contribution to finance the benefit. Chile is one example that a structural pension reform needs adequate implementation. If it is not well implemented, as Barr (2009) stated, it could lead to other severe problems. Complementary reform is necessary as a buffer to ease the transition cost arised by the design transition.

With this consideration, Barr (2009) suggests a mixed scheme (of both PAYGO and funded scheme) to cover different risks and consequences of the two. It is broadly recommended by experts, such as Modigliani and Muralidhar (2004), Holzmann and Guven (2009), and World Bank (1994). The expected outcome is that while individuals still get publicly guaranteed minimum benefit, they are also obliged to partly contribute to their own future benefit when they retire.

However, instead of the pension design, the most important thing lies on the economic performance of the country and effective administration of the pension institutions (Barr, 2006). In doing so, as Barr (2009) emphasizes, strong responsibility from the government including its transparency and proper human quality resource are crucial in implementing total restructuring of the pension program and convincing every workers to get involved in it.

2.4. Motive for Pension Reform

Different pension design is needed for each different kind of motive, as such program is usually purposed for manifold objectives. However, the general performance of pension funding in every country shows whether current deficit will expectedly keep rising or future deficit will unavoidably happen (see Bertocchi et al, 2010; Bonoli, 2005). This common phenomena is mostly caused by challenges from two following circumstances.

a. Demographic Transition

Demographic factor has always been one of the heaviest challenges faced by every countries, especially when the population starts aging (Baldacci and Lugaesi, 1997; Nielsen, 2009 in Azizon, 2014). This has been the result of the increasing number of elder generation, while birth rate is usually slowing down. Thus, workers generation is getting fewer compared to retirees generation (Gordon, 1988). In result, the funding of pension benefit will constantly get heavier.

b. Longevity Factor

As the welfare of the society increases overtime, their longevity also increases (Turner, 2011), which brings more pressure to pension benefit provision. The higher the life expectancy of a retiree, the bigger the burden of pension benefit that has to be funded.

These two circumstances ground the financial burden occurrence in any pension scheme system. Mismatching fund between revenue and expenditure produces funding shortage that has to be financed by government fiscal. But the deficit will most likely to keep increasing, since demographic transition and longevity factor seems to never cease to happen. Additional funding source then is necessary to at least partly absorb the burden of the government fiscal.

One of the obvious solution is to reform pension system or formula, whether by implementing parametric challenges shifting the current scheme, or adding different scheme. However, reforming pension also deals with problematic challenges. When dealing with these challenges, countries usually perform pension reform that usually tends to only create short-run sufficiency, but does not accomplish the need to sustain in the long future (Holzmann and Guven, 2009). In addition to that, pension scheme also faces trade-off between maintaining the sustainability of the scheme and giving adequate benefit to the retirees (Holzmann and Guven, 2009).

Additionally, reforming pension scheme should be placed no more than as a part within a set of policy direction in improving economic outcomes. Barr (2009) believed that maintaining output per worker is more important than merely accumulating pension fund. He explained that if output growth is stable, it would be easier to keep the balance between contribution and benefit. It means that keeping financial matter safe may be good, but this alone would not be sufficient if there are macroeconomic instabilities that affect worker's output performance. Oppositely, reaching good economic output growth per se will make it easier to adjust pension scheme to deliver the objectives.

2.5. Features of Desired Pension Scheme Design

Pension is basically purposed to transfer wealth in working period to old-age period, while guaranteeing basic needs provision of society. This principle implies that redistribution feature should be attach in the program, especially in public pension, as found by Weizsacker (1994) that pension program indirectly influence income disparity of the population. Thus, it means that an ideal pension reform should consider the achievement of income equality across demographic group, thus bringing incentive to work.

In macro economic perspective, fully funded scheme has advantage in sustaining economic performance in a sense that its fund can be used for investment, unlike PAYGO's fund that is directly used to pay the retirees'

benefit. However, Augusztinovics and Martos (1996) emphasized that shifting the scheme to funded mechanism has to be well-linked to the prior one to ensure that the participants do not have resistance and dissatisfaction toward the new scheme. Moreover, Arza (2008) suggests that direct move to funded scheme by removing the PAYGO one may eliminating income-redistribution feature as there is no wealth transfer between contributors and recipients.

From financial perspective, Modigliani and Muralidhar (2004) recommended that the benefit of a scheme should be well-adjusted to the fund revenue. The importance of this characteristic becomes more important when a country experiences a demographic transition, where PAYGO scheme tends to fail to persist. In such condition, the existence of funded scheme is very crucial, whether as a replacement of the PAYGO scheme or as additional scheme.

However, a funded scheme with DC mechanism requires reliable attitude from the government in utilising the accumulated fund to gain the trust of the society to be involved in the scheme (Hess and Impavido in Musalem and Palacios, 2004). It also needs well-educated administrators, while high rate of financial literacy among the participants is necessary as well so that they can choose how their contribution to be invested. Diamond (1997, in Modigliani and Muralidhar, 2004) emphasised the existence of its return uncertainty, thus recommending social security to use the PAYGO scheme.

2.6. Pension Reform Design: Moving to Multipillar Scheme

Based on the direction of the reform, the changes in pension scheme design can be generally classified into three forms: expansive reform, which is mostly implemented through extending pension member coverage and increasing the benefits; retrenchment policy, which aims to maintain fiscal sustainability and prevent the system from collapsing; and third, the combination of the two, which is usually practiced most of the time in order to keep the balance between increasing welfare of the elders and keeping the fiscal healthy. The reform usually include lengthening the assessment period for calculating initial benefits (for example, from the past three years of earnings to lifetime earnings), introducing actuarial increments (decrements) for earlier (later) retirement (for example from 0 or 2 percent to 6 percent a year), increasing the retirement age, changing from wage to price indexation of benefits, and reviewing the minimum pension guarantee provisions but also increasing the contribution rate.

Although the direction of pension reform in the world varies among countries, there are some similar patterns of changes that are purposed to maintain fiscal sustainability. First, it always includes retirement age extension, as found that people's life expectation is continuously increasing all around the world (Bertocchi, 2010). Furthermore, many European countries also implement incentive to those who delay their retirement (Bonoli, 2006; Bongaarts, 2004). Second, a simple approach to maintain the sustainability of pension system is usually used in order to adjust the balance between contributions and benefits.

However, parametric changes can only hold temporarily, as Rother (2004) believes that they will only delay the incoming deficit. As quick as the dependency ratio grows, the deficit will occur as PAYGO system lets the funding source comes from the working generation, causing the gap between paid contribution and must-paid benefit getting bigger (Sayan and Kiraci, 2000). In relation to this, tightening funding system through shifting the

PAYGO system into the funded one can also be expected. The funded system could be beneficial as the direct link between individual contributions and pension entitlements can be expected to ease distorting effects on the market through reducing the perceived tax burden of unfunded system (Rother, 2004; Fehr, 2000), although it would harm the low-income society and needs time to optimally benefit the whole society (Lewis, 2002).

To optimally gain the advantage of both PAYGO and funded scheme, multipillar scheme proposed by World Bank (1994) has been broadly acknowledged as a basis for every country in determining the reform direction. As suggested by Schludi (2005), this mix of mechanism can reduce the risk faced from both scheme. It is often recognized as three-scheme pillars: publicly-managed defined benefit pillar using PAYGO mechanism; mandatory funded defined contribution managed by private institutions; and a voluntary pillar as an optional choice. However, Orszag and Stiglitz (2001) emphasized that this set reform is not a rigid formulation for every country. Proper assessment and adjustment are obviously needed to implement the right reform that can gain social acceptance in the implementation (Augusztinovic and Martosm, 1996).

Despite the choices of how a country should reform its pension, one should note that the failure of pension policy is often caused by poor implementation rather than by the design form itself (Barr, 2009). For example, although Chile has successfully pushed down the deficit since its first reform in 1980s, its coverage did not even reach half of its society in 2000s (see Soto, 2007). Also, its new design needed strong legal supports to run properly, especially in clearing various uncertain regulation and management issue (Iglesias-Palau, 2007). Pension design always need adequate human capacity both in performing administrative and political capability is essential in determining the result of a pension design (Andrews, 2006).

2.7. Pension Reform Comparison of Several Countries

Around the world, there has been no successful country that does not face severe deficit problem by using single-pillar scheme. The pension burden is always distributed with other scheme, which mostly uses DC scheme. Table 2.1 provides us comparison of pension schemes which are being implemented in three countries, each of which represents three different welfare states. Despite their different approach in providing pension benefit, they always use different scheme with different mechanism through which pension burden can be shared. Additionally, the deficit is also being minimised through implementing modest benefit, relatively high contribution and high retirement age.

In Indonesia, while the burden is fully taken by government through single-pillar scheme, the parametric arrangement is also too incriminating the sustainability of the program. Therefore, pension reform will be decisive in preventing jeopardising risk in the future. By following similar path implemented in other developed countries with much-more sustainability in their pension program, implementing additional pillar is necessary in Indonesia.

Table 2.1. Pension Scheme Comparison of Several Countries

Comparison	England	Germany	Sweden	Indonesia
1.Welfare State	Liberal	Corporatist-Statist	Social-Democratic	Social-Democratic

2. First pillar	Basic Pension for poor citizen, using DB-PAYGO scheme	National compulsory program, using DB-PAYGO scheme	Minimum Pension, fully-funded by government	National Compulsory Pension, limited to civil servant
Contribution rate	-		0%	4.75%
Replacement rate	-	10% Maximum at 70%	-	80% of latest income
3. Second pillar	Pension for middle-income citizen, using DB-PAYGO scheme	Pension benefit provided by employer	National compulsory program, using DC-Funded scheme	-
Contribution rate	-	0%	18,5%	-
Replacement rate	20% of average income	Based on employer	Depends on investment return from contribution	-
4. Additional pillar(s)	Voluntary private scheme	Voluntary private scheme	Voluntary private scheme	-
5. Retirement Age	65 years old	67 years old	67 years old	58 years old

Source: Bozio et al (2010); Esping-Andersen (1990); Gruber and Wise (eds) (1999); OECD (2009)

2.8. Matching Concept Principle

Since pension funding management is basically based on the balance between its revenue and expenditures, funding management principle can use matching concept as the basis in developing pension reform options (Bodie et al, 2011). The main point of this concept is to ensure the balance of revenue and expenditure of a pension scheme, or otherwise the residual can be considered as surplus or deficit, which will be the core to determine the need to reform the scheme.

2.9. Basic Model

The principle of matching concept basically states that expenditure (benefit) must equal with revenue (Lakatos and Musgrave, 1970). the model can be initially built from following equation:

$$\text{resource function} = \text{burden function}$$

$$f(S) = f(B)$$

$$f(L, E, I) = f(R, O)$$

Where:

- L : Worker's contribution
- E : Employer's contribution
- I : Investment outcome
- R : Replacement (pension benefit)
- O : Operational cost

This mathematical expression means that unless the accumulation of each resource's component can equal the total of the burden, deficit arises and has to be financed by government fiscal. The resource is usually collected from participant's contribution during their working period, employer's contribution, and the return of pension's fund investment. Meanwhile, the expenses consists of the pension benefit payment to the retirees and the operational cost which arises during the implementation of the policy. Therefore, to achieve financial balance of a pension scheme, following equation must be fulfilled.

$$f(S) - f(B) = 0$$

This simple model expresses the basic logic of pension fund management. It has not taken into account time and scheme variables which will be very influential in shaping the form of the model. For that reason, the equation will be developed to form proper models in Chapter 3 that will be going to used for reform simulation.

2.10. Indonesia's Current Pension Scheme

Presently, the pension scheme which is carried by government fiscal only covers 4% of the total working force, which includes civil servant and military forces. As pension participants, they are obliged to pay 8% of their basic salary to PT. Taspen and PT. Asabri – public enterprises which are mandated to be responsible for the technical operation – consisting of 4.75% for pension contribution and 3.25% for old age security (THT), that will be paid once when the participant retirees. However, those whole amount of money –the 3.25% - that is paid to PT. Taspen is being accumulated without being used as pension benefit to the retirees, while the retirees' benefit is fully paid by government. With the retirees' number is unstopabbly increasing due to aging population, the funding shortage is continually increasing with accelerating growth.

This on-going situation leads Indonesia to a problematic situation. In accumulating the pension fund from the participant, PT. Taspen uses defined contribution (DC) scheme, where the collected fund consists of individual account from the participants, but, when the participants retire, their benefit is paid from the government, which is similar with the defined benefit (DB) scheme. As the reason for this kind of system is unknown, it seems inconsistent and certainly endangers the government fiscal.

Financial deficit is obvious to happen in the pension scheme, as the matching concept prnciple is expressed with following equation:

$$f(L) = f(R, O)$$

The left side of the equation, which is the resource side $f(L)$, is represented only by worker's contribution (L), while the right one denotes the expenditure

function consisting of pension provision (R) and operational cost (O). There is no government (as employer) contribution to directly fund the scheme in Indonesia, while with PAYGO mechanism, there is no investment outcome that can be expected to add the fund resources. With modest calculation, significant amount of funding shortage is not surprising to always occur.

$$(4.75\% \times w \times t) - (w \times t') = \textit{Deficit}$$

Where:

w = worker's salary

t = working period (in month)

t' = retiring period (in month)

Assuming the working period is 35 years, then the collected fund is equal to, or 1.7 years ($0.0475 \times w \times 35$). Meanwhile, the retiring period is 14 years (with current life expectation is 72 years old and retirement age of 58 years old). Thus, it means that the scheme could not cover 12.3 years of pension benefit. Consequently, this amount of gap has to be financed from government fiscal. Or, alternatively, the pension scheme needs to be reformed.

Chapter 3

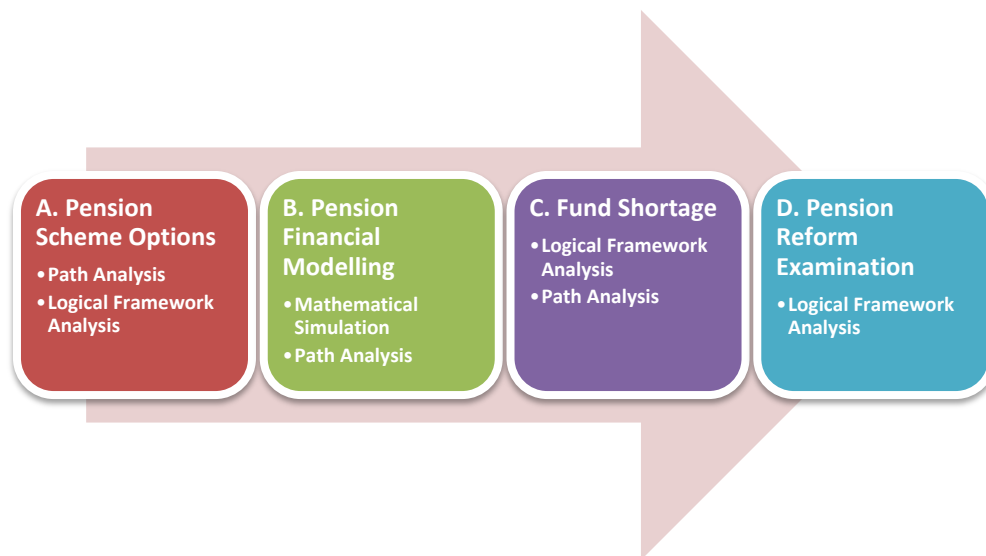
METHODOLOGY

3.1. Research Framework

In conducting research related with a set of examinations on policy outcome, it is imperative to not directly replicate model from prior researches. Different context and objective might need completely different approach and formulation to determine the result, and neglecting this possibility may lead us to a bias conclusion, while reflecting sceptical attitude (Lakatos in Worrall and Currie (eds), 1978). According to Popper (1992), critical attitude toward every underlying assumption behind the result of existing researches would prevent us from unconsciously falling into the acceptance of knowledge that is only applicable in specific cases and help us to improve the existing knowledge. Hence, beside explaining the method used, this part also covers its usage in formulating the pension financial model.

Since pension fund management is deeply related with demographic, social and national ideology branch discipline, this research will mainly use theoretical analysis that will be expressed in mathematical model. The main reason is to enable the analysis to not only be based on data, but also on related theories involved (Chiang, 2004). Accordingly, mathematical formulation is built based on three instrumental analysis: path analysis, latent variable model, logical framework analysis (LFA). Diagram of Figure 3.1 depicts the big picture of the research framework sequence.

Figure 3.1. Research Framework



3.1.1. Path Analysis

This method constitutes the analysis of causal relationship between variables to make conclusion. It enables us to analyse the connectivity of past events to the future occurrence, while also explaining any deviation from the past incidence. Furthermore, according to Mahoney (2000), sequent occurrence and extra impact to the outcome can also be taken into account under this tool to improve the prediction accuracy.

In order to provide logical explanation about the relationship among the variables, path diagram is used as the basis for mathematical model, in which all related variable can be described. In this sense, the result of the dependent variable is the total outcome of every inherent sequence within the diagram, whether it affects the end product directly or not.

Furthermore, the vector of the causality relationship is built based on theory and the context of Indonesia. Finally, in measuring the scale of influence between variables, path coefficient will be determined as the variable coefficient in the analysis (Kline, 2005). This coefficient is determined through the mix of historical data or projected data and theoretical consideration.

3.1.2. Logical Framework Analysis

This method is purposed to ensure the analysis reach the objective of the research, while the result is being reinforced with path analysis. The main function of this technique is to examine the problems and formulating a program design that is purposed to overcome it (Ortengren, 2004 in Azizon, 2014). In this research, the objective will be referenced in analysing the fitness of scheme reform to the desired criteria of a scheme option to achieve the desired outcome.

One of the expected benefit from this tool is that we can convert the analysis result into examination and recommendation in which the most appropriate pension scheme is determined (see Akroyd, 2012). By analysing the problem under a logical and systematic way of framework in which all stakeholders are involved, we can examine whether the selected scenarios of pension design enable to overcome the problem or not.

Sequentially, path analysis and logical framework analysis method are used in this research as depicted in Figure 3.1 with following explanation.

- a. This study starts with examining possible and ideal options of pension scheme in the near future. The examination begins with inquiring comparative study of pension reforms that are implemented in several countries, and followed by analysing their results. Besides, selecting the most appropriate scheme to be simulated will also be done through analysing factors such as national ideology, welfare state, and demographic transition.
- b. Based on the selected schemes, mathematical models is developed as the basis of the simulation. Then, every related variable is classified based on theoretical and path analysis, so that the model outcome can give precise estimation. The mathematical model itself is formulated with matching concept approach, where pension scheme revenue oughts to cover the expenses of the burden.
- c. By using simulation result, we are able to analyse the variable outcomes of each scheme, wherein the fund shortage is be treated as the main focus. We also traces the volatility of the variable outcome, from which we can examine the sustainability of the scheme.
- d. The last stage deals with decision outcome based on the simulation result. Besides government expenditure, investment return comes as additional source to cover the pension burden, as scheme option with funded scheme feature enables the pension management to invest the contribution.

3.2. Pension Financial Modelling

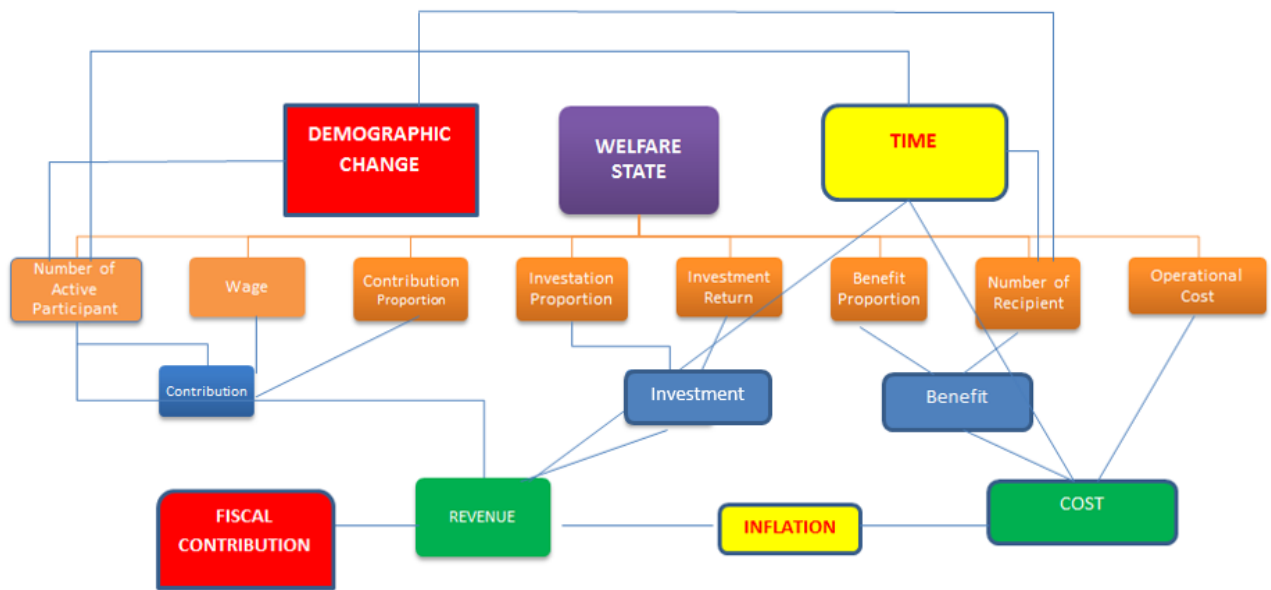
To conduct a mathematical model that can fully express the pension fund management, we have to examine all related variables in a structured logical framework, in which each variable's relationship with one and another is well defined. Therefore, the model that will be used in this study should be derived from analysing every related aspect that may have influence to the pension system.

A pension scheme is principally developed from welfare state, which represents the national ideology and law enforcement of the nation. By analysing welfare state in Indonesia from varieties of capitalism point of view done by Lakatos and Musgrave (1970), we can infer that Indonesia market economy is implemented under coordinated-market-economy approach. It is reflected on Indonesia Constitution Regulation (UUD 1945) Number 33 verse 1 and 4, and then reinforced by regulation number 40 year 2004 and regulation number 25 year 2011 on pension scheme implementation. These regulation implied that Indonesia adopts *bismarckian* system, where social security program – including pension – is nationally implemented with DB system.

3.2.1. Path Diagram

To develop pension financial management model, there should be logical thinking of how every variable affects one another under a well-defined framework of a path diagram. Therefore, as pointed by Kline (1982), relationships among all related factors need to be well defined to built reliable mathematical model. The diagram that can best express the relationship of all related factors toward the implementation of pension scheme can be acknowledged in Figure 3.1.

Figure 3.2. Path Diagram of Pension Scheme



There are three major elements that are influential on the magnitude of pension deficit: demography, welfare state, and time. Demographic structure channels its impact through influencing the composition between workers and retirees. Also, it has an effect through the longevity of the retirees. Then, welfare state deals with the regulation and its direction that determines the shape of pension design formulation, such as the pension mechanism, rate of contribution and benefit, retirement age, investment policy, and institutional management. Lastly, since the simulation is conducted under time period, time is an essential factor that has instrumental weight on determining whether the program’s financing is adequate or not.

3.2.2. Pension Financial Management Model

Pension simulation has been previously done in several countries, including England (Blake and Mayhew, 2006) and China (Zeng, 2011), and in general (Muralidhar, 2004). Using similar mathematical logic, this pension fund management model that will be used in this research can be built as follows.

Resource function = burden function

$$f(Resourc) = f(Burden)$$

$$f(L,E,,I) = f(R,O).....(1)$$

Where:

L : Participant contribution

E: Employer Contribution

I: Investment Return

R: Replacement (benefit amount)

O: Operational Cost

The initial equation (1) is built with an assumption that the amount of resources should equal the burden. With $K=L+E$ denoted as total contribution from worker and employer, resource function can be mathematically expressed as:

$$f(S) = f(K) + f(I).....(2)$$

With

$$K = \alpha W \dots \dots \dots (3)$$

$$f(I) = \pi \cdot f(K) \dots \dots \dots (4)$$

Where:

$f(S)$: resource function

$f(K)$: total contribution function

$f(I)$: total investment function

α : fraction of wage to be contributed

W : wage

π : investment return

Combining (3) and (4), Resource function is as follows.

$$f(S) = \alpha W + \pi \cdot u \cdot f(K) \dots \dots \dots (5)$$

In other side, recall burden function as follows:

$$f(B) = f(R) + f(O) \dots \dots \dots (6)$$

With

$$R = \Omega W \dots \dots \dots (7)$$

$$f(O) = l f(K) \dots \dots \dots (8)$$

Where:

$f(B)$: burden function

Ω : benefit amount proportion

l : operational cost index as a fraction of total contribution, with $0 < l < 1$

Thus, by combining (7) and (8), burden function can be formulated as follows.

$$f(B) = \Omega W + l f(K) \dots \dots \dots (9)$$

When the amount of $f(S)$ outweighs $f(B)$, it would mean that the funding management has a surplus budget, and if it is the opposite, it would mean that there is a shortage. As the last source of revenue, the government usually takes the responsibility to cover the shortage. Thus, later we can convert a shortage fund into government expenditure. For now, we can mathematically express the deficit (D) by subtracting $f(S)$ with $f(B)$:

$$D = f(S) - f(B) \dots \dots \dots (10)$$

In a more detailed expression, the full equation becomes

$$D = \alpha W + \pi \cdot u \cdot f(K) - \Omega W + l f(K) \dots \dots (11)$$

3.2.3. Individual Funding Shortage Model

Time variable needs to be included in equation (11) to show us the pension fund management model for a single individual in his lifetime as pension participant. If the period of individual paying the contribution is t_c and the period of receiving benefit is t_m , we can express the equation (11) into:

$$D = [\alpha W_1 + \pi \cdot u \cdot f(K)] t_c - [\Omega W_2 + l f(K)] t_b \dots \dots (12)$$

Then, if we express the time factor in a more detailed form to enable each variable within the model to change overtime, the above equation would be expressed as following:

$$D = \sum_{t=1}^R [\alpha W_1 + \pi \cdot f(K)] - \sum_{t=R+1}^P [QW_2 + lf(K)] \quad (13)$$

Where:

- D : deficit
- t : time period
- R : year of retirement
- P : year of death
- α : contribution rate
- W_1 : worker's salary
- W_2 : latest salary before retirement
- π : investment rate of return
- $f(K)$: collected fund to be invested
- Q : replacement rate (pension benefit ratio)
- l : operational cost index

This expression shows the amount of deficit that government should pay for one individual from his entirement involvement in the pension scheme. Beside the influence from time, we should also consider the changing of wage. Therefore, the calculation of W should take into account the wage growth of the individual.

3.2.4. Aggregate Funding Shortage Model

This approach is needed to incorporate cross-sectional differences among the participants. In this approach, we adapt the equation (12) by incorporating the total participants and the time frame.

$$D = \sum_{t=1}^R \cdot \sum_{n1=1}^{n1} [\alpha W_1 + \pi \cdot u \cdot f(K)] - \sum_{t=R+1}^P \cdot \sum_{n1=1}^{n1} [QW_2 + lf(K)] \quad (14)$$

3.2.5. Periodic Funding Shortage Model Approach

The previous two approaches use individual approach, under which the resulted calculation expresses the need of additional fund of the same individuals in their life-time. Meanwhile, to be able to examine the performance of a pension scheme in a certain time-frame projection, an approach with periodic basis will be more sufficient. Therefore, we need additional work from equation (14) to provide the expected outcome for the analysis. Such methodology will be applied under certain time framing along with the implementation and its changes.

In equation (14), we assume that individuals who pay the contribution are the same with those who receive the benefit. However, as our scenario is simulated under specific period, the person who receive benefit at the time is different from contributor participants. Therefore, the retirees will be noted as n_2 .

Accordingly, the model used will be adjusted to three scenarios: current scheme, parametrical reform scheme, and multipillar reform scheme.

3.2.5.1. Current Scheme

Indonesia's current system uses single pillar system with DB-PAYGO scheme, hence the contribution directly goes to the retirees. With such mechanism, there is no opportunity for the pension fund management to invest the revenue from payment contribution. This makes the funding management only has payment contribution as their resource. In mathematical sense, we can express the deficit equation as:

$$D = \sum_{t=1}^{30} \cdot \sum_{n1=1}^{n1} \cdot [\alpha W_1] - \sum_{t=1}^{30} \cdot \sum_{n2=1}^{n2} [QW_2 + lf(K)] \quad (15)$$

Where:

- D : deficit
- t : time period
- n₁ : working participants
- n₂ : retiree participants
- α : contribution rate
- W₁ : worker's salary
- W₂ : latest salary before retirement
- Q : replacement rate (pension benefit ratio)
- l : operational cost index

There are two adjustments from equation (14) that we can see in equation (15). First, since we use periodic approach, certain period is fixed from year 2016 until 2045 (30 years). Second, there is no investment feature as part of revenue resource in the scheme since the scheme is PAYG.

3.2.5.2. Parametrical Reform Scheme

In this reform, gradual changes will be applied to two variables: contribution rate (α) and retirement age, while the same model applied with equation (15). The changes will be implemented as follows.

Table 3.1. Parameters' Value Used in Parametrical Reform Scheme

Year	Contribution Rate	Retirement Age
2016-2025	8%	60
2026-2035	10%	62
2036-2045	12%	64

The changes will be implemented three times with 10 years interval. First changes is applied on the basis year – 2016 –, from previously 4.75% into 8%. I choose 8% because with current scheme, the participants contribute 3.25% for old-age allowance, a single benefit that will be paid to the participant from its accumulation and interests. Thus, assuming that old-age allowance

benefit is being reallocated into pension benefit, the total contribution becomes 8% in total. Afterwards, further moderate changes are expected in 2026 and 2036. Different value of the parameters could have been selected to represent this scenario, but since our idea is to see the direction of the outcome, any value would suffice.

3.2.5.3. Multipillar Reform Scheme

As one of the options to minimize the fund shortage, we will include a DC-Funded scheme as an addition to the first scheme. This will enable us to see how much is the advantage of having two schemes. To accommodate the scheme into the existing model, we should first notice two differences in the mechanism.

Table 3.2 Parameters' Value Used in Multipillar Reform Scheme

Pension Pillars	Contribution Rate	Mechanism
First-Pillar (PAYGO-DB)	Year 2016: 8% Year 2025: 10% Year 2035: 12%	PAYGO-DB
Second-Pillar (Funded-DC)	5%	Funded-DC

First, a funded scheme means that every tax payer has individual account to which they store their contribution, and from which they will get their benefit based on the accumulated fund with its investment performance. With such feature, funding resource from investment will be very vital in covering the expenses. Second, as the receiver of the benefit and the contributor must be the same person, the receivers of this benefit is different from the recipients of the first scheme (n_2), and thus we denote them as (n_3). Accordingly, we should acknowledge in the model that at the beginning of period, there is no n_3 since there is no second scheme's participants that have retired. Eventually, as the scheme is being implemented along the time, the portion of retirees who get benefit from the second scheme will grow every year.

Mathematically expressed, the multipillar scheme can be shown as follows.

$$\begin{aligned}
D = & \sum_{t=1}^t \cdot \sum_{n1=1}^{n1} \cdot [\alpha W_1 + \Omega W_1] - \sum_{t=1}^t \cdot \sum_{n2=1}^{n2} [QW_2 + lf(K_1)] \\
& + \sum_{t=1}^t \sum_{n1=1}^{n1} u \cdot \pi \cdot f(K_2) \\
& - \sum_{t=1}^t \cdot \sum_{n3=1}^{n3} [\pi \cdot f(K_2) + l \cdot f(K_2)] \quad (16)
\end{aligned}$$

Where:

n_3 : Retiree participants of DC-Funded scheme

K_1 : Collected contribution from DB-PAYGO scheme

K_2 : Collected contribution from DC-Funded scheme

2.4. Incorporating the Influence from Longevity Factor and Welfare State

The last factors included in the model that influences the model are longevity, which affects through the changes of n_2 and n_3 , and welfare state through the regulation related to pension scheme design formulation and its implementation. Their functional expression can be mathematically expressed as

$$n_{2,3} = f(t, d) \dots (17)$$

$$\partial = f(\Theta) \dots (18)$$

where:

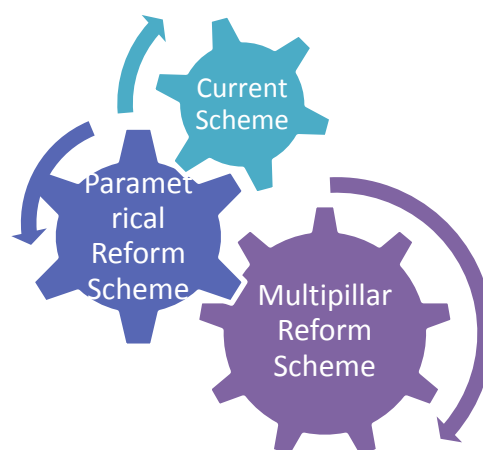
d : Demographic factor

∂ : Pension design

Θ : Welfare state, which is social democratic according to Indonesia Constitution Lawa Number 33 and National Social Security System Act Number 40, 2004

Successively, the three scenarios are simulated based on three schemes which represent every possible reform that the government might choose within the existing principle and constitution which reflects social-democratic welfare state, where the government has central role in providing pension.

Figure 3.3. Simulation Scheme Scenarios



3.3. Data

This research uses secondary data, which involves financial and demographic data. They are mainly provided by PT. Taspen, which includes pension contribution revenue and its expenditure for benefit payment during 2009-2013. All other related data are either calculated by authors or from other institutions. The detail is described as following table.

Table 3.3 Variable Data and Its Source

Variable	Definition/Description	Source
W	Salary of workers (civil servants) that are participated in the pension scheme.	PT. Taspen
W_1	Salary during working period. It grows 5% each year to take inflation consideration into account	PT. Taspen and mathematical calculation
W_2	Latest salary before retiring	mathematical calculation
n_1	Number of working participant	PT. Taspen
n_2	Number of retiree participant	PT. Taspen
R	Retirement age	Ministry of Finance
P	Death age	United Nations
α	Contribution rate	Ministry of Finance
Q	Replacement rate/Benefit Ratio	Ministry of Finance
π	Investment return	Mathematical calculation
t	Time period	Given
l	Operational cost Index	BPJS

CHAPTER 4

PENSION REFORM IN CHILE: A COMPARATIVE STUDY

Chile is one of the interesting countries from which we can learn about pension reform. Their pioneer step that has arguably generated positive outcome in terms of financial perspective and has attracted many other countries to learn from their encounter (Acuna and Iglesias, 2001; Kay and Sinha, 2008). They include many Latin American countries (e.g. Argentina, Columbia, Mexico, Bolivia, Peru, Uruguay and others in 1990s) and countries from other region (e.g. Croatia, Hungary, Kazakhstan, Poland etc) (Orszag and Stiglitz, 2001). Barr and Diamond (2009) confirmed that their experience pattern could also be a good model for other countries to give insight in formulating pension reform.

Likewise, this chapter aims to provide us insight from their experience in reforming their pension system and how they managed to face the challenges. To begin with, general outlook of Chile pension system is provided before presenting several comparable of its dimension with Indonesia in term of pension system implementation. Later, in chapter 5, the result from both actual and simulated pension scheme of Indonesia is also being compared with Chile.

4.1. Pension Program Development in Chile

Social security was first initiated in 1924 as a response to overcome social and economy problems. However, its burden constantly increased as the number of benefit recipient rose. To fund the program, social security tax was initially imposed 5% to the worker's income, and had significant increase overtime. The payroll tax increased to around 30% in 1950s, reached 40% in 1960s, then extended to almost 50% in 1970s. Covering the social security expenses was the reason why such tax increase was necessary (see Cerda, 2008).

Reforms on the pension system continued more extensively between 1979-1982. Chilean government implemented these changes as part of structural economic reform to reduce the state's role and to eradicate monopolies in its business environment (see Acuna and Iglesias, 2001). The retirement age increased from 60 to 65 to minimize the deficit, while the payroll tax was lowered by 50% to prevent early retirement (see Cerda, 2008). Later, the Chilean government realised that parametric reform was not enough to permanently solve the increasing financial burden. In 1981, pension scheme with individual accounts (IA) was introduced to new workers entering labor market in 1982 to replace the PAYGO one. Workers that have been under PAYGO scheme was offered voluntarily scheme as an additional option.

Chile had been under traditional PAYGO system since 1925, before transforming it into IA funded scheme in 1981 (see Cerda, 2008). Hundreds of pension institutions were running the system with different regulation and poor management, which caused parametrical changes in the system did not help much (Edwards, 1998). The unavoidable deficit was handled by government, while the demographic and inflation added to worsen the situation. The peak was reached in 1979, where the ratio of workers per retiree had fallen to 2.5 from 12 in 1955.

The urge to uniform the regulation with new mechanism of scheme comes to initiation in the beginning of 1980s. The key features include capitalising contributed funds to each individual participant's account. By allowing this, the retirement benefit calculation can be based on the balance of accumulated fund. The fund management was run by several private institutions, called the Pension Fund Administrators (AFPs), to which workers were free to choose. This allowed government to limit their capacity as system regulator and guarantee the minimum pensions (see Acuna and Iglesias, 2001).

The role and coverage of AFP continually increased and was intended to gradually replace the old pension management institutions (see Edwards, 1998). Afterwards, in order to eliminate different standards and rules, Chilean government introduced some regulatory changes in the system under which AFP worked (see Acuna and Iglesias, 2001). In total, there were 448 modifications of the main laws between 1981 to 2000. These adjustments were taken with consistency among policy stakeholders in determining the direction of the pension design, Iglesias-Palau (2009) studied. The aim was, to strengthen the financial condition through broadening the investment opportunities and eliminating obstacles in managing the collected contributory fund.

Ever since reform in 1980 started, Chile has significantly reduced the deficit and offset the opposite impact from its demographic transition (Cerda, 2008). Its reform then got promoted Despite the cost reduction was gradually achieved, Chile had to pay substantial cost to manage the reform from

PAYGO into funded scheme, since there were many participants that had contributed in PAYGO scheme. But once paying-transition-cost period was passed, Chile started to harvest its financial sustainability.

However, although Chile lessened the fiscal burden through the funded scheme, the coverage was only around 60 percent in 2003, while administrative problems and high inflation were also of high concerns (see Soto, 2007). Further reform was initiated in 2008 to broaden the system's coverage and increase the safety net. The government announced Basic Solidarity Pension (PBS) and Solidarity Pension Payment (APS) as interferences to citizen who did not contribute at all or not fully contribute to the system (Behrman et al, 2011). This package of programs was launched as part of three-pillar scheme that was implemented at the time.

4.2. Chile's Current Pension Scheme

Since the latest reform in 2008, Chile has basically used three-pillar pension scheme: Solidarity pillar, an obligatory contribution pillar, and voluntary contribution pillar (see Juaregui, 2010). This combination of scheme is purposed to smoothen the consumption pattern of elders before and after retiring, with the first scheme is specialised to prevent them to fall into poverty. The second pillar is a DC scheme, with the retirement benefit is calculated based on accumulated fund from each participant (Juaregui, 2010). Then, the third one is a voluntary scheme to add benefit to those who are willing to contribute more. The characteristics of each pillar are explained as follows.

a. Solidarity Pillar

Poor citizens has historically irregular contribution to the pension scheme, whether caused by fluctuating or low income due to working in informal sectors. Pension Fund Administrator (AFP) provides a safety benefit to this group of individuals to guarantee that they would get a basic benefit to cover their basic needs. The fund is provided by the national budget, and transferred to the 60% of the poorest citizen regardless of their pension contribution (Júaregui, 2010).

The age eligibility for this scheme is 65 years old, with those who were not contributing at all will be allowed to get Basic Solidarity Pension (PBS). The coverage was initially 40% of the poorest and has escalated to 60% of the population in 2012. Meanwhile, those who were occasionally contributing due to low income will be entitled to Solidarity Pension Payment (APS). Beside the minimum guaranteed pension, they also get social assistance benefit.

b. Mandatory Contribution Pillar

The main revenue comes from this second pillar, which requires every mid-income individual to contribute. The benefit is calculated fully based on the amount of contributions accumulated during the individual's working period. Individuals would get lesser benefit if they have periods where they could not contribute – whether due to job changes, getting involved in informal work, or joining this scheme at older age (Júaregui, 2010).

To deal with increasing life expectancy, this mechanism has been reshaped in terms of contribution rate, longer working period to be eligible to retire, and lower benefit (see Júaregui, 2010)

c. Voluntary Pillar

The third pillar aims to attract more contribution that is exempted from tax, where the participants will have broad options of investment to which their contribution is allocated (Júaregui, 2010). Compared to the mandatory pillar, this scheme allows the members to have freedom to decide the level of contribution and choose which investment options are best to their preference.

The challenge had always been to encourage middle-income workers to participate in this scheme, since voluntary contribution only reached the rich workers when it was introduced in 2002. Since 2008, further tax incentives has been added and Collective Voluntary Pension Savings (APVC) was introduced (Júaregui, 2010).

4.3. The Pension Reform Result

Cerda (2008) studied the comparison between the 1981 reform result and the case if there were no reform taken. He found that both schemes have considerably huge cost to be financed with different tendency. The transition to IA scheme yields a certain cost with the fact that benefit for existing and upcoming PAYGO benefit recipients still needs to be financed until the time when the whole participants in the system are entitled in IA scheme. However, as the PAYGO recipients is gradually replaced by IA participants, the deficit is decreasing overtime.

The opposite direction happens if there was no reform implemented in 1981. Increasing number of retirees due to both demographic transition and longevity factor pushes the deficit to continually increase overtime. Simulation done by Cerda (2008) shows that without changing the scheme into individual account, the financial problem would appear at a later period. The deficit could even be delayed until 2025 had the government proposed parametrical reform only in 1981. But once the financial crisis appears, it would continually be bigger and more difficult to overcome. This finding is also concluded by Melguizo et al (2009) that in long term, financial burden without pension reform will be bigger than the one with reform.

Despite the reform, Chile did not move away from market-oriented economy. The reform itself was initiated from inside neoliberal economists (Mesa-Lago and Muller, 2002) and it was even made as an example of what free-market economy could achieve (see Buchholz et al, 2008). The implementation is run by authorized private institutions, while the government focus on the regulation and providing minimum pension to the poor. It allows the social security to be more difficult to be affected by political stability (Iglesias-Palau, 2009).

4.4. Comparison with Indonesia

Before reforming the pension scheme, Chile has two similarities with current Indonesia in relation to pension benefit provision. First, both countries inherited conventional PAYGO scheme from the past. Second, in terms of demographic challenge, Chile started to experience financial problem that was caused by aging population in early 1980s. To prevent the deficit from mounting further, Chilean government began the reform in 1981. Compared to Chile, Indonesia began to suffer from pension fund shortage since 2004. However, the intention to reform the scheme did not continue in 2005 when

the new elected political party at the time did not prioritise to reform the pension.

Therefore, we can examine whether the success of Chile in creating sustainability in pension financial would also turn out in Indonesia with similar path of reform. In following table, we can clearly look basic comparison between current Chile and Indonesia.

Table 4.1. Scheme Comparison between Chile and Indonesia

Comparison Criteria	Chile	Indonesia's Current Scheme	Multipillar-Reform Scenario
Pension Scheme	Three-pillar scheme, which consists: 1. Solidarity pillar that is guaranteed and funded by government 2. Mandatory pillar using DC scheme 3. Voluntary pillar using DC scheme	Single-pillar scheme, which is centralized by state-owned enterprises using PAYGO scheme, where government take full responsibility to fund the deficit	Two-pillar scheme, where there is an additional Funded-DC scheme to the existing system
First-pillar	Solidarity pillar funded by government	PAYGO-DB scheme for civil servant and military force	PAYGO-DB scheme for civil servant and military force
Second Pillar	Mandatory contributory pillar	-	Funded-DC scheme for civil servant and military force
Third Pillar	Voluntary Contributory Pillar	-	-
Retirement age eligibility	65 years old	58 years old	60 years old in 2016, 62 years old in 2026, 64 years old in 2036 until 2045

Source: Acuna and Iglesias (2001); Cerda (2006)

CHAPTER 5

SIMULATION RESULT AND ANALYSIS

This chapter provides the analysis that comes from the simulation result in order to examine each scheme's performance. The coverage includes financial deficit results from three scenarios: current scheme (without any reform), parametrical reform, and multipillar reform. The objective is to examine the capability of each scenarios in reducing the fiscal deficit and whether it can sustain in the future. Then, the projection is compared with the reform result of Chile – that was initiated in 1981 using multipillar reform – and its other scenarios using the old scheme and parametrical reform.

5.1. Simulation Result Analysis

The values that are used in the models are addressed as in Table 5.1 as the basis of simulation calculation. In the current scheme column, replacement rate (pension benefit rate), contribution rate, retirement age are exactly the same as present regulation. The latter two are variables that are used as the changing

variables, whereas replacement rate (pension benefit rate) is set fixed. The other variables are determined based on data from PT. Taspen or assumption from Social Security Administrative Bodies (BPJS).

Table 5.1. Variable Values Used in Pension Scheme Scenario

Variables	Value	
	Current Scheme	Parametrical and Multipillar Reform
Replacement Rate (Q)	0.8	No changes
Contribution Proportion (α)	0,0475	Year 2016-2025: 0.08 Year 2026-2035: 0.10 Year 2036-2045: 0.12 In multipillar reform, there is an additional 0,05 contribution rate for the second pillar scheme
Retirement Age	58	Year 2016-2025: 60 Year 2026-2035: 62 Year 2036-2045: 64
Life Expectancy	72.4 years old (year 2014, and gradually increasing each year up to 74,4 years old in 2045)	No changes
Total Length of Months in Simulation (t)	444 (30 years)	No changes
Length of Contributing Period (t_1)	Depends on each participant's cohort of age until reaching retirement age	Similar with current scheme (with adjustment to different retirement age)
Length of Receiving Benefit Period (t_2)	Depends on each participant cohort of age's life expectancy after 58-year-old of age	Similar with current scheme (with adjustment to different retirement age)
Number of Working Participants in 2016 (n_1)	4,525,205	No changes
Working Participants Growth (Civil Servant Employment)		

Growth): 2014-2019 2019-2045	0% 1.97%	No changes
Number of Retired Participants (n_2)	Year 2016: 2,172,945 Year 2016-2045: Adjusted with new cohort of retirees and deceased retirees	Similar with current scheme (with additional adjustment due to different retirement age)
Salary (W, W_1, and W_2)	Diverse among the participants	No changes
Average Salary Growth Rate (g)	5%	No changes
Operational Cost Index	0.001277348	No changes

Source: Author's compilation

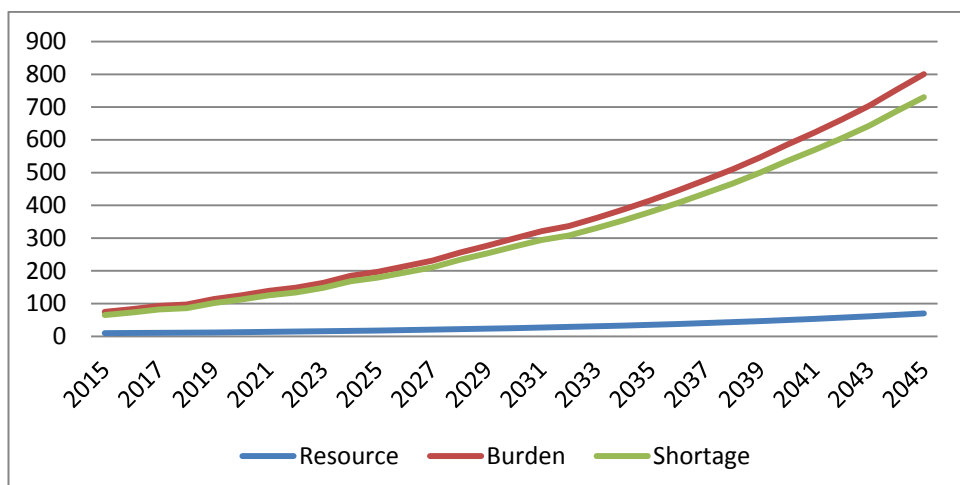
Major changes in parametrical reform lies in different contribution rate and retirement age with further changes every ten years. Subsequently, the latter changes leads to adjustments in contribution and receiving-benefit period. Meanwhile, life expectancy's value changes along the years based on UN projection for Indonesia. Consequently, the increasing of life expectancy expands the benefit-receiving period for retiree, while raising the retirement age would do the contrary.

Under the three scenarios, we should note that three major variables changes overtime: wage, number of working participants and retirees, retirees and life expectancy. The growth of wage in turn affects the amount of contribution paid and the latest wage before retire, which determines the level of pension benefit. Then, as the effect of demographic transition, the number of workers and retirees are also adjusted each year. Lastly, the increasing life expectancy raises the number of opportunity of retirees in getting pension benefit provision. In sum, each variables in each scenarios change overtime.

5.1.1. Current Scheme Simulation

Following simulation result is the outcome of financial model shown in equation (15), which is explained in Chapter 3. Without any changes in the scheme, the expected outcome is generally depicted on graph 5.1, from which we can see that the fund resource that comes from participant's contribution is significantly lower than financial burden. Along the time fame, the burden grows much faster than the resource's growth, resulting in escalating financial gap between the two.

Figure 5.1. Financial Trend Projection with Current Scheme



Source: Author’s calculation

On the starting simulation period, financial shortage of the pension fund totals Rp 86.012 trillion, with only 12.3% of the monetary burden can be covered by the resource (see Table 5.2). With annual deficit growth of 9.08% per year, it will expectedly get doubled for the first two periods – 4 years and 5 years–, and reach more than its thirteen-fold by 2045.

We should also take note that faster growth of the financial liability deteriorates the coverage capacity of the funding resource. Over the simulation years, its coverage percentage will continuously decline until it reaches 8.75% in 2045, although the degression is slowing down, as in the last period it will only decrease by 0.42% (compared to 1.49% in the first period).

Table 5.2. Result Estimation from Current Scheme in Certain Period

Year	Shortage (in trillion Rp)	Resource-Burden Ratio
2016	86.012	12.3%
2020	133.004	10.13%
2025	222,211	9.07%
2030	343.884	8.41%
2035	508.742	8.52%
2040	772.321	8.51%
2045	1,165.668	8.75%
Average Deficit Growth		9.08%

Source: Author’s calculation

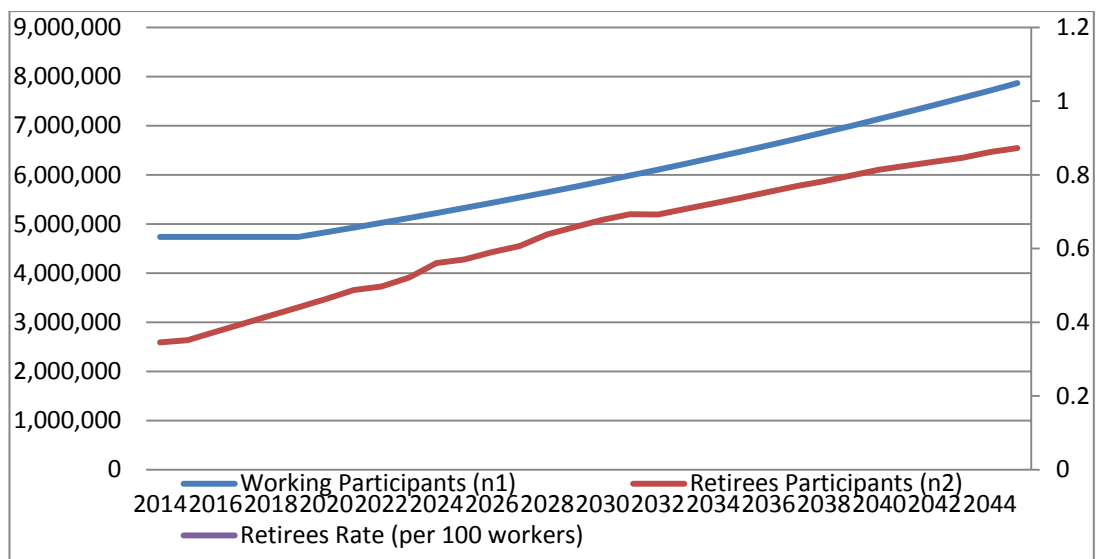
The exponentially-rising deficit can be observed from three main causes. First, the gap of the contribution rate to the replacement rate is too big. With only 4.75% of the basic salary to be collected to cover 80% of the last salary of retirees, it is certain that the benefit that has to be paid will outweigh the collected contribution.

Second, the rapid rise of the retirees enhances the certainty that participant’s contribution will grow more insignificant from year to year. We can infer this from graph 5.2, where the number of retirees grows faster than the natural

growth of workers. Currently (2015), the retirees rate equals to 55, which means every 55 retirees are supporting 100 retirees. It is estimated that the number will continue to rise until 87 by 2030, before starting to stabilise at that level. In other words, the same level of participant's contribution will be responsible to cover more retirees in the future.

The third factor comes from increasing longevity, which causes the burden to become heavier. The rising life expectancy will cause the retirees to receive the benefit for a longer time, adding the burden that has to be paid. Along the simulation years, the life expectancy increases by 1.84 years, meaning that in average, the retirees in 2045 will get benefit 23 more times than the retirees in 2016.

Figure 5.2. Comparison Projection between Workers and Retirees



Source: Author's calculation

If we sum up the performance of current scheme for 30 years, several important of financial results are presented in Table 5.3. It is estimated that the total yielded deficit will be amounted more than 10 times of total collected revenue. In other words, during 2016-2045, the resource can only pay off 8.78% of the liability.

Table 5.3. Accumulated Value Estimation of Simulation Result with Current Scheme

Result Variables	Accumulation Value from 2016-2045 (Trillion Rp)
Revenue	926.191
Burden	10,553.952
Deficit	9,627.762
Shortage-Resource Ratio	10.395

Resource Coverage	8.78%
Retirees-Rate (per 100 workers)	74.2

Source: Author's calculation

5.1.2. Parametrical Reform Simulation

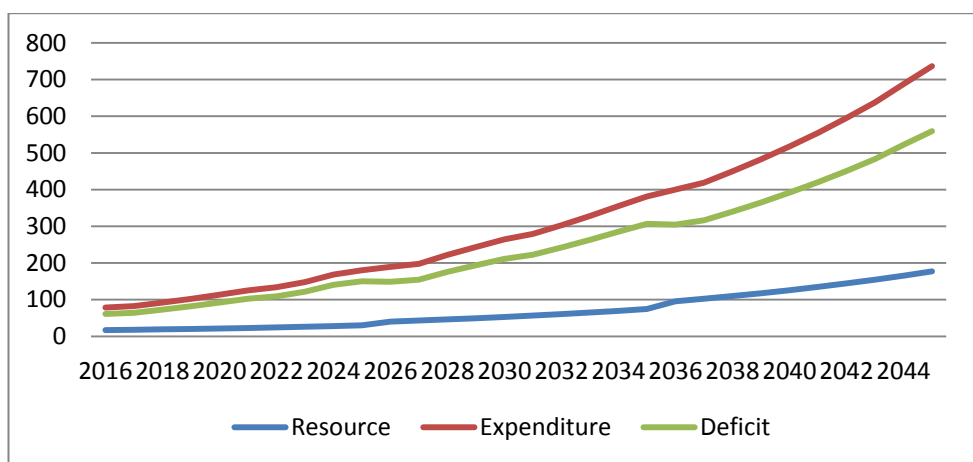
Recall changes of parametrical reform scheme as presented in following table.

Table 5.4. Parameters' Value Used in Parametrical Reform Scheme

Year	Contribution Rate	Retirement Age
2016-2025	8%	60
2026-2035	10%	62
2036-2045	12%	64

With parametrical changes in the pension design scheme, the same trend still persists (see figure 5.4), but in much smaller gap between resource and burden. Additionally, the shortage is expected to grow in a slower pace. Obviously, the size of the gap and the speed of the deficit to increase could be simply lowered further by determining more expansive variables. However, it is clear that parametrical reform could not prevent the shortage from increasing in the future, and it only delays the financial crises from happening.

Figure 5.3 Financial Trend Projection with Parametrical Reform Scheme



Source: Author's calculation

This scenario shows the scheme yields significantly bigger coverage, between 8-15% higher compared to current scheme (see Table 5.5), but the capability to cover the burden does not show significant increase within the time frame. The deficit grows in slower rate of 8% in average causing the revenue can only cover 16.65% of the pension burden at the end of simulation period.

Table 5.5. Result Estimation from Parametrical Reform Scheme in Certain Period

Year	Deficit (in trillion Rp)	Resource-Burden Ratio
2016	61.14	22.02%

2020	91.96	18.82%
2025	150.14	16.71%
2030	211.27	20.05%
2035	306.73	16.04%
2040	391.64	24.32%
2045	559.27	24.05%
Average Deficit Growth	8%	

Source: Author's calculation

Along the time projection, parametrical reform can reduce the deficit-revenue ratio to almost half from current scheme (10.395 to 5.269). The main source of the improvement comes from the increasing revenue, which reaches 128%. Meanwhile, the burden decreases 10.3%, caused by the increasing of retirement age. In result, the deficit reduced by 23.62%, which is gained from increasing contribution rate and retirement age.

Table 5.6. Accumulated Value from Parametrical Reform Performance Projection

Result Variables	Accumulation Value from 2016-2045
Revenue	2,114.170
Burden	9,467.483
Deficit	7,353.312
Deficit-Revenue Ratio	5.269
Revenue-Burden Ratio	15.953
Retirees-Rate (per 100 workers)	72

Source: Author's calculation

However, despite this parametrical reform could significantly reduce the deficit, it is far from an ideal solution. Not only that it still yields deficit five times to the revenue, it also does not prevent the future deficit from increasing. At the end of the simulation period, the scheme's revenue only cover 16.65% of the expenses, decreases 2,84% from the beginning of simulation period. Parametrical reform might give mathematical solution to the deficit by raising contribution rate and retirement age much further without considering the appropriateness of the scheme, but still, it will not be able to push the deficit to decrease.

5.1.3. Multipillar Reform Simulation

In this scenario, we use the financial model of equation (16) which is developed in chapter 3. The parameter used in this scenario is as presented in following table with further changes as follows (recall Table 3.2).

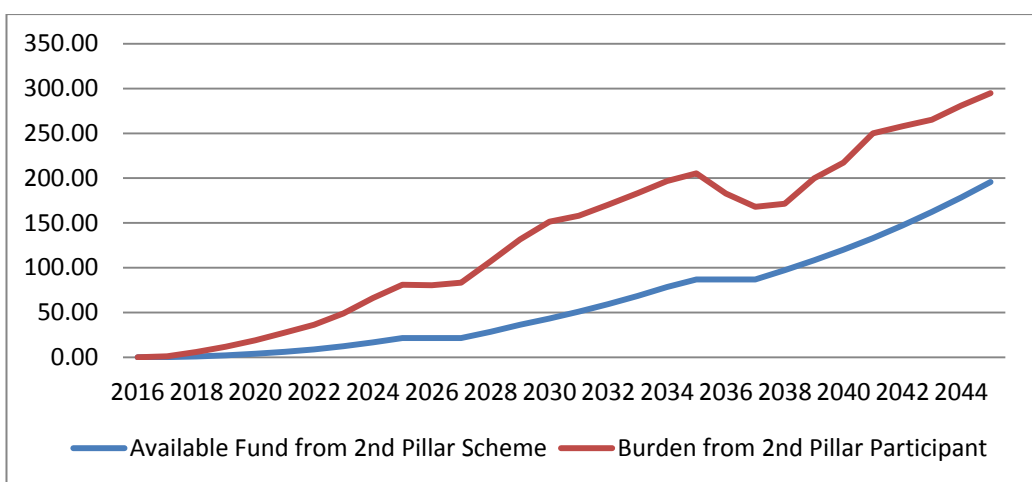
Table 5.7. Parameters' Value Used in Multipillar Reform Scheme

Pension Pillars	Contribution Rate	Mechanism
First-Pillar	Year 2016: 8%	PAYGO-DB

	Year 2025: 10%	
	Year 2035: 12%	
Second-Pillar	5%	Funded-DC

In this scenario, parametrical reform is treated as part of multipillar reform scheme, where additional contribution is allocated to the second pillar Funded-DC scheme. This allows the additional revenue to not directly goes to the retirees, but moves to investment first before being used to pay the retirees who have previously paid the additional contribution. Subsequently, the collected fund that can be allocated as pension benefit starts from zero in the beginning of the simulation (see figure 5.5). Afterwards, both variables rises as the participants involved in second-pillar scheme starts retiring.

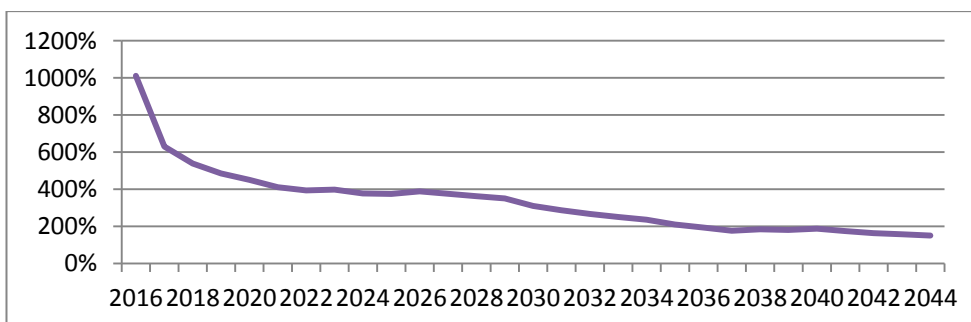
Figure 5.4. Performance Trend Projection of Second Pillar Scheme



Source: Author's calculation

The uncovered expenses is expected to be covered by investment, making the role of pension fund management institution become crucial to perform adequate investment performance. As DC-Funded Scheme begins at 2016, the investment burden starts at a very high burden (see figure 5.6). It is because the new retirees will have only paid for a short time, while they will receive the benefit for a relatively much longer time. Then, as the implementation of this scheme goes longer, the investment burden goes decreasing and will be below 200% after 2035.

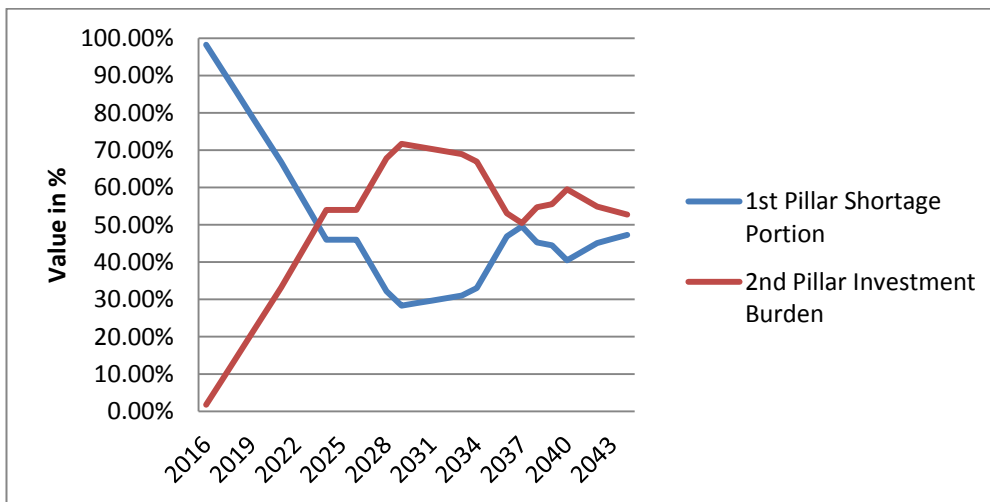
Figure 5.5. Investment Burden Trend Projection of the Second Pillar Scheme



Source: Author's calculation

Thus, there are two beneficial features that we can expect from the second-pillar scheme. First, the deficit only arises if only the investment does not perform the expected outcome. Second, the advantage of this scheme is that it can help to cover the deficit from first-pillar scheme, depending on how big the contribution rate of this scheme is compared to the contribution rate of the first-pillar scheme. In this scenario, we specify it 5% of the worker's salary, resulting its absorption of burden coverage in figure 5.7.

Figure 5.6. Shortage Fraction Trend Estimation from Multipillar Reform Scheme



Source: Author's calculation

At the early period of multipillar scheme implementation, the DC-Funded scheme can only absorb little portion as the most retirees are still not involved in the scheme. As the second scheme participants starts retiring, its shortage absorption increases up until around 70% at 2029. Afterwards, its portion start decreasing because the retirees who are involved in the second scheme will expectedly pass away. From that point, the shortage absorption's movement depends on the amount of retirees with a tendency to go at 50%.

The projected deficit that is absorbed into investment burden of second-pillar scheme shows that this scheme might substantially push the deficit from investment return. In the beginning, it is unlikely to happen since the needed investment return starts from 1000% due to the relatively short period of contribution. But the possibility of this mechanism to fulfill the investment return gets lighter as the year goes on despite the share of this burden to cover the deficit gets bigger.

In conclusion, assuming that investment return could fulfill the expected deficit that comes from the second pillar alone, multipillar pension scheme can both reduce the deficit and help to prevent the rising deficit in the future. Then, accordingly, the shared burden to the second-pillar scheme makes the role of investment very crucial to sustain the financial balance. If it is followed by bigger proportion in second-pillar scheme compared to proportion in first-pillar, the investment burden would be more eased and it would absorb the deficit from first-pillar scheme even more.

5.1.4. Lesson from the Three Scheme Scenarios

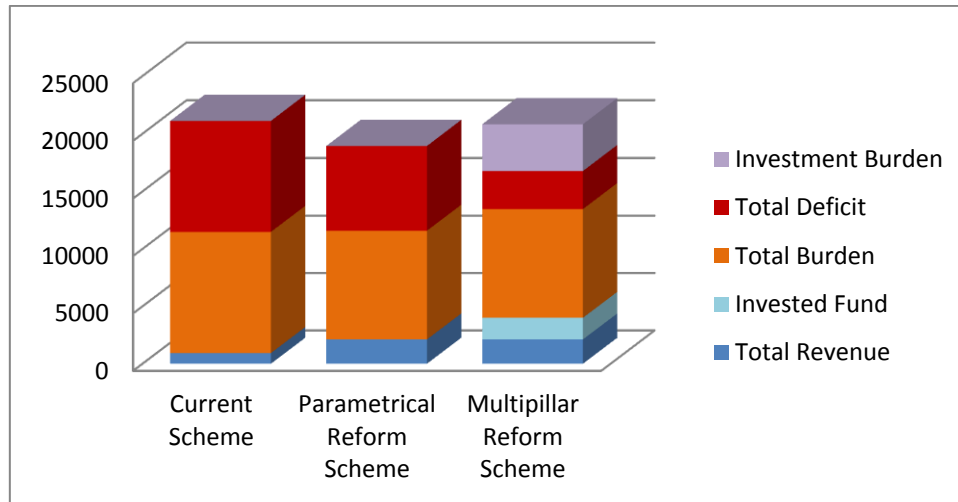
Table 5.8. General Comparison between the Three Scheme Scenarios

Scheme	Shortage-Resource Ratio	Investment Burden for 30 years	Average Investment Burden Per Year
1. Current Scheme (DB-PAYGO)	10.395		
2. Parametrical Reform Scheme (DB-PAYGO)	3.478		
3. Multipillar Reform Scheme:			
a. First Pillar (DB-PAYGO)	1.561		
b. Second Pillar (DC-Funded)		233.82%	115.27%

Source: Author's calculation

Table 5.7 presents the comparison of shortage ratio of the three simulated scheme in 30 years period. The first scheme scenario shows that the funding shortage is 1039.5 times of the resource, implying that it needs additional resources which equals to 939.5% of its revenue. Meanwhile, a parametrical reform scheme would reduce the additional resources needed to 247.8% of its revenue. With multipillar scheme, the remaining uncovered burden would need additional 56.1% from its revenue, while the necessary investment return is expected to yield 233.82% in total, or 115.27% in average each year. However, the expected investment return decreases every year, reaching 50.73% by the end of the simulation.

Figure 5.7. Result Comparison between the Three Scheme Scenarios



Source: Author's calculation

Until 2045, pension design scheme with two-pillar scheme with modest parametrical changes is estimated to effectively reduce funding shortage to 34.28% of its expected shortage with current scheme. The main source of its alleviation comes from deficit reallocation to second-pillar scheme. With investment feature as the distinctive feature of DC-Funded scheme, it is expected that the scheme to yield 215,24% during its total time.

5.2. Implication to the Role of Investment

Around the world, investment has been highly regarded as one of crucial component of funding source in running pension program (see Modigliani and Muralidhar, 2004). For the case in Indonesia, based on simulation result, it would hold for more than 50% of the pension burden since 2022. This inevitably causes the performance of investment will be vital to cover the deficit.

The rate of investment return would depend on three factors: investment decision, money market condition, and support from government (Azizon, 2014). The first one deals with how well PT. Taspen and BPJS as pension fund institutions make investment decision. Next, money market will be influential, as it determines the interest of the invested fund. Then it will highly depend on the monetary policies implemented. And lastly, support from government is needed in terms of creating regulation through which investment options can be expanded to many sectors (Azizon, 2014). Regarding to this, further studies on the role of investment in a reformed pension scheme in Indonesia is very important.

5.3. Scheme Reform Results Comparison with Chile

There are two distinctions between the reform scenarios in Indonesia and in Chile that need to be clearly stated first before comparing them. First, the former case uses relatively modest parametrical changes since the purpose is to plot the impact direction of doing such reform. Hence, there is still room for Indonesia to choose higher contribution rate and retirement age. Meanwhile, in Chile, the parametrical changes had been appropriately determined to give the highest possibility to yield the expected outcome. Second, despite both cases use multipillar reform as one of the scenarios, there are three differences in the scheme and its mechanism.

First difference lies on the first-pillar scheme. In this simulation, first-pillar scheme uses PAYGO mechanism, whilst Chile uses non-contributory pillar, where the benefit is fully funded by government. Second, second-pillar scheme's participants in this study is the same individuals who are involved in the first-pillar scheme. Meanwhile, first-pillar scheme in Chile is only for the low-income participant, who are among the 60%-poorest citizen. Then, the third differences is the existence of transitional cost. In our study, we enlarge the previous system with second-pillar scheme as an addition to the existing scheme. On the contrary, Chile use the funded scheme to replace the old PAYGO one, causing the pension benefit of retirees who were entitled in the old scheme needs to be funded by government, since the new participants' contribution can not be used to pay the retirees' benefit. This transitional cost exists in Chile during there are still retirees who are not involved in the new scheme, while in this simulation similar expenditure does not occur.

Table 5.9. Reform Result Comparison with Chile in % of GDP

Years After Actual Reform (1981)	Without Reform		Parametrical Reform		Multipillar Reform	
	Indonesia	Chile	Indonesia	Chile	Indonesia	Chile
1	-4,58	1,1	-3,83	1,1	-3,83	-2
5	-5,81	-	-4,74	-	-3,77	-
10	-7,25	-	-6,07	-	-2,8	-
15	-8,68	0,9	-6,69	0,9	-1,89	-3,7
20	-9,43	-0,1	-7,61	0,2	-2,51	-4,8
25	-10,41	-1,9	-7,61	-1,4	-3,39	-4,5
30	-11,12	-2,3	-8,52	-2,2	-4,03	-3,9
35	-	-4,7	-	-3,6	-	-3,2
40	-	-5,3	-	1,3	-	-2,3

Source: Cerda (2006) and Author's calculation

To make both reform comparable, we use the deficit in terms of % of GDP in table 5.8. For Indonesia, the GDP growth is assumed 5% during the simulation period. Without any reform, both countries suffer unstoppable increasing financial deficit in the future, as the revenue will never be able to catch up with rising burden due to demographic transition. The different is that in Chile, the deficit starts arising 20 years after the actual reform. Similar trend appears in both countries where they implemented parametrical reform. Such reform could only temporarily reduce the deficit, but could not change the trend.

Using multipillar reform scenario, both countries show its effectiveness in sustaining the financial balance. Indonesia could notably reduce the deficit and push the trend down until 15 years after the reform. Afterwards, the deficit share in terms of GDP starts rising again as the impact of demographic transition effect is going to get bigger and could not be resisted without further reform in the future.

CHAPTER 6

CONCLUSION

This research paper aims to examine whether multipillar pension scheme reform can consistently overcome financial deficit in Indonesia pension system in the future. In so doing, financial simulation is conducted through developing financial model under the influence of demographic transition and economic assumptions within the scope of social-democratic welfare state. In the end, this study concludes how multipillar reform scheme can perform in fiscal perspective.

The sequence of this research to answer the question is as follows. In formulating the appropriate financial model to calculate the deficit, I use path analysis to build framework in which each related variable's effects to the deficit are specified. Then, the relations between variables are expressed in mathematical model to perform the simulation. The model then is being adjusted to the three scenarios which are being simulated: current pension scheme (without reform), parametrical reform, and multipillar reform. Accordingly, the outcome of the simulation projection is used to determine whether the reform can be the panacea to the deficit issue. Finally, the result and conclusion are being compared to the similar's reform that was performed by Chile to study more on the outcome differences.

By keeping the current scheme to operate in the next 30 years, this study find that financial deficit is rising 9.08% each year in average, while generating revenue only 8.75% of the needed fund by the end of projection period. With parametrical reform, the new scheme could push the total deficit along the year by 23.62% compared to the current scheme's deficit. Its revenue can reach 24.05% by the end of the simulation period, where the financial coverage each year is 8 to 15% higher compared to current scheme. However, its outcome still show that the deficit rises 8% each year in average. Meanwhile, multipillar reform scenario shows that by adding Funded-DC pillar, the financial burden can be financed by investment return by 50-70% after 6 years of the reform. The necessary investment rate of return decreases every year to perform the expected outcome, reaching 50.73% by the end of the simulation year.

In general, multipillar scheme is not only able to decrease the deficit by transferring the deficit into second-pillar scheme, but also to preventing the deficit from rise in the future by handing over part of the finance burden into the investment return. Consequently, the role of investment would be very crucial to meet the expected outcome.

This is similar to what has been experienced by Chile until recently, where mandatory contributory pillar with Funded-DC mechanism is used as one of the scheme from which the financing comes from investment return. The difference is that Chile use the new scheme to totally replace the previous PAYGO-DB scheme, so that there is transition cost which arises due to the existing of old scheme's retirees. Eventually, the financial deficit continued to decrease, similar with what is expected with Indonesia if multipillar reform is implemented.

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