

Risk Management in Company Pension Schemes

Masterarbeit

zur Erlangung des akademischen Grades „Master of Science (M.Sc.)“
im Studiengang Wirtschaftswissenschaft
der Wirtschaftswissenschaftlichen Fakultät
der Leibniz Universität Hannover

vorgelegt von

Name: Nguyen

Vorname: Thi Thu Phuong



Prüfer: Prof. Dr. Michael H. Breitner

Hannover, den 30.09.2013

Table of Contents

List of Figures	IV
List of Tables	V
List of Abbreviations	VI
1. Introduction	1
1.1 Background, motivation and research problem.....	1
1.2 Thesis framework.....	3
2. Theoretical background	4
2.1 Company pension schemes in German pension system.....	4
2.1.1 Mandatory state pension provision.....	4
2.1.2 Company Pension Schemes.....	5
2.1.3 Private Pension Schemes.....	9
2.2 Types of commitment.....	9
2.3 Five alternatives of company pension schemes.....	11
2.3.1 Direct Pension Commitment.....	12
2.3.2 Support Fund.....	13
2.3.3 Pension Insurance Fund.....	14
2.3.4 Direct Insurance.....	15
2.3.5 Pension Fund.....	16
3. Different risks in occupational pension schemes	17
3.1 Biometry Risks.....	18
3.2 Financial Risks.....	19
3.2.1 Financial Risks in Defined Benefit Plan and Defined Contribution Plan.....	19
3.2.2 Capital investment risks.....	20
3.3 Risks from the perspective of employees.....	22
4. Asset-Liability Management, a key instrument of Risk Management	23
4.1 General principles of Asset-Liability Management.....	23
4.2 Optimization technique.....	27
4.2.1 Optimization under consideration of insurance technical reserves.....	27
4.2.2 Optimal investment under inflation risk.....	30
4.2.3 Mean-Variance Portfolio Optimization with inflation hedge.....	42
4.3 Immunization strategy.....	47
4.4 Simulation technique.....	51
5. Governance of Company Pension Schemes	54

5.1 Governance as part of risk and return management	54
5.2 Holistic Balance sheet, a possible future regulation concept	57
5.2.1 Motivation of HBS.....	58
5.2.2 Functioning Principles of HBS	58
5.2.3 Strengths and Weaknesses of HBS	61
5.3 Investment Governance	64
5.3.1 Investment Regulations.....	64
5.3.2 Sustainable Investment	67
6. Discussion.....	69
7. Conclusion	73
Appendix	76
List of References	84
Ehrenwörtliche Erklärung	96

1. Introduction

1.1 Background, motivation and research problem

One of the most important aims of the pension system is to provide a certain income to people upon their retirement.¹ The German pension system is composed of three integral parts: mandatory state pension provision, company pension schemes (in many literature also as occupational or work-based pension schemes) and private pension schemes.²

However, nowadays the oldest part of the Germany pension system, “state pension”, is influenced by the demographic shift in Germany’s society. The younger share of the population is shrinking while the older population is growing, which is the result of the sustained low fertility rates and the increase in life expectancy. Between the years 1990 and 2012, the number of people from the age of 65 and above has increased by 5 million, representing an increase of 42%, while the total population grew only by 3%.³ At the same time, the ratio of pensioners to employees has grown up over the past decades and a further uptrend is expected in the following decades. According to the German Federal Statistical Office, this ratio will increase from 40.32% in 2015 to 73.89% in 2050⁴, approximately 33.57% decrease in the workforce. Therefore, the deficit of employees contributing to the social security system is growing whilst at the same time, the number of beneficiaries and retirees receiving pension benefit will increase. In this connection, governments of many countries are forced to reduce pension benefits of the future generations and to promote the entirely funded schemes through the crisis of “Pay As You Go” public pension system.⁵

In Germany, the government must absorb a new debt every year in order to finance the future public pension obligation which causes more and more future liabilities, the so-called “implicit government debt” and the consequent inflation hereafter.⁶ For this reason, the relevance of capital funded pension schemes “company pension schemes” will be increasing in the coming years. The statistics from the last several years show that the general known word “crisis” such as financial crisis, euro crisis or public debt crisis etc. has raised its relevance in most official debates. The subprime crisis began in 2007 and thereafter the following financial crisis has a great effect on the capital funded pension schemes such as occupational pension schemes or private pension schemes. Euro crisis and public debt crisis nowadays have been

¹ Cf. Bodie and Davis (2000), p. 1.

² Cf. Hertrich (2013), p. 19 cont.

³ See Federal Statistical Office 2011, p. 8.

⁴ See Federal Statistical Office 2013.

⁵ Cf. Vigna (2009), p. 1.

⁶ Cf. Mehnert and Nastansky (2012), p. 9 cont.

threatening a potential consequence of the high inflation in the future.⁷ Furthermore, pension accounting under German Commercial Law has experienced extensive changes through the German Accounting Law Modernization Act since 2009 and the trend to more market-based accounting of International Accounting Standard (IAS) 19.⁸

The mechanism of company pension schemes operates relatively simple. Firstly, contributions are paid into pension funds which are then invested on capital markets. When employees leave for retirement, invested capital is paid in the form of pension benefits. But the returns on investment, mortality or salary growth all are uncertain, which forces occupational pension funds to take risks inevitably.⁹ Parallel to the development and encouragement of company pension schemes, the importance of risk management due to the junction of risky factors such as (1) underfunding of pension, (2) persistence because of *low interest rate, inflation*, reform, etc., (3) legislative burden or (4) financial and economic turmoil has been highlighted.¹⁰

In general, there are two main types of benefit commitments in company pension schemes: Defined Benefit (DB) and Defined Contribution (DC). In DB, the sponsoring companies pledge a final level of retirement benefit which is often defined according to a benefit formula based on the employees' age, tenure and final (or average) salary. In this case, the risk related to future return on Defined Benefit Fund's Asset is taken by the sponsor. In a DC plan, a fixed amount of compensation can be paid by companies or employees themselves, which determines the level of accumulation at old-age. Since the past decades, there has been a gradual shift from DB Plan towards DC Plan and hybrid design through combining the features of both DB and DC. This gradual change causes transfers of risks from employers of DB to the particular employees of DC plans.¹¹ In occupational pension schemes, different methods of risk management have to be implemented for appropriate kind of pension commitments. The target of the risk management is to act in the best *strategic* interest of employees and pension fund investors. This target involves firstly in the financial stability of pension fund investors once those mentioned risks occur and secondly in maximization of the returns on investment paid either by sponsored companies or contributed through deferred compensation.

Against this background, this thesis focuses on the management of three most important risks in work-based pension funds: *investment, longevity and inflation risk* and tries to describe

⁷ Cf. Schmähl (2012), p. 5 cont.

⁸ Cf. Derbort et al. (2012), p. 5.

⁹ Cf. Franzen (2010), p. 4.

¹⁰ Cf. Broadbent et al. (2006), p.1 cont.

¹¹ Cf. Broeders and Chen (2010), p. 1201.

about how risks related to company pension schemes can be hedged and avoided with different techniques of strategic risk management tool “Asset-Liability-Management”. Although risk management tools are based on sophisticated methods, they always face criticism about the appropriateness of the underlying assumptions. Furthermore, many risk-based models which are primarily developed for banks and non-life insurance companies, are not fully suitable for company pension funds. Thus, regulatory and governance authorities can eliminate those risks by undertaking the utility of specified risk-based models or by establishing a standardized regulatory environment.¹² Likewise, improved governance plays an increasing role in optimizing investment returns, enhancing efficient company pension funds and payment securities for beneficiaries.¹³ Hence, this thesis also aims to describe how the *specific* characteristics of company pension schemes are integrated into the *risk-oriented* regulation structure “Holistic balance Sheet” based on the logics of Solvency II. In addition, it targets to study on how investment decision-making is operated under investment governance. Finally, this thesis will try to explain the sustainable investment strategy which is increasingly recognized as “a deliberate choice of pension funds, also in times of turmoil”¹⁴.

1.2 Thesis framework

The remainder of this thesis is organized as follows. In the second Chapter, the three pillars of the German pension system “State Pension Provision, Company Pension Schemes and Private Pension Schemes” are introduced, in which this Chapter concentrates on the second pillar “Company Pension Schemes”. Then, three main kinds of the permitted benefits in company pension schemes are characterized. The realization of these three kinds of commitments in five different alternatives of performance follows subsequently. Chapter 3 focuses on the variable risks in company pension schemes. With respect to the three kinds of committed benefits in case of “disability, death and retirement”, various risks are discussed in two categories: (1) actuarial risks (longevity risk) and (2) risks related to financial *stability* as well as *persistence* for pension benefit such as investment risk and inflation risk. Appropriate risks in different types of benefit commitment and different risk takers (fund investors or beneficiaries) are also considered. This Chapter specifies one of the most fundamental risks in work-based pension funds: capital investment risk. As one of the most important instruments for managing risks in company pension schemes, “Asset Liability Management” is represented and discussed in Chapter 4. The first section of Chapter 4 deals with the general principle of Asset

¹² Cf. Franzen (2010), p. 14.

¹³ Cf. Stewart and Yermo (2008), p. 2.

¹⁴ See Sievänen (2012), p. 93.

Due to the increasing relevance of a consistent and standardized regulatory environment, this study tries to describe about a current *risk-oriented* regulatory approach for company pension schemes based on the logics of Solvency II, the so-called “Holistic Balance Sheet”. Towards the question of whether this extended solvency balance sheet for company pension schemes is a workable tool for supervision across EU, there are still many diverse opinions. According to the report on Quantitative Impact Study (QIS) published in April 2013 by European Insurance and Occupational Pension Authority (EIOPA), the Holistic Balance Sheet approach can contribute to the sustainability, strong governance and transparency in company retirement funds. In contrast, the president of the German Working Committee for company pension schemes (aba) stated at this year's 74th aba Annual Meeting in Stuttgart, that Holistic Balance Sheet approach is a danger to company pension schemes. Also at this annual meeting, German Federal Minister of Labor and Social Affairs Ursula von der Leyen also stated that occupational pension funds in Germany are already protected by the Pension Fund Verein and stricter rules for Solvency Capital Requirement under Holistic Balance Sheet are unnecessary.²¹² Based on the first pillar of Solvency II and additional covering mechanism of company pension funds, Holistic Balance Sheet sets requirements on capital adequacy as well as risk management to protect beneficiaries' company pension security. However, much criticism has also been articulated pointing to its specific weaknesses. Indeed, possible taking effect of Holistic Balance Sheet approach across EU takes time and depends on a balance of its strengths and weaknesses. But whether “Holistic Balance Sheet” would be a workable tool for supervision across EU or not, this approach developed by the European Insurance and Occupational Pensions Authority (EIOPA) highlights the *two* fundamental problems, which need to be considered in future studies on regulation and governance in company pension schemes. Firstly, the implementation of regulations and governance, which are originally evolved into bank and normal insurance companies (e.g. Solvency II), is not entirely adequate for those in a company pension fund. Secondly, its specific characteristics of additional financial covering mechanism are required to be taken into account.

7. Conclusion

The thesis in hand presents a number of very relevant instruments, governance and regulations to hedge against risks related to company pension funds in Germany, other EU as well und OECD countries. Among various tools, this thesis concentrates on one of the most important risk management tools “Asset-Liability Management” (in some recent literature also

²¹² <http://www.institutional-investment.de/content/am-reports/artikel//aba-jahrestagung-holistic-balance-sheet-ansatz-ist-eine-gefahr.html>

called as “Liability Driven Investment”) techniques which are mostly utilized not only voluntarily but also mandatorily in Germany as well as in many other EU and OECD countries. Amongst various risks in occupational pension funds, risk management tools and governance regulations predominantly focus on the three most relevant, which are market risk (particularly interest rate risk), longevity risk and inflation risk. This is due to the fact that work-based pension benefits do not only stem from pure insurance products but also from return from saving's process of pension contributions. In practice, most cases have shown that risk-based models based on many appropriate assumptions cannot fulfill completely all the requirements of risk management and cannot prevent potential financial crises as well. Therefore, efficient risk management tools must take into account of the long-term nature of work-based pension schemes, namely investment planning horizon, relatively certain liabilities or lower liquidity risk.

In addition, good pension fund governance can manage company pension fund's risks to cope with maximizing return on investment, demographic shift, financial regime and corresponding costs, etc. Applying different approaches for regulation of investment risks depends on many factors, such as the kind of pension system (DB, DC or hybrid form), the alternatives of performance, or whether company pension schemes are mandatory or voluntary, special situation of national capital market, political strategy, etc. The application of most available quantitative regulations on investment measures in company pension schemes, which are instituted originally for short-term horizon and higher liquidity risks in banks and non-life insurance companies, should be improved in the future. The fundamental natures of long-term investment, low liquidity risk and additional security mechanisms in company pension schemes need to be *fully* taken into account in risk management instruments and investment governance. Furthermore, investment governance does not mean only risk avoiding, but also risk taking. Besides, the regulation approaches for optimizing the investment portfolios and hedging against investment risks, it is often regulated which amount of investment risks a company pension fund may resume. What kind of risk management tools and which regulations may be appropriately applied for company pension funds, must be predicated on the type of pension commitment, alternative of performance and political strategies of different countries.

This study has shown that to achieve the highest goal, managing risks related to company pension schemes must concentrate on developing *strategic* risk management tools and enhancing good governance and regulations. Regarding the most relevant strategic risk management instrument - “Asset-Liability-Management”, the underlying assumptions, cost, situa-

bility and adequacy of risk-based models for long-term investment process must be carefully considered in the implementation process. To optimize risk-return investment process in occupational pension funds, a simultaneous application of different techniques of Asset-Liability-Management is suggested.

This thesis suggests that further studies on a harmonized *strategic* risk management tool is needed, which help eliminate the shortcomings of currently available short-term risk management instruments. Likewise, future regulations need to consider specific characteristics of additional financial covering mechanism in company pension schemes. Besides, to stabilize pension funds' industry and to safeguard beneficiaries' securities, future research is suggested to consider a *consistent and standardized* regulatory environment. Also in the context of a consistent and standardized regulatory environment, the future harmonization of regulatory environment across EU must overcome not only differences in country-specific occupational pension schemes but also various politic constraints. Furthermore, sustainable investments focused on longer-term (intergenerational) and aligning investment decision-making into the ethical, environmental (e.g. renewable energy, clean water, etc.), social and governance aspects highlight potential solutions to problems in times of turmoil, such as demographic shift in many Western EU countries, public debt crisis, potential inflation risk and financial crisis, etc.