MASTERS IN ACTUARIAL SCIENCE

MASTER'S FINAL WORK

INTERNSHIP REPORT

IMPACT OF THE NEW PENSIONS ACT IN THE NETHERLANDS: THE EMPLOYERS' PERSPECTIVE

OLISEMEKA SHEDRACK UKENAZOR

SUPERVISION

JOANA RIBEIRO

ONOFRE ALVES SIMÕES

OCTOBER – 2024

Abstract

During recent times, there has been a decline in the number of Defined Benefit schemes in the Netherlands because of the ever-increasing liabilities of these schemes. This is explained by financial factors such as low interest rates, and demographic factors such as the increase in life expectancy. These factors together with changes in the Dutch labour market in this contemporary age made the Dutch government to seek a pension system that will better accommodate the new status quo.

After series of discussions over the years, the Dutch Senate on May 30, 2023, approved the Future of Pensions Act (in Dutch; Wet Toekomst Pensioenen (Wtp)) with the sole purpose of ensuring that Dutch pension system is more future-proof for both employers and employees.

Since this work was done in the context of a curriculum internship at Mercer, specifically in the Dutch team, this became an interesting topic for me to investigate. While carrying out actuarial valuations for various clients, it was noticeable that the number of active members declined in comparison to previous valuations; for some clients there were no more active members, just deferred and retired members while for others there was a closure of their Defined Benefit plans. Another important fact is that a significant number of retired members lived longer than the expected age set by the company, thus making sponsors to have increased liabilities as they must keep paying the retirement benefits. One of Mercer's clients' data was used as a case study, and it has shown that there is a reasonable need for a change to a Defined Contribution scheme. The new type of scheme was then proposed, and it is discussed in the Wtp framework.

This internship report will provide a better understanding of the pension schemes in the Netherlands, and it will reveal the benefits of the proposed Defined Contribution scheme. The proposed pension scheme was analysed in comparison to the Defined Benefit scheme, and it proved to be a more adequate option for the present times, particularly from the point of view of employers.

Key words: Future of Pensions Act, the Netherlands, Defined Benefits (DB), Defined Contribution (DC), Curtailment, Settlement.

Resumo

Nos últimos tempos, o número de planos de pensões tem vindo a diminuir nos Países Baixos, devido às responsabilidades cada vez maiores desses esquemas. Isso é explicado por fatores financeiros, como baixas taxas de juros, e fatores demográficos, como o aumento da esperança de vida. Esses fatores, juntamente com as mudanças no mercado de trabalho holandês nesta era contemporânea, levaram o governo do país a tentar encontrar um sistema de pensões que melhor se adapte ao novo status quo.

Depois de uma discussão que se prolongou por vários anos, o Senado holandês aprovou, em 30 de maio de 2023, a Lei do Futuro das Pensões (em holandês, Wet Toekomst Pensioenen (Wtp)), com o único objetivo de garantir que o sistema de pensões holandês seja mais preparado para o futuro para os funcionários.

Uma vez que este trabalho foi realizado no contexto de um estágio curricular na Mercer, mais especificamente na equipa holandesa, o surgimento da nova legislação esteve na génese do tópico de pesquisa escolhido. Ao realizar avaliações atuariais para vários clientes, foi perceptível que o número de membros ativos está a diminuiu, em comparação com avaliações anteriores; para alguns clientes, já não havia membros ativos, apenas membros diferidos e aposentados, enquanto para outros se observou o encerramento de seus planos de Benefício Definido. Outro facto importante é que um número significativo de membros aposentados viveu mais do que a idade esperada estabelecida pela empresa, o que faz com que os patrocinadores tenham passivos aumentados, pois devem continuar a pagar os benefícios pós reforma. Os dados de um dos clientes da Mercer foram usados como estudo de caso e evidenciaram a razoabilidade da mudança para um esquema de Contribuição Definida. O novo tipo de esquema foi então proposto e discutido no contexto da Wtp.

Este relatório de estágio fornecerá uma melhor compreensão dos esquemas de pensão nos Países Baixos e revelará os benefícios do esquema de Contribuição Definida proposto. O esquema de pensão proposto foi analisado em comparação com o esquema de Benefício Definido e há evidência de ser uma opção mais adequada para os tempos atuais, sobretudo do ponto de vista dos patrocinadores.

Palavras-chave: Lei do Futuro das Pensões, Países Baixos, Benefícios Definidos (BD), Contribuição Definida (CD), Redução, Acordo.

Acknowledgment

I thank God for seeing me through the two years of this Masters program. I want to thank my brother, and Mike Gaal, my actuarial mentor, for their timely support, presence and encouragement throughout this journey. To my girlfriend who always encouraged me and gave me suggestions, thank you.

My supervisor at Mercer, Joana Ribeiro, thank you very much for your support, patience and guidance throughout this internship and in the production of this report. To Gerard Jager, for his key contribution in the production of the Chapter 4 of this report, thank you.

Finally, I would like to express my immense gratitude to my supervisor, Professor Onofre Alves Simões for his guidance and careful review of my report.

CONTENTS

ABSTRACT ..... **i**

RESUMO ..... **ii**

ACKNOWLEDGMENT ..... **iii**

1 INTRODUCTION **1**

2 THE FUTURE OF PENSIONS ACT **2**

2.1 Background Information 2

2.1.1 Shift from Defined Benefit Scheme to Defined Contribution Scheme in the Netherlands 2

2.1.2 The National Old-Age Pensions Act 2

2.2 The Future of Pensions Act 3

2.2.1 Solidarity-based DC Scheme 5

2.2.2 Flexible DC Scheme 6

2.2.3 DC Capital Scheme 7

2.2.4 The Transition Plan 7

2.2.5 Other Features of the Wtp 8

3 IN-DEPTH DISCUSSION ABOUT THE PENSION SCHEMES IN THE NETHERLANDS **10**

3.1 Introduction 10

3.2 The Defined Benefit Scheme 10

3.3 The Defined Contribution Scheme 13

4 CONVERSION FROM DB SCHEMES TO DC SCHEMES **16**

4.1 Introduction 16

4.2 Application to the DB scheme 16

4.2.1 Data of the Scheme 16

4.2.2 Defined Benefit Table 18

4.2.3 Accrual Liabilities and Normal Cost 20

4.3 Conversion to the DC scheme 27

4.3.1 Defined Contribution Table 28

4.3.2 Accrued Liabilities 29

4.4 Effects of Changing from DB scheme to DC scheme 33

4.4.1 Overfunded status 33

4.4.2 Underfunded status 37

5 CONCLUSION 40

REFERENCES 41

LIST OF FIGURES

Figure 1: Number of DB pension funds in the Netherlands, 1997-2016 4

LIST OF TABLES

Table 1: AOW Retirement Age 3
Table 2: AOW Pension 3
Table 3: Final Salary Scheme Details 11
Table 4: CARE Scheme Details 11
Table 5: Revalued Pension 12
Table 6: Statistics of client's data 16
Table 7: Snippet of data 17
Table 8: Details of member with employee ID 6537 18
Table 9: DB benefits table 20
Table 10: Decrements' rate and other assumptions 21
Table 11: Decrements' benefits 23
Table 12: Retirement accrued liabilities and normal cost 23
Table 13: Withdrawal accrued liabilities and normal cost 24
Table 14: Disability accrued liabilities and normal cost 26
Table 15: Total PBO AL and NC 27
Table 16: Summary of employer's accrued liabilities and normal cost 27
Table 17: Changes in details of member with employee ID 6537 28
Table 18: DC benefits table 29
Table 19: Service Ratio for DC Scheme 29
Table 20: Decrements' benefits 30
Table 21: Retirement accrued liabilities and normal cost 31
Table 22: Withdrawal accrued liabilities and normal cost 31
Table 23: Disability accrued liabilities and normal cost 32
Table 24: Summary of member's accrued liabilities and normal cost 32
Table 25: Summary of employer's accrued liabilities and normal cost 33
Table 26: Fiscal Year (FY) 2023 Accounting Assumptions 33
Table 27: Balance sheet as at 31/12/2023 34
Table 28: Profit and Loss account as at 31/12/2023 34
Table 29: Profit and Loss account as at 31/12/2024 36
Table 30: Change in 2023 Fair Value of Assets 37
Table 31: Balance sheet as at 31/12/2023 37
Table 32: Profit and Loss account as at 31/12/2023 37
Table 33: Profit and Loss account as at 31/12/2024 38

1 Introduction

This internship report is based on the six months internship that was carried out at Mercer Portugal Lisbon's office under the Actuarial Valuations department. In this department, actuarial valuations are carried out for Netherlands pension schemes, UK pension schemes, Germany pension schemes and several other countries. I was assigned to the Netherlands pension scheme where I performed actuarial valuations for clients with Defined Benefit (DB) plans. The valuations could either be Roll Forward (RF) or Full Valuation (FV) depending on what the client wants.

In the Netherlands, about 80% of people currently have pensions accrued through their employers (the DB scheme). In the DB scheme, a fixed amount of pension benefits is guaranteed to the members. Over the last several decades, the labour market in the Netherlands have undergone significant changes such as: the way people work; employees now working longer; employees no longer working for one company all their lives; the aging Dutch population in which there are more pensioners compared to those working. Because of these changes, the Dutch government chose a pension system that better reflects and adapts to the careers of the modern era (Séveno 2023). And as a result, on May 30, 2023, the Dutch Senate approved the Future of Pensions Act (FPA) (in Dutch; Wet Toekomst Pensioenen (Wtp)). The goal of this legislation is to ensure that Dutch pension system is more future-proof, which means it has to be more in tune with social and economic developments and the modern labour market. What this means is that in a thriving economy, providers of pensions will find it easier to increase supplementary pensions, because if successive investments are very good, it will not take as long for pensions to increase. In case of a struggling economy, series of buffer measures have been put in place by the government to absorb as much of the potential losses as possible (Séveno 2023).

One of the key changes in the Future of Pensions Act is the shift from DB schemes to Defined Contribution (DC) schemes. Under the DC scheme, there is a fixed pension premium paid by the employees and employers, which is then accrued in an investment fund. Another important change is that the contribution rates will be age-independent, which means that pension contributions will apply the same percentage to all ages. Thus, under the new scheme – from the employers' perspective – pension costs will be more stable and will not increase as employees' ages increase (Citigroup 2023).

By January 1, 2028, all Dutch pension schemes providers must comply with the new legislation. So, pension providers have a period of four years to implement the new pension schemes.

The main purpose of the work underlying this report is using data to analyse the legal mandatory change from DB scheme to DC scheme, understanding the impact of this change for both employees and employers. The DC scheme will be discussed in-depth, using examples from other countries that currently have DC schemes. With the data provided by Mercer, a thorough analysis of this change to DC schemes will be done, particularly from the perspective of employers.

The structure of this report is such that Chapter 2 provides brief introduction on the current pension schemes (DB and DC schemes) in Netherlands, and the Future of Pensions Act (with special focus on the transition from DB scheme to DC scheme).

In Chapter 3, we discuss in detail on how pensions are calculated under the DB and the DC schemes and proceed to a comparison of the schemes.

In Chapter 4, we use real data to carry out specific calculations for DB and DC schemes and analyse both results to understand the effects of changing from DB scheme to DC scheme on the employer side. This report ends with Chapter 5 where a summary of the work carried out is done, and a conclusion is provided.

2 The Future of Pensions Act

2.1 Background Information

2.1.1 Shift from Defined Benefit Scheme to Defined Contribution Scheme in the Netherlands

Currently, in the Netherlands, the pension schemes in place are the Defined Benefit and the Defined Contribution schemes. Both schemes are under the Netherlands occupational pension pillar. About 90% of Dutch people have pension schemes and about 80% have DB schemes. The subject of this report is the conversion of all DB schemes to DC schemes, which is the most important change in the Future of Pensions Act. So, all Dutch people can only have DC schemes by January 1, 2028. The reason for this change is to have a better balance between the pension amount and contribution rates. The stability legislators seek in the Wtp is dependent on having a plan that is well-funded, has a solid investment strategy, and is managed effectively to ensure the long-term sustainability of the benefits. Also, this change will provide a more personal and transparent solidarity-based system. To achieve this goal, each employee accruing pension through their employer will have a personal 'pension depots' (Loeff 2023).

Defined benefit (DB) pension scheme is a type of pension plan where the retirement benefit is based on a formula that takes into account factors such as an employee's salary, years of service, and a predetermined accrual rate. Under a defined benefit scheme, the scheme is responsible for providing a specific retirement benefit to employees upon their retirement. The benefit is typically calculated as a percentage of the employee's final salary or average salary over a specific period of time. The key feature of a defined benefit scheme is that the employer bears the investment and longevity risks associated with providing the promised retirement benefits. This means that the employer is responsible for ensuring that there are sufficient funds to meet the pension obligations, regardless of the investment performance or changes in life expectancy. (Mercer, 2020).

Although defined benefit schemes have been prevalent in the past, there has been a shift towards defined contribution schemes in recent years as shown in Figure 1. In the Netherlands, a defined contribution pension scheme is a type of pension plan where the contributions made by both the employer and the employee are defined, but the ultimate retirement benefit is not predetermined. Under a defined contribution scheme, the contributions made by the employer and the employee are typically based on a percentage of the employee's salary. These contributions are invested in individual pension accounts, and the accumulated funds are used to provide retirement benefits. Unlike a defined benefit scheme, where the retirement benefit is based on a formula, the final retirement benefit in a defined contribution scheme depends on factors such as the investment performance of the pension funds at the time of retirement. Thus, in a defined contribution scheme, the investment and longevity risks are shifted from the employer to the employee. The fund managers on behalf of the employees manage the employees' pension investments and help them to make decisions regarding their retirement savings. Defined contribution schemes offer individuals more flexibility and control over their retirement savings.

In Chapter 3, additional details about DB and DC schemes will be provided.

2.1.2 The National Old-Age Pensions Act

Algemene Ouderdomswet (AOW) is the state old age pension. Everyone pays pension premiums, even people who are claiming a pension. A single person's pension is equal to 70% of the minimum wage for a single person (or 50 percent for each member in a couple) plus extra money for housing, health insurance, etc. The AOW is indexed twice a year; January 1 and July 1. To

qualify for the full AOW the retiree must have lived in the Netherlands for 50 years. There is an accrual right of 2% per year. So, for every missed year, 2% is cut from the pension.

The official retirement age depends on the life expectancy in the Netherlands. From 2025 the retirement age will increase with 8 months every time that the life expectancy increases by 1 year (Mercer, 2022). In the last five years the official retirement age is as follows:

Year	AOW-retirement age	Born
2020	66 years + 4 months	Between 31-08-1953 and 01-09-1954
2021	66 years + 4 months	Between 31-08-1954 and 01-09-1955
2022	66 years + 7 months	Between 31-08-1955 and 01-06-1956
2023	66 years + 10 months	Between 31-05-1956 and 01-03-1957
2024	67 years	Between 28-02-1957 and 01-01-1958

Table 1: AOW Retirement Age
Source: Mercer

The AOW from 2020 to 2024 is shown below

Average Pay	2020	2021	2022	2023	2024
Minimum Offset	€ 14,167	€ 14,544	€ 14,802	€ 16,322	€ 17,545
Accrual Rate	1.875%	1.875%	1.875%	1.875%	1.875%
Maximum Salary	€110,111	€112,189	€114,866	€128,810	€137,800
Final Pay	**2020**	**2021**	**2022**	**2023**	**2024**
Minimum Offset	€16,030	€16,458	€16,749	€18,470	€19,853
Accrual Rate	1.657%	1.657%	1.657%	1.657%	1.657%
Maximum Salary	€110,111	€112,189	€114,866	€128,810	€137,800

Table 2: AOW Pension
Source: Mercer

In the average pay scheme, the salaries from the last few years of service are averaged while in the final pay scheme, the salary used is the salary in the last year of service. From Table 2, we see that between 2020 and 2024, the minimum offset increased by approximately €3,400 in the average pay plan and by approximately €3,800 in the final pay plan. The slow growth in offset is so that the government is able to meet this obligation. We also see that the minimum offsets in the final pay scheme are higher than those in the average pay scheme for each year, which is as expected since the final salary will usually be higher than the average salary over the last few years. This is compensated for in the accrual rate as the accrual rate for average pay is higher than that of final pay.

2.2 The Future of Pensions Act

Since the 1990s, the DB schemes in Netherlands have been experiencing a decline (Pwc, Pension 2025), because of factors such as: persistent low interest rates, ageing Dutch population and the continuous rise in life expectancy. In Figure 1, we see that the total number of pension funds – Corporate pension funds (non-mandatory) and Corporate pension funds and savings (mandatory) – dropped from more than a thousand funds at the end of 1997 to only 268 pension funds in 2017 (Luković and Savićević 2021).

With a rising life expectancy, members now live longer, and this meant that the schemes had to pay pensions for longer periods. Also, there have been serious changes in the Dutch labour market over the past few decades. For instance, employees are working longer, which meant that pensions will be bigger, so the schemes will need to make an additional pension provision even though they will be paid for shorter periods. In addition, employees are more likely to switch jobs, so there is the problem of what happens to the benefits as it may be difficult to transfer the benefits due to the declining number of employer-sponsored DB plans. These factors made the financial

position of most pension funds to be extremely poor especially after the Global Financial Crisis (although in recent times, there has been a growth in interest rates surge, thus the financial position of pension funds improved).

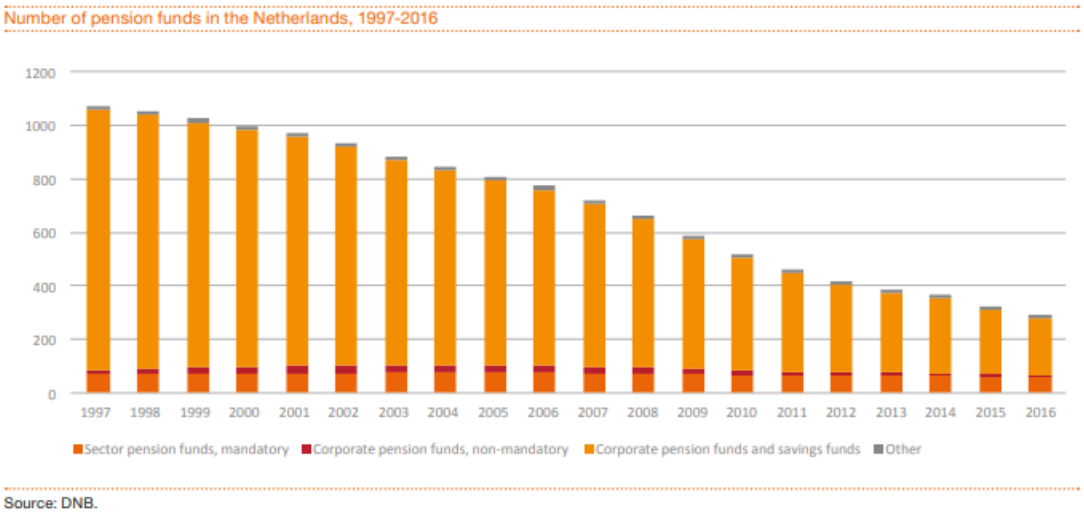

Figure 1: Number of DB pension funds in the Netherlands, 1997-2016
Source: PwC

The poor financial position of pension funds made Dutch citizens begin to lose confidence in the DB pension system. Because of these issues, there has been a desire in Dutch politics and among employers and trade unions since 2004 to reform the pension system. In 2010 a political agreement was reached, but due to the government's budget crisis in 2012, the pension reform was not implemented.

Following almost fifteen years of debate, in 2019, a pension agreement was eventually concluded, and the Dutch Senate gave the approval for the largest-ever pension reform in the Netherlands, materialised in the Wet toekomst pensioenen, requiring a switch from defined benefit (DB) pensions to a defined contribution (DC) system (Citigroup 2023). The journey towards the new Pensions Act has been a significant process that involved legislative changes and improvements to the pension system. On May 30, 2023, the Wtp was adopted and is set to bring about important reforms to the pension system. The adoption of the new Act was driven by the recognition that the previous pension system was inadequate and required significant improvements. Stakeholders and legislators deemed it to be unsatisfactory, leading to the decision to introduce comprehensive reforms.

As already said, the Wtp officially came into force on 1 July 2023, marking the beginning of the transition to the new pension system, and this transition period is expected to be completed by 1 January 2028. During this time, various changes and adjustments will be made to ensure a smooth transition for employers, employees, and pension funds.

The Wtp has three purposes, namely:

1. **A faster growing pension:** In a buoyant economy, we can see pensions growing faster. A buoyant economy means that investments will yield good returns and the profits can be used to increase pensions. On the contrary, in a weak economy, investments will perform poorly, so there will be a need to reduce the pensions. In the new Pension Act, reserve arrangements will be made in order to limit the pension reduction as much as possible (business.gov.nl, n.d.).

2. **A personalised and clearer pension growth:** Participants will have their own pension accounts, and these accounts will show all the contributions they have made. Because the contributions will be used for investments, participants will also see the profit or loss made by their contributions. By so doing, the growth of participants' pensions will become clearer (business.gov.nl, n.d.).
3. **A better suitability to changing jobs:** As mentioned earlier, in recent times, employees do not remain at one job forever. They change jobs more frequently while some others start a business. In the new Pension Act, employee contributions will go to their own pension, irrespective of the employer and age.

The New Pension Act will affect (Citigroup 2023):

- Employers;
- Employees;
- Self-employed persons;
- Pension providers and their administrative organisations;
- Asset managers.

In the Wtp, some elements from the Old Pension Act will remain, for instance (Citigroup 2023):

- Pension schemes will keep saving up for a lifetime pension and the risks associated with old age, occupational disability, and death will be shared collectively;
- Pension schemes will still be administered collectively, and pension providers will continue to apply a collective investment policy to restrict the costs for their members;
- Compulsory occupational pension accumulation will also stay, meaning many people will be part of the system.

One of the most important changes in the Wtp is the transition from promised pension benefits to personal pension pots, where everyone builds up a pension through a defined contribution scheme.

In the Wtp, the DC scheme to choose will come from three variations of the DC solution, namely:

- The solidarity-based DC scheme (*solidaire premieregeling*);
- The flexible DC scheme (*flexibele premieregeling*);
- The DC capital scheme (*de premie-uitkeringsovereenkomst*) (Citigroup 2023)

The solidarity-based and flexible contribution schemes are new and have no defined structure yet.

2.2.1 Solidarity-based DC Scheme

The solidarity premium scheme is a type of pension arrangement in the Netherlands that combines elements of both defined contribution and defined benefit schemes. In a solidarity-based DC scheme, the pension capital is invested collectively, so the risk and investment returns are shared among the participants, resembling a DB scheme. In this scheme, members do not have a choice on how the pension capital is invested.

In a solidarity-based DC scheme, additional features are introduced to promote risk-sharing and solidarity among members. These features aim to ensure that all members, regardless of their individual circumstances, have access to a certain level of retirement income or benefits.

One common feature of a solidarity-based DC scheme is the use of a "collective buffer" or "shared pool." This is a pool of funds that is collectively managed and used to provide additional benefits or support to members who may have lower individual savings or face adverse circumstances, such as poor investment returns or longer lives.

The collective buffer can be used to provide a minimum guaranteed retirement income or to adjust individual benefits based on the overall performance of the scheme. This helps to mitigate the impact of market fluctuations and other risks on individual retirement outcomes.

The solidarity reserve cannot exceed 15% of the total assets of a pension fund (Kinderen, Rosseau and Webster 2022, April 22).

Another aspect of a solidarity-based DC scheme is the use of risk-sharing arrangements. These arrangements can involve sharing investment risks, longevity risks, or other risks among members. For example, if investment returns are lower than expected, the burden must be shared among all members rather than solely impacting individual account balances.

The goal of a solidarity-based DC scheme is to provide a more equitable and stable retirement income for all members, while still maintaining individual account ownership and control. By sharing risks and resources, these schemes aim to reduce the impact of individual variations in savings and investment outcomes.

It is important to note that the specific design and features of a solidarity-based DC scheme are still unclear, and discussion is still ongoing regarding how to implement this kind of schemes. Typically, the details of each particular plan will be outlined in the pension plan documentation or regulations governing the scheme.

2.2.2 Flexible DC Scheme

Flexible DC scheme typically refers to a type of defined contribution (DC) pension scheme that offers increased flexibility and choice to participants in managing their retirement savings. This type of scheme allows individuals to have more control over their pension investments, contributions, and retirement income options (Kinderen, Rosseau and Webster 2022, April 22).

In a flexible DC scheme, participants can make choices regarding various aspects of their pension plans, such as:

1. Contribution levels: Participants may have the flexibility to adjust their contribution levels based on their financial circumstances or retirement goals. They can choose to contribute more during certain periods or decrease their contributions if needed.

2. Investment options: One of the key advantages of a flexible DC scheme is the potential for higher investment returns. Participants can choose from a range of investment options, such as stocks, bonds, and mutual funds, which can potentially generate higher returns over the long term. However, it is important to note that with higher returns comes higher investment risk, and participants bear the investment risk in a flexible DC scheme. So, the flexible DC scheme allows individuals to tailor their investment strategy based on their risk tolerance, investment preferences, and long-term goals.

3. Retirement age: Participants may have the flexibility to choose their desired retirement age within certain limits. This allows individuals to align their retirement plans with their personal circumstances and preferences.

4. Retirement income options: Flexible DC schemes often offer various options for converting accumulated savings into retirement income. Participants may have the choice to receive a lump sum, purchase an annuity, or opt for a flexible drawdown arrangement, among other possibilities.

The aim of a flexible DC scheme is to provide individuals with more control and flexibility in managing their pension savings, allowing them to adapt their plans to changing circumstances

and personal preferences. This can help individuals tailor their retirement strategies to meet their specific needs and goals.

Just as with the solidarity-based DC scheme, it is important to note that the specific design and features of a solidarity-based DC scheme are still unclear, and discussion is still ongoing regarding how to implement this scheme. Again, the details of the scheme will be outlined in the pension plan documentation or regulations governing the scheme.

2.2.3 DC Capital Scheme

A DC capital scheme is a pension scheme that is known under the current pension system, so it is existing already and has a well-defined structure. It can only be executed by pension insurers (and under certain conditions by a pension contribution institution (PPI)). The DC capital scheme is a type of pension arrangement where individuals contribute to their own retirement savings accounts, and the final retirement benefit is determined by the accumulated contributions and investment returns. This scheme starts 15 years before the retirement date, and at the retirement date, it is possible to use the pension capital accrued for a (partial) defined benefit retirement pension.

Just like with solidarity-based and flexible DC schemes, in a DC capital scheme, participants make regular contributions to their individual accounts, typically through payroll deductions or voluntary contributions. These contributions are invested in various financial instruments, such as stocks, bonds, or mutual funds, with the goal of growing the capital over time.

The retirement benefit in a DC capital scheme is based on the value of the accumulated capital at the time of retirement. The final benefit amount is influenced by factors such as the amount of contributions made, the investment performance of the chosen funds, and any fees or charges associated with the scheme.

Upon retirement, participants in a DC capital scheme typically have several options for accessing their accumulated capital. These options may include taking a lump sum payment, purchasing an annuity to provide a regular income stream, or opting for a flexible drawdown arrangement where they can withdraw funds as needed.

DC capital schemes are commonly used to provide retirement savings and investment opportunities for individuals. They offer individuals more control and flexibility over their pension savings, but also place more responsibility on individuals to make informed investment decisions and manage their retirement funds effectively.

Just as with the solidarity-based DC and flexible DC schemes, it is important for individuals participating in a DC capital scheme to regularly review their investment choices, contributions, and retirement goals to ensure they are on track to meet their desired retirement income needs. Consulting with financial advisors or pension providers can provide individuals with guidance and support in managing their DC capital scheme effectively.

The main difference between the three contribution schemes options is the level at which participants are involved in the investment of the contributions and the collective risk sharing whereby a reserve is used if the returns on investments are poor.

2.2.4 The Transition Plan

Considering that the DB pension schemes must be converted to DC-based pension schemes by January 1, 2028, employers and pension funds administrators need to produce a ‘transition’ plan, and it will be the basis upon which the transition to the new scheme is done. Three contribution-based schemes have been presented just as discussed earlier, so in the transition plan, it should be made clear which contribution-based scheme will be chosen and explain in detail how the

conversion of current pension entitlements to the new scheme will be handled. As mentioned earlier, we want to analyse the effects of changing from DB scheme to DC scheme based on the employer perspective and the three variations of the DC scheme discussed in this chapter are calculated the same way for the employers since the employers only need to make a flat-rate contribution and have no business with how the contributions are invested or with the retirement benefits. So, any of the three variations of the DC scheme can be used for this analysis. For this internship report, the **Defined Contribution Capital Scheme** will be chosen and will be analysed in comparison with the Defined Benefit Scheme.

2.2.5 Other Features of the Wtp

Other changes introduced by the Wtp include, but are not limited to, the following:

Flat-rate contribution: In the new defined contribution schemes, the premium contribution will become age independent. For new members who purchase pension schemes on or after January 1, 2028, contributions must be made at the same rate irrespective of member's age (a flat-rate premium). Historically, age-related contribution structures have been used by most schemes (Lockton Global Compliance 2024). The maximum premium is 30% of the pensionable salary.

Existing age-related defined contribution pension schemes will need to be updated in flat-rate (age-independent) contributions accordingly by January 1, 2028, with the following exceptions and subject to specific conditions:

- Voluntary top-up DC schemes: In this scheme, employees are allowed to contribute additional funds to their employer-sponsored retirement plan. These extra contributions can help individuals boost their retirement savings and potentially increase their future retirement income.
- Defined benefit plans (administered with an insurance company) existing on 30 June 2023 which will be updated in an age-related defined contribution plan prior to the end of the transition period (Citigroup 2023).
- Age-based defined contribution schemes existing on 30 June 2023 that are effectively closed to new employees hired on or after 1 January 2028. (While age-related DC schemes existing before 30 June 2023 and flat rate DC schemes may coexist from 1 January 2028, multiple schemes may not be an optimal solution for many companies.) (Lockton Global Compliance 2024)

Minimum entry age: As of January 1, 2024, the statutory minimum entry age for the pension scheme has decreased from 21 years to 18 years (Citigroup 2023).

Differences between groups: Based on the current pension rules, all employees pay the same premiums (into one collective fund) irrespective of their age. In the new Pension Act, pension providers should endeavour to take into account differences between groups of members when investing their contributions. For example, younger groups are still many years away from retirement and can pay contributions in those future years. Even if their investments yield lower returns, they still have many years to recover from the lower returns. As a result, pension funds can take higher risks on their behalf. Older groups are few years away from retirement, so they have fewer opportunities to recover from lower yields and therefore need more security. As a result, pension funds will take less risk on their behalf (Citigroup 2023).

Tax limitations: Tax limitations will apply to pension contributions, and the contribution rate will be capped at 30% of pensionable salary (pensionable annual salary to a ceiling of EUR 137,800 in 2024) less a social security offset (a minimum offset of EUR 17,545 applies in 2024).

“The contribution limits are structured within a fiscal framework intended to keep pension provision within 75% to 80% of career average pay with 40 to 42 years of participation. During a transition period lasting until 1 January 2037, the maximum contribution rate is temporarily increased to 33% to compensate for any loss in accrual due to the transition. The maximum of 30% (or 33%) can be adjusted according to a table included in the legislation if the expected returns (expected interest rate as determined by the Dutch Central Bank and Ministry of Finance) change. Such changes will be notified in advance by the Dutch Central Bank.” (Lockton Global Compliance 2024, 3).

Partner pension: The definition of ‘partner’ contained within the Wtp is :

a) Husband (or wife);
b) registered partner; or
c) partner within the meaning of the pension agreement, being the person of age who runs a joint household with the employee or former employee, unless it concerns a blood relative in the first degree, a blood relative in the second degree in the direct line, an adult stepchild or adult former foster child. Whilst a partner’s pension is defined as a monetary payment, which is fixed or variable, for the partner or former partner, due to the death of the employee or former employee.

Partner pensions paid out upon death prior to retirement will be on a risk-basis and capped at 50% of the pensionable salary regardless of participation years. Partner pensions paid at death after retirement will be capped at 70% of the primary member’s retirement benefits (Citigroup 2023).

“Orphans’ pensions paid at death before retirement cannot exceed a maximum of 20% of the pensionable salary — a maximum of 40% for full orphans — with payment to age 25. This alters the current rules which allow up to 14% of the pensionable salary — up to 28% for full orphans — with payment until the age as agreed in the scheme, but ultimately until the age of 30.” (Lockton Global Compliance 2024, 4).

3 In-Depth Discussion about the Pension Schemes in the Netherlands

3.1 Introduction

In this chapter, we take a deeper look at the DB scheme and the DC Capital Scheme which was chosen for the transfer of the DB schemes. We will discuss how the two schemes' benefits are calculated, their advantages and their disadvantages.

3.2 The Defined Benefit Scheme

In previous chapters, the DB scheme was discussed, although briefly. Now, we present how the benefit is calculated.

The calculation of pension benefits in a DB scheme is typically based on a combination of factors, including an employee's pensionable salary, the accrual rate, and the number of pensionable years. The specific calculation method may vary depending on the pension scheme and the rules set by the pension provider or employer. There are several rules of a DB scheme, but the two most common rules are the Final Salary Scheme and the Career Average Revalued Earning schemes (CARE schemes). Below is a general overview of how pension benefits are calculated in the Netherlands: (Mercer 2020), mirrored in equations (1), (2) and (3).

1. **Pensionable Salary:** The pensionable salary includes the employee's fixed income (*12 monthly salaries, holiday allowance, 13th month, guaranteed emoluments*) and variable income (*shift bonus and commission*). The pensionable salary may be subject to a cap or limit. Effective January 1, 2024, De Nederlandsche Bank (DNB) stated that the maximum annual salary is €137,800. Thus, the pensionable salary is

$$\text{Max}(0, \text{Min}(\text{Fulltime Salary}, \text{Maximum Salary}) - \text{AOW Offset}) \quad (1)$$

Where AOW Offset is the National Old-Age Pension (AOW).

2. **Accrual Rate:** The accrual rate determines how much pension is accrued each year based on the pensionable salary. It is typically expressed as a percentage. For example, if the accrual rate is 1.75% and the pensionable salary is €40,000, the annual pension accrual would be €700 (1.75% of €40,000).

3. **Service Years:** The years of service represent the number of years (rounded off in full months) an employee has participated in the pension scheme and made contributions. It is usually calculated from the start of the employee's participation in the scheme until a specific date, such as the retirement date or termination date.

4. **Calculation:** Once the pensionable salary, accrual rate, and pensionable years are determined, the pension benefit can be calculated. The formula used depends on whether we have a Final Salary Scheme or CARE Scheme.
   Under a **Final Salary Scheme**, the pension benefit is calculated based on the employee's final salary, which is usually the average salary earned over a specific period of time, such as the highest consecutive years of earnings or the average of the highest-paid years. The final salary is often adjusted for inflation or other factors. The formula is given as:

$$\text{Pension} = \text{Accrual Rate} \times \text{Pensionable Salary} \times \text{Years of Service} \quad (2)$$

   Example: Assuming a member has 11 years of service and is about to retire at the end of 2024, with the accrual rate of 1.875%. The member's base salary and bonus for the 11 years are shown in the table below. The gross salary is the sum of the base salary and the

bonus. Furthermore, the member's pensionable salary is the average of the three best consecutive years of service.

Year	Base Salary (€)	Bonus (€)	Gross Salary (€)
2024	52900	8000	60900
2023	51500	7500	59000
2022	50500	7000	57500
2021	48500	6500	55000
2020	46500	6200	52700
2019	44000	6000	50000
2018	42000	5800	47800
2017	41000	5600	46600
2016	40000	5200	45200
2015	39000	4000	43000
2014	35000	2000	37000

Table 3: Final Salary Scheme Details

Source: Pension Scheme Calculations Excel file

Based on Table 3 above, the three best consecutive years of service are 2022, 2023 and 2024. So, the pensionable salary = $\frac{57500+59000+60900}{3}$ = €59,133.33.

Annual pension benefit = $1.875\% \times 59133.33 \times 11$ = €12,196.25

Under a **CARE Scheme**, the promised pension is calculated each year based on the annual salary and the accrual rate. Every unit of pension accrued each year is then revalued to the date of decrement, usually in line with the Consumer Price Index (CPI) or Retail Price Index (RPI), which are the two most used inflation measures.

$$\text{Pension} = \sum_{i=1}^{n} \text{Accrual Rate} \times \text{Salary at CARE year i} \times (1 + \text{CPI})^{n-1} \qquad (3)$$

Where n is the number of years until decrement and the CARE revaluation is in line with CPI.

Example: Same member as in the Final Salary Scheme example. Additionally, the CARE revaluation is in line with inflation and revaluation is done one year after accrual.

Year	Gross Salary (€)	Accrual	Pension (€)	Inflation
2024	60900	1.875%	1141.88	5%
2023	59000	1.875%	1106.25	5%
2022	57500	1.875%	1078.13	4%
2021	55000	1.875%	1031.25	4.5%
2020	52700	1.875%	988.13	4%
2019	500	1.875%	937.50	2%
2018	47800	1.875%	896.25	2.5%
2017	46600	1.875%	873.75	2%
2016	45200	1.875%	847.50	2.5%
2015	43000	1.875%	806.25	3%
2014	37000	1.875%	693.75	

Table 4: CARE Scheme Details

Source: Pension Scheme Calculations Excel file

Inflation

Year	Pension	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Revalued Pension
2014	693.75	*1.03	1.03	1.02	1.03	1.02	1.04	1.05	1.04	1.05	1.05	973.31
2015	806.25		*1.03	1.02	1.03	1.02	1.04	1.05	1.04	1.05	1.05	1,098.19
2016	847.5			*1.02	1.03	1.02	1.04	1.05	1.04	1.05	1.05	1,126.23
2017	873.75				*1.03	1.02	1.04	1.05	1.04	1.05	1.05	1,138.34
2018	896.25					*1.02	1.04	1.05	1.04	1.05	1.05	1,139.18
2019	937.5						*1.04	1.05	1.04	1.05	1.05	1,168.24
2020	988.13							*1.05	1.04	1.05	1.05	1,183.97
2021	1031.25								*1.04	1.05	1.05	1,182.43
2022	1078.13									*1.05	1.05	1,188.64
2023	1106.25										*1.05	1,161.56
2024	1141.88											1,141.88
Total CARE Pension												**€12,501.97**

Table 5: Revalued Pension

Source: Pension Scheme Calculations Excel file

It is important to note that the calculation of pension benefits can be more complex, as there may be additional factors involved, such as indexation (adjustment for inflation), pension age, and potential reductions for early retirement or other factors. For example, if the member retires earlier than the normal agreed retirement age (NRA), there is a reduction in the member's pension benefits. If the member retires later than the NRA, there is an increase in the benefits. Sometimes, the member is also entitled to the ill-health benefits i.e. benefits may be reduced or increased depending on the scheme. A member's dependent may also receive benefits between 50% and 70% of the accrued pension on the death of the member. Therefore, the specific details and calculations can vary between different pension schemes and providers.

Advantages of Defined Benefit Scheme

- Guaranteed Retirement Income: DB schemes provide a guaranteed retirement benefit. This provides retirees with a predictable and stable income throughout their retirement years. The benefits are not dependent on returns on assets.
- Retirement Security: DB schemes offer a level of retirement security, as the pension benefits are typically not dependent on the performance of investment markets. This can provide peace of mind for employees, knowing that they will have a reliable income in retirement. And in turn, employers will have more loyal employees since they know they are secured financially during retirement.
- Inflation Protection: Some DB schemes provide inflation protection by adjusting pension benefits to keep pace with inflation. This helps to maintain the purchasing power of the pension income over time (GRS Research Memorandum 2003).

Despite these advantages, DB schemes also have some disadvantages:

Disadvantages of Defined Benefit Scheme

- Employer Responsibility: In a DB scheme, from the employer's perspective, the employer bears the investment and longevity risks. This means that the employer is responsible for ensuring that there are sufficient funds to meet the pension obligations, regardless of market fluctuations or changes in life expectancy.

- Cost and Funding Challenges: DB schemes can be costly for employers to fund, as they are responsible for ensuring that there are sufficient funds to meet the pension obligations. Economic factors, such as low interest rates or increased life expectancy, can create funding challenges for employers.
- Limited Flexibility: DB schemes typically provide a fixed income in retirement, which may limit the flexibility for retirees to adjust their income based on changing circumstances or financial needs. Also, DB schemes are managed by the employer (or a delegated partner), so the employee has no say in how the money is invested, and this could cause the investments to grow at a slower rate. Therefore, depending on the type of agreement between the employer and employee, this slow growth rate could impact the amount of retirement income the employee would receive, see the next point.
- Potential Benefit Reductions: In certain situations, such as financial difficulties faced by the employer or changes in pension regulations, there may be a risk of benefit reductions or adjustments to the pension scheme. This can impact the expected retirement income for employees (GRS Research Memorandum 2003).
- Lack of Portability: DB schemes are often tied to a specific employer, which means that if an employee leaves the company before retirement, they may not be able to transfer the accrued pension benefits to another scheme. This lack of portability can be a disadvantage for employees who change jobs frequently.

3.3 The Defined Contribution Scheme

In previous chapters, the DC scheme was discussed. Continuing from there, we now discuss the DC scheme in detail, which will guide our calculations in Chapter 4.

There are two main types of DC schemes with respect to management:

- The trust-based scheme, which is governed by a board of trustees or directors. The board is responsible for overseeing the operation of the scheme, making decisions on investment strategies, and ensuring compliance with legal and regulatory requirements.
- The contract-based scheme, which is established through a contract between the employer and a pension provider, such as an insurance company. The pension provider is responsible for managing the pension assets, investing the contributions, and providing retirement benefits to the scheme participants. (M&G Wealth 2024, April 6).

The member's retirement benefit in a DC scheme is typically dependent on the following factors:

- Contributions: The total contributions made by both the employer and the employee over the course of the participant's employment are taken into account.
- Investment returns: The contributions are invested in various financial instruments such as stocks, bonds, and mutual funds. The growth of the retirement savings is influenced by the performance of the investments. The returns earned on the investments of the contributions made to the DC scheme play a significant role in determining the final pension amount. Investment returns can vary and are subject to market fluctuations.
- Time: The length of time the participant has been contributing to the DC scheme can also impact the pension calculation. Generally, the longer the participant has been contributing, the larger the accumulated funds and potential pension amount.
- Expenses and fees: It is important to consider any expenses or fees associated with the DC scheme, such as administrative fees or investment management fees. These expenses can reduce the overall growth of the retirement savings and, consequently, the pension amount.

Upon retirement, there are several options for what to do with the accumulated funds in a Defined Contribution (DC) scheme. Below are some common options:

- Annuity purchase: One option is to use the accumulated funds to purchase an annuity. An annuity is a financial product that provides a regular income stream for a specified period or for the rest of the retiree's life. This option can provide a guaranteed income in retirement, but there is no flexibility and potential for growth.
- Lump sum withdrawal: Another option is to withdraw the accumulated funds as a lump sum. This allows retirees to have immediate access to the full amount of their retirement savings. However, it is important to consider the tax implications and potential for overspending or mismanagement of the funds.
- Partial withdrawal: Some DC schemes allow retirees to make partial withdrawals from their accumulated funds while leaving the remaining balance invested. This option provides flexibility by allowing retirees to access a portion of their savings while keeping the rest invested for potential growth.
- Income drawdown: Income drawdown, also known as a pension drawdown or flexible drawdown, allows retirees to keep their funds invested and withdraw a regular income as needed. This option provides flexibility and potential for continued growth of the retirement savings. However, it also carries the risk of investment performance and the need to carefully manage withdrawals to ensure the funds last throughout retirement (Dillingh and Zumbuehl 2021).
- Combination of options: Retirees may also choose to combine different options based on their financial goals and circumstances. For example, they may use a portion of the funds to purchase an annuity for guaranteed income and keep the remaining funds invested for flexibility and potential growth.

It is important for retirees to carefully consider their financial goals, risk tolerance, and income needs when deciding what to do with their accumulated DC funds upon retirement. So, it is advisable to consult a financial advisor or retirement planning professional to evaluate the available options and make informed decisions based on individual circumstances.

Advantages of DC schemes

- Individual control: DC schemes provide individuals with more control over their retirement savings. Participants (with the help of a financial advisor) can choose how their contributions are invested, allowing them to tailor their investment strategy to their risk tolerance and financial goals.
- Portability: DC schemes are typically portable, meaning that if an employee changes jobs, they can usually transfer their accumulated funds to a new employer's plan or an individual retirement account (IRA). This flexibility allows individuals to maintain their retirement savings and continue to contribute to their account.
- Transparency: DC schemes offer transparency in terms of contributions and investment performance. Participants can easily track their contributions and monitor the growth of their investments, providing a clear picture of their retirement savings progress.
- Potential for higher returns: Since the retirement benefit in a DC scheme is based on the performance of the investments, there is a potential for higher returns compared to traditional pension schemes. If the investments perform well, participants may benefit from increased retirement savings (GRS Research Memorandum 2003).

Disadvantages of DC schemes

- Investment risk: The main disadvantage of DC schemes is that the investment risk is borne by the individual participant. If the investments perform poorly, the retirement

savings are negatively impacted. This risk can be mitigated through diversification and regular monitoring of the investment portfolio.

- Uncertain retirement income: Unlike traditional pension schemes, which provide a guaranteed retirement income, DC schemes do not guarantee a specific benefit amount. The retirement income is dependent on the performance of the investments, making it uncertain and subject to market fluctuations.
- Responsibility for investment decisions: Participants in DC schemes are responsible for making investment decisions or selecting investment options from the available choices. This can be challenging for individuals who may not have the necessary knowledge or expertise to make informed investment decisions.
- Inadequate savings: DC schemes rely on individuals to contribute a sufficient amount of money to build an adequate retirement pension pot. However, some individuals may not contribute enough or may withdraw funds prematurely, leading to inadequate savings for retirement (GRS Research Memorandum 2003).

4 Conversion from DB Schemes to DC Schemes

4.1 Introduction

In this chapter, we aim to convert a DB scheme to a DC scheme and analyse the effects of this change on the employer's side. We start by applying data to the DB scheme of one Mercer's client and then calculate the projected benefits obligation (PBO) accrued liabilities (AL). To implement the conversion to a DC scheme, the programming of Mercer's software system for calculating liabilities is tweaked such that we have a DB with Curtailment (Curtailment refers to closure of the DB plan, meaning there will no longer be accrual, neither will there be a salary increase), and we achieve the desired result. A careful analysis of both results is then done by showing the balance sheet and the profit and loss (P&L) account.

4.2 Application to the DB scheme

4.2.1 Data of the Scheme

In the previous chapter, the DB scheme calculation of benefits was presented, and the programming in Mercer's software system to calculate accrued liabilities is based on this method of benefits calculation. The data that will be applied to the DB scheme is that of a client in the Netherlands. The statistics of the data is shown in Table 6 below, where **OP represents the primary member's pension**, and **NP represents the partner's pension**.

Memberships	**A Act**	**B Def**	**C Ret**	**D Retbene**	**A+B+C+D Total**	**C+D Pensioner**
Number	270	550	127	24	971	151
Average age	48.5	49.5	71.2	63.9	52.4	70.0
Average years of service	13.4					
Total OP (€)	3,010,603	2,003,726	1,028,199	0	6,042,528	1,028,199
Total NP (€)	2,073,141	1,328,332	507,235	138,837	4,047,546	646,073
Total pension (€)	3,010,603	2,003,726	1,028,199	138,837	6,181,366	1,167,036
Average OP (€)	11,150	3,643	8,096	0		
Average NP (€)	7,678	2,415	3,994	5,785		
Average pension (€)	11,150	3,643	8,096	5,785		7,729

Table 6: Statistics of client's data
Source: MFW_Data_Inputfile Excel File

The client has 971 members with an average age of 52.4 years. **Act** represent active members, **Def** represent deferred members (members who have left the company but still have their retirement benefits with the company), **Ret** represent retired members (pensioners). The client chosen has a retirement age of 68, so if a member is at least 68, the member's status changes from Act/Def to Ret. **Retbene** represent beneficiary member (partner) of the primary member. Currently, the partner's pension is 70% of the primary member's pension.

As mentioned in Chapter 3, one of the changes in the Wtp is that if the primary member dies before the retirement age, the partner will receive a risk-based retirement benefit which is capped at 50% of the pensionable salary regardless of participation year. And if the primary member dies after the retirement age, the partner will receive benefits capped at 70% of the primary member's retirement benefits.

EmployeeID Number	BirthDate	Gender	USC	PayNormalCurrentYear
5988	21/11/1949	M	Ret	0.00
6635	28/10/1957	M	Act	71,188.00
5465	10/05/1961	M	Def	0.00
9274	07/08/1968	F	RetBene	0.00
EmployeeID Number	**PastServiceBenefitOPatValDate**	**PastServiceBenefitNPatValDate**	**RetirementAge**	**TypeOfPlan**
5988	5,940.66	4,675.06	68	AveragePay
6635	26,983.48	17,379.96	68	AveragePay
5465	26,278.98	18,395.64	68	AveragePay
9274	0.00	3,322.55	68	AveragePay

Table 7: Snippet of data

Source: MFW_Data_Inputfile Excel File

Description of the fields

- EmployeeIDNumber: It is a unique number assigned to each employee.
- BirthDate: The birthdate of the primary member and in the case of death of the primary member, it is the birthdate of the beneficiary.
- Gender: M for Males and F for Females.
- USC: Universal Status Code. There are different possibilities for USC but we only use the codes Act (Active), Def (Deferred), Ret (Retired) and RetBene (Retired Beneficiary).
- ProrateDate. This represents the hire date of the employee, and only active members have this information.
- MembershipDate: Date from which the benefit formula should start to calculate the benefit. Information is available for active members only. For this report, it is assumed to be the same as the prorate date.
- PayNormal: Represents the normal annual salary. Also available for only active member.
- Offset: In the Netherlands, the state pension (AOW) is paid to everyone, as seen before. This state pension is represented by Offset in the data. Also available for only active members.
- PayNormalMaximum: The annual pensionable salary is usually subject to a cap. As at 2020, De Nederlandsche Bank (DNB) stated that the maximum salary is €110,111.
- BeneficiaryBirthDate: Mandatory for Ret and RetBene members. We assume that there are two genders: male and female. We also assume that the male gender is older than the female gender by 3 years. If X represents Male and Y represents Female, then X – Y = 3. So, if the primary member is a male and the USC is Ret, then to get beneficiary's birth date, we subtract three years, else if the primary member is a female and the USC is Ret, we add three years. If the USC is RetBene, the beneficiary's birth date is the same as the primary member's birth date.
- BeneficiaryGender: Mandatory for Ret and RetBene members. If the primary member is a male and the USC is Ret, then the beneficiary is a female, else if the primary member is a female and the USC is Ret, then the beneficiary is a male. If the USC is RetBene, the beneficiary gender is the same as the primary member's gender.
- PTCurrent: Current parttime percentage. If a person works 100% the variable must be 1. Mandatory for active members.
- PastServiceBenefitOPatValDate: Accrued vested Old Age pension at the valuation date.
- PastServiceBenefitNPatValDate: Accrued vested Spouse (partner) pension at the valuation date. Currently in the Netherlands, this benefit is 70% of OP benefits.
- RetirementAge: The retirement age for this client is 68.

- TypeOfPlan: Represents the DB scheme rule, which can either be FinalPay or AveragePay. For this report, we are using the AveragePay.

This data is then loaded into Mercer's retirement software to produce the liabilities results. Therefore, all the results that follow are obtained from Mercer's retirement software. We consider one member to show how the benefits, accrued liabilities (AL) and normal cost (NC) are calculated in the software system. The details of this member are shown in Table 8 below. Mercer's Yield Curve as at August 31, 2024 was used to estimate the discount rate and the resulting discount rate was 3.50%.

Member Details	
ID	6537
Status	Active
Birth Date	15/05/1976
Hire Date	05/04/2020
Valuation Date	01/01/2024
Retirement Age	68
Salary	€88,062.00
AccruedOPAveragePay at the beginning of year 2024	€4,290.54
AccruedNPAveragePay at the beginning of year 2024 (70% of OP)	€3,003.36
PartTime Current	0.90
Offset	€17,488.00
Maximum Salary	€137,800.00
Gender	M
Accrual Rate	1.875%
Salary Increase	2.000%
Offset Increase	1.000%
Indexation Active (Adjustment for inflation)	2.000%
Indexation Inactive (Adjustment for inflation)	2.000%
Discount Rate	3.500%

Table 8: Details of member with employee ID 6537
Source: Mercer

4.2.2 Defined Benefit Table

With the details in Table 8, we now produce the benefits table using defined formulas. Because our valuation date is 01/01/2024, the first year in the table below represents the date 31/12/2023. In Mercer's software system, the Current Age is rounded to the next full month's age. Between the birthdate and valuation date[1] (31/01/2024), there are 572 months. So, the current age at 01/01/2024, that is 572/12, equal to 47.6667 years.

Service years is also rounded to the next full month's age. Between the hire date and valuation date[1], there are 45 months. So, the service years at 01/01/2024, that is 45/12, equal to 3.75 years. Equations (4) to (8) below allow the calculation of the relevant amounts.

$$\text{Pension base} = \text{Max}(0, \text{Salary} - \text{Offset}) \times \text{PTCurrent} \quad (4)$$

For this member, Pension base at 01/01/2024 = $\text{Max}(0, 88062 - 17488) \times 0.90 = €63{,}516.60$

$$\text{Accrual in the year 2024} = \text{Accrual Rate} \times \text{Pension base} \quad (5)$$

For this member, Accrual in the year 2024 = $1.875\% \times 63{,}516.60 = €1{,}190.94$

[1] Since the current age is rounded to the next full month's age, we use 31/01/2024 for the valuation date instead of 01/01/2024

Accrued OP at year end (31/12/2023) = Accrued OP at year start (01/01/2024) = €4,290.54

$$\text{Accrued NP (or Attainable NP)} = 70\% \times \text{Accrued OP (or Attainable OP)} \quad (6)$$

For this member, Accrued NP at year end (31/12/2023) = $70\% \times 4290.54$ = €3,003.38

Accrued OP at year end (31/12/2024) =

$$\text{Accrual in 2024} + \text{Accrued OP at year end (31/12/2023)} \times (1 + \text{Indexation Active}) \quad (7)$$

For this member, Accrued OP at year end (31/12/2024) = $1190.94 + 4290.54 \times (1 + 2\%)$ = €5,567.29

From equation (6), Accrued NP at year end (31/12/2024) = $70\% \times 5567.29$ = €3,897.10

Attainable OP =

$$\text{Accrued OP} + \text{Accrual Rate} \times \text{Pension base} \times \text{Max}(0, \text{Retirement Age} - \text{Current Age}) \quad (8)$$

For this member, Attainable OP at year end (31/12/2023) =
$4290.54 + 1.875\% \times 63516.60 \times \text{Max}(0, 68 - 47.6667)$ = €28,506.24

From equation (6), Attainable NP at year end (31/12/2023) = $70\% \times 28506.24$ = €19,954.37

The attainable OP (or NP) is for active members that make it to retirement age or became disabled, while accrued OP (or NP) is for active members that may withdraw from the plan before the retirement age.

The same calculation is repeated for Years 2025 to 2043, and the result is the Benefits table below.

Year End	Age	Current Age	Service years	Salary (€)	Offset (€)	Pension base (€)
2023	48	47.6667	3.7500	88,062.00	17,488.00	63,516.00
2024	49	48.6667	4.7500	89,823.24	17,662.88	64,944.32
2025	50	49.6667	5.7500	91,619.70	17,839.51	66,402.18
2026	51	50.6667	6.7500	93,452.10	18,017.90	67,890.78
2027	52	51.6667	7.7500	95,321.14	18,198.08	69,410.75
2028	53	52.6667	8.7500	97,227.56	18,380.06	70,962.75
2029	54	53.6667	9.7500	99,172.11	18,563.86	72,547.43
2030	55	54.6667	10.7500	101,155.56	18,749.50	74,165.45
2031	56	55.6667	11.7500	103,178.67	18,937.00	75,817.50
2032	57	56.6667	12.7500	105,242.24	19,126.37	77,504.29
2033	58	57.6667	13.7500	107,347.09	19,317.63	79,226.51
2034	59	58.6667	14.7500	109,494.03	19,510.81	80,984.90
2035	60	59.6667	15.7500	111,683.91	19,705.92	82,780.19
2036	61	60.6667	16.7500	113,917.59	19,902.98	84,613.15
2037	62	61.6667	17.7500	116,195.94	20,102.01	86,484.54
2038	63	62.6667	18.7500	118,519.86	20,303.03	88,395.15
2039	64	63.6667	19.7500	120,890.25	20,506.06	90,345.78
2040	65	64.6667	20.7500	123,308.06	20,711.12	92,337.25
2041	66	65.6667	21.7500	125,774.22	20,918.23	94,370.39
2042	67	66.6667	22.7500	128,289.71	21,127.41	96,446.07
2043	68	67.6667	24.0833	130,855.50	21,338.68	98,565.13
Year End	Age	Accrual (€)	Accrued OP (€)	Accrued NP (€)	Attainable OP (€)	Attainable NP (€)
2023	48	1,190.94	4,290.54	3,003.36	28,506.24	19,954.37
2024	49	1,217.71	5,567.29	3,897.10	29,109.61	20,376.72
2025	50	1,245.04	6,896.34	4,827.44	29,722.09	20,805.46
2026	51	1,272.95	8,279.31	5,795.51	30,343.81	21,240.67
2027	52	1,301.45	9,717.85	6,802.49	30,974.89	21,682.42

2028	53	1,330.55	11,213.65	7,849.56	31,615.44	22,130.81
2029	54	1,360.26	12,768.48	8,937.93	32,265.60	22,585.92
2030	55	1,390.60	14,384.11	10,068.88	32,925.47	23,047.83
2031	56	1,421.58	16,062.40	11,243.68	33,595.19	23,516.64
2032	57	1,453.21	17,805.22	12,463.66	34,274.88	23,992.42
2033	58	1,485.50	19,614.53	13,730.17	34,964.67	24,475.27
2034	59	1,518.47	21,492.32	15,044.62	35,664.68	24,965.27
2035	60	1,552.13	23,440.63	16,408.44	36,375.04	25,462.53
2036	61	1,586.50	25,461.57	17,823.10	37,095.88	25,967.12
2037	62	1,621.59	27,557.30	19,290.11	37,827.34	26,479.14
2038	63	1,657.41	29,730.03	20,811.02	38,569.55	26,998.68
2039	64	1,693.98	31,982.04	22,387.43	39,322.64	27,525.85
2040	65	1,731.32	34,315.67	24,020.97	40,086.75	28,060.72
2041	66	1,769.44	36,733.30	25,713.31	40,862.01	28,603.41
2042	67	1,808.36	39,237.42	27,466.19	41,648.57	29,154.00
2043	68	1,848.10	41,830.53	29,281.37	42,446.56	29,712.59

Table 9: DB benefits table

Source: Pension Scheme Calculations Excel file

From Table 9, we see that between age 48 and retirement age (68), the offset increased by approximately by €4,000. This is expected because the AOW offset is from the government, so the increase must be low in order for the government to be able to meet this obligation. If the primary member is alive at the retirement age, they will receive the attainable OP of amount €42,446.56 annually, else the primary member's partner receives the attainable NP of amount €29,712.59 annually.

4.2.3 Accrual Liabilities and Normal Cost

Accrued liabilities refer to the amount of pension benefits that have been earned by employees but have not yet been paid or funded by the employer. These liabilities arise from the obligation of the employer to provide future pension benefits to its employees based on their years of service and compensation. The amount of the accrued liability is determined by estimating the present value of the future pension benefits that employees will earn from the valuation date to the retirement age. So, for this member, the present value at the valuation date (01/01/2024) of the pension benefits earned from age 48 to retirement age (68) gives the accrued liabilities.

Normal cost refers to the annual cost that an employer incurs to provide pension benefits to its employees for a specific period.

The calculation of accrued liabilities and normal cost takes into account factors such as the service ratio, discount rates, expected future pension benefits (OP or NP), cost of living assumption (indexation inactive), annuity factor $\ddot{a}_x$, survival probability (tPx), retirement rates, withdrawal rates, disability rates. (Dickson, Hardy and Waters 2009).

4.2.3.1 Multiple Decrement Table and Other Assumptions

The withdrawal rates, disability rates, and mortality rates are unisex, that is, applicable to both males and females. These rates are provided and can be seen in Table 10 below.

		Rates				
Year End	**Time, t**	tPx	**RET_x**	**WTH_x**	**DIS_x**	**$MORT_x$**
2023	0	1.000000	0%	0.90%	0.26%	0.12%
2024	1	0.987148	0%	0.90%	0.27%	0.14%
2025	2	0.974303	0%	0.80%	0.27%	0.15%

2026	3	0.962427	0%	0.70%	0.27%	0.17%
2027	4	0.951452	0%	0.60%	0.28%	0.18%
2028	5	0.941344	0%	0.50%	0.29%	0.20%
2029	6	0.932047	0%	0.40%	0.29%	0.22%
2030	7	0.923549	0%	0.30%	0.54%	0.24%
2031	8	0.913539	0%	0.30%	0.55%	0.27%
2032	9	0.903364	0%	0.20%	0.55%	0.29%
2033	10	0.893885	0%	0.20%	0.56%	0.32%
2034	11	0.884189	0%	0.10%	0.57%	0.35%
2035	12	0.875179	0%	0.10%	0.58%	0.38%
2036	13	0.865883	0%	0.00%	0.59%	0.41%
2037	14	0.857205	0%	0.00%	0.60%	0.45%
2038	15	0.848234	0%	0.00%	0.61%	0.49%
2039	16	0.838929	0%	0.00%	0.62%	0.53%
2040	17	0.829323	0%	0.00%	0.63%	0.57%
2041	18	0.819404	0%	0.00%	0.63%	0.62%
2042	19	0.809151	0%	0.00%	0.63%	0.66%
2043	20	0.798707	100%	0.00%	0.00%	0.72%
Year End	**Age x**	**time t**	**Service Ratio (SR) AL**	**Service Ratio (SR) NC**	**Cost of Living Factor (COLF)**	**discount factor, v^t**
2023	48	0	1.000000	1.000000	1.485947	1.000000
2024	49	1	0.789474	1.000000	1.456811	0.966184
2025	50	2	0.652174	0.826087	1.428246	0.933511
2026	51	3	0.555556	0.960526	1.400241	0.901943
2027	52	4	0.483871	0.941935	1.372786	0.871442
2028	53	5	0.428571	0.924051	1.345868	0.841973
2029	54	6	0.384615	0.906832	1.319479	0.813501
2030	55	7	0.348837	0.890244	1.293607	0.785991
2031	56	8	0.319149	0.874251	1.268242	0.759412
2032	57	9	0.294118	0.858824	1.243374	0.733731
2033	58	10	0.272727	0.843931	1.218994	0.708919
2034	59	11	0.254237	0.829545	1.195093	0.684946
2035	60	12	0.238095	0.815642	1.171659	0.661783
2036	61	13	0.223881	0.802198	1.148686	0.639404
2037	62	14	0.211268	0.789189	1.126162	0.617782
2038	63	15	0.200000	0.776596	1.104081	0.596891
2039	64	16	0.189873	0.764398	1.082432	0.576706
2040	65	17	0.180723	0.752577	1.061208	0.557204
2041	66	18	0.172414	0.741117	1.040400	0.538361
2042	67	19	0.164835	0.730000	1.020000	0.520156
2043	68	20	0.155709	0.719212	1.000000	0.502566

Table 10: Decrements' rate and other assumptions
Source: Pension Scheme Calculations Excel file

So, at age 48, the mortality rate is 0.12% (0.0012393), disability rate is 0.26% (0.002613) and withdrawal rate is 0.90% (0.009). For Retiree rates, the rate is zero from age 48 to 67 and 100% at age 68 as age 68 is the retirement age, so it is certain a retirement will happen at that age. ${}_tP_x$ is the survival probability, that is, the probability that a life aged x now will survive to age $x+t$. At age 48 and time 0, ${}_0P_{48} = 1$ because the probability of a life aged 48 surviving to age 48 (48 + 0) is 1. Results for this part are obtained with equations (9) to (13).

For $x, t > 0$,

$$ {}_tP_x = {}_{t-1}P_{x-1} \times (1 - RET_{x-1} - WTH_{x-1} - DIS_{x-1} - MORT_{x-1}) \quad (9) $$

Thus, ${}_1P_{49} = {}_0P_{48} \times (1 - RET_{48} - WTH_{48} - DIS_{48} - MORT_{48})$

$= 1 \times (1 - 0 - 0.009 - 0.002613 - 0.0012393) = 1 \times 0.987148 = 0.987148$

Discount factor at time $t = (1 + \text{discount rate})^{-t}, \quad t = 0, \ldots, 20$ (10)

Discount factor at time 2 = $(1 + 3.5\%)^{-2} = 1.035^{-2} = 0.933511$

At time $t = 0$, Service Ratio (SR) AL = 1.

For time $t > 0$,

$$ \text{Service Ratio AL at time t} = \frac{\text{Service years at time 0}}{\text{Service years at time t}} \quad (11) $$

Thus, at time t = 1, Service Ratio AL = $\frac{3.75}{4.75}$ = 0.789474.

At time $t = 0,1$, Service Ratio NC = 1.

For time $t > 1$,

$$ \text{Service Ratio NC at time t} = \frac{\text{Service years at time 1}}{\text{Service years at time t}} \quad (12) $$

Thus, at time t = 2, Service Ratio NC = $\frac{4.75}{5.75}$ = 0.826087.

Cost of living factor (COLF) at time t = $(1 + \text{Indexation Inactive})^{20-t}$ (13)

Thus, Cost of living factor at time 0 = $(1 + 2\%)^{20-0} = 1.02^{20} = 1.485947$

In Table 11 below, the OP and NP values for the decrements are shown. As mentioned earlier, retiree and disability benefits are the attainable OP (or NP) while withdrawal benefits are the accrued OP (or NP), and they can be seen in Table 9.

		OP Values (€)			NP Values (€)		
Year End	**Age, x**	**RET**	**WTH**	**DIS**	**RET**	**WTH**	**DIS**
2023	48	28,506.24	4,290.54	28,506.24	19,954.37	3,003.36	19,954.37
2024	49	29,109.61	5,567.29	29,109.61	20,376.72	3,897.10	20,376.72
2025	50	29,722.09	6,896.34	29,722.09	20,805.46	4,827.44	20,805.46
2026	51	30,343.81	8,279.31	30,343.81	21,240.67	5,795.51	21,240.67
2027	52	30,974.89	9,717.85	30,974.89	21,682.42	6,802.49	21,682.42
2028	53	31,615.44	11,213.65	31,615.44	22,130.81	7,849.56	22,130.81
2029	54	32,265.60	12,768.48	32,265.60	22,585.92	8,937.93	22,585.92
2030	55	32,925.47	14,384.11	32,925.47	23,047.83	10,068.88	23,047.83
2031	56	33,595.19	16,062.40	33,595.19	23,516.64	11,243.68	23,516.64
2032	57	34,274.88	17,805.22	34,274.88	23,992.42	12,463.66	23,992.42
2033	58	34,964.67	19,614.53	34,964.67	24,475.27	13,730.17	24,475.27
2034	59	35,664.68	21,492.32	35,664.68	24,965.27	15,044.62	24,965.27
2035	60	36,375.04	23,440.63	36,375.04	25,462.53	16,408.44	25,462.53
2036	61	37,095.88	25,461.57	37,095.88	25,967.12	17,823.10	25,967.12
2037	62	37,827.34	27,557.30	37,827.34	26,479.14	19,290.11	26,479.14

2038	63	38,569.55	29,730.03	38,569.55	26,998.68	20,811.02	26,998.68
2039	64	39,322.64	31,982.04	39,322.64	27,525.85	22,387.43	27,525.85
2040	65	40,086.75	34,315.67	40,086.75	28,060.72	24,020.97	28,060.72
2041	66	40,862.01	36,733.30	40,862.01	28,603.41	25,713.31	28,603.41
2042	67	41,648.57	39,237.42	41,648.57	29,154.00	27,466.19	29,154.00
2043	68	42,446.56	41,830.53	42,446.56	29,712.59	29,281.37	29,712.59

Table 11: Decrements' benefits
Source: Pension Scheme Calculations Excel file

In the next three subsections, we calculate AL and NC in the case of retirement, withdrawal and disability. For each decrement, the AL and NC are calculated if the primary member makes it to retirement age (in which case we have the OP benefits), if the primary member dies before age 68 (in which case we have the NP benefits), and if the primary member dies after age 68 (in which case we also have NP benefits). With these values and factors, we can now calculate the AL and NC. The annuity factor $\ddot{a}_x$ is obtained from Mercer's retirement software.

4.2.3.2 AL and NC for the Retirement Decrement

For the first decrement, Retirement, the result from applying the AL and NC formulas to age 68 is shown in Table 12 below.

ActivesOPRetirement_Ret				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
…	…	…	…	…
2043	68	17.401707	46,166.78	12,311.14
ActivesNPRetirementBefore65_Ret				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
…	…	…	…	…
2043	68	0.000000	-	-
ActivesNPRetirementAfter65_Ret				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
…	…	…	…	…
2043	68	5.566669	10,337.87	2,756.77

Table 12: Retirement accrued liabilities and normal cost
Source: Pension Scheme Calculations Excel file

We present the formula to calculate the AL and NC, equations (14) and (15).

If the primary member makes it to retirement age (ActivesOPRetirement_Ret)

Projected Benefit Obligation (PBO) AL at age x =

$$RET(OP\ Value)_x \times \ddot{a}_x \times SR\ (AL) \times RET(Rates)_x \times {}_tP_x \times v^t \quad (14)$$

Projected Benefit Obligation (PBO) NC at age x =

$$\frac{RET(OP\ Value)_x \times \ddot{a}_x \times RET(Rates)_x \times tPx \times v^t}{Service\ Years\ at\ age\ x} \quad (15)$$

PBO AL at age 68 $= 42446.56 \times 17.401707 \times 0.155709 \times 1 \times 0.798707 \times 0.502566 =$ €46,166.78

PBO NC at age 68 $= \frac{42446.56 \times 17.401707 \times 1 \times 0.798707 \times 0.502566}{24.0833} =$ €12,311.14

If the primary member dies before retirement age (ActivesNPRetirementBefore65_Ret), equations (14) and (15) are applied

PBO AL at age 68 = $29712.59 \times 0 \times 0.155709 \times 1 \times 0.798707 \times 0.502566 = 0$

PBO NC at age 68 = $\frac{29712.59 \times 0 \times 1 \times 0.798707 \times 0.502566}{24.0833} = 0$

If the primary member dies after retirement age (ActivesNPRetirementAfter65_Ret), equations (14) and (15) are applied

PBO AL at age 68 = $29712.59 \times 5.566669 \times 0.155709 \times 1 \times 0.798707 \times 0.502566 =$ €10,337.87

PBO NC at age 68 = $\frac{29712.59 \times 5.566669 \times 1 \times 0.798707 \times 0.502566}{24.0833} =$ €2,756.77

4.2.3.3 AL and NC for the Withdrawal Decrement

For the second decrement, Withdrawal, the result from applying the AL and NC formulas to some ages is shown in Table 13 below.

ActivesOPWithdrawal_Wth				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	8.172056	468.91	-
2024	49	8.468573	465.46	124.12
2025	50	8.776890	410.23	109.40
…	…	…	…	…
2043	68	17.401707	-	-
		PBO AL	**at 01/01/2024**	3,041.21
		PBO NC	**at 01/01/2024**	685.95
ActivesNPWithdrawalBefore65_Wth				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	1.365620	36.91	-
2024	49	1.348721	35.62	9.50
2025	50	1.328667	30.44	8.12
…	…	…	…	…
2043	68	0.000000	-	-
		PBO AL	**at 01/01/2024**	209.93
		PBO NC	**at 01/01/2024**	46.14
ActivesNPWithdrawalAfter65_Wth				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	2.614176	105.00	-
2024	49	2.709030	104.23	27.79
2025	50	2.807658	91.86	24.50
…	…	…	…	…
2043	68	5.566669	-	-
		PBO AL	**at 01/01/2024**	681.00
		PBO NC	**at 01/01/2024**	153.60

Table 13: Withdrawal accrued liabilities and normal cost
Source: Pension Scheme Calculations Excel file

We present the formula to calculate the AL and NC, equations (16) to (19).

If the primary member makes it to retirement age (ActivesOPWithdrawal_Wth)

PBO AL at age x =

$$WTH(OP\ Value)_x \times \ddot{a}_x \times SR\ (AL) \times COLF_x \times WTH(Rates)_x \times {}_tP_x \times v^t \qquad (16)$$

PBO NC at age 48 = 0.

PBO NC at age $x > 48$ =

$$\frac{WTH(OP\ Value)_x \times \ddot{a}_x \times COLF_x \times WTH(Rates)_x \times {}_tP_x \times v^t}{Service\ Years\ at\ age\ x} \qquad (17)$$

Thus, PBO AL at age 49 = $5567.29 \times 8.468573 \times 0.789474 \times 1.456811 \times 0.009 \times 0.987148 \times 0.966184 = €465.46$

PBO NC at age 49 = $\frac{5567.29 \times 8.468573 \times 1.456811 \times 0.009 \times 0.987148 \times 0.966184}{4.75} = €124.12$

If the primary member dies before retirement age (ActivesNPWithdrawalBefore65_Wth)

PBO AL at age x =

$$WTH(NP\ Value)_x \times \ddot{a}_x \times SR\ (AL) \times WTH(Rates)_x \times {}_tP_x \times v^t \qquad (18)$$

PBO NC at age 48 = 0.

PBO NC at age $x > 48$ =

$$\frac{WTH(NP\ Value)_x \times \ddot{a}_x \times WTH(Rates)_x \times {}_tP_x \times v^t}{Service\ Years\ at\ age\ x} \qquad (19)$$

PBO AL at age 49 = $3897.10 \times 1.348721 \times 0.789474 \times 0.009 \times 0.987148 \times 0.966184 = €35.62$

PBO NC at age 49 = $\frac{3897.10 \times 1.348721 \times 0.009 \times 0.987148 \times 0.966184}{4.75} = €9.50$

If the primary member dies after retirement age (ActivesNPWithdrawalAfter65_Wth), equations (16) and (17) are applied

PBO AL at age 49 = $3897.10 \times 2.709030 \times 0.789474 \times 1.456811 \times 0.009 \times 0.987148 \times 0.966184 = €104.23$

PBO NC at age 49 = $\frac{3897.10 \times 2.709030 \times 1.456811 \times 0.009 \times 0.987148 \times 0.966184}{4.75} = €27.29$

4.2.3.4 AL and NC for the Disability Decrement

For the third decrement, Disability, the result from applying the AL and NC formulas to some ages is shown in Table 14 below. Equations (20) to (23) display the mathematics.

ActivesOPDisability_Dis				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	8.172056	904.51	-
2024	49	8.468573	717.68	191.38
2025	50	8.776890	596.27	159.00
…	…	…	…	…
2043	68	17.401707	-	-
		PBO AL	**at 01/01/2024**	9,536.53
		PBO NC	**at 01/01/2024**	2,301.87

ActivesNPDisabilityBefore65_Dis				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	1.365620	71.20	-
2024	49	1.348721	54.92	14.65
2025	50	1.328667	44.24	11.80
…	…	…	…	…
2043	68	0.000000	-	-
		PBO AL	**at 01/01/2024**	503.18
		PBO NC	**at 01/01/2024**	115.19
ActivesNPDisabilityAfter65_Dis				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	2.614176	202.54	-
2024	49	2.709030	160.71	42.85
2025	50	2.807658	133.52	35.61
…	…	…	…	…
2043	68	5.566669	-	-
		PBO AL	**at 01/01/2024**	2,135.46
		PBO NC	**at 01/01/2024**	515.45

Table 14: Disability accrued liabilities and normal cost
Source: Pension Scheme Calculations Excel file

If the primary member makes it to retirement age (ActivesOPDisability_Dis)

PBO AL at age x =

$$DIS(OP\ Value)_x \times \ddot{a}_x \times SR(AL) \times COLF_x \times DIS(Rates)_x \times {}_tP_x \times v^t \quad (20)$$

PBO NC at age 48 = 0.

PBO NC at age $x > 48$ =

$$\frac{DIS(OP\ Value)_x \times \ddot{a}_x \times COLF_x \times DIS(Rates)_x \times {}_tP_x \times v^t}{Service\ Years\ at\ age\ x} \quad (21)$$

PBO AL at age 49 = $29109.61 \times 8.468573 \times 0.789474 \times 1.456811 \times 0.002654 \times 0.987148 \times 0.966184 = €717.68$

PBO NC at age 49 = $\frac{29109.61 \times 8.468573 \times 1.456811 \times 0.002654 \times 0.987148 \times 0.966184}{4.75} = €191.38$

If the primary member dies before retirement age (ActivesNPDisabilityBefore65_Dis)

PBO AL at age x =

$$DIS(NP\ Value)_x \times \ddot{a}_x \times Service\ Ratio\ (AL) \times DIS(Rates)_x \times {}_tP_x \times v^t \quad (22)$$

PBO NC at age 48 = 0.

PBO NC at age $x > 48$ =

$$\frac{DIS(NP\ Value)_x \times \ddot{a}_x \times DIS(Rates)_x \times {}_tP_x \times v^t}{Service\ Years\ at\ age\ x} \quad (23)$$

PBO AL at age 49 = $20{,}376.72 \times 1.348721 \times 0.789474 \times 0.002654 \times 0.987148 \times 0.966184 = €54.92$

PBO NC at age 49 = $\frac{20{,}376.72 \times 1.348721 \times 0.002654 \times 0.987148 \times 0.966184}{4.75} = €14.65$

If the primary member dies after retirement age (ActivesNPDisabilityAfter65_Dis), equations (20) and (21) are applied

PBO AL at age 49 = $20376.72 \times 2.709030 \times 0.789474 \times 1.456811 \times 0.002654 \times 0.987148 \times 0.966184 = €160.71$

PBO NC at age 49 = $\frac{20376.72 \times 2.709030 \times 1.456811 \times 0.002654 \times 0.987148 \times 0.966184}{4.75} = €42.85$

4.2.3.5 Total AL and NC

The summary of the AL and NC, obtained by adding the three cases for each decrement is shown in Table 15 below. For example, PBO AL for Retirement = PBO AL ActivesOPRetirement_Ret + PBO AL ActivesNPRetirementBefore65_Ret + PBO AL ActivesNPRetirementAfter65_Ret = $46{,}166.78 + 0 + 10{,}337.87 = €56{,}504.65$. We see in Table 15 that the disability AL is higher than the withdrawal AL. This is expected because the disability rates are higher at older ages (age 55 to 67).

Decrements	PBO AL	PBO NC			Grand Total
Retirement	€56,504.65	€15,067.91		**PBO AL**	**€72,611.96**
Withdrawal	€3,932.14	€885.68		**PBO NC**	**€18,886.10**
Disability	€12,175.17	€2,932.51			

Table 15: Total PBO AL and NC
Source: Pension Scheme Calculations Excel file

For the 971 members, the AL results from Mercer's retirement software is shown in Table 16 below:

Accrued Liability	Active	€57,115,292
	Deferred	€32,832,156
	Pensioner	€20,501,338
	Total	**€110,448,786**
Normal Cost (Actives Only)		€3,941,163

Table 16: Summary of employer's accrued liabilities and normal cost
Source: Mercer

So, as at 01/01/2024 (valuation date), based on the DB scheme calculations, the employer is carrying in liabilities €110,448,786 and the normal cost for the employer is €3,941,163.

4.3 Conversion to the DC scheme

Conversion to the DC scheme is done using the same methodology as the DB scheme but now a Curtailment will be done on the DB scheme. Curtailment of the DB plan refers to closure of the DB plan which means there will no longer be accrual, neither will there be a salary increase. This means there will be a significant reduction in the future pension benefits that employees are expected to receive under the DB plan. It is the first step taken when there is a change of pension plan (in this case change from DB to DC).

We will consider the same member to show how the benefits and accrued liabilities (AL) are calculated in the software system. We will not have a normal cost because in a DC scheme, the employer only makes contribution (while the employee with the help of the investment fund manager is responsible for the management of the contribution's investment), so the employer

will not incur any cost. The details of the member are the same as that shown in Table 8 except that salary increase, offset increase and accrual rate are now 0%.

Member Details	
ID	6537
Accrual Rate	0%
Salary Increase	0%
Offset Increase	0%

Table 17: Changes in details of member with employee ID 6537
Source: Mercer

4.3.1 Defined Contribution Table

With these details, the benefits table is produced using the same formulas used for the DB scheme. The result is seen in Table 18.

Year End	Age	Current Age	Service years	Salary (€)	Offset (€)	Pension base (€)
2023	48	47.6667	3.7500	88,062.00	17,488.00	63,516.60
2024	49	48.6667	4.7500	88,062.00	17,488.00	63,516.60
2025	50	49.6667	5.7500	88,062.00	17,488.00	63,516.60
2026	51	50.6667	6.7500	88,062.00	17,488.00	63,516.60
2027	52	51.6667	7.7500	88,062.00	17,488.00	63,516.60
2028	53	52.6667	8.7500	88,062.00	17,488.00	63,516.60
2029	54	53.6667	9.7500	88,062.00	17,488.00	63,516.60
2030	55	54.6667	10.7500	88,062.00	17,488.00	63,516.60
2031	56	55.6667	11.7500	88,062.00	17,488.00	63,516.60
2032	57	56.6667	12.7500	88,062.00	17,488.00	63,516.60
2033	58	57.6667	13.7500	88,062.00	17,488.00	63,516.60
2034	59	58.6667	14.7500	88,062.00	17,488.00	63,516.60
2035	60	59.6667	15.7500	88,062.00	17,488.00	63,516.60
2036	61	60.6667	16.7500	88,062.00	17,488.00	63,516.60
2037	62	61.6667	17.7500	88,062.00	17,488.00	63,516.60
2038	63	62.6667	18.7500	88,062.00	17,488.00	63,516.60
2039	64	63.6667	19.7500	88,062.00	17,488.00	63,516.60
2040	65	64.6667	20.7500	88,062.00	17,488.00	63,516.60
2041	66	65.6667	21.7500	88,062.00	17,488.00	63,516.60
2042	67	66.6667	22.7500	88,062.00	17,488.00	63,516.60
2043	68	67.6667	24.0833	88,062.00	17,488.00	63,516.60
Year End	Age	Accrual (€)	Accrued OP (€)	Accrued NP (€)	Attainable OP (€)	Attainable NP (€)
2023	48	0.00	4,290.54	3,003.36	4,290.54	3,003.36
2024	49	0.00	4,376.35	3,063.45	4,376.35	3,063.45
2025	50	0.00	4,463.88	3,124.71	4,463.88	3,124.71
2026	51	0.00	4,553.16	3,187.21	4,553.16	3,187.21
2027	52	0.00	4,644.22	3,250.95	4,644.22	3,250.95
2028	53	0.00	4,737.10	3,315.97	4,737.10	3,315.97
2029	54	0.00	4,831.85	3,382.29	4,831.85	3,382.29
2030	55	0.00	4,928.48	3,449.94	4,928.48	3,449.94
2031	56	0.00	5,027.05	3,518.94	5,027.05	3,518.94
2032	57	0.00	5,127.59	3,589.32	5,127.59	3,589.32
2033	58	0.00	5,230.15	3,661.10	5,230.15	3,661.10
2034	59	0.00	5,334.75	3,734.32	5,334.75	3,734.32
2035	60	0.00	5,441.44	3,809.01	5,441.44	3,809.01

2036	61	0.00	5,550.27	3,885.19	5,550.27	3,885.19
2037	62	0.00	5,661.28	3,962.89	5,661.28	3,962.89
2038	63	0.00	5,774.50	4,042.15	5,774.50	4,042.15
2039	64	0.00	5,889.99	4,122.99	5,889.99	4,122.99
2040	65	0.00	6,007.79	4,205.45	6,007.79	4,205.45
2041	66	0.00	6,127.95	4,289.56	6,127.95	4,289.56
2042	67	0.00	6,250.51	4,375.36	6,250.51	4,375.36
2043	68	0.00	6,375.52	4,462.86	6,375.52	4,462.86

Table 18: DC benefits table

Source: Pension Scheme Calculations Excel file

From Table 18 above, we see that the accrual is zero. This is what is expected as we no longer have defined benefits, rather we have contributions from the employer, which are invested, hence no more accrual on the benefits. We also see that the accrued OP (or NP) and attainable OP (or NP) are now the same amounts, this is because the driver of the difference is the accrual, which is now zero.

4.3.2 Accrued Liabilities

We show next the accrued liabilities (AL) which were also calculated using the same approach as in the DB scheme.

4.3.2.1 Multiple Decrement Table and Other Assumptions

The decrements' rates and other assumptions are the same as those in Table 10 except that the service ratio (AL) and service ratio (NC) are now 1. This is because service years do not apply to DC, only to DB (which uses service years to calculate retirement benefits).

Year End	Age x	time t	Service Ratio AL	Service Ratio NC
2023	48	0	1.000000	1.000000
2024	49	1	1.000000	1.000000
2025	50	2	1.000000	1.000000
2026	51	3	1.000000	1.000000
2027	52	4	1.000000	1.000000
2028	53	5	1.000000	1.000000
2029	54	6	1.000000	1.000000
2030	55	7	1.000000	1.000000
2031	56	8	1.000000	1.000000
2032	57	9	1.000000	1.000000
2033	58	10	1.000000	1.000000
2034	59	11	1.000000	1.000000
2035	60	12	1.000000	1.000000
2036	61	13	1.000000	1.000000
2037	62	14	1.000000	1.000000
2038	63	15	1.000000	1.000000
2039	64	16	1.000000	1.000000
2040	65	17	1.000000	1.000000
2041	66	18	1.000000	1.000000
2042	67	19	1.000000	1.000000
2043	68	20	1.000000	1.000000

Table 19: Service Ratio for DC Scheme

Source: Pension Scheme Calculations Excel file

In Table 20, the OP and NP values for the decrements are shown. We see that the OP (or NP) values are the same for the three decrements as opposed to that of the DB scheme where the withdrawal OP (or NP) values are different from retirement and disability OP (or NP) values.

		OP Values (€)			NP Values (€)		
Year End	**Age, x**	**RET**	**WTH**	**DIS**	**RET**	**WTH**	**DIS**
2023	48	4,290.54	4,290.54	4,290.54	3,003.36	3,003.36	3,003.36
2024	49	4,376.35	4,376.35	4,376.35	3,063.45	3,063.45	3,063.45
2025	50	4,463.88	4,463.88	4,463.88	3,124.71	3,124.71	3,124.71
2026	51	4,553.16	4,553.16	4,553.16	3,187.21	3,187.21	3,187.21
2027	52	4,644.22	4,644.22	4,644.22	3,250.95	3,250.95	3,250.95
2028	53	4,737.10	4,737.10	4,737.10	3,315.97	3,315.97	3,315.97
2029	54	4,831.85	4,831.85	4,831.85	3,382.29	3,382.29	3,382.29
2030	55	4,928.48	4,928.48	4,928.48	3,449.94	3,449.94	3,449.94
2031	56	5,027.05	5,027.05	5,027.05	3,518.94	3,518.94	3,518.94
2032	57	5,127.59	5,127.59	5,127.59	3,589.32	3,589.32	3,589.32
2033	58	5,230.15	5,230.15	5,230.15	3,661.10	3,661.10	3,661.10
2034	59	5,334.75	5,334.75	5,334.75	3,734.32	3,734.32	3,734.32
2035	60	5,441.44	5,441.44	5,441.44	3,809.01	3,809.01	3,809.01
2036	61	5,550.27	5,550.27	5,550.27	3,885.19	3,885.19	3,885.19
2037	62	5,661.28	5,661.28	5,661.28	3,962.89	3,962.89	3,962.89
2038	63	5,774.50	5,774.50	5,774.50	4,042.15	4,042.15	4,042.15
2039	64	5,889.99	5,889.99	5,889.99	4,122.99	4,122.99	4,122.99
2040	65	6,007.79	6,007.79	6,007.79	4,205.45	4,205.45	4,205.45
2041	66	6,127.95	6,127.95	6,127.95	4,289.56	4,289.56	4,289.56
2042	67	6,250.51	6,250.51	6,250.51	4,375.36	4,375.36	4,375.36
2043	68	6,375.52	6,375.52	6,375.52	4,462.86	4,462.86	4,462.86

Table 20: Decrements' benefits

Source: Pension Scheme Calculations Excel file

We now calculate the AL in the case of retirement, withdrawal and disability using the same methodology as with the DB scheme.

4.3.2.2 AL and NC for the Retirement Decrement

For the first decrement, Retirement, the result from applying AL and NC formulas, equations (14) and (15), to age 68 is shown in Table 21 below. We observe that the accrued liabilities are lower than those of DB scheme, which is as expected since that is what a Curtailment entails.

ActivesOPRetirement_Ret				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
…	…	…	…	…
2043	68	17.401707	44,533.61	-
ActivesNPRetirementBefore65_Ret				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
…	…	…	…	…
2043	68	0.000000	-	-
ActivesNPRetirementAfter65_Ret				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**

…	…	…	…	…
2043	68	5.566669	9,972.16	-

Table 21: Retirement accrued liabilities and normal cost
Source: Pension Scheme Calculations Excel file

4.3.2.3 AL and NC for the Withdrawal Decrement

For the second decrement, Withdrawal, the result from applying AL and NC formulas, equations (16) and (17), to some ages is shown in Table 22 below. Again, we observe that the accrued liabilities are lower than those of DB scheme.

ActivesOPWithdrawal_Wth				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	8.172056	468.91	-
2024	49	8.468573	463.46	-
2025	50	8.776890	407.15	-
…	…	…	…	…
2043	68	17.401707	-	-
		PBO AL	**at 01/01/2024**	3,009.95
		PBO NC	**at 01/01/2024**	-
ActivesNPWithdrawalBefore65_Wth				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	1.365620	36.91	-
2024	49	1.348721	35.47	-
2025	50	1.328667	30.21	-
…	…	…	…	…
2043	68	0.000000	-	-
		PBO AL	**at 01/01/2024**	207.96
		PBO NC	**at 01/01/2024**	-
ActivesNPWithdrawalAfter65_Wth				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	2.614176	105.00	-
2024	49	2.709030	103.78	-
2025	50	2.807658	91.17	-
…	…	…	…	…
2043	68	5.566669	-	-
		PBO AL	**at 01/01/2024**	674.00
		PBO NC	**at 01/01/2024**	-

Table 22: Withdrawal accrued liabilities and normal cost
Source: Pension Scheme Calculations Excel file

4.3.2.4 AL and NC for the Disability Decrement

For the third decrement, Disability, the result from applying AL and NC formulas, equations (20) and (21), to some ages is shown in Table 23 below. Again, the accrued liabilities are lower than those of DB scheme.

ActivesOPDisability_Dis				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	8.172056	136.14	-
2024	49	8.468573	136.67	-
2025	50	8.776890	137.31	-
…	…	…	…	…
2043	68	17.401707	-	-
		PBO AL	**at 01/01/2024**	4,534.81
		PBO NC	**at 01/01/2024**	-
ActivesNPDisabilityBefore65_Dis				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	1.365620	10.72	-
2024	49	1.348721	10.46	-
2025	50	1.328667	10.19	-
…	…	…	…	…
2043	68	0.000000	-	-
		PBO AL	**at 01/01/2024**	192.72
		PBO NC	**at 01/01/2024**	-
ActivesNPDisabilityAfter65_Dis				
Year End	**Age**	**Annuity Factor**	**PBO AL (€)**	**PBO NC (€)**
2023	48	2.614176	30.48	-
2024	49	2.709030	30.60	-
2025	50	2.807658	30.75	-
…	…	…	…	…
2043	68	5.566669	-	-
		PBO AL	**at 01/01/2024**	1,015.45
		PBO NC	**at 01/01/2024**	-

Table 23: Disability accrued liabilities and normal cost
Source: Pension Scheme Calculations Excel file

4.3.2.5 Total AL and NC

The summary of the AL, obtained by adding the three cases for each decrement is in Table 24. For example, PBO AL for Retirement = PBO AL ActivesOPRetirement_Ret + PBO AL ActivesNPRetirementBefore65_Ret + PBO AL ActivesNPRetirementAfter65_Ret = $44{,}533.61 + 0 + 9{,}972.16 = 54{,}505.77$. Again, we see that the disability AL is higher than the withdrawal AL and this is because the disability rates are higher at older ages (age 55 to 67).

Decrements	PBO AL	PBO NC			Grand Total
Retirement	54,505.77	-		**PBO AL**	**64,140.66**
Withdrawal	3,891.91	-		**PBO NC**	**-**
Disability	5,742.98	-			

Table 24: Summary of member's accrued liabilities and normal cost
Source: Mercer

For the 971 members, the AL results from Mercer's retirement software is shown in Table 25. From the table, we see that only the actives AL has changed. This is because accruals only apply

to active members. So, in a DB scheme these accruals are taken into account, but in a DC scheme, there are no more accruals, thus reducing the accrued liabilities.

Accrued Liability	Active	€48,685,989
	Deferred	€32,832,156
	Pensioner	€20,501,338
	Total	**€102,019,483**
Normal Cost (Actives Only)		-

Table 25: Summary of employer's accrued liabilities and normal cost
Source: Mercer

So, as at 01/01/2024 (valuation date), based on the Curtailment calculations, the employer is carrying in liabilities €102,019,483 (lower than the DB liabilities, as expected) and the normal cost for the employer is €0 (as expected).

4.4 Effects of Changing from DB scheme to DC scheme

To analyse the effect, a balance sheet and a profit and loss (P&L) account are used. This is because a balance sheet will show us the company's financial position at a specific point in time while the P&L account will give us an insight into the company's performance, whether the company is profitable or not. And since we are analysing employee benefits, IAS19 – the accounting standard issued by the International Accounting Standards Board (IASB) for employee benefits – will be used to produce the balance sheet and P&L account (IAS 19 2013). We consider two cases:

1. when the plans are overfunded, in which case assets are higher than liabilities,
2. when the plans are underfunded, in which case assets are lower than liabilities.

4.4.1 Overfunded status

The information needed to produce the accounts are shown in Table 26 below:

2023 Information	
Discount Rate	3.50%
DB AL 2022	€107,335,483
DB AL 2023	€110,448,786
Curtailment AL 2023	€102,019,483
DB NC 2023	€3,941,163
Actual benefit payments (ABP) 2023	€3,576,000
Expected Benefit Payments (EBP) 2024	€3,576,000
Fair Value of Assets 2022	€83,900,000
Fair Value of Assets 2023	€125,816,042
Actual employer contributions 2023	€3,600,000
Expected employer contributions 2024	€3,600,000

Table 26: Fiscal Year (FY) 2023 Accounting Assumptions
Source: Mercer

The fair value of assets as at 31/12/2023 is assumed to be €125,816,042, which is higher than DB liabilities as at 31/12/2023 (€110,448,786).

With the information in Table 26, the balance sheet is first produced, and this is shown in Table 27 below.

4.4.1.1 Balance Sheet

		31/12/2023	31/12/2023	31/12/2023
		DB	Curtailment	Settlement
1.	Defined benefit obligation	€110,448,786	€102,019,483	–
2.	Fair value of plan assets	€125,816,042	€125,816,042	–
3.	**Funded status**	**–€15,367,256**	**–€23,796,559**	–
4.	Effect of asset ceiling/onerous liability	-	-	–
5.	**Net defined benefit liability (asset)**	**–€15,367,256**	**–€23,796,559**	–

Table 27: Balance sheet as at 31/12/2023
Source: P&L IAS19 Excel file

Funded Status = Liabilities – Assets.

Under IAS 19, gains are represented by a negative sign and losses are represented by a positive sign. Under the DB plan, there is an asset of €15.4m, so the employer has sufficient assets to cover the liabilities. Under the Curtailment scenario, there is also an asset of €23.8m, so the employer has sufficient assets to cover the liabilities. A third scenario, Settlement, was added and this is the step after Curtailment where the employer decides to go full DC. So, when a change from DB plan is to be done, the employer decides whether to do a Curtailment (where DB is used for the past and DC for the future) or to do a Settlement (full DC). In the balance sheet, we have a value of zero for Settlement because in a DC plan, the employer does not have liabilities, so assets are not needed to cover the liabilities.

Next, the Profit & Loss (P&L) account is produced and is shown in Table 28 below.

4.4.1.2 Profit and Loss Account for FY 2023

		31/12/2023	31/12/2023	31/12/2023
Components of defined benefit cost		DB	Curtailment	Settlement
1.	Service cost			
	a. Current service cost	€4,079,104	€4,079,104	€4,079,104
	b. Reimbursement service cost	-	-	-
	c. Past service cost	-	–€8,429,303	–€8,429,303
	d. (Gain) / loss on Settlements	-	-	€23,796,559
	e. Total service cost	**4,079,104**	**–€4,350,199**	**€19,446,360**
2.	Net interest cost			-
	a. Interest expense on DBO	€3,694,162	€3,694,162	€3,694,162
	b. Interest (income) on plan assets	–€2,936,920	–€2,936,920	–€2,936,920
	c. Interest (income) on reimbursement rights	-	-	-
	d. Interest expense on effect of (asset ceiling)/onerous liability	-	-	-
	e. Total net interest cost	**€757,242**	**€757,242**	**€757,242**
3.	Remeasurements of Other Long-Term Benefits	**-**	**-**	**-**
4.	Administrative expenses and/or taxes (not reserved within DBO)	**-**	**-**	**-**
5.	**Defined benefit cost included in P&L**	**€4,836,346**	**–€3,592,957**	**€20,203,602**

Table 28: Profit and Loss account as at 31/12/2023
Source: P&L IAS19 Excel file

Service Cost refers to the cost incurred by the employer for providing pension benefits to its employees for another year. Equations (24) to (30) are used.

Current Service Cost (CSR) =

$$\text{Normal Cost (NC)} \times (1 + \text{discount rate}) - \text{Employee Contributions} \quad (24)$$

Based on the information in Table 26,

$\text{CSR} = 3941163 \times (1 + 3.5\%) - 0 = 3941163 \times 1.035 = €4{,}079{,}104$

$$\text{Past Service Cost (PSC)} = \text{Curtailment AL} - \text{DB AL} \quad (25)$$

$\text{PSC} = 102{,}019{,}483 - 110{,}448{,}786 = -€8{,}429{,}303$

Both Curtailment and Settlement scenarios have past service cost (PSC). Past Service Cost represents the cost of changing from DB plan to DC plan.

Interest Expense on Defined Benefit Obligation =

$$(\text{DB AL } 2022 - 0.5 \times \text{ABP } 2023) \times \text{discount rate} \quad (26)$$

Based on the information in Table 26,

Interest Expense on Defined Benefit Obligation $= (107335483 + 0.5 \times 3576000) \times 3.5\% = 109123483 \times 0.035 = €3{,}694{,}162$

Interest Income on plan assets =

$$(\text{Fair Value of Assets } 2022 + 0.5 \times \text{Actual Employer Contributions } 2023 - 0.5 \times \text{ABP } 2023) \times \text{discount rate} \quad (27)$$

Interest Income on plan assets $= (83900000 + 0.5 \times 3600000 - 0.5 \times 3576000) \times 3.5\% = €3{,}936{,}920$

DB cost included in P&L =

$$\text{Total Service Cost} + \text{Total Net Interest Cost} \quad (28)$$

DB cost included in P&L $= 4{,}079{,}104 + 757{,}242 = €4{,}836{,}346$.

The same calculations are done for the Curtailment and Settlement scenarios. For the Settlement scenario,

(Gain)/Loss on Settlements =

$$\text{Decrease in plan assets} - \text{Decrease in obligation} \quad (29)$$

Based on the information in Table 26,

(Gain)/Loss on Settlements $= 125{,}816{,}042 - 102{,}019{,}483 = €23{,}796{,}559$.

From the P&L in 2023, we see that for the current plan (DB), the employer has a loss of €4.8m, for the Curtailment a gain of €3.6m, and for the Settlement a loss of €20.2m.

Now that the balance sheet and P&L for the current year have been presented, we look at the P&L for next year (31/12/2024) as this is also important for the employer, see Table 29.

4.4.1.3 Profit and Loss Account for FY 2024

Benefit cost next FY			DB	DB for past, DC for future	DC
			Current	**Curtailment**	**Settlement**
	Financial year ending on		31/12/2024	31/12/2024	31/12/2024
Components of defined benefit cost					
1	Service cost				
	a. Current service cost		€4,079,104	-	-
	b. Reimbursement service cost		-	-	-
	c. Past service cost		-	-	-
	d. (Gain) / loss on Settlements		-	-	-
	e. Total service cost		€4,079,104	-	-
2	Net interest cost				-

	a. Interest expense on DBO		€3,941,068	€3,508,102	-
	b. Interest (income) on plan assets		−€4,403,981	−€4,403,981	-
	c. Interest (income) on reimbursement rights		-	-	-
	d. Interest expense on effect of (asset ceiling)/onerous liability		-	-	-
	e. Total net interest cost		−€462,913	−€895,880	-
3	Remeasurements of Other Long-Term Benefits		-	-	-
4	Administrative expenses and/or taxes (not reserved within DBO)		-	-	-
5	Defined benefit cost included in P&L		€3,616,190	−€895,880	-
6.	Remeasurements (recognized in other comprehensive income)		-	-	-
7.	Total defined benefit cost recognized in P&L and OCI (DB)		€3,616,190	−€895,880	-
	DC contributions		-	€4,000,000	€4,000,000
	Total (DB + DC)		€3,616,190	€3,104,120	€4,000,000
			Not stable	**More stable**	**Stable**

Table 29: Profit and Loss account as at 31/12/2024
Source: P&L IAS19 Excel file

Under IAS 19, when there is a change from DB plan to DC plan, the DB service cost is no longer applicable and is replaced with the more stable DC contribution (for DC the P&L is equal to the contribution). This is why both Curtailment and Settlement do not have service cost in the next fiscal year (FY) because they both use DC for the future. Equations (30) and (31) show how Interest expense and Interest income are calculated.

Interest expense on DBO for next FY =

$$\text{discount rate} \times (\text{AL } 2023 - 0.5 \times \text{EBP } 2024) + \text{discount rate} \times \text{NC } 2023 \quad (30)$$

Interest income on plan assets for next FY =

$$-\text{discount rate} \times \begin{pmatrix} \text{Fair Value of Assets } 2023 + \\ 0.5 \times \text{Expected Employer Contributions } 2024 - 0.5 \times \text{EBP } 2024 \end{pmatrix} \quad (31)$$

From the P&L, we see that for the current plan (DB), the employer has a loss of €4.8m in 2023 and a loss of €3.6m in 2024. For the Curtailment scenario there was a gain of €3.6m in 2023 and in 2024 a loss of €3.1m (total of DB + DC). For the Settlement scenario there was a loss of €20.2m in 2023 and in 2024 a loss of €4.0m (total of DB + DC). So, the employer may not choose to settle the cost of Settlement is very high.

From Table 29, in FY 2024 we assumed there is a DC premium of €4,000,000 by the employer. In case of Curtailment, a loss of €3.1m will be recognized in the P&L, while in the case of Settlement, a loss of €4m will be recognized in the P&L.
In terms of stability of the costs:

1. DB plan is not stable because it has three components (Current service cost, Interest expense on DBO and Interest (income) on plan assets) that depend on interest rate and interest rate fluctuates yearly.
2. Curtailment is more stable because it has two components (Interest expense on DBO and Interest (income) on plan assets) that depend on interest rate.

3. Settlement is stable because it has no components that depend on interest rate. This is another reason why employers prefer a DC plan.

4.4.2 Underfunded status

All the information in Table 26 stays the same except for the assets in 2023 which is now €100,046,078. So, the fair value of assets as at 31/12/2023 is €100,046,078, which is lower than DB liabilities as at 31/12/2023 (€110,448,786).

2023 Information	
Fair Value of Assets 2023	€100,046,078

Table 30: Change in 2023 Fair Value of Assets
Source: Mercer

Just as in the overfunded case, the balance sheet and P&L account for FY 2023 are first produced, then the P&L account for FY 2024 is produced.

4.4.2.1 Balance Sheet

		31/12/2023	31/12/2023	31/12/2023
		DB	Curtailment	Settlement
1.	Defined benefit obligation	€110,448,786	€102,019,483	–
2.	Fair value of plan assets	€100,046,078	€100,046,078	–
3.	**Funded status**	**€10,402,708**	**€1,973,405**	–
4.	Effect of asset ceiling/onerous liability	-	-	–
5.	**Net defined benefit liability (asset)**	**€10,402,708**	**€1,973,405**	–

Table 31: Balance sheet as at 31/12/2023
Source: P&L IAS19 Excel file

In Table 31 above, the funded status is a loss compared to that of the overfunded status which is a gain. So, the employer does not have sufficient assets to cover the liabilities.

4.4.2.2 Profit and Loss Account for FY 2023

		31/12/2023	31/12/2023	31/12/2023
Components of defined benefit cost		DB	Curtailment	Settlement
1.	Service cost			
	a. Current service cost	€4,079,104	€4,079,104	€4,079,104
	b. Reimbursement service cost	-	-	-
	c. Past service cost	-	–€8,429,303	–€8,429,303
	d. (Gain) / loss on Settlements	-	-	–€1,973,405
	e. Total service cost	**4,079,104**	**–€4,350,199**	**€6,323,604**
2.	Net interest cost			-
	a. Interest expense on DBO	€3,694,162	€3,694,162	€3,694,162
	b. Interest (income) on plan assets	–€2,936,920	–€2,936,920	–€2,936,920
	c. Interest (income) on reimbursement rights	-	-	-
	d. Interest expense on effect of (asset ceiling)/onerous liability	-	-	-
	e. Total net interest cost	**€757,242**	**€757,242**	**€757,242**
3.	Remeasurements of Other Long-Term Benefits	-	-	-
4.	Administrative expenses and/or taxes (not reserved within DBO)	-	-	-
5.	**Defined benefit cost included in P&L**	**€4,836,346**	**–€3,592,957**	**€5,566,362**

Table 32: Profit and Loss account as at 31/12/2023
Source: P&L IAS19 Excel file

Compared to Table 28, the DB cost included in the P&L is the same for DB and Curtailment while the DB cost for Settlement is lower and this is because Settlements depend on the plan assets. Since the plan assets changed, DB cost in case of Settlement will also change. The cost of Settlement is lower compared to the case of overfunded status, so the employer may choose to do a Settlement.

4.4.2.3 Profit and Loss Account for FY 2024

Benefit cost next FY			DB	DB for past, DC for future	DC
			Current	**Curtailment**	**Settlement**
	Financial year ending on		31/12/2024	31/12/2024	31/12/2024
	Components of defined benefit cost				
1	Service cost				
	a. Current service cost		€4,079,104	-	-
	b. Reimbursement service cost		-	-	-
	c. Past service cost		-	-	-
	d. (Gain) / loss on Settlements		-	-	-
	e. Total service cost		€4,079,104	-	-
2	Net interest cost				-
	a. Interest expense on DBO		€3,941,068	€3,508,102	-
	b. Interest (income) on plan assets		−€3,502,033	−€3,502,033	-
	c. Interest (income) on reimbursement rights		-	-	-
	d. Interest expense on effect of (asset ceiling)/onerous liability		-	-	-
	e. Total net interest cost		€439,055	€6,069	-
3	Remeasurements of Other Long-Term Benefits		-	-	-
4	Administrative expenses and/or taxes (not reserved within DBO)		-	-	-
5	Defined benefit cost included in P&L		€4,518,139	€6,069	-
6.	Remeasurements (recognized in other comprehensive income)		-	-	-
7.	Total defined benefit cost recognized in P&L and OCI (DB)		€4,518,139	€6,069	-
	DC contributions		-	€4,000,000	€4,000,000
	Total (DB + DC)		€4,518,139	€4,006,069	€4,000,000
			Not stable	**More stable**	**Stable**

Table 33: Profit and Loss account as at 31/12/2024
Source: P&L IAS19 Excel file

Again, under IAS 19, when there is a change from DB plan to DC plan, the DB service cost is no longer applicable and is replaced with the more stable DC contribution (for DC the P&L is equal to the contribution). This is why both Curtailment and Settlement have zero service cost in the next fiscal year (FY).

From the P&L for both 2023 and 2024, we see that for the current plan (DB), the employer has a loss of €4.8m in 2023 and a loss of €4.5m in 2024. For the Curtailment scenario there was a gain of €3.6m in 2023 and in 2024 a loss of €4.006m (total of DB + DC). For the Settlement scenario there was a gain of €5.6m in 2023 and in 2024 a loss of €4.0m (total of DB + DC).

Comparing the underfunded status' DB, Curtailment and Settlement costs in FY 2024 to that of overfunded status, we see that the costs recognised in P&L for DB scheme and Curtailment changed (€3.6m to €4.5m in the case of DB scheme, €3.1m to €4.006m in the case of Curtailment) while that of Settlement is unchanged. Thus, in terms of stability, we see again that Settlement (that is, full DC) is stable.

5 Conclusion

The goal of my internship was to equip me with real life knowledge on Pension Funds, to see how the concepts and tools we have learnt are applied in the industry. To equip me with this knowledge, I was assigned to do actuarial valuations of the Netherlands Defined Benefit Schemes.

From the beginning, I was already told that the topic I would research was the new pensions act in the Netherlands especially to analyse what this means for Dutch companies. So, from my first day in the Company, I started making inquiries about the pension plans in the Netherlands, I went through the old pensions act and compared with the new pensions act to fully understand the changes to be made. Since my work entailed doing actuarial valuations and accrued liabilities is one of the key parameters that will be used to analyse the change from DB scheme to DC scheme, I ensured I took my actuarial valuations trainings seriously and these trainings were instrumental in helping me deliver this internship report.

In summary, this document informs about the current pension schemes in Netherlands and the two variants of DC scheme – Flexible and Solidarity DC schemes – that will be introduced by the new pensions act. Both DB and DC schemes were thoroughly analysed to understand why the DB scheme is unfavourable to most employers and why the change to DC scheme will be very much welcome by them. On the employer side, the burden of ensuring that there are sufficient funds to meet the pension obligations will no longer exist. Also, the cost of funding the pension plan will become stable as they just need to pay the DC premium every year for their employees. For employees, even though a DB scheme provides them guaranteed retirement benefits, there is the problem of not being able to transfer their accrued pension benefits to another company, they can only receive the benefits at retirement, so there is no potential for growth. We are in an age where employees change jobs multiple times during their active years of service, so a DB scheme is not the best for them. With a DC plan, they can transfer their accrued pension benefits to another company and their benefits continue to grow.

To study and analyse the effects of changing from a DB scheme to a DC scheme, one of Mercer's clients' data was used to calculate the accrued liabilities for the company. With these results, we prepared a balance sheet and a profit and loss account under IAS 19 to see the movement of cashflows. This was done for the valuation year (2023) and a one-year projection was done to see what happens to the profit and loss account in 2024. This is important to the employer, as they want to see what costs they might expect to incur in the following year(s) and see if they will be making a profit or loss.

Studying and analysing the conversion to a DC scheme showed that it is indeed a sound solution to the problems that the DB schemes posed. Of course, the DC scheme has disadvantages too, for example it is still exposed to investment risk, the retirement income is uncertain as it depends on investment performance. Despite these disadvantages, it is still a better option to the DB scheme from an employer's perspective especially because the costs incurred by the employer will now be stable. In the new pensions act, buffers will be put in place in case of poor investment performance.

In this internship report, only the effects on the employers were analysed and not the effects on the employees. This is because in a DC scheme, the responsibility of managing the investment fund now falls on the employee, so much work is still ongoing regarding how the new pensions act will affect employees especially because there are two new variants of a DC scheme – flexible and solidarity DC schemes. Therefore, my suggestion for further research will be for the government to analyse the effects of the new pensions act on employees under both the flexible and solidarity DC schemes and to provide a proper legislation regarding the changes.

In conclusion, the change to DC scheme is surely a good step in the right direction but the disadvantages must be kept in mind and ensure the DC scheme is constantly improved on to ensure optimality.

References

Victoria Séveno (2023, June 5), – What you need to know about the Netherlands' new pension system. Retrieved from https://www.iamexpat.nl/expat-info/dutch-expat-news/what-you-need-know-about-netherlands-new-pension-system

Loyens Loeff (2023, June 26), – The future pensions act explained. Retrieved from https://www.loyensloeff.com/insights/news--events/news/the-future-pensions-act-explained/

Pwc (n.d.). Pension 2025, – Scenarios for the future of the pension sector. Retrieved from https://www.pwc.nl/nl/assets/documents/pwc-pension-2025.pdf

Luković, S. and Savićević, M. (2021), – The decline of defined benefit pension plans in developed countries, Vol. 67, November, 19-37. Retrieved from https://www.researchgate.net/publication/356195378_The_decline_of_defined_benefit_pension_plans_in_developed_countries

Citigroup (2023), – Pension Reform in the Netherlands – 'Wet toekomst pensioenen'. Retrieved from https://www.citigroup.com/rcs/citigpa/storage/public/icpublic/Pension%20Reform%20in%20the%20Netherlands.pdf

business.gov.nl, (n.d.), – The new Pension Act: this is what it means for you. Retrieved from https://business.gov.nl/running-your-business/staff/terms-of-employment/the-new-pension-act-this-is-what-it-means-for-you/

Kinderen, Rosseau S. and Webster F. (2022, April 22), – The Netherlands: Second pillar pension reforms advance. Mercer. Retrieved from https://www.mercer.com/insights/law-and-policy/the-netherlands-second-pillar-pension-reforms-advance/

Lockton Global Compliance (2024, May 6), – The Netherlands Reforms Its Pension System. Retrieved from https://globalnews.lockton.com/the-netherlands-reforms-its-pension system/?print-posts=pdf

M&G Wealth (2024, April 6), – Legal structures of pension schemes. Retrieved from https://www.mandg.com/wealth/adviser-services/tech-matters/pensions/types-of arrangement/legal-structures

Dillingh, R. and Zumbuehl, M. (2021, November 26), – Pension Payout Preferences. CPB Netherlands Bureau for Economic Policy Analysis. Retrieved from https://www.cpb.nl/sites/default/files/omnidownload/CPB-Discussion-Paper-431-Pension-Payout-Preferences.pdf

Mercer (n.d.), – What is a defined benefit pension scheme? – Internal document.

Mercer (n.d.), – What is a defined contribution pension scheme? – Internal document.

Mercer (2020), – Defined benefit and defined contribution pension schemes calculation – Internal document.

Mercer (2022), – Dutch Pension Scheme – Internal document.

Dickson, Hardy, M.R., and Waters H. R. (2009), – Actuarial Mathematics for Life Contingent Risks. Cambridge University Press, 2013.

IAS 19 (2013), – IAS 19 Employee Benefits. Retrieved from https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2022/issued/part-a/ias-19-employee-benefits.pdf?bypass=on