

Physiotherapy

Insurance coverage for physiotherapy

CASE STUDY 1

Study load: 4 ECTS (112 hrs)

Domain: Healthcare

Core tasks: Design and development of products and services

Specially highlighted competences:

- Independent judgement: sensitivity to the environment; balancing of stakeholders' interests. The student is well-informed about external development and effectively applies this knowledge to the organisation. (S)he knows the impact of activities on the environment.
- Process and project control: organisation of teamwork.

Schedule: Actuarieel Instituut, Utrecht

23/04/2021, 14.30 hrs	Kick-off meeting
07/05/2021, 9.00 hrs	Interim meeting
01/05/2021, 9.00 hrs	Ethics Lecture
28/05/2021, 9.00 hrs	Interim meeting
04/06/2021, 16.00 hrs	Report submission deadline
04/06/2021, 16.00 hrs	Presentation deadline
11/06/2021, 9.00 hrs	Conclusion meeting

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Introduction to Case Study 1

Case 1 concerns (supplementary) insurances for physiotherapy. The project team is asked – in an exploratory setting – to investigate alternatives to the (supplementary) insurance of physiotherapy. The assignment is to suggest an insurance product offered by health insurance companies. The suggested product can be part of the mandatory health insurance, supplementary insurance or a combination.

1. Background

A good health service for everyone is a constitutional right. To provide the Dutch population with adequate care, the government is actively involved in the legislation and financing of health services. The government also plays an active role in maintaining a high standard of healthcare, which is accessible and available to the inhabitants of the Netherlands. Several insurance packages are determined by law and the content of these packages are fixed. These are the mandatory insurances. Premiums of these packages may slightly vary between insurers. In addition to the mandatory insurance packages, people can choose supplementary health insurance. Please note that the supplementary insurance does not replace the mandatory insurance.

The total funding of healthcare in the Netherlands is a hybrid system of public and private insurance. The system consists of three compartments. The first compartment is compulsory and relates to high-cost medical risks that are too costly to be afforded by practically anyone. Such risks are often related to chronic illnesses, necessitating for instance long-term stays in a nursing home, care related to disabilities, and mental healthcare. Since 2015, this compartment is regulated under the Wet Langdurige Zorg (WLZ – Long-term Care Act) and the Wet Maatschappelijke Ondersteuning (Wmo – Social Support Act).

The second compartment consists of regular healthcare, financed by the Health Insurance Act (HIA) and dates from 2006. All residents in the Netherlands are mandatorily insured under the HIA. The HIA covers primary and secondary health services, such as visits to a family doctor (GP – general practitioner) and specialist care, hospital admissions, medication, obstetric and maternity care, physical therapy (partly), and dental care for children aged under 18 years. The publicly financed health coverage is financed by compulsory tax contributions and insurance premiums. Insurance premiums differ by insurer.

The third compartment covers additional benefits via supplementary (private) insurance policies. This insurance is optional and can be added to the first and second compartment on a voluntary basis. The benefits of these packages vary substantially, as do the premiums and individual access to the packages. Insurance companies are free to define specific insurance policies to cover specific health cost risks. There is free competition in this compartment.

2. Formulation

Healthcare companies offer supplementary insurance for physiotherapy. In case study 1, we ask students to develop a product for the mandatory health insurance, supplementary health insurance or a combination to reduce “overconsumption” of physiotherapy. The Board of Directors asks for advice and for concrete solutions to tackle this undesirable situation.

The project team is asked to design an insurance product that can be offered by insurance companies and covers expenses for physiotherapy, including a funding mechanism (e.g. pay-as-you-go, capital funding) that covers the expected risks related to the product characteristics. The assumptions under which the case study is formulated may be innovative and new to the market and hence differ from the current Dutch situation. Therefore the project team is encouraged to be inspired by physiotherapy care insurance solutions in other countries.

The project team is asked to take the current situation with the Covid-19 pandemic into account.

The next items are suggested to be addressed by the project team: individual vs group insurance, mandatory vs voluntary insurance, other benefit characteristics (e.g. cash settlement or in-kind, insurance excess, age at entry) and premium setting. Additionally, pros and cons regarding the specific insurance product should be addressed.

The project team is explicitly asked to propose disruptive and innovative proposals. Creativity and out-of-the-box thinking is important to remain competitive in the market. It is also important that the health insurance company customers are happy with the new insurance products and that quality remains at a high level. Finally, the project team should convince the Board of Directors of the insurance company that the presented solution reduces “overconsumption” and is profitable.

3. Core task

The core task that is specifically addressed in Case Study 1 is: *Design and development of products and services*. This means that design issues such as product definition, pricing, capital requirements and the unique selling points should be investigated and reported. The project team should describe the market in the broadest sense, including an analysis of stakeholders and their interests. Also an analysis of the impact of the Covid-19 pandemic on the product definition and pricing should be made. Use of data is necessary to develop the proper health insurance product. Product development should be based on research results incorporating medical and demographic statistics.

4. Competences

In the assessment of Case Study 1, special attention will be paid to the following competences: *independent judgement; process and project control*. The specific competences to be addressed in the first area are *sensitivity to the environment and balancing of stakeholders' interests*. The project team should identify all the relevant stakeholders and discuss their interests. The stakeholders' interests should be addressed in the product design.

In the area of process and project control, special attention should be given to the *organisation of the teamwork*. The project team is expected to organize its activities by assigning various tasks to the team members, such as project coordination, research, report-writing and presentation. The project control process should aim for the timely delivery of the report, which should address all the issues mentioned in the assignment, within the limited time frame of the project, with due distribution of attention to these issues in view of their relative importance.

5. Required output

The project team is asked to design an insurance product that can be offered by healthcare insurance companies and that covers expenses for physiotherapy, including a funding mechanism that covers the expected risks relating to the product characteristics. The insurance products designed should be described, presented, and defended in a public presentation. The team should motivate the preferred option.

- During the first interim meeting the team should have described the project approach, i.e. how they are going to tackle the assignment.
- During the second interim meeting the team will discuss the project's state of play and discuss potential challenges with the supervisors.

- The report describes the case study results. The length of the report should be a maximum of 5,000 words, including a management summary of maximum two pages. Please make sure to add the references used at the end of the report and stick to the length constraints. Please restrict the use of appendices. Reports that do not meet length constraints are rejected and returned to the authors with the request to rewrite. Note that the case report represents the report to the Board of Directors, so write accordingly.
- Students are asked to include a literature review to provide (scientific) evidence that supports their choices. For example, literature on priority setting in health care or a study of international examples.
- The results in the report are presented in a joint session with the other project teams during the conclusion meeting.
- The report is defended in the conclusion meeting. The goal of the presentation and the defence is to persuade the Board of Directors that the designed product is the best offer for both the insurance company and the clients. The presentation (max 15 slides) and defence will take approximately 40 minutes in total.
- Each project team delegates one member to join the Board of Directors during the conclusion meeting when another team is presenting. (S)he will receive in advance the report of the other project team to prepare adequately.
- For ethics there will be an individual home assignment. Details will be shared by the AI. This assignment has 25% weight in your final mark. Group marks as well as individual marks have to be > 5,5.

6. Literature

The following are suggested entries to the subject, relevant organizations, and literature.

- Relevant organisations: Ministry of Health, Welfare and Sports [Ministerie van VWS], Information Centre of the Association of Dutch Health Insurers [Vektis], Dutch Health Insurers Association [Zorgverzekeraars Nederland, ZN].
- Chapter xvi of the Government Budget 2021 for Health, Welfare and Sport (Rijksbegroting 2021, Volksgezondheid, Welzijn en Sport).
- Sabik, L. & Lie, R. (2008). *Priority setting in health care: Lessons from the experiences of eight countries*. International Journal for Equity in Health, 7:4.
- European Observatory on Health Systems and Policies (2016). Voluntary health insurance in Europe: country experience. Brussels: European Observatory on Health Systems and Policies (<https://www.euro.who.int/en/about-us/partners/observatory/publications/studies/voluntary-health-insurance-in-europe-country-experience-2016>).

- Schut, E. & Wildt, J. E. de (2011). *Risicoverevening: hoe zit het nu precies?* MHA Commonsense in de Eerstelijns nr. 4
https://issuu.com/eerstelijns/docs/de201104_lr
(choose "De Eerstelijns Nummer 4 – 2011, page 10 and 11)
- Information in English:
<https://www.government.nl/documents/leaflets/2016/02/09/healthcare-in-the-netherlands>

7. Data sources

No data sources are directly available to the team. The team is expected to search for relevant information sources and to report on the availability of data.

8. Software

There are no special software requirements for Case Study 1.

Mitigating risks for African Utilities – EMAS 11

CASE STUDY 2

Study load:	4 ECTS (112 hrs)
Domain:	General
Core tasks:	Risk Management, Product development, Process and Product Control

General Introduction

The EMAS program includes various case-study assignments carried out by teams of students and supervised by academics and professional actuaries. The general structure of the case-study assignments is described in the EMAS Educational Plan. This document introduces Case Study 2 Mitigating risks for African utilities, which is a 4-ECTS case study to be carried out in a period of eight weeks (including holidays) in the second semester of the EMAS programme.

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Contribution to development of competences:

- Domain: General
- Core tasks: Risk Management, Product development, Process and Product Control
- Competences: Competence 1: Communication and Consultancy; Competence 2: Making an Independent Assessment; Competence 3: Entrepreneurship

Meetings and deliverables:

Introductory meeting: 11th of June 2021

1st interim meeting: 2nd of July 2021

2nd interim meeting: 3rd of September 2021

Defence: 17th of September 2021

Mitigating risks for African utilities

Introduction

This case deals with the development of a holistic solution for utilities such as solar plants with an international funding base in less developed countries in Africa. Utilities are essential for the development of emerging economies as they provide access to for example electricity. Typically, utility projects in poor African countries are too large to raise funding within their country of origination and therefore those entities are dependent on international capital markets for their funding needs. Naturally, the availability of funding is crucial for the development of such entities.

Raising funding in international capital markets can be quite a challenge for such entities, let alone the increasing complexity of the utility's balance sheet. Sizeable energy projects contain a high amount of risk originating from their original business model. Especially, given the fact that such projects are being developed in less developed countries and these projects have billion-dollar balance sheets, risks should be weighted with the utmost care.

The development of African utility projects is also crucial for the broader agenda on the energy transition from fossil fuels to sustainable energy. Typically, large utility projects entail the development of large solar plants, offshore wind parks and hydro plants. No wonder that these types of projects take a prominent place on the global Sustainable Development Goals (hereafter SDG) agenda.

The team is asked to develop an efficient and holistic solution to enable the utility to access international capital markets and to map, assess and potentially mitigate all forthcoming risks of such a funding structure.

Background

Utilities have large funding needs and often located in developing (African) economies. Their green nature and the positive impact on the lesser developed economies makes these energy projects ideal candidates for international development finance institutions (DFI's). These DFI's are in the business of lending money and are founded to develop and support emerging economies. As their lending activities cross international borders, these types of utilities are very much into their scope. Of course such type of lenders has, just like any other investor, profit targets but their roots are more of a social-economic nature and their ultimate goal is to contribute to the development of those countries. Therefore, for those (green) investments environmental -as well as the social economic impact is carefully considered.

Just like its business model, the balance sheet of a utility is very complex. The development of such a project takes years, the size is large in terms of notional, and revenues and liabilities are most often denominated in different currencies. In addition, the owner structure of such a project also can be complex as in most cases local governments also become (partly) an owner.

Once a utility project is constructed it provides access to electricity and this is obviously key to any economic development of a developing country. For example, the connection of rural areas to the power grid is a key service to the poorest and enables further development. But, in addition to this social-economic function those projects also should be economically viable as its shareholders have profit targets as well. In this playing field, the role of proper risk management is essential to ensure that all financial risks are considered and are not automatically transferred on the expense of the least dominant voice in such a utility project (towards users) via pricing of electricity.

Capital markets can also play a role in the mitigation and transference of risk. Derivative contracts are solely designed for the purpose of transferring risk and there are market participants which can help to enhance the utility's business model with such contracts. Currency risk can be transferred with the help of exchange-rate linked derivatives and guarantee structures can help to enhance the credit profile of any market participant looking to borrow money.

Both credit- and foreign exchange risk are important hurdles for any party on the borrowing side who is considering raising funding via international capital markets. This applies even more to utilities in developing countries.

Formulation

The team is challenged to develop and map a holistic risk overview and solution for a typical utility with international funding needs. A clear description of this framework with all its stakeholders must be provided for together with an overview of all risks coming forth out of such a funding structure. Moreover, the team should investigate if any and where (unwanted) risks can be transferred to with the help of international capital markets.

Ultimately, with the help of the framework above, the team is asked to deliver a detailed business plan for an exemplary development finance institution which is looking into lending to an utility and is part of a “syndicate”. It must consider all risks within this structure and mitigate wherever it sees an opportunity to do so. Off course, any type of risk mitigation takes place in line within its business model and its risk-appetite which also must be addressed in this plan.

Phase I

- A review of existing literature with respect to utilities in Africa and risk mitigation via derivatives is required.
- The team is asked to map the business cycle of a utility and map the funding structure and identify all risks involved.
- Investigation of potential market participants where risks can be mitigated to and identify potential instruments fit for this purpose.
- Identified risk factors must be completely described and weighted against the standard business practices of such a utility project.

At the end of this phase the team has a clear idea on the business cycle of a utility and has a clear overview of the potential funding structure. Moreover, the pros and cons must be described in full detail and the team should have a clear idea on the practical implications of this business plan in a typical developing country.

Deliverables Phase I: First draft of the report, background description and a detailed mapping on the forthcoming risks resulting from its funding structure.

Phase II

In this phase we will zoom in on the risk mitigation possibilities:

- Further development of the risk framework
- The team should have a clear idea on the market participants involved and address hurdles such as credit risk and exchange rate risk.
- Design a tailor-made solution on how to transfer risks forthcoming out of the funding structure.
- Develop a model on how to price all relevant financial risks, data will be provided for
- **Individual assignment:**
 - The participant is asked to define the risk appetite from both the lender and the utility perspective with respect to exchange rate risk and credit risk.

Here the team will refine their ideas from phase 1 and apply their concept to real life data and translate their findings to a business plan.

Deliverables Phase II: Do a full analysis and provide a draft of the complete funding structure. Describe the first results into the report and start to draft a final presentation

Phase III

- Develop a business plan for the setup for the lender based on your entire setup.
- Make a risk/return analysis for your funding structure.
- Suggest the ultimate lending rate and present your complete solution.
- Clear description of (standardized) products used.
- A fictional overview of balance sheet
- Pay close attention to:
 - Feasibility of the product (does it improve the life of the end-user)
 - Usability of the product (is the product implementable?)
 - Scalability of the product (is there a healthy profit basis, how is the product going to be rolled out?)
 - Capital structure (what kind of capital is required and how much?)
 - Sustainability (what is the expected development impact and how is that going to be measured?)

At the end of this phase the team will present their business plan to a jury and their fellow participant groups and provide feedback on other initiatives. Part of the analysis is based on the total business cycle of the utility; how do the financial cost including interest and risk mitigation premiums impact financial sustainability of the utility project.

Deliverables Phase III: Final report, presentation and a discussion session.

Deliverables:

- A detailed business plan on the proposed structure
- A presentation on the lending structure
- On an individual basis:
 - A clear and concise description/suggestion for the risk appetite of both the lenders and the utility with respect to the funding structure (3 pages max.)
- Teams are requested to give feedback on each other in the final presentation session

Data sources:

An exemplary dataset is delivered which contains:

- A fictional balance sheet for an utility in either Uganda, Tanzania or Malawi
- Exchange rate data for the different countries
- Relevant credit rating data for utilities

Software

- Any (statistical) package that the student deems useful to handle sets of data.
Examples are: Excel, Matlab, VBA, SAS, SPSS
- Word and presentation processing software: MS Word, MS Powerpoint.

EMAS 11 – Case 03**Financially sustainable pensions****General Information**

The EMAS program includes various case assignments carried out by teams of five or six students and supervised by academics and professional actuaries. The general structure of the case assignments is described in the EMAS Study Guide. This document provides an introduction to and information on Case 03 “Financially sustainable pensions”, which is a 4-ECTS case to be carried out during a period of 8 weeks in Q4 2021.

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Contribution to the development of competences:

- Domain: Pension (domain 3)
- Key tasks: Valuation (key task 1)
Capital specification and allocation (key task 2)
Risk management (key task 5)
Product development
- Competences: Quality assurance (competence 1)
Communication & consultancy (competence 2)
Process & project management (competence 3)
Making an independent assessment (competence 4)

Meetings and deliverables:

- 29 October 2021 Introductory meeting
Distribution of assignment 1
- 9 November 2021 Deadline submission questions (1), (2), (3) and (4)
- 12 November 2021 First interim meeting
Feedback on assignment
Distribution of assignment 2
- Assignment 3 will be distributed after submission of assignment 2
- 26 November 2021 Second follow-up meeting
Feedback on material that has been submitted
- 9 December 2021 Deadline submission of assignment 3
- 10 December 2021 Instructions about final meeting

- 17 December 2021 Defense in final meeting

Further explanation

Case 3 consists of three assignments. These assignments succeed each other.

Assignment 1 is delivered in the Introductory meeting of 29 October 2021. In this first assignment your team is asked to analyze the financial situation and current contribution policy of a pension fund.

Assignment 2 will be delivered to you on or close after 12 November 2021. In this assignment 2 your team is asked to advise the pension fund on a proposed change in the contribution policy of the pension plan. You are also asked about your opinion regarding the move from a Defined Benefit to a Defined Contribution plan.

Assignment 3 will be delivered to you after you have submitted the results of assignment 2. This assignment 3 is completely about the national pension deal. Due to this deal all pension legislation will change and you will be asked to investigate the consequences for the pension fund.

It is up to the project group how to schedule the activities for these assignments. Note however that the results of questions (1), (2), (3) and (4) are to be submitted before 8 November 2021 – which is only ten days after the kick off. And the result of all assignments are to be submitted on or before 9 December 2021. Note furthermore that the assignment 3 will only be delivered after submission of the preceding assignments.

The expected work load divided over these three assignments is 20% – 35% – 45%; but the actual work load division may deviate from this expectation.

Final meeting (17 December 2021)

In the final meeting your group will be asked to present a part of your case. This will be done in the following way:

- One group will be asked to take the role of the consulting team.
- The other groups will have the role of different representatives in the pension fund Board.
- The consulting team has to explain/present a specific part of the results to the whole pension fund Board.

There will be several rounds, so all groups will have the role of consulting team.

You will be informed about the role of your group and about the specific case element you have to present/explain on or before 10 December 2021.

The results of each assignment are to be sent by email to the supervisors. The supervisors will build a file for each group with all results of the four assignments. So you don't have to write one total report, but you can submit the results for the assignments separately.

Grading

The final mark for this case will be based on your Group result, corrected for an Individual component.

Your Group result will be an average of the results for the different elements of this case. Each question will be rated based on:

- Results in the file (assignments)
 - o Correctness and relevance of the calculations
 - o Clarity of your professional opinion
 - o Considerations in balanced treatment of stakes of stakeholders
 - o Recognizable independent view
 - o Brightness of written work

- Presentation in final meeting

And the Individual component will be an adjustment on the Group mark, related to the individual effort of each group member to the different elements. Relative high individual efforts on high rated elements will result in a positive individual adjustment.

Therefore, for each group it is suggested to make a fair distribution of the activities for the different group members. And for each individual it is important to take your component seriously because you will be graded for your personal component as well.

Literature

- <http://www.toezicht.dnb.nl/4/5/9/50-204668.jsp?s=n> (DNB information about pension fund supervision – valuation, solvency margin, recovery plan, governance, etc).
- Dijsselbloem, J.R.V.A. et al, Advies Commissie Parameters, <https://www.rijksoverheid.nl/documenten/kamerstukken/2019/06/11/advies-commissie-parameters> , 6 juni 2019
- <https://www.dnb.nl/nieuws/dnb-nieuwsbrieven/nieuwsbrief-pensioenen/nieuwsbrief-pensioenen-juni-2019/index.jsp> (about the UFR)
-

Websites on the nation pension deal

- <https://www.netspar.nl/dossier-pensioenakkoord-netspar-onderzoek-op-hoofdpijnen-uit-ser-advies/> Scientific research on the national pension deal
- https://www.cpb.nl/search?tags_en=Pensions%20and%20population%20ageing Official calculations of Centraal Plan Bureau on pension deal.
- <https://www.rijksoverheid.nl/onderwerpen/pensioen/toekomst-pensioenstelsel>
- <https://www.internetconsultatie.nl/wettoekomstpensioenen>
- <https://www.willistowerswatson.com/nl-NL/Insights/trending-topics/pensioenakkoord>
- <https://www.willistowerswatson.com/en-NL/Insights/2020/06/netherlands-sweeping-pension-reforms-further-details-released>
- <https://www.cpb.nl/onderwerp/pensioenen-en-vergrijzing>

EMAS Case 03 – Financially sustainable pensions

Introduction

You work for an international pension consulting firm. As a consultant you are the advisor of the company pension fund “Stichting Pensioenfonds Paradise” (hereafter Paradise). You are new in this role for this client. In previous years another actuary was advisor for this pension fund, but this actuary retired last year. The pension fund was looking for a creative pro-active pragmatic advisor, and after a pleasant interview they selected you as the new advisor of the fund.

Paradise is the pension fund of the company “Dashboard Light BV”. This company manufactures dashboard lights, especially for the automobile industry. As other companies in the automobile industry, the business of this company is strongly related to the general economic conditions. Dashboard Light BV is a Dutch subsidiary of a large US corporation. The pension situation is closely monitored by the Dashboard Light group actuary who works for the CFO of the firm. The group actuary looks at US-GAAP accounting pension figures in particular as these are the figures that materialize in Dashboard Light’s P&L.

Dashboard Light is an important client of your consulting firm. Your firm not only works for the Dutch pension fund, but your firm is also the advisor and global actuary of Dashboard Light all over the world. Especially in the US Dashboard Light is considered as one of the key clients of your firm.

The pension fund Paradise has a Board consisting of 5 board members (1 independent chairperson, 2 employer representatives, 1 employee representative and 1 pensioner representative). The chairperson is an external professional pension manager, hired by Dashboard Light.

The pension fund has an own pension department who supports the day-to-day board members. There is an Investment Advisory Committee consisting of one employee of Dashboard Light (who works in the corporate treasury department) and two independent external advisors. The administration is outsourced to Pension Hole B.V..

The pension fund has a financial policy based on the funding level of the pension fund. See the excel worksheet for more information.

EMAS Case 03 – Pension fund financial situation

Assignment 1 (of 3)

We are reaching the end of the year 2021. This year is an important year for Paradise. At the start of the year the pension fund had a coverage ratio below the legally required minimum. During the year there were a few occurrences that impacted the coverage ratio; (i) interest rate developments, (ii) volatility on the stock market (iii) a new mortality table, and (iv) a deadly car accident with four high earning managers resulted in an unexpected increase of the survivor's pension payments.

You are asked by the pension fund Board to analyze the financial position of the pension fund at the end of September 2021.

- (1) Calculate the coverage ratio of Paradise as per 30 September 2021, based on the market interest rate as published by DNB (in Dutch “rentetermijnstructuur” or RTS).

At the start of 2021 the coverage ratio of Paradise was 90.1%. In September 2020 the Koninklijk Actuarieel Genootschap published a new mortality table. In April 2021 the Paradise Board decided to update the pension fund mortality table for that new published table. As a consequence of this mortality rate update, the coverage ratio increased by 2.0 %-point (the new table is already incorporated in the expected pension cashflows used for question 1). You may assume that the coverage ratio was stable during the three months before December 2020, and then increased linearly in nine months to the current level (apart from the mortality rate update effect).

- (2) Calculate the policy coverage ratio (beleidsdekkingsgraad) of Paradise as per 30 September 2021 and make an estimate of the policy coverage ratio as per 31 December 2021.
- (3) Calculate the legally minimum required capital (in Dutch “minimum vereist eigen vermogen” or MVEV).
- (4) Calculate the legally required coverage ratio (in Dutch “vereist eigen vermogen” or VEV) as per 30 September 2021, by using the standard DNB model.
- (5) Calculate the coverage ratio on the pure swap rate (without using the Ultimate Forward Rate) and calculate the real funding ratio (in Dutch “reële dekkingsgraad”).
- (6) Calculate the premium coverage ratio (in Dutch “premiedekkingsgraad”).
- (7) Provide your opinion on the contribution policy related to the pension accrual.
- (8) Give your professional opinion on the financial situation of Paradise. What is your expert view on expected future financial development for this pension fund (What are the financial means for recovery? How realistic are these? Etc.)? Describe what groups of stakeholders (i.e. employer, employees, pensioners, etc) suffer the most from this financial pension fund situation. Being a pro-active pension advisor for Paradise, what would you suggest the Board to do?

Assignment 2 (of 3)

The company “Dashboard Light” is making losses due to bad economic circumstances resulting from low material delivery and high gas prices. Dashboard Light is highly leveraged and therefore it is costly to attract cash for pension funding and the company states that it has difficulties to pay the high pension contribution. The company proposes to lower the accrual rate to 1.65% and change the contribution to be a fixed percentage of 25% of the pension base for the years 2022 and 2023, where 19% will be paid by the employer and 6% by the employees. The contribution becomes independent of the financial position of the fund. In return to the contribution fixation Dashboard Light will waive any future refunding of capital above a coverage ratio of 140%.

The HR-manager of Dashboard Light has stated that she will ask the Works Council for consent on the suggested change; she has indicated to expect that the Works Council will accept these changes.

This change will be for two years only. From 2024 onwards, the company would like the pension fund to have implemented a new scheme according to the Dutch Pension Agreement (In Dutch ‘Pensioenakkoord’ or ‘Wet toekomst pensioenen’).

- (9) What do you advise to the pension fund board given the proposal of the company to change contributions for 2022 and 2023? What are the pros and cons from changing the contributions for different stakeholders? Could the pension fund board accept this proposal, where an important aspect is that the consequences for all stakeholders should be taken into account in a balanced way (‘evenwichtige belangenafweging’).

Do you take into account that the Dutch Central Bank announced a lower interest rate (nieuwe UFR) in coming years, and if yes: how?

<https://www.dnb.nl/nieuws/nieuwsoverzicht-en-archief/persberichten-2020/dnb389973.jsp>

The corporate Dashboard Light Pension Committee is getting concerns about timelines of the new pension legislation. Also with the change of the Minister of Social Affairs, a transition from 1/1/2024 on to a new pension scheme seems uncertain. The Committee suggests to also analyze a scenario to immediately start a Defined Contribution plan (DC) for all new accrual. The new DC scheme contributions will follow a 3%-staffel-1.

The already existing benefits will stay in the Defined Benefit scheme and will keep following the FTK rules. When a member in the DC plan reaches retirement age, he/she can use the DC capital to buy an annuity within the current DB scheme. This is also called the ‘ingroei variant’, and some other pension funds in the Netherlands already announced they will use this model.

After consultation of the Board of Paradise, the Dashboard Light Pension Committee asks your expert opinion on the suggested move to DC.

The Board of Paradise requests you to draft a presentation including the following:

- (10) The pros and cons for the different stakeholders of the suggested DC plan for new accrual compared to the current situation. Include both quantitative and qualitative aspects of the plan.
- (11) Compare for new joiners the expected benefit level and the risks involved in the new DC plan versus the current DB plan.
- (12) Suggestions for adjustments in the design of the DC plan – note the new plan accrual must be DC.

Assignment 3 (of 3)

In June 2019 the Dutch government, unions and employer representatives reached an agreement regarding a pension change (Pensioenakkoord). In December 2020 the Minister of Social Affairs published draft legislation for consultation. In summary the new legislation is:

- All future pension accrual will be in a defined contribution plan in which each participant has a personal pension account.
- The pension contribution is the same percentage for all participants in that plan, irrespective of their age.
- There will be two possible types of DC, option (a) is a Solidary contribution plan, and option (b) is a Flexible contribution plan.
- By default, all existing pensions within pension funds will be transferred into the new pension plan ("invaren"); although a pension fund board can decide to not transfer and continue as a 'closed DB plan' if they have good reasons for not transferring.
- New legislation will be applicable as per 1 January 2023 and there will be a four years implementation period (till 1 January 2027).

Dashboard Light would like to implement the new pension regulations from 2024 onwards. They work together with Paradise in analyzing the options and scenarios and they have asked you to guide them in the trajectory to the new pension world.

- (13) In the national pension agreement, the pension contribution is the same percentage for all participants. What are the consequences for expected pension accrual for different generations?

On national level the expectation is that some generations will experience negative consequences. These generations need to be compensated adequately. Which options to compensate do you advice? What are the pros's and cons?

- (14) The national pension agreement mentions two possible types of new pension scheme. There is 'Solidary contribution plan' ('de solidaire premieregeling') and the 'Flexible contribution plan' ('de flexibele premieregeling'). One of the mandatory components in the Solidary contribution plan is a 'solidarity reserve' ('solidariteitsreserve'). Another element in the Solidary contribution plan is the possibility for young participants to invest more than 100% in equity ('opheffen van de leenrestrictie').

What are the pros and cons of these two possible schemes? What is the added value of having a solidarity reserve? Explain how 'investing more than 100%' works and why this can be relevant?

- (15) According to the national pension agreement the current benefits/assets should also become a part of the new pension scheme. The collective amount of pension assets of the current fund need to be divided into personal assets for each individual participant in the pension plan. Where all generations need to be treated in a balanced way ('evenwichtige belangenafweging'). According to the pension agreements there are two methods: the standard method ('standaardmethode') or 'value based ALM'.

What are the pros and cons of both methods? What method do you advise the pension fund to use?

Illustrate how a transfer will look like in the 'standard method' to (A) Solidary contribution plan with a 10% solidarity reserve at the start and to (B) Flexible contribution plan without a solidarity reserve.

The illustration can be done on a simplified situation where we have only three participants: a 25 years old participant with a € 1,000 accrued pension right and salary of € 40,000; a 50 years old participant with a € 15,000 accrued pension right and salary of € 45,000; and a 70 years old pensioner with a € 30,000 accrued pension right. You may add more 'representative people' ('maatmensen') if that is more illustrative in your opinion. If needed in this illustration, you can use a projection return ('projectierendement') equal to the most recent RTS plus 0.5%.

You may assume that the current coverage ratio is 95%; but we ask you to also illustrate the effects as if the coverage ratio at the moment of transfer was 110%.

- (16) Make a quantitative 'representative people' analysis for the representative persons from the previous question starting from the 110% coverage ratio situation. Illustrate how the pension capital for each participant develops in different financial scenarios regarding interest rate development and investment return.

Make the illustration for (A) Solidary contribution plan with a solidarity reserve and (B) Flexible contribution plan.

You may assume that the contribution rate is equal to 22.5% of pension base.

You may assume (in the Solidary contract) that each year $1/15^{\text{th}}$ of the solidarity reserve will be distributed amongst the participants; and that each year $1/10^{\text{th}}$ of the contribution and $1/10^{\text{th}}$ of any positive excess investment return ('overrendement') will be attributed to the solidarity reserve. If you have better suggestions how to spend the solidarity reserve, please include in the illustrations.

- (17) Having all the insights – what would be your general advice to the Board of Paradise regarding the implementation of the national pension deal? What type of pension scheme would you suggest? What would you advise regarding the transfer of vested pensions? What would you suggest regarding the project plan (governance structure, timeline, etc)? Provide your final advice in a short memo or presentation with a clear management summary.

Strategic Risk: real options and futures

Challenges and opportunities in a changing environment

CASE STUDY 4 (EMAS 11)

Study load: 4 ECTS (112 hours)

Domain: General

Core task: Challenges and opportunities that arise in the environment in which financial institutions operate should be translated into a strategy and/or business model.

Location: Actuarieel Instituut, Utrecht

Schedule:	11/02/2022, 10h00-12h00	Kick-off meeting
	<i>16/02/2022, 23h59</i>	<i>Topic submission deadline</i>
	25/02/2022, 09h00-13h00	Opportunity for skype (30 mins)
	<i>08/03/2022, 23h59</i>	<i>Extension topic submission</i>
	<i>10/03/2022, 23h59</i>	<i>Report submission deadline</i>
	11/03/2022, 09h00-13h00	Interim meeting (Debate Training)
	<i>14/03/2022, 23h59</i>	<i>Debate proposition submission deadline</i>
	<i>21/03/2022, 23h59</i>	<i>Extension submission deadline</i>
	01/04/2022, 9h00-13h00	Conclusion meeting (debate)

Note that these deadlines may change due to COVID restrictions. Any changes to the deadlines will be communicated during the kick-off meeting.

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Introduction to the Case

The skills and knowledge of actuaries can provide a valuable contribution in advising on business models and strategy. In particular, actuaries can assess the impact of a proposed change in business model in terms the impact on the profitability and the risk profile of financial institutions.

1. Background

The financial sector has changed in the last decade, and will keep changing in the years to come. A range of changes in terms of technology, society, customer behaviour and legislation is affecting all financial sectors (banks, insurers, pension funds, and other financial institutions), and is likely to continue to do so, and the distribution of roles and products between these different types of financial service providers will be subject to change. This implies that business models which are viable today may not be viable any more five years from now. Innovation and cost reductions will result in winners and losers in markets. Institutions which strengthen their adaptability and innovate successfully will be able to offer their products with a competitive edge, expand their market share, and increase their profitability. Those that do not will need to look for alternatives, i.e. consider an acquisition or scale back operations.

2. Formulation

The case requires students to assess the sustainability of existing business models in the light of economic, societal, technological and ecological developments and trends. Students do research on the current situation and current trends observed, and formulate a substantiated vision on the future market on a 5-year horizon. Based on their market vision, students advise on a new strategy or a change of the business model.

Students are encouraged to apply a cross-sectoral perspective, as the distribution of roles and products between different types of financial service providers (banks, insurers, pension funds, and other financial players) may be subject to change.

Students work in groups. Each group chooses their own subject within one of the four themes provided below, or they can propose a different theme of their own choice. Within the theme chosen, the group must focus the scope of their research according to their own interests. For more information on a theme, contact with different experts from the industry is recommended. The case supervisors can help identifying the right experts.

Note that it is not the intention of this case to reuse any work done in previous courses or cases.

- Theme 1 – Insurance

The insurance sector will constantly change in the years to come. A range of changes in terms of technology, society, regulation, customer behaviour and legislation will affect the sector. The portfolio of individual life insurance policies is expected to contract further over the years ahead. Among the causes are low interest rates, the aftermath of tax-related changes, increased competition from other financial services, and a loss of confidence throughout society due to legal disputes following the unit-linked insurance misspelling scandal. In the non-life insurance market, distribution models change, and innovative technology may impact the premium volumes and the type of clients/risks for existing players. Increased competition may come from new entrants to the life and non-life insurance markets, fuelled by technological developments, foreign capital, and trends in society. Insurers increasingly face competition from players outside the traditional insurance sector.

- Theme 2 – Pensions

The design of Dutch collective pensions has operated successfully in the current way for many decades. Nonetheless, in the last decade, problems that require solutions have arisen in the Dutch pensions. People, on average, live longer and therefore also need a pension for longer. So a larger pension is needed than previously assumed. In relative terms, the number of young people paying contributions is continuously declining. The number of freelancers, who accrue little or no pension in the second or third pillars and who will therefore rely heavily on the AOW as a basic provision, increases. And with interest rates who are very low for many years, pension funds, in accordance with accounting rules and buffer requirements, have to hold high levels of capital in order to meet their current and future obligations. These developments have put such pressure on the system that many pension funds have not been able to achieve their ambition of indexing pensions for many years, and some funds have actually had to reduce their pensions.

Recently the government and the 'sociale partners' reached an agreement on the details of the new Dutch pension policy and published an internet consultation on December 16, 2020¹ for the new legislation. On May 10, 2021 Minister Koolmees announced that the new pension law will be operational on 1 January 2023, the latest. Based on the internet consultation funds are preparing for the new Dutch pension policy. Different dimensions of pension dilemmas will come together in the new structure or are still not addressed. A first dimension is the financial situation of many pension funds, caused by the low interest rates and the trend in mortality rates over the last decades. A second dimension of the reform process is to realize a more integrated and tailor-made approach to saving for retirement, health care and housing over the lifecycle of individuals. The current one-size-fits-all approach to pension schemes may not adequately reflect individual differences, such as in careers, living situations and financial positions. A third dimension of reform is the need for more transparency and accountability, and demands for more responsible investments in which environmental, social and governance issues are taken into account. A fourth dimension is the adaption of pension contracts to the current reality in which the financial risks in pension plans are primarily borne by plan participants, as insurers and employers no longer underwrite the risks in most pension arrangements. Population aging leads to an increasing number of retirees relative to workers, which makes pension funds vulnerable to shocks in the financial markets and which calls for an appropriate investment policy. A fifth dimension is the market structure (market size, market players, concentration, competition, etc.) is subject to constant change, because of the factors mentioned above in combination with the increasing regulatory requirements. Finally, the transition of the current structure to the new more individual agreement contains different challenges, because of the different stakeholders involved (compensation, well-balanced between participants).

- Theme 3 – Credit

Non-bank lending to consumers and enterprises is on the rise. Pension funds, insurers and other investors are gaining ground in the Dutch mortgage market, while bank mortgage loan portfolios and market shares are falling. There are various reasons for the rise of pension funds and insurers on the mortgage lending market. The low interest rate environment has created additional incentives for pension funds and insurers to look for investments with attractive yields, limited risks and relatively low capital requirements. Changing regulatory frameworks are also responsible for the observed shifts. And finally, the entry barriers to the Dutch mortgage market have been lowered in the past few years as mortgage loans have developed into standard products, due to the lowering of the LTV limit, the tightening of income requirements, and tax incentives for repayments on new mortgages. The Dutch corporate loan market is also seeing changes, the private

¹ <https://www.internetconsultatie.nl/wettoekomstpensioenen>

placement market has doubled over the past five years, and Dutch insurers and other players/platforms are increasingly active in this market.

- Theme 4 – Climate

Climate change is more and more visible and has both impact on insurable risks and on insurers' investments. For example, non-life insurers may be confronted with increased claims payments, unexpected or otherwise, due to climate-related damage if extreme weather conditions occur more frequently. EIOPA announced additional climate related disclosures by insurers, and more additional reporting requirements from other stakeholders will follow soon. Changes in extreme weather conditions will require insurers to introduce new products and reconsider pricing for existing products. At the same time, certain types of risks may well turn out to be impossible to insure. Climate change not only impacts insurable risks but also insurers' investments. Transition risks may emerge if current climate policies are tightened (development of CO₂-prices for instance) and the emergence of alternative energy sources causes traditional energy providers to be downgraded in financial markets, thereby indirectly affecting financial institutions' capital positions. The consequences of climate change are not limited to the insurance sector. Also banks and pension funds will face the consequences, as changes in climate can disrupt business models of regular companies, thereby changing the performance of investments and loans. On top of that, society may impose additional requirements on financial institutions depending on the climate change in the coming years.

3. Core task

The student learns to see global change in a broad context. Challenges and opportunities that arise in the environment in which financial institutions operate should be translated into a strategy and/or business model. Moreover, the student sharpens his or her vision and convinces (direct) colleagues by debating it within the team, and against other teams. Finally, the business opportunity should be conveyed to higher management.

Tasks:

- Risk management
- Product development and product management

4. Competences

The student needs to leverage the skills in risk assessment acquired during the education. Knowledge is not quintessential, since out-of-the-box thinking is encouraged. Furthermore, the student should demonstrate the skill to convey ideas and persuade others of their merit.

Competences:

Knowledge and Understanding

- The EMAS graduate understands the social context in which (s)he is working;
- The EMAS graduate is familiar with the various branches of the actuarial domain such as life insurance, non-life insurance, pensions and also the financial sector, specifically banking;
- The EMAS graduate is aware of various sources of risk, such as underwriting risk and financial market risk as well as reputation risk and other non-financial risks.

Applying Knowledge and Understanding

- The EMAS graduate can make a link between practical risk management and risk measurement problems and specialized knowledge of actuarial science, in order to apply this knowledge in practice;
- The EMAS graduate can use mathematical and statistical models, methods, and techniques to solve risk management and risk measurement problems;
- The EMAS graduate has learned to use relevant software;

- The EMAS graduate can comprehend, critically evaluate, and apply scientific literature in actuarial science.

Making Judgements

- The EMAS graduate can judge one's own and others' work critically, both in terms of logical coherence and in terms of practical relevance;
- The EMAS graduate does not rely only on quantitative methods. He is also aware of the environment of a give product or institution, and is capable of forming an opinion on whether the needs of customers are met in an appropriate manner;
- The EMAS graduate is able to weigh the interests of various stakeholders. In this he is guided by professional ethical principles.

Communication

- The EMAS graduate can summarize quantitative analyses and solutions of risk management and risk measurement problems in written and verbal presentations, and discuss the relevance/limitations of the models, methods and results both in quantitative and in qualitative terms;
- The EMAS graduate is able to communicate in a clear manner. Reports are expected to be well-written, both at the level of use of language and at the level of structuring of content. Oral presentations are conducted in an appropriate manner.
- Both in written and in oral presentations, the EMAS graduate is able to get his message across in a way that is adapted to the audience at hand, be it a Board of Directors, a group of risk management professionals, or an audience of laymen.
- The EMAS graduate is aware that the effectiveness of advice depends not only on the quality of the advice itself, but also on the degree of its acceptance by the advisees. In any given situation, the actuary therefore makes sure that he understands the concerns of his counterparty and that he is able to demonstrate how his suggestions address these concerns.

Learning Skills

- The EMAS student develops new methods and techniques to solve risk management and risk measurement problems: In each of his main fields of knowledge, the EMAS graduate is able to think on an abstract level and pursues a helicopter view on the matter at hand. Rather than being limited to particular procedures, The EMAS graduate is familiar with the backgrounds of such procedures and is capable of making adaptations as these may be required by changing situations.

5. Required output

The required output for this case strikes a balance between group and individual contributions, actuarial and communication skills, and written and oral presentation.

There are in total three deliverables; these are detailed below. These deliverables mimic the real life development of ideas. At first, inspiration is triggered by a tantalising, new way to look at a certain topic. Then, the idea becomes more concrete by discussing it with peers – for instance, your company colleagues. In turn, this shared vision of the group must be defended against other, and others can be convinced by its merits – others include for instance your manager, your board, or a regulator. If the idea takes hold within the company, it follows the hierarchical lines, and it is presented in higher echelons. Moreover, each group member has their own view on this shared vision; so, if the group parts, each individual is left with a slightly different idea, which they take with them until their next opportunity arises.

More detail about the grading of each deliverable can be found in Appendix B.

	Part 1: Report	Part 2: Debate	Part 3: Extension
Individual/group effort	Group	Group	Individual
% of scoring	40%	30%	30%
Form	Written	Oral	Written

- **Report (40%)**

Teams should produce a report regarding their vision on changes in the Netherlands related to their chosen theme, and translate this into a strategy, risk management and/or business model.

The report is expected to contain at least four parts:

- Research on the current situation and current trends observed.
- An overview of quality, relevant papers with competing vision from academic literature.
- A substantiated vision on the future market.
- A new strategy, risk management, and/or business model that companies should apply.

To get started, a (non limitative) list of suggestions for research questions is provided:

- What roles do the current financial institutions fulfil?
- What shifts in activities do we see between sectors nowadays?
- What are the underlying drivers of these shifts (economic, societal, technological, ecological, etc.)?
- What is your vision on the financial system in now and in the coming years?
- What is the distribution of roles and products between banks, insurers, pension funds and other financial players in this vision?
- What does this imply for the sustainability of current business models and the potential of new ones?

These are suggested research questions. Students are free to formulate their own research questions for the assessment of the written report, and submit these to the case supervisors before writing the case. At least the subject and structure of the report should be submitted to the case supervisors after the kick-off of the case.

Form: written, group

Guideline: equivalent of 3000 words; no minimum or maximum applies.

Note that this number should be seen as a guideline: the supervisors expect that a group requires approximately this amount of words to write a good report. An example report will be shown in the introduction meeting to show the expected level of depth and detail.

We understand that there may be good reasons to restrict the scope of the analysis. That is fine, as long as the considerations for the scoping are described in the report, and that the resulting report provides a complete overview of the topic and scene that are within the scope. It is better to set a smaller scope and to have sufficient depth in that area, than to have a very broad scope with limited depth. Feel free to use the first interim meeting to align this scope with the thesis supervisors, and/or to ask feedback from the supervisors on a draft version of the report when appropriate.

- **Debate (30%)**

Two teams debate each other either in favour or against a proposition. Each team consists of three speakers, who have respectively 4, 4 and 2 minutes. The first speaker of each team is expected to state the position of the team. The second speaker of each team can reinforce the first speaker, and rebut the opponent. The third speaker should

summarize the debate in favour or against the proposition. The fourth team member can interrupt when following the rules for interruptions.

The proposition is related to the theme chosen by the teams, and should be submitted to the case supervisors on a deadline that will be communicated to you during the kick-off meeting. The timing and format of the debate will be selected based on expected COVID restrictions during the case period.

Form: oral, group

Guideline: first speaker can prepare, second speaker reacts, third speaker listens and summarises, fourth speaker can interrupt the opponent

- Extension (30%)

In addition to the team report, each student should write an individual extension to this report. The extension should aim to add more actuarial depth and result in a concrete proposal that can be pitched to management. The choice of extension is free. However, some guidance is provided.

For instance, assume the team has written a report on future pension products in the Netherlands. Then, a possible extension is to make a concrete product proposal based on the business model in the team report. Or, a new risk management framework can be presented, that should go together with the new business model; either for an existing company, a new company or for the regulator. Optionally, the conclusions from the report can be extended worldwide.

The above are examples of extensions, and by no way meant to steer students into a certain theme or direction. Students are encouraged to present their own, authentic vision.

The extension should be brief and to the point while having sufficient actuarial depth. It should not repeat the situation and trends that are described in the Group report, as you can expect that the reader of the extension has read the Group report.

Form: written, individual

Guideline: equivalent of 1000 words; no minimum or maximum applies.

6. Literature

Note that this overview is not meant to be complete, and students are expected to identify their own literature for their report. However, the list below can be a good starting point.

Theme 1 – Insurance

- DNB Visie op Toezicht 2021-2024 ([link](#)), en eventuele eerdere DNB rapporten
- ING: What's next for the insurance sector in 2022 ([link](#))
- McKinsey article "Insurance 2030—The impact of AI on the future of insurance", 2018 ([link](#))

Theme 2 – Pensions

- The most recent proposed legislation from the Dutch government: <https://www.internetconsultatie.nl/wettoekomstpensioenen>
- Several Netspar papers (<https://www.netspar.nl/en/publications/>), for example "Toekomst arbeidsmarkt en pensioen – Een verkenning voor de langere termijn", 2021 ([link](#))
- DNB Occupational Study "De vermogensopbouw van huishoudens: is het beleid in balans?", 2015 ([link](#))
- Tilburg University, "Pensioenaanvullingen uit het Eigen Woningbezit" 2019 ([link](#))

Theme 3 – Credit

- IG&H regular "Hypotheekupdate" ([link](#))
- DNB report "Kredietmarkten in beweging: grotere rol pensioenfondsen en verzekeraars bevordert financiële stabiliteit", 2016 ([link](#))
- DNB report "Veranderen voor vertrouwen", 2021 ([link](#))
- CPB Policy Brief "Een wereld zonder banken? Marktfinanciering en bankfinanciering in perspectief", 2015 ([link](#))

Theme 4 – Climate

- CRO Forum report "The heat is on – Insurability and resilience in a Changing Climate", 2019 ([link](#))
- Bank of England report "The impact of climate change on the UK insurance sector", 2015 ([link](#))
- KNMI Klimaatscenario's voor Nederland '14, 2014 ([link](#))
- Lloyds report Catastrophe Modelling and Climate Change ([link](#))
- DNB report "De Nederlandse financiële sector veilig achter de dijken?", 2017 ([link](#))
- The Global Risks Report 2021, 2021 ([link](#))
- DNB report "Op weg naar een duurzame balans, 2021 ([link](#))

7. Data sources

Data sources are not provided for this case. Teams should investigate relevant and reliable data sources independently.

The case is well suited for forecasts, projections or scenarios, which can be based partially or fully on (well-motivated) assumptions. When making any assumptions, please make sure the reader is likely to accept these assumptions by using the right references and arguments.

8. Software

There are no limitations to - nor requirements for - the use of specific software.

Appendix A – Experts

Students are encouraged to contact experts in their network in order to leverage their knowledge. When a meeting with an expert outside of the network of the students is appreciated, students can indicate this, and an expert will be sought immediately after the kickoff meeting together with the case supervisors.

Appendix B – Grading

Practical information on the objective criteria used to grade the deliverables can be found below.

Debate (30%)

Debating is a jury sport; multiple sets of rules and scoring exist. The rules for this debate are from the debating style "American Parliamentary". The grade is based on the standard jury instructions used on the highest European and World levels. An extract regarding the scoring (0-100) is provided below.

Points	Interpretation	Description
85-100	<i>Excellent to perfect.</i>	The speaker has many strong points and few, if any, weaknesses.
75-85	<i>Above average to very good.</i>	The speaker has clear, strong points and less important weaknesses.
65-75	<i>Average.</i>	The strengths and weaknesses of the speaker are roughly balanced.
60-65	<i>Moderate to below average.</i>	The speaker has clear problems and little strong points.
50-60	<i>Inadequate</i>	The speaker has fundamental weaknesses and few, if any, strong points.

Strong points and weak points are not determined by the jury on their beliefs. Rather, an argument is perceived as strong if it has not been countered by the opposing team, or if the argumentation has more depth than the counterargument. The correctness of the argument is not a criterion.

Note that – in contrast to the jury instructions provided above – the grade awarded will be for the group, and not the individual. The grade is determined by dividing the number scored in the debate of points by 10.

Report (40%) and Extension (30%)

For the written deliverables, the "Essay Evaluation Guidelines" by prof.dr. R. Laeven are followed. Students are familiar with these guidelines from the courses.

The final grade (1.5-10) consists of two parts. First, a 2.0 – 9.5 is scored on content. Then, an adjustment of -0.5 / +0.5 can be made based on writing style.

Because of the academic nature of this program, it is important to quote two relevant papers from scientific journals that have opposing views on the topic of the group report, and to explain how you included the conclusions from these papers in your recommendation.

Appendix C – Meetings

Practical information on the content of the meetings can be found below.

Meeting 1 – Kick-off meeting

February 11th, 2022 10h00-12h00

General introduction
Case introduction
Theme selection
Group selection
Explanation deliverables and grading

Meeting 2 – Interim meeting (30 mins using MS teams)

February 25th, 2022 09h00-13h00

The opportunity to discuss the progress, scoping applied, and potentially a draft report.

Meeting 3 – Interim meeting

March 11th, 2022 09h00-13h00

Introduction to debating (by external expert)
Show debate (by external expert)
Practice debating (with external expert)

Meeting 4 – Conclusion meeting

April 1st, 2022 9h00-13h00

Debate
Feedback and grading
Case evaluation

Valuation of a Life Insurance Portfolio

CASE STUDY 5

General Introduction

The EMAS program includes various case-study assignments carried out by teams of a maximum of five students and supervised by professional actuaries. The general structure of the case-study assignments is described in the EMAS Educational Plan. This document provides an introduction to, and information on, Case Study 5 'Valuation of a Life Insurance Portfolio', which is a 4-ECTS case study to be carried out in a period of seven weeks in the fourth semester of the EMAS programme.

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Contribution to development of competences:

- Domain: Life insurance
- Core tasks: Key Task 1: Valuation;
Key Task 2: Risk Management;
Accounting & control
- Competences: Competence 1: Quality Assurance;
Competence 2: Communication and Consultancy;
Competence 3: Process and Project Management;
Competence 4: Making an Independent Assessment

Meetings and deliverables:

Introductory meeting: 31 March 2021
1st interim meeting: 7 April 2021
2nd interim meeting: 28 April 2021
Final Report submission: 12 May 2021
Defence: 19 May 2021

Introduction

Case Study 5 is about Valuation of life insurance contracts. Due to market developments like the extended requirements of Solvency II, our fictional insurer ("Continental Insurance") has changed its perspective on the Dutch insurance market and has decided to focus entirely on the markets of Property & Healthcare insurance. Continental Insurance has found a potential buyer for its life insurance portfolio. As part of the negotiating process, the value of the Continental insurance portfolio has to be determined.

1. Background

In the late eighties and early nineties of the last century, life insurers typically used Embedded Value (EV) calculations in estimating the value of companies within the framework of mergers & acquisitions. Over the years, EV methods developed from deterministic to stochastic methods and from traditional to so-called Fair Value (or Market Consistent) methods. Nowadays most valuations are based on Solvency II principles or use parts of the Solvency II principles.

2. Formulation

Case Study 5 takes place in an imaginary situation where Continental Insurance (Continental) has decided to divest its insurance portfolio. It has found a potential buyer in LaVie Verzekeringen, an insurance company of long standing on the Dutch life insurance market, which was willing to sign a Letter of Intent. Both parties agreed that each party would engage an external consultancy firm to perform a valuation based on market-consistent principles. They also agreed that both parties would jointly engage a (third) deal-making consultancy firm to supervise the process of valuation and the negotiations. The case-study supervisors will act as this third party. Two teams will represent a consultancy firm acting for the buyer and two others will take on the role of a team of consultants acting on behalf of the seller.

First the teams will be asked to prepare a report on the theoretical background and considerations of the fair value valuation methods currently used in the insurance industry. This part of the report is meant to inform the executives of both parties about the possible building blocks of a fair value valuation and additional elements that are needed in a valuation, like interest rates and assumptions.

After this both parties will actually value the insurance portfolio and determine the asking or bidding price for transferring the liabilities and assets and their associated risks. This results in a bidding or selling report which will be offered to the counterparty as input for the negotiations.

In preparation of the actual negotiations, each team will prepare a document to support their position and to prepare them to respond to counterarguments. Finally, the teams will actually enter into negotiations on their assumptions, valuation method and price with the

other party, resulting in an agreement on a price and —most likely— a set of detailed agreements and preconditions (or “non” agreements).

Part 1: Theoretical comparison of valuation methods

In the insurance practice several techniques are used to value insurance companies and books of insurance contracts. For these valuation methods you are asked to show in detail the different “building blocks” of the valuation. For this part, it is recommended that you cover at least the following areas:

- The difference between the cost of non-hedgeable risks and frictional cost of capital in MCEV and similar costs in Solvency II
- An explanation and calculation of the cost of non-hedgeable risks or risk margin
- The methodologies of calculating the time-value of options and guarantees in relation to liabilities
- The relationship between the statutory balance sheet and the balance sheet on MCEV or Solvency II principles
- The differences and similarities between MCEV, Solvency II and IFRS 17
- The use of sensitivities and the way these are reflected in the final valuation
- The interest rates (curves) that can be used to value the liabilities

This will result in a report for the management of your client, which will enable them to understand the differences between valuation techniques and the impact this may have on the value of the portfolio.

Part 2: Valuation of the portfolio

The actual valuation of the insurance portfolio is carried out by assessing all the base assumptions and finding the best approach to determine the correct price at which the liabilities and assets and their associated risks can be transferred. As the starting point for this, you will be provided with a valuation model that Continental uses for best estimate cash flow projections. You may also take into account market conditions, the ability to write new business or cost efficiencies. As the portfolio complies with Solvency II standards, you will have to pay particular attention to any regulatory consequences. This has also implications for the assumptions used, in particular the cost of non-hedgeable risks (or similarly the risk margin in Solvency II).

Both parties have agreed to share their findings to facilitate an open discussion on the final price. Therefore, each team will prepare a (bidding or selling) report which will be offered to the management of the counterparty. This report will consist of a description of the valuation method and the assumptions used. The actual price will not be disclosed to the other party.

Part 3: Negotiating the value of the portfolio

As a meaningful tool for the final step (that is, the actual negotiation of the price and the base assumptions), each team will prepare the arguments in favour of their position, together with arguments that could be presented by the counterparty. For each negotiable item you will define a best, desired and minimal required outcome.

In a closing meeting the teams will actually enter into negotiations with the other party on the assumptions made and method used. This will result in an agreement on a price and, most likely, a set of detailed agreements and preconditions (or “non” agreements).

3. Core tasks

Specifically, in relation to this case study, you will be assessed on the following:

Valuation: You must be in a position to determine the value of uncertain cash flows in the future. In doing so, you must demonstrate that you have mastered the appropriate methods and techniques and can apply these in a way which complies with relevant regulations.

Risk Management: You must be able to signal, quantify and analyse the various risks incurred by a company. The actuary must report on the risks and profitability of subsidiaries and activities, and give advice on the actions necessary to arrive at the company's desired risk profile.

Accounting & Control: Signalling and identifying risks, testing towards adequate methods and model parameters, verification of

sources, selecting, development and building of tools (software and models) and validation, monitoring and review.

4. Competences

Quality assurance: In relation to all activities, you must work professionally and with integrity on the basis of guidance notes, quality standards and a code of professional conduct.

Communication and consultancy: You must be able to communicate adequately with clients, customers and other interested parties verbally, nonverbally and in writing, and in a manner tailored to specific target groups.

Process and Project Management: An ability to manage and supervise actuarial projects, including those of a multidisciplinary nature, in order to attain set objectives in accordance with quality criteria determined beforehand.

Making an Independent Assessment: On the basis of the available information, the actuary must form a correct, realistic and independent opinion, and give advice.

5. Required output

You are asked to deliver three separate documents:

Part 1. A report on the different valuation elements

Part 2. A bidding or selling report

Part 3. A briefing document in preparation for negotiations

You are expected to hand in the first report by April 21th. The bidding and selling report must be handed in at latest by May 12th at 23hrs, and a briefing document on the negotiation strategy by 16:00 hrs on May 16th.

There is no prescribed format for the bidding/selling report, but make sure it is clear to the supervisors how results are derived.

Next to the bidding/selling report, you are expected to deliver at the same time a second version of the report which will be sent to the team that represents the counterparty by the deal-making team. This may contain as much as information as you think is necessary to share to start the negotiation.

On 19 May 2021, you are expected to represent your party in a closing meeting chaired by the deal-making team. The individual contribution to the negotiation of each member in the team will be evaluated as well as the total result of the team.

6. Literature

- http://www.cfoforum.nl/downloads/CFO-Forum_MCEV_Principles_and_Guidance_April_2016.pdf
- Wüthrich, M.V., H Bühlmann, and H. Furrer, "Market-Consistent Actuarial Valuation", 2008 Springer.
- Bacinello, A. R., 2003, Fair Valuation of a Guaranteed Life Insurance Participating Contract Embedding a Surrender Option, *Journal of Risk and Insurance*, 70(3), 461–487.
- Castellani, G., M. De Felice, R. Moriconi, and C. Pacati, "Pricing Formulae for Financial Options and Guarantees Embedded in Profit Sharing Life Insurance Policies", 2007, unpublished manuscript.

7. Data sources

A basic spreadsheet model (MS Excel) and an insurance portfolio will be provided. The model as such reflects the model which is used by Continental's actuarial department to calculate cash flows. You are advised to extend the spreadsheet model to reflect the market valuation approach, but you may also use other tooling.

8. Software

MS Excel

Retail Mortgages

CASE STUDY 6

General Introduction

The EMAS program includes various case-study assignments carried out by teams of five students and supervised by academics and professional actuaries. The general structure of the case-study assignments is described in the EMAS Educational Plan. This document provides an introduction to and information on Case Study 4, Retail Mortgages, which is a 4-ECTS case study to be carried out in a period of seven weeks in the second semester of the EMAS programme.

Study load: 4 ECTS (112 hrs)
Domain: Banking

Schedule: Actuarieel Instituut, Utrecht

19/05/2021, 14.30 hrs	Kick-off meeting
02/06/2021, 9.30 hrs	Interim meeting
23/06/2021, 9.30 hrs	Interim meeting
01/06/2021, 18.00 hrs	Submission deadline data chapter
22/06/2021, 18.00 hrs	Submission deadline methodology chapter
29/06/2021, 18.00 hrs	Submission deadline final model report
06/07/2021, 18.00 hrs	Submission deadline validation report
06/07/2021, 18.00 hrs	Submission deadline presentation
07/07/2021, 12.30 hrs	Conclusion meeting

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Introduction

In recent years, the banking label of insurance company Life Long Insurance (LLI) has significantly expanded its retail mortgage portfolio by attracting new customers with attractive low interest rates. Mortgages provide an interesting asset class, since a high duration is combined with a higher return compared to government bonds. Moreover, providing clients with retail mortgages fits the societal role the insurance group has envisioned for itself.

LLI has started a Free Capital Generation program in which it wants to optimize its capital structure. As a part of the program, LLI has decided to develop an internal capital model for the mortgage portfolio of its banking label. It has decided to hire the consultancy firm Very Exclusive Consultancy (VEC) to develop a regulatory compliant credit risk model using an internal rating-based (IRB) approach.

1. Background

Retail mortgage loans have traditionally mainly been offered by banks. Due to low income on other fixed income instruments and the demand for long-term mortgages, the retail mortgage market has seen a growing interest from insurance and pension groups as well.

When a bank provides a loan to a client it acquires credit risk, i.e. the risk that the client will not be able to repay the loan. After an obligor is past due more than 90 days on any material credit obligation, the obligor goes into default. When the defaulted client is not able to pay back all contractually agreed cash flows, then a loss occurs to the bank. The credit risk for the bank can be subdivided into two parts, namely the probability of default (PD) and the loss given default (LGD). The product of these two parts gives the expected credit loss, for which the bank is required to hold a provision. For additional unexpected credit losses, the bank is required to hold capital.

The regulatory framework for the required credit risk capital is specified in the Capital Requirements Regulation (CRR) [1]. This regulation allows for a standardized approach or for an (advanced) IRB approach to calculate PD and LGD estimates for credit risk capital determination. In the (advanced) IRB approach, the PD and LGD estimates are based on the own portfolio. The capital formula is fully specified in the CRR and has the PD and (downturn) LGD estimates as input.

2. Formulation

The project team is part of the consultancy firm VEC, which has obtained the assignment from the senior management of LLI to develop a regulatory compliant credit risk model using an advanced internal rating-based (IRB) approach. LLI has provided VEC with a large dataset containing historic information on client characteristics and observed defaults and losses in the portfolio. With this data it is required to develop models for the probability of default (PD) and the loss given default (LGD). These PD and (downturn) LGD estimates are input for the regulatory Pillar I credit risk capital requirement calculation.

The modelling process can be split up into different phases which may partly overlap in time.

Phase 1: Data analysis (group effort)

An important first step in model development is to gather data and to get acquainted with the available dataset. The quality of the data needs to be examined. Questions that are required to be addressed in this phase are (amongst other):

- What is the quality of the acquired data?
- How do key figures such as default rates and loss rates behave in this portfolio?
- Which risk drivers (covariates) are of potential interest to model development?

The deliverable of phase 1 is a chapter in the model report explaining data characteristics, data quality, key figures and promising risk drivers. Graphical representation of the results is required.

Phase 2: Modelling (group assignment)

In parallel with the data analysis, the requirements for the credit risk model to be compliant with the regulatory requirements for the advanced IRB approach should be studied. Getting familiar with the model requirements also helps giving further direction to the data analysis. When the requirements are formulated, the model can be designed. Questions to address are:

- Which models fit the requirements?
- Which models fit the available data?

After choosing a structure for the models, the associated parameters need to be estimated using the available historical data. Of course, the model performance should be tested as well. To this end, it is important to choose suitable statistics to measure the model performance. Using the PD and LGD estimations (including downturn LGD), the regulatory credit risk capital needs to be determined using the Pillar I capital formula.

The deliverable, of phase 1 and 2 combined, is a group report (of maximally 7,500 words) explaining the data analysis, the advanced IRB model requirements, the model structure for the PD and LGD models, the model calibration procedure, the model performance and the regulatory credit risk capital based on Pillar I.

Phase 3: Model validation (individual assignment)

After the model development trajectory a model validation takes place. In such a validation trajectory, an independent model validator forms an extensive assessment if the developed model is fit for purpose.

In phase 3, each person obtains the model report from a different group. It is required to make an individual assessment of the developed model by the other group. The deliverable of phase 3 is a brief validation report (of maximally 1,500 words) with the key findings of this model assessment. This is an individual assignment resulting in an individual validation report. Moreover, the findings are input to the group discussion which is part of Phase 4.

Phase 4: Model Governance Committee (group assignment)

The approval of the model will be formally decided by the Model Governance Committee (MGC). The MGC is formed by representatives of the modelling department, the validation department and the board of directors. The final deliverable by the development team is to give a presentation in the MGC at the closing meeting after which critical questions shall be asked by the validation department and the board.

After the model has been validated and approved it can be taken into production.

3. Core tasks

This case focusses on the core tasks *valuation and capital allocation* (core task 1), *risk management* (core task 2), *analysis & validation* (core task 6), and *data handling* (core task 10).

Moreover, the deliverables of this case focus on developing core tasks *reporting & consultancy* (core task 5), *quality assurance* (core task 7), *process- and project-management* (core task 8), and *communication* (core task 9).

4. Competences

Competences further developed during the case and required for successful completion of the case study are:

- Collaboration;
- Communication;
- Independent judgment;
- Professionalism;
- Independence.

5. Required output

You are required to deliver the following three deliverables:

A Model report (group effort, 70% of final grade; due date: June 29, 18.00)

The model report (of max. 7,500 words) explains:

- The performed data analyses in the data chapter (due date: June 1, 18.00);
- The model requirements, the model structure, the estimation procedure and the capital formula in the methodology chapter (due date: June 22, 18.00);
- The estimated model, the model performance and the results for the regulatory capital (Pillar I) in the results chapter.

The use of relevant academic literature is required.

B Validation report (individual effort, 20% of final grade; due date July 6, 18.00)

The individual validation report (of maximally 1,500 words) explains the key findings from assessing the model report of another group.

C Presentation & Discussion (group effort, 10% of final grade; due date July 6, 18.00)

At the closing meeting a presentation is given about the developed model and the obtained results for the capital requirements. The board of directors and the validation department will be present at this meeting asking critical questions.

6. Literature

[1] Capital Requirements Regulation (CRR) 575/2013 on prudential requirements for credit institutions and investment firms

[2] EBA, Guidelines on PD and LGD estimation (EBA-GL-2017-16)

[3] Gouriéroux, C. and J. Jasiak (2015). *The Econometrics of Individual Risk: Credit, Insurance, and Marketing*. Princeton University Press.

[4] Verbeek, M. (2008). *A guide to modern econometrics*. John Wiley & Sons.

[5] Tasche, D. (2008). *Validation of internal rating systems and PD estimates*. In: The analytics of Risk Model Validation, A volume in Quantitative Finance, pp.169–196. Academic Press.

Further (academic) literature search should be pursued by the teams.

7. Data sources

Data on the mortgage portfolio will be made available to the teams.

8. Software

R is recommended as software package, but teams are also free to choose another programming language when desired.