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A Visualization of Nordea Life's customer behavior in relation to the corona pandemic in Norway today.

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I confirm that the work is self-prepared and that references/source references to all sources used in the work are provided cf. Regulation relating to academic studies and examinations at the Western Norway University of Applied Sciences (HVL), §10.



PREFACE

This report was written by Raida Talukdar and Herborg Irgens Sjo, two software engineer students at Western Norway University of Applied Sciences in Bergen (HVL).

We would like to thank our internal supervisor, Ilona Heldal, for the helpful guidance and constant feedback throughout our thesis. We also appreciate the help of Carsten Gunnar Helgesen, our course coordinator. Towards the end phase of our thesis work, we were able to get Tord Hettervik Frøland as one of our internal supervisors. With his undoubted talented skills, dedication and fresh pair of eyes on our project, we were successfully able to submit a well-rounded thesis report that we are proud of.

Lastly, we would like to thank our external supervisors, Sedef Sicakkan and Jan Erik Sørtveit, from Nordea Life. Jan Erik was able to give us access to various work tools and work permissions throughout, whereas Sedef has given us insight into Nordea Life's work methods and analyzing tools, as well as useful knowledge and skills within our thesis development. Throughout our status meetings, we were able to gain the attention of Jarand Pollestad, another resourceful employee from the Oslo department of Nordea Life, in which he was able to give us a more business and visualization related feedback. All have been helpful in this project development, and were able to give us a perspective into Nordea Life's work atmosphere.



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1. INTRODUCTION

1.1 MOTIVATION AND GOAL

The sudden decrease of the stock prices on the Norwegian stock exchange market of the first half of 2020 has greatly affected the banks in Norway. This thesis will look into possible effects the stock price has on customer behavior, with a collaboration through Nordea Life and Pensions. Potential correlation between the customer behavior and the stock prices of Oslo Børs could help reduce the negative impact, as a result from a downturn in the stock market. The goal of this thesis work is to uncover such potential correlations, as well as look into how the covid-19 situation has a role in the matter.

The goal itself has some subgoals:

Subgoal 1: to retrieve the private customer data from Nordea Life.

Subgoal 2: to identify and compare the stock exchange data against the customer data.

Subgoal 3: to visualize the research of patterns in reports using an analyzing tool.

Subgoal 4: to form some conclusions, and create valid solutions for Nordea Life.

Subgoal 5: to validate the research in the reports with specialists in the field.

1.2 CONTEXT

The project assignment was provided by Nordea Life in late 2019, with the purpose of researching potential correlations between stocks at Oslo Børs and the customer behavior at Nordea. The research on the matter tracked down the different patterns and occurring changes of the customers to see if there was a possibility to gain new insights for Nordea.

This assignment was set before the Covid-19-situation took place, but the present time has proven to be more relevant than ever. Covid-19 could be seen to have had a great impact on the economical situation in Norway per this date. The research took place in the spring of 2020 and gave a thorough analysis of how a pandemic could affect the economy in Norway, including Nordea Life and their customers.

1.3 LIMITATIONS

There were limitations regarding both the accessibility to data, and the knowledge of the group. In regards to the data, there were limitations that impacted what could be compared. For instance, the internal data that Nordea provided, contained the customer data that was limited to only a few fields that described the customers' gender, age and whether the customers had



Life Insurance contracts or Fund Account contracts. It would have been more preferable to research even more complex and exact customer data. This way, it would have been easier to gain more useful results that could visualize more. For instance, geographical locations. The external data, which contained the stock exchange data, was limited to only the rough average value of all of the stocks in Oslo Børs combined, instead of each of the 150+ stocks, with their own 4 to 5 different time intervals (which would have been up to over 600 different data sources in total).

There were also limitations within the knowledge of the analyzing tools, and the SQL programming language. The most significant limitation was the time limitation, which consisted of 3 to 4 months in total, which is the duration of the whole project development.

1.4 RESOURCES

The primary equipment that was used in the development of this thesis were the work computers supplied by Nordea. The computers came with the essential licenses and software programs needed throughout the project development. The main software programs were Tableau Desktop and Microsoft SQL Server Management Studio. Nordea also provided the necessary internal customer data that was significantly used in this thesis.

For any issues that occurred, it was possible to directly communicate with the external supervisors from Nordea.

All the personal research notes, college assignments and drafts of thesis reports were written in respective personal computers.

1.5 ORGANIZATION OF THE REPORT

Chapter 1 describes why this project was chosen and what the outcome was expected to be, along with what limitations were introduced and what resources were utilized to develop and work on the project.

Chapter 2 explains the details and motivation behind the project, both from the standpoint of Nordea as well as the group members.

Chapter 3 presents the depths of the data types used and an explanation as to why, as well as the tools used to both, extract and develop, the data in an orderly and preferred manner.

Chapter 4 describes the lifespan of the project; where the project started and how it evolved over time, in every phase. It goes into detail on the start-, mid-, end phases, and how the project developed over time. This chapter also goes in depths of risk management and the various testing methods used.



Chapter 5 explains methodology work of all the data, and deep-dives into how analysis of the data took place, as well as how the data was visualized in an efficient manner.

Chapter 6 discusses the different aspects and insights of the results gained from working with the various reports.

Chapter 7 reviews each of the different testing methods based on the results made from the corresponding testing. An evaluation of the data was being made. for their own to see if they give an answer which fits into the hypothesis that was made. This chapter also goes in depth into the external data sources to see if they give us correct and usable data.

Chapter 8 discussed whether the hypotheses were given answers to, and reflection on the project development itself. It also describes future possibilities, both within Nordea Life and others.

Chapter 9 consists of both a resource and a literature list, in which both were used to gather information about the various topics used and described in this thesis.

Chapter 10 contains all the attachments used, such as a Gantt Chart and a Risk Diagram, as well as all the produced Tableau reports in an orderly manner.

1.6 TRAINING NEEDS AND EXPERIENCE

The thesis work required some SQL programming on the SQL Server program, and report creation and analyzing on the Tableau program. The previous training needs necessary were mainly the knowledge and understanding within databases, and basic knowledge within SQL syntaxes, but it was also beneficial to have had other programming language experiences. It was also beneficial that through the studies at college, there had been various subjects that provided knowledge and experiences on different software programs and programming languages, meaning the ability to familiarize with a new software program or language settled rather efficiently.

2. PROJECT DESCRIPTION

2.1 DESCRIPTION OF COMPANY

Nordea is a leading financial group in the Nordic region, market as one of the largest private banks in Europe. Nordea Life and Pensions is a life insurance and pensions company in Norway,



and one of the sub-organizations of Nordea. This thesis has possible implications for two of their main products; Life Insurance and Fund Accounts.

2.1.1 EXTERNAL SUPERVISORS

One of the external supervisors from Nordea Life was Sedef Sicakkan. She was the main contact person for most of what regarded the different assignments, reports made in Tableau, SQL coding within SQL Server, connection and transfer of data between SQL Server and Tableau, and other essential issues. She explained in-depth details about the expectations and motivation for this thesis, and provided guidance throughout. Another contact person from Nordea Life was Jan Erik Sørtveit, which helped in regards to verification forms and NDAs, registered both the members of the group onto Nordea's systems and networks, and also handed out essential equipment and tools. The newest addition to this team was Jarand Pollestad, also a helpful supervisor. His role was to help guide towards the right direction from a business standpoint, whereas he contributed with resourceful inputs and remarks during the weekly status meetings.

2.2 COMPANY'S MOTIVATION

Nordea Life has employees that are educated and trained in taking a more detailed approach on their tasks, and they are working towards solving their main insights in an incremental order. Therefore, it was in Nordea Life's favour for the group to utilize a more general approach in some of the main topics that concern both Nordea Life and the economy in Norway today. It was desirable to find correlations and patterns in customer behavior relating to the economical situation per today. This way Nordea can gain better insights into what and why customers buy at given time frames, presumably. This motivated a research into what would make customers leave, what would make them come or purchase, as well as what would make them stay. This research can also provide an opportunity to see how customer behavior is affected by the greater societal impact of the corona situation.

2.3 COMPANY PRODUCTS

2.3.1 LIFE INSURANCE

Life insurance is a contract between an insurance policy holder, such as Nordea Liv, and a person who is requesting said insurance. The aforementioned person pays the insurer a certain amount of money in exchange for a premium to the family upon death or terminal illness, all depending on what type of insurance has been bought. The payment to the family of the



insured person comes either all at once or in regular intervals, usually decided by the person who is responsible for paying the insurance. Different expenses can be covered by said insurance the most common being funeral expenses.

2.3.2 FUND ACCOUNTS

Fund Accounts gives the customer a flexible-long-term savings plan (with the recommended amount of time for a fund account to be closed being 3 years), the customer can choose between their own investment fund portfolio or invest in a pre-selected investment fund based on their desired risk profile. The customer can free of charge move their savings out of the fund at any time. If customers open an ASK-account that they use for buying their funds they have the advantage of changing funds at any given time without having to pay taxes. Nordea Liv's fund accounts are set up in such a way that you can choose to either pay a premium once or set in a monthly deposit which is predetermined in your individual contract.

2.4 PREVIOUS WORK

The thesis definition, and idea, concerns an area previously not explored at Nordea Life. Nordea Life themselves had never assigned a Bachelor's thesis to a group of College students before, meaning this was a new experience and learning process in both parts.

Nordea Life did not have any previous work on this subject (although their usual work is listed on their Data Warehouse).

2.5 IMPACT OF COVID-19

The highly infectious disease that was first discovered in Wuhan, China in late 2019 quickly became a worldwide pandemic that has caused the health of over 1 million people of the world (so far in time). This caused the world to take immediate actions, which led to social distancing, isolation and fear. The normal everyday routine suddenly switched over to a stay-at-home routine, with every office, workplace, school and university suddenly shut-down in Norway. Seeing how society reacted to the pandemic situation made it that much more interesting to see how it had affected every bank customer in the country when all the stocks were decreasing. It was also interesting to look into the stay-at-home routine and how it affected, and shifted, the customer's behaviours and previous patterns.

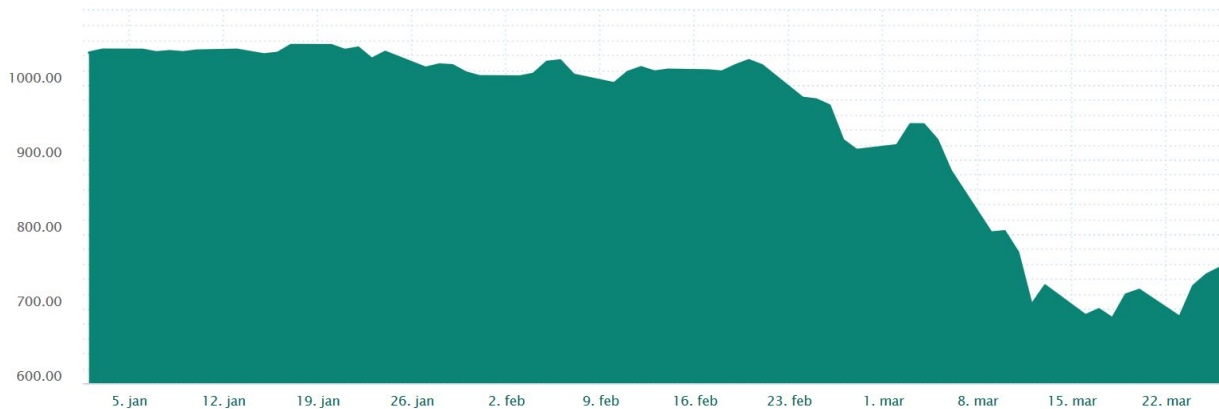


Figure 1: Oslo Børs stock values decreasing from the beginning of the year towards 27th of March 2020.

Since early March of 2020 the stocks started to decrease a lot. As Figure 1 shows, the stock fell abruptly and then started to increase slowly.

2.6 INITIAL SOLUTION IDEA

The initial solution circulated around the idea of gathering useful insights on the research concerning customer behavior, the behavioral patterns during a pandemic and the correlations between the two, combined into a format that would be represented by various Tableau reports. Creating diagrams of different charts and colors would be helpful visualization tools on the research on sudden and unpredictable changes in new patterns.

By the establishment of this solution idea, Nordea Life and Pensions would potentially gather new information and resources that would be helpful for the bank in implementing new protocols during a crisis, such as this particular pandemic.

3. DATA WORK

3.1 TOOLS

3.1.1 TABLEAU

One of the software programs, and the main program of use, was Tableau Desktop. In this thesis work this program acted as the analyzing tool throughout the project development. The program displays the reports as well as all the main components, which was used to build the type of preferred reports on. The reports and sheets being made were used to visualize all the



data in a practical way; in the forms of diagrams, statistics, numbers, texts, colors, text boxes, etc. After connecting to a database, there is a window for adding specified data sources. In this area, there was an option for customizing SQL queries, which was taken a lot of advantage of. Below, there was a table overview to display the overviewed data. All of the active sheets that we were working on were called worksheets. When combining worksheets, we would make dashboards, which then again could be collected into stories. Dashboards and stories were frequently used, as they would combine all sheets together to create reports that surrounded a topic at a time.

3.1.2 MICROSOFT SQL SERVER

The other program in use was the Microsoft SQL Server, which was a server side tool which could access the private data sources from the data warehouse at Nordea Life. The program was connected directly to Tableau, and transferred all the data that had been retrieved from the selected data warehouse. The data could be requested through customized SQL queries, as mentioned, thereafter be formatted in the most preferred and efficient manner. The database of use consisted of the two tables Fund Accounts and Life Insurance, and had corresponded views of the same names. There were also created procedures of the tables which would keep in track, organize, update and execute the data in their corresponded tables and views, and their associated fields. When we would need to modify a table or view, it had to be done through their procedures as well (also by right-clicking on the tables and choosing alter option).

3.2 USE OF DATA

The use of data was essential to start creating the reports and the sheets, making it possible to do all the research within them. Tableau needed reliable data sources to generate accurate reports. We chose visualizations of these reports that allowed us to easily discover patterns to potentially guide employees of Nordea's business decisions. There were different types of data sources that were needed in this project, the external stock data and the private customer data. It was also possible to use some correlation approaches (chapter 5) of these data sources to generate the information that were needed.

3.2.1 INTERNAL DATA SOURCES

The internal data sources were Nordea Life's own customer data. These customer data contained information in the forms of fields. These were useful as they contained information of whether the customer had Life Insurances and/or Fund Accounts. This data was the core of



the thesis work, as it were these data sources that were compared against the stock exchange data.

The fields of use were: IsActiveDate, ContractNo, IsActive, AcceptanceDate, ExpiryDate, Gender, Age, AgeSpan_New, AgeSpan, Balance, CustomerNo, Segment, StatusCode, Product, SSN, FirstName, LastName, DateOfBirth, DateOfDeath and PostalCode. (AgeSpan_New were created as an improved version of AgeSpan, because of the errors mentioned in chapter 5). The last 10 fields mentioned above were later removed to make the tables and views GDPR-friendly. The fields removed were either unnecessary or repeated in the other useful fields.

3.2.2 EXTERNAL DATA SOURCES

The external data used to compare with the internal data were the stock exchange data sources from Oslo Børs. These were retrieved from Oslo Børs' webpages in the form of Excel sheets (in appendix). It was crucial to know when the download of the data sources were being made, as the time and date stamps were important fields to be used in the reports. Each time frame was useful in its own regard, and could span over specific days, weeks, months and years.

The decision to use stock exchange data as the external data to compare with the internal data stems from the awakened interest amongst the employers at Nordea Life, as well as the covid-19 situation in society.

4. PROJECT DEVELOPMENT

4.1 PROJECT PLAN

The project plan in its Gantt Chart-form shows a straightforward way of keeping track of what task was due, which group member had done what, as well as which tasks were assigned to whom. This was the main reasoning to why choosing a Gantt Chart was preferable, as it was a structured and informative way of displaying the progression of the project development. The structure of the chart was divided into start-, mid- and end-phases which displays how, and more importantly, what the focus of the group shifted towards during the more concluding stages of each phase. This project plan consisted of a collection of key tasks to accomplish on a weekly basis. First and foremost, it needed to show the objectives that were important to follow and keep track of during the progression itself (Gantt Chart listed in appendix).



4.2 DEVELOPMENT PROGRESS AND TABLEAU-REPORTS

It was quickly recognizable and insightful to learn that employees at Nordea Life and Pensions had work- and development methods adapted to an incremental and detailed-oriented work-flow. For the thesis work, it was preferable to have an overall perspective on the matter, while also working incrementally as well. The development progress did not follow any specific development methods, other than following a structured and incremental development which consisted of a start phase, mid phase and an end phase.

4.2.1 START PHASE

This phase mostly consisted of familiarizing ourselves with the analyzing and server tools. It was essential to look up relevant documentation, watch tutorials and thus eventually learn the ways of the programs. In this phase, it was established that we would have weekly status meetings. These meetings mostly revolved around updating the supervisors with the current state of the research and script work that had been done. Initially we struggled with understanding what the potential end products would look like, making it hard to start on a specific spot.

Consequently, the supervisors present at the status meetings started to hand out small assignments. Some of the first assignments dealt with researching some of the pre-made tables on a test database. This allowed us practice in discussing and picking out the fields that seemed fitting for the new tables and views that the supervisor would create; Fund Accounts and Life Insurance.

Other assignments would be to create some basic, but necessary, SQL scripts in order to retrieve specific customer data based on these fields.

Once there was enough knowledge to start making drafts of reports in Tableau, the process became more smooth. The first drafts of the reports were intentionally made rather easy and less complex. These were visualized through text tables, which was not that ideal considering the goal was to visualize the results.



Active Contracts vs. Last Price Trade of OB OSEAX

Fund Accounts:

2020	Null	1 265 898	^
687,04	31 234		
688,78	31 383		
691,05	31 212		
699,06	31 225		
705,01	31 139		
718,78	31 249		
725,06	31 320		
727,88	31 524		
730,22	31 409		
730,99	31 157		
745,8	31 469		
749,96	31 569		
754,81	31 491		
775,3	31 113		
778,31	31 591		
788,11	31 680		
788,71	31 657		
791,31	31 638		
792,84	31 958		
793,56	31 872		
802,01	31 070		
803,08	31 701		
803,73	31 096		
805,47	31 843		
807,62	31 984		
808,67	32 023		
809,11	31 940		
809,81	31 735		
812,64	32 100		
815,92	31 892		
818,2	31 722		
819,8	32 255		

Life Insurance:

2020	Null	1 955 201	^
687,04	48 371		
688,78	48 595		
691,05	48 231		
699,06	48 305		
705,01	48 112		
718,78	48 447		
725,06	48 502		
727,88	48 917		
730,22	48 689		
730,99	48 156		
745,8	48 761		
749,96	49 005		
754,81	48 843		
775,3	48 042		
778,31	49 065		
788,11	49 251		
788,71	49 194		
791,31	49 120		
792,84	49 778		
793,56	49 572		
802,01	47 881		
803,08	49 308		
803,73	47 964		
805,47	49 520		
807,62	49 844		
808,67	49 966		
809,11	49 722		
809,81	49 398		
812,64	50 029		
815,92	49 627		
818,2	49 353		
819,8	50 441		

Years:

- (All)
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

The second column shows the Last Price Trade of OB OSEAX, and the third shows the total number of active contracts. The text table is sorted in a descending order with every active day present.

Last: 803,08
Year: 2020
Total Number of Active Contracts: 49 308

Figure 2: Active Contracts vs. Last Price Trade of OB OSEAX in Text Tables.

The report in Figure 2 was one of the drafts created, in which it took LastTradePrice as the field from the external source, whilst the parameter no_active_contracts as the internal source (more on chapter 5.1.2). It would display the number of active contracts per active day against the last traded price of Oslo Børs. When finalized, it concluded the start phase of the thesis work.

4.2.2 MID PHASE

In this phase, the basic understanding of SQL scripts and the connection between Tableau and SQL Server was well established. Previous tasks that were a bit difficult became easier in this phase. Earlier, entire tables were retrieved from the database when managed, which was not the best option as it took time to upload large amounts of data simultaneously. The solution to this evolved throughout this phase, resulting in the use of Custom SQL Queries to extract the fields. This made the process of using the database easier, and it was possible to efficiently work on several reports during a workday. The status meetings during this phase consisted of taking notes and improving the reports according to what the supervisors suggested. Instead of being completely codependent on their guidance, the progress had made a shift to us handing them significantly more updated versions of the reports from the week before.



Active Contracts vs. Gender

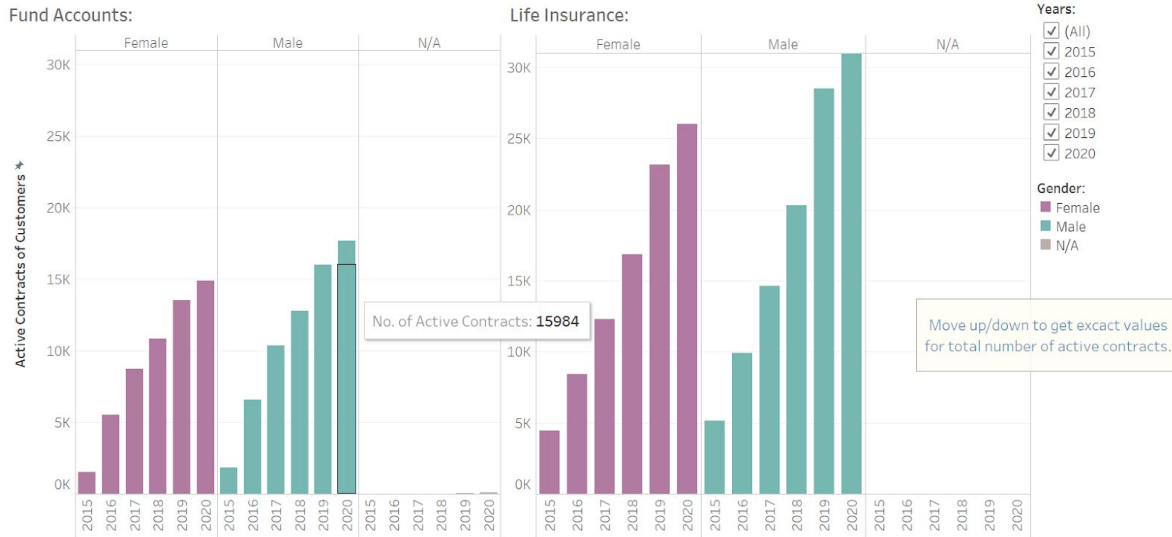


Figure 3: Active Contracts vs. Gender in Histograms.

Figure 3 represents one of the attempts made at creating a histograms-based diagram. This visualization was able to show the number of active contracts on each specific year of the last 5 years divided by gender. By hovering at a specific part of a column it would display the number of the field on a specific day. This was considered a good visualization by the supervisors, but failed to mention the specific days of the year. It was also a bit unconventional to have three separate diagrams per product.

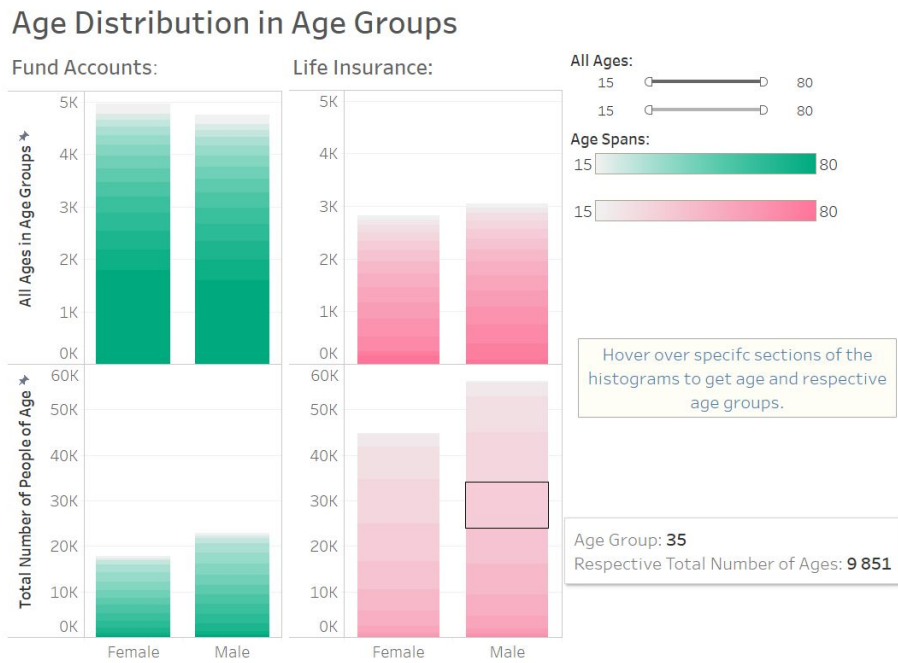


Figure 5: Age and Gender Distribution in Age Groups in Histograms.

Figure 5 also represents a histogram-based solution. Here we have visualized both the number of persons in each respective age group as well as the total number of customers within the specified age group. The diagrams were colorful and showcased a significant difference between the two products, but failed to disclose the problem description concerning age groups against gender. The figure 7 had the same problem, but now in the form of Gantt Charts:

Age vs. Gender in Age Groups

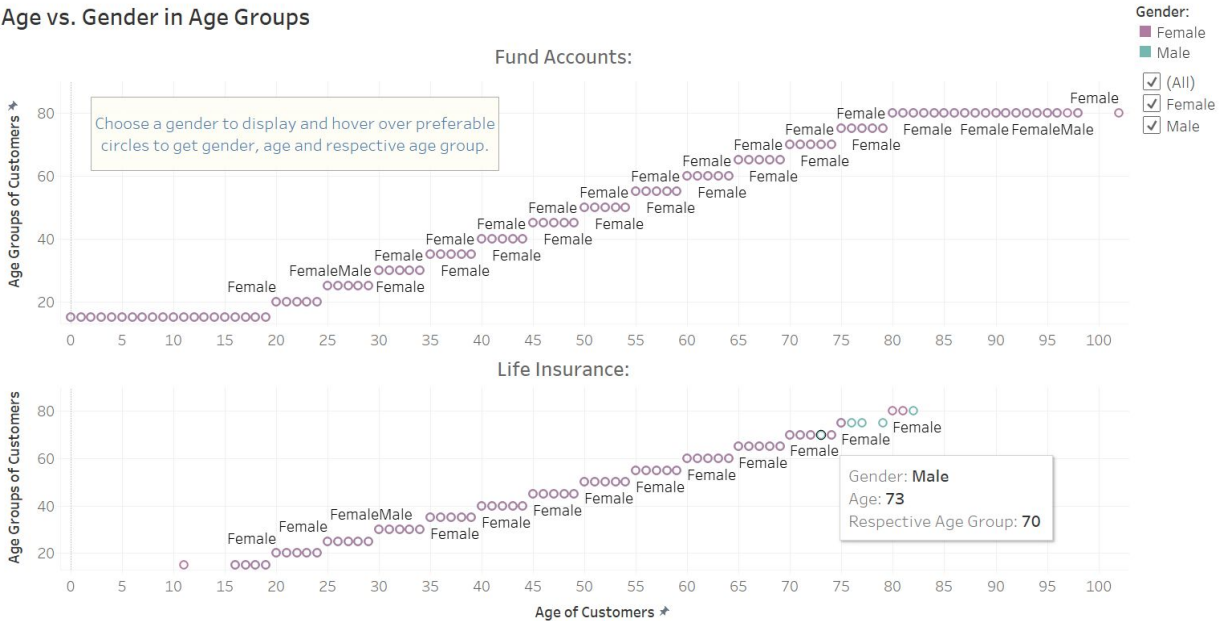


Figure 7: Age and Gender Distribution in Age Groups in Gantt Charts.

Figures 1, 2, 4 and 7 have illustrated reports created with the approach described in 5.1.2. Figures 8,13 and 14 in this chapter shows reports that were created with the approach described in 5.1.1.

Fund Accounts vs. Oslo Børs Stock Market

Fund Accounts: Active contracts



OB OSEAX: Last Traded Price

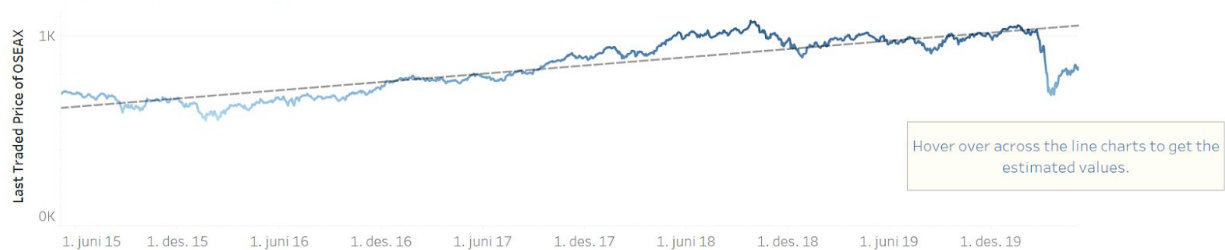


Figure 8: Fund Accounts vs. Oslo Børs Stock market in Line Charts.

Figure 8 represents the first line chart created that utilized both the external and internal data. It visualizes an ascended Line Chart on Fund Account, with values increasing with time. It was correlatable with the plotting of the OB stock data from the chart in Figure 13, which has the equivalent time interval. The corresponding report for Life Insurance is shown in Figure 14. These two reports conclude the mid phase.

4.2.3 END PHASE

There was significantly less time during this phase, which eventually led us to an urgent situation. The experiences collected from earlier stages were heavily influenced during the work progress in this phase of the thesis. The reports created during this phase were reaching a lower level of advancement than preferable, but the reports still meet most of the criteria and answer fully to the initial problem descriptions. The status meetings during this phase became full-on work meetings, in which the supervisors guided us through some scripting and more advanced levels of report creation.

Both the figures below illustrate the resulting reports from this phase.

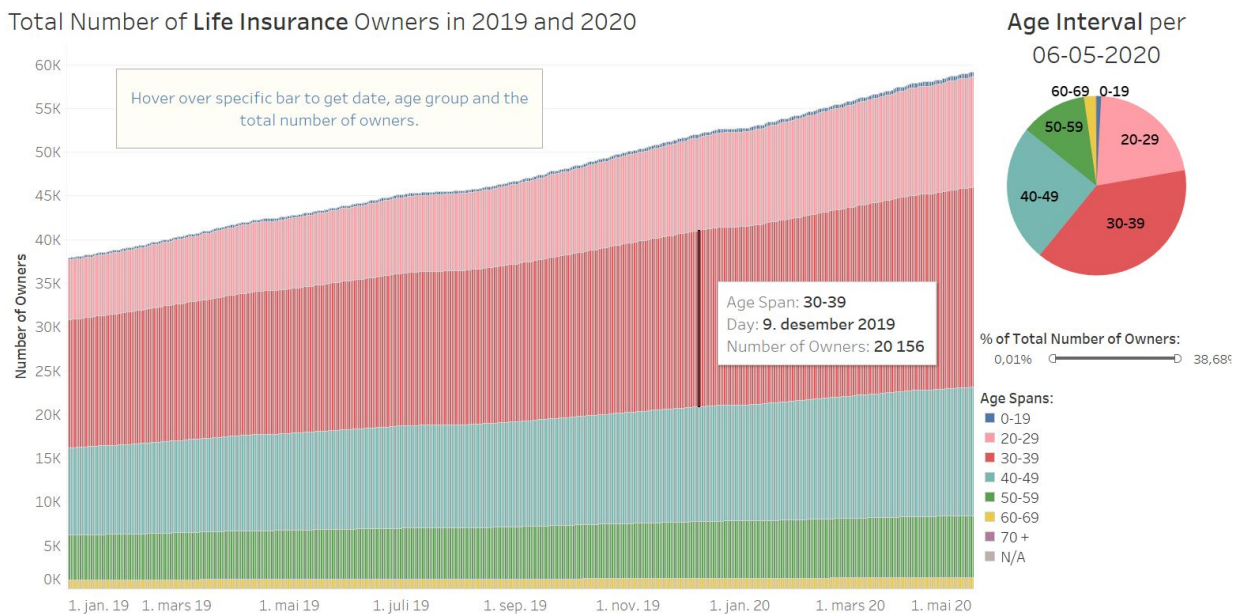


Figure 13: Total Number of Life Insurance Owners per Age Groups in 2019 and 2020.

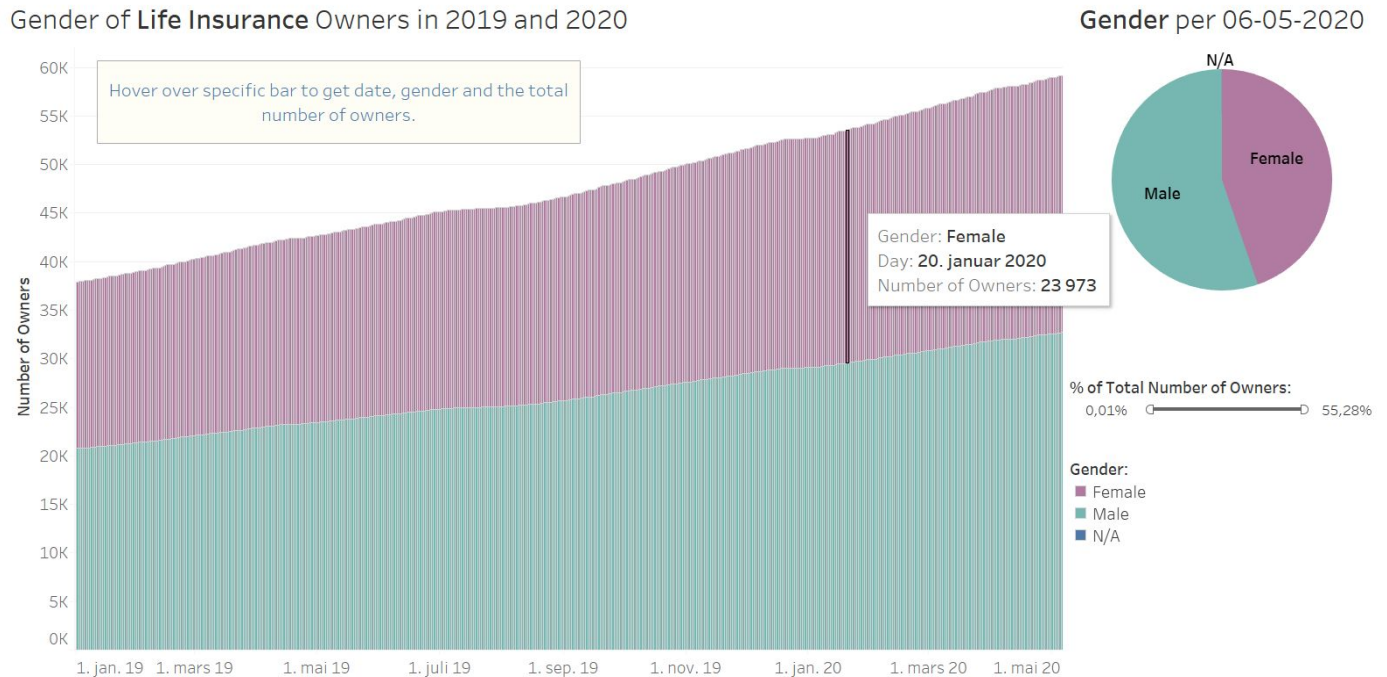


Figure 14: Life Insurance Owners per Gender in 2019 and 2020.

Figure 13 visualizes the total numbers of owners per age group with Life Insurance. It can be seen which age groups have the most owners by looking at the diagram. Correspondingly, Figure 14 visualizes the gender distribution of Life Insurance owners. Matching reports on Fund Accounts were also created, and is listed as figure 10 and 11 in the appendix. These reports concluded the entirety of the technical part of this thesis.

4.3 RISK MANAGEMENT

To assess potential risks and to create a plan for dealing with them, we have created a Risk Diagram (see in the Appendix). Our original risk factors were nr. 1-5, most of which have low to medium probabilities, but leave relatively large consequences.

Nr. 1 was deemed as low probability as the members of the group had a good understanding of the technology being used. If there was a lack of knowledge to use a tool, it was relatively easy for the members to contact the supervisors or other members that had the necessary knowledge. There were also many useful online resources such as learning videos and



documentation. Possible consequences for this would be a negative impact on the results, as we were completely dependent on all the tools to achieve them.

Nr. 2 and 3 were prevented by actively communicating with various supervisors and continually adapting all tasks and assignments as the project progressed. New types of tasks and surveys were adjusted based on the group's capacity to solve them. If a requirement was too consuming, the supervisor would be present to discuss alternative approaches. If there was poor communication it would have directly affected the results with bad and/or unrealistic reports, which could have negatively impacted our results.

Nr. 4 was something we always had in mind and something we tried to work around. It had the highest probability of occurring and possibly the highest consequences regarding what was possible to produce within the given time frame. We experienced some challenges relating to this risk factor that took us even more time to work around. Nevertheless, it was possible to use measures such as adjusting the preferred results according to our time frames and otherwise work well with the remaining time.

Nr. 5 had a high probability and was present almost since the official start of the thesis work. Nevertheless, we managed to get our work done despite the negative impacts of the pandemic, which in itself has a relatively large impact on project development. We have gradually acquired every digital resource we needed from home via the work VPN and the work PCs. All meetings also took place digitally.

In addition to the work process, we discovered some new risk factors, which are listed from points 6-10. These have medium to high probability, but leave relatively large consequences.

Nr. 6 was a consequence of the home office solution. We were unlucky regarding delays of access to all necessary programs and licenses on all work areas provided by Nordea. This created major delays in project development and it was difficult to foresee how much we would be able to complete. After a while we got what we needed in the form of programs and access to digital resources, though as a lot of time had passed by then there was uncertainty regarding how much we would be able to learn and research in the remaining time. Our solution was to take a pragmatic approach and attempt as best we could to adjust our plans according to the capacity of the group and the time remaining.

Nr. 7 occurred when one of the group members fell ill. The consequence of this was a larger workload on one of the group members. There was no optimal solution to this as the time constraints remained the same. Thus the healthy group member simply had to take on extra work to reduce the negative impact and avoid the possibility of having an incomplete thesis in the end. An additional measure was to attempt to reduce the remaining amount of work and to adjust the goals to slightly more realistic requirements.



Nr. 8 relates to the danger that the selected external data resource may not be sufficient to give us proper answers and conclusions. There is a risk of a lack of sources to compare against as we only utilized the Oslo Børs Stock Exchange (and its fields) data to compare with two, bigger of size, customer products of Nordea. A suggested measure was to find other alternative data sources that could be utilized in the comparison.

Nr. 9 occurred due to a temporary lack of response via email correspondences from the supervisors of Nordea. This proved to be due to heavier workloads of Nordea employees during the Corona pandemic. We solved this by setting up meetings directly in the calendar that the supervisor could accept, after having suggested date and time. Gradually, regular weekly status meetings were set up with the supervisors.

Nr. 10 revolved around database issues that were caused due to full harddisks on Nordea's main server. This caused increased latency time for executions of all the SQL scripts developed on SQL Server. Because of this issue, some work meetings were postponed. It was eventually solved by contacting the IT Team of Nordea.

4.4 FUNCTIONAL TESTING

This type of testing approach was based on tangible benefits, meaning the testing produced would be physical, long-term assets based on testing.

4.4.1 TABLE AND VIEW TESTING

Since it was necessary to both upload and use data directly from Nordea's database, it was crucial for it to be in the correct format for it to be usable. The approach used to test if the data would upload into their tables and views was to use the SELECT-option on the SQL Server program.

4.4.2 PROCEDURE TESTING

When the procedures previously had been altered, they were permanently changed into the newest formats, which also altered the associated content in the tables and views. Sometimes, there would be no data displayed when the tables and views were selected to display. The cause of this was a lack of execution when there had been modifications in the procedures. Therefore, the testing approach chosen was to use the Execute-option on the SQL Server program after a modification on the scripts of the procedures. This would display the updated versions of the data in the corresponding tables and views.



4.4.3 METADATA TESTING

Initially, the metadata of the tables were initialized (automatically) with unmatched data types and data sizes to their corresponding views. This worked non-disruptively and without any error prompts for most of the time. Later on however, the arithmetic overflow-error was shown more frequently, meaning it would require a change in the metadata. The unmatched data types and data sizes in the tables were eventually changed to correctly match its corresponding views, e.g. from varchar(5) to int on the field AgeSpan. An approach taken was to manually check if executing their respective procedures would still give error prompts, by checking and matching the field information listed in the columns-folder.

4.4.4 TESTING IN TABLEAU

Once all the data in the database on SQL Server was safely stored, it was crucial to check if the same data would correctly transfer into the data sources of Tableau reports. Before creating and using the data sources, it was always imperative to check if the data was matching with the database.

A previous problem when working with a whole table at a time, would be that Tableau would upload the data from all of the fields in the related table, thus automatically load in the whole table unnecessarily. A solution to this was to take in use the Custom SQL Query option that Tableau offered. This way, it was possible to manually select the relevant fields that would be in use for that exact data source (when kept in mind that each worksheet was usually delivered a specific data source each).

When the Custom SQL Queries in Tableau were modified, it was crucial to refresh the data sources before use. Otherwise, the worksheets would keep on using the previous modified versions. This way the correctly matched number of rows and columns in a Tableau data source was an accurate representation of the number of rows and columns from the database it was retrieved from. Another approach was to take sampled tests to match up the data from a chosen number of specific dates, with the corresponding dates on the diagrams of the Tableau reports.

Not all the diagrams made in Tableau had the same minimum and maximum values even though they represented the same type of diagrams. Tableau would automatically adjust the x- and y-axis to satisfy the values of the data used. However, for interpreting the diagrams correctly and for efficient usability, it was preferable to create fixed x- and y-axis. Since the



filters, colors, titles, tooltips, etc. were automatically pre-set as well, it was crucial to customize them too. This meant it became quite crucial to test these visualizing objects.

Many of the diagrams in the report had common filtrations and legends. In order for them to be adjusted by one primary filter, it was necessary to use the action-options in Tableau. Once dashboards and their respective stories were created in Tableau, the synchronization from one to the other was a necessity, otherwise there was no point in going to the next phases for the worksheets it was building on.

4.5 NON-FUNCTIONAL TESTING

This type of testing approach was based on intangible benefits, meaning the testing produced would be non-physical, short-term assets based on testing.

4.5.1 PERFORMANCE TESTING

The chosen performance qualities in this thesis were the loading time of each of the tables, views and procedures, as well as the execution time for the procedures. This was to ensure the efficiency and the accessibility of data, within a preferable time frame. The approach to test this was to take the time, in seconds, for each of the mentioned components. For execution of the procedures, it was possible to look at the execution time in the execution bar on the bottom.

4.5.2 OSLO BØRS OSEAX DATA

We decided not to test the external data as the data was collected directly from Oslo Børs Stock Exchange Marked who are legally obligated to do their own rigorous testing and authentication to ensure correct data to outline the day-to-day trades.

4.5.3 SURVEY

We created a customized survey as a part of the non-functional testing, to achieve honest and authenticated feedback. This would represent the acceptance test for this thesis. The chosen participants, around 6 people, were random, anonymous employees at Nordea Life. They would have the knowledge and the experience to be able to give the preferred type of feedback for the particular reports created in this thesis. The questions made consisted of screenshots of the different development phases of the reports made in Tableau. Above the pictures, a problem description was present, in which the participants would decide how accurate it was by choosing one or multiple alternative solutions from below. After the results were made, it would be possible to gain the perspective from a professional standpoint in the statistics calculated by Google Forms (link to survey in Chapter 9).



5. METHODOLOGY

5.1 CORRELATION APPROACHES

The different approaches used in this thesis were primarily influenced by the unique data that was accessible to use and what insight was to be gathered from the data of use. Eventually, all of the different reports made in Tableau gave different results and outcomes to gain insights from, which was one of the initial goals. These approaches helped us identify patterns and perform rapid changes. The inputs were in the format of Custom SQL Queries, which consisted of specified script codes for the data sources that would be used in the corresponding Tableau worksheets. The generated output became the fields that would be represented as attributes, or parameters, on Tableau's main view on the worksheets.

There were mainly two types of correlation approaches used in the thesis work. One of them enabled our research into the possible correlation between Nordea's customer data and the data of Oslo Børs. The other approach helped in performing a deep-dive into the correlations between some of the key fields that would give insight into the customers' patterns. Screenshots of all the Tableau reports are listed in the appendix as figures, in the order of the actual development of the reports. The figures were in Tableau's story-format when the screenshots were taken. The approaches below were used on both Fund Accounts and Life Insurance.

5.1.1 CORRELATION OF CUSTOMER DATA AND OSLO BØRS OSEAX DATA

This approach started off with creating a limit of the time interval for the Oslo Børs data. The decided time interval was from the 6th of May 2015 to the 6th of May 2020. Initially, the preferable time interval was to look at the last two years to research whether the year to date had a significant noteworthy change in comparison to the previous years.

The data retrieved from the pre-set Excel sheets, directly from the Oslo Børs webpage, had an option to choose the last 5 years. Once this was chosen and downloaded, the next step was to manually adjust the exact start- and end-dates of the Excel sheets. The one Excel sheet would represent the entirety of the external data source, and was in this particular approach, selected and added into the data source section of Tableau, ready to use.

The internal data source, which is located in the same data source section of Tableau, was a pre-decided set of data retrieved directly from the Nordea Life database containing the



relevant fields. Both the external and internal data was joined with full outer, using IsActiveDate and OSEAX fields as a common field. For the internal data it was necessary to plan beforehand which fields would be of relevant use for a particular workbook, or even, a particular worksheet (depending on what each worksheet would visualize).

Since some of the main research goals surrounding OB data was to achieve an insight into customer actions in regards to Fund Accounts and Life Insurance, IsActiveDate and ContractNo were the most desired fields to pick from both tables. IsActiveDate would tell what active day it was, whereas ContractNo gave information about the customers and how many active contracts there were. These fields were manually selected when defining the Custom SQL Query section in Tableau. For instance, a SQL count-function with distinction was used on ContractNo, creating the new parameter no_active_contracts. This parameter would visualize the total number of active contracts per active day, of either Fund Accounts or Life Insurance, in the form of diagrams (depending on which table the data source was used on). The same time interval as mentioned, but this time for the internal data, was utilized in the procedures of the corresponding tables of use.

In Tableau's main view on the worksheet of use, it is possible to drag-and-drop the fields and parameters into columns and rows, and choose a preferred diagram, e.g. the line charts. When concluding each of these reports, the use of colors, axis-fixations, trend lines, filtration of years, headlines, to parallel diagram sizes and add text boxes were implemented and adjusted. Dashboards and stories were created based on the corresponding worksheets as well. Figure 8, 9 and 10 are the finished products of this correlation approach.

5.1.2 CORRELATION OF CUSTOMER DATA FIELDS

This correlation only looked into the relevant data fields retrieved from the database, meaning only the internal data was the focus. In this approach, the same steps regarding the internal data from the subchapter above were embodied. For this particular search, it was preferable to look into what role the gender and the different ages of the customers played regarding the patterns.

Firstly, it was necessary to select and retrieve Gender, AgeSpan_New and IsActiveDate. Gender would identify each customer, IsActiveDate would look into the active days for the specific contract of the customer, and AgeSpan_New would give the corresponding age groups of the customers (AgeSpan was recreated into AgeSpan_New, see below). The SQL count-function would filter out the three fields and count them accordingly, and create a new parameter called NumberOfOwners, i.e. owner of a Fund Account or a Life Insurance. The tables created from the SQL Custom Queries would display in the data source section of Tableau, illustrating all the



corresponding data. Then, all the fields and parameters were displayed in the main view of the chosen worksheet, ready for use. After drag-and-drop, a diagram was chosen, e.g. histogram chart. These reports were concluded with the same customizations as mentioned above, and developed into dashboards and stories as well. The histograms of Figure 10-14 were the finished products of this approach.

The corresponding Pie Charts of the histograms from Figure 11-14 were created with almost the same steps, only adding the end-date as a condition in the Custom SQL Query (because Pie Charts only display a day at a time). The older versions of the histogram-based reports are listed as Figure 2-4, with Figure 7 as a Gantt Chart, which would take in use the same fields as mentioned. The older version of the corresponding Pie Charts is listed as Figure 6. These older versions had later been marked as unreliable, as a result of some field-errors (explained below).

5.1.3 BALANCE FIELD APPROACH

As mentioned in chapter 4.2.3, the Balance field was created as a means of further researching the correlations to the Fund Accounts. The creation of this field was rather complicated, and had to be developed with the aid of the external supervisors.

Firstly, the procedure for the Fund Accounts table was altered several times. The latest modification was the one that seemed to get the correct data, which would come from another table, within another database. In the procedure mentioned, a new temporary table #ContractsVolume was added, as well as some SQL clustered columnstore indexes. The implementation of the Balance field was, after modification, added into the previous illusion of the cartesian product between the tables. A new connection between Balance and Fund Accounts was created. A new view for Balance was also created with the corresponding fields; Holdingsdate, ContractNo, Balance. The Fund Accounts table was also modified, by adding a field for Balance.

When creating the report in Figure 15, the same approach described in 5.1.2 was embodied, only with the use of the new fields this time. However, this approach proved to attract some errors within some of the Fund Accounts-related reports on Tableau, e.g. Figure 11 and 12 (in appendix).

5.1.4 ERRORS WITH AGESPAN FIELD

As mentioned in 5.1.3, there were some after-effect problems regarding the use of the Balance field. Figure 16 illustrates the way one of the Fund Account reports got affected.

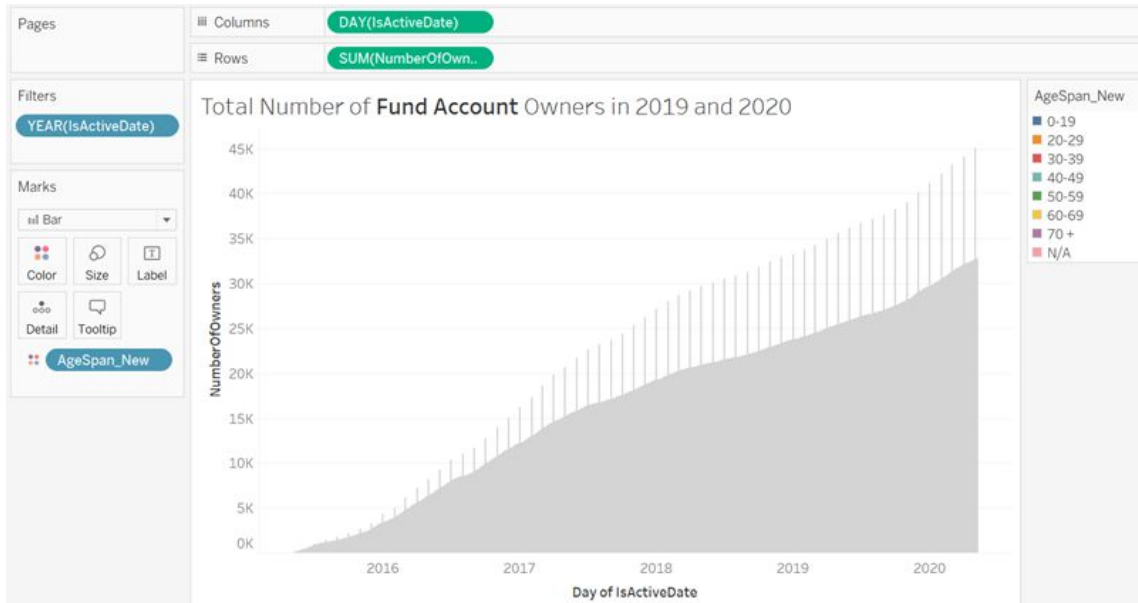


Figure 16: Errors of figure 11.

The same problem affected the corresponding gender distributed reports of this Fund Accounts report as well, as seen in Figure 17.



Figure 17: Errors of figure 12.

Although the supervisors did not have the time to look at it, we believe there is a high probability that the problems stemmed from the interlacing of the Balance and Func Account

views, which was instigated in the corresponding Fund Accounts procedure. The spikes may have occurred from the end-of-the month dates of the last 2 years of Fund Accounts, that came with the Holdingsdate field from the Balance view.

There was, however, a sudden decision to temporarily fix the problem without the supervisors, as shown in the corresponding Figure 17 and 18.

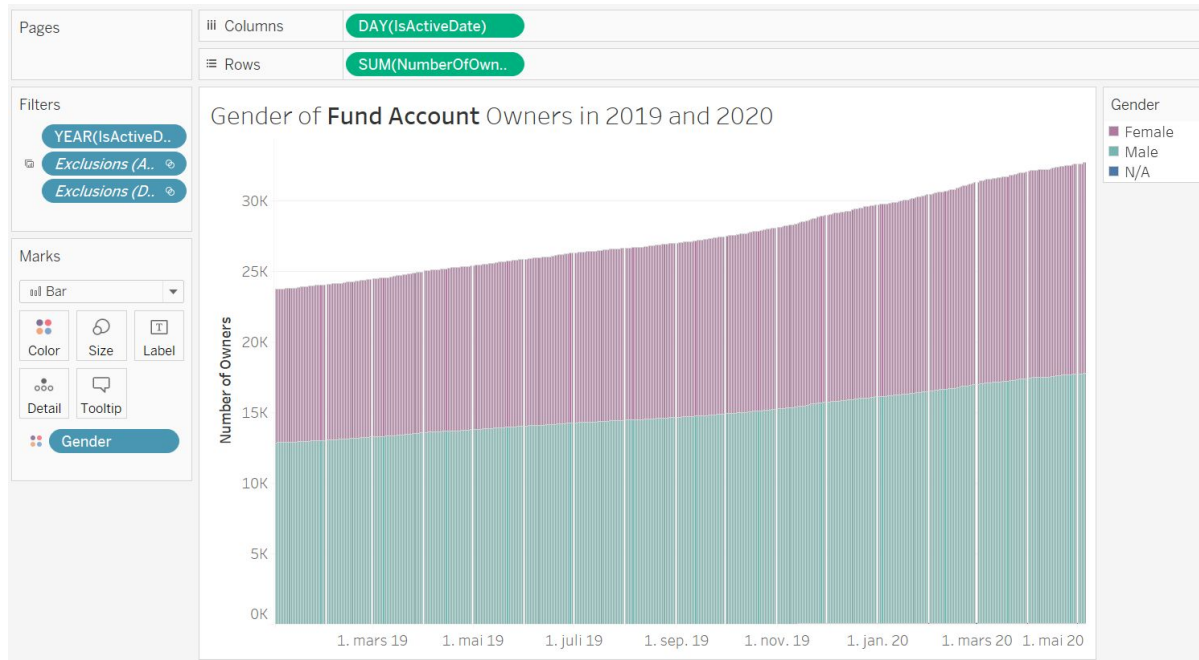


Figure 18: Errors of figure 12.

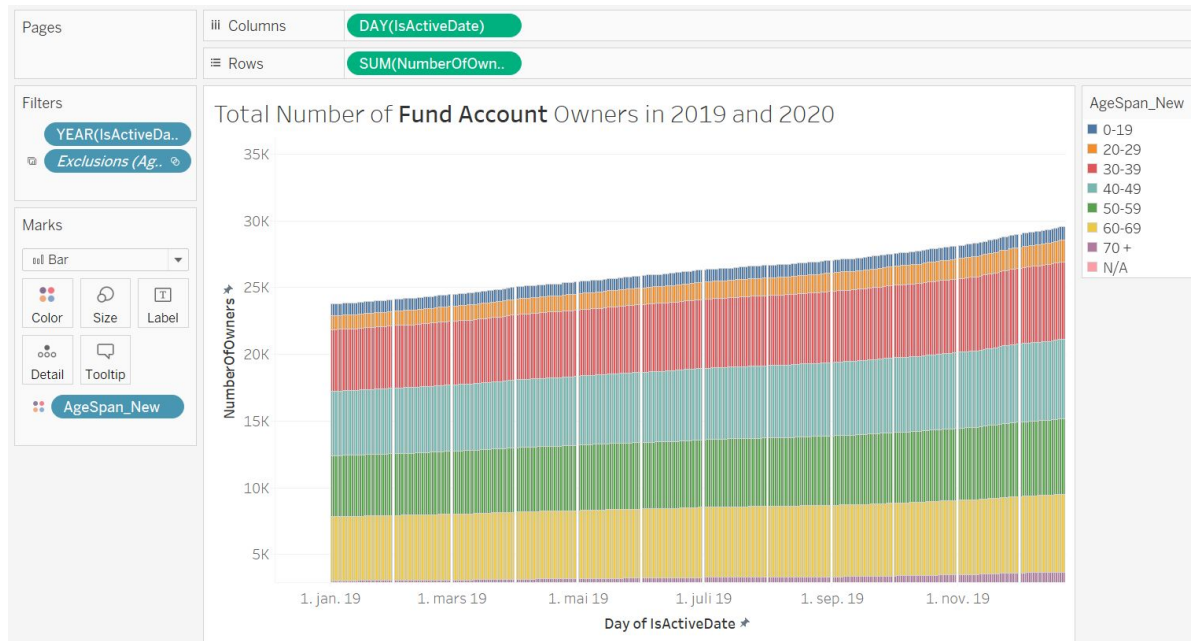


Figure 19: Errors of figure 11.

This implied using the Exclude option in the main view of the worksheet in Tableau and manually hide all the spiked dates, consequently displaying the missing data.

6. RESULTS AND DISCUSSION

6.1 INSIGHTS

6.1.1 FUND ACCOUNTS VS. OSLO BØRS STOCK MARKET

When looking at the green line chart in Figure 8, representing the total number of Fund Account contracts, it appears to be increasing steadily with time. Clearly, it has the largest sum of active contracts per 6th of May 2020, but that is not enough to conclude that there has been a change in the patterns. As for the Oslo Børs line chart, there is a clear and significant drop in the pricing of the stocks from mid-March of 2020, but that does not affect the numbers of Fund Accounts compellingly.

6.1.2 LIFE INSURANCE VS. OSLO BØRS STOCK MARKET

Looking at the pink line chart in Figure 9, the total number of active contracts in Life Insurance does not show us much more than an increase for the last 5 years, which is predictable. However, it appears to be a steeper ascent from early 2019, but with an even steeper one since



early 2020. It can be difficult to say why there was an ascent in January of this year, but it is much explainable to see that the line keeps ascending as of March of this year. Statistically, from the start of this year to the end of March, there was an increase of 9,71%, and from March of last year to March of this year, there was an increase of 38,73%. However, the increase from the end of March of 2015 to the end of March this year has been significant, with an increase from 3014 to 48 683 active contracts. Moreover, it is easier to assume that the Corona pandemic had a role in it, causing more customers of Nordea Life to impulse-buy Life Insurances. The ascent in March-April gives an ideal symmetry of the descending line chart of Oslo Børs.

6.1.3 BALANCE IN FUND ACCOUNTS

Over the course of 5 years, there has been a massive increase in Fund Account purchases amongst customers; starting with approximately 552 active Fund Accounts by the end of May of 2015, to approximately a total of 44 570 active Fund Accounts as of april of 2020. With calculations from interpreting the bars on the diagrams of figure 15, 97,4% of the customers have exactly one Fund Account, meaning the remaining 2,56% of the customers owning more than one. There has also been a significant increase of the sum of balance saved in these Fund Accounts. However, from end of February to the end of March of this year, there has been a 86,4% decrease of the balance in Fund Accounts, possibly due to the negative shift in the OB stock pricings; presumably a pandemic effect.

6.1.4 AGE AND GENDER OF LIFE INSURANCE OWNERS IN 2019 AND 2020

By looking at the histogram of figure 13, the color distribution representing the different age spans tells us something insightful. The most distributed color, red, represents the age group with the ages from 30 to 39. Meaning customers within that age range purchases the most Life Insurances. Moreover, we can see a great distribution of the age group 40-49. The corresponding gender distribution of the customers clearly shows there is a male-dominated procurement, in figure 14.

6.1.5 AGE AND GENDER OF FUND ACCOUNT OWNERS IN 2019 AND 2020

Looking at figure 11, the interpretation of the age group is a bit harder to tell. However, there seems to be leading groups in yellow, blue and red, representing the ages 60-69, 40-49 and 30-39. The leading group, held by mostly pensionists, represents 19,3% alone among the 32 683 owners. The histograms show that this is a male-dominated procurement as well, but stands more equated to the females than it did in the Fund Accounts histogram from above. Conclusively, it is safe to assume that there are significantly more Life Insurancers than Fund Account owners, with a total number of 59 162 owners of Life Insurance.



7. EVALUATION

7.1 FUNCTIONAL TESTING RESULTS

This subchapter contains the results from executing the functional testings from subchapter 4.4.

7.1.1 TABLES AND VIEWS RESULTS

By following the testing approach for this section, the data in both the tables and the views was able to load up efficiently, in their respective fields. There were no signs of computational or database related errors.

7.1.2 PROCEDURE RESULTS

After some modification, the testing approach was conducted. It was quickly established that the data in the associated tables and views of their respective procedures would still load when following the correct order.

7.1.3 METADATA RESULTS

The testing of metadata approach was conducted, and there appeared to be no new error prompts displaying an arithmetic overflow, or other types of errors. The tables and views were successfully running.

7.1.4 TABLEAU TESTING RESULTS

All data that was associated with the tables that were used in all the unique data sources in Tableau reports would, without any problems, upload into the data source overview in Tableau. Taking some test samples on specific dates on both the database and on the Tableau reports was effectively accomplished throughout the development to ensure that the data was correct on both parts.

When testing the visualizing objects, there were still some tooltips that would not display. The decided solution for this was to hover on the sections of the diagrams that would display the tooltips, and take the screenshots accordingly (screenshots for this thesis report). Other objects would display the way it was fixed to.



While testing the respective dashboards and their stories, the synchronization would work effectively, adjusting to the modifications from the previous phases. The only concern was to adjust the sizes of the diagrams to fit the frame, and also add in the titles.

7.2 NON-FUNCTIONAL TESTING RESULTS

This subchapter contains the results from executing the non-functional testings from subchapter 4.4.

7.2.1 PERFORMANCE RESULTS

The amount of time it would take the database to load in the data from both the tables and their respective views was roughly 3 seconds. This was considered a quick and efficient loading time.

Almost likewise, both the procedures would take roughly 4 seconds each to display their scripts. However, executing the Fund Accounts procedure would take approximately 1 minute and 31, whilst the Life Insurance procedure would take approximately 2 minutes. There was no specific explanation as to why one would take a bit longer than the other, especially considered that the Fund Accounts procedure had longer script code to execute. All above 3 seconds would be considered slow, but had in mind that procedures generally take longer time to execute, the execution time was within reason.

7.2.3 SURVEY RESULTS

75% of the participants said that figure 3 was a good representation of data that displayed only the necessary information, while 62,5% meant that figure 5 was an ok representation that was not clear enough to fit the problem description.

¼ of the participants also said that figure 13 visualized great insight that could be concluded, also with the same results on figure 14.

Moreover, half of the participants said that it was assumable to say that customers did purchase more during the Corona Pandemic by looking at figure 8, while 1 person said that it would not, and another said that it was not conclusive enough to assume. With the same alternatives from the figure 8-question, figure 9 had the results in which 75% agreed with that the Corona Pandemic did, in fact, influence the customers to purchase more.

There was a tie between opinions on figure 7, saying it was both 'not good', and 'a ok' visualization of data. Figure 15 was considered a good visualization.

Most of the participants answered "4" (meaning "good") on how well the colors were used in the making of the reports, and how well they could interpret the survey.



Conclusively, most answered that the use of the Oslo Børs data was both developed and visualized well in this thesis.

7.3 FINAL SOLUTION IDEA

Initially, the preferable time interval was to look at the last two years to research whether the year to date had a significant noteworthy change in comparison to the previous years. After recommended advice from supervisors, there was a deeper understanding as to why it had to be expanded. It was eventually expanded to 5 years, meaning the research would look back as far as 6th of May 2015, instead of 2019 or 2018. This was, amongst other reasons, to enhance the sudden increase that was displayed on some of the line charts created, for instance, shown mid-March 2020 in figure 8.

Moreover, instead of deep-diving fully into the pandemic influence on the customers, the focus shifted towards what was considered to be useful insights for Nordea Life. For instance, it was initially proposed by Nordea to conduct research into when and where customers came to buy, as well as looking into when and where they would leave. However, the supervisors eventually recommended not to look into cancellation of contracts, and instead keep on researching various aspects of the active contracts.

Eventually, the final solution circulated around the idea of gathering what was possible to interpret from the Tableau reports that were being made. The time limitation started to affect the quality of the report-making, causing the progress to speed up during the end phase and finally conclude the thesis work.

8. CONCLUSIONS AND FURTHER WORK

As we saw in the results, there were some interesting insights gained from the reports made in Tableau. Most of the reports were deemed useful and provided new information. Many of the patterns discovered provided further insights into specific customer behaviors. We argue that our hypothesis that the Corona Pandemic influenced the behavior of customers of Nordea Life has been strengthened.

The development process itself was challenging. We encountered some risk factors, both previously considered and new ones, that caused the group to take necessary actions. For instance, the entire technical part had to be completed in the span of a month. Despite this, the knowledge and experiences gained from the last few months are irreplaceable. There was a huge shift in the normal day-to-day schedule, especially considering the on-going pandemic.



Instead of working from the offices of Nordea, we had to work from our own respective homes, contacting the supervisors through Microsoft Teams calls. The communication and problem-solving was efficient and highly informative, resulting in many of the goals being reached. Although the time crunch affected the quality of the reports, there were some insightful reports produced. We believe the end results achieved from this thesis work is a good basis that can be further researched and taken into action.

The reports developed in this thesis work can potentially provide insights that can help guide Nordeas business decisions through partially predicting customer behaviors in crisis situations such as a pandemic. This was an initial goal of the project and we believe our results could serve as a basis in developing and establishing new safety measures and implementation of protocols to better fit the standards of the customers during crisis times. Considering that the pandemic had a global effect that influenced the pricings of the stock exchange markets worldwide, many banks were consequently affected. Thus, the content within this thesis could potentially help make other national, or international, bank-related companies get an insight into what to do in such uncontrollable circumstances as well.

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10. APPENDIX

1. RISK DIAGRAM

Risk #	Description	Probability <i>P</i>	Consequence <i>C</i>	Seriousness <i>P x C</i>	Measures
1	Limited technology understanding	2	5	10	Ask for guidance from external supervisors. Self-learn via. online tutorials and documentations.
2	Limited task understanding	3	4	12	Communication with internal/external supervisors to adapt the tasks. Refer the problem to experienced supervisors.
3	Uneven distribution of tasks	3	5	15	Communication within the group and internal supervisor to set rules for task distribution.
4	Limited time	5	5	25	Communication with internal/external supervisors to discuss and adjust the goals and tasks. Work to adapt the possibilities of a "smaller" result/product, or extend the deadlines.



5	Covid-19 pandemic influence	5	3	15	Home office solution through office-VPN. Communication and meetings via. Microsoft Teams.
6	Limited tool/program availability	4	5	20	Communication with internal/external supervisors to retrieve the tools in a safe and efficient manner. Get temporary replacement tools.
7	Illness	3	4	12	Communication within the group. Temporary heavier workload for healthy group members. Sick group members act as "silent listener" in Teams-meetings.
8	Limited external data	4	5	20	Communication with internal/external supervisors to discuss reliable alternative external data/resources to implement, if necessary. Discuss and evaluate the preferable results.



9	Limited guidance	3	3	9	Communication with internal/external supervisors and ask for more guidance. Set up more Teams-meetings in the calendar.
10	Database issues	2	5	10	External supervisors contact IT support. Work on less database-dependent tasks (e.g. the end-report or obligatory tasks).

Diagram 1: Risk Diagram.

(Or open the PDF document from the attachment list).

2. TABLEAU REPORTS

Active Contracts vs. Last Price Trade of OB OSEAX

Fund Accounts:

2020	Null	1 265 898
	687,04	31 234
	688,78	31 383
	691,05	31 212
	699,06	31 225
	705,01	31 139
	718,78	31 249
	725,06	31 320
	727,88	31 524
	730,22	31 409
	730,99	31 157
	745,8	31 469
	749,96	31 569
	754,81	31 491
	775,3	31 113
	778,31	31 591
	788,11	31 680
	788,71	31 657
	791,31	31 638
	792,84	31 958
	793,56	31 872
	802,01	31 070
	803,08	31 701
	803,73	31 096
	805,47	31 843
	807,62	31 984
	808,67	32 023
	809,11	31 940
	809,81	31 735
	812,64	32 100
	815,92	31 892
	818,2	31 722
	819,8	32 255

Life Insurance:

2020	Null	1 955 201
	687,04	48 371
	688,78	48 595
	691,05	48 231
	699,06	48 305
	705,01	48 112
	718,78	48 447
	725,06	48 502
	727,88	48 917
	730,22	48 689
	730,99	48 156
	745,8	48 761
	749,96	49 005
	754,81	48 843
	775,3	48 042
	778,31	49 065
	788,11	49 251
	788,71	49 194
	791,31	49 120
	792,84	49 778
	793,56	49 572
	802,01	47 881
	803,08	49 308
	803,73	47 964
	805,47	49 520
	807,62	49 844
	808,67	49 966
	809,11	49 722
	809,81	49 398
	812,64	50 029
	815,92	49 627
	818,2	49 353
	819,8	50 441

Years:

- (All)
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

The second column shows the Last Price Trade of OB OSEAX, and the third shows the total number of active contracts. The text table is sorted in a descending order with every active day present.

Last: **803,08**
Year: **2020**
Total Number of Active Contracts: **49 308**

Figure 2: Active Contracts vs. Last Price Trade of OB OSEAX in Text Tables.

Active Contracts vs. Gender

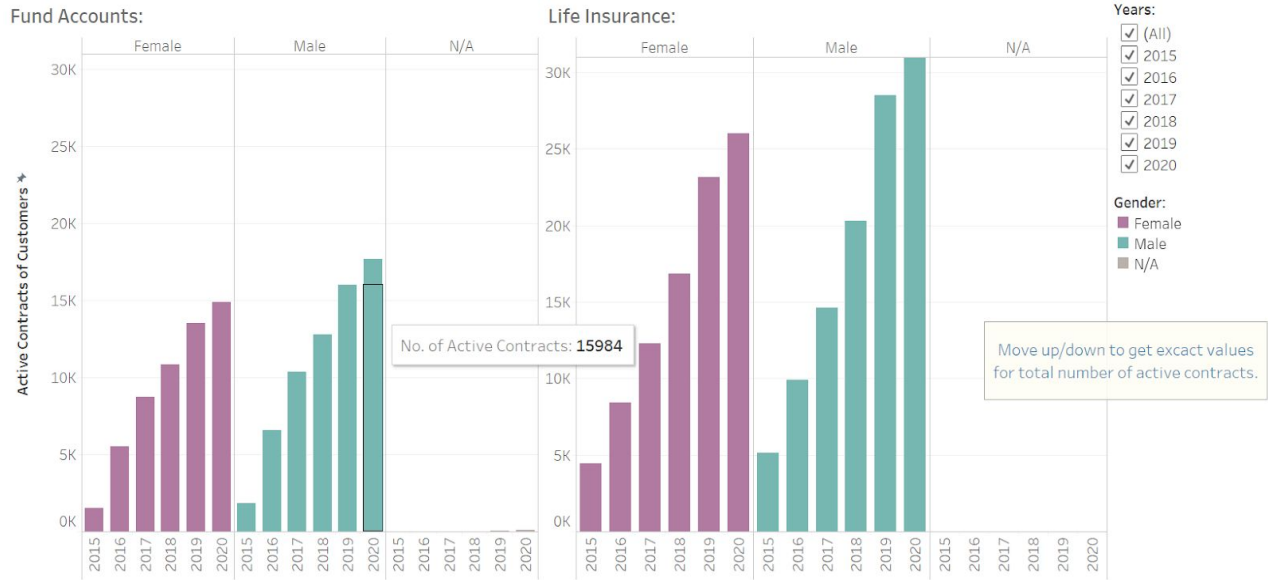


Figure 3: Active Contracts vs. Gender in Histograms.

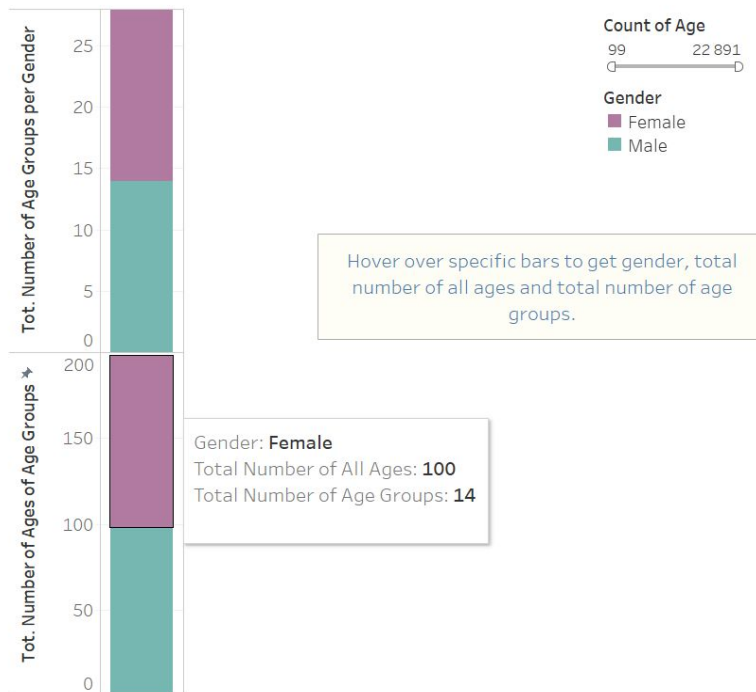


Figure 4: Old Version of Age and Gender Distribution in Age Groups in histograms.



Age Distribution in Age Groups

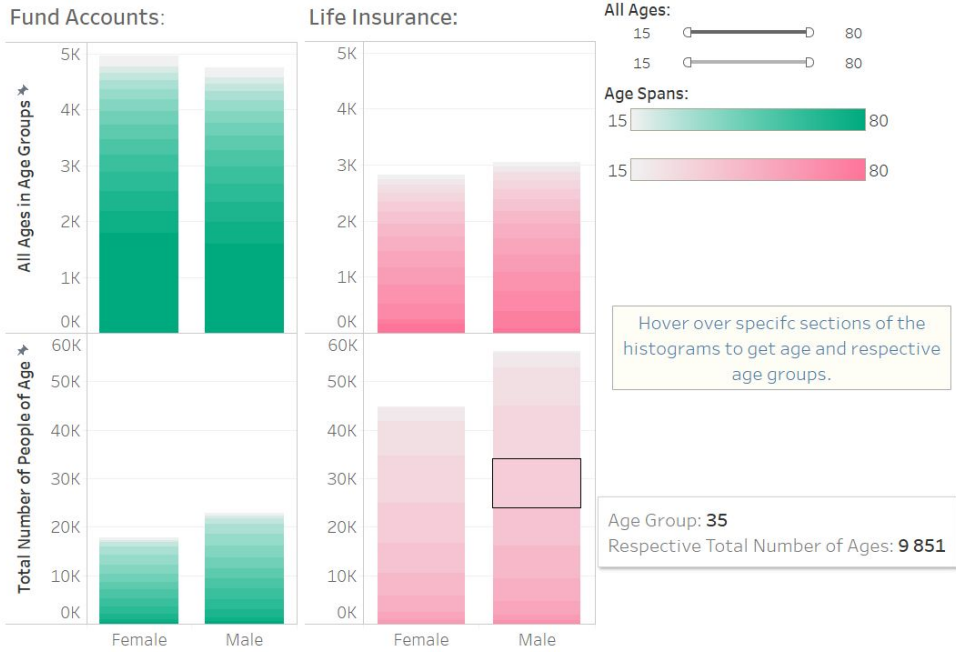
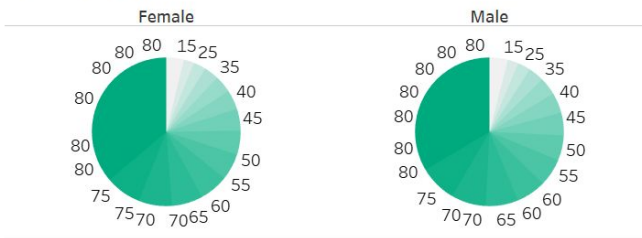


Figure 5: Age and Gender Distribution in Age Groups in Histograms.

Age vs. Gender

Fund Accounts:



Life Insurance:

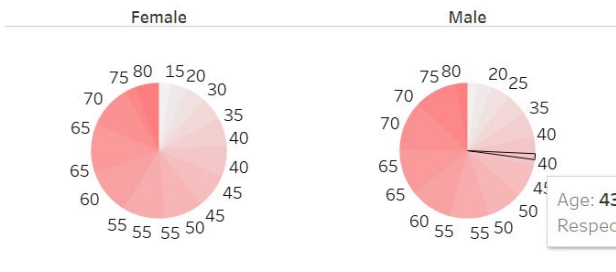


Figure 6: Age and Gender Distribution in Age Groups in Pie Charts.

Age vs. Gender in Age Groups

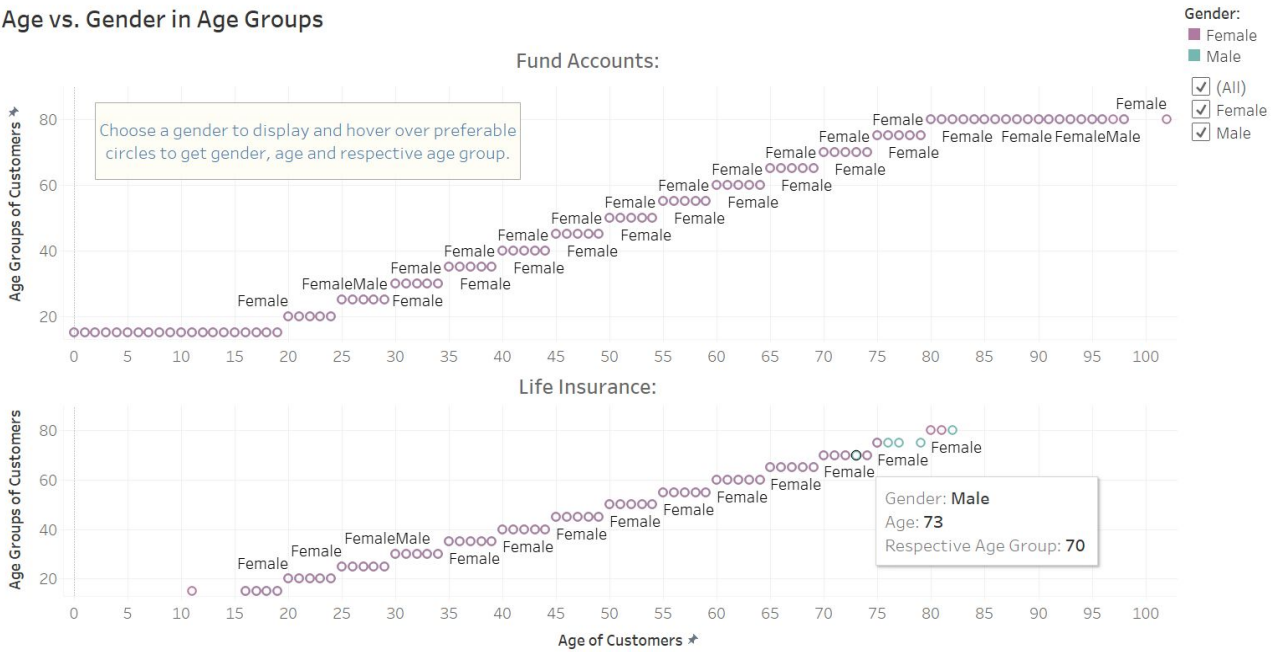


Figure 7: Age and Gender Distribution in Age Groups in Gantt Charts.

Fund Accounts vs. Oslo Børs Stock Marked

Fund Accounts: Active contracts



OB OSEAX: Last Traded Price

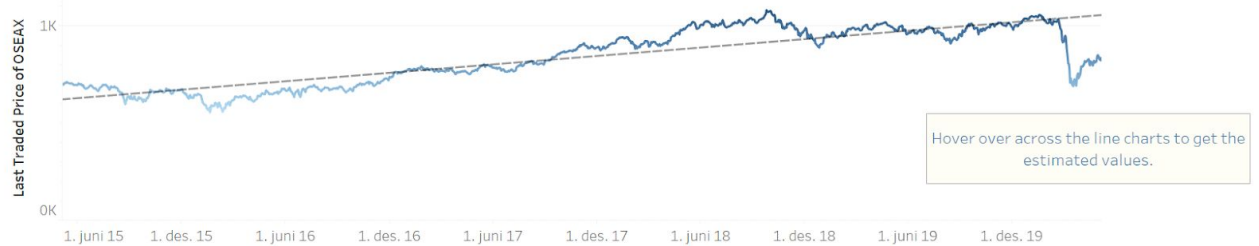


Figure 8: Fund Accounts vs. Oslo Børs Stock Marked in Line Charts.



Life Insurance vs. Oslo Børs Stock Marked

Life Insurance: Active contracts



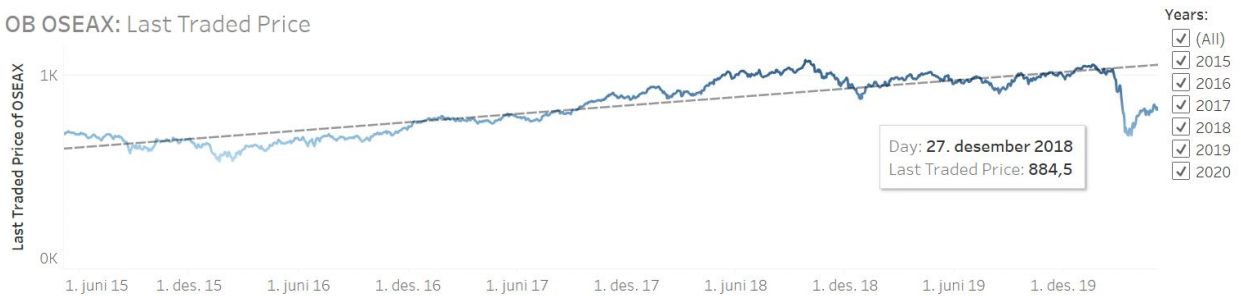
OB OSEAX: Last Traded Price



Figure 9: Life Insurance vs. Oslo Børs Stock Marked in Line Charts.

Oslo Børs Stock Marked Last 5 Years

OB OSEAX: Last Traded Price



OB OSEAX: Last Traded Prices (Weekly)



Figure 10: Oslo Børs Stock Marked of the Last 5 Years in Line Charts.



Total Number of Fund Account Owners in 2019 and 2020

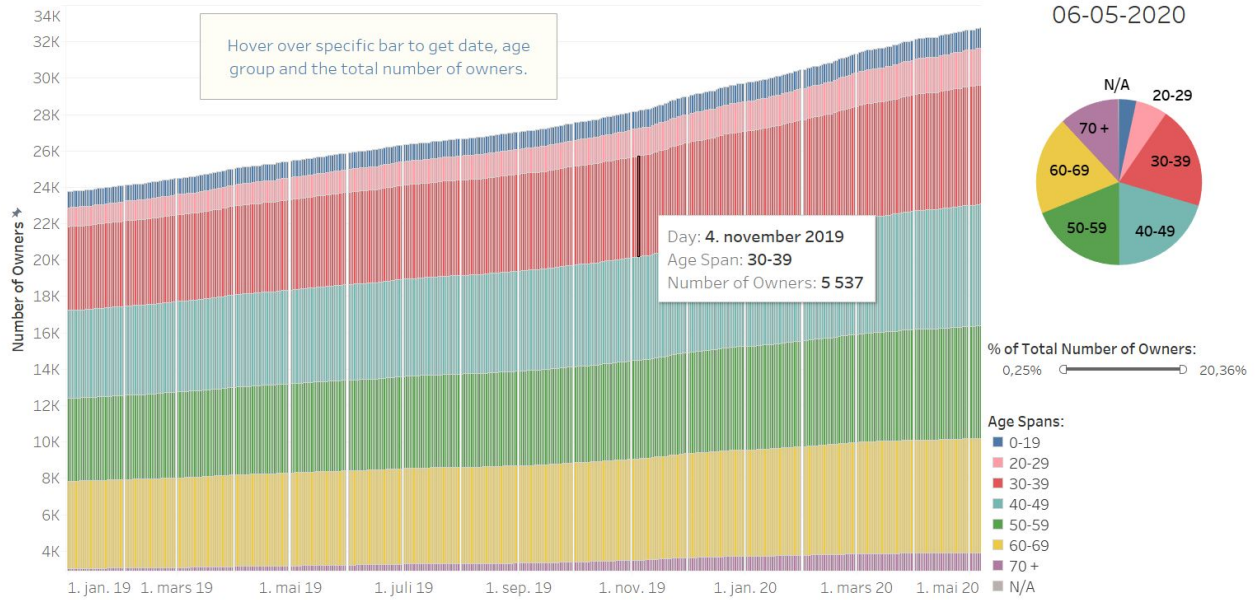


Figure 11: Total Number of Fund Account Owners per Age Groups in 2019 and 2020.

Gender of Fund Account Owners in 2019 and 2020

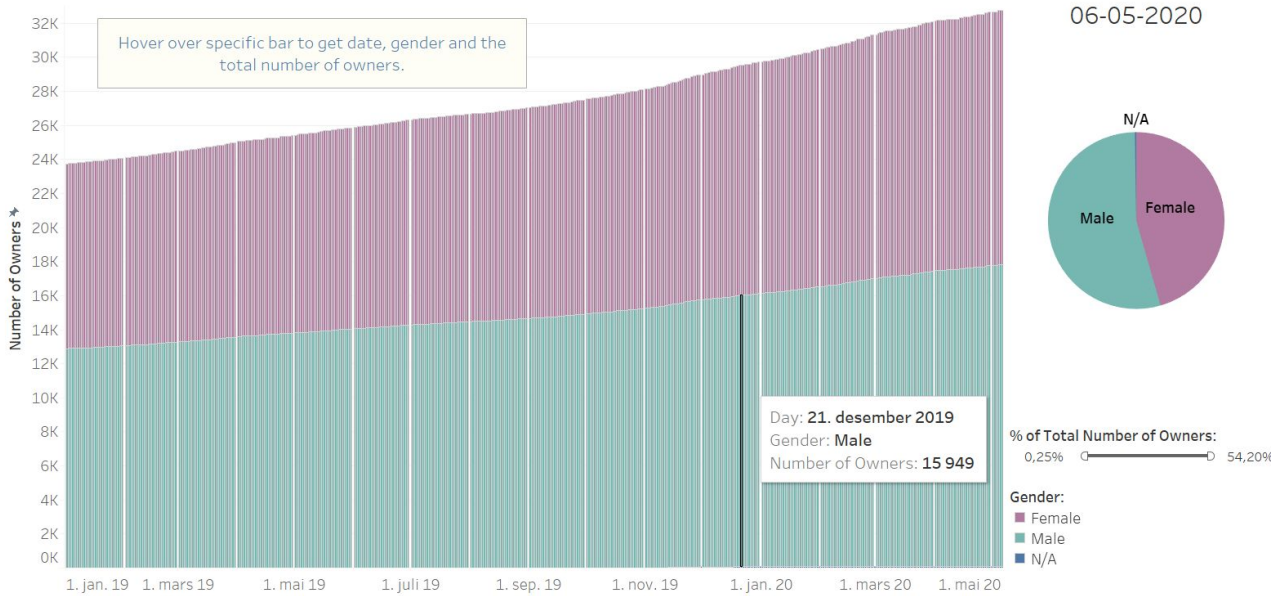


Figure 12: Fund Account Owners per Gender in 2019 and 2020.



Total Number of Life Insurance Owners in 2019 and 2020

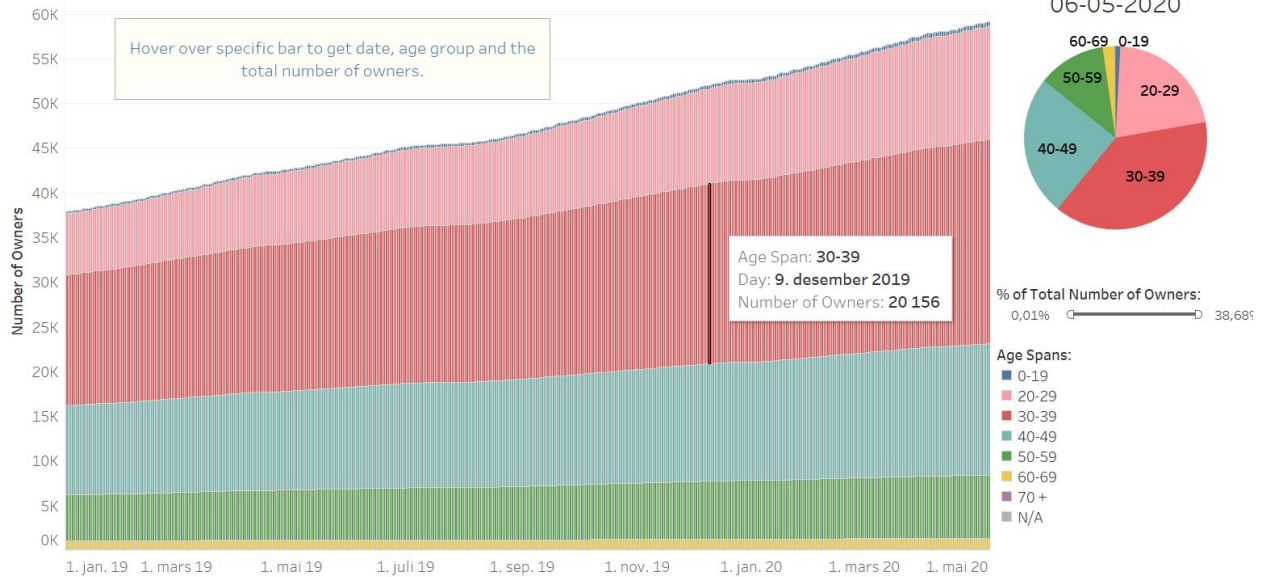


Figure 13: Total Number of Life Insurance Owners per Age Groups in 2019 and 2020.

Gender of Life Insurance Owners in 2019 and 2020

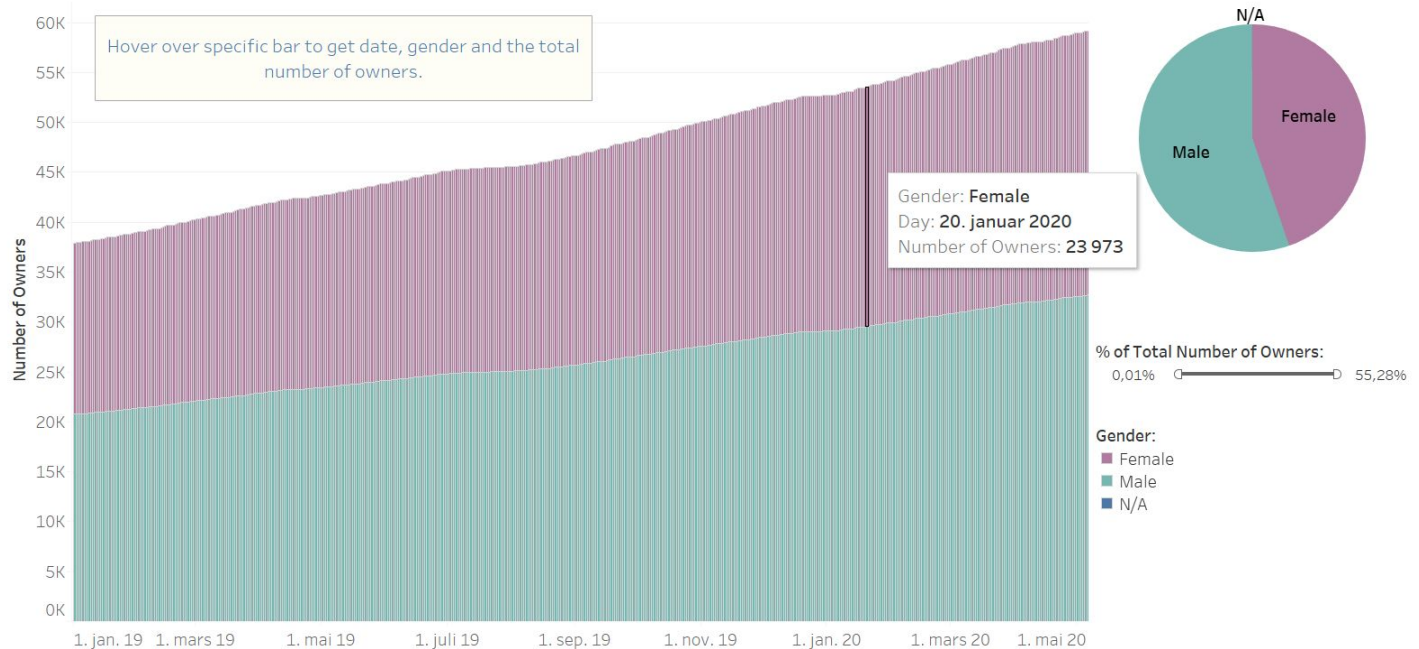
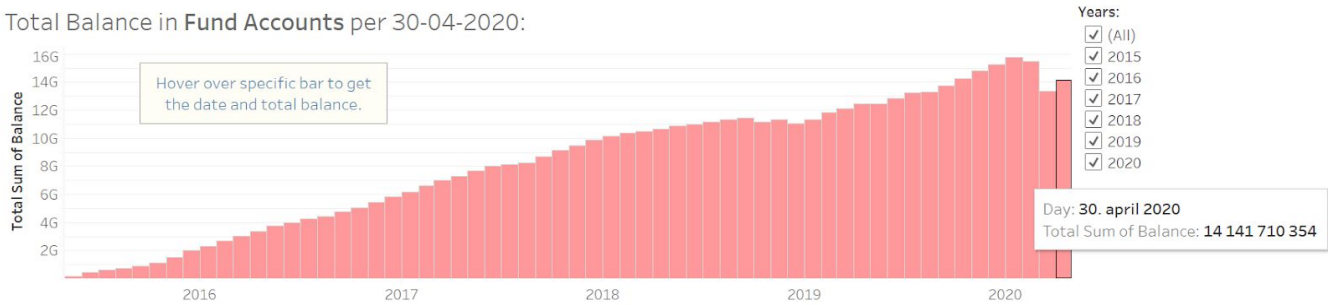


Figure 14: Life Insurance Owners per Gender in 2019 and 2020.

Total Balance in Fund Accounts per 30-04-2020:



Total Number of Fund Accounts with Balance per 30-04-2020:

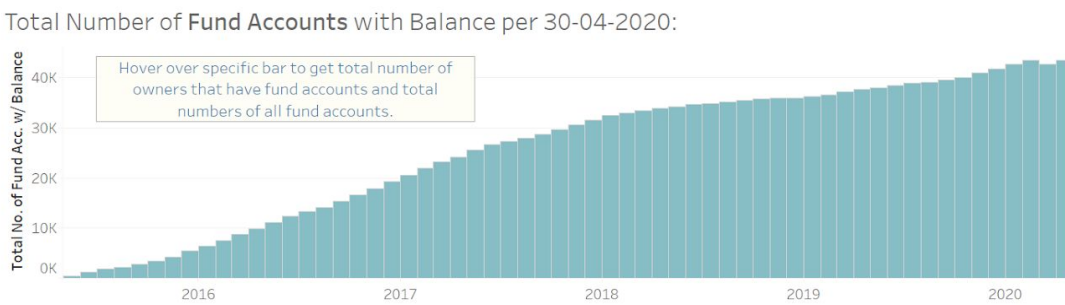


Figure 15: Total Balance and Number of Fund Accounts per 30-04-2020.

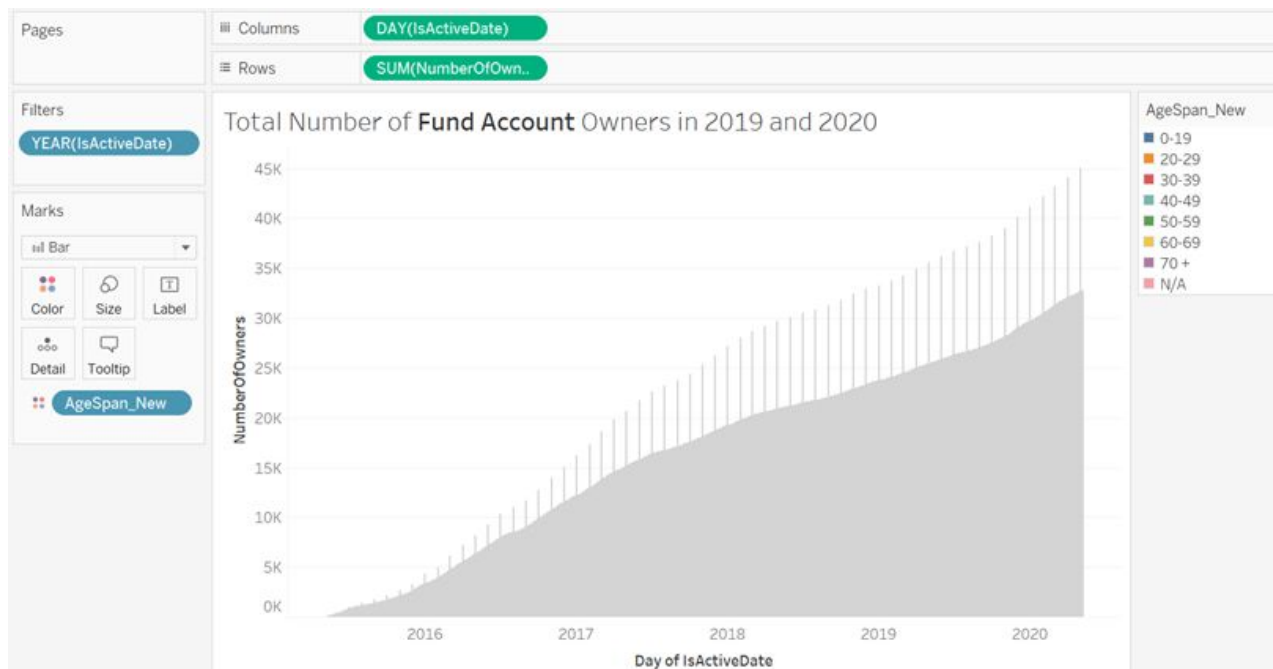


Figure 16: Errors of figure 12.

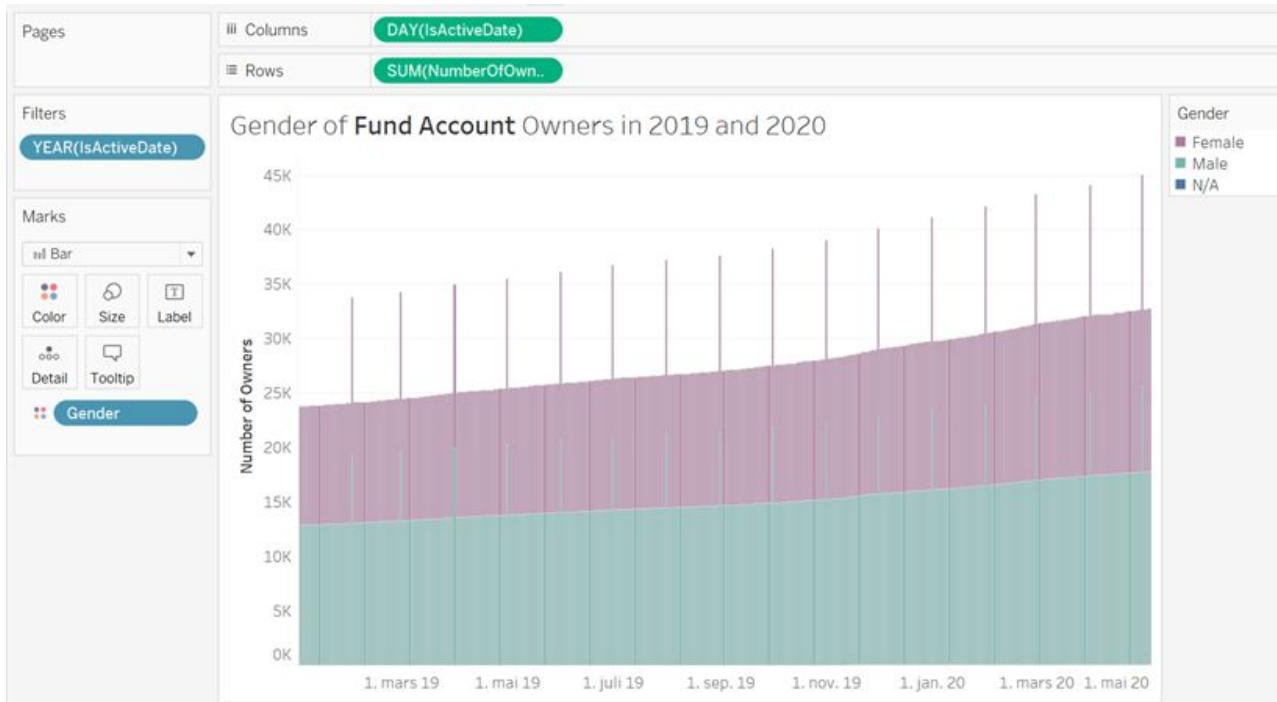


Figure 17: Errors of figure 12.

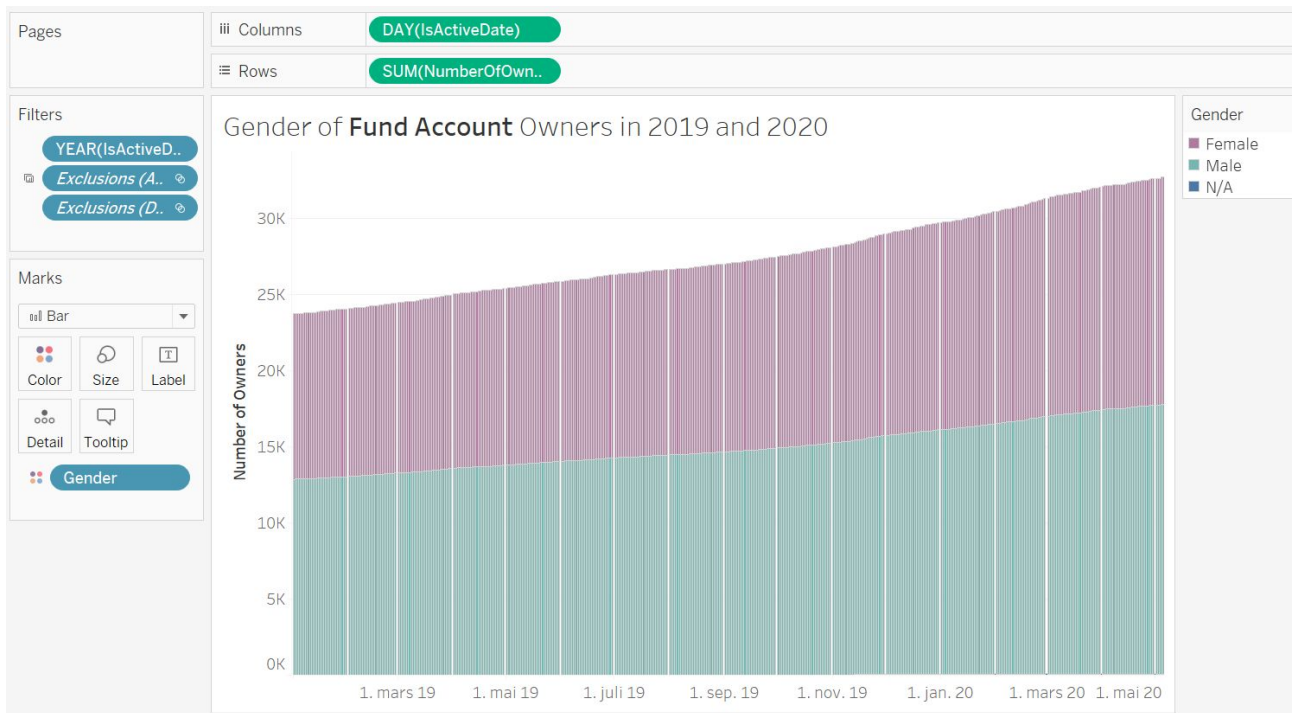


Figure 18: Errors - Missing values.

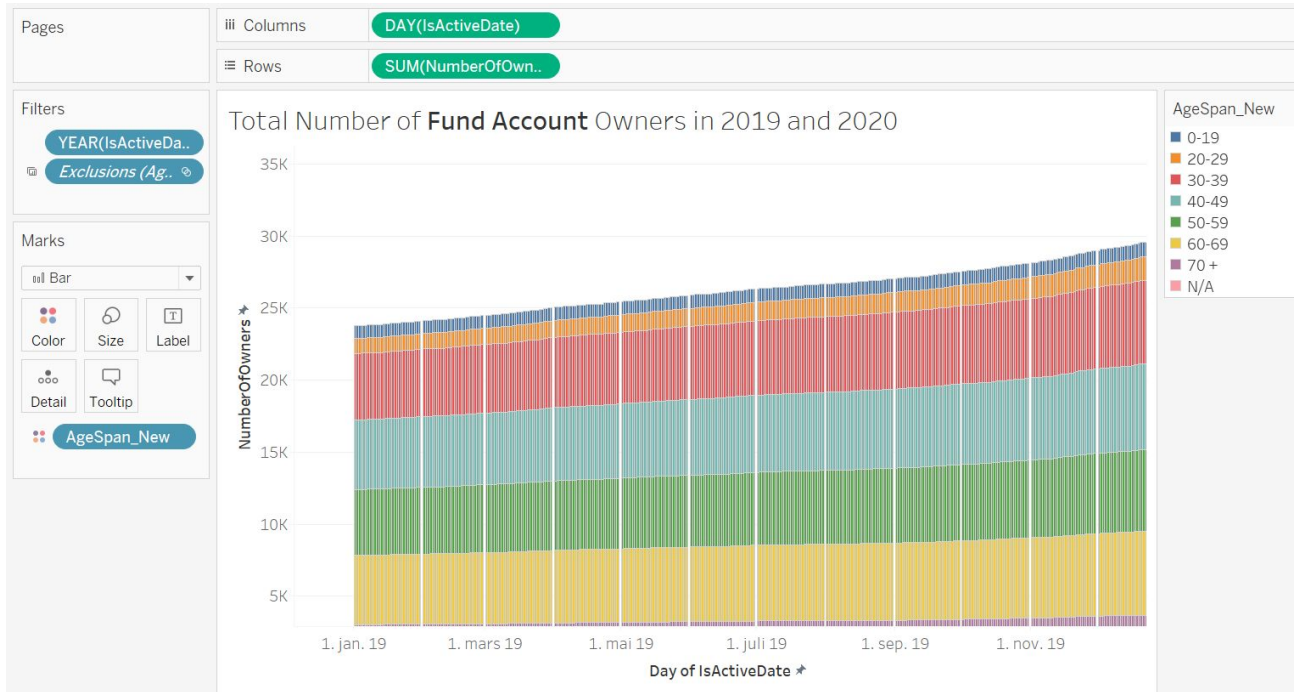


Figure 19: Errors - Missing values.

3. GANTT CHART

Gantt Chart of Project Development

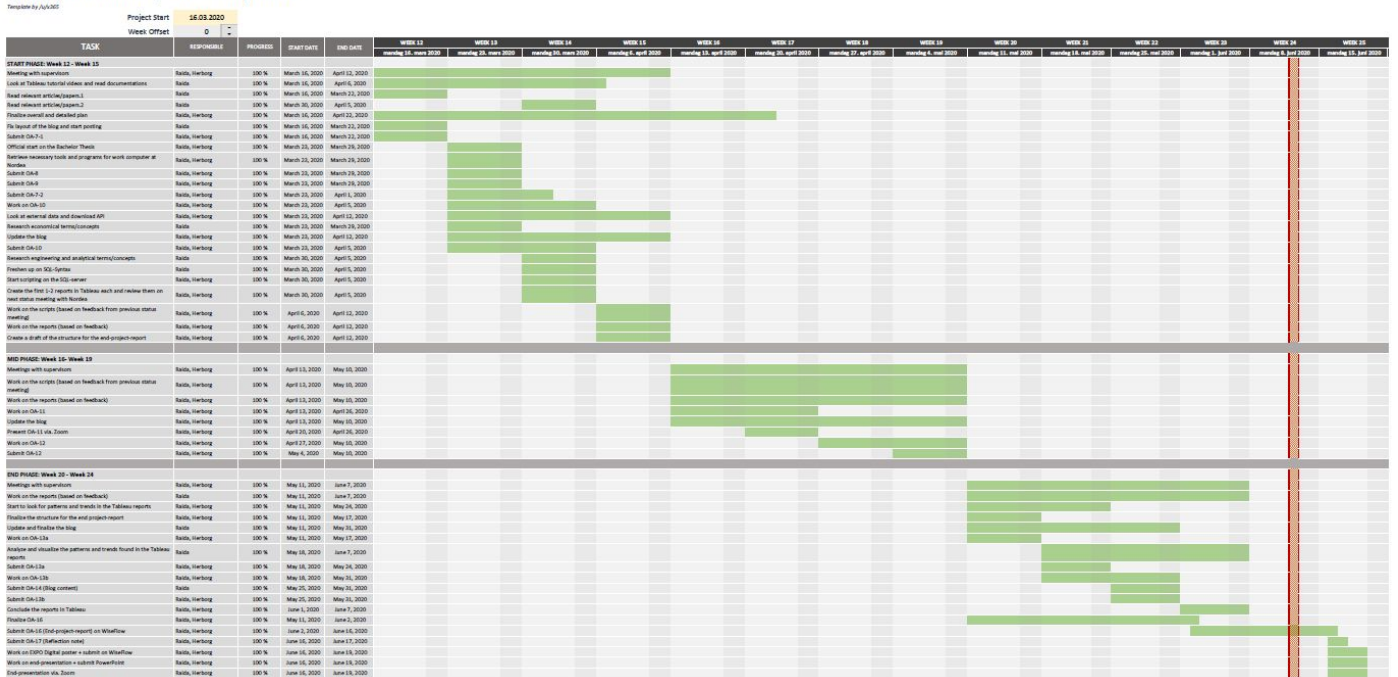


Figure 15: Gantt Chart of the Project Development.

The Excel sheet can be accessed from the following link (or open Excel sheet from attachment list - it will not show the 1' and 0's):

https://docs.google.com/spreadsheets/d/17l_cRSIxt4EmrZNLBby7rd3mjtqgLNJ7/edit?dls=true#gid=1234917882