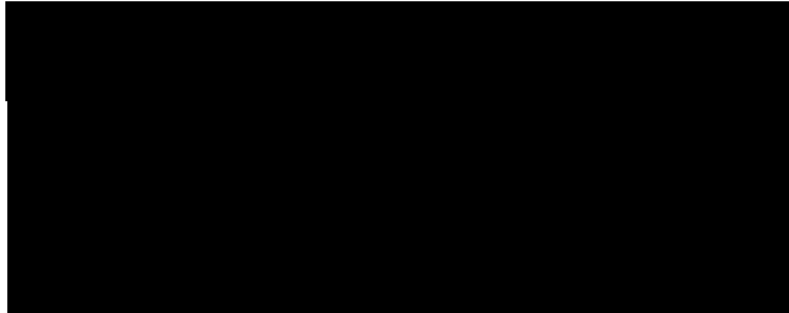


Data Science Challenge

May 17, 2021



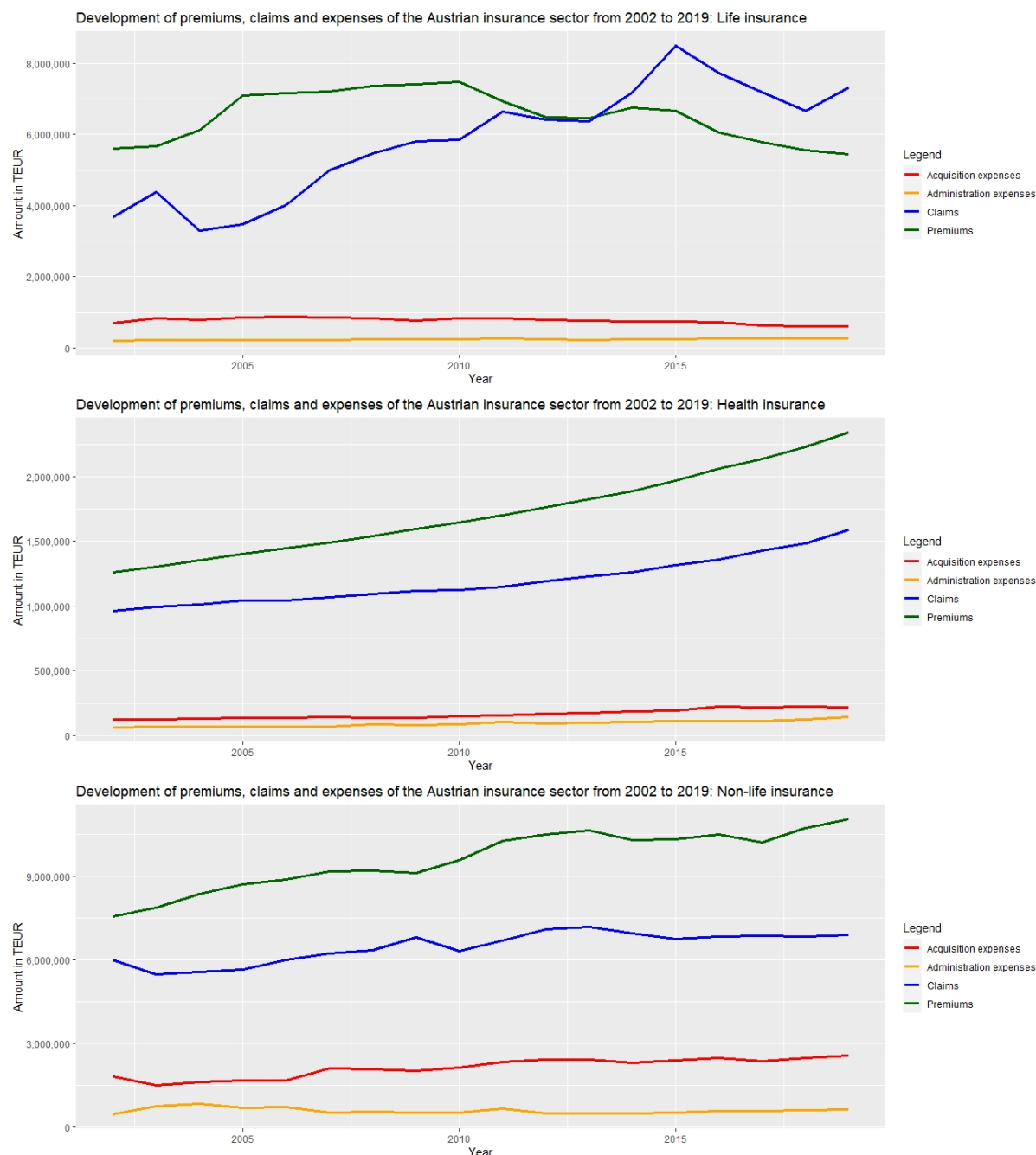
2 Data analysis

2.1 Research question

The aim of my analysis is to analyze the growth of the insurance industry in Austria and selected EU countries. For this purpose, I have taken a closer look at the development of balance sheet totals, premium volume and other items of insurance companies in Austria and selected EU countries over time and made comparisons between countries and between the insurance sectors "life insurance", "health insurance" and "non-life insurance". In addition, the trends in these items were also compared to the economic growth of the states (growth of the real GDP) to determine whether the insurance industry in those states was outperforming or underperforming the overall economy of those states. In order to also analyze the impact of the pandemic on this sector of the economy, it would be interesting to extend the analyses to 2020 as soon as suitable data are available.

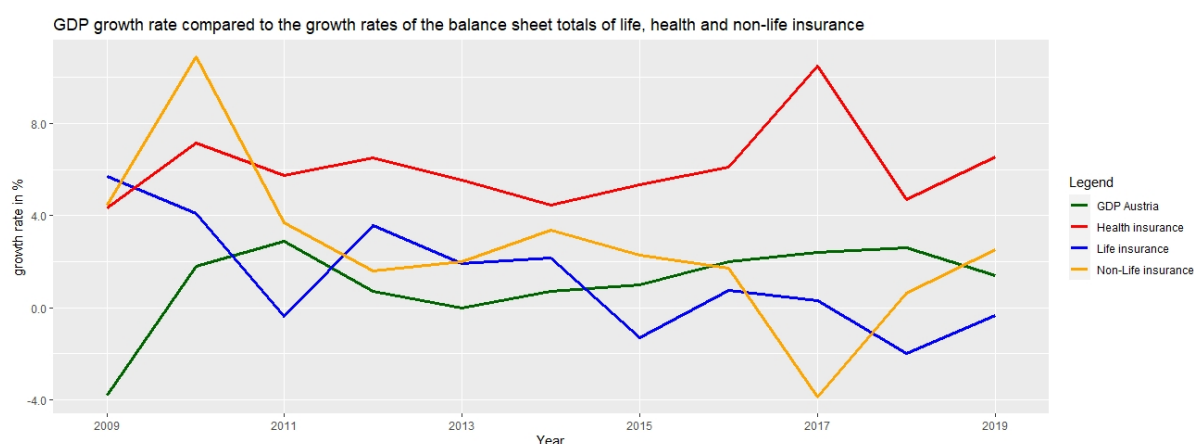
2.2 Outcome of the analysis

Analysis of the Austrian insurance sector:



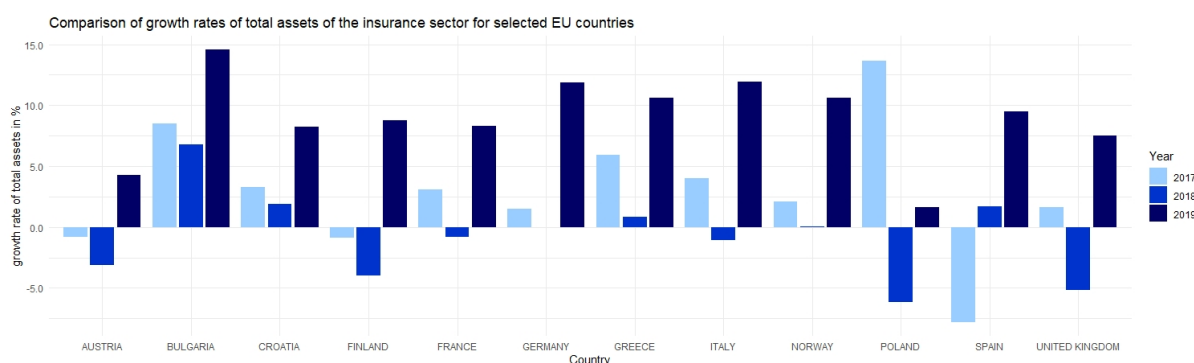
In this analysis, the development of premiums, claim payments and expenses (administration and acquisition expenses) of each of the segments life, health and non-life in Austria from 2002 to 2019 has been observed. It can be seen that the segments have developed very differently. While health and non-life insurance are growing steadily and premium volume is increasing more strongly than claims payments for the benefit of insurance companies, the situation in life insurance is almost the opposite. Here, the premium volume is decreasing, which is related, among other things, to the decline of traditional life insurance and the related maximum interest rate for life insurance contracts, which has been only 0.5% since 2016. The development of

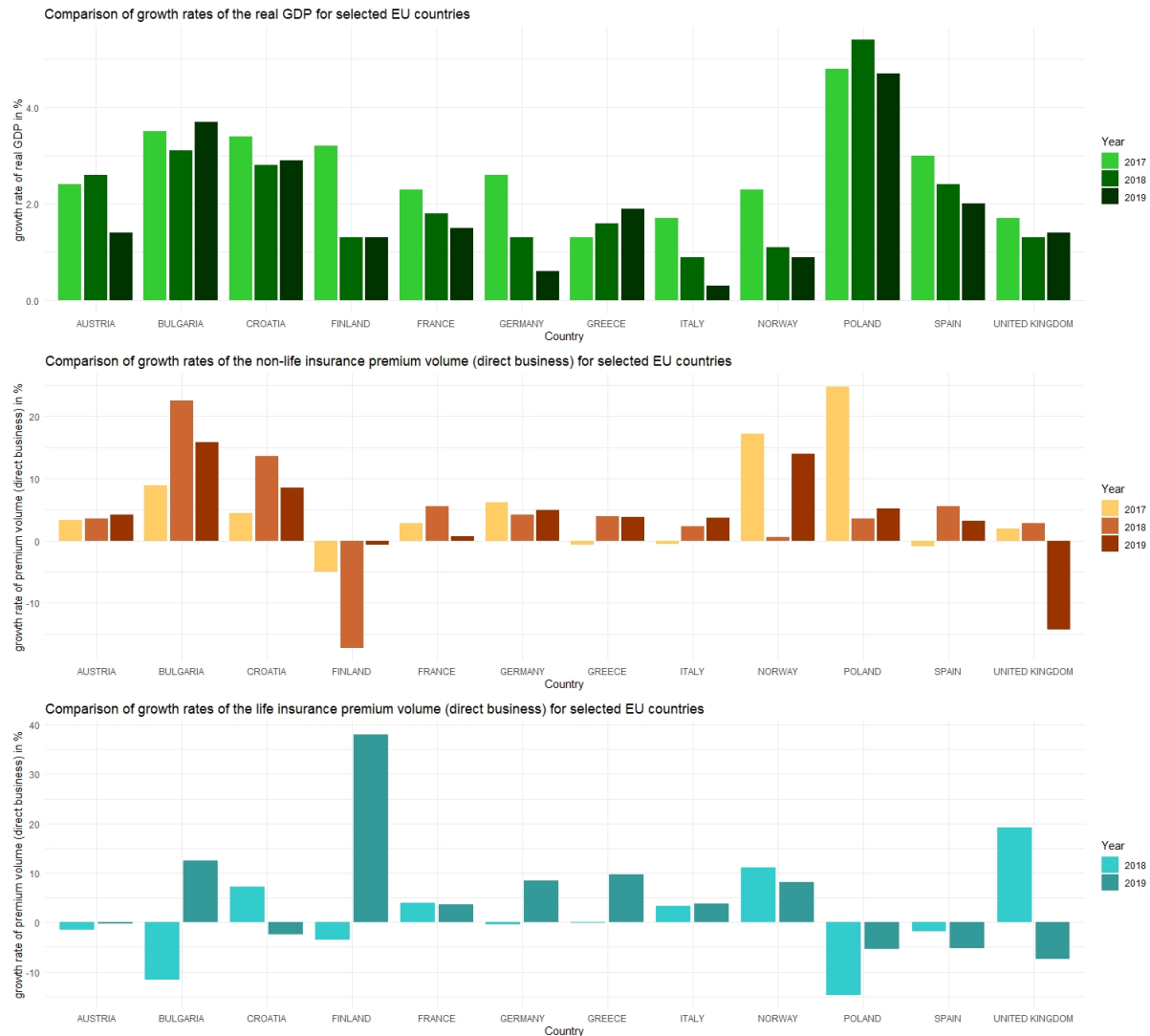
the maximum interest rate can be found in Appendix A. It is also remarkable that the claim payments for life insurance contracts have outperformed the premium payments since 2013. Another interesting point in this analysis is that in the Non-life insurance sector, acquisition expenses have a higher impact than in the other two segments. This might be due to the higher number of insurance contracts and thus more contract conclusions than in Life or Non-life, since an average person might only have one life insurance but has several Non-life insurance contracts (i.e. car liability insurance, household insurance, theft insurance). To stay with the costs: It is also noteworthy that even though the premium volume of Health and Non-life is increasing due to more insurance contracts, the administration costs stayed almost constant. This is an indicator that through digitalization and the use of technology more contracts are not necessarily associated with higher administration expenses.



To provide a second view on the growth of the Austrian insurance industry, the change of balance sheet assets in % of Austrian insurance companies (again subdivided into the three lines of business) is shown here in comparison with the growth of real GDP. A similar trend as above can be identified: The Life insurance sector is decreasing with growth rates near zero or even negative rates, while health insurance is growing and outperforming the growth rates of the Austrian economy (measured by the real GDP). Non-life insurance is also growing, with the exception of 2017, but this anomaly could also be due to the legal changes resulting from the introduction of Solvency II.

Analysis of the insurance sector of selected EU countries:

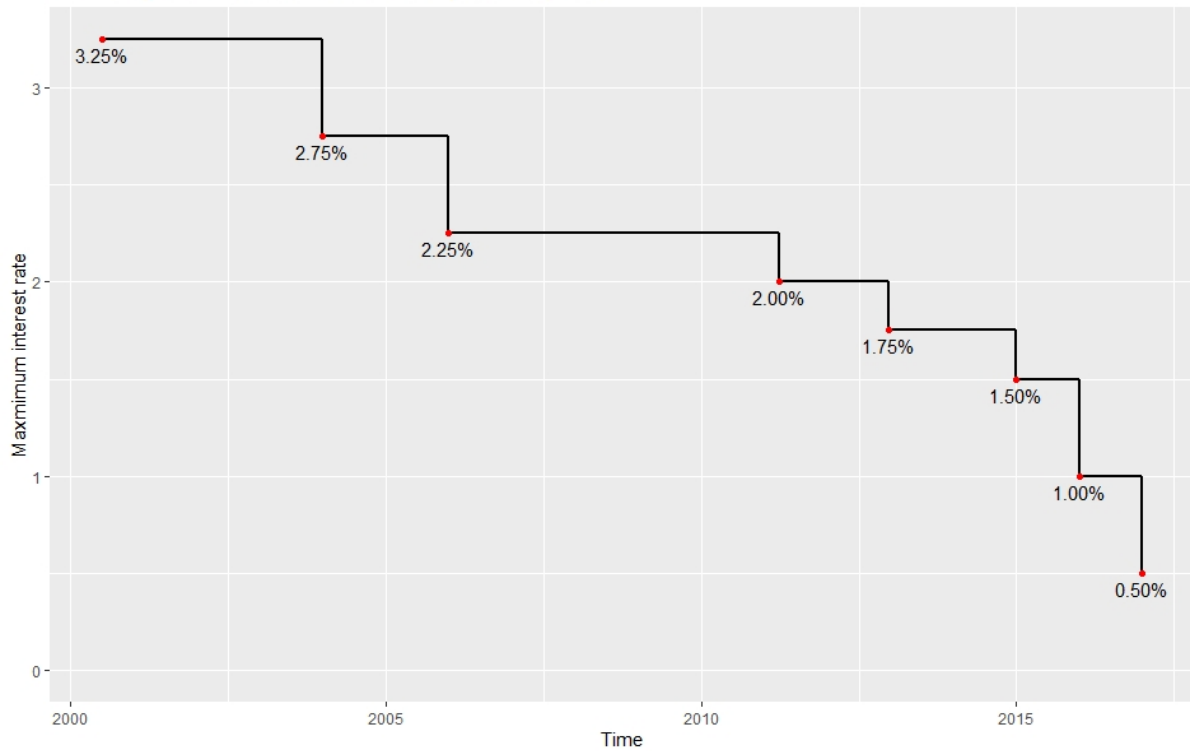




To analyze the development of the European insurance sectors, I have selected several EU countries and took a closer look at the growth rates of balance sheet assets (1st plot), the growth rates of real GDP (2nd plot), and the growth rates of premium volume in the "Life" (3rd plot) and "Non-Life" (4th plot) lines of business. It can be seen that the development varies greatly. Bulgaria's insurance sector has a remarkable growth compared to other countries, whereas Austria's insurance sector growth is rather small. Also it is noteworthy that even though Poland's GDP growth is the highest, its insurance sector has not developed to the same extent in the last two years. Also, growth rates of the total assets in the year of 2019 are remarkably high compared to the other years of the analysis, whereas that of 2017 are very low (and even negative for six countries). A comparison of life premium volume growth rates also shows that the trend already discussed in Austria is also occurring in other countries: Life insurance is growing a lot slower than Non-life insurance (and is often even regressive). Here, Bulgaria and Croatia show a remarkable development of the Non-life line of business. Also, Finland is quite an anomaly in this analysis since it is the only country with shrinking premium volume for Non-life insurance, but a growth in life insurance premiums of nearly 40% in 2019. Comparing the growth of the Non-life premium volume to the growth of the GDP, it is notable that the insurance sector is outperforming the overall economy in most of the states including Austria.

Appendix A: maximum interest rates for life insurance contracts in Austria

Development of the maximum interest rate for life insurance contracts (LV-Höchstzinssatz) according to Financial Markets Authority Austria (FMA)



Appendix B: Data and data sources

The following data sets are used in the analysis:

- `staticstic2XXX.txt`

Data sets (18 files in total) provided by the Austrian Financial Market Authority (FMA) about the insurance sector in Austria from the years 2002 to 2019. The data can be downloaded from

www.github.com/smalldatascience/Versicherungsstatistik

- `SA.Balance.Sheet.csv`

Aggregated balance sheet data of the insurance industry of EU countries provided by the European Insurance and Occupational Pensions Authority (EIOPA). The data can be downloaded from

https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet

- `SA.Premiums.Claims.Expenses.csv`

Aggregated data of the insurance industry of EU countries concerning premiums (written and earned), claims incurred and expenses (i.e. administrative expenses or acquisition expenses). The data can be downloaded from

https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Premiums,claimsandexpenses

- `bf-hochstzinssatze-bei-versicherungsunternehmen.pdf`

Data about the regulatory maximum interest rate for life insurance contracts in Austria provided by FMA. The data can be downloaded from

<https://www.fma.gv.at/versicherungen/information-zu-einzelnen-versicherungssparten/hoechstzinssatz/>

- `GDP.Econ.growth.EU.xlsx`

Data about GDP economic growth of EU countries provided by eurostat, the statistical office of the European Union. Note that the file's name was modified, the download name is *TEC001151621188348529.xlsx*. The data can be downloaded from

<https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en/>