Assign 大纲

1: candidates:

Norway: 1846-2022 3

Denmark: 1832-2022 2

Sweden: 1860-2022 1

**Switzerland: 1876-2021** 0

尝试看看按照年分类能不能画图

不能就copy代码直接计算qxt

不需要输出对比的部分：

不同性别但完全相同的代码部分不重复，后续直接改数据库代入，不需修改名称。

不要cohort

1. Download mortality data from the Human Mortality Database (www.mortality.org) for a country of your choice. Please keep in mind that this country should also have data regarding 2020 and 2021 available on either the HMD or the Short-term Mortality Fluctuations (STMF) Database (https://www.mortality.org) (in light of question (3) and (4) in this assignment). You are free to focus on data for males, females or unisex. **Develop and discuss an exploratory data analysis of your data set.**
2. **Check data**

-number of death

-exposure to risk

-log(qx)

-expectation of life ex 🡪 see when is more stable 🡪 not yet

1. **Build a stochastic mortality projection model** using the data up to and including **2019.** Describe your model specifications, assumptions and choices, document parameter estimates and illustrate mortality projections with these models. We do not impose a specific methodology; focus is on rigourous explanation, calibration and motivation of your strategy. Demonstrate the evaluation of a selection of insightful metrics (e.g. life expectancy or expected present value of a life annuity) using the mortality estimates and the projections.

**2.Estimate the paras in LS approach**

Females:

Time series: 可能影响的原因：the number of iteration

验证：1. Kappa really changes if I change the number of iter?

2.if changes, use 10 specific year to see if drift < 1 ever exist.

3. if not working at all, then use auto.arima, the inferior option.

**4.visualization of ex**

1. How does your proposed model react to the data collected for 2020 and/or 2021? Describe a robustness or sensitivity analysis. Discuss useful insights.

应该是说如果加入了2022 和2021，模型会有什么变化： 即要求对比图： 叠加三个model的扇形图（阐述robustness的强弱）

**5.projection**

1. **Define a metric(就是列出对比)** to evaluate **excess mortality or excess of deaths** during the 2020-2021 pandemic period. Evaluate the metric using your proposed mortality projection model and the 2020-2021 observations.

**6.Pandemic impact**

Model 2020-2021 with current model : for 2019

🡪 得到被对比数据: 2021/2020 (2019 prediction)

Model 2020-2021 with model without 2019: for 2018:

🡪 excess = 2021/2020 (2019 prediction) – 2021/2020 (2018 prediction)

∑

β^ (1) x = t log mx,t∑