

DAT565/DIT407 Assignment 1

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Problem 1: Dependency Ratio

After the analysis of the data on the Swedish population by age over years, provided by the SCB [1], we were able to identify some general trends of the dependent population, the fraction of the population that depends on the productive population to sustain themselves.

From figure 1 we can see that the amount of dependent people was at an all time low in the 1940s, but afterwards an increasing trend began to appear, suggesting more stress for the labour force and probable more political instability. [2]

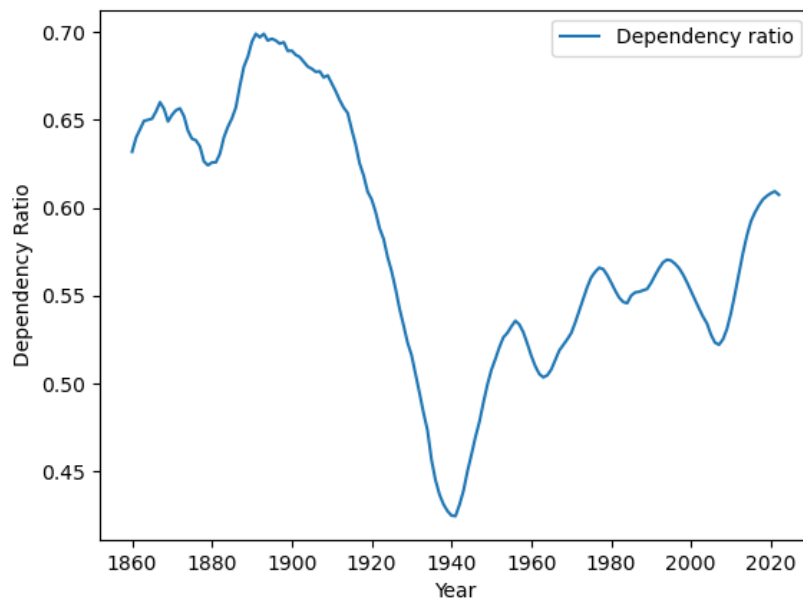


Figure 1: Dependency ratio of Sweden from 1860 to 2022.

After inspecting figure 2 we can also understand how in the latest years the majority of dependent people is made up by elderly. This, combined to the fact that the dependency ratio is increasing, indicates that the Swedish population is aging. [3]

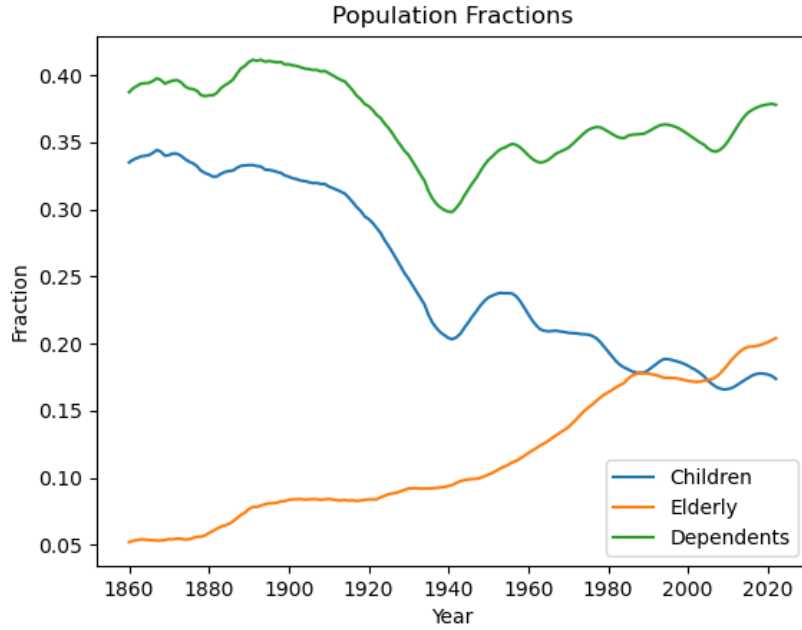


Figure 2: Fraction of children, the elderly and the total dependent population from 1860 to 2022.

References

- [1] Statistiska centralbyrån. *Folkmängden efter ålder och kön. År 1860 - 2022*. Retrieved 2023-10-20. 2023. URL: https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__BE__BE0101__BE0101A/BefolkningR1860N/.
- [2] World Economics. *Sweden's Age Dependency Ratio: Total*. 2024. URL: <https://www.worlddeconomics.com/Demographics/Age-Dependency-Ratio-Total/Sweden.aspx> (visited on 09/05/2024).
- [3] Andreas Motel-Klingebiel, Annika Heuer, and Indre Genelyte. *Sweden, Almost a Country for Old Men*. 2023. URL: <https://www.ispionline.it/en/publication/sweden-almost-a-country-for-old-men-106929> (visited on 09/05/2024).

A Code

Following is the Python code that we use to extract and visualized the information presented in this article:

A.1 Problem 1

```
1 # importing libraries and loading the dataset
2
3 import pandas as pd
4 import matplotlib.pyplot as plt
5
6 df = pd.read_csv(
7     "../data/swedish_population_by_year_and_sex_1860-2022.csv"
8 )
9
10 # creating a new data frame containing
11 # the amount of people of a certain age for each year:
12 age_df = df.drop(columns='sex').groupby("age").sum()
13
14 # generating a support vector with all the ages
15 # in the dataset:
16 age = pd.to_numeric(age_df.index.str.replace("+", ""))
17
18 # calculating the amount of children by summing
19 # every age under 15 years old:
20 children_count = age_df[age <= 14].sum()
21
22 # doing the same thing for the elderly:
23 elderly_count = age_df[age >= 65].sum()
24
25 # and for the labor force:
26 labor_count = age_df[(age >= 15) & (age <= 64)].sum()
27
28 # Calculating the dependency ratio:
29 dependent_count = children_count + elderly_count
30 dependency_ratio = dependent_count / labor_count
31
32 # plotting the ratio:
33 _, ax = plt.subplots()
34 ax.plot(dependency_ratio, label="Dependency_Ratio")
35 ax.set_xlabel('Year')
36 ax.set_ylabel('Dependency_Ratio')
37 ax.set_xticks(range(0, len(dependency_ratio), 20))
38 ax.legend()
39
40 plt.savefig("dependency_ratio.png")
41
42 # calculating the total amount of a particular
43 # age group relative to the total population:
```

```

44 total_count = age_df.sum()
45 children_fraction = children_count / total_count
46 elderly_fraction = elderly_count / total_count
47 dependent_fraction = dependent_count / total_count
48
49 # plotting the fractions:
50 _, ax = plt.subplots()
51 ax.plot(children_fraction, label="Children")
52 ax.plot(elderly_fraction, label="Elderly")
53 ax.plot(dependent_fraction, label="Dependents")
54 ax.set_title('Population Fractions')
55 ax.set_xlabel('Year')
56 ax.set_ylabel('Fraction')
57 ax.set_xticks(range(0, len(children_fraction), 20))
58 ax.legend()
59
60 plt.savefig("population_fractions.png")

```