

Health Economics Assignment 1

Mathijs Lenderink

2022-10-07

Summary

Calculation on costs of an EU wide Health plan.

Scenario 1: All member states will spend per capita as much (or more) as the Netherlands on their Health sector.

Scenario 2: All member states will have the same (or higher) life expectancy as the Netherlands. This is calculated using a linear regression run on life expectancy and health expenditure per capita. This coefficient is then used to calculate the extra expenditure needed to match the life expectancy of the Netherlands.

The allocation of this extra expenditure is then calculated for all member states using the following equation:
Extra Expenditure of member $i = (\text{GDP}_i / \text{SUM}(\text{GDP})) * \text{TotalExtraExpenditure}$

This calculation then shows how much each member state will have to spend for an EU wide Health plan.

Data preparation

```
library(tidyverse)
library(readxl)
library(knitr)
```

```
cc <- read.csv("Data/cc.csv") %>%
  select(Country, Year, Function, Value) %>%
  spread(Function, Value) %>%
  na.omit() %>%
  rename(CR = `Curative and rehabilitative care`, AS = `Ancillary services (non-specified by function)`
         MG = `Medical goods (non-specified by function)`) %>%
  mutate(cc = CR + MG + AS) %>%
  select(country = Country, year = Year, cc)

gdp <- read.csv("Data/gdp.csv") %>%
  select(country = Country, year = Year, gdp = Value)

le <- read.csv("Data/le.csv") %>%
  select(country = Country, year = Year, le = Value)

pop <- read.csv("Data/pop.csv") %>%
  select(country = Country, year = Year, population = Value)
```

```

HEpc <- read.csv("Data/HEpercapita.csv") %>%
  select(country = Country, year = Year, HEpc = Value)

oecd1 <- full_join(HEpc, gdp, by = c("country", "year"))
oecd2 <- full_join(oecd1, le, by = c("country", "year"))

oecd <- full_join(oecd2, pop, by = c("country", "year"))%>%
  na.omit()

oecd$year <- as.factor(oecd$year)

```

For the Health expenditure per capita data I used OECD data measured in current prices and current PPP's. The United Kingdom will be part of the EU dataset as in 2016 they were still a member state of the EU.

```

df <- filter(oecd, year == 2016)
countries <- unique(oecd$country)
EUCountries <- list("Austria","Belgium","Bulgaria","Croatia" ,"Cyprus" ,"Czech Republic","Denmark","Est

EUdf <- filter(df, country %in% EUCountries)

```

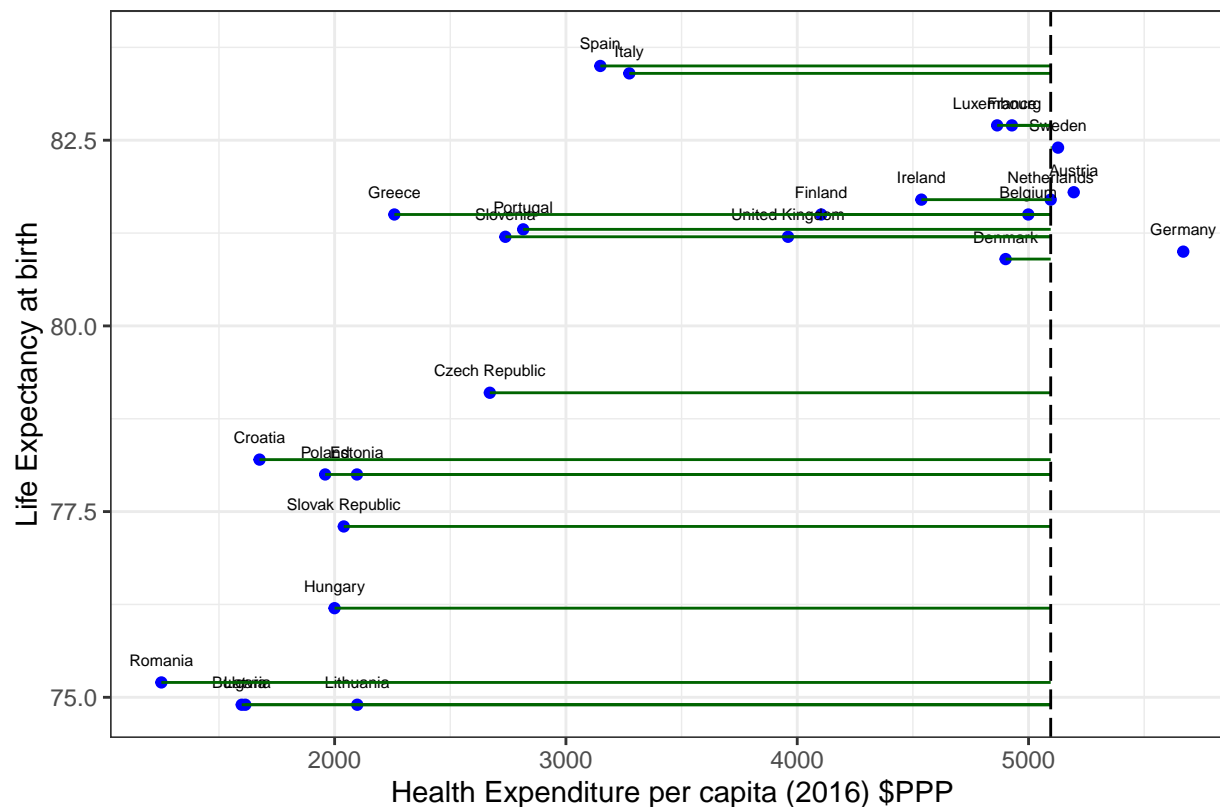
Scenario 1

```

HENl <- EUdf$HEpc[EUdf$country == "Netherlands"]
EUdf$graph1diff <- HENl - EUdf$HEpc
EUdf$graph1diff <- ifelse(EUdf$graph1diff>=0,EUdf$graph1diff,0)

ggplot(data = EUdf, aes(x = HEpc, y = le, label = country))+
  geom_point(color = "blue")+
  geom_text(nudge_y = 0.3, size = 2)+
  labs(x = "Health Expenditure per capita (2016) $PPP", y = "Life Expectancy at birth", caption = "Source: OECD")
  geom_segment(aes(x = HENl,
                  y = le,
                  yend = le,
                  xend = ifelse(HEpc<=HENl,HEpc,HENl)),
             color = 'darkgreen')+
  geom_vline(xintercept = HENl, color = "black", linetype = "longdash")+
  theme_bw()

```

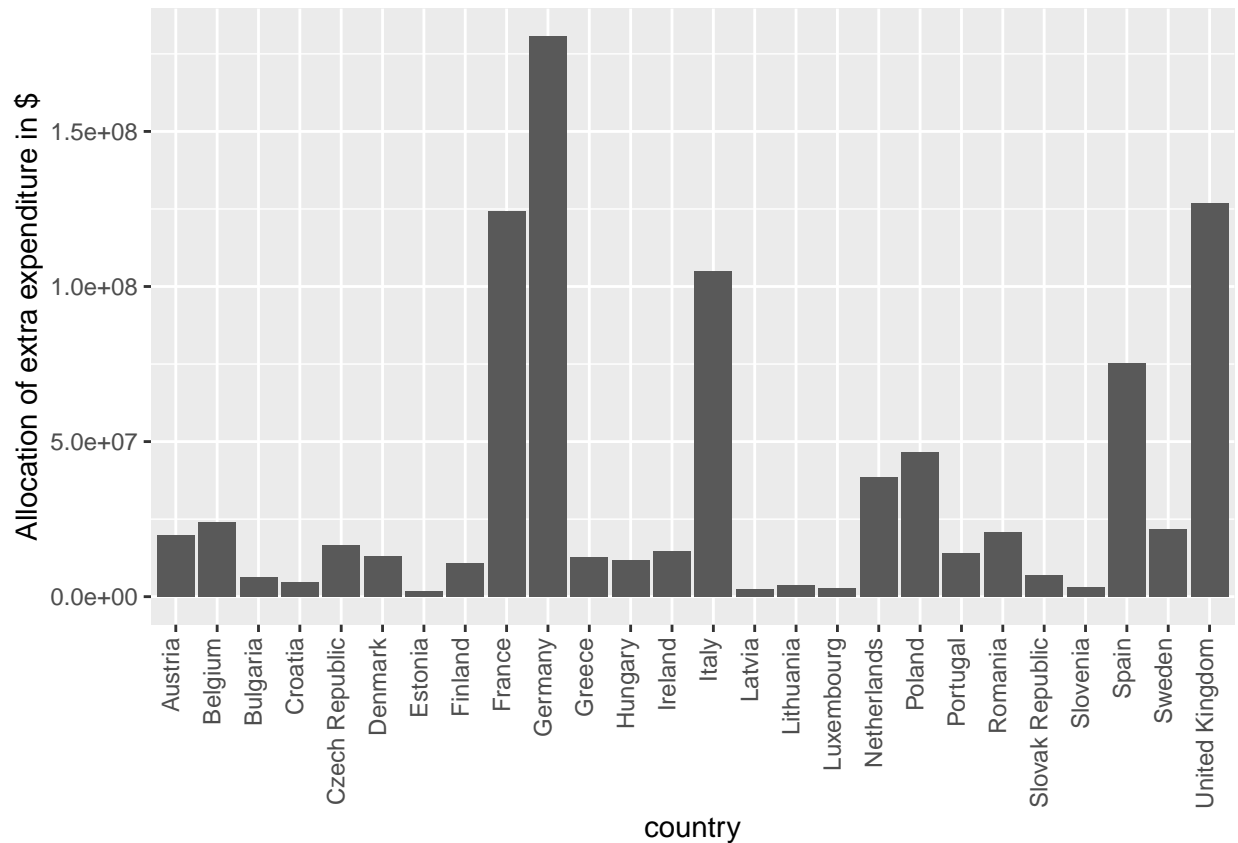


To calculate the allocation of extra expenditure we first sum the total extra cost and then calculate the allocation of extra expenditure.

```
Scenario1costs <- sum(EUdf$graph1diff)
sumGDP <- sum(EUdf$gdp)
#Allocation of extra expenditure in scenario 1 --> AOEESC1
EUdf$AOEESC1 <- (EUdf$gdp/sumGDP)*Scenario1costs*EUdf$population
```

To show which country will bear most of the extra costs per member state in scenario 1 we plot the extra costs in a barchart below.

```
ggplot(data = EUdf, aes(x=country, y=AOEESC1))+
  geom_bar(stat = "identity")+
  labs(y = "Allocation of extra expenditure in $")+
  theme(axis.text.x = element_text(angle = 90, vjust = 0.2, hjust=1))
```

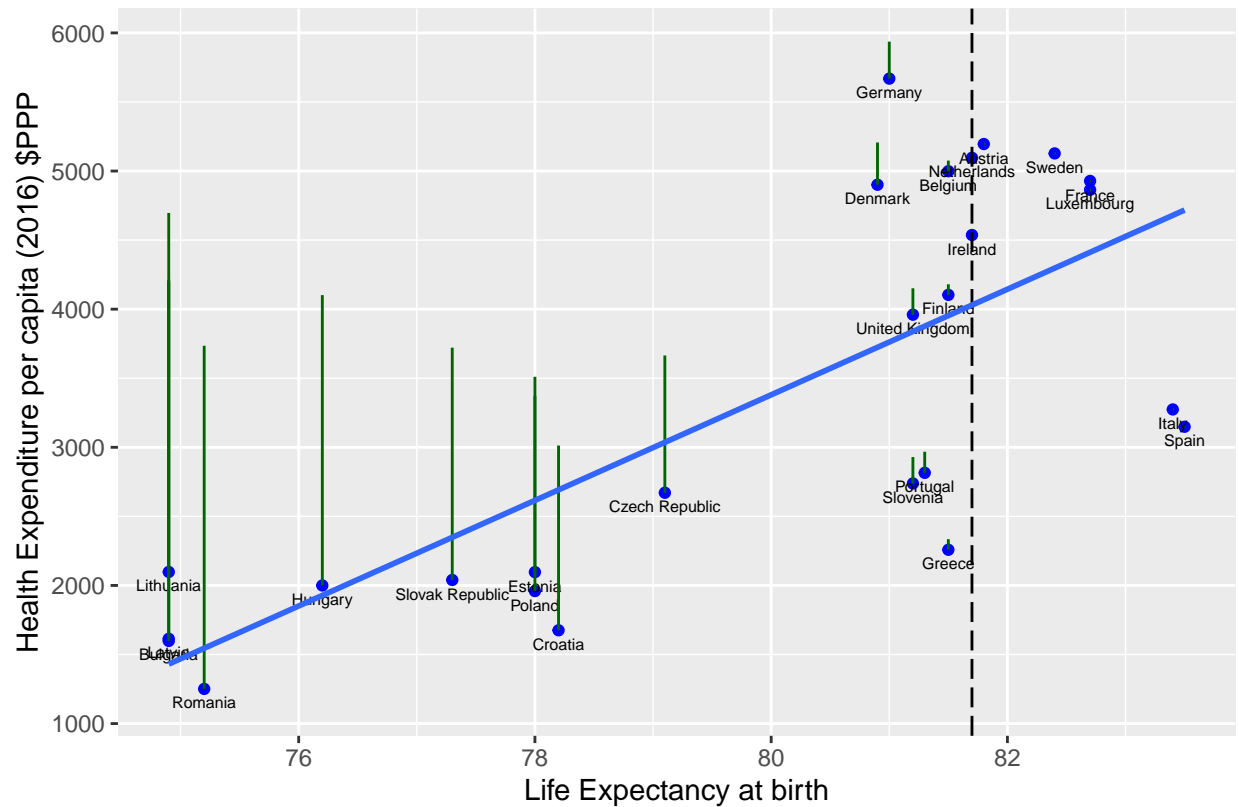


Scenario 2

```
LEn1 <- EUdf$le[EUdf$country == "Netherlands"]

model_1 <- lm(HEpc ~ le, data = EUdf)
coeff <- model_1$coefficients[2]
EUdf$graph2diff <- (LEn1 - EUdf$le)*coeff
EUdf$graph2diff <- ifelse(EUdf$graph2diff<=0,0,EUdf$graph2diff)
```

```
ggplot(data = EUdf, aes(x = le, y = HEpc, label = country))+
  geom_point(color = "blue")+
  geom_text(nudge_y = -100, size = 2)+
  labs(x = "Life Expectancy at birth" , y = "Health Expenditure per capita (2016) $PPP", caption = "Source: Eurostat")
  geom_segment(aes(x = le,
                    y = HEpc,
                    yend = graph2diff+HEpc,
                    xend = le),
               color = 'darkgreen')+
  geom_vline(xintercept = LEn1, color = "black", linetype = "longdash")+
  stat_smooth(method="lm", se = FALSE)
```



Source OECD, year 2016

```
theme_bw()
```

Calculation of extra expenditure per country in scenario 2.

```
Scenario2costs <- sum(EUdf$graph2diff)

#Allocation of extra expenditure in scenario 2 --> AOEESC2
EUdf$AOEESC2 <- (EUdf$gdp/sumGDP)*Scenario2costs*EUdf$population
```

To show which country will bear most of the extra costs per member state in scenario 2 we plot the extra costs in a barchart below. The barchart distribution is the same as in scenario 1 as the share of gdp has not changed, but the values have changed due to the difference in total extra expenditure.

```
ggplot(data = EUdf, aes(x=country, y=AOEESC2))+
  geom_bar(stat = "identity")+
  labs(y = "Allocation of extra expenditure in $")+
  theme(axis.text.x = element_text(angle = 90, vjust = 0.2, hjust=1))
```

