HealthEconA1

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```
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.

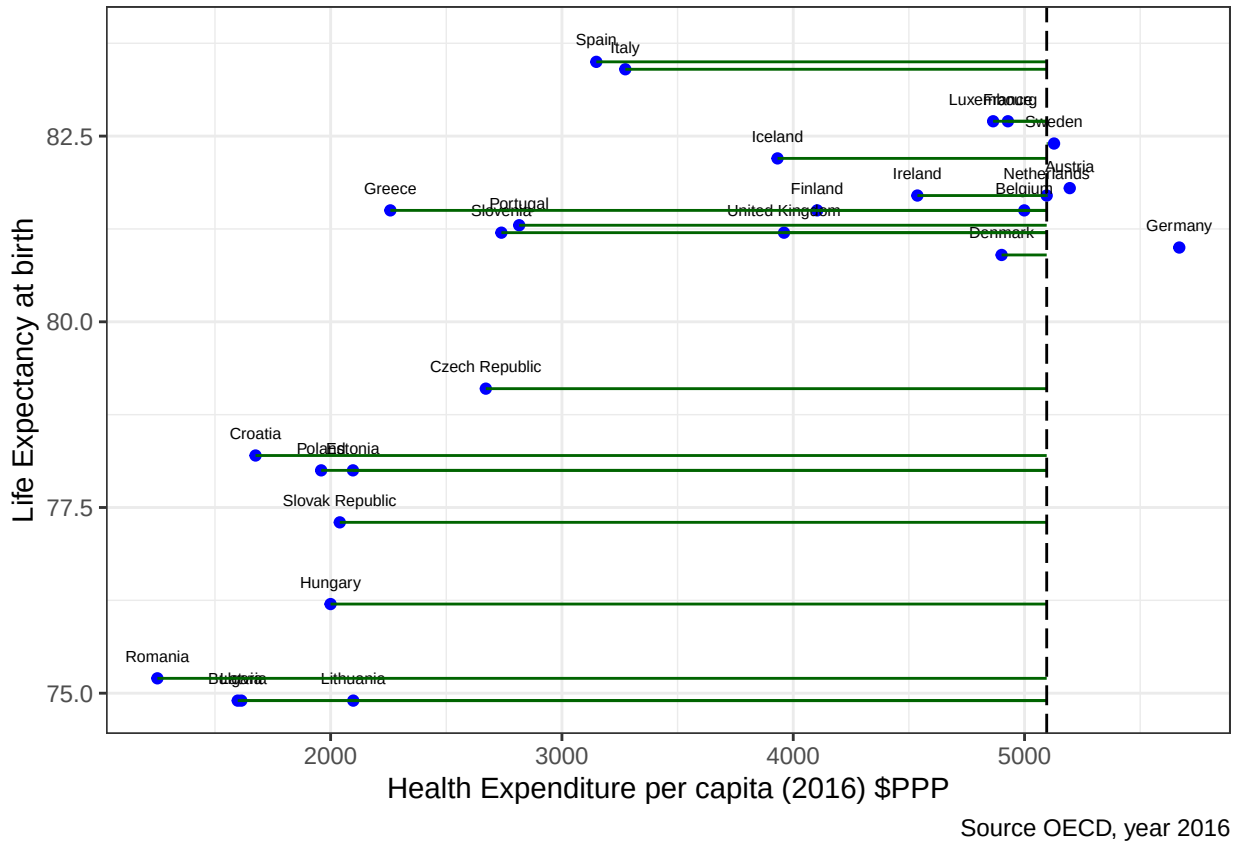
```
df <- filter(oecd, year == 2016)
countries <- unique(oecd$country)
EUcountries <- list("Austria","Belgium","Bulgaria","Croatia" ,"Cyprus" ,"Czech Republic","Denmark","Est

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 = "Sour
  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()
```

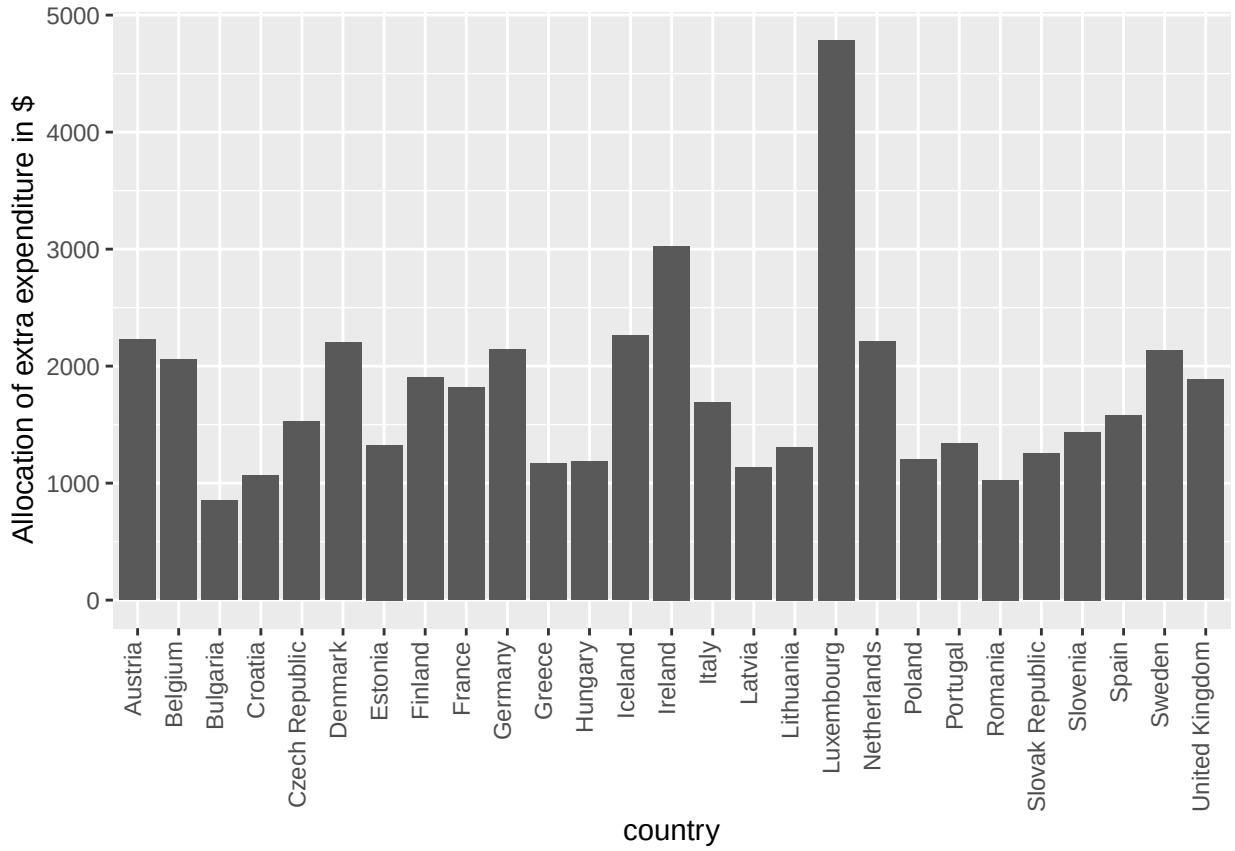


To calculate the allocation of extra expenditure we first sum the total extra cost and then calculate the allocation of extra expenditure.

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

To show which country will bear most of the extra costs 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))
```



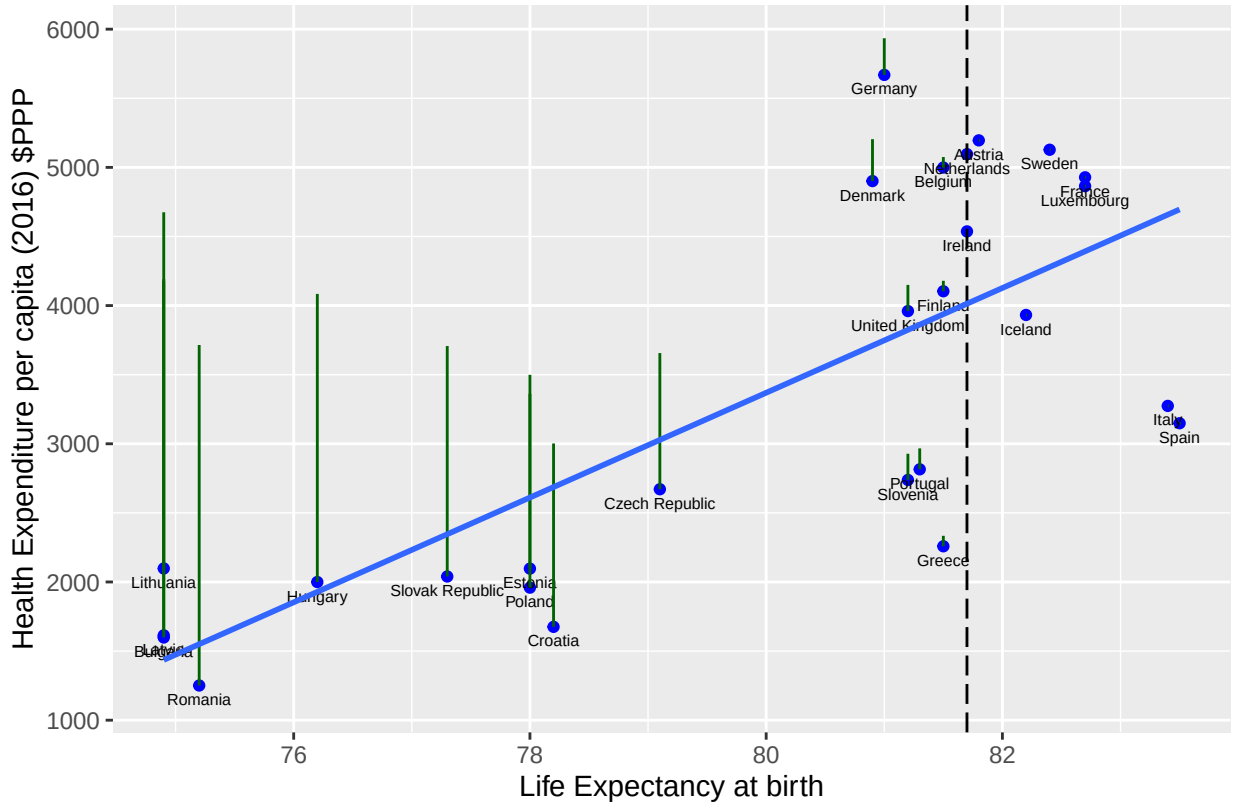
Scenario 2

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

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

```
EUdf$graph2diff <- (LEnl - EUdf$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 = "Sou
  geom_segment(aes(x = le,
                   y = HEpc,
                   yend = graph2diff+HEpc,
                   xend = le),
               color = 'darkgreen')+
  geom_vline(xintercept = LEnl, 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
```

To show which country will bear most of the extra costs in scenario 1 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))
```