Health Spending and Life Expectancy in Eighteen OECD Countries

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Introduction

I want to produce a version of a figure I first saw in Kenworthy (2014, 51). Versions of it have appeared elsewhere, too. To make it we'll need to get data from the OECD and then write some code to draw the graph.

```
library(tidyverse)
library(tinytable)
my_colors <-  c("grey50", "firebrick")
```

The Data

We're working in this little project, so our local data files and our output is defined with respect to where the project is on our computer. In R, the `here` package helps us stay disciplined about this.

```
library(here)
```

```
here() starts at /Users/kjhealy/Documents/courses/mptc_oecd
```

We set things up by getting the data from a file in the project.[1] It's a comma-separated values or CSV file. To do our work we'll put it in a thing named `df`. It looks like this:

[1] Don't worry at this point if you don't know any R.

```r
## The data are generated by R/make_oecd_df.R
df <- read_csv(
  here("data", "oecd_health_lifexp.csv"),
  col_types = cols(
    country = col_character(),
    iso3 = col_character(),
    year = col_integer(),
    life_exp = col_double(),
    health_ppp = col_double()
  )
)
```

```r
df
```

```
# A tibble: 2,238 x 5
   country   iso3   year life_exp health_ppp
   <chr>     <chr> <int>    <dbl>      <dbl>
 1 Australia AUS    1962     71           NA
 2 Australia AUS    1967     70.8         NA
 3 Australia AUS    1971     NA          999.
 4 Australia AUS    1972     NA         1027.
 5 Australia AUS    1973     NA         1080.
 6 Australia AUS    1974     NA         1199.
 7 Australia AUS    1975     NA         1351.
 8 Australia AUS    1976     72.8       1387.
 9 Australia AUS    1977     NA         1444.
10 Australia AUS    1978     NA         1451.
# i 2,228 more rows
```

```r
my_countries <- c("AUT", "AUS", "BEL", "CAN", "DEU", "DNK", "ESP",
                  "FIN", "FRA", "GBR", "GRC", "IRL", "ITA", "JPN",
                  "NLD", "NOR", "NZL", "SWE", "USA")
cnames <- df$country[df$iso3 %in% my_countries] |>
  unique() |>
  paste0(collapse = ", ")

cnames <- str_replace(cnames, "United States", "and the United States")
```

There's more data here than we are interested in. We'll look at these countries only: Australia, Austria, Belgium, Canada, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, Sweden, and the United

States. We're also just interested in 1970 and after. And in particular we want to draw a figure that contrasts the US and all the other countries. For that we'll make an indicator or flag or dummy variable that picks out the US from all the other countries. Finally, we'll smooth the trends a little by calculating a five-year moving average for each country.

```
df_plot <- df |>
  filter(iso3 %in% my_countries, year > 1969) |>
  drop_na() |>
  arrange(country, year) |>
  group_by(country) |>
  mutate(
    us_flag = ifelse(iso3 == "USA", "United States",
                                    "Eighteen OECD Countries"),
    avg_spend = slider::slide_dbl(health_ppp, mean, .before = 2, .after = 2)
  )
```

On our computer, we end up with a data frame that looks like this:

```
df_plot
```

```
# A tibble: 909 x 7
# Groups:   country [19]
   country   iso3   year life_exp health_ppp us_flag                 avg_spend
   <chr>     <chr> <int>    <dbl>      <dbl> <chr>                       <dbl>
 1 Australia AUS    1976     72.8      1387. Eighteen OECD Countries     1480.
 2 Australia AUS    1981     74.8      1527. Eighteen OECD Countries     1503.
 3 Australia AUS    1982     74.6      1526. Eighteen OECD Countries     1523.
 4 Australia AUS    1983     75.4      1572. Eighteen OECD Countries     1576.
 5 Australia AUS    1984     75.7      1606. Eighteen OECD Countries     1612.
 6 Australia AUS    1985     75.5      1649. Eighteen OECD Countries     1655.
 7 Australia AUS    1986     76        1706. Eighteen OECD Countries     1702.
 8 Australia AUS    1987     76.2      1741. Eighteen OECD Countries     1751.
 9 Australia AUS    1988     76.2      1809. Eighteen OECD Countries     1798.
10 Australia AUS    1989     76.4      1850. Eighteen OECD Countries     1842.
# i 899 more rows
```

The Figure and some Tables

Now we write some code to draw the plot we want. The results are shown in Figure 1.

```r
df_plot |>
  ggplot(aes(
    x = avg_spend,
    y = life_exp,
    group = country,
    color = us_flag
  )) +
  geom_line(linewidth = 0.9) +
  scale_color_manual(values = my_colors) +
  scale_x_continuous(labels = scales::label_dollar()) +
  labs(
    color = NULL,
    title = "Health Spending and Life Expectancy, 1970-2023",
    x = "Heath Spending (Per capita, constant prices, constant PPPs, five year rolling averag
    y = "Life Expectancy",
    caption = "Data: OECD. Graph: @kjhealy"
  ) +
  theme_bw() +
  guides(color = guide_legend(nrow = 1)) +
  theme(legend.position = "top", legend.text.position = "top")
```

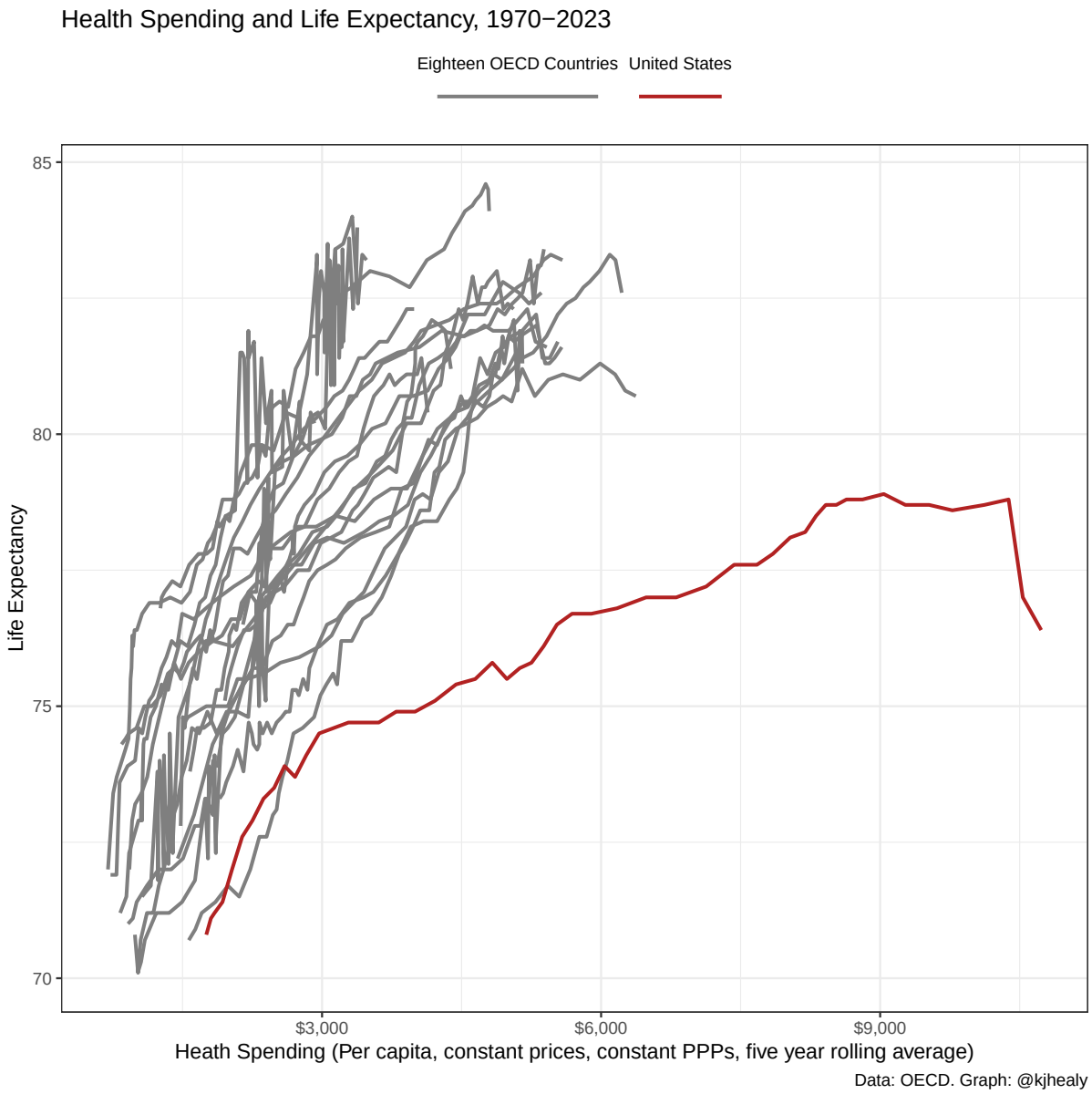

Figure 1: The figure we were trying to draw

Let's also make summary table or two while we are here. First, a table of the average life expectancy at birth for every country. This is shown in Table 1.

```
df_plot |>
  summarize(`Mean` = round(mean(life_exp), 1)) |>
  rename(Country = country) |>
  tt()
```

Table 1: Average Life Expectancy at Birth, in years, 1970-2023

Country	Mean
Australia	79.3
Austria	77.0
Belgium	77.0
Canada	79.2
Denmark	77.0
Finland	76.9
France	79.7
Germany	76.9
Greece	79.5
Ireland	77.5
Italy	80.7
Japan	79.7
Netherlands	78.3
New Zealand	77.0
Norway	78.5
Spain	79.0
Sweden	79.0
United Kingdom	77.5
United States	75.9

And second, Table 2 summarizes spending on health each year across countries.

```
df_plot |>
  group_by(year) |>
  summarize(across(
    health_ppp,
    list(
      Min = \(x) min(x),
      Mean = \(x) mean(x),
      Median = \(x) median(x),
      Max = \(x) max(x)
```

Table 2: Range of Spending across countries in Constant PPP per capita, selected years 1970-2023, rounded to the nearest dollar.

Year	Min	Mean	Median	Max
1970	466	962	906	1,663
1975	764	1,557	1,461	2,145
1980	936	1,749	1,774	2,666
1985	976	1,909	1,881	3,455
1990	1,121	2,275	2,413	4,470
1995	1,484	2,567	2,373	5,255
2000	1,904	3,081	2,796	6,068
2005	2,687	3,763	3,508	7,682
2010	2,964	4,282	4,234	8,489
2015	2,123	4,595	4,669	9,355
2020	2,348	5,102	5,171	11,081
2023	3,249	4,699	5,078	5,392

```
  ),
  .names = "{fn}"
)) |>
mutate(across(
  starts_with("M"),
  \(x) scales::label_currency(accuracy = 1, prefix = "")(x)
)) |>
filter(year %in% c(seq(1970, 2023, 5), 2023)) |>
rename(Year = year) |>
tt()
```

References

Kenworthy, Lane. 2014. *Social Democratic America*. New York: Oxford University Press.