Question 1

2025-11-16

Data

Just a brief description of the data used in this analysis. There are 4 files which I am going to import to this file later, two for Kenya, two for Bangladesh.

For Kenya, there are "Kenya_Wealth", "Kenya_Income", and in each of them, it contains the following indicators:

- Gini coefficient
- Share of income/wealth held by highest 1%
- Share of income/wealth held by highest 10%
- Share of income/wealth held by bottom 50%
- Share of income/wealth held by middle 40%

The same applies for Bangladesh, with files "Bangladesh_Wealth" and "Bangladesh_Income".

Note that the data for Bangladesh are imported in form of .xlsx files, as I found that it would be easier to import than the .csv file generated by the website as csv files generated are not in regular format. And I have changed the name for the files for convenience and clarity of the files.

```
# !!! DON"T FORGET TO CHANGE THE WORKING DIRECTORY TO YOUR OWN DIRECTORY !!!
setwd("~/R/BI_Group_Proj/Data")

# Importing Kenya Data
Ken_W_Ineq <- read_delim("Kenya_Wealth_Inequality.csv",
  delim = ";", escape_double = FALSE, col_names = FALSE,
  trim_ws = TRUE, skip = 1
) # This is why I would rather use xls file

Ken_I_Ineq <- read_delim("Kenya_Income_Inequality.csv",
  delim = ";", escape_double = FALSE, col_names = FALSE,
  trim_ws = TRUE, skip = 1
)

# Importing Bangladesh Data
Bang_W_Ineq <- read_excel("Bang_Wealth_Inequality.xlsx", col_names = FALSE)
Bang_I_Ineq <- read_excel("Bang_Income_Inequality.xlsx", col_names = FALSE)
```

```
# Make a function for cleaning data sets
clean_data_inequality <- function(x) {
  colnames(x) <- c("Country", "Indicator", "Percentile", "Year", "Value")
  # Columns of Inequality data sets are all in this order, check when use for others
  x <- x %>%
    pivot_wider(
      names_from = Percentile,
      values_from = Value
    ) %>%
```

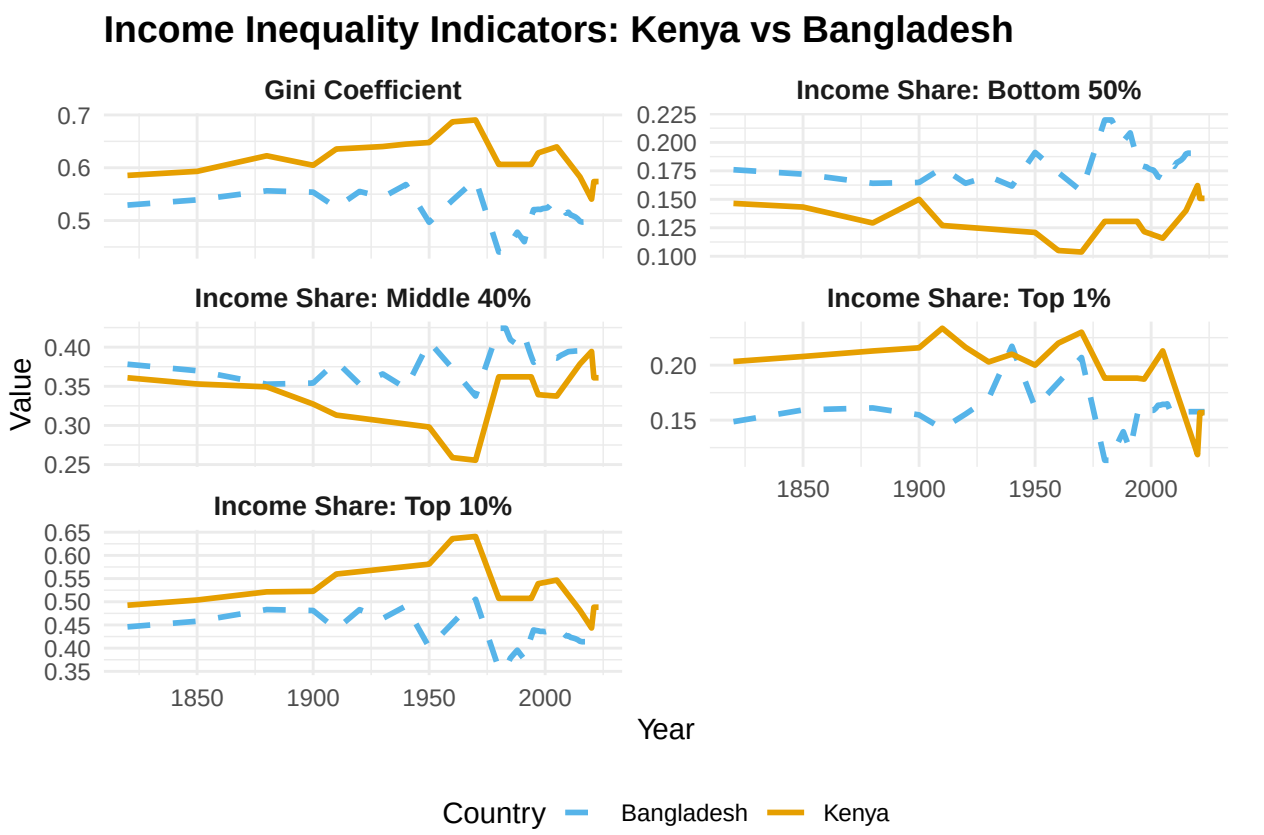
```
    filter(!if_all(c(pall, p0p50, p50p90, p90p100, p99p100), is.na)) %>%
    # filter out those rows where all the values are NA
    select(Country, Year, pall, p0p50, p50p90, p90p100, p99p100) %>%
    # To ensure the columns are in correct order and delete indicator column
    group_by(Country, Year) %>%
    summarise(
      across(
        c(pall, p0p50, p50p90, p90p100, p99p100),
        ~ first(na.omit(.))
      ),
      .groups = "drop"
    )
  # Note that previously we have 5 lines for a single year, and each
  # line only shows a single indicator. By doing this, we combine the data together.
  colnames(x) <- c(
    "Country", "Year", "Gini_Coeff", "Share_Bottom50",
    "Share_Middle40", "Share_Top10", "Share_Top1"
  )
  return(x)
}

Bang_I_Ineq_wider <- clean_data_inequality(Bang_I_Ineq)
Bang_W_Ineq_wider <- clean_data_inequality(Bang_W_Ineq)
Ken_I_Ineq_wider <- clean_data_inequality(Ken_I_Ineq)
Ken_W_Ineq_wider <- clean_data_inequality(Ken_W_Ineq)

longer_format <- function(x) {
  x %>% pivot_longer(
    cols = c(
      Gini_Coeff, Share_Bottom50, Share_Middle40,
      Share_Top10, Share_Top1
    ),
    names_to = "Indicator",
    values_to = "Value"
  )
}

Bang_I_Ineq_longer <- longer_format(Bang_I_Ineq_wider)
Bang_W_Ineq_longer <- longer_format(Bang_W_Ineq_wider)
Ken_I_Ineq_longer <- longer_format(Ken_I_Ineq_wider)
Ken_W_Ineq_longer <- longer_format(Ken_W_Ineq_wider)
```

Question 1

In this sector I will draw some line chart comparing inequality of income & wealth between Kenya and Bangladesh by means of Gini coefficient and share of income/wealth occupied by different social class.

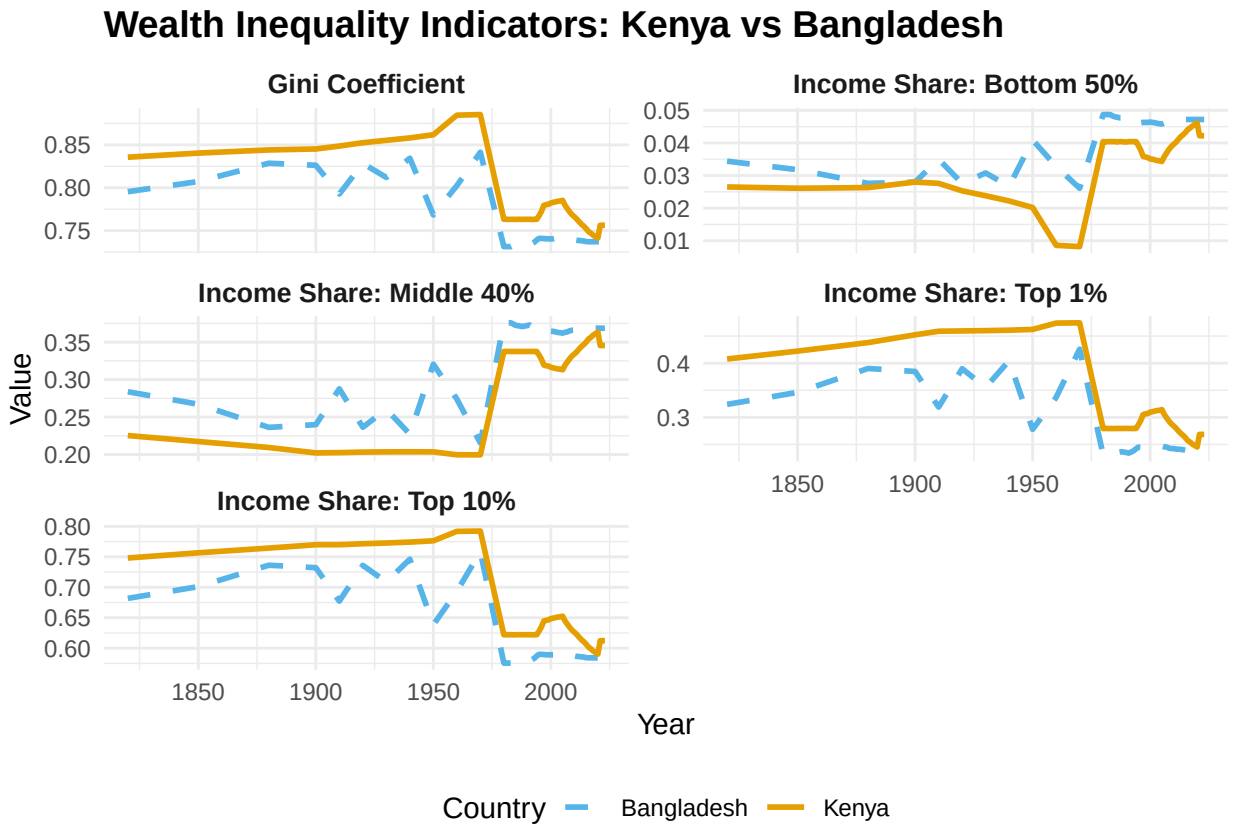
```
# -----Income Inequality-----
I_Inequality_K_and_B <- bind_rows(Ken_I_Ineq_longer, Bang_I_Ineq_longer)

indicator_labels <- c(
  "Gini_Coeff" = "Gini Coefficient",
  "Share_Bottom50" = "Income Share: Bottom 50%",
```

```
  "Share_Middle40" = "Income Share: Middle 40%",
  "Share_Top10" = "Income Share: Top 10%",
  "Share_Top1" = "Income Share: Top 1%"
)

I_Inequality_K_and_B %>% ggplot(aes(x = Year, y = Value, color = Country, linetype = Country)) +
  geom_line(linewidth = 1) +
  facet_wrap(~Indicator,
    scales = "free_y", ncol = 2,
    labeller = labeller(Indicator = indicator_labels)
  ) +
  scale_color_manual(values = c("Kenya" = "#E69F00", "Bangladesh" = "#56B4E9")) +
  scale_linetype_manual(values = c("Kenya" = "solid", "Bangladesh" = "dashed")) +
  labs(
    title = "Income Inequality Indicators: Kenya vs Bangladesh",
    x = "Year",
    y = "Value"
  ) +
  theme_minimal() +
  theme(
    legend.position = "bottom",
    plot.title = element_text(face = "bold", size = 14),
    strip.text = element_text(face = "bold", size = 10)
  )
```




```
# -----Wealth Inequality-----
W_Inequality_K_and_B <- bind_rows(Ken_W_Ineq_longer, Bang_W_Ineq_longer)
```

```r
W_Inequality_K_and_B %>% ggplot(aes(x = Year, y = Value, color = Country, linetype = Country)) +
  geom_line(linewidth = 1) +
  facet_wrap(~Indicator,
    scales = "free_y", ncol = 2,
    labeller = labeller(Indicator = indicator_labels)
  ) +
  scale_color_manual(values = c("Kenya" = "#E69F00", "Bangladesh" = "#56B4E9")) +
  scale_linetype_manual(values = c("Kenya" = "solid", "Bangladesh" = "dashed")) +
  labs(
    title = "Wealth Inequality Indicators: Kenya vs Bangladesh",
    x = "Year",
    y = "Value"
  ) +
  theme_minimal() +
  theme(
    legend.position = "bottom",
    plot.title = element_text(face = "bold", size = 14),
    strip.text = element_text(face = "bold", size = 10)
  )
```

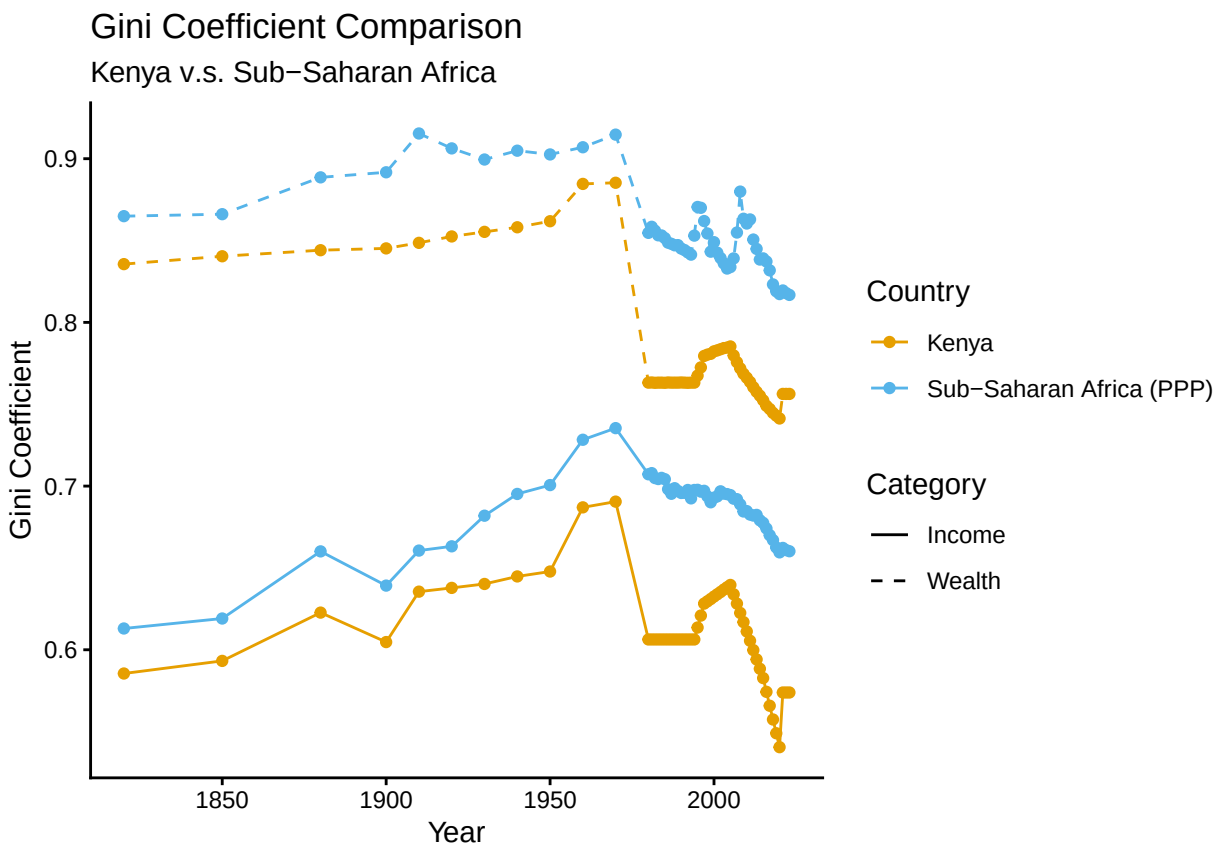


Question 2

```r
# Import Data of wider region
SS_Africa_I_Ineq <- read_excel("Data/Sub_Sahara_Africa_Income_Inequality.xlsx",
  col_names = FALSE
)
```

```r
SS_Africa_W_Ineq <- read_excel("Data/Sub_Sahara_Africa_Wealth_Inequality.xlsx",
  col_names = FALSE
)

Euro_I_Ineq <- read_excel("Data/Europ_Income_Inequality.xls",
  col_names = FALSE
)
Euro_W_Ineq <- read_excel("Data/Euro_Wealth_Inequality.xlsx",
  col_names = FALSE
)


# Clean data

SS_Africa_I_Ineq_wider <- clean_data_inequality(SS_Africa_I_Ineq)
SS_Africa_W_Ineq_wider <- clean_data_inequality(SS_Africa_W_Ineq)

Euro_I_Ineq_wider <- clean_data_inequality(Euro_I_Ineq)
Euro_W_Ineq_wider <- clean_data_inequality(Euro_W_Ineq)


# Pivot longer for plot
SS_Africa_I_Ineq_longer <- longer_format(SS_Africa_I_Ineq_wider)
SS_Africa_W_Ineq_longer <- longer_format(SS_Africa_W_Ineq_wider)

Euro_I_Ineq_longer <- longer_format(Euro_I_Ineq_wider)
Euro_W_Ineq_longer <- longer_format(Euro_W_Ineq_wider)

# Then we draw a line chart to compare the income and wealth distribution.
# For simplicity, we compare the Gini coefficient only for now.
# So we write a function first to combine the df's into one.

# NOTE: write in order of regional income, regional wealth, country income, country wealth
W_I_Gini <- function(df1, df2, df3, df4) {
  Keep_Gini_Only <- function(x, y) {
    x %>%
      select(Country, Year, Gini_Coeff) %>%
      mutate(Category = ifelse(y == "I", "Income", "Wealth"))
  }

  df1 <- Keep_Gini_Only(df1, "I")
  df2 <- Keep_Gini_Only(df2, "W")
  df3 <- Keep_Gini_Only(df3, "I")
  df4 <- Keep_Gini_Only(df4, "W")

  df <- bind_rows(df1, df2, df3, df4)
  return(df)
}

Africa_Inequality <- W_I_Gini(
  SS_Africa_I_Ineq_wider, SS_Africa_W_Ineq_wider,
  Ken_I_Ineq_wider, Ken_W_Ineq_wider
)
```

```r
Euro_Inequality <- W_I_Gini(
  Euro_I_Ineq_wider, Euro_W_Ineq_wider,
  Bang_I_Ineq_wider, Bang_W_Ineq_wider
)


# Compare Sub_Sahara Africa with Kenya

Africa_Inequality %>% ggplot(aes(x = Year, y = Gini_Coeff,
                                 colour = Country, linetype = Category))+
  geom_line()+
  geom_point()+
  scale_colour_manual(values =
    c("Kenya" = "#E69F00", "Sub-Saharan Africa (PPP)" = "#56B4E9",
      labels = c("Sub-Saharan Africa (PPP)" = "Sub-Saharan Africa",
                 "Kenya" = "Kenya"))
  )+
  scale_linetype_manual(values =
                          c("Wealth" = "dashed", "Income" = "solid"))+
  labs(
    title = "Gini Coefficient Comparison",
    subtitle = "Kenya v.s. Sub-Saharan Africa",
    x = "Year",
    y = "Gini Coefficient"
  ) +
  theme_classic()
```



```r
# Compare Europe with Bangladesh

Euro_Inequality %>% ggplot(aes(x = Year, y = Gini_Coeff,
                               colour = Country, linetype = Category))+
  geom_line()+
  geom_point()+
  scale_color_manual(
    values = c("Bangladesh" = "#E69F00", "Europe (PPP)" = "#56b4e9",
               labels = c("Bangladesh" = "Bangladesh", "Europe (PPP)" = "Europe"))
  )+
  scale_linetype_manual(
    values = c("Wealth" = "dashed", "Income" = "solid")
  )+
  labs(
    title = "Gini Coefficient Comparison",
    subtitle = "Europe v.s. Bangladesh",
    x = "Year",
    y = "Gini Coefficient"
  )+
  theme_classic()
```