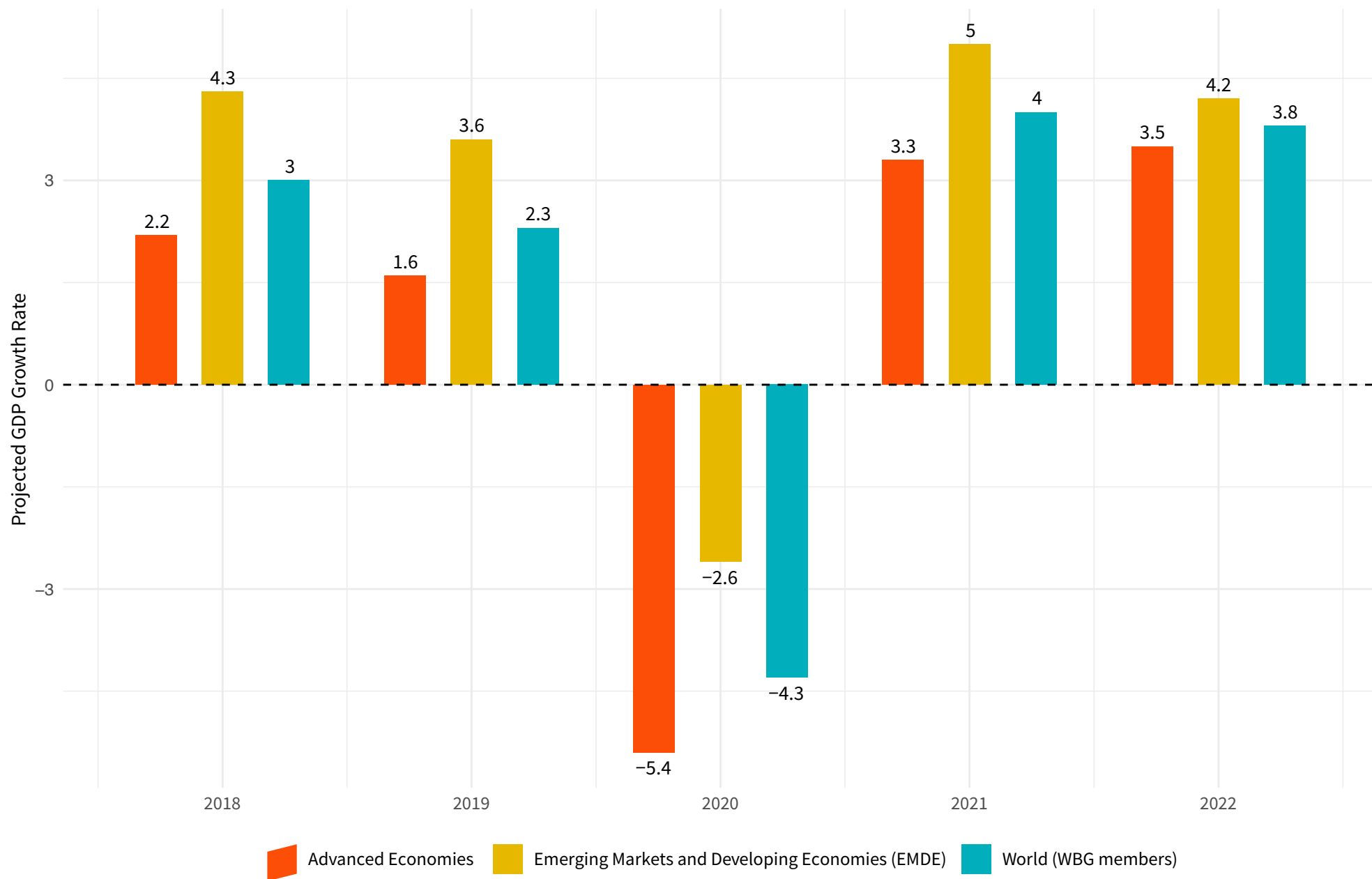


The pandemic had dramatically hit the global economic prospect in 2020. Is the projected shrinkage in GDP growth fall proportionally on the advanced economies and emerging markets and developing economies (EMDE)? How quickly can those economies recover from recessions as a result of COVID? This bar chart reveals that both advanced economies and EMDEs bounce back to their pre-pandemic level even the growth aspect of advanced economies was disproportionately disrupted by the pandemic. Moreover, the EMDEs were less hit and faster recovered from the disruptions.

Bouncing Back

Both Advanced Economies and Emerging Countries and Developing Economies (EMDE) forecast growth levels higher than the pre-COVID era

GDP Growth (Constant 2010 US\$)



```

library(ggplot2)
library(readxl)
library(tidyverse)

setwd("/Users/qixue/Desktop/4-Data Visualization/@Viz Assignment 3_Due 4:7")

econprospect <-
read_excel("Data_Extract_From_Global_Economic_Prospets.xlsx")

econprospect[, 3:7] <- sapply(econprospect[,3:7], as.numeric)

df.econprospect <- pivot_longer(econprospect,
                                names_to = "year",
                                values_to = "scores",
                                3:7)

View(df.econprospect)
str(df.econprospect)

df.econprospect$year <- as.numeric(df.econprospect$year)

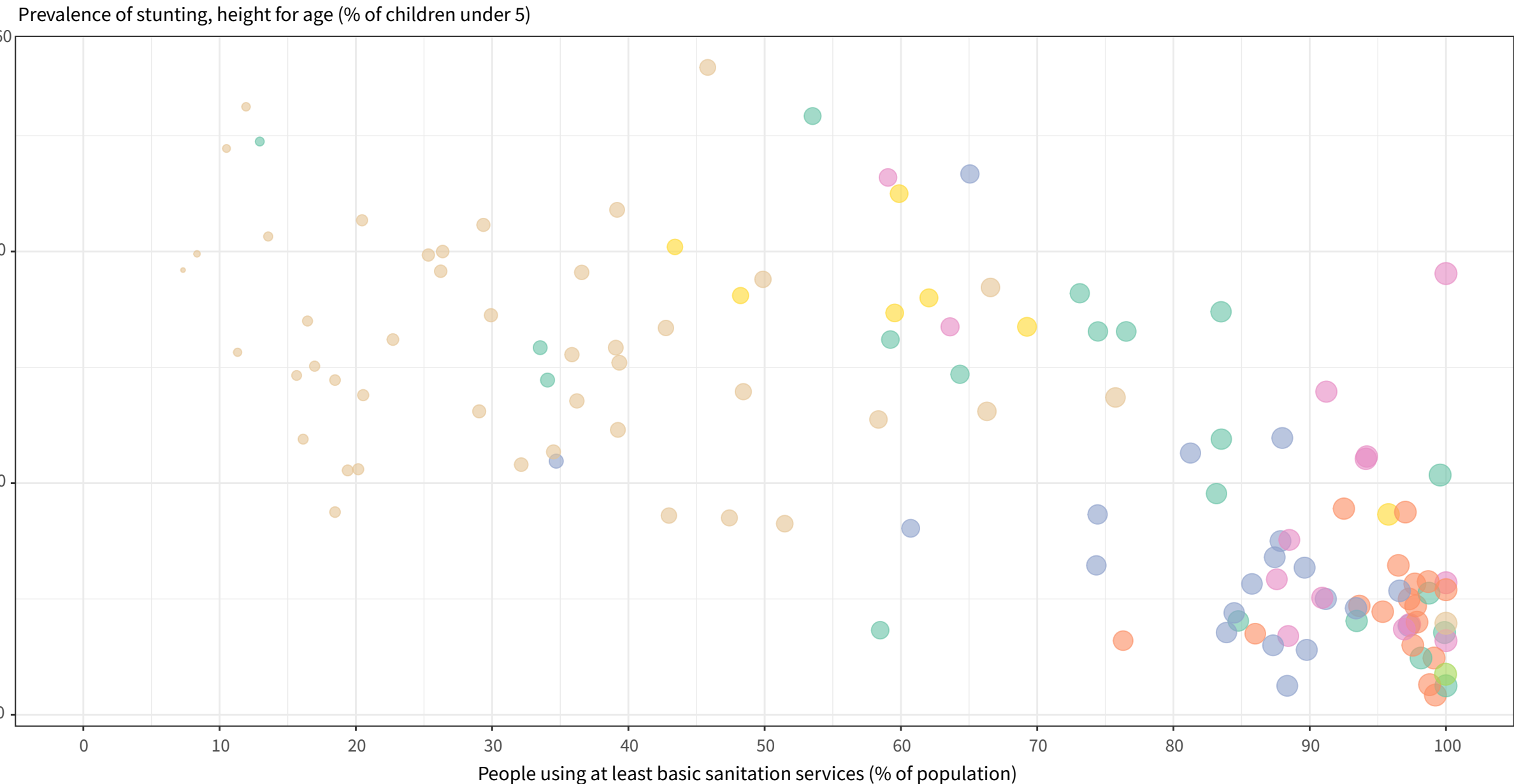
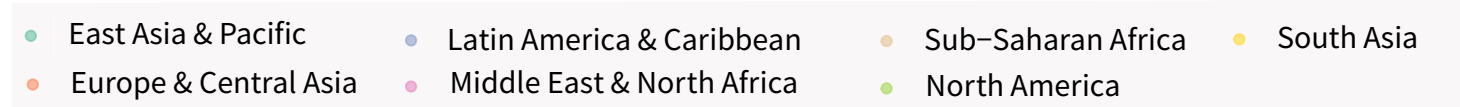
ggplot(data = df.econprospect,
       mapping = aes(x = year, y = scores, fill = `Country Name`)) +
  geom_bar(stat = "identity", position = position_dodge (0.8), width = 0.5) +
  geom_text(aes(label = scores), position = position_dodge (0.8)) +
  labs(title = paste("Bouncing Back"),
       subtitle = "Both Advanced Economies and Emerging Countries and Developing
Economies (EMDE) forecast growth levels higher than the pre-COVID
era\n\nGDP Growth (Constant 2010 US$)",
       x = "Year (From 2018 to 2022)",
       y = "Projected GDP Growth Rate",
       caption = "Data Source: World Bank | Global Economic Prospect") +
  theme_minimal() +
  theme(plot.margin = unit(c(1, 1, 1, 1), "cm")) +
  theme(legend.position="bottom") +
  theme(legend.title = element_blank()) +
  scale_fill_manual(values = alpha(c("#FC4E07", "#E7B800", "#00AFBB", 0.3))) +
  geom_hline(yintercept = 0, col="black", linetype="dashed")

```

SDG 6 highlights the importance of ensuring the availability and sustainable management of water and sanitation for all. We all know that the benefits of having access to clean water and sanitation cannot be underestimated. But how can we turn this imperative into policies? The visualization (on the next page) reveals a negative relationship between sanitation and stunting, indicating that access to clean water significantly reduces the risk of stunting children.

Sanitation and Stuning in the World

Countries with higher access to sannitaion has less risk of impaired growth and development that children experience from poor nutrition.



```

library(readxl)
library(dplyr)
library(ggplot2)

setwd("/Users/qixue/Desktop/4-Data Visualization/@Viz Assignment 1_Due 3:1/2-
Original Scatter")
df <- read_excel("sanitation and stunting.xlsx", sheet="Data")
region <- read_excel("sanitation and stunting_Metadata.xlsx", sheet="Country
- Metadata")

dfp <- df %>% left_join(region %>% select(Code, Region), by=c("Country
Code"="Code")) %>%
  rename("sanitation" = "MRV - People using at least basic sanitation
services (% of population) [SH.STA.BASS.ZS]",
        "stunting" = "MRV - Prevalence of stunting, height for age (% of
children under 5) [SH.STA.STNT.ZS]")

str(dfp)
dfp$sanitation <- as.numeric(dfp$sanitation)
dfp$stunting <- as.numeric(dfp$stunting)

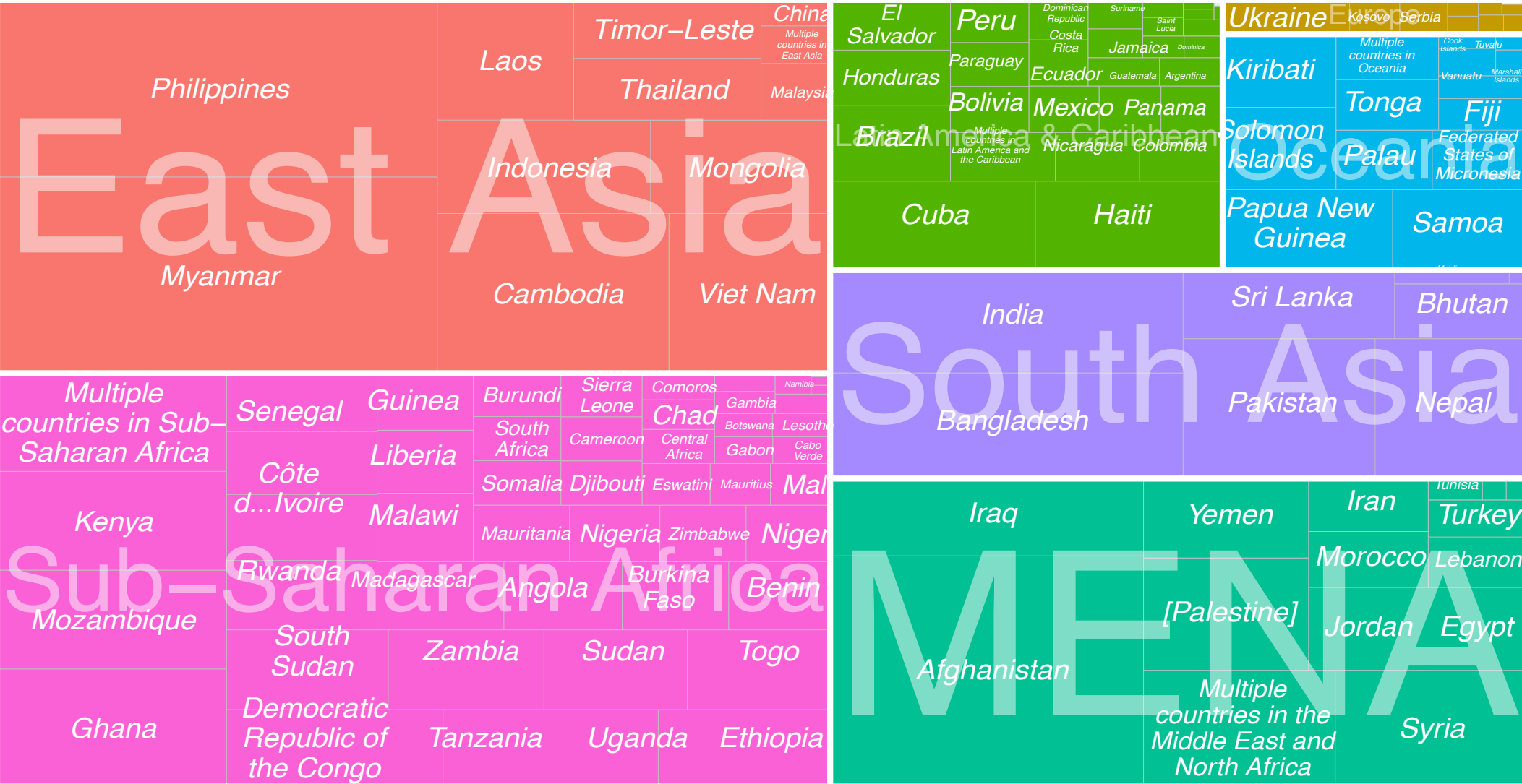
ggplot(dfp %>% na.omit(),
       mapping = aes(x = sanitation, y = stunting,
                     group = Region, color = Region, size = sanitation))+
  geom_point(alpha = 0.6)+
  theme_bw() +
  scale_color_brewer(palette = "Set2") +
  scale_x_continuous(limits = c(0, 100),
                    breaks = c(0,10, 20, 30, 40, 50, 60, 70, 80, 90, 100)) +
  labs(title = paste("Sanitation and Stuning in the World"),
       subtitle = "Countries with higher access to sannitaion has less risk of
impaired growth and development that children experience from poor
nutrition",
       x = "People using at least basic sanitation services (% of population)",
       y = "Prevalence of stunting, height for age (% of children under 5)",
       caption = "Data Source: World Bank | World Development Indicators")

```

Japan is the fourth-largest donor country in the world and the largest in Asia. On a net disbursement basis, Japan's official development assistance (ODA) reaches US\$7,016.09 in 2016 (current prices), accounting for 0.21% of its Gross National Income (GNI). Where does the foreign assistance flow? What is Japan's geographical focus in distributing the aids? How would this vary within the region? We will explore these questions in the visualization below. It indicates that East Asia, Sub-Saharan Africa, and MENA account for three-quarters of Japan's ODA. Myanmar and the largest recipient of Japan's foreign aid in East Asia and the world, followed by Afghanistan. Some countries are more heavily reliant on bilateral grants than technical operations, namely, Myanmar, Cambodia, Pakistan, Afghanistan, and multiple countries in Sub-Saharan Africa.

Top three destinations of Japan's Foreign Assitance in 2018

Japan's outbound bilateral official development assistance by region and country




```

library(ggplot2)
library(readxl)
library(treemapify)

setwd("/Users/qixue/Desktop/4-Data Visualization/@Viz Assignment 4_Due
4:23")
ODAJapan_2018 <- read_excel("Japanese Bilateral ODA by Country_2018.xlsx",
col_types = c("text", "text",
"numeric","numeric","numeric","numeric","numeric","numeric"))

View(ODAJapan_2018)
str(ODAJapan_2018)

##ggplot
ggplot(ODAJapan_2018,
      aes(area = Total,
          label = Country,
          subgroup = Region,
          fill = Region)) +
  geom_treemap() +
  geom_treemap_subgroup_border(color = "white") +
  geom_treemap_subgroup_text(place = "center",
                            grow = TRUE,
                            color = "grey98",
                            alpha = 0.5,
                            min.size = 0) +
  geom_treemap_text(fontface = "italic",
                    color = "white",
                    place = "center",
                    grow = FALSE,
                    reflow = TRUE,
                    na.rm = TRUE) +
  theme(plot.margin = unit(c(1, 1, 1, 1), "cm")) +
  theme(legend.position = 'none') +
  labs(title = "Top three destinations of Japan's Foreign Assistance in 2018",
       subtitle = "Japan's outbound bilateral official development
assistance by region and country",
       caption = "Data Source: White Paper on Development Cooperation 2018 |
Ministry of Foreign Affairs of Japan")

```

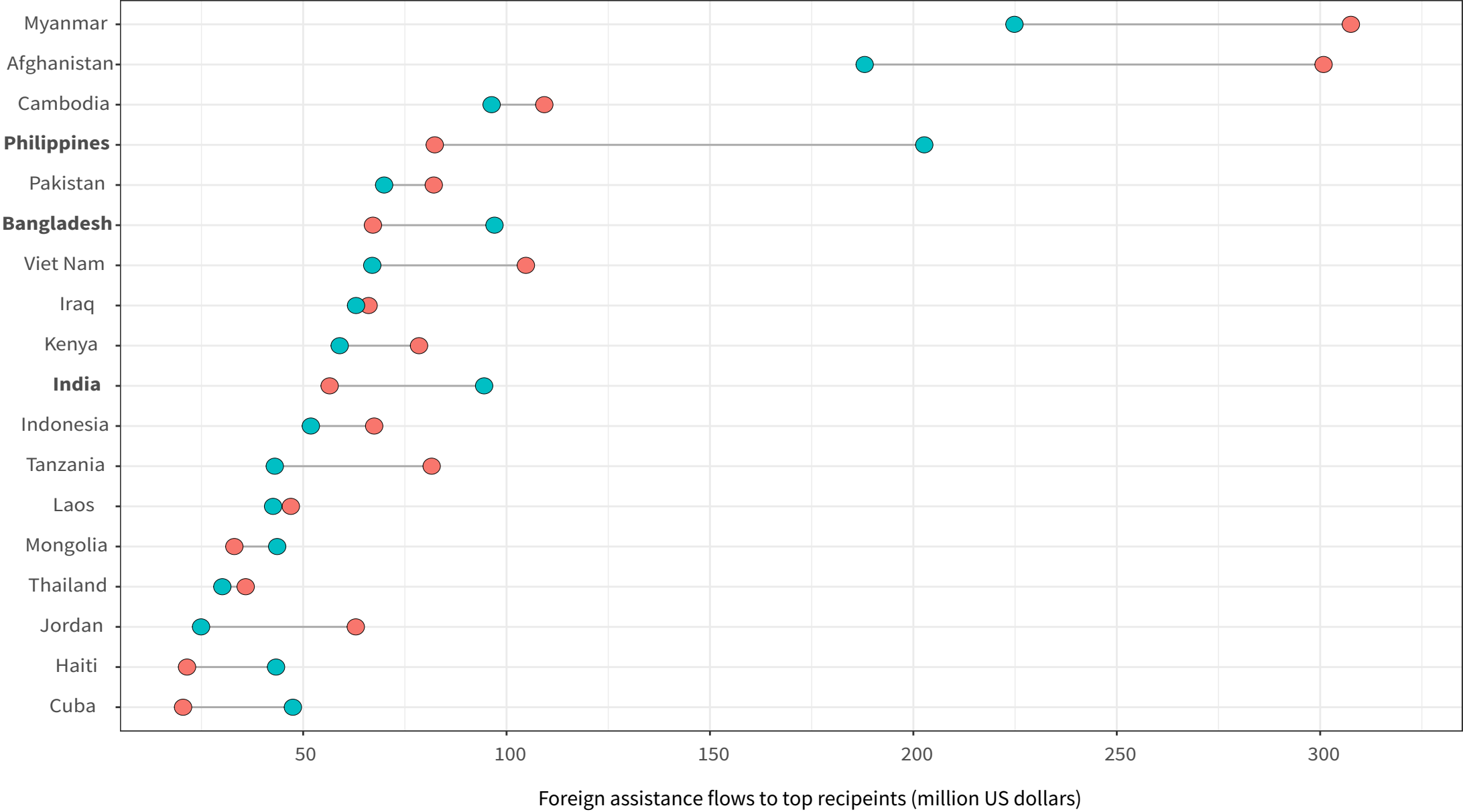
Japan's foreign aid was almost evenly distributed in East Asia, Sub-Saharan Africa, and MENA from the last visualization. These three regions account for three-quarters of Japan's total development assistance. But what happens within each region? Do most recipients receive stable funding over time? In this visualization, we examine recent trends in Japan's foreign aid spending. We found that most countries receive less aid from Japan, except the Philippines, Bangladesh, and India - the Philippines received 120 million more in 2018 than in 2016.

Japan's Top Recipients Seen Substantial Cut on Foreign Aid From 2016 to 2018

The exceptions are the Philippines, Bangladesh and India. The Philippines saw an increase of over \$100 million of aid from Japan.

2016
2018

A list of top recipients



```

library(ggplot2)
library(readxl)

setwd("/Users/qixue/Desktop/4-Data Visualization/@Viz Assignment 4_Due 4:23")

#Data Set 1
ODAJapan_2016 <- read_excel("Japanese Bilateral ODA by Country_2016.xlsx")
df.ODAJapan_2016 <- as.data.frame(ODAJapan_2016)

View(df.ODAJapan_2016)
str(df.ODAJapan_2016)

df.ODAJapan_2016$Year <- 2016
df.ODAJapan_2016 <- df.ODAJapan_2016[,c('Year', 'Country', 'Total')]

#Data Set 2
ODAJapan_2018 <- read_excel("Japanese Bilateral ODA by Country_2018.xlsx")
df.ODAJapan_2018 <- as.data.frame(ODAJapan_2018)
df.ODAJapan_2018$Year <- 2018
df.ODAJapan_2018<-df.ODAJapan_2018[,c('Year', 'Country', 'Total')]

#List of interest countries
countries_var <- c("Myanmar", "Afghanistan", "Cambodia", "Philippines",
                  "Pakistan", "Bangladesh", "Viet Nam", "Iraq", "Kenya",
                  "India", "Indonesia", "Tanzania", "Laos", "Mongolia",
                  "Thailand", "Jordan", "Haiti", "Cuba")

#Filter countries
df.ODAJapan_2016 <- df.ODAJapan_2016[df.ODAJapan_2016$Country %in%
countries_var,]
df.ODAJapan_2018 <- df.ODAJapan_2018[df.ODAJapan_2018$Country %in%
countries_var,]

df.ODAJapan <- rbind(df.ODAJapan_2016, df.ODAJapan_2018)
df.ODAJapan$Year<-as.character(df.ODAJapan$Year)

#Define levels/order
order <- rev(countries_var)

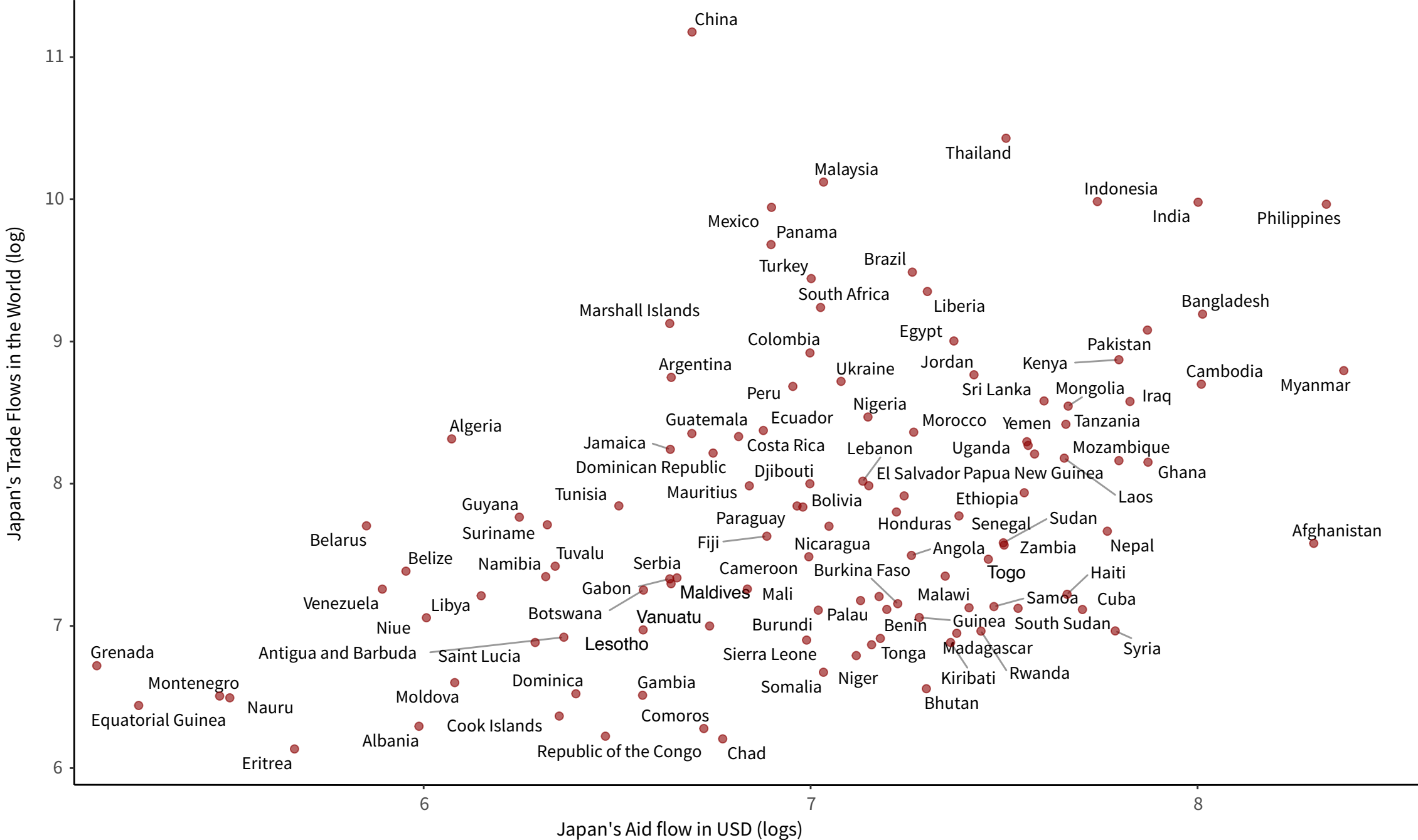
#ggplot
ggplot(df.ODAJapan) +
  geom_line(aes(x = Total, y = Country, group = Country), color = "darkgrey") +
  geom_point(aes(x = Total, y = Country, fill = Year),
            shape = 21, size = 5, stroke = FALSE) +
  scale_y_discrete(limits = order) +
  scale_x_continuous(limits = c(20, 320),
                    breaks = c(50, 100, 150, 200, 250, 300)) +
  theme_bw() +
  theme(plot.margin = unit(c(1, 1, 1, 1), "cm")) +
  labs(title = "Japan's Top Recipients Seen Substantial Cut on Foreign Aid
From 2016 to 2018",
       subtitle = "The exceptions are the Philippines, Bangladesh and India.
The Philippines saw an increase of over $100 million of aid from Japan",
       x = "Foreign assistance flows to top recipients (million US dollars)",
       y = "A list of top recipients",
       caption = "Data Source: White Paper on Development Cooperation 2019 |
Ministry of Foreign Affairs of Japan")

```

On foreign aid, early analyses often focus on "strings attached." This argument traces back to the colonial era where the imperialists exploited the colonies with unequal trade. Yet the debate is still going on today. Research shows that foreign aid is positively correlated with future trade. Foreign aid announced yesterday also shows a positive correlation with bilateral trade today. While the causal relationship is complex and requires careful analysis, the visualization below shows Japan's exports in 2020 are approximately proportional to 2018 Official Development Assistance.

Trade flows to Where Aid flows

Japan's export volumes is highly associated with aid flows. Meanwhile, there are some noticeable outliers relealed by the distribution. Japan and China are important trade partners, regardless of aid flows. Southeast Asia countries, such as Thailand and Malaysia, are trading heavily with Japan, given relatively loww foreign aid.



```

library(readxl)
library(ggplot2)
library(ggrepel)

setwd("/Users/qixue/Desktop/Data Viz Assignment_Due 4:23")

ODAJapan_2018 <- read_xlsx("Japan's Bilateral ODA by Country (2018).xlsx")
export2020 <- read_xlsx("Japan's Export in 2020.xlsx")

#data.frame
as.data.frame(ODAJapan_2018)
as.data.frame(export2020)

#Select and combine data
ODAJapan_2018 <- ODAJapan_2018[,c('Country', 'Log(Total Aid)')]
export2020 <- export2020[,c('Country', 'log(Real Value)')]

corr_data <- merge(ODAJapan_2018, export2020, all = FALSE, by='Country')
View(corr_data)

#ggplot
ggplot(corr_data,
       mapping = aes(x = `Log(Total Aid)`, y = `log(Real Value)`) +
       geom_text_repel(mapping = aes(label = Country), segment.color= 'gray60') +
       scale_x_continuous(expand=expansion(c(0.01,0.2))) +
       geom_point(color = 'darkred', size = 2, alpha = 0.6) +
       theme_classic() +
       theme(plot.margin = unit(c(1, 1, 1, 1), "cm")) +
       labs(title = "Trade flows to Where Aid flows",
            subtitle = "Japan's export volumes is highly associated with aid
                        flows",
            x = "Japan's Aid flow in USD (logs)",
            y = "Japan's Trade Flows in the World (logs)",
            caption = "Data Source: White Paper on Development Cooperation 2019
                      | Ministry of Foreign Affairs of Japan")

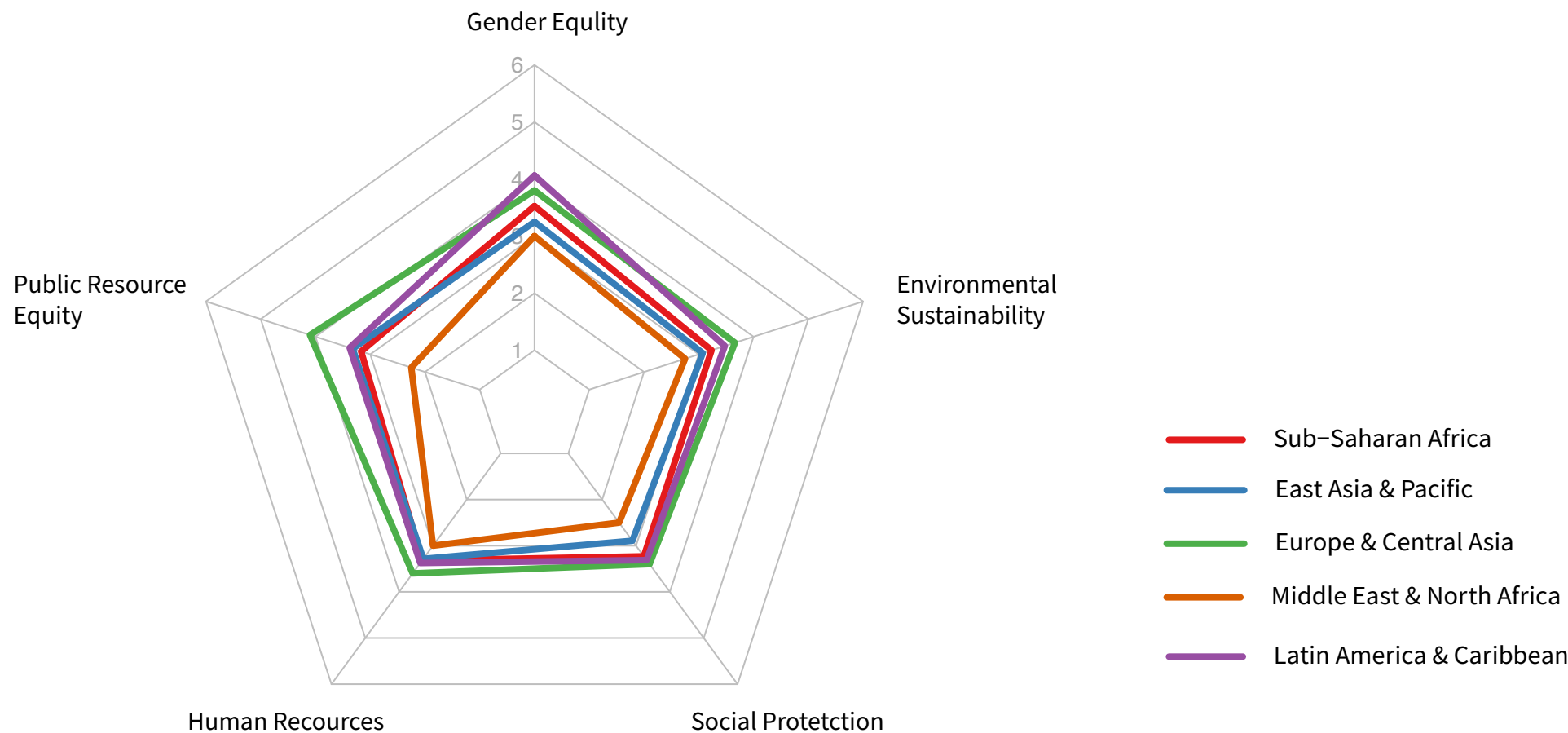
```

The World Bank's Country Policy and Institutional Assessment (CPIA) evaluates countries' policies and institutional frameworks for poverty reduction, sustainable growth, and effective development assistance. Sixteen criteria are divided into four clusters: economic management, structural policy, social inclusion and equity, public sector management and institutions. Among regions in the world, which regions are doing better than their counterparts? The graph below takes a close look at each region's social inclusion score - finding that Europe is the best performing region in its CPIA scores.

Europe is Leading in its Policies for Social Inclusion/Equity

Social protection and labor assess government policies in social protection and labor market regulations that reduce the risk of becoming poor, assist those who are poor to better manage further risks, and ensure a minimal level of welfare to all people.

CPIA Social Protection Rating (1=Low To 6=High)



```

library(readxl)
library(dplyr)
library(ggplot2)
library(tidyverse)
library(fmsb)

setwd("/Users/qixue/Desktop/4-Data Visualization/@Viz Assignment 3_Due 4:7")
CPIA <-
read_excel("Data_Extract_From_World_Development_Indicators_Radar.xlsx")

CPIA$Scores <- as.numeric(CPIA$Scores)

df.CPIA <- pivot_wider(CPIA,
                        names_from = "Series Name",
                        values_from = "Scores")
View(df.CPIA)

line_colors <- c("#e41a1c", "#377eb8", "#4daf4a", "#984ea3", "#d95f02")

colnames(df.CPIA) = c('country_name',
                      'Gender Equality',
                      'Equity of Public Resource',
                      'Human Resources',
                      'Social Protection',
                      'Environmental Sustainability')

min_score <- c(1,1,1,1,1)
max_score <- c(6,6,6,6,6)

plot.CPIA <- rbind(max_score,min_score,df.CPIA[,-1])

radarchart(plot.CPIA,
            axistype = 1,
            seg = 5, pty = 32, plty=1, plwd = 2,
            pcol=line_colors,
            cglty = 1, cglcol='grey',cglwd=1,axislabcol = "darkgrey",
            caxislabels = seq(1, 6, 1))

title(main="Europe is Leading in its Policies for Social Inclusion/Equity",
      sub=paste("The ranking is measured by the Country Policy And
Institutional Assessment, namely the CPIA scores published by the World Bank
\n Data Source: WORLD BANK | IDA Resource Allocation Index
(IRAI)"),
      font.sub = 1, cex.sub = 1)

legend (x = 1, y = 1, cex = 0.8, x.intersp = 0.3, legend =
df.CPIA$country_name,
        lty = 1,lwd = 2,bty = "n", col = line_colors)

```