Lecture 2 - The Solow Growth Model

UCLA - Econ 102 - Fall 2018

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Contents

1 Empirics of the Solow Growth Model

The datasets are as follows, from the **World Development Indicators (WDI)**:
- Gross savings (% of GDP): https://data.worldbank.org/indicator/NY.GNS.ICTR.ZS
- Gross Domestic Savings (% of GDP): https://data.worldbank.org/indicator/ny.gds.totl.zs
- Gross capital formation (% of GDP): https://data.worldbank.org/indicator/ne.gdi.totl.zs - Adjusted savings: net national savings (% of GNI): https://data.worldbank.org/indicator/NY.ADJ.NNAT.GN.ZS

Harrod-Domar model had fixed proportions. This model, unlike the Solow growth model, assumed that there was

```
load("/Users/geerolf/Drive/work/datasets/wdi/WDI.RData")
load("/Users/geerolf/Drive/work/datasets/wdi/WDI.variable.nobs.RData")
```

Figure 3 shows Investment as % of GDP. Figure **??** shows Saving as % of GDP.

1.1 Investment (% of GDP)

```
map_data("world") %>%
  filter(region != "Greenland", region != "Antarctica") %>%
  left_join(iso3166 %>%
              select(region = mapname, countrycode = a3) %>%
              mutate(region = ifelse(region == "China(?!:Hong Kong|:Macao)", "China", region),
                     region = ifelse(region == "Finland(?!:Aland)", "Finland", region),
                     region = ifelse(region == "UK(?!r)", "UK", region),
                     region = ifelse(region == "Norway(?!:Bouvet|:Svalbard|:Jan Mayen)", "Norway", regi
            by = "region") %>%
  left_join(WDI %>%
              filter(Indicator.Code %in% c("NE.GDI.TOTL.ZS"),
                     year == "2016") %>%
              mutate(countryname = paste(Country.Name),
                     countrycode = paste(Country.Code)) %>%
              select(countryname, countrycode, variable = Indicator.Code, value) %>%
              arrange(countryname, variable),
            by = "countrycode") %>%
  ggplot(aes(long, lat, group = group)) +
```

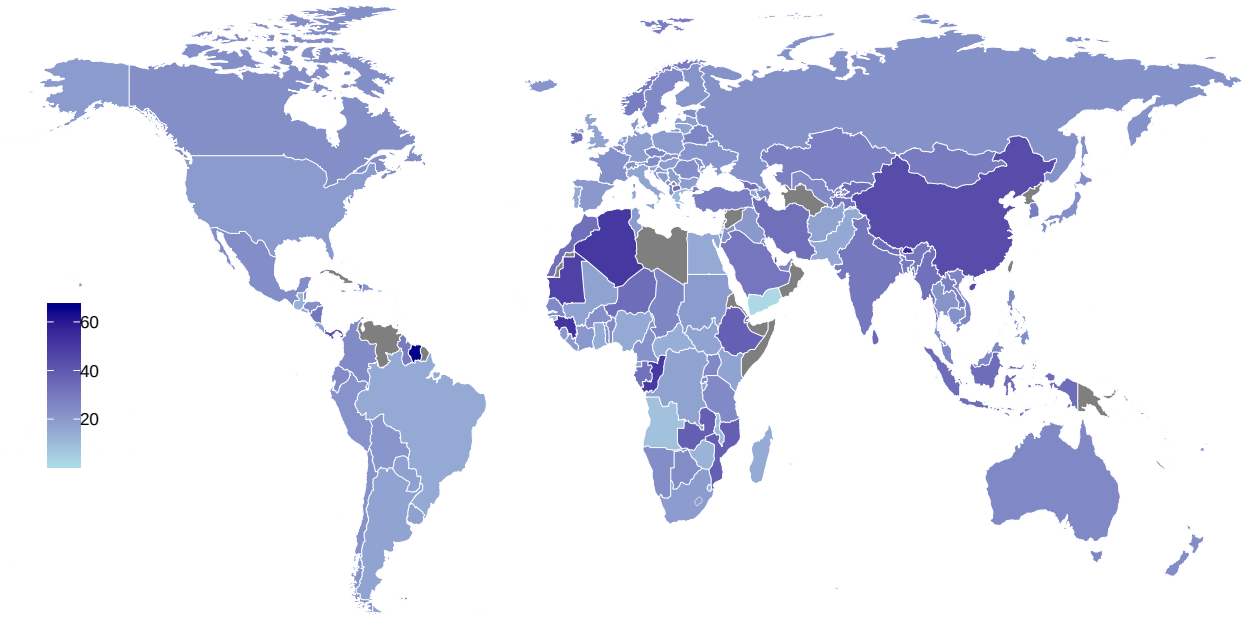

Figure 1: Investment as a percentage of GDP (Source: WDI, World Bank)

```
  geom_polygon(aes(fill = value),
               colour = alpha("white", 1/2),
               size = 0.1)  +
  scale_fill_continuous(low="lightblue", high="darkblue", guide="colorbar") +
  theme_void() +
  theme(legend.position = c(0.1, 0.4),
        legend.title = element_blank())
```

```
##
## Attaching package: 'maps'
```

```
## The following object is masked from 'package:purrr':
##
##     map
```

1.2 Saving (% of GDP)

```
map_data("world") %>%
  filter(region != "Greenland", region != "Antarctica") %>%
  left_join(iso3166 %>%
              select(region = mapname, countrycode = a3) %>%
              mutate(region = ifelse(region == "China(?!:Hong Kong|:Macao)", "China", region),
                     region = ifelse(region == "Finland(?!:Aland)", "Finland", region),
                     region = ifelse(region == "UK(?!r)", "UK", region),
                     region = ifelse(region == "Norway(?!:Bouvet|:Svalbard|:Jan Mayen)", "Norway", regi
            by = "region") %>%
  left_join(WDI %>%
              filter(Indicator.Code %in% c("NY.GNS.ICTR.ZS"),
                     year == "2016") %>%
```

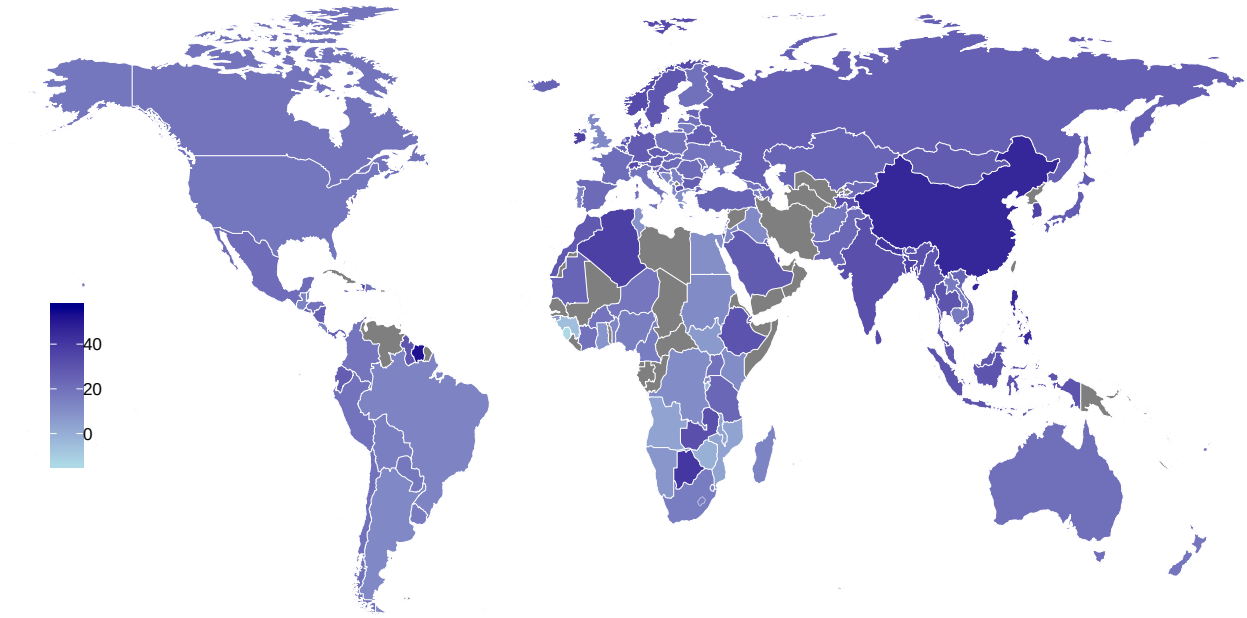

Figure 2: Investment as a percentage of GDP (Source: WDI, World Bank)

```
              mutate(countryname = paste(Country.Name),
                     countrycode = paste(Country.Code)) %>%
              select(countryname, countrycode, variable = Indicator.Code, value) %>%
              arrange(countryname, variable),
            by = "countrycode") %>%
  ggplot(aes(long, lat, group = group)) +
  geom_polygon(aes(fill = value),
               colour = alpha("white", 1/2),
               size = 0.1)  +
  scale_fill_continuous(low="lightblue", high="darkblue", guide="colorbar") +
  theme_void() +
  theme(legend.position = c(0.1, 0.4),
        legend.title = element_blank())
```

1.3 Net Saving (% of GDP)

```
WDI %>%
  filter(Indicator.Code %in% c("NY.ADJ.NNAT.GN.ZS"),
         year == "2016") %>%
  mutate(countryname = paste(Country.Name),
         countrycode = paste(Country.Code)) %>%
  select(countryname, countrycode, variable = Indicator.Code, value) %>%
  arrange(countryname, variable) %>%
  head
```

```
##   countryname countrycode          variable      value
## 1 Afghanistan         AFG NY.ADJ.NNAT.GN.ZS -24.377300
## 2     Albania         ALB NY.ADJ.NNAT.GN.ZS   6.877819
## 3     Algeria         DZA NY.ADJ.NNAT.GN.ZS  26.259674
```

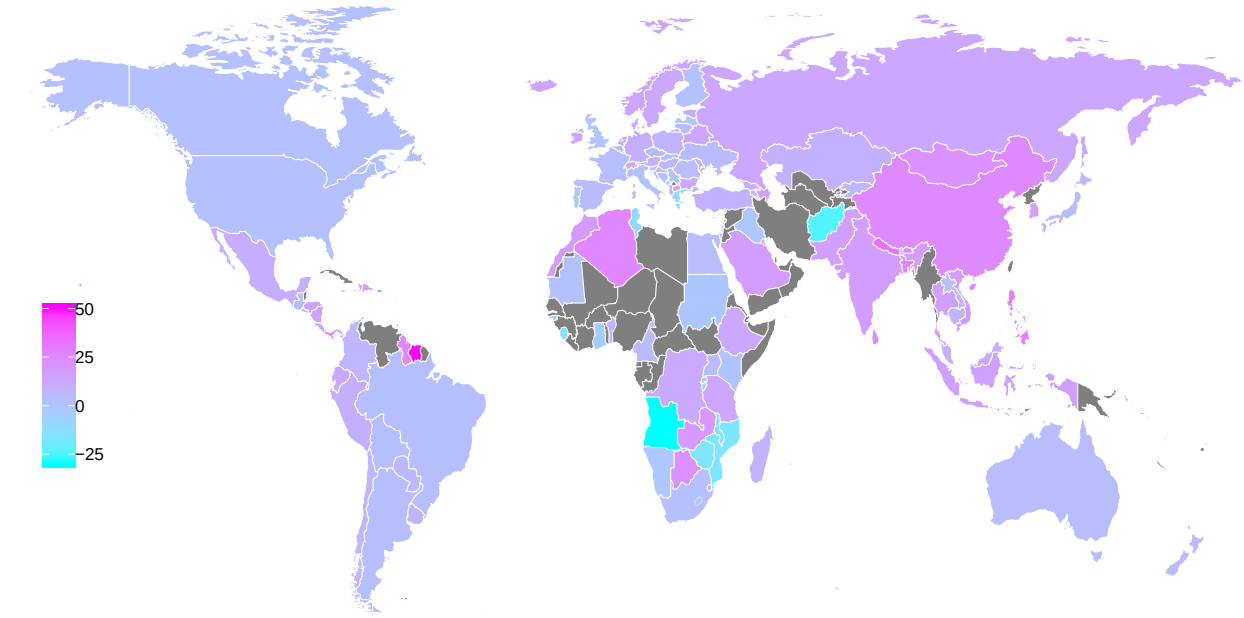

Figure 3: Net saving as a percentage of GDP (Source: WDI, World Bank)

```
## 4      Angola          AGO NY.ADJ.NNAT.GN.ZS -29.815095
## 5  Arab World          ARB NY.ADJ.NNAT.GN.ZS  12.132902
## 6   Argentina          ARG NY.ADJ.NNAT.GN.ZS   3.170884
```

```
map_data("world") %>%
  filter(region != "Greenland", region != "Antarctica") %>%
  left_join(iso3166 %>%
              select(region = mapname, countrycode = a3) %>%
              mutate(region = ifelse(region == "China(?!:Hong Kong|:Macao)", "China", region),
                     region = ifelse(region == "Finland(?!:Aland)", "Finland", region),
                     region = ifelse(region == "UK(?!r)", "UK", region),
                     region = ifelse(region == "Norway(?!:Bouvet|:Svalbard|:Jan Mayen)", "Norway", regi
            by = "region") %>%
  left_join(WDI %>%
              filter(Indicator.Code %in% c("NY.ADJ.NNAT.GN.ZS"),
                     year == "2016") %>%
              mutate(countryname = paste(Country.Name),
                     countrycode = paste(Country.Code)) %>%
              select(countryname, countrycode, variable = Indicator.Code, value) %>%
              arrange(countryname, variable),
            by = "countrycode") %>%
  ggplot(aes(long, lat, group = group)) +
  geom_polygon(aes(fill = value),
               colour = alpha("white", 1/2),
               size = 0.1)  +
  scale_fill_continuous(low = rgb(0, 1, 1), high = rgb(1, 0, 1), guide = "colorbar") +
  theme_void() +
  theme(legend.position = c(0.1, 0.4),
        legend.title = element_blank())
```

2 Penn World Tables (PWTs)

User guide to the Penn World Tables: https://www.rug.nl/ggdc/docs/user_guide_to_pwt90_data_files.pdf