Download data from WID.world into R

Thomas Blanchet
Paris School of Economics – EHESS

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The World Wealth and Income Database (WID.world) is an extensive source on the historical evolution of the distribution of income and wealth both within and between countries. It relies on the combined effort of an international network of over a hundred researchers covering more than seventy countries from all continents.

Anyone can access and plot the data through the website WID.world. For more advanced users, we provide the R package `wid`, which lets them download the data from WID.world directly into R.[1] It exports a single function called `download_wid`. This vignette explains how to use it.

Arguments of the function

The command `download_wid` has the following arguments:

```
download_wid(
    indicators, # Codes corresponding to indicators to retrieve
    areas, # Areas (mostly countries) for which to retrieve the indicators
    years, # Years for which to retrieve the indicators
    perc, # Percentiles (part of the distribution)
    ages, # Age groups (adults, all ages, elderly, etc.)
    pop, # Population type (individual, households, tax units, etc.)
    metadata, # Logical: should it fetch metadata too (eg. sources, etc.)
    verbose, # Logical: should it display messages showing progress
    include_extrapolations # Logical: should it include data based on extrapolations/interpola
)
```

Indicators The argument `indicators` is a vector of 6-letter codes that corresponds to a given series type for a given income or wealth concept. The first letter correspond to the type of series. Some of the most common possibilities include:

[1] A similar package for Stata users exists: see `http://econpapers.repec.org/software/bocbocode/s458357.htm`.

one-letter code	description
a	average
s	share
t	threshold
m	macroeconomic total
w	wealth/income ratio

Type ?wid_series_type to access the complete list. The next five letters correspond a concept (usually of income and wealth). Some of the most common possibilities include:

five-letter code	description
ptinc	pre-tax national income
pllin	pre-tax labor income
pkkin	pre-tax capital income
fiinc	fiscal income
hweal	net personal wealth

Type ?wid_concepts to access the complete list. For example, sfiinc corresponds to the share of fiscal income, ahweal corresponds to average personal wealth. If you don't specify any indicator, it defaults to "all" and downloads all available indicators.

Area codes All data in WID.world is associated to a given area, which can be a country, a region within a country, an aggregation of countries (eg. a continent), or even the whole world. The argument areas is a vector of codes that specify the areas for which to retrieve data. Countries and world regions are coded using 2-letter ISO codes. Country subregions are coded as XX-YY where XX is the country 2-letter code. Type ?wid_area_codes to access the complete list of area codes. If you don't specify any area, it defaults to "all" and downloads data for all available areas.

Years All data in WID.world correspond to a year. Some series go as far back as the 1800s. The argument years is a vector of integer that specify those years. If you don't specify any year, it defaults to "all" and downloads data for all available years.

Percentiles The key feature of WID.world is that it provides data on the whole distribution, not just totals and averages. The argument perc is a vector of strings that indicate for which part of the distribution the data should be retrieved. For share and average variables, percentiles correspond to percentile ranges and take the form pXXpYY. For example the top 1% share correspond to p99p100. The top 10% share excluding the top 1% is p90p99. Thresholds associated to the percentile group pXXpYY correspond to the minimal income or wealth level that gets you into the group. For example, the threshold of the percentile group p90p100 or p90p91 correspond to the 90% quantile. Variables with no distributional meaning use the percentile p0p100. See http://wid.world/percentiles for more details. If you don't specify any percentile, it defaults to "all" and downloads data for all available parts of the distribution.

Age groups Data may only concern the population in a certain age group. The argument ages is a vector of age codes that specify which age categories to retrieve. Ages are coded using 3-digit codes. Some of the most common possibilities include:

3-digit code	description
999	all ages
992	adults, including elderly (20+)
996	adults, excluding elderly (20-65)

Type `?wid_age_codes` to access the complete list of age codes. If you don't specify any age, it defaults to `"all"` and downloads data for all available age groups.

Population types The data in WID.world can refer to different types of population (i.e. different statistical units). The argument `pop` is a vector of population codes. They are coded using one-letter codes. Some of the most common possibilities include:

one-letter code	description
i	individuals
t	tax units
j	equal-split adults (ie. income or wealth divided equally among spouses)

Type `?wid_population_codes` to access the complete list of population types. If you don't specify any code, it defaults to `"all"` and downloads data for all types of population.

Metadata All data in WID.world is associated to a metadata giving in particular sources and methodological details. If the argument `metadata` is `TRUE`, the command will download those as well. Default is `FALSE`.

Extrapolations/interpolations Some of the data on WID.world is the result of interpolations (when data is only available for a few years) or extrapolations (when data is not available for the most recent years) that are based on much more limited information that other data points. We include these interpolations/extrapolation by default as a convenience, and also because these values are used to perform regional aggregations. Yet we stress that these estimates, especially at the level of individual countries, can be fragile.

For many purposes, it can be preferable to exclude these data points. For that, use the option `include_extrapolations = FALSE`.

Verbose By default, the command is silent. If you set `verbose = TRUE`, it will output some information on the progress of the request.

Usage

Although all arguments default to `"all"`, you cannot download the entire database by typing `download_wid()`. The command requires you to specify either some indicators or some areas. To download the entire database, please visit https://wid.world/data/ and choose "download full dataset''.

If there is no data matching you selection on WID.world (maybe because you specified an indicator or an area that doesn't exist), the command will return `NULL` with a warning.

The command returns a sorted `data.frame` with the following columns: `country`, `variable`, `percentile`, `year` and `value`.

All monetary amounts for countries and country subregions are in constant local currency of the reference year (i.e. the previous year, the database being updated every year around July). Monetary amounts for world regions are in EUR PPP of the reference year. You can access the price index using the indicator `inyixx`, the PPP exchange rates using `xlcusp` (USD), `xlceup` (EUR), `xlcyup` (CNY), and the market exchange rates using `xlcusx` (USD), `xlceux` (EUR), `xlcyux` (CNY). To check the current reference year, you can look at when the price index is equal to 1.

Shares and wealth/income ratios are given as a fraction of 1. That is, a top 1% share of 20% is given as 0.2. A wealth/income ratio of 300% is given as 3.

Examples

Top 1% income share in the United States, 2010–2015

Here we simply seek the top 1% shares of pre-tax national income in the United States over the period 2010–2015. The function `download_wid` returns a `data.frame` with the desired data.

```
data <- download_wid(
    indicators = "sptinc", # Shares of pre-tax national income
    areas = "US", # In the United States
    years = 2010:2015, # Time period: 2010-2015
    perc = "p99p100" # Top 1% only
)
kable(data) # Pretty display of the data.frame
```

country	variable	percentile	year	value
US	sptinc992f	p99p100	2010	0.1650000
US	sptinc992f	p99p100	2011	0.1685000
US	sptinc992f	p99p100	2012	0.1804000
US	sptinc992f	p99p100	2013	0.1726000
US	sptinc992f	p99p100	2014	0.1785000
US	sptinc992f	p99p100	2015	0.1757000
US	sptinc992i	p99p100	2010	0.1896000
US	sptinc992i	p99p100	2011	0.1926000
US	sptinc992i	p99p100	2012	0.2060000
US	sptinc992i	p99p100	2013	0.1963000
US	sptinc992i	p99p100	2014	0.2013000
US	sptinc992j	p99p100	2010	0.1790000
US	sptinc992j	p99p100	2011	0.1808000
US	sptinc992j	p99p100	2012	0.1948000
US	sptinc992j	p99p100	2013	0.1847000
US	sptinc992j	p99p100	2014	0.1897000
US	sptinc992j	p99p100	2015	0.1889000
US	sptinc992m	p99p100	2010	0.2022000

country	variable	percentile	year	value
US	sptinc992m	p99p100	2011	0.2031000
US	sptinc992m	p99p100	2012	0.2178000
US	sptinc992m	p99p100	2013	0.2064000
US	sptinc992m	p99p100	2014	0.2106000
US	sptinc992m	p99p100	2015	0.2117000
US	sptinc992t	p99p100	2010	0.1970000
US	sptinc992t	p99p100	2011	0.2005000
US	sptinc992t	p99p100	2012	0.2142000
US	sptinc992t	p99p100	2013	0.2036000
US	sptinc992t	p99p100	2014	0.2092000
US	sptinc992t	p99p100	2015	0.2086000
US	sptinc996i	p99p100	2010	0.1849000
US	sptinc996i	p99p100	2011	0.1880000
US	sptinc996i	p99p100	2012	0.2045000
US	sptinc996i	p99p100	2013	0.1822000
US	sptinc996i	p99p100	2014	0.1871000
US	sptinc996i	p99p100	2015	0.1862000
US	sptinc999i	p99p100	2010	0.1896000
US	sptinc999i	p99p100	2011	0.1926000
US	sptinc999i	p99p100	2012	0.2060000
US	sptinc999i	p99p100	2013	0.1963000
US	sptinc999i	p99p100	2014	0.2013000
US	sptinc999i	p99p100	2015	0.2007000
US	sptinc999j	p99p100	2010	0.1772038
US	sptinc999j	p99p100	2015	0.1887891

If we also request the metadata, the `data.frame` also contains additional columns with extra information.

```
data <- download_wid(
    indicators = "sptinc", # Shares of pre-tax national income
    areas = "US", # In the United States
    years = 2010:2015, # Time period: 2010-2015
    perc = "p99p100", # Top 1% only
    metadata = TRUE # Also request metadata
)
colnames(data)
```

```
##  [1] "country"     "countryname" "variable"    "percentile"  "year"
##  [6] "value"       "shortname"   "shortdes"    "pop"         "age"
## [11] "source"      "imputation"  "quality"
```

Here, the metadata is the same for all observations because we only requested one variable.

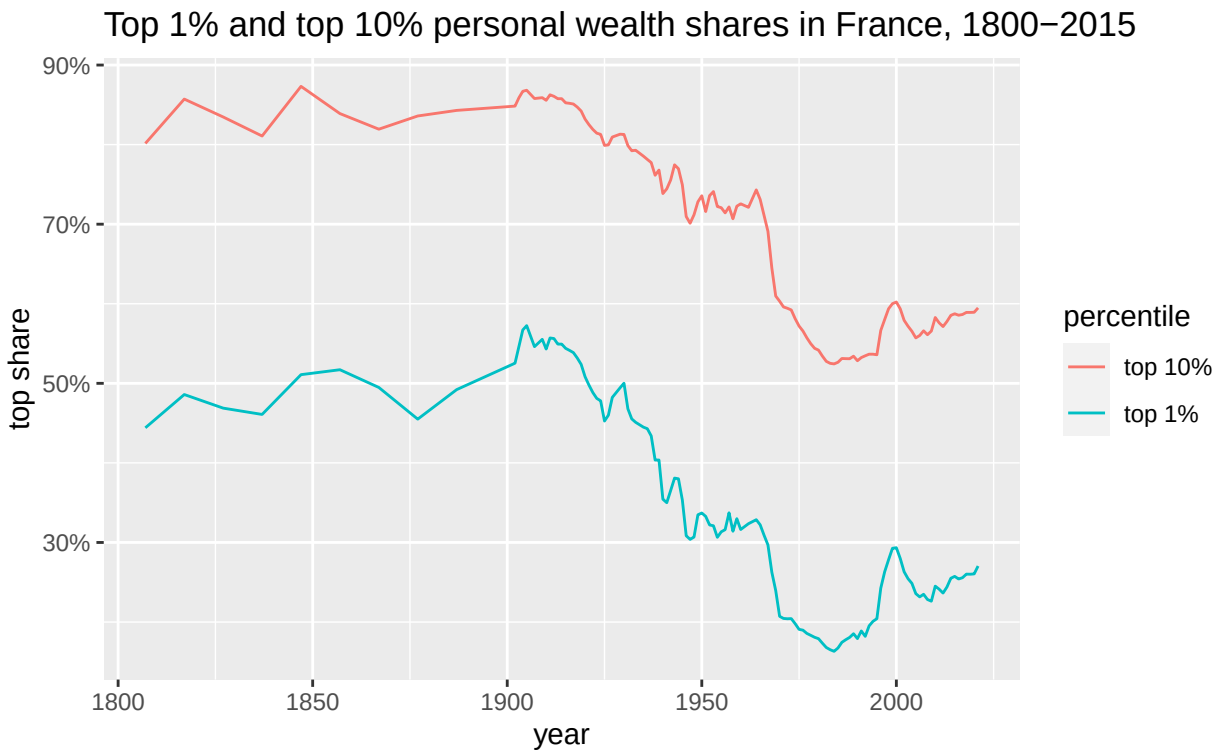
Plot top wealth shares in France since the 1800s

In this example, we still select only one indicator, but we ask for two different percentiles. The function still returns a `data.frame` in "long" format, which makes it easy to plot with `ggplot2`.

```
data <- download_wid(
    indicators = "shweal", # Shares of personal wealth
    areas = "FR", # In France
    perc = c("p90p100", "p99p100") # Top 1% and top 10%
)

library(ggplot2)
library(scales)

ggplot(data) +
    geom_line(aes(x = year, y = value, color = percentile)) +
    ylab("top share") +
    scale_y_continuous(label = percent) +
    scale_color_discrete(labels = c("p90p100" = "top 10%", "p99p100" = "top 1%")) +
    ggtitle("Top 1% and top 10% personal wealth shares in France, 1800-2015")
```



Evolution of income for the bottom 50% of the population

We now focus solely on the bottom half of the population (`p0p50`), and look at the average pre-tax national income in three different countries (France, United States and China). Since we are looking at monetary amounts for three different countries, we need to convert them into the same currency using the purchasing power parities in the database.

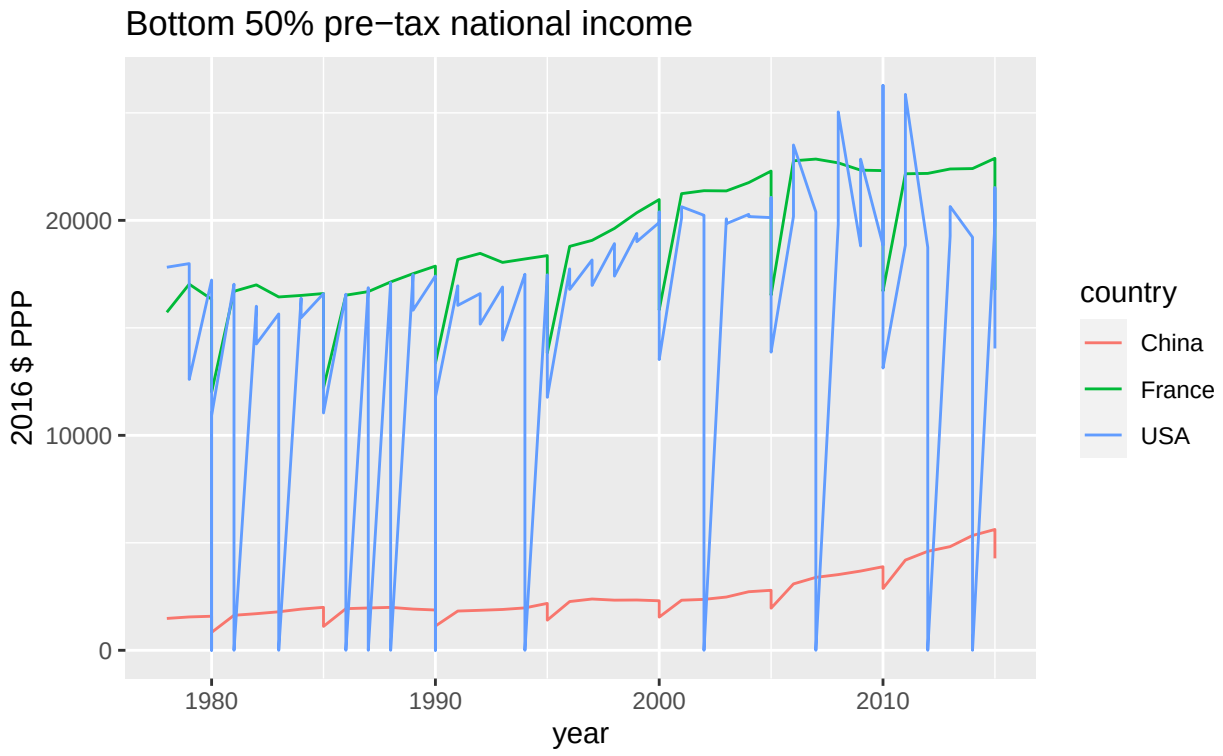
```r
# We use the tidyverse to manipulate the data, see http://tidyverse.org
library(tidyverse)

# Average incomes data
data <- download_wid(
    indicators = "aptinc", # Average pre-tax national income
    areas = c("FR", "CN", "US"), # France, China and United States
    perc = "p0p50", # Bottom half of the population
    pop = "j", # Equal-split individuals
    year = 1978:2015
) %>% rename(value_lcu = value)

# Purchasing power parities with US dollar
ppp <- download_wid(
    indicators = "xlcusp", # US PPP
    areas = c("FR", "CN", "US"), # France, China and United States
    year = 2016 # Reference year only
) %>% rename(ppp = value) %>% select(-year, -percentile)

# Convert from local currency to PPP US dollar
data <- merge(data, ppp, by = "country") %>%
    mutate(value_ppp = value_lcu/ppp)

ggplot(data) +
    geom_line(aes(x = year, y = value_ppp, color = country)) +
    ylab("2016 $ PPP") +
    scale_color_discrete(labels = c("CN" = "China", "US" = "USA", "FR" = "France")) +
    ggtitle("Bottom 50% pre-tax national income")
```



Evolution of national income over long period

We now plot the evolution of average net national income per adult in France, Germany, the United Kingdom and the United States.

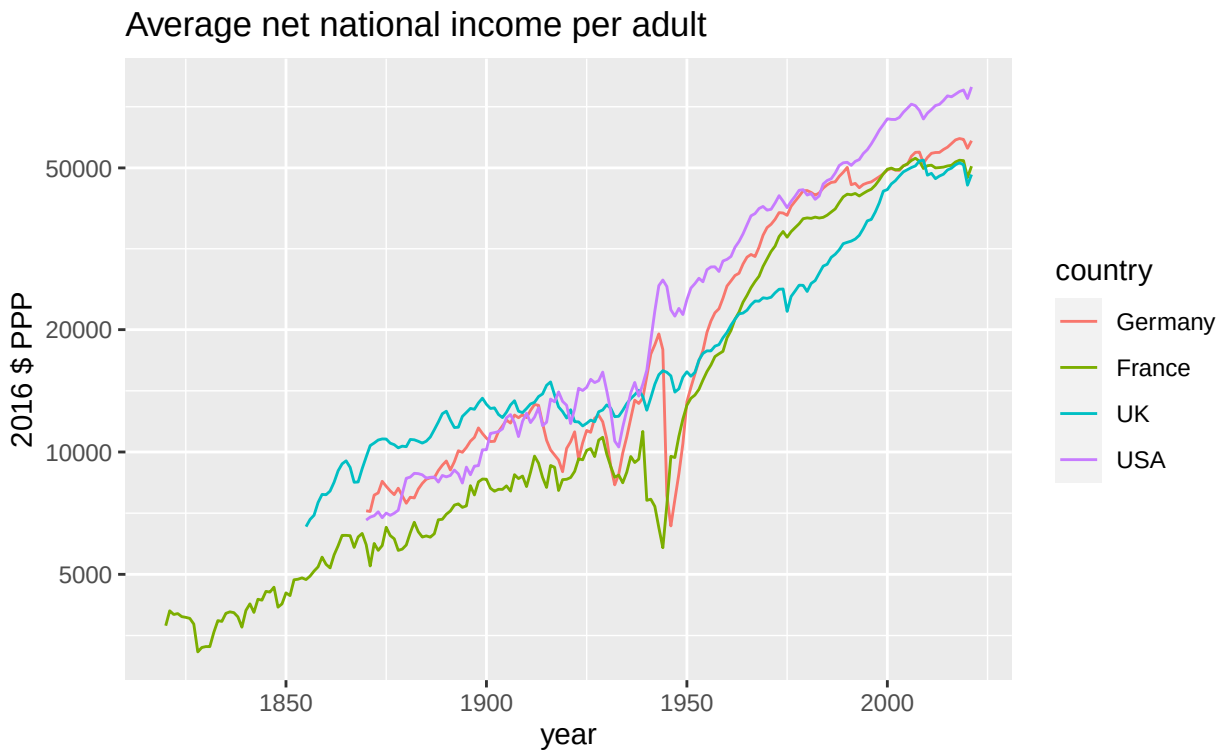
```
# Average national income data
data <- download_wid(
    indicators = "anninc", # Average net national income
    areas = c("FR", "US", "DE", "GB"),
    ages = 992 # Adults
) %>% rename(value_lcu = value)

# Purchasing power parities with US dollar
ppp <- download_wid(
    indicators = "xlcusp", # US PPP
    areas = c("FR", "US", "DE", "GB"), # France, China and United States
    year = 2016 # Reference year only
) %>% rename(ppp = value) %>% select(-year, -percentile)

# Convert from local currency to PPP US dollar
data <- merge(data, ppp, by = "country") %>%
    mutate(value_ppp = value_lcu/ppp)

ggplot(data) +
    geom_line(aes(x = year, y = value_ppp, color = country)) +
    scale_y_log10(breaks = c(2e3, 5e3, 1e4, 2e4, 5e4)) +
    ylab("2016 $ PPP") +
```

```
    scale_color_discrete(
        labels = c("US" = "USA", "FR" = "France", "DE" = "Germany", "GB" = "UK")
    ) +
    ggtitle("Average net national income per adult")
```



Divergence of incomes in the United States since 1970

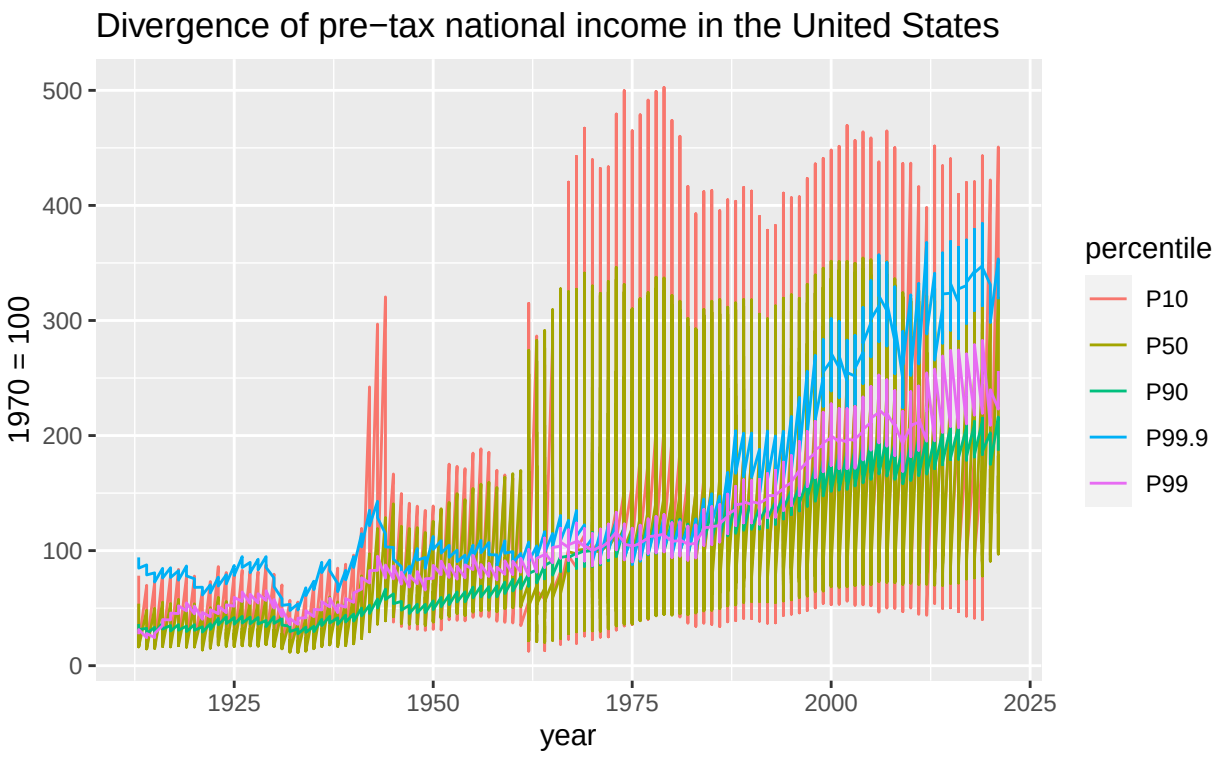
Yet another way of observing an increase in inequality is to observe how the different fractiles of the distribution have evolved since a reference year. In the following graph, you can see that the different percentiles of the US distribution of pre-tax national income had a similar evolution throughout the 1970s, and then started to diverge after 1980.

```
data <- download_wid(
    indicators = "tptinc", # Thresholds of pre-tax national income
    areas = "US", # United States
    perc = c("p10p100", "p50p100", "p90p100", "p99p100", "p99.9p100")
)

# Keep the value for 1970 in a separate data.frame
data1970 <- data %>% filter(year == 1970) %>%
    rename(value1970 = value) %>%
    select(-year)

# Divide series by the reference year (1970)
data <- merge(data, data1970, by = c("country", "percentile")) %>%
    mutate(value = 100*value/value1970)
```

```
ggplot(data) +
    geom_line(aes(x = year, y = value, color = percentile)) +
    ylab("1970 = 100") +
    scale_color_discrete(
        labels = c("p10p100" = "P10", "p50p100" = "P50", "p90p100" = "P90",
            "p99p100" = "P99", "p99.9p100" = "P99.9")
    ) +
    ggtitle("Divergence of pre-tax national income in the United States")
```



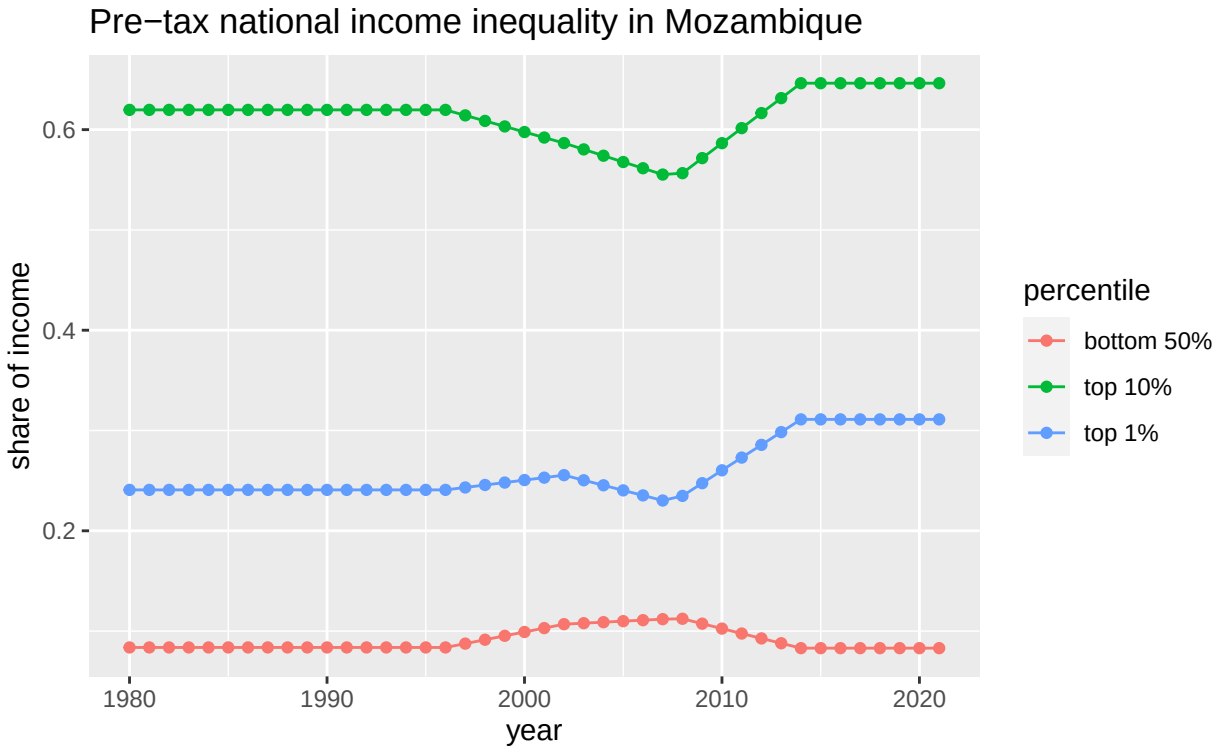
Including or excluding extrapolations

In some countries, many data points are the result of interpolations or extrapolations. For example, estimates in most African countries are based on surveys that are only realized every few years, which we interpolate to produce yearly series and perform regional aggregations. For example, takethe inequality series for Mozambique:

```
data <- download_wid(
    indicators = "sptinc", # Shares of pre-tax national income
    areas = "MZ", # Mozambique
    perc = c("p0p50", "p90p100", "p99p100") # Bottom 50%, top 10% and top 1%
)

ggplot(data, aes(x = year, y = value, color = percentile)) +
    geom_line() + geom_point() +
    ylab("share of income") +
    scale_color_discrete(
        labels = c("p0p50" = "bottom 50%", "p90p100" = "top 10%", "p99p100" = "top 1%")
```

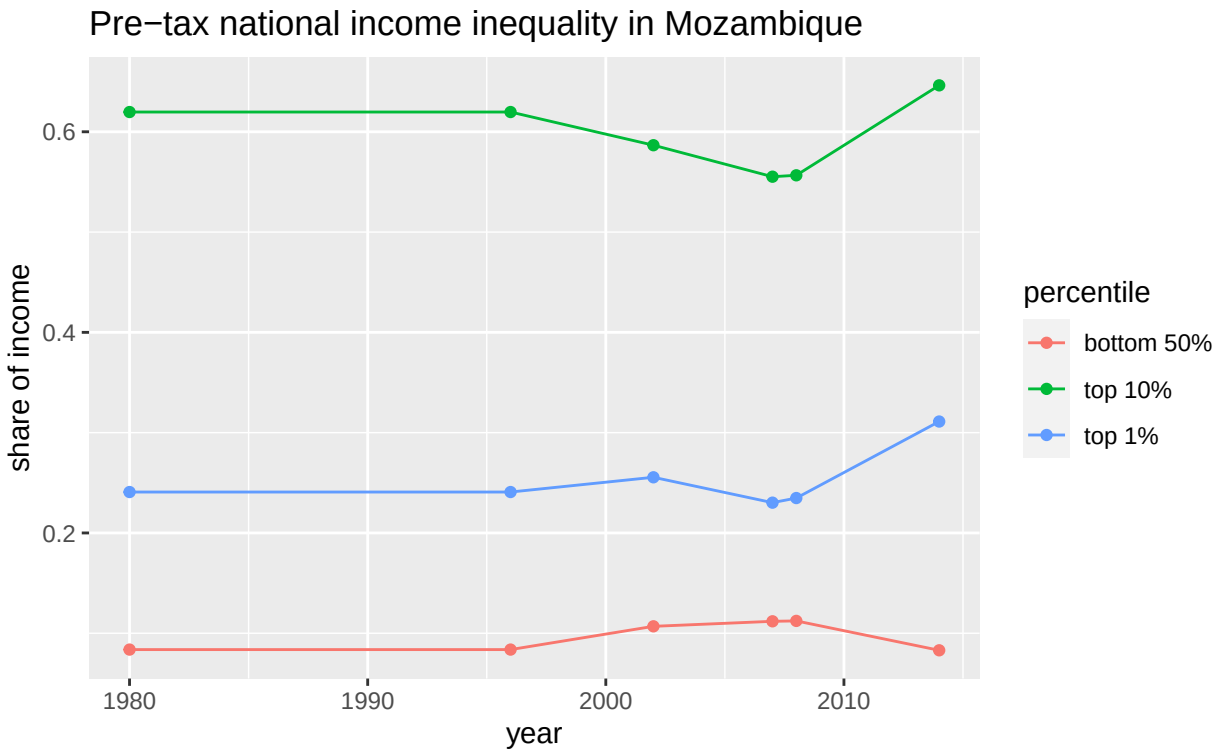
```
    ) +
    ggtitle("Pre-tax national income inequality in Mozambique")
```



The linear interpolation is quite visible. In some contexts, this might be undesirable. To exclude interpolated points, use `include_extrapolations = FALSE`:

```
data <- download_wid(
    indicators = "sptinc", # Shares of pre-tax national income
    areas = "MZ", # Mozambique
    perc = c("p0p50", "p90p100", "p99p100"), # Bottom 50%, top 10% and top 1%
    include_extrapolations = FALSE # Do not include interpolations
)

ggplot(data, aes(x = year, y = value, color = percentile)) +
    geom_line() + geom_point() +
    ylab("share of income") +
    scale_color_discrete(
        labels = c("p0p50" = "bottom 50%", "p90p100" = "top 10%", "p99p100" = "top 1%")
    ) +
    ggtitle("Pre-tax national income inequality in Mozambique")
```


Pre−tax national income inequality in Mozambique
share of income
0.6
0.4
0.2
1980
1990
2000
2010
year
percentile
bottom 50%
top 10%
top 1%