# FRED - Example

Datasets

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## Contents



## Introduction

```
rm(list = ls())
pklist <- c("tidyverse", "fredr")
source("https://fgeerolf.github.io/datasets/load-packages.R")
options(tibble.print_max = 30)
```

## Set Key: FRED

Here you need to insert a code chunk showing (that's the only part of the R-Markdown file that I did not include):

**fredr_set_key("your key")**

You may get a key on this website: https://research.stlouisfed.org/useraccount/login/secure/

## Unemployment Rate and Fed Funds

### Modern Data

```
fredr(series_id = "UNRATE")
```

```
## # A tibble: 848 x 3
##    date       series_id value
##    <date>     <chr>     <dbl>
##  1 1948-01-01 UNRATE      3.4
##  2 1948-02-01 UNRATE      3.8
##  3 1948-03-01 UNRATE      4
##  4 1948-04-01 UNRATE      3.9
##  5 1948-05-01 UNRATE      3.5
##  6 1948-06-01 UNRATE      3.6
##  7 1948-07-01 UNRATE      3.6
##  8 1948-08-01 UNRATE      3.9
##  9 1948-09-01 UNRATE      3.8
## 10 1948-10-01 UNRATE      3.7
## # ... with 838 more rows
```

```
fredr(series_id = "UNRATE",
      observation_start = as.Date("1990-01-01"))
```

```
## # A tibble: 344 x 3
##    date       series_id value
##    <date>     <chr>     <dbl>
##  1 1990-01-01 UNRATE      5.4
##  2 1990-02-01 UNRATE      5.3
##  3 1990-03-01 UNRATE      5.2
##  4 1990-04-01 UNRATE      5.4
##  5 1990-05-01 UNRATE      5.4
##  6 1990-06-01 UNRATE      5.2
##  7 1990-07-01 UNRATE      5.5
##  8 1990-08-01 UNRATE      5.7
##  9 1990-09-01 UNRATE      5.9
## 10 1990-10-01 UNRATE      5.9
## # ... with 334 more rows
```

What are other data series for unemployment?

```
unemp.1929.1942 <- fredr(series_id = "M0892AUSM156SNBR")
unemp.1947.1966 <- fredr(series_id = "M0892CUSM156NNBR")
unemp.1948.now <- fredr(series_id = "UNRATE")

unemp.1929.1942 %>%
  head
```

```
## # A tibble: 6 x 3
##   date       series_id        value
##   <date>     <chr>            <dbl>
## 1 1929-04-01 M0892AUSM156SNBR  0.69
## 2 1929-05-01 M0892AUSM156SNBR  1.65
## 3 1929-06-01 M0892AUSM156SNBR  2.06
## 4 1929-07-01 M0892AUSM156SNBR  0.79
## 5 1929-08-01 M0892AUSM156SNBR  0.04
## 6 1929-09-01 M0892AUSM156SNBR  0.91
```

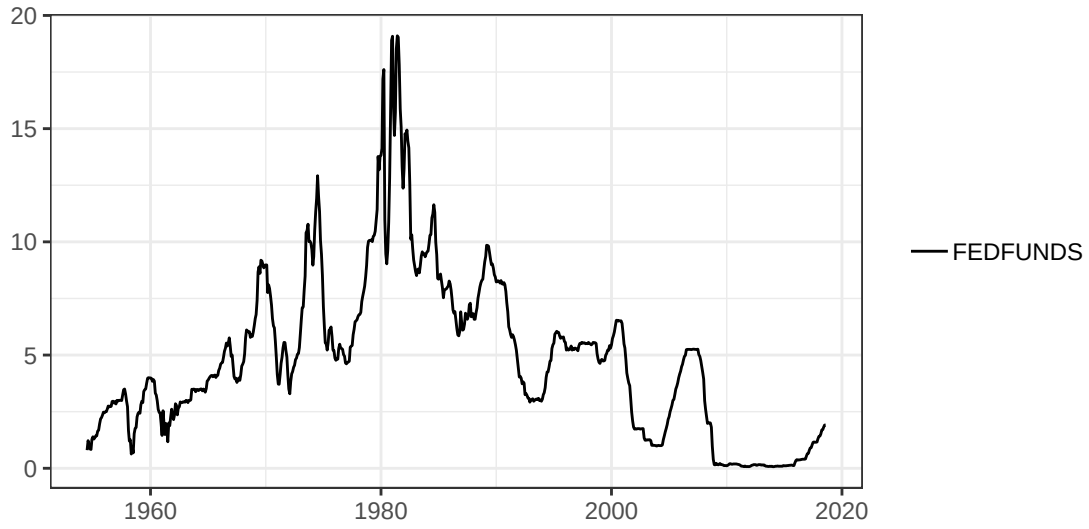
```
fredr_series_search_text(search_text = "unemployment",
                         order_by = "popularity",
                         sort_order = "desc") %>%
  select(id, observation_start, title) %>%
```

```
  as.tibble %>%
  head(20)
```

```
## # A tibble: 20 x 3
##    id          observation_start title
##    <chr>       <chr>             <chr>
##  1 CPIAUCSL    1947-01-01        Consumer Price Index for All Urban Consu~
##  2 UNRATE      1948-01-01        Civilian Unemployment Rate
##  3 PAYEMS      1939-01-01        All Employees: Total Nonfarm Payrolls
##  4 USSLIND     1982-01-01        Leading Index for the United States
##  5 NROU        1949-01-01        Natural Rate of Unemployment (Long-Term)
##  6 LNS14000024 1948-01-01        Unemployment Rate: 20 years and over
##  7 UNEMPLOY    1948-01-01        Unemployment Level
##  8 U6RATE      1994-01-01        Total unemployed, plus all marginally at~
##  9 M0892AUSM1~ 1929-04-01        Unemployment Rate for United States
## 10 UNRATENSA   1948-01-01        Civilian Unemployment Rate
## 11 LNS14000031 1972-01-01        Unemployment Rate: 20 years and over, Bl~
## 12 NROUST      1949-01-01        Natural Rate of Unemployment (Short-Term)
## 13 USPHCI      1979-01-01        Coincident Economic Activity Index for t~
## 14 CCSA        1967-01-07        Continued Claims (Insured Unemployment)
## 15 LNU04027662 1992-01-01        Unemployment Rate: College Graduates: Ba~
## 16 PAYNSA      1939-01-01        All Employees: Total Nonfarm Payrolls
## 17 UEMPMEAN    1948-01-01        Average (Mean) Duration of Unemployment
## 18 LNS14000006 1972-01-01        Unemployment Rate: Black or African Amer~
## 19 Q0892BUSQ1~ 1940-04-01        Unemployment Rate for United States
## 20 CALOSA7URN  1990-01-01        Unemployment Rate in Los Angeles County,~
```

### Integrate with tidyverse package

```
fredr_series_search_text(search_text = "federal funds",
                         order_by = "popularity",
                         sort_order = "desc",
                         limit = 1) %>%
  pull(id) %>%
  fredr(series_id = .) %>%
  ggplot(data = ., mapping = aes(x = date, y = value, linetype = series_id)) +
  geom_line() +
  labs(x = "Observation Date", y = "Rate", color = "Series") +
  theme_bw() + xlab("") + ylab("") + theme(legend.title = element_blank())
```




### Look for series: debt and gross domestic product

```
fredr_series_search_text(search_text = "debt",
                         order_by = "popularity",
                         sort_order = "desc",
                         limit = 5) %>%
  as.data.frame %>%
  arrange(observation_start)
```

```
##               id realtime_start realtime_end
## 1       FEDFUNDS     2018-09-24   2018-09-24
## 2            DFF     2018-09-24   2018-09-24
## 3    GFDEGDQ188S     2018-09-24   2018-09-24
## 4   BAMLH0A0HYM2     2018-09-24   2018-09-24
## 5 BAMLH0A0HYM2EY     2018-09-24   2018-09-24
##                                                                 title
## 1                                    Effective Federal Funds Rate
## 2                                    Effective Federal Funds Rate
## 3 Federal Debt: Total Public Debt as Percent of Gross Domestic Product
## 4            ICE BofAML US High Yield Master II Option-Adjusted Spread
## 5                  ICE BofAML US High Yield Master II Effective Yield
##   observation_start observation_end    frequency frequency_short
## 1        1954-07-01      2018-08-01      Monthly               M
## 2        1954-07-01      2018-09-21 Daily, 7-Day               D
## 3        1966-01-01      2018-01-01    Quarterly               Q
## 4        1996-12-31      2018-09-21 Daily, Close               D
## 5        1996-12-31      2018-09-21 Daily, Close               D
##           units units_short     seasonal_adjustment
## 1       Percent           % Not Seasonally Adjusted
## 2       Percent           % Not Seasonally Adjusted
## 3 Percent of GDP    % of GDP     Seasonally Adjusted
## 4       Percent           % Not Seasonally Adjusted
## 5       Percent           % Not Seasonally Adjusted
##   seasonal_adjustment_short           last_updated popularity
## 1                       NSA 2018-09-04 15:41:02-05         94
## 2                       NSA 2018-09-24 15:41:07-05         79
```

```
## 3                       SA 2018-07-27 16:31:02-05         83
## 4                      NSA 2018-09-24 08:51:17-05         90
## 5                      NSA 2018-09-24 08:51:17-05         80
##   group_popularity
## 1               95
## 2               95
## 3               83
## 4               90
## 5               80
##
## 1
## 2
## 3
## 4 The ICE BofAML Option-Adjusted Spreads (OASs) are the calculated spreads between a computed OAS in
## 5
```

```
fredr_series_search_text(search_text = "gross domestic product",
                         order_by = "popularity",
                         sort_order = "desc",
                         limit = 5) %>%
  as.data.frame %>%
  arrange(observation_start)
```

```
##               id realtime_start realtime_end
## 1          PAYEMS     2018-09-24   2018-09-24
## 2           GDPC1     2018-09-24   2018-09-24
## 3             GDP     2018-09-24   2018-09-24
## 4 A191RL1Q225SBEA     2018-09-24   2018-09-24
## 5     GFDEGDQ188S     2018-09-24   2018-09-24
##                                                        title
## 1                              All Employees: Total Nonfarm Payrolls
## 2                                        Real Gross Domestic Product
## 3                                             Gross Domestic Product
## 4                                        Real Gross Domestic Product
## 5 Federal Debt: Total Public Debt as Percent of Gross Domestic Product
##   observation_start observation_end frequency frequency_short
## 1        1939-01-01      2018-08-01   Monthly               M
## 2        1947-01-01      2018-04-01 Quarterly               Q
## 3        1947-01-01      2018-04-01 Quarterly               Q
## 4        1947-04-01      2018-04-01 Quarterly               Q
## 5        1966-01-01      2018-01-01 Quarterly               Q
##                                  units                  units_short
## 1                Thousands of Persons            Thous. of Persons
## 2    Billions of Chained 2012 Dollars          Bil. of Chn. 2012 $
## 3                  Billions of Dollars                   Bil. of $
## 4 Percent Change from Preceding Period % Chg. from Preceding Period
## 5                      Percent of GDP                    % of GDP
##              seasonal_adjustment seasonal_adjustment_short
## 1             Seasonally Adjusted                       SA
## 2 Seasonally Adjusted Annual Rate                     SAAR
## 3 Seasonally Adjusted Annual Rate                     SAAR
## 4 Seasonally Adjusted Annual Rate                     SAAR
## 5             Seasonally Adjusted                       SA
##             last_updated popularity group_popularity
## 1 2018-09-07 08:13:09-05         84               85
```

```
## 2 2018-08-29 07:51:02-05         94               97
## 3 2018-08-29 07:51:02-05         91               93
## 4 2018-08-29 07:51:02-05         89               97
## 5 2018-07-27 16:31:02-05         83               83
##
## 1 All Employees: Total Nonfarm, commonly known as Total Nonfarm Payroll, is a measure of the number
## 2
## 3
## 4
## 5
```

```
fredr_series_observations(series_id = "UNRATE",
                          observation_start = as.Date("1990-01-01"),
                          frequency = "q",
                          units = "chg")
```

```
## # A tibble: 115 x 3
##    date       series_id   value
##    <date>     <chr>       <dbl>
##  1 1990-01-01 UNRATE    -0.0667
##  2 1990-04-01 UNRATE     0.0333
##  3 1990-07-01 UNRATE     0.367
##  4 1990-10-01 UNRATE     0.433
##  5 1991-01-01 UNRATE     0.467
##  6 1991-04-01 UNRATE     0.233
##  7 1991-07-01 UNRATE     0.0333
##  8 1991-10-01 UNRATE     0.233
##  9 1992-01-01 UNRATE     0.267
## 10 1992-04-01 UNRATE     0.233
## # ... with 105 more rows
```

## Integrate the purrr package

This is how to create a wide database with various FRED Databases:

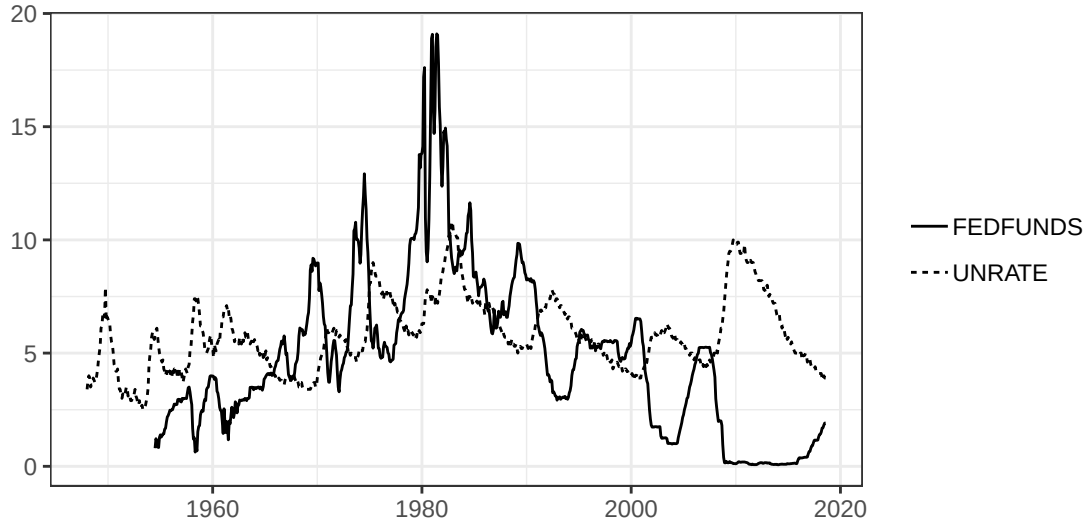
```
map_dfr(c("FEDFUNDS", "UNRATE"), fredr) %>%
  spread(series_id, value) %>%
  top_n(10)
```

```
## Selecting by UNRATE
```

```
## # A tibble: 10 x 3
##    date       FEDFUNDS UNRATE
##    <date>        <dbl>  <dbl>
##  1 1982-09-01    10.3    10.1
##  2 1982-10-01     9.71   10.4
##  3 1982-11-01     9.2    10.8
##  4 1982-12-01     8.95   10.8
##  5 1983-01-01     8.68   10.4
##  6 1983-02-01     8.51   10.4
##  7 1983-03-01     8.77   10.3
##  8 1983-04-01     8.8    10.2
##  9 1983-05-01     8.63   10.1
## 10 1983-06-01     8.98   10.1
```

This is how to map them:

```
map_dfr(c("UNRATE", "FEDFUNDS"), fredr) %>%
  ggplot(data = ., mapping = aes(x = date, y = value, linetype = series_id)) +
  geom_line() +
  labs(x = "Observation Date", y = "Rate", linetype = "Series") +
  theme_bw() + xlab("") + ylab("") + theme(legend.title = element_blank())
```




```
params <- list(series_id = c("UNRATE", "OILPRICE"),
               frequency = c("m", "q"))

pmap_dfr(.l = params,
         .f = ~ fredr(series_id = .x, frequency = .y))
```

```
## # A tibble: 1,119 x 3
##    date       series_id value
##    <date>     <chr>     <dbl>
##  1 1948-01-01 UNRATE      3.4
##  2 1948-02-01 UNRATE      3.8
##  3 1948-03-01 UNRATE      4
##  4 1948-04-01 UNRATE      3.9
##  5 1948-05-01 UNRATE      3.5
##  6 1948-06-01 UNRATE      3.6
##  7 1948-07-01 UNRATE      3.6
##  8 1948-08-01 UNRATE      3.9
##  9 1948-09-01 UNRATE      3.8
## 10 1948-10-01 UNRATE      3.7
## # ... with 1,109 more rows
```

# Nominal and Real Oil Prices

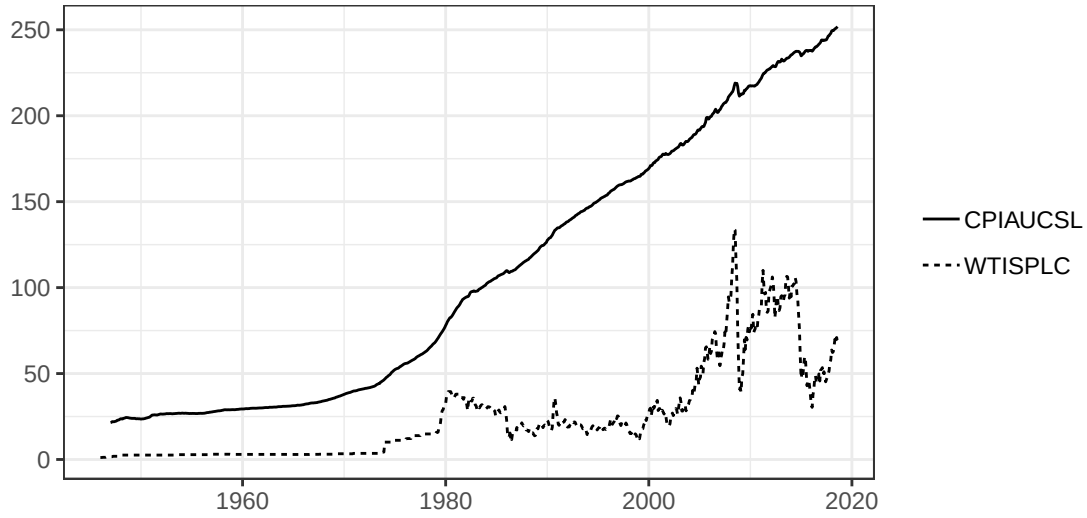
## Oil Prices and Price Index

Data from FRED - Federal Reserve Bank of St. Louis:

- **CPIAUCSL**: Consumer Price Index for All Urban Consumers: All Items. Available at: https://fred.stlouisfed.org/series/CPIAUCSL

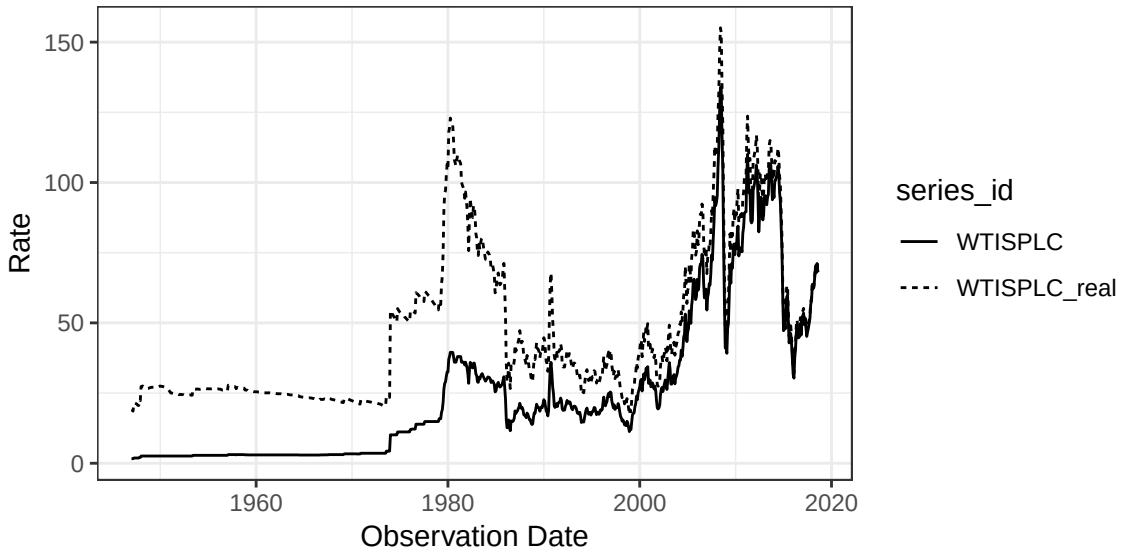
- **WTISPLC**: Spot Crude Oil Price: West Texas Intermediate (WTI). Available at: https://fred.stlouisfed.org/series/WTISPLC

```
map_dfr(c("CPIAUCSL", "WTISPLC"), fredr) %>%
  ggplot(data = ., mapping = aes(x = date, y = value, linetype = series_id)) +
  geom_line() +
  labs(x = "Observation Date", y = "Rate", color = "Series") +
  theme_bw() + xlab("") + ylab("") + theme(legend.title = element_blank())
```




## Real Oil Prices

```
map_dfr(c("CPIAUCSL", "WTISPLC"), fredr) %>%
  spread(series_id, value) %>%
  # Current House Prices from August 2018
  na.omit %>%
  mutate(WTISPLC_real = CPIAUCSL[860]* WTISPLC / CPIAUCSL) %>%
  select(-CPIAUCSL) %>%
  gather(series_id, value, -date) %>%
  ggplot(data = ., mapping = aes(x = date, y = value, linetype = series_id)) +
  geom_line() +
  labs(x = "Observation Date", y = "Rate", color = "Series") +
  theme_bw()
```




## Passenger car registration

```
fredr_series_search_text(search_text = "Passenger Car Registrations",
                         order_by = "popularity",
                         sort_order = "desc",
                         limit = 5) %>%
  as.data.frame %>%
  select(observation_start, id, title, everything()) %>%
  arrange(observation_start)
```

```
##   observation_start              id
## 1        1895-01-01 A01108USA258NNBR
## 2        1925-01-01 M01109USM543NNBR
## 3        1960-01-01    USASACRQISMEI
## 4        1960-01-01  SLRTCR03USQ180S
## 5        1960-01-01    USASACRMISMEI
##                                                                  title
## 1     Automobile Registrations, Passenger Cars, Total for United States
## 2                    New Passenger Car Registrations for United States
## 3                         Passenger Car Registrations in United States
## 4 Retail Trade Sales: Passenger Car Registrations for the United States
## 5                         Passenger Car Registrations in United States
##   realtime_start realtime_end observation_end          frequency
## 1     2018-09-24   2018-09-24      1944-01-01 Annual, End of Year
## 2     2018-09-24   2018-09-24      1966-12-01             Monthly
## 3     2018-09-24   2018-09-24      2018-04-01           Quarterly
## 4     2018-09-24   2018-09-24      2018-04-01           Quarterly
## 5     2018-09-24   2018-09-24      2018-06-01             Monthly
##   frequency_short             units    units_short     seasonal_adjustment
## 1               A              Cars           Cars Not Seasonally Adjusted
## 2               M Thousands of Cars Thous. Of Cars Not Seasonally Adjusted
## 3               Q    Index 2010=100 Index 2010=100     Seasonally Adjusted
## 4               Q             Units          Units     Seasonally Adjusted
## 5               M    Index 2010=100 Index 2010=100     Seasonally Adjusted
```

```
##   seasonal_adjustment_short           last_updated popularity
## 1                       NSA 2012-08-15 15:49:17-05         18
## 2                       NSA 2012-08-16 11:04:06-05          7
## 3                        SA 2018-07-12 14:21:11-05         42
## 4                        SA 2018-07-12 14:21:10-05         12
## 5                        SA 2018-07-12 14:21:11-05          7
##   group_popularity
## 1               18
## 2                7
## 3               43
## 4               15
## 5               43
##
## 1
## 2 Data For 1925 Are For Forty-Seven States Plus Estimates For The Other Three States (Which Account
## 3
## 4
## 5
```

```
map_dfr(c("USASACRQISMEI"), fredr) %>%
  spread(series_id, value) %>%
  na.omit %>%
  # Current House Prices from August 2018
  gather(series_id, value, -date) %>%
  ggplot(data = ., mapping = aes(x = date, y = value, linetype = series_id)) +
  geom_line() +
  scale_y_continuous(breaks = seq(80, 220, 20)) + xlab("") + ylab("") +
  theme_bw() + theme(legend.title = element_blank())
```


## Computing Environment

```
Sys.time()
```

```
## [1] "2018-09-24 17:30:26 PDT"
```

```
sessionInfo()
```

```
## R version 3.5.1 (2018-07-02)
## Platform: x86_64-apple-darwin15.6.0 (64-bit)
## Running under: macOS High Sierra 10.13.6
##
## Matrix products: default
## BLAS: /Library/Frameworks/R.framework/Versions/3.5/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/3.5/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] bindrcpp_0.2.2  fredr_1.0.0     forcats_0.3.0   stringr_1.3.1
##  [5] dplyr_0.7.6     purrr_0.2.5     readr_1.1.1     tidyr_0.8.1
##  [9] tibble_1.4.2    ggplot2_3.0.0   tidyverse_1.2.1
##
## loaded via a namespace (and not attached):
##  [1] tidyselect_0.2.4 haven_1.1.2      lattice_0.20-35  colorspace_1.3-2
##  [5] htmltools_0.3.6  yaml_2.2.0       utf8_1.1.4       rlang_0.2.2
##  [9] pillar_1.3.0     glue_1.3.0       withr_2.1.2      modelr_0.1.2
## [13] readxl_1.1.0     bindr_0.1.1      plyr_1.8.4       munsell_0.5.0
## [17] gtable_0.2.0     cellranger_1.1.0 rvest_0.3.2      evaluate_0.11
## [21] labeling_0.3     knitr_1.20       curl_3.2         fansi_0.3.0
## [25] broom_0.5.0      Rcpp_0.12.18     scales_1.0.0     backports_1.1.2
## [29] jsonlite_1.5     hms_0.4.2        digest_0.6.15    stringi_1.2.4
## [33] grid_3.5.1       rprojroot_1.3-2  cli_1.0.0        tools_3.5.1
## [37] magrittr_1.5     lazyeval_0.2.1   crayon_1.3.4     pkgconfig_2.0.2
## [41] xml2_1.2.0       lubridate_1.7.4  assertthat_0.2.0 rmarkdown_1.10
## [45] httr_1.3.1       rstudioapi_0.7   R6_2.2.2         nlme_3.1-137
## [49] compiler_3.5.1
```