2021-07-31

Contents

```r
pacman::p_load("tidyverse",
               "readxl",
               "lubridate",
               "knitr")
```

Chapter 1

2021 6   COVID-
19

Chapter 2

- 1963 2020

2.1

-
-

$$\log(Y_{year,quaterly}) - \log(Y_{year-1,quaterly})$$

-

2.2 R

```r
col.label <-
   c("year",
     "1",
     "2",
     "3",
     "4",
     "5",
     "6",
     "7",
     "8",
```

7

```r
      "9",
      "10",
      "11",
      "12",
      "type",
      "group")

select.raw <- 14:63

select.column <- c(1,3:14)

raw.vacancy.full <-
  read_excel("data/ 6 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "   ")

colnames(raw.vacancy.full) <- col.label

raw.seeker.full <-
  read_excel("data/ 7 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "   ")

colnames(raw.seeker.full) <- col.label

raw.hir.full <-
  read_excel("data/ 8 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = "   ",
         group = "   ")

colnames(raw.hir.full) <- col.label


raw.vacancy.part <-
  read_excel("data/ 6 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "    ")
```

```r
colnames(raw.vacancy.part) <- col.label

raw.seeker.part <-
  read_excel("data/ 7 .xlsx",
             sheet = "       ")  %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "    ")

colnames(raw.seeker.part) <- col.label

raw.hir.part <-
  read_excel("data/ 8 .xlsx",
             sheet = "       ") %>%
  .[select.raw,select.column] |>
  mutate(type = "   ",
         group = "    ")

colnames(raw.hir.part) <- col.label

df <-
  rbind(raw.hir.full,
        raw.hir.part,
        raw.vacancy.full,
        raw.vacancy.part,
        raw.seeker.full,
        raw.seeker.part
        ) |>
  pivot_longer(cols = 2:13,
               names_to = "month",
               values_to = "n") |>
  mutate(n = n |> as.numeric(),
         year = year |> str_sub(1,4) |> as.numeric(),
         month = month |> as.numeric(),
         quaterly = month |> cut(c(0,3,6,9,12), labels = c(1,2,3,4)),
         date = yq(str_c(year,quaterly,sep = ":Q"))
         ) |>
  group_by(date,type) |>
  mutate(n = n |> sum()) |>
  ungroup() |>
  distinct(year,quaterly,date,type,n) |>
  spread(key = type, value = n) |>
  group_by(quaterly) |>
  mutate(  = log( ) - log(lag( )),
           = log( ) - log(lag( )),
```

```
                   = log(  ) - log(lag(  ))
            ) |>
  ungroup() |>
  pivot_longer(cols = c(4:6),
               names_to = "type",
               values_to = "N") |>
  na.omit()

fig <-
  df |>
  ggplot(aes(x = date,
             y = N)
         ) +
  geom_line() +
  geom_hline(yintercept = 0) +
  facet_wrap(~type,
             ncol = 1) +
  ylab("") +
  xlab("") +
  theme_bw()
```
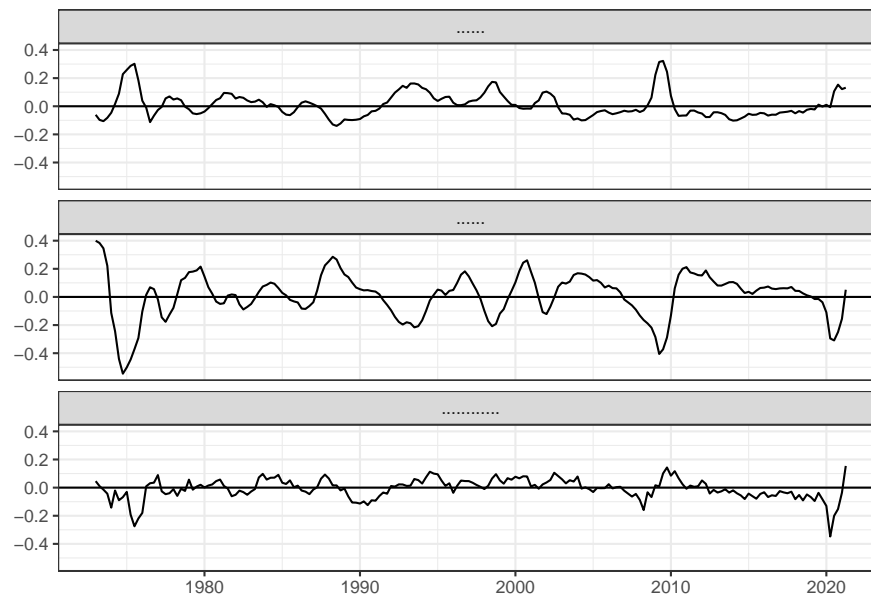
2.3

-
  - – 90
- COVID-19 2020 2 3 3 90
- 2020 2 COVID-19

Chapter 3

：

- 1963　2020　　　　Kawata and Sato (2021)

3.1

-
    - Kawata and Sato (2021)
  - Diamond-Mortencen-Pissarides　　　(Rogerson et al., 2005)　　　4

  1.

$$rU = b + \underset{\smile}{\Delta}$$

$$\Delta = \frac{m}{\underset{\smile}{u}} \times \underbrace{(W - U)}$$

$m:$　　$u:$　$U:$　　$W:$　　$r, b:$

-
    - 　　　　　　　　　　$W - U$
    - 　　　　　　　　　　　　　　　　" "

13

2.

$$rV = -k + \frac{m}{v} \times (J - V)$$

$v :$ $m/v :$ $J :$ $V :$ $k :$

3.

$$V = 0$$

- 0

4.

$$(1 - \beta)(W - U) = \beta(J - V)$$

$\beta :$

- β Δ " " β

3.1.1

-

$$\Delta = \frac{m}{u} \times \underbrace{(W - U)} = \frac{m}{u} \times \underbrace{\frac{\beta}{1 - \beta}(J - V)}$$

-

$$\Delta = \frac{m}{u} \times \underbrace{(W - U)} = \frac{m}{u} \times \underbrace{\frac{\beta}{1 - \beta}k \times \frac{v}{m}}$$

-

- (β, k) Δ

- 2019 VS 2020 , "With COVID-19" VS "Without COVID-19" Δ, Δ'

$$\log(\Delta) - \log(\Delta') = \underbrace{\log(\frac{m'}{u'}) - \log(\frac{m}{u})}_{} + \underbrace{\log(\frac{v'}{m'}) - \log(\frac{v}{m})}_{} = \log(\frac{v'}{u'}) - \log(\frac{v}{u})$$

- v/u

  –

3.1.2

-

  – 2020 4 $\Delta = 2020 \ 4$ $\Delta' = 2019 \ 4$

  –

3.2 R

```r
col.label <-
   c("year",
     "1",
     "2",
     "3",
     "4",
     "5",
     "6",
     "7",
     "8",
     "9",
     "10",
     "11",
     "12",
     "type",
     "group")

select.raw <- 14:63

select.column <- c(1,3:14)
```

```r
raw.vacancy.full <-
  read_excel("data/ 6 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "   ")

colnames(raw.vacancy.full) <- col.label

raw.seeker.full <-
  read_excel("data/ 7 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "   ")

colnames(raw.seeker.full) <- col.label

raw.hir.full <-
  read_excel("data/ 8 .xlsx",
             sheet = "        ") %>%
  .[select.raw,select.column] |>
  mutate(type = "  ",
         group = "   ")

colnames(raw.hir.full) <- col.label


raw.vacancy.part <-
  read_excel("data/ 6 .xlsx",
             sheet = "       ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "    ")

colnames(raw.vacancy.part) <- col.label

raw.seeker.part <-
  read_excel("data/ 7 .xlsx",
             sheet = "       ") %>%
  .[select.raw,select.column] |>
  mutate(type = " ",
         group = "     ")

colnames(raw.seeker.part) <- col.label
```

```r
raw.hir.part <-
  read_excel("data/ 8 .xlsx",
             sheet = "       ") %>%
  .[select.raw,select.column] |>
  mutate(type = "   ",
         group = "    ")

colnames(raw.hir.part) <- col.label

df <-
  rbind(raw.hir.full,
        raw.hir.part,
        raw.vacancy.full,
        raw.vacancy.part,
        raw.seeker.full,
        raw.seeker.part
        ) |>
  pivot_longer(cols = 2:13,
               names_to = "month",
               values_to = "n") |>
  mutate(n = n |> as.numeric(),
         year = year |> str_sub(1,4) |> as.numeric(),
         month = month |> as.numeric(),
         quaterly = month |> cut(c(0,3,6,9,12), labels = c(1,2,3,4)),
         date = yq(str_c(year,quaterly,sep = ":Q"))
         ) |>
  group_by(date,type) |>
  mutate(n = n |> sum()) |>
  ungroup() |>
  distinct(year,quaterly,date,type,n) |>
  spread(key = type, value = n) |>
  group_by(quaterly) |>
  mutate(   = log(  / ) - log(lag(  / )),
            = log(lag(  / )) - log(  / ),
              = log( / ) - log(lag( / ))
         ) |>
  ungroup() |>
  select(- ,
         - ,
         -  ) |>
  pivot_longer(cols = c(4:6),
               names_to = "type",
               values_to = "N") |>
  na.omit()
```
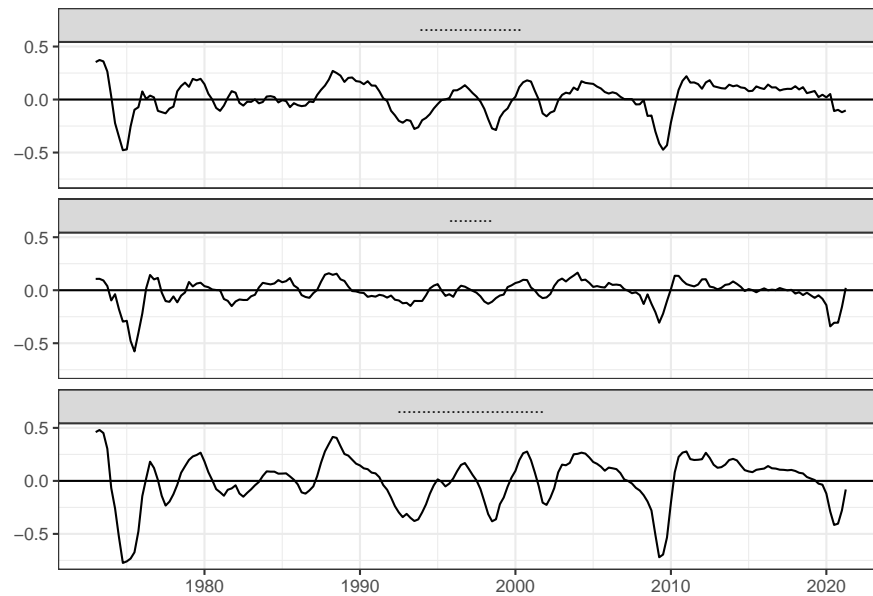
```r
fig <-
  df |>
  ggplot(aes(x = date,
             y = N)
         ) +
  geom_line() +
  geom_hline(yintercept = 0) +
  facet_wrap(~factor(type,
                     levels = c("     ",
                                "  ",
                                "       ")),
             ncol = 1) +
  ylab("") +
  xlab("") +
  theme_bw()
```

3.3

-
- COVID-19
- COVID-19   2020 2 3

- 2021 2 2020 2

Chapter 4

Session information

```
sessionInfo()
```

```
## R version 4.1.0 (2021-05-18)
## Platform: x86_64-w64-mingw32/x64 (64-bit)
## Running under: Windows 10 x64 (build 19042)
##
## Matrix products: default
##
## locale:
## [1] LC_COLLATE=Japanese_Japan.932  LC_CTYPE=Japanese_Japan.932
## [3] LC_MONETARY=Japanese_Japan.932 LC_NUMERIC=C
## [5] LC_TIME=Japanese_Japan.932
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] knitr_1.33      lubridate_1.7.10 readxl_1.3.1    forcats_0.5.1
##  [5] stringr_1.4.0   dplyr_1.0.7      purrr_0.3.4     readr_1.4.0
##  [9] tidyr_1.1.3     tibble_3.1.2    ggplot2_3.3.5   tidyverse_1.3.1
##
## loaded via a namespace (and not attached):
##  [1] tidyselect_1.1.1  xfun_0.24         haven_2.4.1       colorspace_2.0-1
##  [5] vctrs_0.3.8       generics_0.1.0    htmltools_0.5.1.1 yaml_2.2.1
##  [9] utf8_1.2.1        rlang_0.4.11      pillar_1.6.1      glue_1.4.2
## [13] withr_2.4.2       DBI_1.1.1         dbplyr_2.1.1      modelr_0.1.8
## [17] lifecycle_1.0.0   munsell_0.5.0     gtable_0.3.0      cellranger_1.1.0
## [21] rvest_1.0.0       evaluate_0.14     labeling_0.4.2    fansi_0.5.0
```

```
## [25] highr_0.9        broom_0.7.8      Rcpp_1.0.6        backports_1.2.1
## [29] scales_1.1.1     jsonlite_1.7.2   farver_2.1.0      fs_1.5.0
## [33] hms_1.1.0        digest_0.6.27    stringi_1.6.1     bookdown_0.22
## [37] grid_4.1.0       cli_2.5.0        tools_4.1.0       magrittr_2.0.1
## [41] pacman_0.5.1     crayon_1.4.1     pkgconfig_2.0.3   ellipsis_0.3.2
## [45] xml2_1.3.2       reprex_2.0.0     assertthat_0.2.1  rmarkdown_2.9
## [49] httr_1.4.2       rstudioapi_0.13  R6_2.5.0          compiler_4.1.0
```

Bibliography

Kawata, K. and Sato, Y. (2021). A first aid kit to assess welfare impacts. *Economics Letters*, page 109928.

Rogerson, R., Shimer, R., and Wright, R. (2005). Search-theoretic models of the labor market: A survey. *Journal of economic literature*, 43(4):959–988.