

2021-07-31

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


Chapter 1

Chapter 2

- 1963 2020

2.1

-
-

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

2.2 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)

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

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(),
         quarterly = month |> cut(c(0,3,6,9,12), labels = c(1,2,3,4)),
         date = yq(str_c(year,quarterly,sep = ":Q"))
  ) |>
  group_by(date,type) |>
  mutate(n = n |> sum()) |>
  ungroup() |>
  distinct(year,quarterly,date,type,n) |>
  spread(key = type, value = n) |>
  group_by(quarterly) |>
  mutate(
    = log( ) - log(lag( )),
    = log( ) - log(lag( )),
    = log( ) - log(lag( ))
  ) |>

```

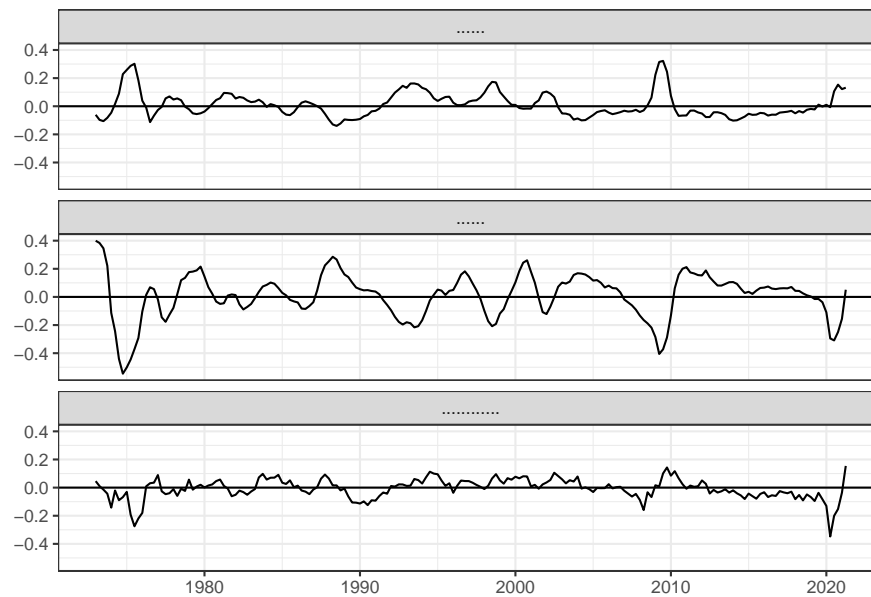
```

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



Chapter 3

⋮

- 1963 – 2020 Kawata and Sato (2021)

3.1

- - Kawata and Sato (2021)
 - Diamond-Mortencen-Pissarides (Rogerson et al., 2005) 4
- 1.

$$rU = b + \Delta$$

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

$m :$ $u :$ $U :$ $W :$ $r, b :$

- - $W - U$
 - ” ”

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

•

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

•

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

•

• (β, k) Δ

- 2019 VS 2020, “With COVID-19” VS “Without COVID-19”
 Δ, Δ'

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

- v/u

—

3.1.2

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

3.2 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)
```

```
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
```

```

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

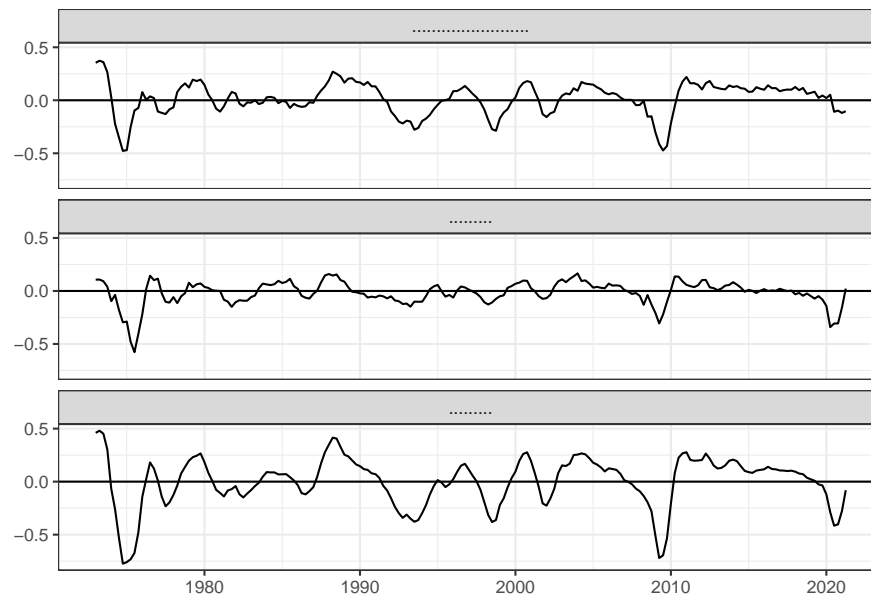
colnames(raw.hir.part) <- col.label

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(),
         quarterly = month |> cut(c(0,3,6,9,12), labels = c(1,2,3,4)),
         date = yq(str_c(year,quarterly,sep = ":Q"))
  ) |>
  group_by(date,type) |>
  mutate(n = n |> sum()) |>
  ungroup() |>
  distinct(year,quarterly,date,type,n) |>
  spread(key = type, value = n) |>
  group_by(quarterly) |>
  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()

```

```
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



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.