

ECON807 PS5: Business cycle properties in Canada

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In this document I walk through my code, equations and results for the ECON807 PS5.

Preliminaries

```
# Load libraries

library(tidyverse)
library(lubridate)
library(mFilter)
library(dynlm)

# Load the data

raw_national_accounts <-
  read.csv('data.csv')
```

Preparing the data

In this part, I prepare the dataset to present a time series of the various national accounts.

```
# Transform to a date

df <-
  raw_national_accounts %>%
  mutate(
    date = ymd(paste(REF_DATE, '01'))),
```

```

    month_year = floor_date(date, 'month')
  ) %>%
  select(-REF_DATE) %>%
  relocate(date, month_year) %>%
  rename(account = 'Estimates',
         value = 'VALUE')

# Create a joint dataframe to plot all of my timeseries. Will be needing to create a lot o

output <-
  df %>%
  filter(account == 'Gross domestic product at market prices') %>%
  select(month_year, account, value) %>%
  mutate(account = 'Output')

consumption <-
  df %>%
  filter(account %in% c('Household final consumption expenditure', 'Durable goods')) %>%
  select(month_year, account, value) %>%
  group_by(month_year) %>%
  summarise(value = value[account == 'Household final consumption expenditure'] -
            value[account == 'Durable goods']) %>%
  mutate(account = 'Consumption')

investment <-
  df %>%
  filter(account %in% c('Gross fixed capital formation',
                      'Durable goods',
                      'General governments gross fixed capital formation')) %>%
  select(month_year, account, value) %>%
  group_by(month_year) %>%
  summarise(value =
            value[account == 'Gross fixed capital formation'] +
            value[account == 'Durable goods'] -
            value[account == 'General governments gross fixed capital formation'] )%>%
  mutate(account = 'Investment')

government <-
  df %>%
  filter(account %in% c('General governments final consumption expenditure',
                      'General governments gross fixed capital formation')) %>%

```

```

select(month_year, account, value) %>%
group_by(month_year) %>%
summarise(value =
            value[account == 'General governments final consumption expenditure'] +
            value[account == 'General governments gross fixed capital formation'] )%>%
mutate(account = 'Government Purchases')

time_series_graph <-
  output %>%
  bind_rows(consumption) %>%
  bind_rows(investment) %>%
  bind_rows(government)

```

(a) Presenting the national account time series

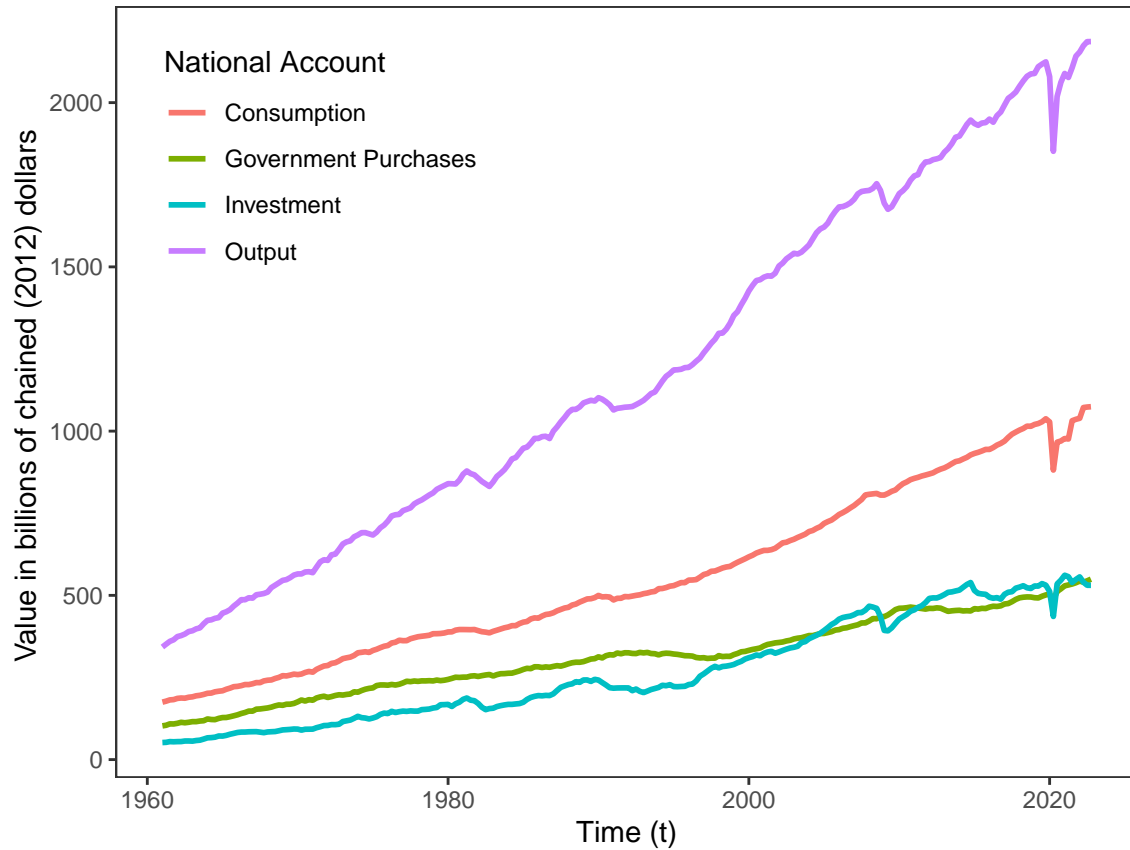
I present graphs with the time series below.

```

time_series_graph %>%
  ggplot(aes(month_year, value/1000, colour = account)) +
  geom_line(linewidth = 1) +
  theme_bw()+
  theme(panel.grid.major = element_blank(),
        panel.grid.minor = element_blank(),
        legend.position = c('0.2', '0.8'))+
  labs(x = 'Time (t)',
       y = 'Value in billions of chained (2012) dollars ',
       colour = 'National Account',
       title = 'Time Series Graph of Select Canadian National Accounts',
       subtitle = 'Quarterly 1961-2022')

```

Time Series Graph of Select Canadian National Accounts Quarterly 1961–2022



(b) Some transformations

Below, I do the required transformations on the data.

```
# (i) Log

time_series_transformed <-
  time_series_graph %>%
  mutate(log = log(value))

# (ii) Baxter King filter

bk_log <- bkfilter(time_series_transformed$log, pl = 6, pu = 32, nfix = 12)
```

```

# Add to the dataframe

time_series_transformed <-
  time_series_transformed %>%
  mutate(bk_log_trend = bk_log$trend,
         bk_log_cycle = bk_log$cycle)

# (iii) Hamilton (2016)

# Need to run a regression with lags of the dependent variable. Must use a ts object for a

output_ts <- ts(
  output$value,
  start = c(1961,1),
  frequency = 4
)

consumption_ts <- ts(
  consumption$value,
  start = c(1961,1),
  frequency = 4
)

investment_ts <- ts(
  investment$value,
  start = c(1961,1),
  frequency = 4
)

government_ts <- ts(
  government$value,
  start = c(1961,1),
  frequency = 4
)

# Run the regressions for all of the national accounts as specified, using the dynlm packa

```