

Financial Econometrics Workshop 2

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1 Introduction

In this workshop we will introduce basic time series model in STATA. Date transformation and model selection approach will also be introduced in this workshop.

2 Input Data and Date Transformation

The first step in STATA is input data, make sure your .dta file is in the right working directory. In this workshop we will use the dataset: monthly JP Morgan/Goldman Sachs stock price data from 2000/01/01 to 2014/12/01.

Menu:

File → Change Working Directory → STATA Workshop

Command:

```
1 use gs.dta, clear
2 generate date_1 = date(date, "YMD") #transform date as year-month-day
3 generate datem = mofd(date_1) #the monthly date (months since 1960m1
   ) containing date_1
4 format datem %tm # %tm encoded monthly date (months since 1960m1)
5 tsset datem
```

Note:

`tsset` declares data to be time-series data.

3 Graphic Analysis and Data Transformation

In this section, you will learn how to combine two dependent variables in the same graph

Command:

```
1      graph twoway line gs_adjclose datem, yaxis(1) sort || line
      jpm_adjclose datem, yaxis(2) sort
2      graph twoway connected gs_adjclose datem,yaxis(1)|| connected
      jpm_adjclose datem, yaxis(2) sort msymbol(Th)
3      dfuller gs_adjclose # DF test for original time series
4      dfuller jpm_adjclose # DF test for original time series
5
6      g log_gs_adjclose = log(gs_adjclose)
7
8      g dlog_gs_adjclose = d.log_gs_adjclose
9
10     dfuller dlog_gs_adjclose # DF test for dlog time series
11
12     g log_jpm_adjclose = log(jpm_adjclose)
13
14     g dlog_jpm_adjclose = d.log_jpm_adjclose
15
16     dfuller dlog_jpm_adjclose # DF test for dlog time series
17
18     # We use jpm data as an example for autocorrelation function and
      partial autocorrelation function
19     corrgram dlog_jpm_adjclose,lags(10)
20
21     ac dlog_jpm_adjclose,lags(10) #autocorrelation function
22     pac dlog_jpm_adjclose,lags(10) #partial autocorrelation function
```

Note:

We will introduce DF test in next workshop.

Note:

By log-differencing, we can transform non-stationary time series data into stationary time series data.

4 ARIMA Model Selection

As a benchmark model, $ARIMA(p, d, q)$ can be divided by three parts:

$AR(p)$, Integrated(d) and $MA(q)$.

Command:

```
1      #We use gs data as an example for ARIMA
2      arima dlog_gs_adjclose, arima(1,0,0)
3      estat ic #AIC BIC
4      est store m1 #store regression result in m1
5
6      quiet arima dlog_gs_adjclose, arima(2,0,0)
7      est store m2
8
9      quiet arima dlog_gs_adjclose, arima(0,0,1)
10     est store m3
11
12     quiet arima dlog_gs_adjclose, arima(0,0,2)
13     est store m4
14
15     quiet arima dlog_gs_adjclose, arima(1,0,1)
16     est store m5
17
18     quiet arima dlog_gs_adjclose, arima(1,0,2)
19     est store m6
20
21     quiet arima dlog_gs_adjclose, arima(2,0,1)
22     est store m7
23
24     quiet arima dlog_gs_adjclose, arima(2,0,2)
25     est store m8
26
27     est table m1 m2 m3 m4 m5 m6 m7 m8, stats(aic bic)
```

Note:

For demonstration, the lag length in ARIMA ≤ 2 .

Note:

`quietly` command does not show the regression result.

Note:

We can also use `for` loop to select model automatically.

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