Chapter 4

Ods Graphics on;

DATA Current;

input date CL PR PL;

datalines;

2017.2 25.3 10.3 2.32

;

Run;

Data Netflow;

input date CL PR PL;

datalines;

2018.1 0.21 0.1 0.05

2018.2 0.22 0.16 0.06

2019.1 .24 0.18 0.08

2019.2 0.28 0.21 0.1

2020.1 0.31 0.23 0.14

;

Run;

Data TransitionMatrix;

input CL PR PL;

datalines;

0.98 0.01 0.01

0.02 0.93 0.05

0.06 0.21 0.73

;

Run;

PROC IML;

use Current; read all into Current;

use Netflow; read all into Netflow;

use TransitionMatrix; read all into TransitionMatrix;

Current = Current [1,2:4];

Netflow = Netflow [,2:4];

Model\_2018\_1 = Current \* TransitionMatrix + Netflow [1,];

Model\_2018\_2 = Model\_2018\_1 \* TransitionMatrix + Netflow [1,];

Model\_2019\_1 = Model\_2018\_2 \* TransitionMatrix + Netflow [1,];

Model\_2019\_2 = Model\_2019\_1 \* TransitionMatrix + Netflow [1,];

Model\_2020\_1 = Model\_2019\_2 \* TransitionMatrix + Netflow [1,];

Budgetinputs = Model\_2018\_1//Model\_2018\_2//Model\_2019\_1//Model\_2019\_2//Model\_2020\_1;

Create Budgetinputs from Budgetinputs;

append from Budgetinputs;

Quit;

Data Output;

Set Budgetinputs (rename=(Col1=Cl Col2=Pr Col3=Pl));

Run;

Proc print data=output;

Run;

Data Past;

input Cl Pr Pl;

datalines;

30.68 5.73 1.51

30.65 5.74 1.53

30.83 5.43 1.66

30.9 5.3 1.72

31.1 4.7 2.12

31.05 4.73 2.14

31.01 4.81 2.1

30.7 5.01 2.21

30.3 5.3 2.32

29.3 6.4 2.22

29.3 6.5 2.12

28.8 7.3 1.82

28.8 8.1 1.02

28.7 8.3 0.92

28.6 8.34 0.98

28.4 8.37 1.15

27.6 9.01 1.31

26.5 9.5 1.92

26 9.8 2.12

25.3 10.3 2.32

;

Run;

/\*Fig 4.9 - 4.10\*/

PROC ARIMA Data=Past;

identify var=Cl scan esacf;

RUN;

/\* Fig 4.11 - 4.16 \*/

PROC ARIMA Data=Past;

identify var=Cl(1);

estimate p=1;

forecast lead=5 interval=semiyear out=Cl1;

identify var=Cl;

estimate p=2;

forecast lead=5 interval=semiyear out=Cl2;

identify var=Cl;

estimate q=1;

forecast lead=5 interval=semiyear out=Cl3;

RUN;

/\*Fig 4.17\*/

PROC ARIMA Data=Past;

identify var=Pr scan esacf;

RUN;

/\*Fig 4.18 to 4.21\*/

PROC ARIMA Data=Past;

identify var=Pr(1);

estimate p=1;

forecast lead=5 interval=semiyear out=Pr1;

identify var=Pr;

estimate p=1;

forecast lead=5 interval=semiyear out=Pr2;

identify var=Pr;

estimate q=2;

forecast lead=5 interval=semiyear out=Pr3;

RUN;

/\*Fig 4.22\*/

PROC ARIMA Data=Past;

/\* identify var=Cl scan esacf; \*/

/\* identify var=Pr scan esacf; \*/

identify var=Pl scan esacf;

RUN;

/\*For Fig 4.23 and 4.24\*/

PROC ARIMA Data=Past;

identify var=Pl;

estimate q=3;

forecast lead=5 interval=semiyear out=Pl1;

identify var=Pl;

estimate q=1;

forecast lead=5 interval=semiyear out=Pl2;

RUN;

/\* MCMC Section \*/

Data Base\_Qtr;

input date $ cl pr pl @@;

datalines;

2008\_Q1 30.69 5.71 1.52 2008\_Q2 30.68 5.73 1.51 2008\_Q3 30.68 5.72 1.52 2008\_Q4 . 5.74 .

2009\_Q1 30.76 5.56 1.6 2009\_Q2 30.83 5.43 1.66 2009\_Q3 . 5.5 . 2009\_Q4 30.9 5.3 1.72

2010\_Q1 . 5.2 . 2010\_Q2 31.1 . . 2010\_Q3 31.4 4.6 1.92 2010\_Q4 31.05 . .

2011\_Q1 31 4.5 2.42 2011\_Q2 31.01 4.81 2.1 2011\_Q3 30.9 4.9 2.12 2011\_Q4 . 5.01 2.21

2012\_Q1 30.5 5.2 . 2012\_Q2 30.3 5.3 2.32 2012\_Q3 30.9 . 1.52 2012\_Q4 29.3 6.4 2.22

2013\_Q1 . 6.3 . 2013\_Q2 29.3 6.5 2.12 2013\_Q3 28.3 7 2.62 2013\_Q4 . . 1.82

2014\_Q1 . 7.8 . 2014\_Q2 28.8 8.1 1.02 2014\_Q3 . . 1.05 2014\_Q4 28.7 8.3 0.92

2015\_Q1 28.5 8.4 1.02 2015\_Q2 28.6 8.34 0.98 2015\_Q3 28.5 . . 2015\_Q4 . . 1.15

2016\_Q1 28.1 . 1.22 2016\_Q2 27.6 9.01 1.31 2016\_Q3 27.6 9.1 1.22 2016\_Q4 . 9.5 1.92

2017\_Q1 26.5 9.5 1.92 2017\_Q2 26 . . 2017\_Q3 26.1 9.7 2.12 2017\_Q4 . 10.3 2.32

;

Run;

Ods Graphics On;

Proc MI Data=Base\_Qtr seed=313232 nimpute=5 mu0=29.2 7 1.7 out=imputed;

MCMC chain=single displayinit initial=em(itprint) plots=all;

Var cl pr pl;

Run;

Proc MI Data=Base\_Qtr seed=313232 nimpute=5 mu0=30.3 5.5 2 out=imputed;

MCMC chain=single displayinit initial=em(itprint) plots=all;

Var cl pr pl;

Run;