

Appendix

A. Data structure

The currency rates and economic indicators are taken from the Far Eastern Economic Review magazine. This data are recorded in a Microsoft Access database file called dataindicators.mdb. The data in the tables data of Thailand and data of Malaysia are comprised of the following fields.

The data of currency rate and economic indicators in Thailand.

| Index | Year | Month | Cur. | Econ. | Int.res | Exports | Imports | Money |
|-------|------|-------|--------|-------|---------|---------|---------|--------|
| 1 | 1983 | 1 | 22.975 | 6.9 | 1.31 | 1.706 | 2.182 | 350.45 |
| 2 | 1983 | 2 | 22.975 | 5.5 | 1.38 | 1.524 | 2.212 | 357.24 |
| 3 | 1983 | 3 | 22.975 | 5.5 | 1.54 | 1.524 | 2.212 | 357.24 |
| 4 | 1983 | 4 | 22.975 | 5.5 | 1.55 | 1.375 | 2.119 | 372.24 |
| 5 | 1983 | 5 | 22.975 | 5.5 | 1.55 | 1.535 | 2.212 | 397.51 |
| 6 | 1983 | 6 | 22.975 | 5.5 | 1.56 | 1.535 | 2.212 | 397.51 |
| 7 | 1983 | 7 | 22.975 | 5.5 | 1.57 | 1.627 | 2.168 | 420.61 |
| 8 | 1983 | 8 | 22.975 | 5.5 | 1.57 | 1.61 | 2.379 | 420.61 |
| 9 | 1983 | 9 | 22.975 | 5.5 | 1.76 | 1.61 | 2.379 | 420.61 |
| 10 | 1983 | 10 | 22.975 | 5.5 | 1.76 | 1.61 | 2.379 | 420.61 |
| 11 | 1983 | 11 | 22.975 | 5.5 | 1.85 | 1.62 | 2.42 | 423.59 |
| 12 | 1983 | 12 | 22.975 | 5.5 | 1.67 | 1.62 | 2.42 | 423.59 |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| 168 | 1996 | 12 | 25.53 | 8.5 | 38.49 | 13.86 | 17.73 | 3553 |

The data of currency rate and economic indicators in Malaysia.

| Index | Year | Month | Cur. | Econ. | Int.res | Exports | Imports | Money |
|-------|------|-------|--------|-------|---------|---------|---------|-------|
| 1 | 1983 | 1 | 2.308 | 3.9 | 3.16 | 2.998 | 3.423 | 11.5 |
| 2 | 1983 | 2 | 2.274 | 4.4 | 3.45 | 2.485 | 2.924 | 34.62 |
| 3 | 1983 | 3 | 2.27 | 4.4 | 3.89 | 2.559 | 3 | 36.14 |
| 4 | 1983 | 4 | 2.305 | 4.4 | 3.77 | 2.508 | 2.881 | 36.14 |
| 5 | 1983 | 5 | 2.306 | 5 | 3.77 | 2.394 | 2.905 | 37.19 |
| 6 | 1983 | 6 | 2.302 | 5 | 3.76 | 2.328 | 2.919 | 38.31 |
| 7 | 1983 | 7 | 2.329 | 5 | 3.92 | 2.301 | 2.885 | 38.31 |
| 8 | 1983 | 8 | 2.332 | 5 | 3.92 | 2.298 | 2.882 | 38.31 |
| 9 | 1983 | 9 | 2.366 | 5 | 4.06 | 2.265 | 2.84 | 38.31 |
| 10 | 1983 | 10 | 2.345 | 5 | 4.06 | 2.286 | 2.866 | 38.31 |
| 11 | 1983 | 11 | 2.342 | 5 | 4.07 | 2.775 | 2.916 | 39.02 |
| 12 | 1983 | 12 | 2.347 | 5.6 | 3.98 | 2.769 | 2.91 | 39.02 |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| 168 | 1996 | 12 | 2.5225 | 8.3 | 26.12 | 19.68 | 19.6 | 219.7 |

Queries were used to create the data structure. The trade balance was got by taking the difference between the value of exports and imports and converting the money supply in both countries to US\$ by dividing the money supply by the currency rate in each country. After that, these data were transferred to files using the Programmer's File Editor (thai.num and malay.num).

Data in Thailand appropriate for statistical analysis in this study.

| Year | Month | Currenc | Econ | Intres | Export | Import | Trade | Money |
|----------|-------|---------|------|--------|--------|--------|--------|---------|
| 1983.083 | 1 | 22.975 | 6.9 | 1.31 | 1.706 | 2.182 | -0.476 | 15.254 |
| 1983.167 | 2 | 22.975 | 5.5 | 1.38 | 1.524 | 2.212 | -0.688 | 15.549 |
| 1983.250 | 3 | 22.975 | 5.5 | 1.54 | 1.524 | 2.212 | -0.688 | 15.549 |
| 1983.333 | 4 | 22.975 | 5.5 | 1.55 | 1.375 | 2.119 | -0.744 | 16.202 |
| 1983.417 | 5 | 22.975 | 5.5 | 1.55 | 1.535 | 2.212 | -0.677 | 17.302 |
| 1983.500 | 6 | 22.975 | 5.5 | 1.56 | 1.535 | 2.212 | -0.677 | 17.302 |
| 1983.583 | 7 | 22.975 | 5.5 | 1.57 | 1.627 | 2.168 | -0.541 | 18.307 |
| 1983.667 | 8 | 22.975 | 5.5 | 1.57 | 1.61 | 2.379 | -0.769 | 18.307 |
| 1983.750 | 9 | 22.975 | 5.5 | 1.76 | 1.61 | 2.379 | -0.769 | 18.307 |
| 1983.833 | 10 | 22.975 | 5.5 | 1.76 | 1.61 | 2.379 | -0.769 | 18.307 |
| 1983.917 | 11 | 22.975 | 5.5 | 1.85 | 1.62 | 2.42 | -0.8 | 18.437 |
| 1984.000 | 12 | 22.975 | 5.5 | 1.67 | 1.62 | 2.42 | -0.8 | 18.437 |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| 1997.000 | 12 | 25.53 | 8.5 | 38.49 | 13.86 | 17.73 | -3.87 | 139.170 |

Data in Malaysia appropriate for statistical analysis in this study.

| Year | Month | Currenc | Econ | Intres | Export | Import | Trade | Money |
|----------|-------|---------|------|--------|--------|--------|--------|--------|
| 1983.083 | 1 | 2.308 | 3.9 | 3.16 | 2.998 | 3.423 | -0.425 | 4.983 |
| 1983.167 | 2 | 2.274 | 4.4 | 3.45 | 2.485 | 2.924 | -0.439 | 15.224 |
| 1983.250 | 3 | 2.27 | 4.4 | 3.89 | 2.559 | 3 | -0.441 | 15.921 |
| 1983.333 | 4 | 2.305 | 4.4 | 3.77 | 2.508 | 2.881 | -0.373 | 15.679 |
| 1983.417 | 5 | 2.306 | 5 | 3.77 | 2.394 | 2.905 | -0.511 | 16.127 |
| 1983.500 | 6 | 2.302 | 5 | 3.76 | 2.328 | 2.919 | -0.591 | 16.642 |
| 1983.583 | 7 | 2.329 | 5 | 3.92 | 2.301 | 2.885 | -0.584 | 16.449 |
| 1983.667 | 8 | 2.332 | 5 | 3.92 | 2.298 | 2.882 | -0.584 | 16.428 |
| 1983.750 | 9 | 2.366 | 5 | 4.06 | 2.265 | 2.84 | -0.575 | 16.192 |
| 1983.833 | 10 | 2.345 | 5 | 4.06 | 2.286 | 2.866 | -0.58 | 16.337 |
| 1983.917 | 11 | 2.342 | 5 | 4.07 | 2.775 | 2.916 | -0.141 | 16.661 |
| 1984.000 | 12 | 2.347 | 5.6 | 3.98 | 2.769 | 2.91 | -0.141 | 16.625 |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : | : |
| 1997.000 | 12 | 2.5225 | 8.3 | 26.12 | 19.68 | 19.6 | 0.08 | 87.096 |

B. Programs

These programs are used to create the figures using the program Asp (see McNeil, 1998a) developed using Matlab Version 5. The programs are as follows.

Figures 3.1 and 3.2 show the numerical summaries for each variable in Thailand and Malaysia.

Figure 3.1

```
*****
%% program chap31t.m to create statistical summary in Thailand
*****
getfile thai
y = getnum;
y = y(:,[4:5 9 6:8]);
putnum(y);
fn{1} = [fn{4}];
fn{2} = [fn{5}];
fn{3} = [fn{9}];
fn{4} = [fn{6}];
fn{5} = [fn{7}];
fn{6} = [fn{8}];
putfn(fn);
dn = {' '};
putdn(dn);
describe font=10
```

Figure 3.2

```
*****
%% program chap31m.m to create statistical summary in Malaysia
*****
getfile malay
y = getnum;
y = y(:,[4:5 9 6:8]);
putnum(y);
fn{1} = [fn{4}];
fn{2} = [fn{5}];
```

```

fn{3} = [fn{9}];
fn{4} = [fn{6}];
fn{5} = [fn{7}];
fn{6} = [fn{8}];
putfn(fn);
dn = {' '};
putdn(dn);
describe font=10

```

Figure 3.3 to 3.12 plot the economic indicators in Thailand and Malaysia. The graphs are presented in two format, that are monthly and yearly data for 1983 to 1996.

Figure 3.3 and 3.4

```

*****
%% program chap32.m to create graphs exports and imports
*****
getfile thai
th = getnum;
ind = ones(168,1);
th = [ind th];
putnum(th);
getfile malay
my = getnum;
ind1 = ind*2;
my = [ind1 my];
putnum(my);
new = [th;my];
putnum(new);
putfile('total');
getfile total
y = getnum;
y = y(:,[1:3 7:8]);
putnum(y);
ind1 = ones(336,1);
ind2 = ind1*2;

```

```

ind = [ind1;ind2];
y1 = y(:,[1 2 3 4]);
y2 = y(:,[1 2 3 5]);
y = [y1;y2];
putnum(y);
newdata = [y ind];
putnum(newdata);
lab = getlab;
lab{1} = {'1 Thailand' '2 Malaysia'};
putlab(lab);
setvar y=4 x=[2 1 5];
track2 font=12
text(0.1,24.75,'Billion US$','horizontal','center');
title('1. Export, 2. Import');
setvar y=4 x=[3 1 5];
stratify
track1 res=1 font=12
text(0.1,23.2,'Billion US$','horizontal','center');
title('1. Export, 2. Import');

```

Figure 3.5 to 3.12

```

*****
%% program chap33.m to create Figure 3.5 to 3.12
*****
getfile total
y = getnum;
y = y(:,[1:3 9 6 10 5]);
putnum(y);
n = size(y,1);
ind = ones(n,1);
newdata = [y(:,[1:3]) ind y(:,[4:7])];
putnum(newdata);

```

```

*****
                %% trade balance
*****
lab = getlab;
lab{4} = {'1 Trade Balance'};
putlab(lab);
setvar y=5 x=[2 4 1];
track2 font=12
text(0.05,1.9,'Billion US$', 'horizontal', 'center');
title('1. Thailand, 2. Malaysia');
setvar y=5 x=[3 4 1];
stratify
track1 res=1 font=12
text(0.05,1.6,'Billion US$', 'horizontal', 'center');
title('1. Thailand, 2. Malaysia');
*****
                %%International reserves
*****
lab = getlab;
lab{4} = {'1 International Reserves'};
putlab(lab);
setvar y=6 x=[2 4 1];
track2 font=12
text(0.05,45.25,'Billion US$', 'horizontal', 'center');
title('1. Thailand, 2. Malaysia');
setvar y=6 x=[3 4 1];
stratify
track1 res=1 font=12
text(0.05,44,'Billion US$', 'horizontal', 'center');
title('1. Thailand, 2. Malaysia');
*****
                %%Money supply
*****
lab = getlab;
lab{4} = {'1 Money Supply'};
putlab(lab);

```

```

setvar y=7 x=[2 4 1];
track2 font=12
text(0.05,165,'Billion US$','horizontal','center');
title('1. Thailand, 2.Malaysia');
setvar y=7 x=[3 4 1];
stratify
track1 res=1 font=12
text(0.05,160,'Billion US$','horizontal','center');
title('1. Thailand, 2.Malaysia');
*****
                %%Economic growth
*****
lab = getlab;
lab{4} = {'1 Economic growth'};
putlab(lab);
setvar y=8 x=[2 4 1];
track2 font=12
text(0.05,12.1,'Percentage','horizontal','center');
title('1. Thailand, 2. Malaysia');
setvar y=8 x=[3 4 1];
stratify
track1 res=1 font=12
text(0.05,11.2,'Percentage','horizontal','center');
title('1. Thailand, 2.Malaysia');

```

Figure 3.13 to 3.15

```

*****
                %% program chap34.m to create Figure 3.13 to 3.15
*****
getfile total
y = getnum;
dn = {' '};
putdn(dn);
describe hist=1 col='7:9 6 10 5'
fn = getfn;

```



```

fn{2} = [fn{7}];
fn{3} = [fn{8}];
fn{4} = [fn{9}];
fn{5} = [fn{6}];
fn{6} = [fn{10}];
fn{7} = [fn{5}];
putfn(fn)
*****
                %%Economic growth
*****
dn = {'Economic growth'};
putdn(dn);
setvar y=5 x=1
compar type=3 test=1
*****
                %%Trade balance
*****
dn = {'Trade balance'};
putdn(dn);
setvar y=9 x=1
compar type=3 test=1
fn{7} = ['log2(exports)'];
fn{8} = ['log2(imports)'];
fn{6} = ['log2(int.res)'];
fn{10} = ['log2(mon.spy)'];
putfn(fn)
*****
%%transformed the economic indicators by taking base 2 logarithm
*****
y(:,[7:8 6 10]) = log(y(:,[7:8 6 10]))/log(2);
putnum(y);
dn = {' '};
putdn(dn);
describe col='7:8 6 10' hist=1

```

```

*****
%%int.reserves
*****
dn = {'base 2 logarithm of international reserves'};
putdn(dn);
setvar y=6 x=1;
compar type=3 test=1
*****
%%exports
*****
dn = ['base 2 logarithm of exports'];
putdn(dn);
setvar y=7 x=1;
compar type=3 test=1
*****
%%imports
*****
dn = {'base 2 logarithm of imports'};
putdn(dn);
setvar y=8 x=1;
compar type=3 test=1
*****
%%money supply
*****
dn = {'base 2 logarithm of money supply'};
putdn(dn);
setvar y=10 x=1;
compar type=3 test=1

```

Figure 4.1 to 4.12 shows the result of fitting the model to the time series of economic indicators.

Figure 4.1 to 4.6

```

*****
%% program chap41.m to create time series plot in Thailand
*****
getfile thai
y = getnum;

```

```

month = y(:,2)/12;
y(:,1) = y(:,1)+month;
putnum(y);
%transformed data by taking base 2 logarithm
y(:,[5:7 9]) = log(y(:,[5:7 9]))./log(2);
putnum(y);
fn{5} = ['log2(int.res)'];
fn{6} = ['log2(exports)'];
fn{7} = ['log2(imports)'];
fn{9} = ['log2(mon.spy)'];
putfn(fn)
dn = {'Thailand'};
putdn(dn);
setvar y=4 z=1;                               %%time series of Economic Growth
tsplot pg=3 cf=-1 ar=1 line=1
setvar y=5 z=1;                               %%time series of International reserves
tsplot pg=3 cf=-1 ar=1 line=1
setvar y=6 z=1;                               %%time series of Export
tsplot pg=3 cf=-1 ar=1:2 line=1
setvar y=7 z=1;                               %%time series of Import
tsplot pg=3 cf=-1 ar=1:2 line=1
setvar y=8 z=1;                               %%time series of Trade Balance
tsplot pg=3 cf=-1 ar=1 line=2
setvar y=9 z=1;                               %%time series of Money supply
tsplot pg=3 cf=-1 ar=1:2 line=1

```

Figure 4.7 to 4.12

```

*****
%% program chap42.m to create time series plot in Malaysia
*****
getfile malay
y = getnum;
month = y(:,2)/12;
y(:,1) = y(:,1)+month;

```

```

putnum(y);
%transformed data by taking base 2 logarithm
y(:,[5:7]) = log(y(:,[5:7]))./log(2);
putnum(y);
fn{5} = ['log2(int.res)'];
fn{6} = ['log2(exports)'];
fn{7} = ['log2(imports)'];
putfn(fn)
dn = {'Malaysia'};
putdn(dn);
setvar y=4 z=1;
tsplot pg=3 cf=-1 ar=1 line=1
setvar y=5 z=1;
tsplot pg=3 cf=-1 ar=1 line=2
setvar y=6 z=1;
tsplot pg=3 cf=-1 ar=1 line=2
setvar y=7 z=1;
tsplot pg=3 cf=-1 ar=1 line=2
setvar y=8 z=1;
tsplot pg=3 cf=-1 ar=1 line=2
%omitted outliers of money supply
y = y(41:168,[1 9]);
y(:,2) = log(y(:,2))./log(2);
putnum(y);
fn{2} = ['log2(mon.spy)'];
putfn(fn)
setvar y=2 z=1
tsplot pg=3 cf=-1 line=2 ar=1

```

%%time series of Economic Growth

%%time series of International reserves

%%time series of Export

%%time series of Import

%%time series of Trade Balance

%%time series of Money supply

Figure 4.13 summaries the signals fitted to the various economic time series.

Figure 4.13

```

*****
%% program chap43.m to create summary time series graph
*****
n = 168;
month = (1:n)';
atai = [6.747 0.3569 3.9001 0.7097 1.0968 -0.523];
btai = [0.0098 0.0302 0.0192 0.0184 0.0181 0.0041];
ctai = [0 0 0 0 -0.00015];
amal = [3.862 1.6199 4.2127 1.5474 1.7674 -0.419];
bmal = [0.0287 0.0185 0.0049 0.0032 -0.0027 0.0189];
cmal = [0 0 0.0001 0.000086 0.00011 -0.00012]; ylab = {'Econ.growth (%)' 'log2
(Int.reserves)' 'log2(Money supply)' 'log2(Exports)' 'log2(Imports)' 'Trade balance'};
width = 0.43;
height = 0.255;
for i=1:2
    for j=1:3
        left = 0.05+0.49*(i-1);
        bottom = 0.1+0.285*(3-j);
        axes('Position',[left,bottom,width,height])
        x = 83+month/12;
        ij = 3*(i-1)+j;
        ytai = atai(ij)+btai(ij)*month+ctai(ij)*month.^2;
        ymal = amal(ij)+bmal(ij)*month+cmal(ij)*month.^2;
        ymax = max(max(ytai),max(ymal));
        ymin = min(min(ytai),min(ymal));
        dy = 0.1*(ymax-ymin);
        ymax = ymax+3*dy;
        ymin = ymin-2*dy;
        xmin = 82;
        xmax = 98.5;
        if ij<6
            plot(x,ytai,'m.-',x,ymal,'k.-')

```

```
else
    plot(x,ytai,'m.-',x,yml,'k.-',[xmin xmax],[0 0],'b-')
end
text(xmin+0.5,ymax-dy,ylab{ij})
text(97,ytai(n)-dy/2,'Th')
text(97,yml(n)+dy/6,'M')
if j<3
    set(gca,'XTicklabel',[])
end
if j==3
    xlabel('year')
end
if ij==1
    text(87.5,ymax+0.15*[ymax-ymin],'Fitted economic growth patterns
(Th=Thailand,M=Malaysia)')
end
axis([xmin,xmax,ymin,ymax])
end
end
```