

Appendix

A. Data structure

We collected the data from National Energy Policy Office. These data are recorded in a Microsoft Excel. The data in the tables data of consumption, data of imports, and data of production are comprised of the following column.

The data of consumption of petroleum products in Thailand during 1984-1999

month	Gasoline	regular	premium	kerosene	diesel	-HSD	-LSD	JP	fuel oil	LPG	total
1	180.7	111.3	69.4	42.7	443.1	435.0	8.1	101.2	281.4	87.0	1136.1
2	174.4	104.9	69.4	38.0	424.6	416.8	7.8	98.1	257.7	78.4	1071.1
3	195.6	122.7	72.9	40.5	492.8	484.1	8.7	107.3	270.7	86.5	1193.4
4	185.2	113.3	72.0	33.5	449.2	440.4	8.8	102.4	249.9	83.0	1103.3
5	180.9	109.6	71.3	36.2	458.1	450.6	7.5	101.5	251.5	85.6	1113.8
6	174.2	104.9	69.3	14.0	431.5	423.9	7.6	94.5	278.2	84.5	1076.9
7	170.5	101.1	69.4	13.2	430.2	423.3	7.0	100.5	252.3	83.7	1050.5
8	174.1	103.6	70.4	13.3	434.8	426.5	8.3	106.0	267.0	79.5	1074.6
9	158.6	93.3	65.3	13.1	393.2	386.0	7.1	96.4	251.9	83.1	996.2
10	168.9	101.1	67.8	12.1	413.2	401.7	11.4	99.0	280.9	89.0	1063.0
...
192	608.9	226.6	382.3	4.5	1344.5	1334.3	10.1	286.5	558.9	305.7	3108.9

The data of petroleum products of imports in Thailand during 1984-1999

month	Gasoline	regular	premium	kerosene	diesel	-HSD	-LSD	JP	fuel oil	LPG	Total
1	0.0	0.0	0.0	9.0	204.0	204.0	0.0	14.9	52.8	66.2	346.9
2	0.0	0.0	0.0	6.2	171.0	171.0	0.0	14.0	88.2	58.2	337.6
3	0.0	0.0	0.0	6.5	244.2	244.2	0.0	12.0	56.1	65.0	383.8
4	0.0	0.0	0.0	4.6	319.1	319.1	0.0	24.1	12.9	61.9	422.6
5	12.4	4.3	8.1	6.4	190.3	190.3	0.0	13.2	62.0	66.1	350.4
6	20.2	11.6	8.6	10.0	244.9	244.9	0.0	22.5	102.9	64.4	464.9
7	19.2	16.9	2.3	1.6	272.1	272.1	0.0	12.3	112.5	70.7	488.4
8	12.2	2.9	9.3	0.0	150.0	150.0	0.0	14.4	91.0	53.6	321.2
9	0.0	0.0	0.0	0.0	239.4	239.4	0.0	22.3	58.0	58.9	378.6
10	0.0	0.0	0.0	0.0	166.2	166.2	0.0	10.3	21.5	65.7	263.7
...
192	23.0	2.7	20.4	0.0	165.7	165.7	0.0	0.0	78.9	0.0	267.7

The data of petroleum products of production in Thailand during 1984-1999

month	gasoline	-regular	-premium	kerosenc	diesel	-HSD	-LSD	JP	fuel oil	LPG	total
1	185.9	110.8	75.1	22.9	248.7	248.7	0	97.7	216.4	24.4	796.0
2	161.5	109.5	51.9	28.7	226.5	226.5	0	80.4	207.2	20.1	724.3
3	172	114.7	57.3	28.8	240.9	240.9	0	89.5	219.6	21.1	771.9
4	176.8	99.8	77.0	34.3	214.0	214.0	0	86.6	221.9	22.4	756.0
5	167.6	95.4	72.2	32.3	232.7	232.7	0	90.7	230.9	20	774.2
6	137.4	80.9	56.4	15.7	170.3	170.3	0	70.9	172.5	18.4	585.1
7	132.1	69.0	63.1	5.2	163.2	163.2	0	76.7	169.8	15.6	562.6
8	185.4	109.0	76.4	17.2	245.8	245.8	0	105	207.3	24.0	784.7
9	157.8	94.5	63.3	18.4	215.4	215.4	0	76.5	256.2	19.7	744.0
10	192.6	111.7	80.9	15.5	261	261.0	0	84.6	243.8	24.5	822.0
...
192	567.1	261.6	305.5	76.6	980.2	976.9	3.4	322.6	586.0	394.7	2723.1

B. Programming

These programs are used to create the figures using the program Asp (see McNeil, 1997) developed using Matlab version 5. The programs are as follows.

In chapter 3

programs to create figures 3.1-3.19 for petroleum of consumption

Figure 3.1

```
getfile dcon
describe hist=1 font=10 fnwid=12
```

Figure 3.2

```
setvar y=12 x=1
track
```

Figure 3.3

```
y = getnum;
total = y(:,12);
n = length(total);
adiffatot = abs(total(2:n)-total(1:n-1));
y1 = [total(1:n-1) adiffatot];
putnum(y1)
fn = getfn;
fn{1} = 'total petroleum products monthly consumption(ML)';
fn{2} = 'monthly change';
putfn(fn)
setvar y=12 x=1
relate lin=1 cor=1
```

Figure 3.4

```

logtotal = log(total)./log(10);
adifftot = abs(logtotal(2:n)-logtotal(1:n-1));
y1 = [logtotal(1:n-1) adifftot];
putnum(y1)
fn = getfn;
fn{1} = 'log of total petroleum products monthly consumption(ML)';
fn{2} = 'monthly change in log';
putfn(fn)
setvar y=12 x=1
relate lin=1 cor=1

```

Figure 3.5

```

getfile dcon
y = getnum;
y = [y(:,1) log10(y(:,2:12))];
putnum(y)
fn = getfn;
for j=2:12
    fn{j} = ['log ' fn{j}];
end
putfn(fn)
setvar y=12 x=1
track

```

Figure 3.6

```

describe hist=1 font=10 col=[1 7 10 9 4 11 3]

```

Figure 3.7

```

relate col=[7 10 9 4 11 3] lin=1 cor=1 font=7 size=8

```

programs to create figures 3.13-3.19 for petroleum of imports and production totals

Figure 3.13

```

getfile dimppro
describe hist=1 font=10 fnwid=12

```

Figure 3.14

```

setvar y=12 x=1
track

```

Figure 3.15

```

y = getnum;
total = y(:,12);
n = length(total);
adifftot = abs(total(2:n)-total(1:n-1));
y1 = [total(1:n-1) adifftot];
putnum(y1)
fn = getfn;
fn{1} = 'total petroleum products monthly import+production(ML)';
fn{2} = 'monthly change';
putfn(fn)
setvar y=12 x=1

```

```
relate lin=1 cor=1
```

Figure 3.16

```
logtotal = log(total)/log(10);
adiffatot = abs(logtotal(2:n)-logtotal(1:n-1));
y1 = [logtotal(1:n-1) adiffatot];
putnum(y1)
fn = getfn;
fn{1} = 'log of total petroleum products monthly import+production(ML)';
fn{2} = 'monthly change in log';
putfn(fn)
setvar y=12 x=1
relate lin=1 cor=1
```

Figure 3.17

```
getfile dimppro
y = getnum;
y = [y(:,1) log10(y(:,2:12))];
putnum(y)
fn = getfn;
for j=2:12
    fn{j} = ['log ' fn{j}];
end
putfn(fn)
setvar y=12 x=1
track
```

Figure 3.18

```
describe hist=1 font=10 col=[1 7 10 9 4 11 3]
```

Figure 3.19

```
relate col=[7 10 9 4 11 3] lin=1 cor=1 font=7 size=8
```

In chapter 4

programs to create figures 4.1-4.13 for petroleum of consumption

```
getfile logcon6m
%%%HSD
setvar z=1 y=2
tsplot lin=1 pg=3 cf=1 fon=8 siz=5
tsplot lin=1 pg=3 cf=-1 fon=8 siz=5 ar=1:2 harm=[1 2 3 16]
%%%fuel oil
setvar z=1 y=3
tsplot lin=1 pg=3 cf=-1 fon=8 siz=5 ar=1:2 harm=[1 2 3 16]
%%%JP
setvar z=1 y=4
tsplot lin=1 pg=3 cf=-1 fon=8 siz=5 ar=1:2 harm=[1 2 3 16 48]
%%%premium
setvar z=1 y=5
tsplot lin=1 pg=3 cf=-1 fon=8 siz=5 ar=1:2 harm=[1 2 3 16 48 64]
%%%LPG
setvar z=1 y=6
```

```
tsplot lin=1 pg=3 cf=-1 fon=8 siz=5 ar=1:2 harm=[1 2 3 16]
%%%regular
setvar z=1 y=7
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 3 16 48 64]

getfile logipr6m
%%%HSD
setvar z=1 y=2
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 16]
%%%fuel oil
setvar z=1 y=3
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 16]
%%%JP
setvar z=1 y=4
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 16]
%%%premium
setvar z=1 y=5
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 16]
%%%LPG
setvar z=1 y=6
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 3 16]
%%%regular
setvar z=1 y=7
tsplot lin=1 pg=3 cf=-1 fon=9 siz=5 ar=1:2 harm=[1 2 16]
```