ภาคผนวก

ภาคผนวก ก

ผลการทดสอบความนิ่งของข้อมูล หรือยูนิทรูท (Unit root test)

ผลการทดสอบด้วยวิธี Augmented Dickey-Fuller test (ADF)

1. SET

Null Hypothesis: SET has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=23)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-38.69220	0.0000
Test critical values:	1% level	-3.963956	
	5% level	-3.412702	
	10% level	-3.128323	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SET)
Method: Least Squares
Date: 07/25/14 Time: 16:46
Sample (adjusted): 3 1557
Included observations: 1555 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SET(-1)	-1.594695	0.041215	-38.69220	0.0000
D(SET(-1))	0.173703	0.025003	6.947316	0.0000
C	-0.000332	0.001437	-0.230820	0.8175
@TREND(1)	1.12E-06	1.60E-06	0.699928	0.4841

R-squared	0.689034	Mean dependent var	1.18E-06
Adjusted R-squared	0.688432	S.D. dependent var	0.050696
S.E. of regression	0.028298	Akaike info criterion	-4.289508
Sum squared resid	1.241973	Schwarz criterion	-4.275748
Log likelihood	3339.093	Hannan-Quinn criter.	-4.284391
F-statistic	1145.559	Durbin-Watson stat	2.023333
Prob(F-statistic)	0.000000		

2. หลักทรัพย์ AOT

Null Hypothesis: AOT has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=23)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-36.72067	0.0000
Test critical values:	1% level	-3.963952	
	5% level	-3.412700	
	10% level	-3.128322	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(AOT)

Method: Least Squares

Date: 07/25/14 Time: 16:52

Sample (adjusted): 2 1557

Included observations: 1556 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AOT(-1)	-0.930252	0.025333	-36.72067	0.0000
C	-0.001597	0.001307	-1.221194	0.2222
@TREND(1)	2.97E-06	1.46E-06	2.040975	0.0414

R-squared	0.464743	Mean dependent var	-2.35E-05
Adjusted R-squared	0.464054	S.D. dependent var	0.035184
S.E. of regression	0.025758	Akaike info criterion	-4.478222
Sum squared resid	1.030370	Schwarz criterion	-4.467908
Log likelihood	3487.057	Hannan-Quinn criter.	-4.474387
F-statistic	674.2057	Durbin-Watson stat	1.997304
Prob(F-statistic)	0.000000		

3. หลักทรัพย์ BTS

Null Hypothesis: BTS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=23)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-39.80311	0.0000
Test critical values:	1% level	-3.963956	
	5% level	-3.412702	
	10% level	-3.128323	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BTS)
Method: Least Squares
Date: 07/25/14 Time: 16:56
Sample (adjusted): 3 1557
Included observations: 1555 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BTS(-1)	-1.631787	0.040996	-39.80311	0.0000
D(BTS(-1))	0.201156	0.024871	8.087851	0.0000
C	-0.001731	0.002470	-0.700807	0.4835
@TREND(1)	2.80E-06	2.75E-06	1.017544	0.3091

R-squared	0.692262	Mean dependent var	1.46E-05
Adjusted R-squared	0.691667	S.D. dependent var	0.087565
S.E. of regression	0.048623	Akaike info criterion	-3.206884
Sum squared resid	3.666821	Schwarz criterion	-3.193124
Log likelihood	2497.352	Hannan-Quinn criter.	-3.201767
F-statistic	1163.001	Durbin-Watson stat	2.011879
Prob(F-statistic)	0.000000		

ผลการทดสอบด้วยวิธีฟิลิบป์ พีรอน (Phillips-Perron test (PP test))

1. SET

Null Hypothesis: SET has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 30 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-63.72665	0.0001
Test critical values:	1% level	-3.963952	
	5% level	-3.412700	
	10% level	-3.128322	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000823
HAC corrected variance (Bartlett kernel)	0.000517

Phillips-Perron Test Equation
Dependent Variable: D(SET)
Method: Least Squares
Date: 07/25/14 Time: 16:51
Sample (adjusted): 2 1557
Included observations: 1556 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SET(-1)	-1.358564	0.023688	-57.35199	0.0000
C	-0.000316	0.001457	-0.216693	0.8285
@TREND(1)	9.84E-07	1.62E-06	0.606883	0.5440

R-squared	0.679281	Mean dependent var	6.28E-07
Adjusted R-squared	0.678868	S.D. dependent var	0.050680
S.E. of regression	0.028719	Akaike info criterion	-4.260561
Sum squared resid	1.280922	Schwarz criterion	-4.250246
Log likelihood	3317.716	Hannan-Quinn criter.	-4.256725
F-statistic	1644.626	Durbin-Watson stat	2.124520
Prob(F-statistic)	0.000000		

2. หลักทรัพย์ AOT

Null Hypothesis: AOT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-36.63130	0.0000
Test critical values:	1% level	-3.963952	
	5% level	-3.412700	
	10% level	-3.128322	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000662
HAC corrected variance (Bartlett kernel)	0.000596

Phillips-Perron Test Equation
Dependent Variable: D(AOT)
Method: Least Squares
Date: 07/25/14 Time: 16:53
Sample (adjusted): 2 1557
Included observations: 1556 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AOT(-1)	-0.930252	0.025333	-36.72067	0.0000
C	-0.001597	0.001307	-1.221194	0.2222
@TREND(1)	2.97E-06	1.46E-06	2.040975	0.0414

R-squared	0.464743	Mean dependent var	-2.35E-05
Adjusted R-squared	0.464054	S.D. dependent var	0.035184
S.E. of regression	0.025758	Akaike info criterion	-4.478222
Sum squared resid	1.030370	Schwarz criterion	-4.467908
Log likelihood	3487.057	Hannan-Quinn criter.	-4.474387
F-statistic	674.2057	Durbin-Watson stat	1.997304
Prob(F-statistic)	0.000000		

3. หลักทรัพย์ BTS

Null Hypothesis: BTS has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-61.62918	0.0000
Test critical values:	1% level	-3.963952	
	5% level	-3.412700	
	10% level	-3.128322	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.002456
HAC corrected variance (Bartlett kernel)	0.001755

Phillips-Perron Test Equation
Dependent Variable: D(BTS)
Method: Least Squares
Date: 07/25/14 Time: 16:56
Sample (adjusted): 2 1557
Included observations: 1556 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BTS(-1)	-1.358519	0.023689	-57.34910	0.0000
C	-0.001487	0.002517	-0.590834	0.5547
@TREND(1)	2.37E-06	2.80E-06	0.847461	0.3969

R-squared	0.679259	Mean dependent var	3.26E-19
Adjusted R-squared	0.678846	S.D. dependent var	0.087538
S.E. of regression	0.049608	Akaike info criterion	-3.167388
Sum squared resid	3.821918	Schwarz criterion	-3.157074
Log likelihood	2467.228	Hannan-Quinn criter.	-3.163553
F-statistic	1644.460	Durbin-Watson stat	2.144108
Prob(F-statistic)	0.000000		

ภาคผนวก ข

ผลการประมาณการมูลค่าสุดโต่งโดยใช้แบบจำลอง BGEV

1. หลักทรัพย์ AOT และดัชนี SET

```
> M1 <- fbvevd(ps, model="log")
Call: fbvevd(x = ps, model = "log")
Deviance: -1691.293
AIC: -1677.293
Dependence: 0.268483
Estimates
    loc1     scale1     shape1      loc2     scale2     shape2       dep
 0.003131   0.014609  -0.173981   0.025098   0.015716   0.217870   0.792037
Standard Errors
    loc1     scale1     shape1      loc2     scale2     shape2       dep
0.0012388  0.0007732  0.0300318  0.0014238  0.0011521  0.0757098  0.0543389
Optimization Information
  Convergence: successful
  Function Evaluations: 123
  Gradient Evaluations: 13
```



```
> M2 <- fbvevd(ps, model="alog")
Call: fbvevd(x = ps, model = "alog")
Deviance: -1691.243
AIC: -1673.243
Dependence: 0.2636329
Estimates
    loc1     scale1     shape1      loc2     scale2     shape2       asy1       asy2       dep
 0.003024   0.014506  -0.162615   0.025078   0.015686   0.210283   0.999232  0.846326   0.776196
```

Standard Errors

loc1 scale1 shape1 loc2 scale2 shape2 asy1 asy2 dep

1.235e-03 7.555e-04 3.126e-02 1.447e-03 1.158e-03 7.620e-02 1.999e-06 4.027e-01 7.832e-02

Optimization Information

Convergence: successful

Function Evaluations: 140

Gradient Evaluations: 15

> M3 <- fbvevd(ps, model="hr")

Call: fbvevd(x = ps, model = "hr")

Deviance: -1690.772

AIC: -1676.772

Dependence: 0.2399745

Estimates

loc1 scale1 shape1 loc2 scale2 shape2 dep

0.003142 0.014633 -0.174277 0.025038 0.015587 0.219890 0.851027

Standard Errors

loc1 scale1 shape1 loc2 scale2 shape2 dep

0.0012428 0.0007715 0.0287273 0.0014193 0.0011408 0.0723466 0.1134943

Optimization Information

Convergence: successful

Function Evaluations: 100

Gradient Evaluations: 1

> M4<- fbvevd(ps, model="neglog")

Call: fbvevd(x = ps, model = "neglog")

Deviance: -1691

AIC: -1677

Dependence: 0.253589

Estimates

loc1 scale1 shape1 loc2 scale2 shape2 dep

0.003125 0.014601 -0.173460 0.025049 0.015647 0.220156 0.505194

Standard Errors

loc1 scale1 shape1 loc2 scale2 shape2 dep

0.0012403 0.0007714 0.0291836 0.0014219 0.0011496 0.0735377 0.0950671

Optimization Information

Convergence: successful

Function Evaluations: 126

Gradient Evaluations: 12

> M5<- fbvevd(ps, model="aneglog")

Call: fbvevd(x = ps, model = "aneglog")

Deviance: -1691.089

AIC: -1673.089

Dependence: 0.2427011

Estimates

loc1 scale1 shape1 loc2 scale2 shape2 asy1 asy2 dep

0.003121 0.014691 -0.169417 0.025181 0.015771 0.218683 0.999430 0.781818 0.537940

Standard Errors

loc1 scale1 shape1 loc2 scale2 shape2 asy1 asy2 dep

1.247e-03 7.835e-04 3.060e-02 1.442e-03 1.168e-03 7.600e-02 1.999e-06 3.611e-01 1.316e-01

Optimization Information

Convergence: successful

Function Evaluations: 134

Gradient Evaluations: 14

> M6<- fbvevd(ps, model="bilog", std.err = FALSE)

Call: fbvevd(x = ps, model = "bilog", std.err = FALSE)

Deviance: -1691.314

AIC: -1675.314

Dependence: 0.2677448

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
0.003131	0.014537	-0.173479	0.025162	0.015729	0.215898	0.783864	0.800921

Optimization Information

Convergence: successful

Function Evaluations: 155

Gradient Evaluations: 16

> M7<- fbvevd(ps, model="negbilog", std.err = FALSE)

Call: fbvevd(x = ps, model = "negbilog", std.err = FALSE)

Deviance: -1691.022

AIC: -1675.022

Dependence: 0.2528714

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
0.003121	0.014614	-0.172451	0.025087	0.015649	0.217531	2.146298	1.831051

Optimization Information

Convergence: successful

Function Evaluations: 74

Gradient Evaluations: 12

> M8<- fbvevd(ps, model="ct")

Call: fbvevd(x = ps, model = "ct")

Deviance: -1691.225

AIC: -1675.225

Dependence: 0.2632408

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
0.003121	0.014601	-0.173254	0.025107	0.015698	0.217321	0.277894	0.306705

Standard Errors

loc1 scale1 shape1 loc2 scale2 shape2 alpha beta

0.0012430 0.0007727 0.0302375 0.0014525 0.0011564 0.0770289 0.1878244 0.1921729

Optimization Information

Convergence: successful

Function Evaluations: 88

Gradient Evaluations: 13

> M9<- fbvevd(ps, model="amix", std.err = FALSE)

Call: fbvevd(x = ps, model = "amix", std.err = FALSE)

Deviance: -1689.582

AIC: -1673.582

Dependence: 0.2696188

Estimates

loc1 scale1 shape1 loc2 scale2 shape2 alpha beta

0.003166 0.014653 -0.172100 0.025206 0.015870 0.216199 0.545874 -0.004424

Optimization Information

Convergence: successful

Function Evaluations: 99

Gradient Evaluations: 12

> **AIC(M1,M2,M3,M4,M5,M6,M7,M8,M9)**

	df	AIC
M1	**7**	**-1677.293**
M2	9	-1673.243
M3	7	-1676.772
M4	7	-1677.000
M5	9	-1673.089
M6	8	-1675.314
M7	8	-1675.022
M8	8	-1675.225
M9	8	-1673.582

การวิเคราะห์ผลการประมาณการ

1. รันแบบจำลองทั้ง 9 แบบจำลอง ด้วยโปรแกรม R
2. เลือกแบบจำลองที่อธิบายความสัมพันธ์ของการขึ้นอยู่กับกันแบบสุดโต่งของ 2 ข้อมูลที่ดีที่สุด โดยพิจารณาจากค่า AIC ที่ต่ำที่สุดจากแบบจำลองที่สามารถรันได้
3. พิจารณาแบบจำลองที่ได้ตามเงื่อนไขของแบบจำลองนั้น เพื่ออธิบายความสัมพันธ์แบบสุดโต่งของข้อมูล 2 ข้อมูลว่าขึ้นอยู่กับกันแบบสมบูรณ์ หรือไม่สมบูรณ์

หมายเหตุ

- เนื่องจากในกรณีนี้ ค่า AIC มีค่าเท่ากัน จึงเลือกทั้ง 3 แบบจำลองในการอธิบายความสัมพันธ์
- การวิเคราะห์ผลการประมาณการมูลค่าสุดโต่งโดยใช้แบบจำลอง BGPD มีขั้นตอนการพิจารณาเช่นเดียวกันกับข้างต้น

2. หลักทรัพย์ BTS และดัชนี SET

```
> M1 <- fbvevd(ps, model="log")
Call: fbvevd(x = ps, model = "log")
Deviance: -1682.089
AIC: -1668.089
Dependence: 0.3182072
Estimates
   loc1    scale1    shape1      loc2    scale2    shape2       dep
 0.00318   0.01084  -0.04153   0.02393   0.01593   0.52459   0.75000
Standard Errors
    loc1     scale1     shape1      loc2     scale2     shape2       dep
8.938e-04  1.999e-06  3.265e-02  1.424e-03  1.299e-03  7.670e-02  4.561e-02
Optimization Information
  Convergence: successful
  Function Evaluations: 40
  Gradient Evaluations: 1

> M2 <- fbvevd(ps, model="alog")
Call: fbvevd(x = ps, model = "alog")
Deviance: -1682.072
AIC: -1664.072
Dependence: 0.3231239
Estimates
   loc1    scale1    shape1      loc2    scale2    shape2      asy1      asy2       dep
 0.00318   0.01084  -0.04153   0.02393   0.01593   0.52459   0.75000   0.75000  0.65000
Standard Errors
    loc1     scale1     shape1      loc2     scale2     shape2       asy1       asy2       dep
9.088e-04  1.999e-06  6.195e-02  1.438e-03  1.318e-03  1.093e-01  4.794e-01  7.374e-01  1.508e-01
Optimization Information
  Convergence: successful
```

```
 Function Evaluations: 40
 Gradient Evaluations: 1

> M3 <- fbvevd(ps, model="hr")
Call: fbvevd(x = ps, model = "hr")
Deviance: -1675.064
AIC: -1661.064
Dependence: 0.3173105
Estimates
   loc1    scale1    shape1     loc2    scale2    shape2      dep
 0.00318   0.01084  -0.04153   0.02393   0.01593   0.52459   1.00000
Standard Errors
    loc1     scale1     shape1      loc2     scale2     shape2       dep
8.926e-04  1.999e-06  2.840e-02  1.414e-03  1.282e-03  7.024e-02  1.121e-01
Optimization Information
 Convergence: successful
 Function Evaluations: 40
 Gradient Evaluations: 1

> M4<- fbvevd(ps, model="neglog")
Call: fbvevd(x = ps, model = "neglog")
Deviance: -1680.111
AIC: -1666.111
Dependence: 0.3149803
Estimates
   loc1    scale1    shape1     loc2    scale2    shape2      dep
 0.00318   0.01084  -0.04153   0.02393   0.01593   0.52459   0.60000
Standard Errors
    loc1     scale1     shape1      loc2     scale2     shape2       dep
8.932e-04  1.999e-06  3.118e-02  1.422e-03  1.299e-03  7.548e-02  1.025e-01
Optimization Information
```

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> M5<- fbvevd(ps, model="aneglog")

Call: fbvevd(x = ps, model = "aneglog")

Deviance: -1682.437

AIC: -1664.437

Dependence: 0.3153362

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	asy1	asy2	dep
0.00318	0.01084	-0.04153	0.02393	0.01593	0.52459	0.75000	0.75000	0.80000

Standard Errors

loc1	scale1	shape1	loc2	scale2	shape2	asy1	asy2	dep
9.048e-04	1.999e-06	5.579e-02	1.432e-03	1.306e-03	8.599e-02	3.662e-01	4.937e-01	2.978e-01

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> M6<- fbvevd(ps, model="bilog", std.err = FALSE)

Call: fbvevd(x = ps, model = "bilog", std.err = FALSE)

Deviance: -1682.089

AIC: -1666.089

Dependence: 0.3182072

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
0.00318	0.01084	-0.04153	0.02393	0.01593	0.52459	0.75000	0.75000

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> M7<- fbvevd(ps, model="negbilog", std.err = FALSE)

Call: fbvevd(x = ps, model = "negbilog", std.err = FALSE)

Deviance: -1680.111

AIC: -1664.111

Dependence: 0.3149803

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
0.00318	0.01084	-0.04153	0.02393	0.01593	0.52459	1.66667	1.66667

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> M8<- fbvevd(ps, model="ct")

Call: fbvevd(x = ps, model = "ct")

Deviance: -1668.197

AIC: -1652.197

Dependence: 0.3992916

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
0.00318	0.01084	-0.04153	0.02393	0.01593	0.52459	0.60000	0.60000

Standard Errors

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
9.033e-04	1.999e-06	3.443e-02	1.457e-03	1.285e-03	7.899e-02	1.644e-01	2.281e-01

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> M9<- fbvevd(ps, model="amix", std.err = FALSE)

Call: fbvevd(x = ps, model = "amix", std.err = FALSE)

Deviance: -1675.286

AIC: -1659.286

Dependence: 0.375

Estimates

loc1	scale1	shape1	loc2	scale2	shape2	alpha	beta
3.180e-03	1.084e-02	-4.153e-02	2.393e-02	1.593e-02	5.246e-01	7.500e-01	-1.570e-25

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> AIC(M1,M2,M3,M4,M5,M6,M7,M8,M9)

	df	AIC
M1	**7**	**-1668.089**
M2	9	-1664.072
M3	7	-1661.064
M4	7	-1666.111
M5	9	-1664.437
M6	8	-1666.089
M7	8	-1664.111
M8	8	-1652.197
M9	8	-1659.286

ผลการประมาณการมูลค่าสุดโต่งโดยใช้แบบจำลอง BGPD

1. หลักทรัพย์ AOT และดัชนี SET

```
> u <- apply(ps, 2, quantile, prob=0.3)
> u
   dat...1.     dat...2.
0.0006298948 0.0103068430

> M1 <- fbvpot(ps, u, model = "log")
> M1
Call: fbvpot(x = ps, threshold = u, model = "log")
Likelihood: censored
Deviance: -4602.547
AIC: -4592.547
Dependence: 0.3182072
Threshold: 6e-04 0.0103
Marginal Number Above: 477 477
Marginal Proportion Above: 0.6994 0.6994
Number Above: 352
Proportion Above: 0.5161
Estimates
 scale1    shape1    scale2    shape2     dep
0.01043  0.12641  0.01539  0.09543  0.75000
Standard Errors
   scale1       shape1       scale2       shape2        dep
1.998e-06  2.538e-02  9.303e-04  4.176e-02  2.347e-02
  Optimization Information
  Convergence: successful
  Function Evaluations: 40
  Gradient Evaluations: 1
```

```
> M2 <- fbvpot(ps, u, model = "alog")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for alog is singular; use std.err = FALSE

> M3 <- fbvpot(ps, u, model = "hr")
> M3
Call: fbvpot(x = ps, threshold = u, model = "hr")
Likelihood: censored
Deviance: -4549.543
AIC: -4539.543
Dependence: 0.3173105
Threshold: 6e-04 0.0103
Marginal Number Above: 477 477
Marginal Proportion Above: 0.6994 0.6994
Number Above: 352
Proportion Above: 0.5161
Estimates
 scale1    shape1    scale2    shape2     dep
0.01043  0.12641  0.01539  0.09543  1.00000
Standard Errors
   scale1     shape1     scale2     shape2      dep
1.998e-06  1.426e-02  8.998e-04  3.726e-02  6.000e-02
  Optimization Information
  Convergence: successful
  Function Evaluations: 40
  Gradient Evaluations: 1
```

```
> M4 <- fbvpot(ps, u, model = "neglog")
> M4
Call: fbvpot(x = ps, threshold = u, model = "neglog")
Likelihood: censored
Deviance: -4595.633
AIC: -4585.633
Dependence: 0.3149803
Threshold: 6e-04 0.0103
Marginal Number Above: 477 477
Marginal Proportion Above: 0.6994 0.6994
Number Above: 352
Proportion Above: 0.5161
Estimates
  scale1    shape1    scale2    shape2     dep
0.01043  0.12641  0.01539  0.09543  0.60000
Standard Errors
   scale1       shape1       scale2       shape2       dep
1.998e-06  2.367e-02  9.184e-04  4.025e-02  4.902e-02
  Optimization Information
  Convergence: successful
  Function Evaluations: 40
  Gradient Evaluations: 1

> M5 <- fbvpot(ps, u, model = "aneglog")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for aneglog is singular; use std.err = FALSE
> M6 <- fbvpot(ps, u, model = "bilog")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for bilog is singular; use std.err = FALSE
```

```
> M7 <- fbvpot(ps, u, model = "negbilog")
> M7
Call: fbvpot(x = ps, threshold = u, model = "negbilog")
Likelihood: censored
Deviance: -4595.633
AIC: -4583.633
Dependence: 0.3149803
Threshold: 6e-04 0.0103
Marginal Number Above: 477 477
Marginal Proportion Above: 0.6994 0.6994
Number Above: 352
Proportion Above: 0.5161
Estimates
  scale1    shape1    scale2    shape2    alpha     beta
0.01043  0.12641  0.01539  0.09543  1.66667  1.66667
Standard Errors
   scale1       shape1       scale2       shape2      alpha        beta
1.998e-06  2.358e-02  9.224e-04  4.049e-02  2.354e-01  2.604e-01
  Optimization Information
  Convergence: successful
  Function Evaluations: 40
  Gradient Evaluations: 1

> M8 <- fbvpot(ps, u, model = "ct")
> M8
Call: fbvpot(x = ps, threshold = u, model = "ct")
Likelihood: censored
Deviance: -4565.977
AIC: -4553.977
Dependence: 0.3992916
Threshold: 6e-04 0.0103
```

Marginal Number Above: 477 477

Marginal Proportion Above: 0.6994 0.6994

Number Above: 352

Proportion Above: 0.5161

Estimates

scale1	shape1	scale2	shape2	alpha	beta
0.01043	0.12641	0.01539	0.09543	0.60000	0.60000

Standard Errors

scale1	shape1	scale2	shape2	alpha	beta
1.998e-06	2.520e-02	8.863e-04	3.875e-02	7.765e-02	7.661e-02

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

```
> M9 <- fbvpot(ps, u, model = "amix")
> M9
Call: fbvpot(x = ps, threshold = u, model = "amix")
Likelihood: censored
Deviance: -4591.232
AIC: -4579.232
Dependence: 0.375
Threshold: 6e-04 0.0103
Marginal Number Above: 477 477
Marginal Proportion Above: 0.6994 0.6994
Number Above: 352
Proportion Above: 0.5161
Estimates
```

scale1	shape1	scale2	shape2	alpha	beta
1.043e-02	1.264e-01	1.539e-02	9.543e-02	7.500e-01	-8.717e-26

Standard Errors

scale1	shape1	scale2	shape2	alpha	beta
1.998e-06	2.726e-02	9.190e-04	4.208e-02	1.746e-01	1.068e-01

Optimization Information

Convergence: successful

Function Evaluations: 40

Gradient Evaluations: 1

> AIC(M1,M3,M4,M7,M8,M9)

	df	AIC
M1	**5**	**-4592.547**
M3	5	-4539.543
M4	5	-4585.633
M7	6	-4583.633
M8	6	-4553.977
M9	6	-4579.232

2. หลักทรัพย์ BTS และดัชนี SET

```
> u <- apply(ps, 2, quantile, prob=0.95)
> u
  dat...1.   dat...2.
0.02919344 0.07688837

> M1 <- fbvpot(ps, u, model = "log")
> M1
Call: fbvpot(x = ps, threshold = u, model = "log")
Likelihood: censored
Deviance: 90.51205
AIC: 100.512
Dependence: 0.3182072
Threshold: 0.0292 0.0769
Marginal Number Above: 28 28
Marginal Proportion Above: 0.0517 0.0517
Number Above: 4
Proportion Above: 0.0074
Estimates
   scale1      shape1      scale2      shape2       dep
1.112e-02  2.596e-17  3.234e-02  6.580e-01  7.500e-01
Standard Errors
   scale1      shape1      scale2      shape2       dep
0.0000020  0.0002504  0.0096972  0.2654067  0.0905757
  Optimization Information
  Convergence: successful
  Function Evaluations: 28
  Gradient Evaluations: 1
```

```
> M2 <- fbvpot(ps, u, model = "alog")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for alog is singular; use std.err = FALSE

> M3 <- fbvpot(ps, u, model = "hr")
> M3
Call: fbvpot(x = ps, threshold = u, model = "hr")
Likelihood: censored
Deviance: 92.52092
AIC: 102.5209
Dependence: 0.3173105
Threshold: 0.0292 0.0769
Marginal Number Above: 28 28
Marginal Proportion Above: 0.0517 0.0517
Number Above: 4
Proportion Above: 0.0074
Estimates
   scale1       shape1       scale2       shape2       dep
1.112e-02  2.598e-17  3.234e-02  6.580e-01  1.000e+00
Standard Errors
   scale1       shape1       scale2       shape2       dep
0.0000020  0.0002551  0.0093102  0.2293313  0.2683642
  Optimization Information
  Convergence: successful
  Function Evaluations: 28
  Gradient Evaluations: 1

> M4 <- fbvpot(ps, u, model = "neglog")
> M4
Call: fbvpot(x = ps, threshold = u, model = "neglog")
Likelihood: censored
```

Deviance: 91.36302

AIC: 101.363

Dependence: 0.3149803

Threshold: 0.0292 0.0769

Marginal Number Above: 28 28

Marginal Proportion Above: 0.0517 0.0517

Number Above: 4

Proportion Above: 0.0074

Estimates

scale1	shape1	scale2	shape2	dep
1.112e-02	2.606e-17	3.234e-02	6.580e-01	6.000e-01

Standard Errors

scale1	shape1	scale2	shape2	dep
0.0000020	0.0002536	0.0098212	0.2501684	0.2281720

Optimization Information

Convergence: successful

Function Evaluations: 28

Gradient Evaluations: 1

```
> M5 <- fbvpot(ps, u, model = "aneglog")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for aneglog is singular; use std.err = FALSE
```



```
> M6 <- fbvpot(ps, u, model = "bilog")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for bilog is singular; use std.err = FALSE

> M7 <- fbvpot(ps, u, model = "negbilog")
> M7
Call: fbvpot(x = ps, threshold = u, model = "negbilog")
```

Likelihood: censored

Deviance: 91.36302

AIC: 103.363

Dependence: 0.3149803

Threshold: 0.0292 0.0769

Marginal Number Above: 28 28

Marginal Proportion Above: 0.0517 0.0517

Number Above: 4

Proportion Above: 0.0074

Estimates

scale1	shape1	scale2	shape2	alpha	beta
1.112e-02	2.606e-17	3.234e-02	6.580e-01	1.667e+00	1.667e+00

Standard Errors

scale1	shape1	scale2	shape2	alpha	beta
0.0000020	0.0002536	0.0093691	0.2442536	0.6048650	0.9171597

Optimization Information

Convergence: successful

Function Evaluations: 28

Gradient Evaluations: 1

```
> M8 <- fbvpot(ps, u, model = "ct")
Error in bvpost.optim(x = x, opt = opt, nm = nm, fixed.param = fixed.param,  :
  observed information matrix for ct is singular; use std.err = FALSE
> M9 <- fbvpot(ps, u, model = "amix")
> M9
Call: fbvpot(x = ps, threshold = u, model = "amix")
Likelihood: censored
Deviance: 91.89788
AIC: 103.8979
Dependence: 0.375
Threshold: 0.0292 0.0769
```

Marginal Number Above: 28 28

Marginal Proportion Above: 0.0517 0.0517

Number Above: 4

Proportion Above: 0.0074

Estimates

scale1	shape1	scale2	shape2	alpha	beta
1.112e-02	2.228e-17	3.234e-02	6.580e-01	7.500e-01	-3.472e-18

Standard Errors

scale1	shape1	scale2	shape2	alpha	beta
0.0000020	0.0002389	0.0095708	0.3313119	1.2506453	0.7054741

Optimization Information

Convergence: successful

Function Evaluations: 29

Gradient Evaluations: 1

> AIC(M1,M3,M4,M7,M9)

	df	AIC
M1	**5**	**100.5120**
M3	5	102.5209
M4	5	101.3630
M7	6	103.3630
M9	6	103.8

ประวัติผู้เขียน

ชื่อ – สกุล	นางสาวสุนิษา ตุ้ยยวง
วัน เดือน ปี เกิด	14 กรกฎาคม 2532
ประวัติการศึกษา	สำเร็จการศึกษามัธยมศึกษาตอนปลาย โรงเรียนดาราวิทยาลัย ปีการศึกษา 2550 สำเร็จการศึกษา ปริญญาตรี วิศวกรรมศาสตรบัณฑิต มหาวิทยาลัยเชียงใหม่ ปีการศึกษา 2554
ประสบการณ์	2555-2556 บริษัทซิมสตาร์ ดีไซน์ แอนด์ เมนูเฟคเจอริ่ง ตำแหน่ง วิศวกร