การประมาณค่าโดยโปรแกรม FRONTIER 4.1c

Output from the program FRONTIER (Version 4.1c)

instruction file = terminal
data file = 2456.csv

Tech. Eff. Effects Frontier (see B&C 1993)
The model is a cost function
The dependent variable is logged

the ols estimates are :

	coefficient	standard-error	t-ratio
beta 0	2.03E+01	7.49E+00	2.72E+00
beta 1	-1.34E+00	5.06E-01	-2.65E+00
beta 2	1.64E+00	4.55E-01	3.62E+00
beta 3	-8.12E-01	6.13E-01	-1.32E+00
beta 4	-5.48E-02	3.78E-02	-1.45E+00
beta 5	-9.99E-02	3.08E-02	-3.24E+00
beta 6	-9.24E-02	2.71E-02	-3.41E+00
beta 7	-7.50E-02	1.74E-01	-4.30E-01
beta 8	4.20E-01	1.72E-01	2.44E+00
beta 9	-1.77E-01	1.74E-01	-1.02E+00
beta10	6.10E-01	1.68E-01	3.64E+00
beta11	-1.34E-01	1.73E-01	-7.72E-01
beta12	3.82E-01	1.82E-01	2.10E+00
beta13	-1.31E+00	1.84E-01	-7.12E+00
beta14	-3.31E-01	1.66E-01	-1.99E+00
beta15	-2.19E-01	1.72E-01	-1.27E+00
beta16	-1.28E-01	1.66E-01	-7.73E-01
beta17	3.21E-03	1.68E-01	1.91E-02
beta18	-5.46E-02	1.81E-01	-3.02E-01
beta19	4.00E-02	1.64E-01	2.44E-01
beta20	-3.77E-01	1.70E-01	-2.22E+00
beta21	-9.51E-01	1.76E-01	-5.40E+00
beta22	-4.93E-01	1.74E-01	-2.83E+00
beta23	-4.16E-01	1.68E-01	-2.47E+00
beta24	-1.41E+00	1.97E-01	-7.16E+00
beta25	-9.37E-01	1.84E-01	-5.08E+00

beta26	4.26E-01	1.65E-01	2.58E+00
beta27	-1.48E+00	2.02E-01	-7.33E+00
beta28	-2.49E-01	1.72E-01	-1.44E+00
beta29	-8.97E-01	1.88E-01	-4.78E+00
beta30	-4.86E-01	4.61E-01	-1.05E+00
beta31	-1.36E+00	1.82E-01	-7.49E+00
beta32	-1.80E+00	2.27E-01	-7.93E+00
sigma-squared	0.64699919E-01		

log likelihood function = 0.12178368E+02

the estimates after the grid search were :

beta 0	0.20206257E+02
beta 1	-0.13421193E+01
beta 2	0.16437130E+01
beta 3	-0.81166441E+00
beta 4	-0.54840030E-01
beta 5	-0.99923806E-01
beta 6	-0.92357372E-01
beta 7	-0.74999238E-01
beta 8	0.41990611E+00
beta 9	-0.17684861E+00
beta10	0.60977599E+00
beta11	-0.13350555E+00
beta12	0.38176574E+00
beta13	-0.13084029E+01
beta14	-0.33058302E+00
beta15	-0.21857017E+00
beta16	-0.12823834E+00
beta17	0.32085817E-02
beta18	-0.54578910E-01
beta19	0.40031660E-01
beta20	-0.37700632E+00
beta21	-0.95136548E+00
beta22	-0.49281118E+00
beta23	-0.41578612E+00
beta24	-0.14092637E+01
beta25	-0.93650749E+00
beta26	0.42612269E+00
beta27	-0.14804442E+01
beta28	-0.24856237E+00
beta29	-0.89655728E+00
beta30	-0.48617238E+00
beta31	-0.13602945E+01
beta32	-0.17971466E+01
delta 0	0.00000000E+00
delta 1	0.00000000E+00

delta 2 0.00000000E+00
delta 3 0.00000000E+00
delta 4 0.00000000E+00
sigma-squared 0.69128255E-01
gamma 0.46000000E+00

(Information on Iterations is Deleted)

the final mle estimates are :

	coefficient	standard-error	t-ratio
beta 0	1.83E+01	1.02E+00	1.80E+01
beta 1	-7.55E-01	2.03E-01	-3.73E+00
beta 2	1.42E+00	2.44E-01	5.81E+00
beta 3	-1.25E+00	2.59E-01	-4.83E+00
beta 4	-7.89E-02	2.82E-02	-2.80E+00
beta 5	-8.23E-02	1.23E-02	-6.69E+00
beta 6	-8.09E-02	1.40E-02	-5.80E+00
beta 7	8.47E-02	1.70E-01	4.99E-01
beta 8	5.49E-01	1.88E-01	2.92E+00
beta 9	-2.50E-01	2.06E-01	-1.21E+00
beta10	1.01E+00	3.05E-01	3.29E+00
beta11	-6.93E-02	2.04E-01	-3.39E-01
beta12	4.84E-01	1.73E-01	2.80E+00
beta13	-5.68E-01	1.65E-01	-3.44E+00
beta14	1.64E-01	1.83E-01	8.95E-01
beta15	-1.13E-01	1.75E-01	-6.43E-01
beta16	1.63E-01	2.74E-01	5.94E-01
beta17	5.34E-03	1.81E-01	2.95E-02
beta18	-2.44E-01	1.87E-01	-1.30E+00
beta19	7.85E-03	2.03E-01	3.86E-02
beta20	-1.06E-01	2.14E-01	-4.93E-01
beta21	-7.66E-01	1.74E-01	-4.41E+00
beta22	-1.58E-01	1.73E-01	-9.13E-01
beta23	1.34E-01	1.72E-01	7.77E-01
beta24	-6.26E-01	1.70E-01	-3.68E+00
beta25	-3.55E-01	1.80E-01	-1.97E+00
beta26	1.40E-02	2.34E-01	5.98E-02
beta27	-6.63E-01	1.75E-01	-3.79E+00
beta28	-9.13E-02	1.74E-01	-5.25E-01
beta29	-2.21E-01	1.88E-01	-1.17E+00
beta30	3.86E-01	2.96E-01	1.30E+00
beta31	-8.27E-01	1.72E-01	-4.80E+00
beta32	-1.21E+00	1.76E-01	-6.87E+00
delta 0	1.14E+00	1.22E-01	9.34E+00
delta 1	-4.16E-01	1.54E-01	-2.70E+00
delta 2	-1.12E-03	4.81E-03	-2.33E-01
delta 3	2.44E-01	1.29E-01	1.89E+00

delta 4 -2.78E+00 1.84E-01 -1.51E+01
sigma-squared 0.79440260E-01 0.83289399E-02 0.95378597E+01
gamma 0.99997989E+00 0.37861813E-03 0.26411305E+04

log likelihood function = 0.46767174E+02

LR test of the one-sided error = 0.69177611E+02
with number of restrictions = 6
[note that this statistic has a mixed chi-square distribution]

number of iterations = 52
6
(maximum number of iterations set at : 100)

number of cross-sections = 27

number of time periods = 5

total number of observations = 135

thus there are: 0 obsns not in the panel

(The covariance matrix for the ML estimators is deleted)

cost efficiency estimates :

firm	year	eff.-est.
1	1	0.21439899E+01
2	1	0.33667924E+01
3	1	0.11555965E+01

(The TE values for observations 4 to 133 are deleted from this output)

26	5	0.19367710E+01
27	5	0.10784824E+01

mean efficiency = 0.16645499E+01

* ค่า eff-est ที่ได้จากการประมาณอยู่ในรูป $\exp(u_{it}) = e^{u_{it}}$ ทำให้อยู่ในรูป $\exp(-u_{it})$ ได้โดย

$$\exp(-u_{it}) = e^{-u_{it}} = \frac{1}{e^{u_{it}}}$$

$$= \frac{1}{\exp(u_{it})}$$