

Appendices

Appendix 1 Output from the program FRONTIER (Version 4.1c) for the stochastic frontier function estimation

Instruction file = litfront.ins

Data file = litfront.prn

Tech. Eff. Effects Frontier (see B&C 1993)

The model is a production function

The dependent variable is logged

The OLS estimates are:

	Coefficient	Standard-error	t-ratio
beta 0	0.39826550E+01	0.44412278E+00	0.89674638E+01
beta 1	0.23263330E+00	0.14607033E+00	0.15926116E+01
beta 2	-0.91719697E-01	0.52005997E-01	-0.17636369E+01
beta 3	0.24123267E-01	0.89575892E-01	0.26930535E+00
beta 4	0.37962714E+00	0.73150798E-01	0.51896514E+01
beta 5	0.63916021E-01	0.40003496E-01	0.15977609E+01
beta 6	0.77370404E-01	0.41170639E-01	0.18792617E+01
beta 7	0.19327948E+00	0.64819508E-01	0.29818104E+01
beta 8	0.12915809E+00	0.62198878E-01	0.20765341E+01
sigma-squared	0.55413488E-01		

Log likelihood function = 0.69760794E+01

The estimates after the grid search were:

beta 0	0.41892919E+01
beta 1	0.23263330E+00
beta 2	-0.91719697E-01
beta 3	0.24123267E-01
beta 4	0.37962714E+00
beta 5	0.63916021E-01
beta 6	0.77370404E-01
beta 7	0.19327948E+00
beta 8	0.12915809E+00
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
delta 5	0.00000000E+00
delta 6	0.00000000E+00
Sigma-squared	0.91878298E-01
Gamma	0.73000000E+00

Appendix 1 Output from the program FRONTIER (Version 4.1c) for the stochastic frontier function estimation (*continued*)

The MLE estimates are:

	Coefficient	Standard-error	t-ratio
beta 0 (CONSTANT)	0.50352882E+01	0.37918932E+00	0.13279088E+02
beta 1 (TREE AGE)	0.23428034E+00	0.11938015E+00	0.19624731E+01
beta 2 (IRR.BEARING)	-0.96723398E-01	0.37951267E-01	-0.25486211E+01
beta 3 (DENSITY)	-0.56418695E-02	0.69088875E-01	-0.81661041E-01
beta 4 (LABOR)	0.16432508E+00	0.65214458E-01	0.25197645E+01
beta 5 (FERTILIZER)	0.70561580E-01	0.33237521E-01	0.21229496E+01
beta 6 (SPRAY)	0.40510820E-01	0.33363044E-01	0.12142423E+01
beta 7 (DUMMY1)	0.92989991E-01	0.54076113E-01	0.17196131E+01
beta 8 (DUMMY2)	0.11095914E+00	0.48216847E-01	0.23012525E+01
delta 0 (CONSTANT)	0.60771988E+00	0.19228838E+00	0.31604607E+01
delta 1 (AGE)	-0.97348580E-02	0.48432264E-02	-0.20099944E+01
delta 2 (ETHNIC)	-0.17127266E+00	0.82316524E-01	-0.20806595E+01
delta 3 (EDUCATION)	-0.19781744E-02	0.14849310E-01	-0.13321658E+00
delta 4 (EXPERIENCE)	0.20327642E-02	0.84567883E-02	0.24037071E+00
delta 5 (INFOCREDIT)	0.12155389E-01	0.25572806E-02	0.47532479E+01
delta 6 (FARM SIZE)	-0.19655800E+00	-0.69747676E-01	-0.28181298E+01
Sigma-squared	0.42339912E-01	0.11038282E-01	0.38357339E+01
Gamma	0.73706292E+00	0.26031335E+00	0.28314450E+01

Log likelihood function = 0.26066588E+02

LR test of the one-sided error = 0.38181017E+02

with number of restrictions = 8

[note that this statistic has a mixed chi-square distribution]

Number of iterations = 39

(maximum number of iterations set at : 100)

Number of cross-sections = 80

Number of time periods = 1

Total number of observations = 80

Thus there are: 0 obsns not in the panel

Appendix 2 Technical efficiency scores of the surveyed litchi farms

Farm#	TE scores	Farm#	TE scores	Farm#	TE scores
1	0.8823	28	0.9350	55	0.4525
2	0.9210	29	0.7754	56	0.6259
3	0.8134	30	0.8695	57	0.5491
4	0.7550	31	0.9483	58	0.6468
5	0.9130	32	0.8449	59	0.9143
6	0.5905	33	0.8869	60	0.9110
7	0.8536	34	0.8502	61	0.5248
8	0.9219	35	0.6324	62	0.8194
9	0.6210	36	0.7239	63	0.6736
10	0.9560	37	0.6954	64	0.4654
11	0.6280	38	0.8855	65	0.9315
12	0.7089	39	0.8219	66	0.5337
13	0.8850	40	0.4016	67	0.5348
14	0.8611	41	0.8757	68	0.6901
15	0.6588	42	0.8066	69	0.4008
16	0.7413	43	0.9073	70	0.8802
17	0.7403	44	0.9206	71	0.7524
18	0.5973	45	0.9061	72	0.4327
19	0.6166	46	0.8955	73	0.7409
20	0.6458	47	0.9571	74	0.5108
21	0.7396	48	0.7727	75	0.7897
22	0.9062	49	0.9323	76	0.3611
23	0.9076	50	0.6199	77	0.6210
24	0.5091	51	0.6047	78	0.6421
25	0.9170	52	0.7813	79	0.9061
26	0.8512	53	0.6438	80	0.8865
27	0.9011	54	0.6515		

Mean TE = 0.747, Max = 0.957, Min = 0.361 and SD= 0.16

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Appendix 3 Distribution of technical efficiency scores

	Range of technical efficiency scores						Total
	<0.5	0.5-0.6	0.6-0.7	0.7-0.8	0.8-0.9	>0.9	
# of farm	6	8	17	13	18	18	80
% of farm	7.5	10	21.25	16.25	22.5	22.5	100
Mean efficiency = 0.74732							

Appendix 4 T-test of mean difference between groups of litchi farmers for TE scores

Criteria classified by group (1) and (2)	Mean (1)	Mean (2)	Diff.	t computed	Statistical inference
Farm size: (1)=small (2)=medium	0.8612	0.7278	0.133	5.1201	Reject Ho at 1%
Farm size: (1)=small (2)=large	0.8612	0.5607	0.300	7.6744	Reject Ho at 1%
Farm size: (1)=medium (2)=large	0.7278	0.5607	0.167	3.8984	Reject Ho at 1%
Ethnic: (1)= Kinh (2)=minorities	0.8210	0.6470	0.174	5.566	Reject Ho at 1%
Farm with average tree age: (1) <9 and (2) =>9	0.7199	0.7792	-0.059	-1.6876	Reject Ho at 5%
Credit access: (1) with (2) without	0.7890	0.7012	0.088	2.5217	Reject Ho at 1%
Farm located in: (1)=old alluvial soil (2)= ferralitic soil area	0.7540	0.7440	0.010	0.2441	Accept Ho

Note: Hypothesis Ho. Mean (1) is not different from Mean (2)

Appendix 5 Regression of variable p_i v.s explanatory variables in the stochastic frontier function – An implication of Breusch-Pagan-Godfrey test for heteroscedasticity

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.3008
R Square	0.0905
Adjusted R Square	-0.0120
Standard Error	1.8556
Observations	80

EES =24.3273
 $\chi^2 = \text{EES}/2 = 12.164$
 (chi-square)

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression (EES)	8	24.3273	3.0409	0.8832	0.5350
Residual	71	244.464	3.4432		
Total	79	268.7912			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	5.8922	3.5009	1.6831	0.0968	-1.0883	12.8727
X Variable 1	-1.1092	1.1514	-0.9633	0.3387	-3.4050	1.1867
X Variable 2	0.0709	0.4099	0.1726	0.8632	-0.7465	0.8883
X Variable 3	-0.6550	0.7061	-0.9276	0.3568	-2.0629	0.7529
X Variable 4	0.2739	0.5766	0.4750	0.6362	-0.8758	1.4237
X Variable 5	-0.2636	0.3153	-0.8356	0.4061	-0.8923	0.3652
X Variable 6	-0.1841	0.3245	-0.5672	0.5724	-0.8312	0.4630
X Variable 7	-0.4430	0.5109	-0.8670	0.3889	-1.4618	0.5758
X Variable 8	0.6196	0.4903	1.2637	0.2105	-0.3580	1.5972

Appendix 6 Ratio of MVP_{Lab}/P_{Lab} to litchi production among the surveyed farms

Farm#	MVP/P_{Lab}	Farm#	MVP/P_{Lab}	Farm#	MVP/P_{Lab}
1	0.849676	28	1.689697	55	1.37679
2	0.939775	29	0.832239	56	1.538207
3	0.974301	30	0.978246	57	1.253034
4	1.355278	31	1.402767	58	1.402767
5	1.166222	32	0.753937	59	2.027636
6	1.21595	33	1.010145	60	1.570704
7	0.675879	34	1.161667	61	1.126465
8	0.7474	35	0.901172	62	2.040889
9	1.024163	36	2.39767	63	1.749333
10	0.660859	37	1.294594	64	1.154451
11	0.630056	38	1.608995	65	2.509592
12	0.735297	39	1.17754	66	1.288185
13	1.025471	40	0.665791	67	1.421333
14	1.193639	41	0.94623	68	0.796571
15	0.958076	42	0.579325	69	1.310073
16	1.020444	43	1.565193	70	1.626333
17	1.072308	44	1.713057	71	1.301067
18	1.37679	45	1.225495	72	0.940015
19	1.217747	46	0.782596	73	1.496913
20	0.953162	47	1.481009	74	1.039006
21	1.824458	48	0.688395	75	0.664301
22	0.743467	49	1.84942	76	0.462739
23	1.126465	50	1.469643	77	1.530667
24	0.499343	51	1.534138	78	1.362373
25	1.050551	52	1.372554	79	2.112121
26	0.665791	53	1.652148	80	1.926255
27	1.295951	54	2.065185		

Mean = 1.235, Max = 0.251, Min = 0.463 and SD= 0.442

Appendix 7 Ratio of $MVP_{\text{Fer}}/P_{\text{Fer}}$ to litchi production among the surveyed farms

Farm#	$MVP_{\text{Fer}}/P_{\text{Fer}}$	Farm#	$MVP_{\text{Fer}}/P_{\text{Fer}}$	Farm#	$MVP_{\text{Fer}}/P_{\text{Fer}}$
1	0.931447	28	8.534343	55	0.330052
2	0.749172	29	1.752097	56	0.783978
3	0.345237	30	1.341111	57	4.876768
4	0.559536	31	0.618974	58	0.758821
5	1.233994	32	5.675358	59	0.653168
6	0.669891	33	0.790928	60	2.926061
7	0.966244	34	0.569172	61	0.87148
8	2.264988	35	0.418688	62	1.251704
9	0.195436	36	0.489438	63	0.766349
10	1.146113	37	0.491936	64	0.58878
11	0.755556	38	0.690168	65	1.083422
12	2.955918	39	0.658888	66	0.429428
13	0.462341	40	0.852000	67	0.622659
14	0.883025	41	0.751022	68	1.172794
15	0.351383	42	0.848791	69	0.697184
16	0.605772	43	1.650598	70	0.647433
17	1.291773	44	0.939300	71	0.528889
18	0.654201	45	0.895554	72	0.253499
19	0.809996	46	0.490775	73	0.618974
20	0.924904	47	0.965284	74	0.220122
21	0.684216	48	0.502917	75	0.668919
22	0.511115	49	2.584582	76	1.341111
23	0.868345	50	1.321675	77	4.506133
24	0.670428	51	0.892802	78	0.597102
25	0.458131	52	2.340848	79	0.959176
26	0.760981	53	3.901414	80	0.786407
27	0.631546	54	0.793772		

Mean = 1.176, Max = 8.53, Min = 0.195 and SD=1.32

Curriculum Vitae

Name: DO QUANG GIAM

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Educational Background:

2001 - 2003 M.Sc. Agricultural Systems (Development option)

Chiang Mai University, Thailand

1990 - 1994 B.Sc. Agricultural Economics

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