

## APPENDIX ONE

## SOME DESCRIPTIVE STATISTICS

## Appendix 1.1: Descriptive statistics

## Sample statistics of market participation

Variable Description	Sample Mean	Std Dev	Min	Max
Selling maize (%)	26	0.44	0	1
Selling livestock (%)	17	0.38	0	1
Selling horticultural crops (%)	19	0.39	0	1
Selling other field crops (%)	21	0.41	0	1
Selling any agricultural commodity (%)	50	0.50	0	1
Value of maize sold (R)	274	787	0	6320
Percentage of maize sold (%)				
Value of livestock sold (R)	492	2036	0	16000
Value of horticulture sold (R)	1663	7361	0	60000
Value of other field crops sold (R)	459	1216	0	7000
Aggregate Value of farm output sold (R)				

## Sample statistics of consumption

Variable Description	Sample Mean	Std Dev	Min	Max
Maize consumed (# of 80kg bags)	3.08	5.75	0	37
Maize exchanges for maize meal (# of bags)	7.12	10.79	0	70
Value of livestock consumed (R)	177	565	0	4000
Value of other crops consumed (R)	142	307	0	1600

**Appendix 1.1. (cont.)**

## Sample Statistics of Explanatory variables

Variable Description	Sample Mean	Std Dev	Min	Max
Value of livestock owned (in R100)	63.418	140	0	910
Pensions earned (R)	3599	4039	0	15480
Salary and wages earned (R)	3599	4039	0	15480
Income from business activities (R)	1523	5750	0	40000
1 if household head is female	0.27	0.45	0	1
Age of household head (years)	57.57	11.55	31	82
Age of head less mean age (years)	-1.13	13.96	-57.57	24.43
Age deviation squared	195	466	0.18	3314
Household size in adult equivalent	4.91	1.97	1.5	16.30
Average education of the household (yrs)	7.49	2.13	2.17	15.17
Average education less mean education (years)	-0.10	2.28	-7.49	7.68
Square of average education deviations	5.20	9.70	0	58.91
Size of arable land (ha)	3.11	3.68	0	27.5
1 if owning a tractor or vehicle	0.17	0.38	0	1
Distance to nearest (regional) town	-27	12.64	-60	-6
1 if road conditions to nearest town are good	0.32	0.47	0	1
1 if farming was learned through extension visits	0.71	0.46	0	1
Interaction of proximity and road conditions to nearest town	-6.85	12.01	-45	0
Interaction between education and salary/wage earnings	199	113	0	518
Interaction between arable land and ownership of tractor/vehicle	0.98	2.97	0	20

## Appendix 1.2: Cross Tabulation for Participants in different Commodities

Number of households selling and not selling horticulture and livestock

		Livestock		Total
		Not sell	Sell	
Horticulture	Not sell	104	24	128
	Sell	26	3	29
Total		130	27	157

% of households selling and not selling horticulture and livestock

		Livestock		Total
		Not sell	Sell	
Horticulture	Not sell	81.3	18.8	100
	Sell	89.7	10.3	100
Total within horticulture		82.8	17.2	100

Number of households selling and not selling horticulture and other field crops

		Other field crops		Total
		Not sell	Sell	
Horticulture	Not sell	107	21	128
	Sell	17	12	29
Total		124	33	157

% of households selling and not selling horticulture and other field crops

		Other field crops		Total
		Not sell	Sell	
Horticulture	Not sell	83.6	16.4	100
	Sell	58.6	41.4	100
Total within horticulture		79	21	100

**Appendix 1.2 (cont.)**

## Number of households selling and not selling horticulture and maize

		Maize		Total
		Not sell	Sell	
Horticulture	Not sell	109	19	128
	Sell	16	13	29
Total		125	32	157

## % of households selling and not selling horticulture and maize

		Maize		Total
		Not sell	Sell	
Horticulture	Not sell	85.2	14.8	100
	Sell	55.2	44.8	100
Total % within horticulture		79.6	20.4	100

## Number of households selling and not selling livestock and other field crops

		Other field crops		Total
		Not sell	Sell	
Livestock	Not sell	103	27	130
	Sell	21	6	27
Total		124	33	157

## % of households selling and not selling livestock and other field crops

		Other filed crops		Total
		Not sell	Sell	
Livestock	Not sell	79.2	20.8	100
	Sell	77.8	22.2	100
Total % within horticulture		79.0	21.0	100

**Appendix 1.2 (cont.)**

## Number of households selling and not selling livestock and maize

		Maize		Total
		Not sell	Sell	
Livestock	Not sell	106	24	130
	Sell	19	8	27
Total		125	32	157

## % of households selling and not selling livestock and maize

		Maize		Total
		Not sell	Sell	
Livestock	Not sell	81.5	18.5	100
	Sell	70.4	29.6	100
Total % within livestock		79.6	20.4	100

## Number of households selling and not selling other field crops and maize

		Maize		Total
		Not sell	Sell	
Other field crops	Not sell	105	19	124
	Sell	20	13	33
Total		125	32	157

## % of households selling and not selling other field crops and maize

		Maize		Total
		Not sell	Sell	
Other field crops	Not sell	84.7	15.3	100
	Sell	60.6	39.6	100
Total % within other field crops		79.6	20.4	100

**Appendix 1.3: Mean comparison of household groups of participation**

## Mean Comparison For Participants And Non-Participants in Markets

Variable Description	Horticulture N=29	Livestock N=27	Maize N=32	Other F-crops N=33	Not Seller N=78
Selling maize (%)	45	30		39	0.0
Selling livestock (%)	10		25	18	0.0
Selling horticultural crops (%)		11	41	36	0.0
Selling other field crops	41	22	41		0.0
Mean value of maize sold (R)	538	633		457	0
Mean value of livestock sold (R)	686	2861	1038	185	0.0
Mean value of horticulture sold (R)	9005	68	1978	1498	0.0
Mean value of other field crops sold (R)	899	198	875	2182	0

## Comparing production and consumption among households

Variable Description	Horticulture N=	Livestock N=	Maize N=32	Other F-crops	Not Seller N=78
Maize produce (# of 80kg bags)	17.69	16.70	31.47	15.91	9.46
Maize consumed (# of 80 kg bags)	3.21	2.85	4.53	2.58	3.41
Maize processed – miller/coop	7.07	6.00	9.59	6.97	6.12
Maize producer price (R / bag)	69.17	65.00	76.38	62.36	60.49
Maize purchase price (R / bag)	129	121	123.34	127	126
Livestock consumed (R)	104	571	315.31	200	73
Other crops consumed (R)	302	571	134	332	69.87

F-statistics are ANOVA tests; Significance level (1% = \*\*\*, 5% = \*\*, 10% = \*)

**Appendix 1.3 (Cont..)**

## Comparing explanatory variables among households groups

Variable Description	Horticulture	Livestock	Maize	Other F-crops	Not Seller
Value of livestock (in R100)	36.40	171	71.51	57.58	50.860
Pensions earned (R)	2386	1720	3452	3335	4162
Salary and wages earned (R)	9937	5978	10623	5115	9539
Income from business (R)	1759	6144	3366	2206	660
Household head is female (%)	14	44	19	21	27
Age of household head (years)	57	54.89	55.97	58.25	58.15
Household size AE	4.56	4.57	4.11	4.93	5.11
Average hh education (yrs)	7.81	7.72	7.65	7.87	7.34
Size of arable land (ha)	6.49	3.95	5.25	3.66	1.83
Ownership of tractor / vehicle (%)	31	26	31	15	9
Distance to nearest town	-23.03	-26.11	-24	-28.76	-28.86
Road conditions to nearest town are good (%)	62	26	50	67	17
Farming was learned through extension visits (%)	76	63	66	70	76
Interaction of proximity and road conditions to nearest town	-13.83	-5.19	-9.56	-16.61	-3.26
Interaction between education and salary/wage earnings	95880	49407	12229 3	56626	79776
Interaction between arable land and ownership of tractor/vehicle	2.83	1.89	2.87	0.99	0.14

F-statistics are ANOVA tests; Significance level (1% = \*\*\*, 5% = \*\*, 10% = \*)

## APPENDIX TWO

## TOBIT MODELS FOR MARKET PARTICIPATION

Table A-2.1: Tobit and OLS results for market participation in horticulture

Variable Description	MLE	Marginal Effects	OLS
Constant	-17164 (18204)	-1257.2 (1359.0)	5538.6 (4552.6)
<b>Household Assets</b>			
• Size of arable land (ha)	2856.2*** (520.29)	209.21*** (78.196)	1054.2*** (160.99)
• Value of livestock (in R100)	-49.128* (28.454)	-3.5984 (2.2790)	-8.8769* (4.8762)
• Pensions earned (R)	-1.6375** (0.7815)	-0.1199* (0.0662)	-0.2195 (0.1961)
• Non-farm earnings (R)	27.324 (34.915)	2.0013 (2.6551)	24.690** (11.432)
• 1 if owning a tractor or vehicle	929.40 (5245.5)	68.074 (383.67)	-1046.3 (1674.4)
<b>Access to Information</b>			
• 1 if farming was learned through extension visits	9906.0* (5233.2)	725.57* (419.08)	1201.7 (1320.9)
• Average hh education (yrs)	263.82 (1247.7)	19.323 (91.283)	188.34 (314.52)
• Distance to nearest town	554.26 (269.82)	40.597 (22.994)	152.21** (60.546)
• 1 if road conditions to nearest town are good	-7604.3 (10083)	-556.98 (770.33)	-4926.5 (2830.3)
<b>Household Characteristics</b>			
• 1 if household head is female	-14769** (6558.6)	-1081.8** (478.22)	-1209.1 (1350.7)
• Age of household head (years)	249.05 (269.45)	18.242 (20.489)	-19.655 (68.475)
• Household size AE	-1924.6** (921.12)	-140.97* (79.180)	-479.76 (307.17)
<b>Interaction Factors</b>			
• Interaction of proximity and road conditions to nearest town	-563.51 (380.97)	-41.274 (30.214)	-121.16 (103.70)
• Interaction between education and salary/wage earnings	-3.4387 (3.3420)	-0.2519 (0.2586)	-2.1042 (1.0603)
SIGMA	13259 (1929.3)		
Φ	0.073		
R-SQ			0.38
ADJ R-RQ			0.32
F-TEST			5.49***

\* = 10% sign level, \*\* = 5% sign level, \*\*\* = 1% sign level (Std errors in brackets)



Table A-2.2: Tobit and OLS results for market participation in livestock

	MLE	Marginal Effects	OLS
Constant	-6223.9 (3925.2)	-580.59 (385.21)	-585.29 (1168.3)
<b>Household Assets</b>			
• Size of arable land (ha)	131.31 (106.08)	12.249 (10.745)	123.81*** (41.314)
• Value of livestock (in R100)	19.757*** (3.502)	1.8430*** (0.5873)	8.5362*** (1.2513)
• Pensions earned (R)	-0.4562** (0.2128)	-0.0426** (0.0199)	-0.0475 (0.0503)
• Non-farm earnings (R)	9.1567 (10.848)	0.8542 (1.0270)	2.3699 (2.9336)
• 1 if owning a tractor or vehicle	496.11 (1319.6)	46.279 (124.33)	351.47 (429.69)
<b>Access to Information</b>			
• 1 if farming was learned through extension visits	-1420.4 (995.46)	-132.50 (96.232)	-329.39 (338.97)
• Average hh education (yrs)	231.22 (275.46)	21.569 (26.186)	61.386 (80.712)
• Distance to nearest town	57.803 (47.290)	5.3920 (4.5957)	10.113 (15.537)
• 1 if road conditions to nearest town are good	4045.0 (2280.2)	377.33* (226.51)	1343.7* (726.32)
<b>Household Characteristics</b>			
• 1 if household head is female	3228.6*** (1040.8)	301.17** (121.78)	852.82** (346.61)
• Age of household head (years)	100.57* (61.569)	9.3811* (5.8557)	11.966 (17.572)
• Household size AE	-736.34** (336.70)	-68.688** (32.742)	-120.38 (78.825)
<b>Interaction Factor</b>			
• Interaction of proximity and road conditions to nearest town	220.77** (93.944)	20.594** (9.5154)	46.349* (26.613)
• Interaction between education and salary/wage earnings	-1.0786 (1.066)	-0.1006 (0.1016)	-0.3005 (0.2721)
SIGMA	3273.7*** (482.78)		
$\Phi$	0.093		
R-SQ			0.47
ADJ R-RQ			0.41
F-TEST			7.77***

\* = 10% sign level, \*\* = 5% sign level, \*\*\* = 1% sign level (Std errors in brackets)

Table A-2.3: Tobit and OLS results for market participation in maize

Variable Description	MLE	Marginal Effects	OLS
Constant	234.18 (2141.6)	40.281 (368.26)	594.78 (539.84)
<b>Household Assets</b>			
• Size of arable land (ha)	149.12** (64.094)	25.649** (11.481)	51.513*** (19.091)
• Value of livestock (in R100)	3.3399* (1.9374)	0.5745* (0.3370)	1.5625*** (0.5782)
• Pensions earned (R)	0.0206 (0.0856)	0.0035 (0.0147)	0.0146 (0.0233)
• Non-farm earnings (R)	-5.8524 (5.5583)	-1.0067 (0.9482)	-1.0794 (1.3555)
• 1 if owning a tractor or vehicle	664.45 (688.28)	114.29 (119.04)	216.97 (198.55)
<b>Access to Information</b>			
• 1 if farming was learned through extension visits	261.48 (573.67)	44.977 (99.065)	147.01 (156.63)
• Average hh education (yrs)	-19.758 (141.64)	-3.3986 (24.348)	9.6355 (37.295)
• Distance to nearest town	9.6586 (30.008)	1.6614 (5.1588)	2.2424 (7.1795)
• 1 if road conditions to nearest town are good	733.19 (1281.7)	126.12 (220.79)	167.94 (335.62)
<b>Household Characteristics</b>			
• 1 if household head is female	-383.25 (644.54)	-65.922 (111.26)	-152.20 (160.16)
• Age of household head (years)	-8.0810 (28.970)	-1.3900 (4.9832)	-6.3486 (8.1197)
• Household size AE	-475.57*** (176.83)	-81.802 (28.359)	-76.947** (36.424)
<b>Interaction Factors</b>			
• Interaction of proximity and road conditions to nearest town	3.5867 (47.257)	0.6169 (8.1322)	4.2296 (12.297)
• Interaction between education and salary/wage earnings	0.5321 (0.4677)	0.0915 (0.0799)	0.1027 (0.1257)
SIGMA	1983.15*** (292.37)		
$\Phi$	0.17		
R-SQ			23
ADJ R-RQ			14
F-TEST			2.62***

\* = 10% sign level, \*\* = 5% sign level, \*\*\* = 1% sign level (Std errors in brackets)

Table A2.4: Tobit and OLS results for market participation in other field crops

	MLE	Marginal	OLS
Constant	-9054.9*** (3264.7)	-1252.53*** (424.62)	-273.51 (775.82)
<b>Household Assets</b>			
• Size of arable land (ha)	200.84** (101.41)	27.782** (14.043)	28.399 (27.435)
• Value of livestock (in R100)	0.8425 (2.4459)	0.1165 (0.3362)	-0.3111 (0.8310)
• Pensions earned (R)	0.0040 (0.1081)	0.0006 (0.0150)	-0.0087 (0.0334)
• Non-farm earnings (R)	-25.182*** (9.2507)	-3.4833*** (1.3499)	-5.3944*** (1.9481)
• 1 if owning a tractor or vehicle	-2123.01** (1076.36)	-293.67* (150.99)	-443.84 (285.34)
<b>Access to Information</b>			
• 1 if farming was learned through extension visits	-195.57 (767.55)	-27.053 (106.75)	-292.53 (225.10)
• Average hh education (yrs)	77.901 (188.76)	10.776 (26.477)	42.714 (53.598)
• Distance to nearest town	-122.28** (53.087)	-16.915*** (6.4535)	-8.2313 (10.318)
• 1 if road conditions to nearest town are good	5959.6*** (2194.8)	824.36*** (277.01)	921.57 (482.32)
<b>Household Characteristics</b>			
• 1 if household head is female	-582.62 (827.33)	-80.594 (114.73)	-195.20 (230.17)
• Age of household head (years)	5.8163 (37.6605)	0.8046 (5.2172)	4.5148 (11.669)
• Household size AE	307.56* (178.32)	42.543* (23.901)	4.1871 (52.345)
<b>Interaction Factors</b>			
• Interaction of proximity and road conditions to nearest town	47.388 (65.244)	6.5550 (8.6215)	-13.796 (17.673)
• Interaction between education and salary/wage earnings	1.8152** (0.7468)	0.2511** (0.1080)	0.4450 (0.1807)
SIGMA	2480.7*** (347.78)		
$\Phi$	0.073		
R-SQ			33
ADJ R-RQ			25
F-TEST			4.28

\* = 10% sign level, \*\* = 5% sign level, \*\*\* = 1% sign level (Std errors in brackets)