Climate change and the Ethiopian economy: a CGE analysis

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ONLINE APPENDIX

Table A1. *Ricardian regression estimates of crop net revenue model*

Variables	Coefficients	t-statistics
Summer temperature	-18165.05***	-3.85
Summer temperature sq	431.74***	3.78
Winter temperature	-4977.89***	-2.92
Winter temperature sq	104.75*	2.18
Spring temperature	-15875.88***	-3.07
Spring temperature sq	433.88***	3.62
Fall temperature	25354.25***	4.76
Fall temperature sq	-763.56***	-4.93
Summer precipitation	-416.82***	-4.21
Summer precipitation sq	0.18***	3.01
Winter precipitation	184.65	0.63
Winter precipitation sq	-4.37***	-4.50
Spring precipitation	-397.78***	-4.26
Spring precipitation sq	0.22***	1.74
Fall precipitation	515.07**	5.25
Fall precipitation sq	-0.15	-1.37
Summer temp X precip	21.49***	4.89
Winter temp X precip	6.75	0.52
Spring temp X precip	16.19***	3.87
Fall temp X precip	-30.15***	-5.53
Soil - clay	353.48*	2.02
Soil - sandy	273.16	1.45
Soil - dark	368.58*	2.27
Soil - red	319.75*	2.07
Livestock Ownership	-319.05	-1.17
Crop land area	451.08***	5.60
Distance from output market	-29.21	-1.23
Distance from input market	44.70*	1.83
Extension program (crop)	-317.53*	-2.02
Credit	-353.00***	-2.74
HH head years of education	10.84	0.39
Family size (log)	630.72***	3.68
Farming experience (years)	-5.74	-1.17
Irrigation	520.88**	2.47
Constant	178954.60***	4.80

F(30, 890)	19.19	
Prob> F	0.000	
R-sq	0.531	
Root MSE	1911	
n	925	

* p<.05; ** p<.01; *** p<.001

Source: Gebreegziabher *et al*. (2013)

Table A2. *Ricardian regression estimates of net livestock revenue model*

Variables	Coefficients	t-statistics
Summer temperature	-10078.2***	-4.66
Summer temperature sq	238.88***	4.57
Winter temperature	381.24	0.35
Winter temperature sq	1.03	0.03
Spring temperature	-5776.53*	-1.87
Spring temperature sq	137.48**	1.99
Fall temperature	10560.03***	4.06
Fall temperature sq	-294.64***	-3.84
Summer precipitation	-140.83***	-3.06
Summer precipitation sq	-0.003	-0.09
Winter precipitation	-992.70***	-3.71
Winter precipitation sq	2.23***	3.93
Spring precipitation	44.17322	1.14
Spring precipitation sq	0.130071	1.51
Fall precipitation	118.6232**	2.34
Fall precipitation sq	-0.04298	-0.58
Soil - clay	373.8652***	3.02
Soil - sandy	72.39039	0.62
Soil - dark	-53.1719	-0.55
Soil - red	174.4503*	1.77
Livestock Ownership	251.146*	1.65
Crop land area	66.83165*	1.74
Distance from output market	89.21277***	5.16
Distance from input market	-63.9982***	-3.52
Extension program (livestock)	348.5848***	3.61
Credit	-143.589*	-1.78
HH head years of education	37.98163**	2.32
Family size (log)	96.93869	0.92
Farming experience (years)	6.818176**	1.99
Irrigation	300.4892**	2.5

Constant	6389.63***	3.04
F(30, 921)	8.54	
Prob> F	0.000	
R-sq	0.235	
Root MSE	1207.5	
n	952	

* p<.05; ** p<.01; *** p<.001

Source: Gebreegziabher *et al*. (2013)

Table A3. *Ricardian regression estimates of (whole) farm net revenue model*

Variables	Coefficients	t-statistics
Summer temperature	-21725.88***	-4.9
Summer temperature sq	499.52***	4.67
Winter temperature	-4691.91**	-2.48
Winter temperature sq	114.01**	2.12
Spring temperature	-23244.23***	-4.14
Spring temperature sq	605.83***	4.66
Fall temperature	30648.82***	5.96
Fall temperature sq	-912.59***	-6.12
Summer precipitation	-498.13***	-5.38
Summer precipitation sq	0.14**	2.46
Winter precipitation	-389.66***	-1.02
Winter precipitation sq	-1.35***	-1.4
Spring precipitation	-379.14**	-3.77
Spring precipitation sq	0.32**	2.05
Fall precipitation	632.24***	6.18
Fall precipitation sq	-0.25*	-2
Summer temp X precip	26.27***	6.44
Winter temp X precip	26.05	1.55
Spring temp X precip	15.9***	3.54
Fall temp X precip	-35.22***	-6.05
Soil - clay	598.77**	2.71
Soil - sandy	259.89	1.22
Soil - dark	231.81	1.21
Soil - red	207.83	1.11
Livestock Ownership	-750.28**	-2.69
Crop land area	640.99***	7.21
Distance from output market	-84.48	-1.57
Distance from input market	124.66*	2.15
Extension program	-229.55	-1.28
Credit	-516.47***	-3.4
HH head years of education	59.32*	1.82
Family size (log)	655.78***	3.5
Farming experience (years)	2.19	0.36
Irrigation	654.51**	2.61
Constant	243993.70***	6.05
F(34, 845)	23.39	
Prob> F	0.000	
R-sq	0.5274	
Root MSE	2200.8	

n	880	

* p<.05; ** p<.01; *** p<.001

Source: Gebreegziabher *et al*. (2013)

Table A4. *Climate predictions of AOGCM models for Ethiopia for 2050 and 2100*

Model		**Current**	**2050**	**2100**
Temperature change (°C), A2 scenarios				
PCM		21.25	23.55	26.8
HadCM3		21.25	25.05	30.7
CGCM2		21.25	24.55	29.3
PCM	B2 scenarios	21.25	23.55	25.3
HadCM3		21.25	25.05	28
CGCM2		21.25	24.15	26.4
	Precipitation change (%)	Current	2050	2100
CGCM2	A2&B2 scenarios	76.77	67.93	60
PCM		76.77	80.71	87.2
HadCM3		76.77	83.36	98.4

Source: Strzepek and McCluskey (2007) and Deressa and Hassan (2009)

Table A5. *Effects of climate change on net revenue for different agro-ecological zones using A1B Scenarios*

	Temperature effect								
	Crop			Livestock			Mixed		
Agro-ecological Zones	2030	2050	2080	2030	2050	2080	2030	2050	2080
Moisture Sufficient Highlands-Cereals based	-1%	-7%	-22%	124%	-47%	-48%	24%	-15%	-28%
Moisture Sufficient Highlands-Enset based	-12%	-23%	-42%	169%	-48%	-15%	64%	-28%	-36%
Pastoralist (Arid Lowland Plains)	-33%	-51%	-81%	145%	8%	93%	62%	-39%	-46%
Humid Low Lands Moisture Reliable	-108%	-135%	-182%	614%	279%	253%	36%	-53%	-95%
	Precipitation effect								
	Crop			Livestock			Mixed		
Agro-ecological Zones	2030	2050	2080	2030	2050	2080	2030	2050	2080
Moisture Sufficient Highlands-Cereals based	34%	34%	44%	-52%	-79%	-153%	16%	11%	5%
Moisture Sufficient Highlands-Enset based	31%	-14%	7%	-167%	-154%	-215%	-9%	-42%	-37%
Pastoralist (Arid Lowland Plains)	-20%	-29%	-39%	-170%	-240%	-206%	-90%	-71%	-72%
Humid Low Lands Moisture Reliable	-40%	-34%	-22%	-288%	-399%	-362%	-150%	-59%	-80%

Source: Gebreegziabher *et al*. (2013)

Table A6. *Income levels per capita by income group (Index 2010 = 1)*

	2020	2040	2060
Rural poor			
- high TFP, no climate change	1.431	3.819	19.342
- high TFP, climate change	1.436	3.857	15.128
- zero TFP, no climate change	1.063	1.118	1.172
- zero TFP, climate change	1.066	1.128	0.960
Rural nonpoor			
- high TFP, no climate change	1.466	4.292	21.969
- high TFP, climate change	1.466	4.004	17.655
- zero TFP, no climate change	1.077	1.173	1.263
- zero TFP, climate change	1.077	1.112	1.025
Urban poor			
- high TFP, no climate change	1.314	3.226	13.344
- high TFP, climate change	1.313	2.577	10.826
- zero TFP, no climate change	1.015	1.039	1.079
- zero TFP, climate change	1.015	0.850	0.861
Urban nonpoor			
- high TFP, no climate change	1.328	3.496	16.012
- high TFP, climate change	1.328	2.776	13.070
- zero TFP, no climate change	1.024	1.062	1.118
- zero TFP, climate change	1.024	0.866	0.893

References

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