

Climate resilience in rural Zambia: evaluating farmers' response to El Niño-induced drought

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ONLINE APPENDIX

Table A1. Determinants of maize productivity (fixed effects model)

| | Log(maize yield, kg/ha) | |
|--|-------------------------|-------|
| | Coefficient | SE |
| <i>Climate</i> | | |
| El Niño shock (1=yes) | -0.291 | 0.280 |
| Absolute rainfall deviation (%) | -0.000 | 0.004 |
| CoV of rainfall | - | - |
| <i>Household socio-demographics</i> | | |
| Age of HH head (years) | 0.016* | 0.009 |
| Education of HH head (years) | 0.030 | 0.019 |
| Head is female (1=yes) | -0.582 | 0.462 |
| Nr. of adult members | -0.068 | 0.042 |
| Dependency ratio | -0.057 | 0.062 |
| <i>Agricultural practices</i> | | |
| (log) Land under maize (ha) | -0.760*** | 0.077 |
| Minimum soil disturbance (1=yes) | 0.059 | 0.074 |
| Crop rotation (1=yes) | 0.023 | 0.079 |
| Residue retention (1=yes) | 0.317** | 0.130 |
| Trees/shrubs grown (1=yes) | 0.078 | 0.067 |
| (log) Maize seeds used (Kg) | 0.432*** | 0.074 |
| Hybrid maize seeds (1=yes) | -0.003 | 0.074 |
| Inorganic fertilizer applied (1=yes) | 0.513*** | 0.148 |
| Fertilizer received on time (1=yes) | -0.026 | 0.086 |
| Mech. erosion contr. (1=yes) | -0.011 | 0.069 |
| Animal/mech. tillage (1=yes) | -0.032 | 0.124 |
| <i>Household wealth, market access and social capital</i> | | |
| No title on land (1=yes) | -0.387** | 0.178 |
| Ag asset wealth index | 0.046 | 0.034 |
| Wealth index | 0.082 | 0.065 |
| Group members (% in SEA) | 0.281 | 0.236 |
| Credit received (% in Ward) | -1.681* | 0.993 |
| <i>Agricultural practices interactions with El Niño shock</i> | | |
| MSD*shock | -0.052 | 0.148 |
| Crop rotation*shock | 0.140 | 0.274 |
| Crop residue*shock | -0.046 | 0.277 |
| Trees/shrubs*shock | -0.030 | 0.140 |
| Mech. Erosion contr.*shock | 0.057 | 0.128 |
| Dummy year (1=2016) | -0.274*** | 0.059 |
| Constant | 5.378*** | 0.565 |
| Number of observations | | 2,243 |
| R2 within | | 0.211 |
| R2 between | | 0.035 |
| R2 overall | | 0.058 |
| Adjusted R2 | | 0.201 |

Notes: Standard errors are clustered at the ward level. Significance level: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Source: Authors' elaboration.

Table A2. Determinants of (log) income per capita (fixed effects model)

| Log(gross income per capita) | | |
|---|--------------------|-----------|
| | Coefficient | SE |
| <i>Climate</i> | | |
| El Niño shock (1=yes) | -0.059 | 0.171 |
| Absolute rainfall deviation (%) | 0.006* | 0.003 |
| CoV of rainfall | - | - |
| <i>Diversification</i> * | | |
| Crop diversity (count index) | 0.111*** | 0.027 |
| Livestock diversity (count index) | 0.022 | 0.026 |
| Income source diversity (count index) | 0.193*** | 0.023 |
| <i>Household socio-demographics</i> | | |
| Age of HH head (years) | 0.008 | 0.008 |
| Edu of HH head (years) | 0.002 | 0.013 |
| Head is female (1=yes) | 0.022 | 0.171 |
| Nr. of adult members | -0.127*** | 0.038 |
| Dependency ratio | -0.165*** | 0.045 |
| <i>Household Wealth</i> | | |
| (log) Land owned (ha) | 0.211*** | 0.031 |
| Ag asset wealth index | 0.049* | 0.027 |
| Wealth index | 0.151*** | 0.043 |
| <i>Market access and social capital</i> | | |
| Maize sold to FRA (% in SEA) | 0.467 | 0.334 |
| Cash received from safety net programmes (% in SEA) | 0.180 | 1.142 |
| Group members (% in SEA) | -0.222 | 0.186 |
| Credit received (% in Ward) | 0.877 | 1.006 |
| Adults perm moved to urban area (1=yes) | -0.098 | 0.071 |
| <i>Interactions with El Niño shock</i> | | |
| Crops diversity*shock | -0.100** | 0.043 |
| Livestock diversity*shock | 0.067** | 0.028 |
| Income source diversity*shock | 0.009 | 0.038 |
| Maize sold to FRA*shock | 0.617 | 0.991 |
| Cash from safety net prog*shock | -0.689 | 1.868 |
| Dummy year (1=2016) | -0.107 | 0.066 |
| Constant | 4.275*** | 0.513 |
| Number of observations | | 2,499 |
| R2 within | | 0.261 |
| R2 between | | 0.328 |
| R2 overall | | 0.307 |
| Adjusted R2 | | 0.254 |

Notes: Standard errors are clustered at the ward level. Significance level: * p < 0.10; ** p < 0.05; ***p < 0.01.

Source: Authors' elaboration.

Table A3. Summary statistics and scoring factors of asset variables

| Wealth index | RALS 2015 | | ENIAS 2016 | |
|--|-----------|-----------------|------------|-----------------|
| | Mean | Scoring factors | Mean | Scoring factors |
| <i>Household durables</i> | | | | |
| Trucks | 0.07 | 0.12 | 0.12 | 0.54 |
| Motorbikes | 0.04 | 0.08 | 0.06 | 0.20 |
| Bikes | 0.96 | 0.11 | 1.08 | 0.40 |
| Boats | 0.06 | 0.00 | 0.02 | 0.05 |
| Solar panel | 0.57 | 0.13 | 0.68 | 0.54 |
| Generator | 0.05 | 0.10 | 0.08 | 0.54 |
| Mobile phones | 1.24 | 0.17 | 1.55 | 0.73 |
| Radio | 0.77 | 0.14 | 0.86 | 0.63 |
| TVs | 0.32 | 0.18 | 0.38 | 0.77 |
| Car battery | 0.33 | 0.16 | 0.38 | 0.70 |
| Sewing machines | 0.05 | 0.06 | 0.05 | 0.40 |
| <i>Dwelling characteristics</i> | | | | |
| Own dwelling (1=Yes, 0=No) | 1.38 | 0.05 | 1.41 | 0.31 |
| Water source (1=protected, 0=open source) | 0.07 | 0.08 | 0.10 | 0.42 |
| House roof (1=metal sheets\tiles\asbestos 0=else) | 0.48 | 0.13 | 0.58 | 0.57 |
| House wall (1=cement/concrete, 0=else) | 0.42 | 0.11 | 0.46 | 0.53 |
| House floor (1=/cement/tiles 0=else) | 0.27 | 0.14 | 0.30 | 0.58 |
| Agricultural asset index | RALS 2015 | | 2016 ENIAS | |
| | Mean | Scoring factors | Mean | Scoring factors |
| <i>Agricultural assets</i> | | | | |
| Ploughs | 0.40 | 0.81 | 0.66 | 0.76 |
| Harrows | 0.06 | 0.75 | 0.09 | 0.72 |
| Cultivators | 0.04 | 0.66 | 0.04 | 0.56 |
| Rippers | 0.04 | 0.47 | 0.08 | 0.50 |
| Ridgers | 0.04 | 0.31 | 0.11 | 0.31 |
| Planter | 0.00 | 0.40 | 0.00 | 0.20 |
| Tractors | 0.01 | 0.30 | 0.01 | 0.34 |
| Carts | 0.29 | 0.76 | 0.47 | 0.73 |
| Wheel bar | 0.12 | 0.25 | 0.14 | 0.17 |
| Pumps | 0.17 | 0.08 | 0.15 | 0.36 |

Notes: All asset variables are in count, unless otherwise indicated. Both indexes are constructed using principal component analysis based on asset ownership and dwelling conditions and agriculture implements. Scoring factor is the weight used to calculate the first principal component. The first component explains 27 per cent (RALS 2015) and 28 percent (ENIAS 2016) of the variance for the wealth index, whereas, it explains 29 percent (RALS 2015) and 26 per cent (ENIAS 2016) of the variance for the agricultural asset index.