**Household Resilience Capacity and Food Security: Evidence from Kyrgyzstan**

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**Supplementary Information (SI)**

**Table S1** Variables used to estimate pillars

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Mean | Std.Dev. | Min | Max |
|  |  |  |  |  |  |  |
| Access to Basic Services - ABS | Infrastructure index | Infrastructure Index measured through factor analysis includes three variables:  1) Improved drinking water sources – dummy is equal to one for public water type, water pipe available in the dwelling and public water plumbing; otherwise, it represents artesian, dam, lake, river, aryk (small aqueduct) and pounder water sources.  2) Improved heating – dummy one represents central and electric installed-type equipment. Otherwise, it includes stove heating, transportable-type of electric heating, gas heating and others.  3) Improved cooking sources – one in the dummy indicates stove with pipe supply and balloons, electric stove and small electric hot plat. Unimproved zero indicates tandyr (tandoor) and others. | 0.505 | 0.336 | 0 | 1 |
| Doctor consultation | It shows the number of consultation with doctors for health issues occurred over the last 12 months. | 2.113 | 3.413 | 0 | 33 |
| Distance to main road | This variable is in kilometers representing the distance from household to the main road. The variable is transformed into a closeness scale with min-max re-scaling (0 is the maximum distance and 1 is the minimum distance). | 0.960 | 0.089 | 0 | 1 |
| Distance to next agricultural and livestock market | It shows the distance in kilometers to reach the nearest livestock market from home. The variable is transformed into a closeness scale with min-max re-scaling (0 is the maximum distance and 1 is the minimum distance). | 0.891 | 0.180 | 0 | 1 |
| Distance to school | It is the distance in kilometers between household and school. The variable is transformed into a closeness scale with min-max re-scaling (0 is the maximum distance and 1 is the minimum distance). | 0.935 | 0.082 | 0 | 1 |
| Distance to the community center | It is a kilometer based distance between home and community center. The variable is transformed into a closeness scale with min-max re-scaling (0 is the maximum distance and 1 is the minimum distance). | 0.932 | 0.136 | 0 | 1 |
| Distance to the hospital | It is a kilometer based distance between home and hospital. The variable is transformed into a closeness scale with min-max re-scaling (0 is the maximum distance and 1 is the minimum distance). | 0.932 | 0.118 | 0 | 1 |
| Distance to the pharmacy | It is a kilometer based distance between home and pharmacy. The variable is transformed into a closeness scale with min-max re-scaling (0 is the maximum distance and 1 is the minimum distance). | 0.950 | 0.118 | 0 | 1 |
|  |  |  |  |  |  |  |
| Assets - AST | Wealth Index per capita | This proxy is measured by factor analysis from different types of 32 non-productive assets available per capita for the last 12 months in the household. | 0.209 | 0.171 | 0 | 1 |
| TLU per capita | This proxy is used to measure a single unit of measurement to represent available livestock per capita in the household for the last 12 months. In order to measure, a conversational factor is applied (horse-0.8, cow-0.8, donkey-0.5, pig-0.2, sheep-0.1, rabbit-0.02 and chicken-0.01). | 0.332 | 0.732 | 0 | 14.8 |
| Per capita land (ha) | Land area of the parcel (hectares) available in the household per capita. | 0.135 | 0.310 | 0 | 5.2 |
| Number of plots and parcels per capita | It represents the number of plots and parcels of land per capita, including household gardening used for agricultural purposes. | 0.429 | 0.494 | 0 | 4.5 |
| Agricultural assets and vehicle per capita | It represents the number of agricultural properties and vehicles per capita available for the last 12 months. | 0.008 | 0.043 | 0 | 0.5 |
| Adaptive Capacity - AC | Income source | This variable includes 14 household income sources (income from crop farming enterprises, other agricultural activities, individual entrepreneurship, non-agricultural enterprises; property income from rent of accommodations/building(s), land, interests and dividends; income from employment, irregular on-time work; and income from inheritance, alimony, scholarships and other sources). | 1.322 | 0.812 | 0 | 5 |
| Income earner share | This variable represents the number of people in the household who are potentially able to earn (their age is between 15 and 65 years old). | 0.666 | 0.250 | 0 | 1 |
| Informal Networking Index | This index is designed to understand how well households are able to reconfigure themselves by using their informal networking channels. The index is based on variables measured by questions corresponding to financial and non-financial aids possibly given to the household during or after the shock in the last 12 months (the number of people are able to give 2000 KGS urgently; to how many people household gave any financial help; from how many people household received any financial help; to how many people household gave any non-financial help; and from how many people household received any non-financial help). | 0.013 | 0.032 | 0 | 1 |
| Migration share | It represents the share of household adult members who are currently working abroad. | 0.039 | 0.103 | 0 | 0.666 |
| Migration share for five years | It indicates the share of household adult members who have worked abroad for more than one month during the last 5 years. | 0.014 | 0.062 | 0 | 0.666 |
| Average Education | This variable represents average years of education (secondary and post-secondary) achieved by household members. | 10.571 | 2.807 | 0 | 17 |
| Saving account | It is a household saving account available in banks or other financial institutions. | 0.229 | 0.420 | 0 | 1 |
|  |  |  |  |  |  |  |
| Social safety Nets - SSN | Money transfers from persons living abroad | It is money received during the last 12 months from abroad sent by household migrant members. | 0.177 | 0.382 | 0 | 1 |
| Number of times receiving money from migrants working abroad | It represents how many times household received a money aid from migrant members in the last 12 months | 0.805 | 2.327 | 0 | 12 |
| Money aid from persons living in Kyrgyzstan (from relatives and friends) | It is the aid received from relatives and friends living in Kyrgyzstan. | 0.065 | 0.247 | 0 | 1 |
| Old age pension | It is a support from the state available for old-aged members of the household. | 0.376 | 0.484 | 0 | 1 |
| Unified monthly allowance | It represents a variable for receiving the allowance as a low-income family. | 0.028 | 0.167 | 0 | 1 |
| Other allowances | It represents other monthly allowances received. | 0.003 | 0.062 | 0 | 1 |

**Table S2** Factorability Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Index** | **Component** | **Cumulative variance** |  |
| **Infrastructure Index** |  |  |  |
|  | 1 | 0.5359 |  |
| Bartlett Test |  |  | 735.535\*\*\* |
| KMO |  |  | 0.583 |
| determinant of R-matrix |  |  | 0.751 |
|  |  |  |  |
| **Wealth Index** |  |  |  |
|  | 1 | 0.2628 |  |
|  | 2 | 0.3474 |  |
|  | 3 | 0.4023 |  |
|  | 4 | 0.4572 |  |
|  | 5 | 0.5015 |  |
|  | 6 | 0.5450 |  |
|  | 7 | 0.5822 |  |
| Bartlett Test |  |  | 30779.289\*\*\* |
| KMO |  |  | 0.920 |
| determinant of R-matrix |  |  | 0.000 |
|  |  |  |  |
| **Networking Index** |  |  |  |
|  | 1 | 0.6508 |  |
|  |  |  |  |
| Bartlett Test |  |  | 8627.654\*\*\* |
| KMO |  |  | 0.785 |
| determinant of R-matrix |  |  | 0.035 |
|  |  |  |  |
| **ABS** |  |  |  |
|  | 1 | 0.2267 |  |
|  | 2 | 0.4410 |  |
|  | 3 | 0.6023 |  |
| Bartlett Test |  |  | 4359.356\*\*\* |
| KMO |  |  | 0.563 |
| determinant of R-matrix |  |  | 0.182 |
|  |  |  |  |
| **AST** |  |  |  |
|  | 1 | 0.3668 |  |
|  | 2 | 0.5737 |  |
| Bartlett Test |  |  | 1258.371\*\*\* |
| KMO |  |  | 0.628 |
| determinant of R-matrix |  |  | 0.614 |
|  |  |  |  |
| **AC** |  |  |  |
|  | 1 | 0.2294 |  |
|  | 2 | 0.4048 |  |
|  | 3 | 0.5643 |  |
| Bartlett Test |  |  | 1118.459\*\*\* |
| KMO |  |  | 0.523 |
| determinant of R-matrix |  |  | 0.645 |
|  |  |  |  |
| **SSN** |  |  |  |
|  | 1 | 0.2799 |  |
|  | 2 | 0.4576 |  |
|  | 3 | 0.6256 |  |
| Bartlett Test |  |  | 1558.949\*\*\* |
| KMO |  |  | 0.505 |
| determinant of R-matrix |  |  | 0.545 |
|  |  |  |  |
| **RCI** |  |  |  |
|  | 1 | 0.4314 |  |
|  | 2 | 0.7303 |  |
| Bartlett Test |  |  | 1998.237\*\*\* |
| KMO |  |  | 0.506 |
| determinant of R-matrix |  |  | 0.453 |

**Table S3** Shock summary statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **N.O** | **Shock events** | **Mean** | **St.Dev.** | **Min** | **Max** |
| Exogenous Shock | | | | | |
| 1. | Drought | 0.158 | 0.365 | 0 | 1 |
| 2. | Cold weather | 0.248 | 0.432 | 0 | 1 |
| 3. | Flood | 0.329 | 0.470 | 0 | 1 |
| 4. | Border closure | 0.052 | 0.222 | 0 | 1 |
| 5. | Neighborhood violence | 0.013 | 0.117 | 0 | 1 |
| Endogenous Shock | | | | | |
| 1. | Diseases of crops or livestock | 0.163 | 0.369 | 0 | 1 |
| 2. | Insufficient water supply for farming or gardening | 0.153 | 0.360 | 0 | 1 |
| 3. | Insufficient energy supply | 0.053 | 0.225 | 0 | 1 |
| 4. | Destruction of household assets | 0.005 | 0.076 | 0 | 1 |
| 5. | Loss of jobs | 0.056 | 0.230 | 0 | 1 |
| 6. | Death of major breadwinner | 0.014 | 0.120 | 0 | 1 |
| 7. | Illness of a major breadwinner | 0.039 | 0.195 | 0 | 1 |
| 8. | Accident | 0.015 | 0.123 | 0 | 1 |

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**Fig.S1** Exogenous Shock

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**Fig.S2** Endogenous Shock

**Table S4** First-stage regression results

|  |  |  |  |
| --- | --- | --- | --- |
|  | **RCI** | **RCI** | **RCI** |
| Border distance | -0.114\*\*\*  (0.029) | -0.118\*\*\*  (0.029) | -0.117\*\*\*  (0.029) |
| DD\_2013 | -8.410  (7.462) |  |  |
| FE\_2013 |  | 0.000  (0.000) |  |
| AFV\_2013 |  |  | -0.000  (0.001) |
| Age HH head | 0.848\*\*\*  (0.130) | 0.828\*\*\*  (0.130) | 0.843\*\*\*  (0.130) |
| Sq.Age HH head | -0.007\*\*\* (0.001) | -0.007\*\*\* (0.001) | -0.007\*\*\*  (0.001) |
| Female head | 1.133  (0.981) | 1.098  (0.980) | 1.067  (0.983) |
| Head married | 0.007  (1.003) | -0.115  (1.001) | -0.077  (1.002) |
| HH size | 0.624  (0.419) | 0.447  (0.441) | 0.612  (0.425) |
| Sq. HH size | 0.002  (0.032) | 0.008  (0.032) | 0.004  (0.032) |
| Rural | 2.022\*\*\*  (0.642) | 2.296\*\*\*  (0.666) | 2.051\*\*\*  (0.642) |
| Exogenous shock | -1.594\*\*  (0.679) | -1.472\*\*  (0.674) | -1.508\*\* (0.675) |
| Endogenous shock | -0.621  (0.928) | -0.567  (0.928) | -0.584  (0.929) |
| Issyk-Kul and the Tian-Shan | -0.989  (0.943) | -0.865  (0.942) | -0.904  (0.943) |
| Fergana Valley | 7.275\*\*\*  (0.710) | 7.521\*\*\*  (0.690) | 7.465\*\*\*  (0.690) |
| Constant | -5.443  (7.605) | -13.035\*\*\* (3.615) | -12.748\*\*\* (3.673) |
| Observations | 2476 | 2476 | 2475 |
| R-squared | 0.136 | 0.136 | 0.135 |

*\*\*\*<0.01, \*\*<0.05, \*<0.1. A base class for both exogenous and endogenous shocks is “Low Shock” class. Standard errors in parentheses. The excluded regional dummy is Bishkek and the Northwest*

**Table S5** 2SLS model of food security outcomes

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Diet Diversity (DD)** | **Food Expenditure (FE)** | **Adeq.Fruits and Vegetables (AFV)** |
| RCI | 0.001\*\*\*  (0.000) | 20.098\*\*  (9.424) | 6.519\*\*\*  (2.333) |
| DD\_2013 | -0.006  (0.038) |  |  |
| FE\_2013 |  | 0.307\*\*\*  (0.032) |  |
| AFV\_2013 |  |  | 0.033  (0.023) |
| Age HH head | 0.000  (0.000) | -1.168  (13.809) | 7.469\*\*  (3.321) |
| Sq.Age HH head | -0.000  (0.000) | 0.037  (0.129) | -0.058\*\*  (0.029) |
| Female head | 0.006  (0.005) | -52.797  (65.587) | 1.620  (17.486) |
| Head married | 0.010\*\*  (0.005) | 105.658  (63.290) | 9.708  (19.542) |
| HH size | 0.003\*  (0.001) | 177.133\*\*\*  (28.291) | -116.306\*\*\*  (8.954) |
| Sq. HH size | -0.000\*\*  (0.000) | -10.227\*\*\*  (2.064) | 4.846\*\*\*  (0.550) |
| Rural | -0.010\*\*\*  (0.003) | -431.842\*\*\*  (54.120) | -12.704  (13.973) |
| Exogenous shock | 0.004  (0.002) | -54.460  (47.922) | 21.113  (12.997) |
| Endogenous shock | 0.014\*\*\*  (0.003) | 204.701\*\*  (85.400) | 60.239\*\*\*  (19.887) |
| Issyk-Kul and the Tian-Shan | -0.023\*\*\*  (0.004) | -437.397\*\*\*  (58.310) | -48.692\*\*\*  (17.138) |
| Fergana Valley | -0.021\*\*\*  (0.005) | -236.847\*\*\*  (92.549) | 21.418  (20.650) |
| Constant | 0.848\*\*\* (0.038) | 938.127\*\*\*  (304.970) | 463.147\*\*\*  (82.457) |
| Observations | 2183 | 2215 | 2174 |
| R-squared | 0.043 | 0.192 | 0.232 |

*\*\*\*<0.01, \*\*<0.05, \*<0.1. A base class for both exogenous and endogenous shocks is “Low Shock” class. Standard errors in parentheses. The excluded regional dummy is Bishkek and the Northwest*

**Table S6** Marginal effects of IV Probit model of food security loss

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Diet Diversity (DD)** | **Food Expenditure (FE)** | **Adeq.Fruits and Vegetables (AFV)** |
| RCI | -0.049\*\*  (0.024) | 0.030  (0.032) | -0.053\*  (0.031) |
| DD\_2013 loss | -1.292\*\*\*  (0.115) |  |  |
| FE\_2013 loss |  | -1.137\*\*\*  (0.138) |  |
| AFV\_2013 loss |  |  | -1.254\*\*\*  (0.119) |
| Age HH head | 0.048  (0.034) | -0.006  (0.038) | -0.008  (0.038) |
| Sq.Age HH head | -0.000  (0.000) | -0.000  (0.000) | 0.000  (0.000) |
| Female head | -0.138  (0.192) | -0.127  (0.207) | -0.085  (0.163) |
| Head married | -0.216  (0.186) | -0.191  (0.206) | -0.141  (0.183) |
| HH size | -0.114  (0.071) | 0.105  (0.073) | 0.235\*\*\*  (0.069) |
| Sq. HH size | 0.007  (0.005) | -0.000  (0.004) | -0.002  (0.004) |
| Rural | 0.153  (0.133) | 0.071  (0.134) | 0.468\*\*\*  (0.130) |
| Exogenous shock | -0.156  (0.107) | -0.389\*\*\*  (0.133) | -0.277\*\*  (0.122) |
| Endogenous shock | -0.590\*\*\*  (0.140) | -0.104  (0.164) | -0.122  (0.145) |
| Issyk-Kul and the Tian-Shan | 0.070  (0.177) | 0.662\*\*\*  (0.156) | 0.181  (0.178) |
| Fergana Valley | -0.096  (0.207) | -0.085  (0.274) | -0.287  (0.252) |
| Constant | -0.431  (0.723) | -1.189  (0.922) | 1.562\*  (0.851) |
| Observations | 2122 | 2122 | 2113 |
| Pseudo R-squared | 0.090 | 0.028 | 0.093 |

*\*\*\*<0.01, \*\*<0.05, \*<0.1. A base class for both exogenous and endogenous shocks is “Low Shock” class. Standard errors in parentheses. The excluded regional dummy is Bishkek and the Northwest*

**Table S7** SEM (Unstandardized and Standardized Coefficients)

|  |  |  |
| --- | --- | --- |
|  | **Unstandardized Estimates** | **Standardized Estimates** |
| AC | 1 | 0.947\*\*\*  (0.080) |
| AST | 0.050\*\*  (0.020) | 0.057\*\*\*  (0.021) |
| SSN | 1.637\*\*\* (0.280) | 0.764\*\*\*  (0.065) |
| ABS | -0.092\*\*\*  (0.027) | -0.079\*\*\*  (0.021) |

*\*\*\*<0.01, \*\*<0.05, \*<0.1.*

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**Fig.S3** Factor loadings of RCI

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**Fig.S4** Factor loadings of AC

*(Notes: 1 – Income source; 2 – Income earner share; 3 – Informal Networking Index; 4 – Saving account; 5 – Migration share; 6 – Migration share for five years; 7 – Average Education)*

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**Fig.S5** Factor loadings of SSN

*(Notes: 1- Money transfers from persons living abroad; 2-Money aid from persons living in Kyrgyzstan (from relatives and friends); 3-Old age pension; 4-Unified monthly allowance; 5-Other allowances; and 6- Number of times receiving money from migrants working abroad)*

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**Fig.S6** Factor loadings of AST

*(Notes: 1- TLU per capita; 2– Number of plots and parcels per capita; 3- Agricultural assets and vehicles per capita; 4-Wealth index per capita; 5- Per capita land (ha))*

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**Fig.S7** Factor loadings of ABS

*(Notes: 1 – Infrastructure index; 2 – Doctor consultation; 3 – Distance to main road; 4 – Distance to next agricultural and livestock market; 5 – Distance to the community center; 6 – Distance to school; 7 – Distance to hospital; 8 – Distance to pharmacy )*

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2. [↑](#footnote-ref-2)