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Livestock, Poverty and Household Response to Shocks in Kyrgyzstan

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Overview

- Motivation
- Data
- Descriptive statistics
- Research objectives
- Methodology
- Conclusion and Discussion

Motivation (1)

- Livestock plays a vital role in reducing poverty in several ways:

  - Livestock is a source of food, income and wealth (Johannesen & Skonhoft, 2010; Rojas-Downing et al.,2017; Anagol et al, 2017; Upton, 2004, Burnsilver,2009; Davis et al., 2007)
  - As food it provides nutrients that are difficult to obtain from plant source (Murphy & Allen, 2003; Zhang et al., 2016; Pereira and Vicente, 2013, McMichael, et al., 2007).
  - Livestock manure is an organic fertilizer for crop production (Nguyen, Bauer,& Grote, 2016).
  - Provides draught animal power on agricultural production and transport (Lawrence and Pearson, 2002; Do et al, 2017).

Motivation (2)

- Livestock is an alternative form of insurance (Hoddinott, 2006; Mogues, 2011;, Kijimo et al., 2006; Mathenge et al.,2015).
- People sell off their livestock in order to smooth consumption, when they face shocks (Rosenzweig and Wolpin, 1993).
- Mogues (2011) report that shocks reduce livestock assets and small livestock are the first to be sold of.
- The households facing shocks without livestock asset are more likely to fall into poverty (Kijima at al., 2006).
- It is necessary to understand the role of livestock on poverty to cope with shocks

about Kyrgyzstan

- Mountainous county, 94% of the territory lying above 1000 m
- Agriculture represents 30% of GDP and 20.4% of employment (FAOSTAT 2011a)
- Suffers from a lack of arable land(FAOSTAT 2011a)
- 87% of agricultural land is pastoral (Kerven et al 2011)
- 65% of the population lives in rural places
- Poor people depend on livestock for their livelihoods (FAO, 2016).
- Livestock sector is vulnerable to shocks
- The ability of rural households to cope with shocks is limited due to imperfect credit and insurance markets

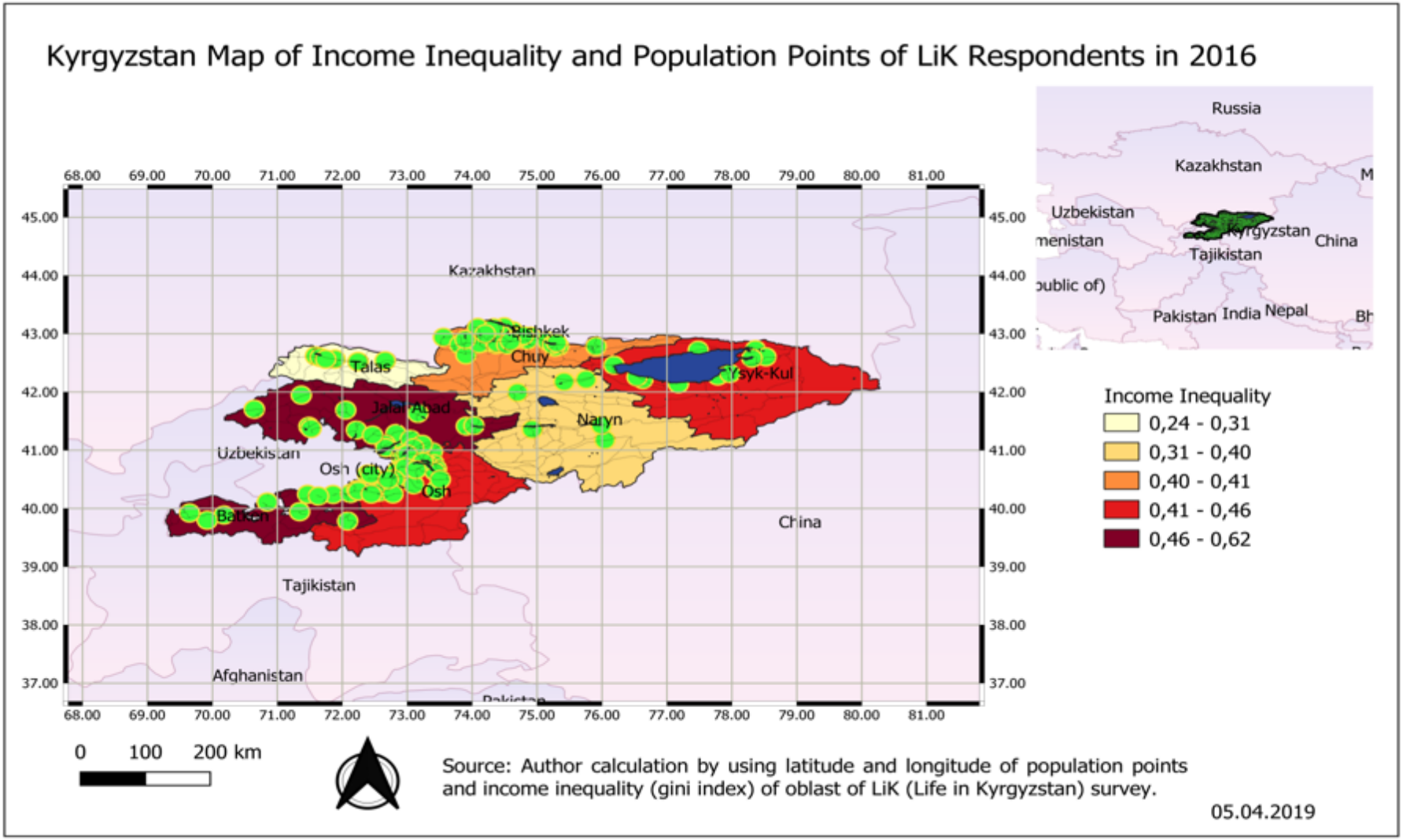
Research Objectives

- To examine the impact of livestock on poverty with a specific focus on shocks.
- Three specific research questions;
  1. What are the roles of livestock asset in reducing poverty?
  2. What is the impact of small and large livestock on poverty with specific focus on shocks perceived by households?
  3. What is the impact of having and giving-up livestock on rural poverty among shock and non-shock groups?

Data (1)

- The data for the current study is taken from the survey "Life in Kyrgyzstan (LIK)"
- Panel survey conducted annually between 2010 and 2013 and again in 2016
- The data are representative at the national
- 3000 households and 8000 individuals over time

Data (2)



Stratified two stage sampling; 16 strata are formed. The population points are drawn according to pop. size. Finally, 25 households are drawn by random sampling.

Conceptual Framework

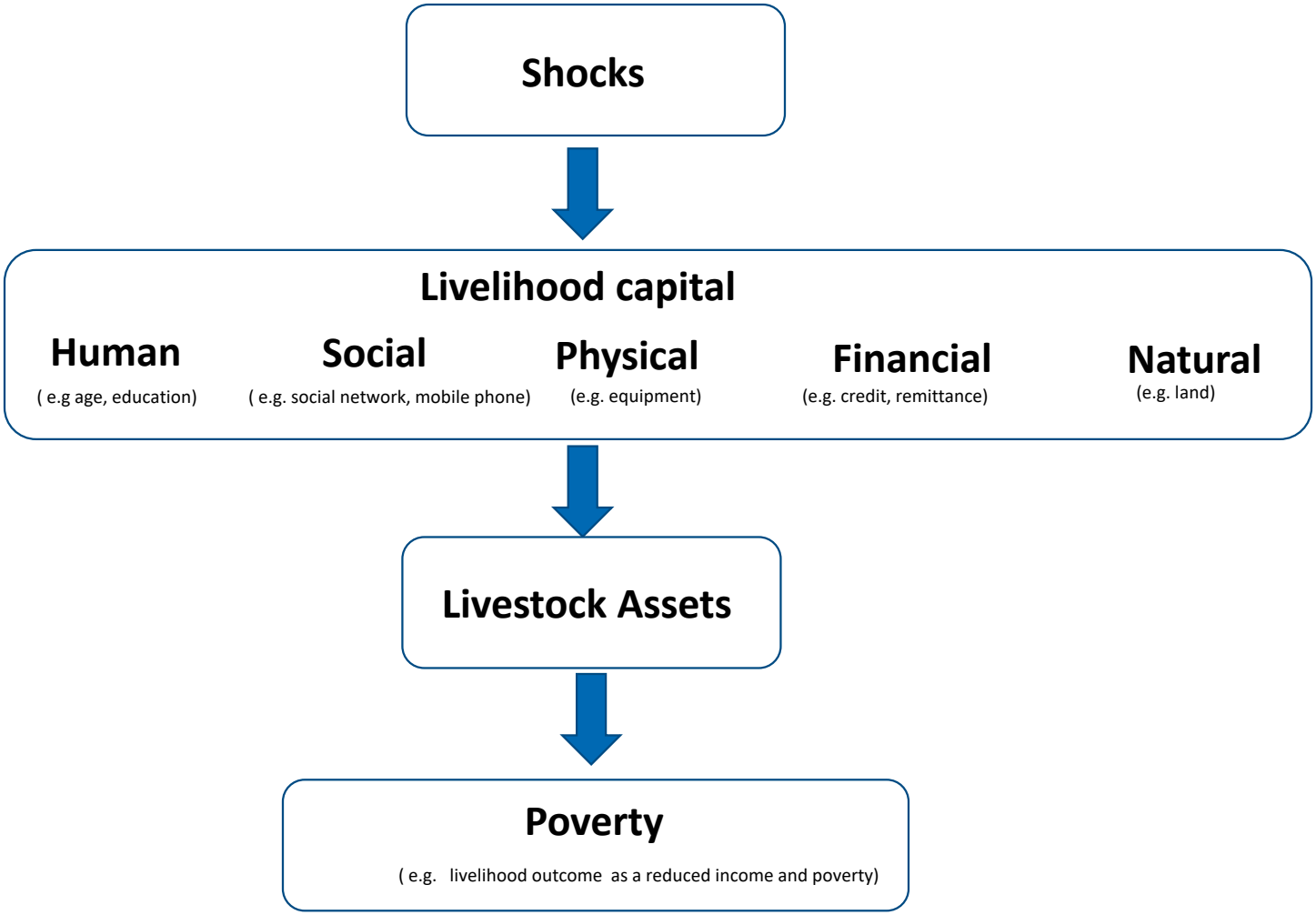


Table 1. Descriptive statistics of households with and without livestock asset

	With Livestock Asset				Without Livestock Asset				Ttest
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	
Natural Financial Social Physical Human									
Age (age of household head)	53.52	13.50	17	99	49.56	14.26	16	105	***
Gender (dummy, 1=male)	.7754	.4173	0	1	.6285	.4832	0	1	***
Education (education level)	2.384	2.380	0	7	3.858	2.588	0	8	***
Family size (number)	5.4674	2.3260	0	17	3.991	2.168	1	15	***
Tractor	.0535	.2250	0	1	.0142	.1183	0	1	***
Car	.3870	.4870	0	1	.2838	.4509	0	1	***
Social festive events	.7824	.4125	0	1	.5832	.4930	0	1	***
Mobile phones	.9819	`	0	2	.9024	.2967	0	1	***
Remittance	.1408	.3478	0	1	.0818	.2741	0	1	***
Credit	.0229	.1497	0	1	.0225	.1484	0	1	***
Land	1.3161	.7171	0	3	.5853	7007	0	3	***
Distance to main road	.8920	1.5953	0	30	.5357	1.038	0	20	***
Distance to market	8.1263	11.485	0	99	3.601	6.6258	0	99	***
Income per capita	2.651	4.03	0	152.2	3.250	3.37	0	91	***
Consumption per capita	2.790	2.48	0	118.7	3.030	2.33	0	73	***

Shock information

- The question used to measure the self-reported experience of being affected by a shock is formulated as follows:

“ During the last 12 months, has your household been affected by the following shocks?”

- We use four different types of shocks (weather shocks) in our paper out of 28 shocks in LiK survey.

1. Drought
2. Too much rain
3. Very cold winter
4. Frosts

Methodology (Fixed effect)

Fixed effect is used to identify the determinants of poverty indices.

$$POV_{ijt}=\theta_1 ELU_{ijt}+\theta_2 S'_{ijt}+\theta_3 S'_{ijt} * ELU'_{ijt}+\theta_4 X'_{ijt}+\theta_5 V'_{jt}+\varepsilon_{ijt}$$

Where i is a household, j is a village, and t is time.

POV_{ijt} is the poverty indices (head-count ratio, poverty gap and poverty severity) at household level (income or consumption per capita of household is below the poverty line 1,25PPP$ and 2PPP$).

ELU_{ij} is the number of European Livestock Units (ELU) of the household. (Livestock numbers converted to a common unit. Conversion factors are: cattle and horse = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01).

S'_{ijt} is a vector of the variables denoting shocks household that has faced during the last five years.

$S'_{ijt} * ELU_{ijt}$ is an interaction term of shock variables with livestock asset in order to see the differential impacts of the shocks on poverty indices.

V'_{jt} is a vector of the variables capturing the village characteristics of village j.

X'_{ijt} is a vector of the variables denoting livelihood capital (human,social, physical and financial capital)

ε_{ijt} is the error term.

Methodology (PSM and DID)

We use a Probit model to estimate the propensity scores based on livelihood assets, shocks, and village characteristics in 2010 to match the households between the treatment and control groups. The model is defined as follows:

$$P(X) = \Pr(D_{ij,2013}=1) \mid X_{ij,2010},\ S_{ij,2010},\ V_{j,2010})$$

Dependent variable represents the probability that household i in village j has livestock in the year 2013.

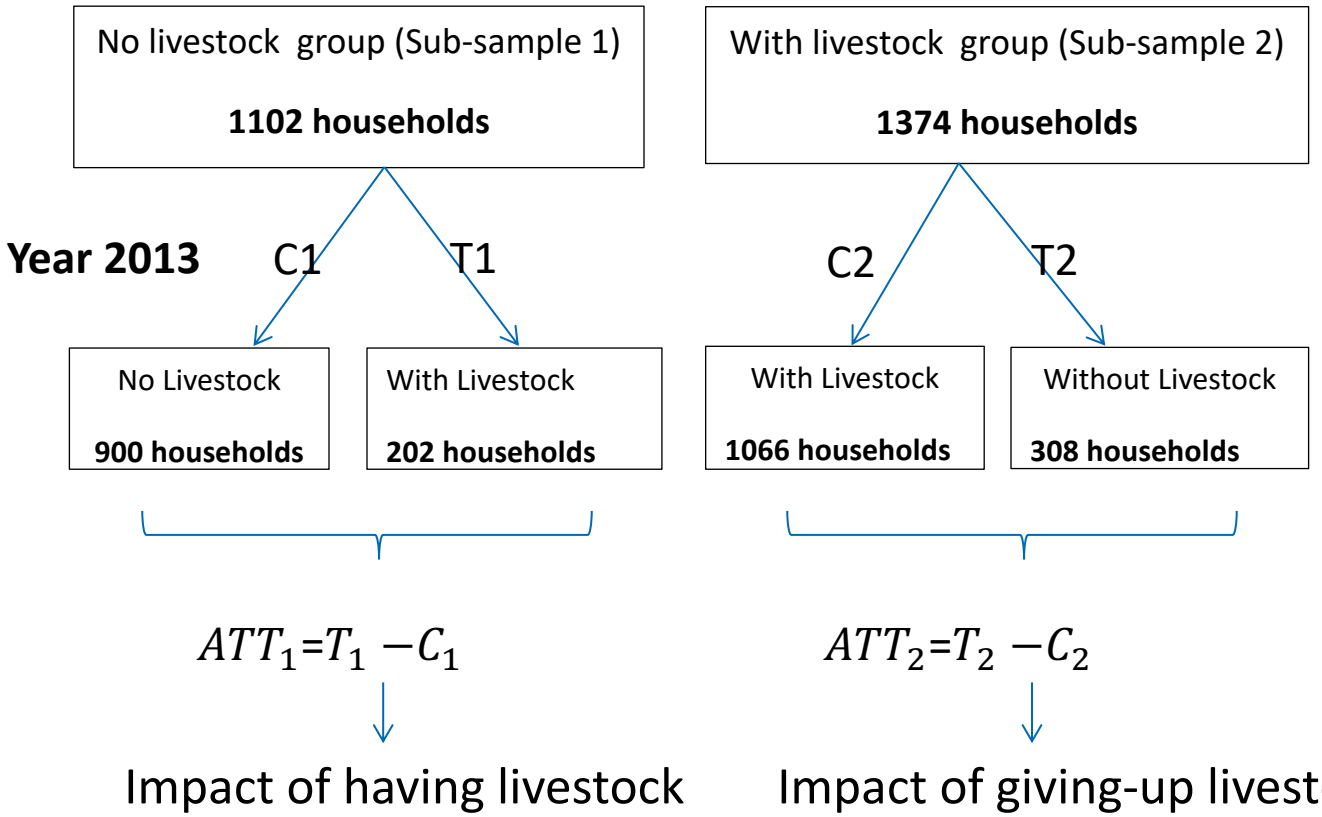
The probability is a function of observable livelihood assets, shocks and village characteristics in 2010

Based on the propensity scores, the impact of livestock production on poverty is modelled as follows:

Methodology (PSM and DID)

$$ATT=E(Y_{2013}^{T}-Y_{2010}^{T}\mid D=1,P(X))-E(Y_{2013}^{C}-Y_{2010}^{C}\mid D=0,P(X))$$

Year 2010



Findings (1)

	Small livestock			Large livestock		
	(1)	(2)	(3)	(1)	(2)	(3)
	Head-count	Poverty gap	Poverty severity	Head-count	Poverty gap	Poverty severity
Livestock	-0.038***	-0.018***	-0.011***	-0.012***	-0.005***	-0.003*
Shock	0.017	0.017*	0.014**	0.017	0.017**	0.015**
Livestock X Shock	-0.005*	-0.003*	-0.002	-0.006**	-0.003**	-0.002*
Age	-0.005**	-0.004***	-0.002***	-0.005**	-0.004***	-0.002***
Education	-0.004	-0.007**	-0.006**	-0.005	-0.008**	-0.007**
Household size	0.037***	0.017***	0.010**	0.035***	0.017***	0.009**
Access to credit	-0.169***	-0.096***	-0.061***	-0.175***	-0.100***	-0.063***
N	11203	11203	11203	11203	11203	11203

There are also other control variables affecting significantly poverty indices such as financial capital (tractors, car), social capital (mobile phones, social events), natural capital (size of land) and village characteristics.

Findings (2)

		Impact of having livestock (ATT1)		Impact of giving-up livestock (ATT2)	
Income poverty indexes		Shock household group	Non-shock household group	Shock household group	Non-shock household group
Head count (P0)	NNM	-0.294***	-0.147	0.121*	0.066
	KBM	-0.296***	-0.188	0.127**	0.036
	Radius	0.274***	-0.166***	0.128 **	0.041
Poverty gap (P1)	NNM	-0.159***	-0.108*	0.063*	0.044
	KBM	-0.168***	-0.088	0.058**	0.030
	Radius	-0.189**	-0.083	0.059*	0.032
Poverty severity (P2)	NNM	-0.101***	-0.069	0.052 *	0.021
	KBM	-0.113***	-0.043	0.047***	0.015
	Radius	-0.110***	-0.040**	0.047	0.017

Findings (3)

		Impact of having livestock (ATT1)		Impact of giving-up livestock (ATT2)	
Consumption poverty indexes		Shock household group	Non-shock household group	Shock household group	Non-shock household group
Head count (P0)	NNM	-0.209***	-0.249***	0.020	0.122
	KBM	-0.185***	-0.169***	0.037	0.096
	Radius	-0.185***	-0.164**	0.039	0.098
Poverty gap (P1)	NNM	-0.045**	-0.038	0.011	0.040*
	KBM	-0.034**	-0.012	0.018	0.033**
	Radius	-0.038**	-0.014	0.019	0.033*
Poverty severity (P2)	NNM	-0.013***	-0.006	0.012	0.014
	KBM	-0.008**	0.004	0.017	0.012
	Radius	-0.011**	0.003	0.017	0.012

Results

- Having livestock (small and large) reduces poverty, but shocks and giving-up livestock increase poverty.
- The impact of having livestock on poverty is higher for households who face shocks.
- The impact of having livestock is associated with livestock asset.
- The average livestock asset for shock household group is bigger than non-shock household group (0,76 ELU vs. 0,28 ELU).
- The higher the livestock asset, the higher the impact is on poverty reduction.
- The households facing shocks without livestock asset are more likely to fall into poverty, because they do not have livestock asset that can work as a smoothing income and consumption.

Contribution

- First Contribution
- Provides useful information on how well the livestock sector can reduce poverty
- Second Contribution
- The higher the livestock asset, the higher the impact is on poverty reduction.
- Third Contribution
- The households facing shocks without livestock asset are more likely to fall into poverty

Policy Implications

- Poor should be supported to raise livestock.
  - ✓ As this could contribute to reducing rural poverty.
- Having livestock reduces poverty, but giving-up livestock increases poverty
  - ✓ If farmers who face shocks receive livestock through relief programs from government then they can escape poverty.
- Empowering rural households to cope with shocks through promoting their access to credit and their education would contribute to reducing rural poverty.

Thank you for your attention!