Keynote Address:
The Effects of Income Shocks on Rural Livelihoods

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Why do We Care About Shocks to Household Income?

- Growing policy relevance as the frequency and severity of shocks is growing
- These include those due to climate change, violence, and shocks like COVID-19 and the Ukraine-Russia war
- Results in rising prices, declining purchasing power, and reductions in household welfare

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Why do We Care About Shocks to Household Income?

- **Knowing the likely impacts – and how they very across different types of people and households – can inform more effective policy responses**

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Plan of Talk

- Consider how different types of shocks affect households and individual welfare, taking two case studies – Kyrgyzstan and Pakistan (four research papers)
- **Kyrgyzstan:** Consider how prices shocks in Kyrgyzstan have historically impacted a) labor supply decisions and migration; and b) health and well-being outcomes
- **Pakistan:** Examine how heat stress and floods impact a) migration outcomes; and b) individuals' aspirations (i.e., goals for the future)
- Discuss policy lessons emerging from these two cases

Case Study 1: Shocks in Kyrgyzstan, Labor & Migration Impacts

- The Gendered Impacts of Income Fluctuations on Household Departure, Labor Supply, and Human Capital Decisions: Evidence from Kyrgyzstan
- Katrina Kosec, Jie Song, Hongdi Zhao, and Brian Holtemeyer
- Forthcoming, *Feminist Economics*

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Research Question

How do income shocks affect labor supply decisions, and how do their effects differ by gender? We consider as outcome variables:

- Household departure
- Employment and hours of labor supplied at the origin
- Temporary migration
- Human capital accumulation

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Preview of the Results

- Analyze 13-year rolling panel in Kyrgyzstan spanning 2004—2016
- Address endogeneity of fluctuations in income to labor supply decisions using household and year fixed effects and a Bartik (1991) instrumental variables strategy
- Find that reductions in income relative to the median spur departure from the household, with smaller impacts on women than men
- Women's labor supply at the origin is affected significantly more than that of men, with short-term increases in hours of employment and declines in home production and other activities
- Reductions in income also fuel temporary migration for both genders, with larger effects for men
- Reductions in income widen the gender gap in pursuit of non-compulsory education, favoring men

Motivation

- Income fluctuations are ubiquitous in low-income countries and can substantially negatively affect the welfare of the poor (Yang 2008)
- Poor households tend to under-insure against such shocks (Rosenzweig 1988; Townsend 1994; Dercon 2002)
- Impacts on migration are ambiguous:
  - Migration can be a form of self insurance (Kennan and Walker, 2011; Clemens, Ozden, and Rapoport, 2015; Kleemans, 2015; Morten, 2019)
  - Households facing negative shocks may have less ability or desire to finance migration (Halliday, 2006; Gray and Mueller, 2012; Angelucci, 2015; Hirvonen, 2016)
- Limited empirical evidence on how income shocks affect migration, employment, and investments in human capital, or how women are differentially affected
  - Differences may be expected given gendered differences in mobility, integration into formal labor markets, types of work performed, perceived returns to education, etc

Background

- Small (200,000 sq. km), land-locked, low-income country in Central Asia
- 2004 GDP per capita: $757 (in constant 2010 USD); still a modest $1,042 per capita by 2016
- 39% of employment in 2004 and 27% in 2016 was in agriculture
- High rates of migration given high rates of poverty; as much as 15% of population estimated to be working abroad (OSCE 2015)
- Internal migration is also common; 18% of individuals in sample born in another community

Data

- Data source: The Kyrgyzstan Integrated Household Survey (KIHS), 2004–2016 (13 years of data)
- Rolling panel dataset; median household is in the sample for 4 years
- Sample comprised of 164,997 individuals from 14,934 households

Outcome Variables

Household Departure:

- Dummy variable for exiting the household roster (and thus ceasing to be considered a household member)

Employment:

- Share of year employed
- Hours during last week employed, on home production, and other time (i.e., leisure, sleep, and unpaid domestic work)

Temporary Migration:

- Dummy variable for main place of work at some point during the year being outside of the oblast (i.e., region) but inside the country, and for it being outside of the country

Human Capital Acquisition (Education):

- Dummy variable for being a student at some point during the year

Econometric Specification

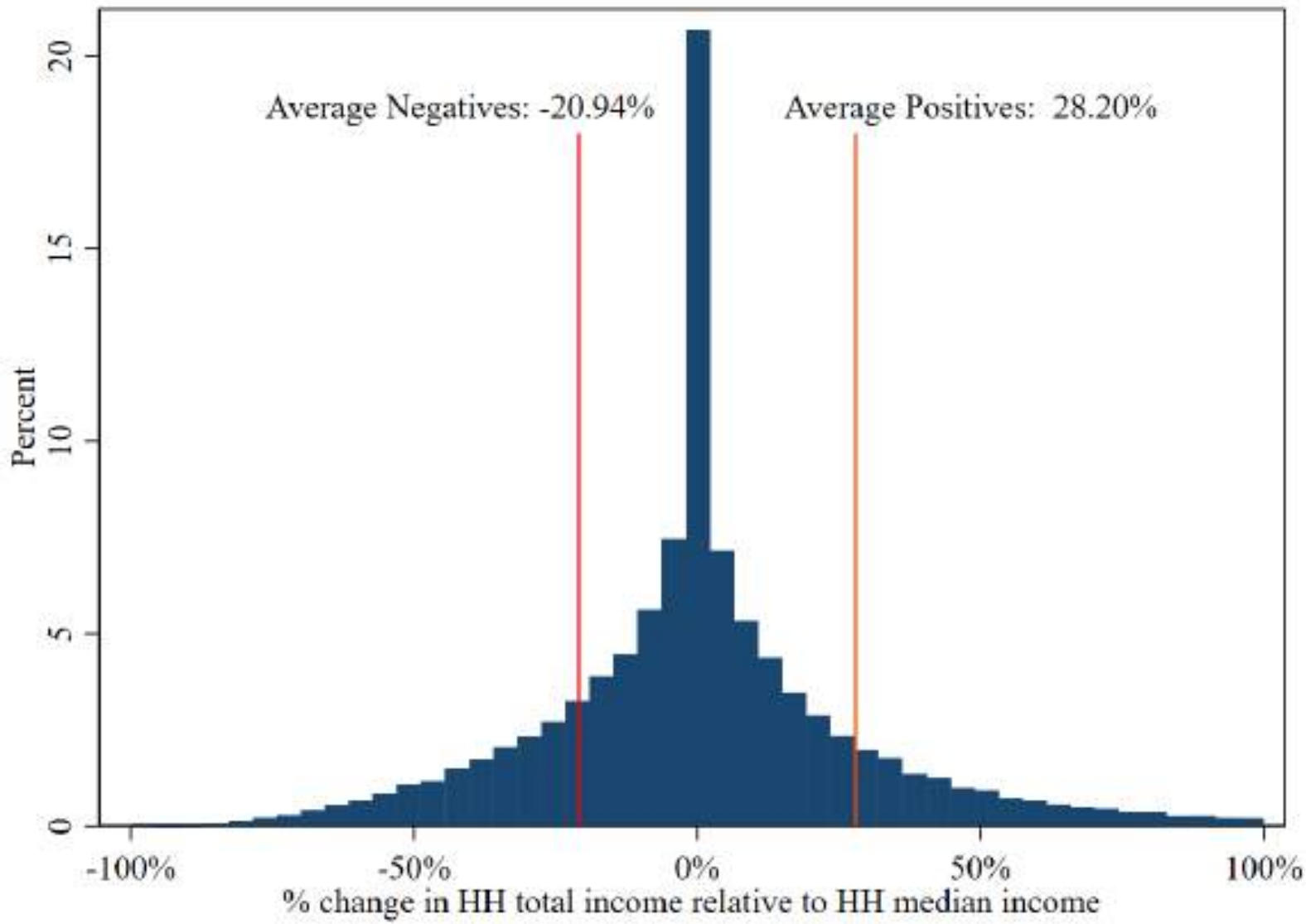
- We estimate:

$$D_{ijt} = \beta_0 + \beta_1(H_{j,t-r}) + \beta_2 H_{j,t-r} G_{ijt} + \beta_3 \boldsymbol{X_{jt}} + \beta_4 \boldsymbol{Y_{ijt}} + \alpha_j + \mu_t + \epsilon_{jt}$$

where

  - i indexes individuals, j indexes households, t indexes years, and r indicates the lag structure of income in years (i.e., 0, 1, 2, or 3)
  - D_{ijt} is a household departure, employment, or education outcome
  - $H_{j,t}$ is the fluctuation in net income experienced by household j in year t relative to that household's median income
  - G_{ijt} is an indicator for being male
  - $\boldsymbol{X_{jt}}$ is a linear time trend interacted with initial year values of net household income and income from each of 9 income sources (logged)
  - $\boldsymbol{Y_{ijt}}$ is a vector of individual-level controls
  - α_j are household fixed effects
  - μ_t are year fixed effects

Distribution of Income Shocks



Identification: Bartik (1991) Instrument

- Problem: Omitted variable bias and reverse causality
- Solution: Compute predicted income (exogenous) using a household's initial-period income shares from 9 different sectors (sources) and nation-wide changes over time in income from those sectors:

$$GI_{j,t} = \sum_{s=1}^{9} IS_{j,s,b_j} \times \frac{N_{s,\sim j,t} - N_{s,\sim j,b_j}}{N_{s,\sim j,b_j}}$$

$$PI_{j,t} = (1 + GI_{j,t}) \times TI_{j,b_j}$$

  - IS_{j,s,b_j} is the share of income household j earned from sector s in base year $t = b_j$
  - $N_{s,\sim j,t}$ is the national household average (excluding the household's own data) income from sector s in year t
- Exploits that part of HH income due to exogenous shifts in returns to economic activity in a given sector

First Stage Results

	(1)	(2)
Controls added iteratively		
Household and year fixed effects	X	X
Baseline income variables interacted with time trend	X	X
Individual controls		X
Predicted change in income relative to HH median, $t-1$	0.525***	0.526***
	(0.022)	(0.022)
R-squared	0.233	0.234
First-stage F-stat	550	554
N	105,155	105,155

Source: Authors' calculations based on KIHS 2004–2016.
Notes: The universe is individuals who were 15-65 years old (inclusive). The dependent variable is the percentage change in income relative to household median income. Our instrument is the predicted percentage change in income relative to household median income. All controls are described in the "Econometric Model" section. Standard errors are in parentheses and clustered at the household level. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Dummy for Departure from Household

	(1)	(2)
Panel A: IV estimates using income from the previous calendar year		
Effect of income shock $(t-1)$ on women	-0.043**	-0.030*
	(0.019)	(0.018)
Effect of income shock $(t-1)$ on men	-0.050***	-0.043**
	(0.019)	(0.019)
P-Value of Difference	0.587	0.273
Panel B: IV estimates using income two calendar years prior		
Effect of income shock $(t-2)$ on women	-0.028	-0.024
	(0.023)	(0.022)
Effect of income shock $(t-2)$ on men	-0.057**	-0.055**
	(0.024)	(0.023)
P-Value of Difference	0.029	0.014
Panel C: IV estimates using income three calendar years prior		
Effect of income shock $(t-3)$ on women	-0.041*	-0.034
	(0.023)	(0.022)
Effect of income shock $(t-3)$ on men	-0.059**	-0.054**
	(0.024)	(0.023)
P-Value of Difference	0.204	0.158
Individual controls	No	Yes

Notes: *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Employment (Share of Year and Total Hours)

	Share of year employed (1)	Hours: all employ-ment (2)	Hours: home production (3)	Hours: other (4)
Effect of income shock $(t-0)$ on women	-0.057***	-2.409***	0.719***	1.690**
	(0.017)	(0.705)	(0.130)	(0.704)
Effect of income shock $(t-0)$ on men	-0.007	-1.331*	0.453***	0.879
	(0.016)	(0.687)	(0.131)	(0.687)
P-Value of Difference	0.000	0.066	0.001	0.159
Effect of income shock $(t-1)$ on women	-0.039*	-0.691	0.036	0.655
	(0.022)	(0.874)	(0.163)	(0.875)
Effect of income shock $(t-1)$ on men	0.010	0.327	0.031	-0.358
	(0.020)	(0.851)	(0.158)	(0.851)
P-Value of Difference	0.003	0.155	0.958	0.150
Effect of income shock $(t-2)$ on women	-0.060**	1.310	0.391**	-1.701*
	(0.024)	(0.990)	(0.181)	(0.992)
Effect of income shock $(t-2)$ on men	0.019	3.673***	0.534***	-4.207***
	(0.022)	(0.955)	(0.175)	(0.955)
P-Value of Difference	0.000	0.003	0.171	0.002

Additional Employment and Human Capital Accumulation

	Dummy—worked multiple jobs	Dummy—would like to work more	Dummy—student (aged 15–25)
	(1)	(2)	(3)
Effect of income shock $(t-0)$ on women	0.112***	-0.011	0.122***
	(0.022)	(0.028)	(0.032)
Effect of income shock $(t-0)$ on men	0.085***	-0.011	0.092***
	(0.021)	(0.027)	(0.031)
P-Value of Difference	0.071	0.998	0.230
Effect of income shock $(t-1)$ on women	0.106***	0.041	0.070*
	(0.027)	(0.033)	(0.041)
Effect of income shock $(t-1)$ on men	0.069***	0.012	-0.021
	(0.026)	(0.032)	(0.040)
P-Value of Difference	0.032	0.117	0.002
Effect of income shock $(t-2)$ on women	0.070**	-0.105***	-0.010
	(0.032)	(0.039)	(0.047)
Effect of income shock $(t-2)$ on men	0.043	-0.143***	-0.085*
	(0.032)	(0.039)	(0.047)
P-Value of Difference	0.131	0.054	0.022

Temporary Migration (Domestic and International)

	Dummy—main place of work is...		
	... in the same oblast (1)	... in another oblast (2)	... in another country (3)
Effect of income shock $(t-0)$ on women	0.017**	-0.016**	0.002
	(0.007)	(0.008)	(0.008)
Effect of income shock $(t-0)$ on men	0.032***	-0.021***	0.001
	(0.008)	(0.008)	(0.008)
P-Value of Difference	0.004	0.347	0.827
Effect of income shock $(t-1)$ on women	0.013	-0.014	0.017
	(0.011)	(0.011)	(0.012)
Effect of income shock $(t-1)$on men	0.020*	-0.017	0.018
	(0.010)	(0.011)	(0.012)
P-Value of Difference	0.261	0.540	0.972
Effect of income shock $(t-2)$ on women	0.019	-0.028**	0.018
	(0.014)	(0.014)	(0.016)
Effect of income shock $(t-2)$ on men	0.027*	-0.032**	0.009
	(0.014)	(0.013)	(0.016)
P-Value of Difference	0.279	0.431	0.354

Conclusions

- Reductions in income relative to the median spur departure from the household, with smaller impacts on women than men
- Women's labor supply at the origin is affected significantly more than that of men, with short-term increases in hours of employment and declines in home production and other activities
- Reductions in income also fuel temporary migration for both genders, with larger effects for men
- Reductions in income widen the gender gap in pursuit of non-compulsory education, favoring men

Case Study 1: Shocks in Kyrgyzstan, Health impacts

- The Effects of Income Fluctuations on Undernutrition and Overnutrition Across the Lifecycle
- Katrina Kosec and Jie Song
- *Health Economics* (2020)

Photo credit: https://www.merit.unu.edu/

Research Question

- How do household income fluctuations in Kyrgyzstan affect health and nutrition outcomes, and how do these effects vary by gender and across the life cycle?

Photo credit: https://www.merit.unu.edu/

Preview of the results

Declines in household income:

- Reduce the weight, weight-for-age Z-scores, and weight-for-height z-scores of young children (under age 5)
- Reduce both weight and height in older children (age 5–18)
- Result in declines in child health and nutrition that are most pronounced among highly agriculture-dependent and rural households
- Lower BMI and incidence of overweight and obesity in adults (both youth age 18–35 and those age 35+)

We additionally consider several possible causal mechanisms

Motivation

- Understanding the impacts of income fluctuations is critical for protecting vulnerable groups:
  - The poor face a higher arrival rate of negative shocks s (Currie and Stabile, 2003)
  - Poor households tend to under-insure against reductions in income (Townsend, 1994, 1995; Jalan and Ravallion, 1999; Dercon, 2002; Yang, 2008)
  - Inability to smooth consumption disproportionately affects women (Dercon and Krishnan, 2000)
- Strong correlations between income and health (Cutler et al., 2006; Adda et al., 2009; Currie, 2009; Banerjee et al., 2010; Bengtsson, 2010; Baird et al., 2011; Ebenstein et al., 2015)
- Causality challenging, motivating consideration of extreme events (droughts, blights, prolonged blackouts, war and armed conflict, recessions, financial crises, etc) or targeted cash transfer programs

Motivation

- External validity concerns with such studies:
  - Extreme events can have behavioral impacts, such as reduced life satisfaction (Luechinger and Raschky, 2009), increased risk aversion (Cameron and Shah, 2015), and reduced aspirations for the future (Kosec and Mo, 2017), which smaller fluctuations in income do not bring about
  - Findings from cash transfer programs may not generalize to populations not targeted by such programs, or far from the cutoff for getting a program
- Raises the important question: What are the health impacts of more commonly-experienced, modest fluctuations in income?
- Also, we know little about how the impacts of income fluctuations vary by gender and across the life cycle

Effects of income Fluctuations on weight, weight-for-age Z-score, and weight-for-height Z-score of children aged 1-5

	(1)	(2)	(3)	(4)	(5)	(6)
	Weight (kg)		**WAZ**		**WHZ**	
Control set						
Basic control set:	X		X		X	
Full control set:		X		X		X
Panel A: OLS, using income of the calendar year preceding Q1 measurement of the outcome						
Income, $t-1$ (logged)	0.502**	0.500**	0.262*	0.262*	0.364*	0.362*
	(0.240)	(0.241)	(0.145)	(0.145)	(0.203)	(0.204)
R^2	0.787	0.787	0.113	0.114	0.052	0.053
N	14,004	14,004	14,004	14,004	14,004	14,004
Panel B: OLS, using income two calendar years prior to Q1 measurement of the outcome						
Income, $t-2$ (logged)	0.595**	0.596**	0.309*	0.311*	0.389*	0.384*
	(0.271)	(0.271)	(0.163)	(0.163)	(0.226)	(0.226)
R^2	0.798	0.799	0.104	0.106	0.051	0.052
N	9788	9788	9788	9788	9788	9788

Effects of income Fluctuations on anthropometric outcomes of children aged 5–18

	(1) Height	(2) Weight	(3) BMI
Panel A: OLS, using income of the calendar year preceding Q1 measurement of the outcome			
Income, $t-1$ (logged)	0.999***	0.953***	0.130
	(0.432)	(0.339)	(0.128)
R^2	0.925	0.892	0.502
N	52,265	52,265	52,265
Panel B: OLS, using income two calendar years prior to Q1 measurement of the outcome			
Income, $t-2$ (logged)	0.767***	0.983***	0.218*
	(0.461)	(0.351)	(0.130)
R^2	0.933	0.901	0.522
N	38,216	38,216	38,216

Effects of income Fluctuations on anthropometric outcomes of youths aged 18–35

	(1) Height	(2) Weight	(3) BMI	(4) Dummy – overweight	(5) Dummy – obese
Panel A: OLS, using income of the calendar year preceding Q1 measurement of the outcome					
Income, $t-1$ (logged)	0.367	0.913*	0.250	0.059**	0.019*
	(0.342)	(0.537)	(0.194)	(0.029)	(0.011)
R^2	0.561	0.411	0.094	0.045	0.004
N	37,060	37,060	37,060	37,060	37,060
Panel B: OLS, using income two calendar years prior to Q1 measurement of the outcome					
Income, $t-2$ (logged)	0.311	0.891	0.273	0.029	0.022*
	(0.406)	(0.622)	(0.222)	(0.035)	(0.012)
R^2	0.564	0.420	0.091	0.044	0.005
N	26,500	26,500	26,500	26,500	26,500

Effects of income Fluctuations on anthropometric outcomes of adults over age 35

	(1) Height	(2) Weight	(3) BMI	(4) Dummy—overweight	(5) Dummy—obese
Panel A: OLS, using income of the calendar year preceding Q1 measurement of the outcome					
Income, $t-1$ (logged)	−0.108	0.313	0.166	0.052***	0.002
	(0.111)	(0.322)	(0.115)	(0.020)	(0.012)
R^2	0.580	0.172	0.048	0.023	0.026
N	73,221	73,221	73,221	73,221	73,221
Panel B: OLS, using income two calendar years prior to Q1 measurement of the outcome					
Income, $t-2$ (logged)	−0.055	0.235	0.103	0.049**	0.009
	(0.114)	(0.346)	(0.125)	(0.021)	(0.014)
R^2	0.584	0.176	0.052	0.025	0.027
N	53,946	53,946	53,946	53,946	53,946

What Explains these Impacts?

Several findings hint at likely channels explaining findings; declines in household income:

- Reduced consumption of healthy foods
- Reduced parental time spent with children
- Increased use of contraception (possibly offsetting some of the negative impacts on existing children)

We do, however, find no changes in healthcare expenditures.

Conclusions

- Reduce the weight, weight-for-age Z-scores, and weight-for-height z-scores of young children (under age 5)
- Reduce both weight and height in older children (age 5–18)
- Result in declines in child health and nutrition that are most pronounced among highly agriculture-dependent and rural households
- Lower BMI and incidence of overweight and obesity in adults (both youth age 18–35 and those age 35+)
- These impacts appear to be due to reductions in consumption of healthy food and less parental time spent with children when income shocks hit

Case Study 2: Shocks in Pakistan, Migration Impacts

- Heat Stress Increases Long-term Human Migration in Rural Pakistan
- Valerie Mueller, Clark Gray, and Katrina Kosec
- *Nature Climate Change* (2014)

Research Question

- Which weather patterns explain the long-term mobility patterns of men and women in Pakistan?

Migration Data

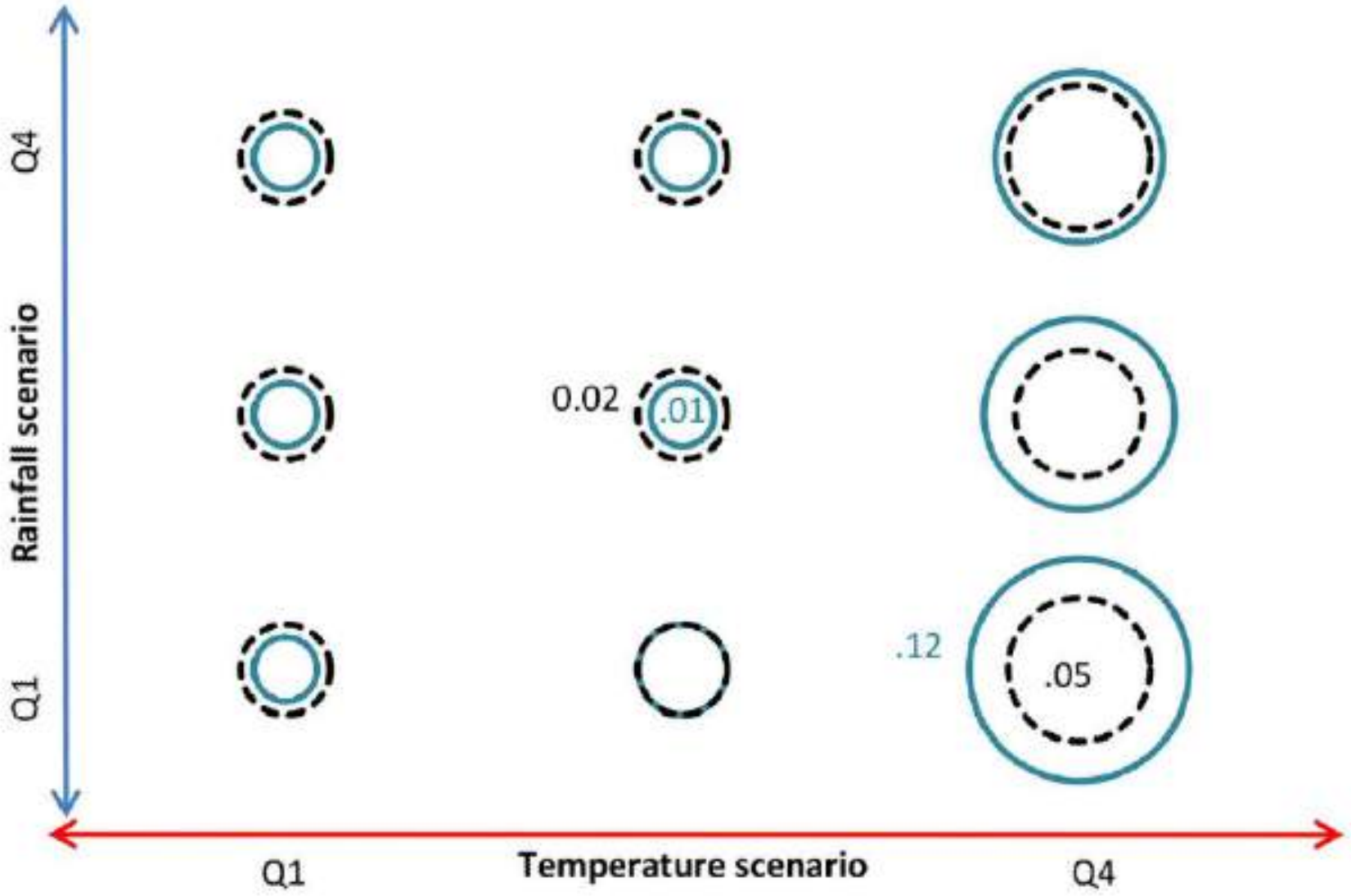
- Pakistan Rural Household Panel Survey (1986-1991) collected by IFPRI Punjab, Sindh, and KPK
  - All individuals present in the 1991 round were tracked
  - come from 583 (origin) households in 37 villages
  - Pre-migration individual and household information (controls) taken from the 1991 round

- 2001 (PIDE) and 2012 (IFPRI) Tracking Surveys for 1991 PRHS
  - Create person-year dataset over 21-year period on when an individual was in the household (did not migrate in that year) and when they left for a reason other than death (migrated in that year)
  - 4,428 individuals (44,791 person-years)
  - Individuals enter the dataset when they turn 15 and leave when they turn 40 or when they migrate (whichever comes first)

Migration Responses to Climate

	Logit Move		Multinomial logit Distance of move				Logit Move		Multinomial logit Distance of move			
			In village		Out of village				In village		Out of village	
Specification A												
Rainfall	1.28		0.94		1.93	**	1.19		1.24		1.17	
Temperature	2.69	***	2.42	***	2.90	**	1.87	***	2.03	**	1.69	*
Joint test of variables	17 92	***			21.96	***	11.60	***	13 92	***		
Specification B												
Rainfall	1.05		1.75		0.53		1.04		1.59		0.62	
Temperature	2.62	***	2.64		2.42	**	1.85	***	2.06	**	1.53	
Rainfall × Temperature	1.01		0.97		1.07	*	1.01		0.99		1.03	*
Joint test of variables	17 92	***			26.32	***	14.56	***	21.80	***		
Specification C												
Rainfall in 1Q	1.47		1.51		1.57		1.13		0.99		1.36	
Rainfall in 4Q	0.82		0.84		0.81		1.20		1.20		1.30	
Temperature 1Q	0.84		1.02		0.68		0.83		0.80		0.84	
Temperature 4Q	5.09	***	2 83	***	11.16	***	1.85	***	1.82	***	2.19	**
Joint test of variables	25.53	***	41.83	***			15.45	***	21.87	***		

Predicted Probabilities of Out-migration by Gender



Migration Due to Heat Stress Appears to be Due to Declines in Farm and Non-farm Income

	Net farm income	90% CI	Farm wage income	90% CI	Non-farm income	90% CI
Variable Mean (1000s 2000 Rupees)	44.15		0.75		31.45	
Rainfall in 1Q	−9.25	[−20, 1]	−0.12	[−0.5, 0.3]	3.93	[0.4, 7.5]
Rainfall in 4Q	13.92	[2, 26]	1.31	[0.4, 2]	15.38	[10, 20]
Temperature 1Q	−10.20	[−28, 8]	0.32	[−0.0, 0.6]	−4.70	[−9, −0.2]
Temperature 4Q	−15.89	[−31, −0.6]	0.59	[−0.1, 1]	−4.90	[−10, −0.1]
Households	648					

Case Study 2: Shocks in Pakistan, Aspirations Impacts

- Aspirations and the Role of Social Protection: Evidence from a Natural Disaster in Pakistan
- Katrina Kosec and Cecilia Mo
- *World Development* (2017)

What Are Aspirations?

- Aspirations can be understood as the degree or quality of performance which an individual desires to attain or feels he/she can attain (Locke and Latham 2002).
- Aspirations levels (low or high) may be influenced by:
  - External factors (e.g., government policies, economic shocks)
  - Aspirations window (set of individuals to whom one is exposed)
  - Internal features and cognitive traits (e.g., locus of control, trust, self-esteem, risk aversion levels, etc)

Research Questions

- **How do natural disasters affect citizens' aspirations for the future?**
- **Can governments' social protection policies successfully mitigate any damaging effects?**

Motivation

- A growing literature recognizes the importance of aspirations in determining whether individuals make investments that can move them out of poverty.
  - Coleman and DeLeire (2003); Macours and Vakis (2009); Bernard et al. (2011); Duflo (2013)
- However, little is known about the factors which contribute to aspiration formation.
  - Beaman et al. (2012); Knight and Gunatilaka (2012)
- No literature examines the impacts of negative shocks like natural disasters on aspirations, nor whether government social protection can help mitigate negative impacts.
- Pakistan's July—August 2010 floods offer a natural experiment to examine the aspirational effects of shocks and government responses.

Preview of the Results

- Higher aspirations predict several future-oriented economic and political behaviors:
  - Greater and more diverse economic investments
  - Voting, membership in political or civic organizations, and political knowledge
- Pakistan's July—August 2010 floods (which placed 1/5 of the country under water) significantly lowered aspiration levels among rural Pakistanis 1.5 years later (March—April 2012).
- The negative impacts of the floods on aspirations were significantly reduced——almost to zero——in villages that received the Citizen's Damage Compensation (Watan Card) Program.
  - Suggests a critically important role for social protection policies in mitigating the negative aspirational impacts of such shocks.

March-April 2012 original survey of 76 villages in Pakistan

- **Study context:** Rural Pakistan (2,090 HHs, 76 villages, 19 districts)

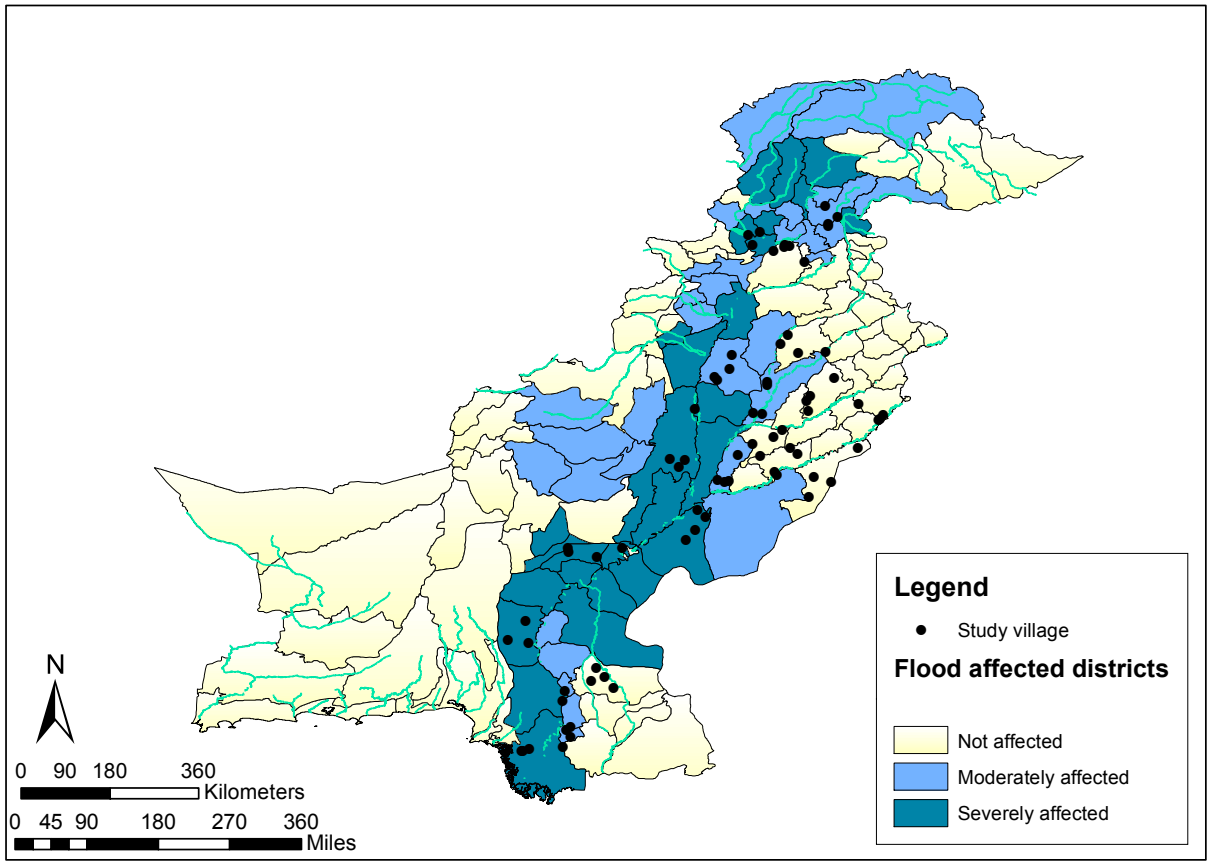


Figure 1: Flood-Affected Districts in Pakistan on August 26, 2010 (UN OCHA)

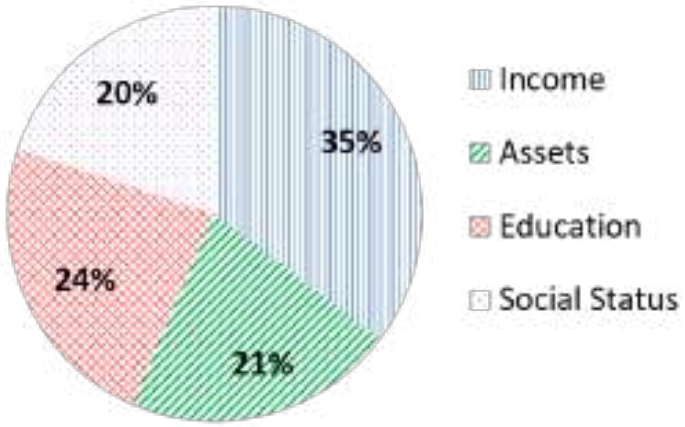
Measuring Aspirations

- We measure the aspiration level using an index similar to that used by Beaman et al. (2012) and Bernard and Seyoum Taffesse (2012).
- Individuals are asked: "what is the level of [. . .] you would like to achieve?" in four dimensions:
  - Income (Rs.)
  - Assets (Rs.)
  - Education level (recoded into years)
  - Social status (1-10 on a ladder)
- Normalize each using the average level in an individual's district.
- Compute a weighted sum of the four components, with the weight equal to the share of 20 beans the individual places on that dimension.

Measuring Aspirations

$$Aspiration\ Level = \sum_{n=1}^{4} \left(\frac{a_n^i - \mu_n^d}{\sigma_n^d} \right) w_n^i \quad (1)$$

- Where:
  - a_n^i is the aspired outcome of individual i on dimension n
  - μ_n^d is the average aspired outcome in district d for outcome n
  - σ_n^d is the S.D. of aspired outcomes in district d for outcome n
  - w_n^i is the weight individual i places on dimension n (weights sum to 1)
- On average, this is how individuals weighted the four dimensions:



Correlations of Aspirations with Future-Oriented Behavior

	Coeff. (Aspirations)	S.E.	N
Panel A: Economic Behavior			
HH expenditure on seeds per acre	208.518*	115.425	1,619
HH expenditure on fertilizer per acre	452.686	325.077	1,619
Savings (share of monthly expenditure)	0.038	0.064	3,459
Cash loans outstanding (share expenditure)	0.125**	0.052	1,128
HH operates a non-agricultural enterprise	0.026**	0.012	3,459
Panel B: Political Behavior			
Voted in elections	0.036***	0.013	2,685
Attended a village meeting in 2013	0.003	0.011	2,685
Member of political or civic organization	0.015**	0.008	2,685
Score on test of political knowledge (0-2)	0.083***	0.025	2,685

Notes: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Measuring 2010 Rainfall Shocks

- **Goal is to measure:** How far above or below the village average was the 2010 monsoon season rainfall?
- Data come from NASA-POWER satellite data, available for 1981-2010
- We try using three different, village-level measures (following Hidalgo et al. 2010 and Hsiang, Burke, and Miguel 2013):
  - **Non-linear measure 1:** The absolute value of 2010 rainfall deviations from the 1981-2010, 30-year village mean
  - **Non-linear measure 2:** Squared 2010 rainfall deviations from the 30-year, 1981-2010 village mean
  - **Simple, linear measure:** Centimeters (cm) (in 10s) of rainfall in the village during June—September 2010

Econometric Specification

- We estimate:

$$A_i = \alpha_0 + \alpha_1 R_v + \beta \boldsymbol{X_i} + \sigma_j + \epsilon_i$$

where

- A_i is an individual's aspiration level 1.5 years later after the rainfall shock
- R_v is a measure of severity of rainfall in village v during the 2010 monsoon season
- σ_j are agro-ecological zone fixed effects
- $\boldsymbol{X_i}$ is a vector of year 2012 controls describing individual i and their household

Effect of 2010 Monsoon Season Rainfall on Aspirations

	(1)	(2)	(3)	(4)	(5)	(6)
Absolute value of rainfall deviations from mean	-0.264***	-0.267***				
	(0.094)	(0.077)				
Square of rainfall deviations from the mean			-0.083***	-0.071***		
			(0.030)	(0.024)		
Centimeters of rainfall in 2010 monsoon (10s)					-0.292***	-0.277***
					(0.103)	(0.084)
Average rainfall during monsoon, 1981-2010	-0.026	0.257***	-0.021	0.255***	0.266	0.531***
	(0.095)	(0.081)	(0.097)	(0.082)	(0.164)	(0.135)
S.D. of rainfall during monsoon, 1981-2010	0.901**	-0.158	0.707**	-0.378	1.307***	0.204
	(0.361)	(0.310)	(0.345)	(0.299)	(0.412)	(0.352)
Observations	3,507	3,459	3,507	3,459	3,507	3,459
R-squared	0.019	0.322	0.019	0.321	0.019	0.322
Demographic Controls	No	Yes	No	Yes	No	Yes

Notes: Robust standard errors are in parentheses and clustered at the household level. All specifications include demographic controls (gender, age, marital status, education, parent's education, income, and monthly expenditure), agro-ecological zone, household size, and ethnicity fixed effect, and controls for latitude, longitude, latitude X longitude, and elevation. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Effect of 2010 Monsoon Season Rainfall on Aspirations, by Expenditure Quintile

	Bottom Quintile (1)	2nd Quintile (2)	3rd Quintile (3)	4th Quintile (4)	Top Quintile (5)
Absolute value of rainfall deviations from mean	-0.392**	-0.450***	-0.385**	-0.067	-0.016
	(0.184)	(0.171)	(0.176)	(0.146)	(0.208)
Average rainfall during monsoon, 1981-2010	0.678***	0.457**	-0.056	-0.026	0.109
	(0.172)	(0.226)	(0.168)	(0.168)	(0.208)
S.D. of rainfall during monsoon, 1981-2010	-1.332**	-0.309	1.844***	0.6	-0.699
	(0.651)	(0.754)	(0.703)	(0.705)	(0.708)
Observations	741	704	705	717	592
R-squared	0.334	0.31	0.303	0.428	0.397

Notes: Robust standard errors are in parentheses and clustered at the household level. All specifications include demographic controls (gender, age, marital status, education, parent's education, income, and monthly expenditure), agro-ecological zone, household size, and ethnicity fixed effect, and controls for latitude, longitude, latitude X longitude, and elevation. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Disaster Relief Program

- Government of Pakistan's 2010 launched the Citizens Damage Compensation, or Watan Card Program in response to the floods.
  - During September 2010 – June 2011, the program provided flood relief to 1.62 million families among the estimated 20 million affected by the 2010 floods.
  - Payments were disbursed using a prepaid debit card called a "Watan Card" worth USD 213 (World Bank 2013).
  - The Watan Card Program was one of the largest post-disaster social safety nets ever implemented (World Bank 2013).
  - We exploit information stemming from a discontinuity to causally identify the extent to which social protection can mitigate the negative effects of natural disasters on aspirations

Disaster Relief Program: Leverage Selection Criterion for Causal Inference

- The official criterion for a household to receive relief was living in a "heavily affected" village, defined as one with at least 50 percent of houses or crops having been flood-affected.
- District government officials ultimately controlled disbursement, and could have redirected funds. One impact evaluation of the program noted that only 43 out of 100 eligible household received a Watan Card.
  - Districts with a greater share of their flood victims concentrated in villages with at least 50 percent flood affectedness given more funds per victim than districts with *the same number* of flood victims spread across villages with less than 50 percent flood affectedness.
  - Instrumental variable for each village: the share of flood victims in other sample villages in the same district that reside in villages that were at least 50 percent flood-affected.

Effect of Disaster Relief - Correlation

	Village Does Not Have Program		Village Has Program	
	(1)	(2)	(3)	(4)
Absolute value of rainfall deviations from mean	-0.446***		-0.055	
	(0.102)		(0.210)	
Centimeters of rainfall in 2010 monsoon (10s)		-0.533***		-0.121
		(0.112)		(0.238)
Average rainfall during monsoon, 1981-2010	0.378***	0.965***	0.590***	0.680***
	(0.099)	(0.187)	(0.151)	(0.233)
S.D. of rainfall during monsoon, 1981-2010	-0.056	0.910*	-1.913**	-1.543
	(0.460)	(0.516)	(0.743)	(1.064)
Observations	2,531	2,531	928	928
R-squared	0.324	0.325	0.393	0.393

Notes: Robust standard errors are in parentheses and clustered at the household level. All specifications include demographic controls (gender, age, marital status, education, parent's education, income, and monthly expenditure), aagro-ecological zone, household size, and ethnicity fixed effect, and controls for latitude, longitude, latitude X longitude, and elevation. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Conclusions

- Aspirations are critical because future-oriented actions and behaviors are likely to be predicated on them; we see empirical evidence that aspirations are associated with important forward-looking economic and political behaviors
- Pakistan's July—August 2010 floods (which placed 1/5 of the country under water) significantly lowered aspiration levels among rural Pakistanis 1.5 years later
- The negative impacts of the floods on aspirations were significantly reduced——almost to zero——in villages that received the Citizen's Damage Compensation (Watan Card) Program
  - Suggests a critically important role for social protection policies in mitigating the negative aspirational impacts of such shocks

Putting the Findings Together

- Economic shocks – from income shocks to floods and droughts – have powerful impacts on a large and varied set of outcomes
  - Negative income shocks spur migration (especially for men), labor hours at the origin (especially for women), and declines in health (especially for young children)
  - Floods reduce migration while heat stress (drought) increaes it
  - Floods lower aspirations (individually-set goals) for the future
- These impacts are not the same across all households or individuals within a household; gender, poverty, urbanization, and other factors moderate their impacts
- Understanding what are the likely impacts and how they may vary across households and individuals can allow more appropriate, targeted policies that avert the greatest negative impacts