Under-investment due to Costly Experimentation

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Famine strikes at Shunaqulir Char: Mother and Daughter go on hungry for days

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ভাতার অপেক্ষায় থেকে মারা গেলেন মতিয়ার

অখিল পোদ্দার / তাহমিন হক ববি, নীলফামারী থেকে ॥ বয়স্কভাতার জন্য আর অপেক্ষা করতে হলো না মতিয়ারের। আড়াই দিন অভুক্ত থেকে গত সপ্তাহে তাঁর মৃত্যু হয়েছে। আগামীকাল তাঁর ভাতা পাওয়ার কথা। মতিয়ারের ঘরটি এখন তাঁর মতোই একা। চারপাশে কোন দরজা-বেড়া নেই। কাশডাঁটার দোচালা ঘরের কোনায় বাঁশের মাচা। মন চাইলে তিনি এখানেই ঘুমোতেন। তাঁর মৃত্যুর খবর মুন্সিপাড়ার বাইরের

Picture (courtesy Daily Janakantha): Left: A woman showing the condition her hunger stricken grand child. Right: A person namely Matiar died while standing in line for Aid.

- Rangpur districts are desperately poor (incomes ~60% of rest of country) and seasonality in income quite pronounced (~40% drop in income before Aman harvest) (Khandker 2009)
- Pre-harvest (Sept-Nov), job opportunities are limited, wages are low, grain prices are high.

Puzzles

- Remittances into the north-east is the lowest in the country
- Khandker (2010) and Zug (2008) find:
  - Greater inter-regional variation in income/poverty than inter-seasonal
  - Less pronounced seasonality in other regions
  - Jobs available and wages higher in nearby urban areas

- Specific Policy Goal of our project:

  Can seasonal migration mitigate the effects of the seasonal famine
  - Reduce the spatial mismatch between jobs and people if there is structural seasonal unemployment in Rangpur?

Experiment

- In 2008, provided households with a small transfer conditional on migration ($8.50+$2.50)
- Randomly allocated across 100 villages (1900 hh)
  - Cash Grant (37 villages)
  - Credit (31 villages)
  - Information/endorsement (16 villages)
  - Control (16 villages)
- Within each village, added conditionalities to random subsets of households (e.g. migrate in a group, or to a specific destination)
- Program implemented by umbrella organization for microcredit NGOs

Outline

1. Seasonal out-migration appears to have large *causal* benefits for monga-prone households
   - High take-up and large consumption effects
   - People re-migrate a year later after incentives removed
2. Why do households fail to take advantage of this apparently attractive investment?

3. Should we scale this program up? What would be the optimal policy design?

Contributions

General:

1. What are the causal effects of seasonal migration on poverty, caloric intake, distribution of expenditures?

– Large literature on effects of migration (Gibson et al 2010, Yang 2008, McKenzie et al 2010, Adams 1998, Barham and Boucher 1998…)

2. Risky Experimentation holds back technology adoption and development

– Green Revolution (Munshi 2004), lower investment in agricultural inputs (Rosenzweig and Wolpin 1993, Dercon and Christiansen 2009), hinders entrepreneurship (Hausmann and Rodrik 2003, Fischer 2009)

Specific:

1. Is a migration support program a cost-effective response?
2. What is the design of the optimal grant, credit or insurance scheme to promote seasonal out-migration during famine?

Program Take-up

	Offer Accepted	Kept Money	Migration Rate
Cash	71.88%	48.26%	59.0%
Credit	52.98%	34.21%	56.8%
Info	35.14%	.	35.9%
Control	.	.	35.9%

	Incentivized	Not Incentivized	P-Value
Migration Rate 2008	58% (0.014)	36% (0.0196)	0.00
Remigration Rate 2009	47% (0.014)	37% (.020)	0.00

Migration the next season (after incentives removed)

Effects of Migration on Consumption amongst remaining household members

	OLS	IV	Mean of Dep. Var.
Food Expenditures	79.16***	224.8*	729.2
	(18.08)	(124.2)	
Non Food Expenditures	46.04***	111.5**	274.4
	(8.448)	(49.54)	
Total Expenditures	124.5***	337.5**	1003.1
	(22.36)	(154.1)	
Total Caloric intake	231.3***	729.4***	2091.3
	(40.61)	(238.1)	

- Per capita expenditures, food expenditures and caloric intake increase 30-35% among migrant households
- Monthly consumption increased by at least $4 per capita ($15/household) due to induced migration. [Travel cost=$7]
- Food consumption shifts towards meat and child education expenditures increased among migrant households.

Savings, Earnings, Remittances

	All Migrants	Incentivized	Not Incentivized	Obs
Total Savings by household	3490.5	3506.6	3434.9	951
Total Earnings by household	7777.2	7451.3	8894.4*	952
Savings per day	56.8	56.5	57.8	905
Earnings per day	99.4	96.1	111.5***	926
Remittances per day	17.8	16.2	23.3***	926
Travel Cost per Episode	444.2	444.4	443.6	953

Earnings of Non Migrants remaining at origin

Income	Only Employed	Employed & Unemployed
Job type: Daily	94.7	87.9
Job type: Salary	64.9	60.6
Non Agricultural Business Daily Profits	61.1	.

A Migration Poverty Trap?

Why didn't more people seasonally migrate to begin with?

- Data most consistent with a rational model in which people are uncertain about *their own* return to migration, and don't experiment out of fear of a devastatingly negative outcome
- Inducing the inaugural migration by insuring against devastation can have a large and long-lasting impact
- Other competing models don't fit all the data
  - Our incentive simply pushes households over a cost-benefit threshold
  - People are mis-informed about the benefits of migration
  - Migration as habit formation
  - A credit constraint prevents migration
  - People gain some other real asset at the destination (network, job leads).

Who was induced to migrate by our treatments?

Percentage of Migrants that Know Someone at Destination

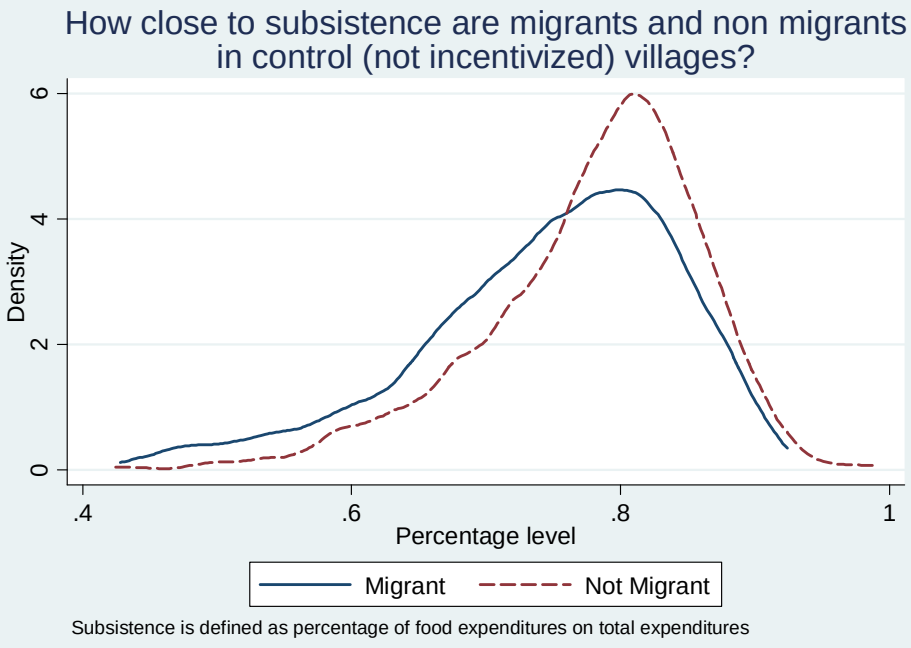
	Incentive	Non incentive	Diff	Std Error
First Episode	47%	65%	0.17***	0.04
Second Episode	60%	72%	0.12**	0.06
Third Episode	68%	82%	0.14	0.09
Fourth Episode	86%	88%	0.06	0.11

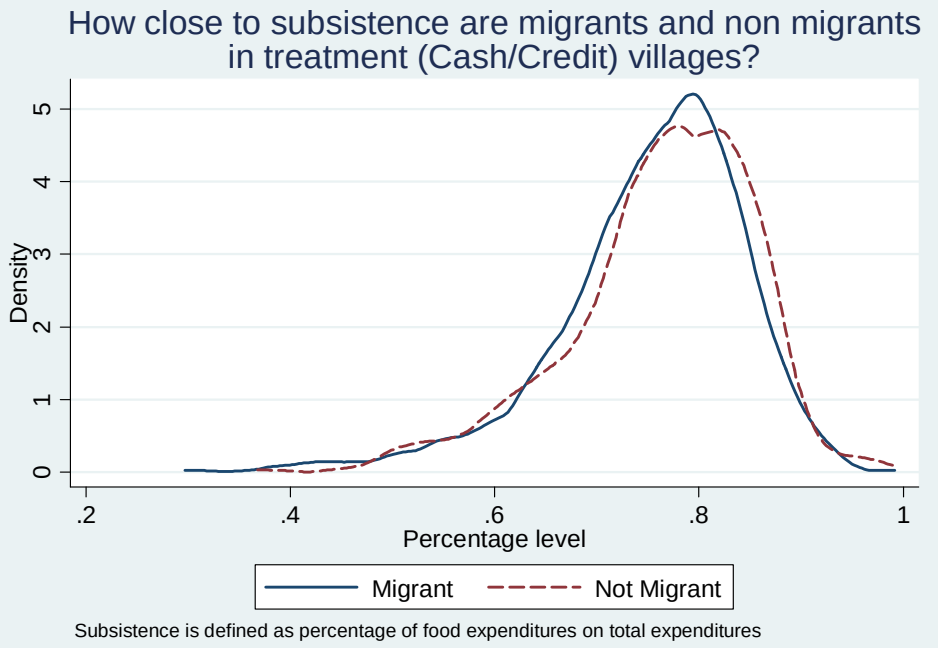
Percentage of Migrants that had a Job Lead at Destination

	Incentive	Non incentive	Diff	Std Error
First Episode	27%	44%	0.17***	0.03
Second Episode	29%	47%	0.18**	0.06
Third Episode	36%	54%	0.18**	0.09
Fourth Episode	53%	59%	0.06	0.15

- Induced migrants less likely to have social networks, job leads at the destination, and to travel alone compared to control group migrants
- We induced people who were *otherwise less comfortable going*

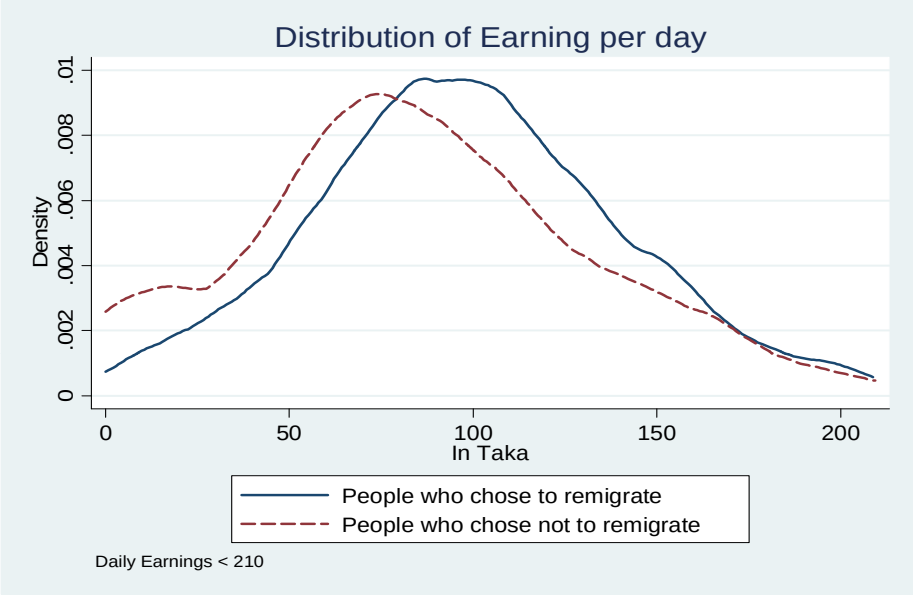
Who Chooses to Migrate?

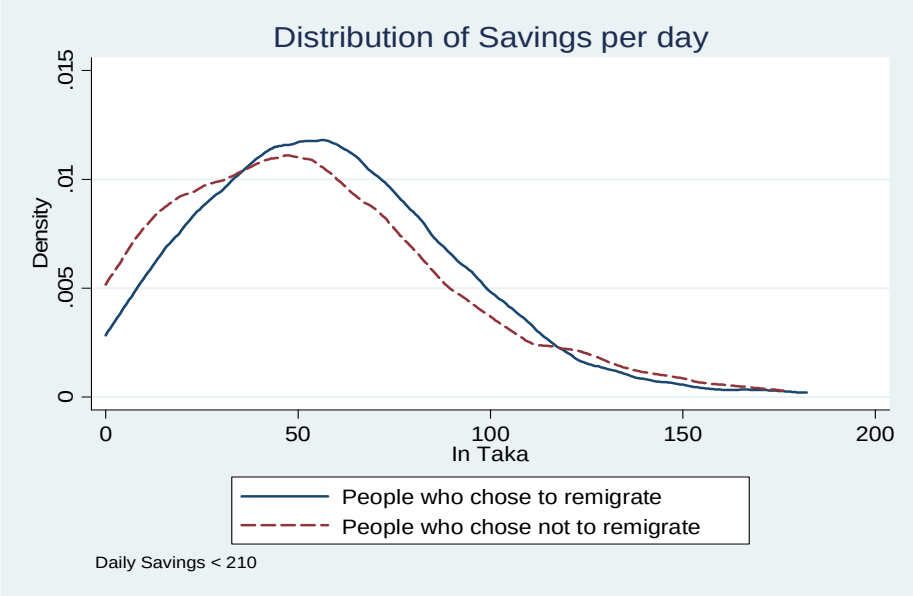


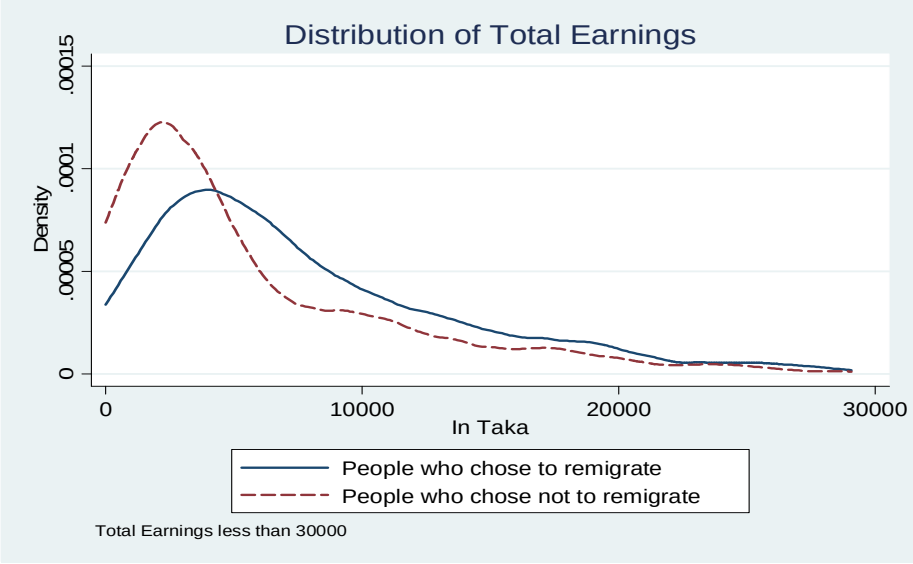


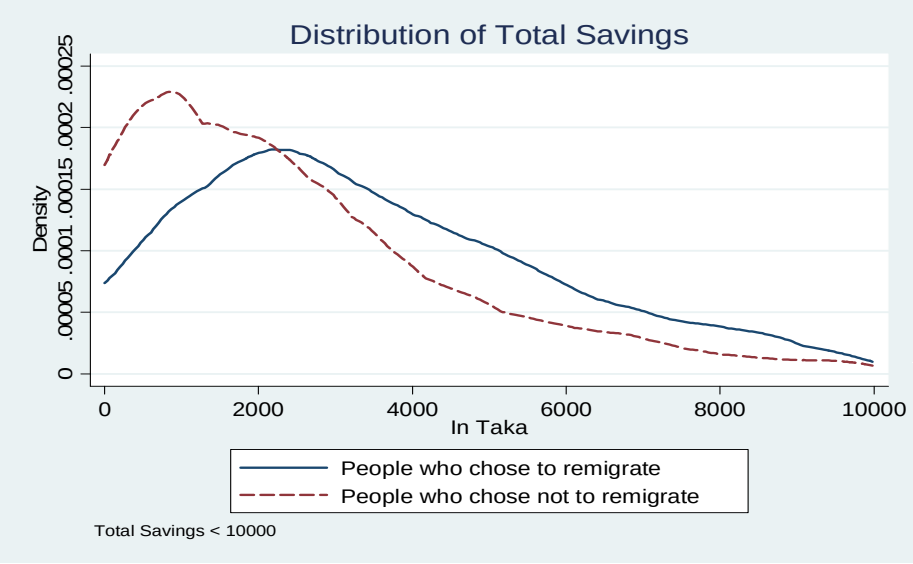
- In general, people closer to subsistence are less likely to migrate (control villages)
- But those households are more responsive to our incentives (treatment villages)

Learning: Who re-migrates in 2009?





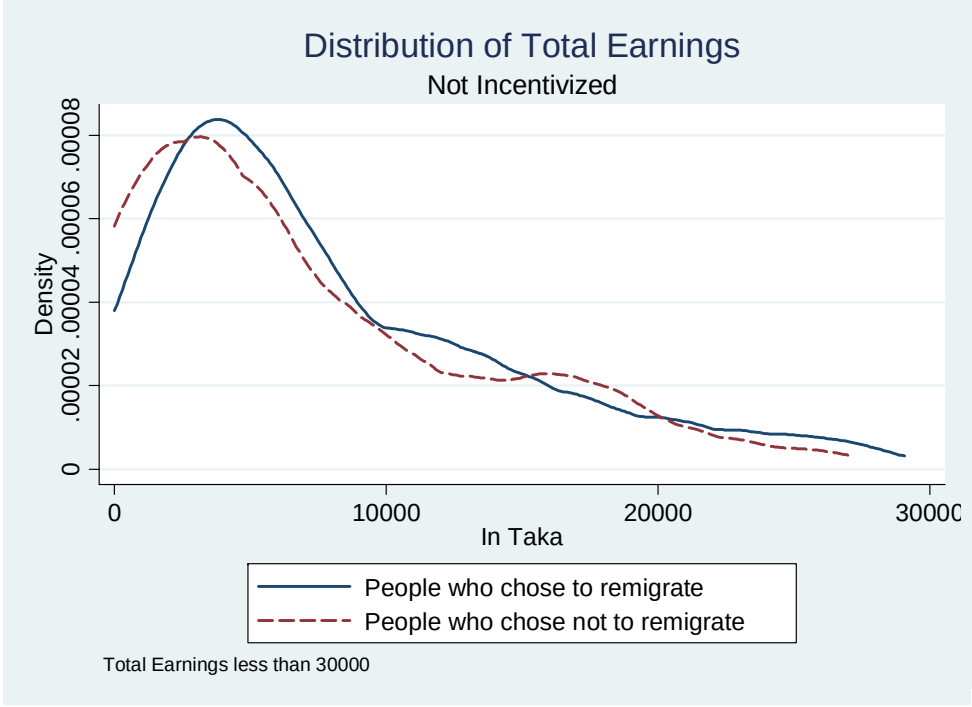


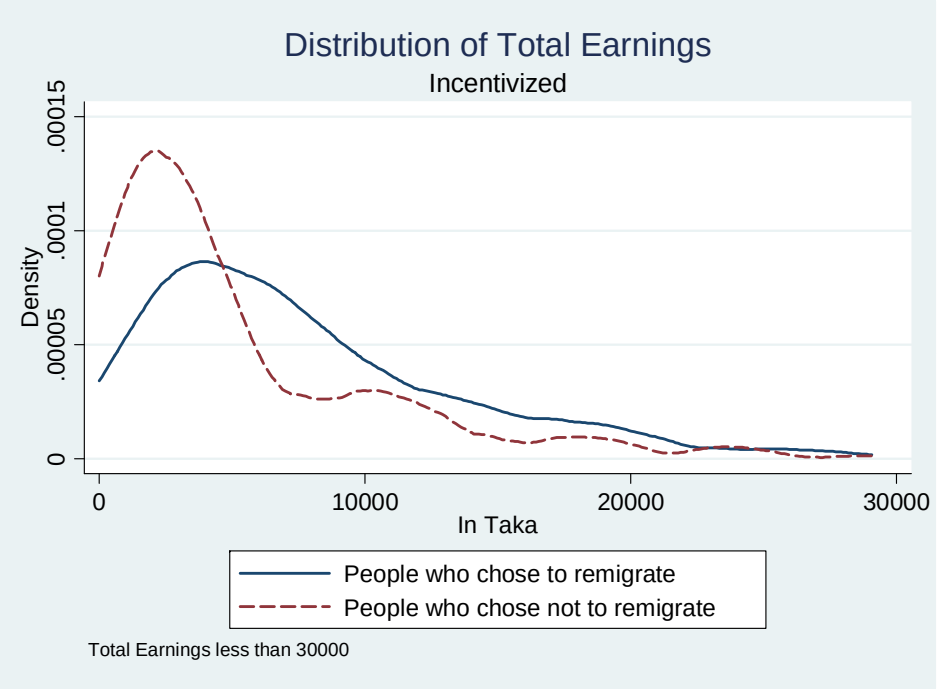


Learning from Self vs Friends/Relatives

Variables	OLS	IV	IV	IV	IV	IV
Did any member in the household Migrate?	0.344***	0.336*	0.355**	0.438***	0.480***	0.436***
	(0.0277)	(0.187)	(0.146)	(0.129)	(0.128)	(0.124)
Incentivized (1=yes, 0=no)						
Succesful migrant (Defined on Expectations of Migrant)	0.0730**	0.0847				
	(0.0285)	(0.127)				
Successful migrant			0.0881			
			(0.0907)			
Number of "Friends" who migrate				-0.0534		-0.117
				(0.0494)		(0.0909)
Number of "Relatives" who migrate					0.00964	
					(0.0288)	
Number of successful friends						0.0982
						(0.152)
Constant	0.122***	0.134**	0.122*	0.0961	0.0685	0.0984
	(0.0313)	(0.0594)	(0.0672)	(0.0713)	(0.0731)	(0.0701)
Observations	1783	1735	1751	1775	1775	1775
R-squared	0.207	0.208	0.209	0.198	0.192	0.196

Learning in the Treatment vs. Control Areas





- "Induced" migrants in the treatment areas appear to learn more than control group regular migrants
- The control group migrants do not update as much based on that one year of experience.

Learning vs Credit Constraints

- All of these results point to a migration poverty trap that the learning associated with our initial push can help households experiment and escape the trap
- However, results also consistent with another story where people are credit constrained:
  - People understand that migration has large positive returns, but they cannot afford to travel
  - Our treatment relieves the credit constraint
  - Those who are successful save enough to be able to travel the following year
  - The asymmetric learning effects are due to the fact more credit contrained people started migrating in treatment areas
- Which story is correct matters for optimal policy design

Learning about Destination Choices

Did you re-migrate to the same destination?	(1)	(2)
Was last season's migration successful? (Based on Expectations)	0.0748**	0.0712**
	(0.0306)	(0.0302)
Was last season's migration successful? (Based on Earnings)	0.0865**	0.0889**
	(0.0376)	(0.0375)
Did you know someone at your destination in previous round?	-0.0224	-0.0230
	(0.0351)	(0.0347)
Successful Friends/Relatives (Earnings) at destination	0.152***	
	(0.0449)	
Unsuccessful Friends/Relatives (Earnings) at destination	0.0434	
	(0.0353)	
Successful Friends/Relatives (Expectations) at destination		0.113***
		(0.0322)
Unsuccessful Friends/Relatives (Expectations) at destination		0.0632
		(0.0597)
Constant	0.178***	0.178***
	(0.0490)	(0.0484)
Observations	833	833
R-squared	0.065	0.063
Mean dependent variable	0.46	0.46

Specific Policy Implications

- The migration support program passes a rigorous evaluation.
- The results can also teach us a lot about specifics of program design:
  - If it is a simple credit constraint, we need to offer credit
  - But if the poverty trap explanation is correct, then we additionally need to offer insurance (e.g. in the form of limited liability in the credit contract). Otherwise, take-up will be lower than socially optimal.

Policy Design

- Design of insurance scheme is complicated by moral hazard
- If verification of migrant's situation in destination is costly, then you cannot insure individual outcomes through limited liability
- Plan to implement insurance program this year using externally verifiable flooding that affects labor demand among potato farmers in Munshiganj
- 2x2 research design: (a) credit, (b) credit with limited liability (insurance), (c)only insurance, (d) control

Conclusions

- Results suggest that we ought to think about the role of micro-credit more broadly
- Not everyone is an entrepreneur, but credit and other financial services can be used to reduce spatial mismatch between people and jobs
- People respond to small incentives, and this has large returns even in the very short run, and long-lasting impacts on behavior and outcomes even after the incentive is removed
- The model proposed here is applicable to other risky technologies where the downside is potentially devastating. e.g. new varieties of seeds, agricultural practices
- We gain a better understanding of *Seasonal Migration,* a common practice to diversify away from agri (Banerjee and Duflo 2006)

End of Presentation

Extra slides follow (with details of theoretical model and additional specifics; not to be presented)

Data and Treatments

- Census of 100 villages in two districts (Lalmonirhat and Kurigram) in June 2008 to identify vulnerable households
- Surveyed a random sub-sample of 1900 eligible households during the pre-monga season in July 2008
- All households randomly assigned to treatments in August 2008
- Incentives offered during the 2008 Monga season starting in September:
  - Cash: 600 Taka ($8.50) (+ 200 Taka if they reported to us at destination)
  - Credit: Loan of same amount
  - Cash/Credit households provided exactly the same information about jobs and wages as in the information-only treatment
- Follow-up Survey in December 2008
- Another migration survey in May 2009
- Second Follow-up (to track longer-run effects): Nov/Dec 2009

Concerns

- Since an incentive is involved, are people accurately reporting their migration?
  - Verification at the destination is imperfect since people migrated outside the given window, and given destinations
  - We verify their reports by asking the same question in two different surveys conducted 6 months apart. >85% consistency
  - We are able cross-verify >60% of reports of group migration by independently asking the migration partners
  - We independently ask neighbors (>85% neighbors verify)
- Are people just going on a short vacation?
  - Almost all migrants find work within a week
  - Short-run consumption/expenditure effects suggest

Poverty Trap Model

- An infinite number of discrete time periods. Discount factor δ
- $\theta \in \{b, g\}$: agent's type ("how will my skills fare at the destination?"), distributed μ(θ)
- Technology 1: "Stay at home" provides certain income of y
- Technology 2: "Migrate" provides uncertain income $y(\theta)=\theta$
- One period expected utility from migrating: $\sum_{\theta} \mu(\theta)u(\theta)$

Assumptions Generating a Poverty Trap

1. It is worth migrating under the good realization: $u(y)<u(g)$
2. It is *not* worth migrating under the bad realization: $u(y)>u(b)$
3. It is *not* worth experimenting with migration:

$$\mu(g)\left[\frac{1}{1-\delta}u(g)\right]+\mu(b)\left[u(b)+\frac{1}{1-\delta}u(y)\right]<\frac{1}{1-\delta}u(y)$$

- For this to hold, the utility under the bad realization [$u(b)$] has to be very low or the agent has to consider outcome *b* quite likely

$$\frac{\mu(g)}{1-\delta}[u(g)-u(y)]<\mu(b)[u(y)-u(b)]$$

- Assumptions 1 - 3 are most likely to hold simultaneously when the utility function is very steep at some point [$u(b)<<u(g)$].
- For example, if you migrate when your family is under the threat of famine, and it's a net loss and you are forced to return, and this puts your family below a subsistence point.

Allowing people to experiment

- A small "incentive to invest", *I* (i.e. a subsidy conditional on migration) can have a large effect on consumption if

$$\frac{\mu(g)}{1-\delta}\left[u(g+I)-u(y)\right] > \mu(b)\left[u(y)-u(b+I)\right]$$

- If u'(b) is large, then the incentive can be very small
- Providing a small *I* that allows people to experiment can permanently increase utility in this economy

$$\frac{1}{1-\delta}\left[\mu(g)u(g)+\mu(b)u(y)\right] > \frac{1}{1-\delta}u(y)$$

- Implications:
  - *I* can increase the migration rate by insuring against the bad outcome
  - Migrating is profitable in that the gain in consumption exceeds *I*
  - A one-period subsidy can have an ongoing impact on the migration rate
  - People learn something, and migration should be serially correlated for those with positive prior-period experiences

Credit constraints

- The raw data suggest that credit constraints would only explain the behavior of a small subset of households at best:
  - Only about 75-80 people (out of 1900) can be coded as "credit constrained" ("refused credit")
  - Only about 75 non-migrants report "not having enough money" as a reason for not migrating.
  - Majority of the sample report that they have taken a loan
  - Lots of people re-migrate even after the incentive is taken away. Accumulated savings from the previous migration does not fully explain this, as larger savings is not at all correlated with re-migration in the control group
  - The cost of migration is about Tk 250 (Tk 500 roundtrip), and even cheaper if you are willing to take risks and travel less comfortably. The average earnings per episode is Tk. 5000-7700 (and average savings+remittances is Tk 2000-3200). Credit constraints isn't likely to explain the lack of Tk 250-500 for the majority of people in this sample.

Learning

- People learned more in the treatment villages.
  - Stronger growth in savings per day (by 12-16 Taka per day, or about 25% larger) in incentivized villages compared to control villages.
  - The growth in earnings per day was about 30% larger in treatment villages.
- People who accumulate significantly greater savings and earnings from the first round are the ones re-migrating in the treatment villages, but not in control
  - Decomposing the diff-in-diff, people not re-migrating in the treatment group are much worse off than people in any of the other 3 groups (treatment re-migrants and control re-migrants and non re-migrants). This suggests that non re-migrants are the induced first round migrants who had a negative experience.

Conclusions

- People respond to small incentives, and this has large returns even in the very short run, and long-lasting impacts on behavior and outcomes even after the incentive is removed
- The model proposed here is applicable to other risky technologies where the downside is potentially devastating. e.g. New varieties of seeds, agri practices
- Our evidence is suggestive that encouraging seasonal migration may be a useful policy response to Monga (to complement other employment policies)
- We gain a better understanding of *Seasonal Migration,* which is a common practic. [Over a third of rural households in agrarian regions of the developing world report non-farm labor earnings, but only 4-10% live away from their place of birth. (Banerjee and Duflo 2006)]
- To do:
  - Look at longer term investment and schooling effects
  - With other treatments, study risk sharing, job information sharing, and social networks

Who is Migrating?

- 93% of migrant households had only one individual migrating
- 97% of migrants are male
- 82% on migrants are household head, additional 16% the son/daughter of household head
- 66% of migrants engaged in agriculture at the origin, 11% in non-ag day labor, 10% transport

	Migrants									
	Cash	**%**	**Credit**	**%**	**Info**	**%**	**Control**	**%**	**Total**	**%**
N	429	41.9	363	35.5	115	11.2	116	11.3	1023	100
Age Group										
0 – 17	22	5.1	30	8.3	12	10.4	9	7.8	73	7.1
18 – 29	137	32.0	104	28.7	46	40.0	41	35.3	328	32.1
30 – 49	213	49.8	188	51.8	47	40.9	55	47.4	503	49.2
50 – 100	56	13.1	41	11.3	10	8.7	11	9.5	118	11.5
Literacy										
Cannot read or write	115	26.9	107	29.5	36	31.3	28	24.1	286	28.0
Can sign only	195	45.6	161	44.4	44	38.3	44	37.9	444	43.4
Can read and write	117	27.3	95	26.2	35	30.4	44	37.9	291	28.5