Poverty Traps and Social Protection
Research in Progress

Michael R. Carter

University of California, Davis
BASIS Collaborative Research Support Program
I4 Index Insurance Innovation Initiative

Symposium on Ultra-poverty
George Washington University.

March 22, 2012
Evidence of poverty traps in this region

Emergency food response inadequate with predictable case load of food insecure of 1.5 million people, even in a good year

HSNP response: Indigence-targeted cash transfers
But are cash transfers adequate given dynamics?

- Adequate for 'graduation' from poverty?
- Adequate to stem the downslide into indigence?

How do we do social protection in this context?

Let's look at the theory for insights on social protection & ideas for empirical identification of poverty traps
Theoretical insights on vulnerability & poverty traps (partial equilibrium)
How risk transfer contracts operate as social protection
The IBLI (index-based Livestock Insurance) project in Northern Kenya
Impact of insurance payments on coping and asset markets
Key Elements of Model

1. Heterogeneity in skills & abilities ($\alpha_i$) that is unrelated to risk aversion

2. Fixed costs barriers to moving ahead

$$f(\alpha_i, k_{it}) = \begin{cases} 
  f_L(\alpha_i, k_{it}) = \alpha_i k_{it}^{\gamma_L} & \text{under the low technology} \\
  f_H(\alpha_i, k_{it}) = \alpha_i k_{it}^{\gamma_H} - E & \text{under the high technology}
\end{cases}$$

3. Borrowing constraints (autarchic accumulation if move ahead)

$$c_{jt} \leq [f(\alpha_j, k_{jt}) + (1 - \delta)\theta_t k_{jt}]$$

$$i_{jt} = f(\alpha_j, k_{jt}) - c_{jt}$$

4. Negative asset shocks, but no insurance (formal or informal)

$$k_{it+1} = \theta_t [i_t + (1 - \delta)k_{it}]$$
Dynamic Choice Problem

\[
\max_{\xi, i} \mathbb{E}_\tau \sum_{t=\tau}^{\infty} \beta^{t-\tau} u(c_t)
\]

s.t. \( c_t \leq [f(\alpha, k_t) + (1-\delta)\theta_t k_t] \)

\[
i_t = f(\alpha, k_t) - c_t
\]

\[
k_{t+1} = \theta_t [i_t + (1-\delta)k_t]
\]

\( k_\tau \) given
Is There a Minimum Asset Threshold?
The Micawber Threshold & Chronic Poverty

Poverty Traps and Social Protection
1. Ex-post effects of realized shocks
   - Costly for all; irreversible effects for middle ability group

2. Ex-ante effects of risk (anticipation of shocks)
   - “sense of insecurity, of potential harm people must feel wary of—something bad can happen and ‘spell ruin,’ “ [Calvo and Dercon]
   - Isolate effect on Micawber Frontier (previous figure)
   - Effects again pronounced for middle ability group

3. Risk & shocks can thus increase unnecessary deprivation


5. This motivates search for social protection strategies
Partial equilibrium impacts include:

1. Smoothing effect
2. Shifting equilibrium effect
3. Shifting threshold effect
4. Vulnerability effect

General equilibrium/spillover benefits
Risk Transfer Contracts
Shifting threshold effect

Median Terminal Herd Size

Median With Insurance

Median Autarky

Initial Herd Size

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

M.R. Carter
Poverty Traps and Social Protection
Risk Transfer Contracts
Shifting vulnerability effect

Initial Herd Size vs. Probability of Collapse

- With Insurance
- Autarky
Risk Transfer Contracts
Self-targeting? Maybe not at actuarially fair prices
Is Risk Transfer Implementable?

In model, easy to create risk transfer, but what about in the real world?

Index-based Livestock Insurance (IBLI)

- NDVI-based predicted mortality index
- Moral hazard & adverse selection proof; Modest transactions costs
- Lottery pricing for smart subsidy design
- Rolled out with a HSNP cash transfer program

Let’s look briefly at IBLI & its impacts
Design of Index Insurance

NDVI (Feb 2009, Dekad 3)  ZNDVI: Deviation of NDVI from long-term average
Design of Index Insurance

Laisamis Cluster, zndvi (1982-2008)

NASA NDVI Image Produced By: USGS-EROS Data Center. Source: FEWS-NET
Design of Index Insurance

Figure 1: IBLI Index Readings and Color Legend

October 2010

- Green
  - Good Regime: Stable: Here, the division in question is within a good regime and is characterized as stable. This means that the forage conditions are above normal and are either improving or at least have not worsened over two consecutive months. Index readings do not relate to livestock mortality due to forage scarcity.

- Yellow
  - Good Regime Worsening: While the division in question is characterized by better than average forage cover over the past year, the situation has been consistently worsening within the past two months (that is, such that the past two months the forage situation has been better than the long-run average). Index readings do not relate to livestock mortality due to forage scarcity.

- Orange
  - Red Regime Moderate: The sum of forage available over the past year has dropped below the long-run average, however, while the division in question is under considerable stress, the model predicts less than 10% average livestock mortality. At these levels, the model is not as accurate in predicting losses as they are not yet extreme.

- Red
  - Red Regime Accurate: Average livestock deaths predicted to be between 10 and 15%. At this level, model predictions become more precise. The situation is quite serious but not yet classified as severe. Indemnity payout will not be triggered and individuals are expected to cater to the level of losses.

- Black
  - Red Regime Severe: The drought is now severe. Forage scarcity has been pronounced over a long period and greater than 15% of livestock in the area is predicted to have died. Indemnity payout will be triggered if conditions persist throughout the season up to the potential payout period.

March 2011

North Horr: 29%
Loiyangalani: 16%
Maikona: 31%
Central and Gadamoji: 22%
Laisamis: 19%

28 July - 12 August 2011
### Research Design & Results

#### No Cash Transfers

<table>
<thead>
<tr>
<th>Control Locations</th>
<th>HSNP Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSN Only</td>
<td>HSNP+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No Asset Insurance</th>
<th>Asset Insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Cash Transfers</td>
<td>Cash Transfers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insured</th>
<th>Uninsured</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qtr 3</td>
<td>Qtr 4</td>
<td>Qtr 3</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>Reduce the number of meals eaten each day</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>Rely more on food aid</td>
<td>88</td>
<td>50</td>
</tr>
<tr>
<td>Rely on assistance from others</td>
<td>39</td>
<td>22</td>
</tr>
<tr>
<td>Pull children otherwise in school, out of school</td>
<td>9.7</td>
<td>8.0</td>
</tr>
<tr>
<td>Sell livestock</td>
<td>39</td>
<td>18</td>
</tr>
<tr>
<td>Increase non-livestock activities like petty trade</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Send family members to look for work elsewhere</td>
<td>3.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Did not do anything different</td>
<td>24</td>
<td>8.8</td>
</tr>
</tbody>
</table>

*Note: DD* denotes statistical significance.*
Conclusions

1. In the absence of any social protection, much unnecessary poverty emerges because of weak initial endowments, bad luck, or both.

2. In this setting, standard social protection (cash transfers) may exhaust their budgets & have modest effects over the long run.

3. Risk transfer (in combination with other mechanisms—the 3 p’s of the World Bank’s new social protection strategy) appears promising.

4. Technical & uptake challenges are non-trivial.

5. Much still to learn from pilots and other approaches.


http://blip.tv/file/3757148