Social Protection in the Face of Climate Change: Targeting Principles and Financing Mechanisms

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Climate Change & Poverty Conference, World Bank

February 2015

Summary

- Shocks are a recognized driver of poverty
- Climate change, which increases the frequency & intensity of climatic shocks, threatens to make shocks an ever more important part of the poverty dynamics
- Against this backdrop, we ask two questions:
  1. How should social protection in the face of climate change be targeted or prioritized between the already destitute and those who are vulnerable to becoming destitute?
  2. How should social protection targeted at the vulnerable be financed: purely through a public budget or co-financed with premium contributions by the beneficiaries

Summary

- To gain purchase on these questions, we develop a theoretical model of risk, accumulation and insurance inspired by pastoral regions of the horn of Africa where climatic shocks already loom large and drive poverty
- Preliminary findings from the theoretical analysis are:
  - Gauged by standard poverty metrics, targeting some of a fixed social protection budget at the vulnerable can reduce 1^{st} and 2^{nd} degree poverty measures
  - A given social protection budget can be stretched by beneficiary-paid premiums for insurance that functions as a contingent social protection
  - However, insurance demand by the vulnerable is highly price elastic, implying limits to beneficiary self-financed social protection
- Our goal is to initiate a conversation about social protection in an era of climate change-fueled increases in the number & intensity of shocks

Outline

1. A Dynamic Model of Risk, Vulnerability & Long-term Poverty Dynamics
   - Core insights from a model with fixed human capital/capabilities
   - Endogenous human capital formation & the inter-generational transmission of poverty
2. Poverty Implications of Vulnerability-targeted Contingent Social Protection (VSP)
   - Standard social protection via means-tested CCT
   - Inter-temporal poverty tradeoffs if prioritize VSP over a CCT
3. Financing VSP to Reduce the Tradeoff
   - Implementing VSP via index insurance
   - Budget-stretching through beneficiary co-finance of VSP
   - Limitations of co-finance

Dynamic Model of Consumption & Accumulation in the Face of Risk

- Consider a multi-generation household dynasty i:
  - Enjoys initial endowments of physical assets (A_{i0}) and human capital (H_{i0})
  - Assets and human capital produce income using a low or high (fixed cost) technology
  - Assets are subject to random depreciation (mortality) shocks
  - Consumption cannot be more than cash on hand (value of income plus assets) as no borrowing is possible
  - Each generation lives 25 years
  - For now, assume human capital fixed across generations at H_{io}
  - In a moment, will allow human capital to be updated for each new generation, where updating sensitive to 'childhood' nutrition in the prior generation
- Mathematically:

Dynamic Model of Consumption & Accumulation in the Face of Risk

$$\max_{\underrightarrow{c}_{gt}} \quad E_\theta \left[\sum_{g=1}^{\infty} \sum_{t=1}^{25} u(c_{gt}) \right]$$

subject to :

$$c_{gt} \leq A_{igt} + f(A_{it}, H_{it})$$

$$f(A_{igt}, H_{igt}) = H_{igt} \max[A_{igt}^{\gamma^h}, A_{igt}^{\gamma^l}]$$

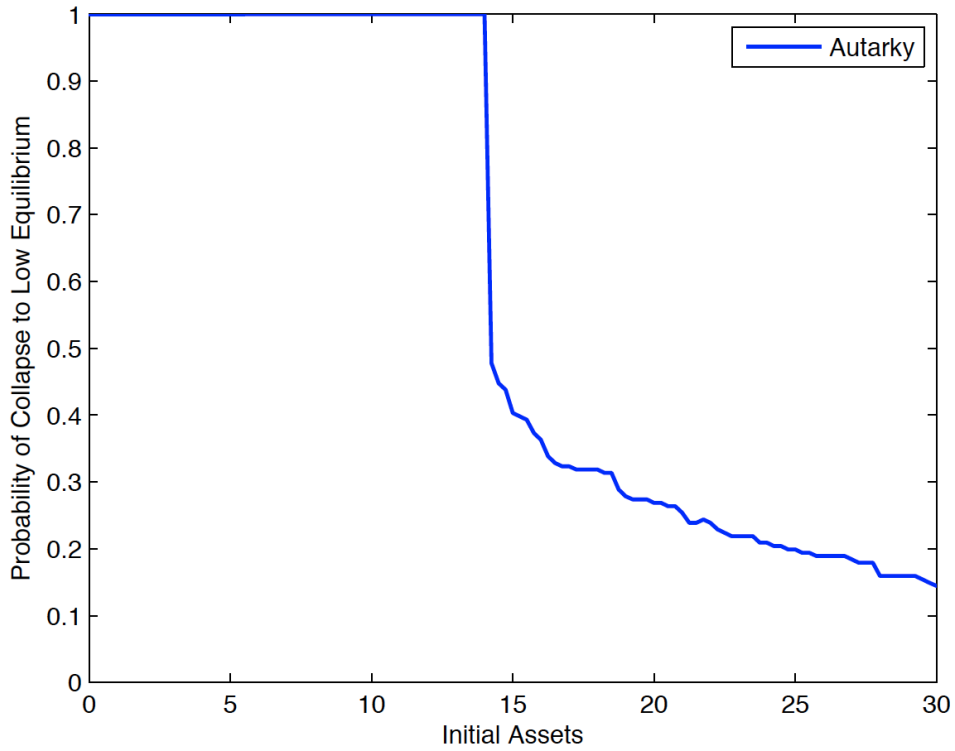
$$A_{igt+1} = f(A_{igt}, H_{igt}) - c_{gt} + (1 - \theta_{gt+1}) A_{igt}$$

$$H_{igt+1} = \bar{H}_{i0}$$

$$A_{igt} \geq 0$$

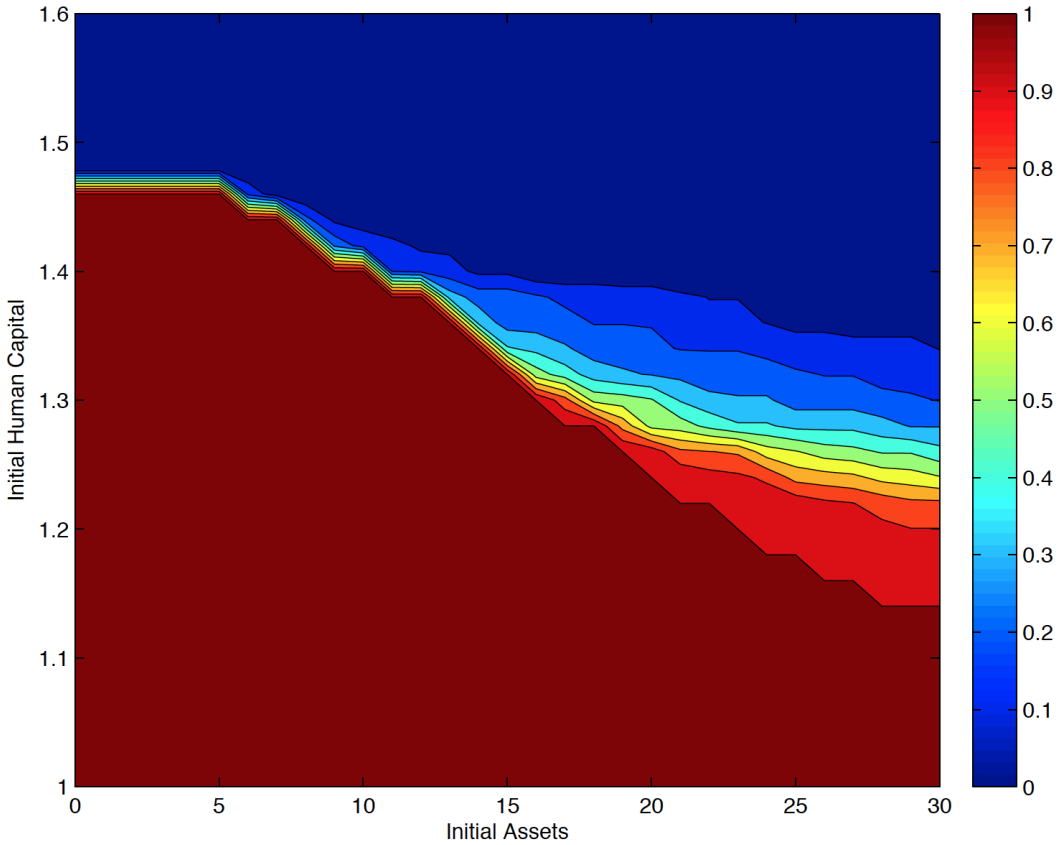
Dynamic Model (fixed human capital)

- Model admits 2 possible long-run equilibria:
- For each initial endowment pair (H_{i0}, A_{i0}), there is some probability that the dynasty will end up in 'chronic poverty' at the low equilibrium
- Fixing H_{io} at some intermediate level, see the following:



Dynamic Model (fixed human capital)

- More generally, if look across full endowment space see the following:



- For fixed human capital, partitions space into: Always poor; Never poor; and, Multiple equilibrium potentially poor

Dynamic Model (fixed human capital)

- Model has three key implications:
  1. *Irreversible Consequences*
     A shock that pushes a household below a critical asset level has irreversible consequences as the household becomes mired in chronic poverty.
  2. *Increasing Risk Moves the Chronic Poverty Map*
     Increasing risk raises the boundary dividing those with and without prospects for escaping chronic poverty. For a given asset distribution, this shift not only increases the number of individuals trapped in chronic poverty, but also increasing vulnerability.
  3. *Asset Smoothing by the Vulnerable*
     While households near either steady state will tend to smooth consumption, highly vulnerable households will cut consumption in an effort to preserve capital and avoid the collapse into chronic poverty.
- But, what are inter-generational consequences of asset smoothing?

Nutritionally Sensitive Inter-generational Transmission of Human Capital

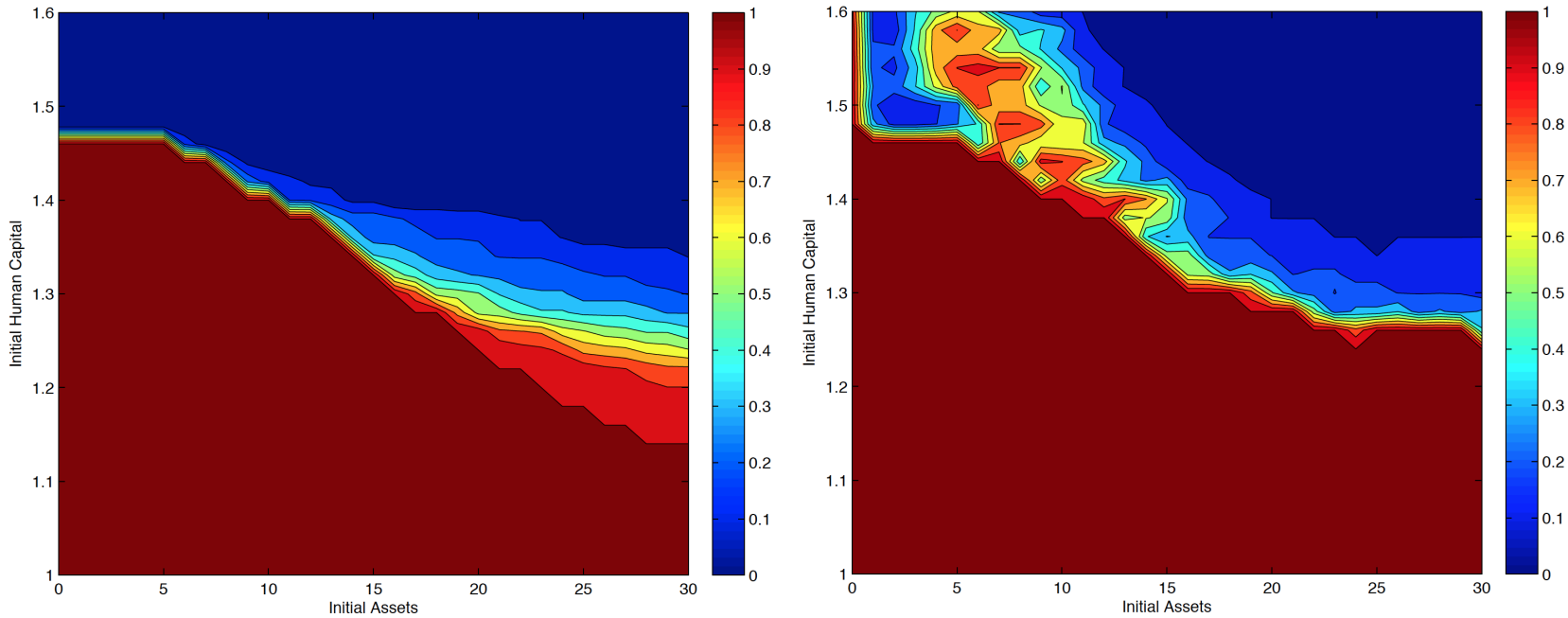
- Ample evidence that the 'First 1000 Days' matter for human potential
- Consider following equation of motion for human capital

$$H_{igt} = \begin{cases} H_{igt-1} \forall t \neq 1 \\ \left\{ wH_{i(g-1),25} + (1-w)\tilde{H} \right\} - \left\{ \lambda \sum_{t=1}^{5} 1(z > c_{i(g-1)t}) \left(\frac{(z - c_{i(g-1)t})}{z} \right)^2 \right\} \forall t = 1 \end{cases}$$

- The first term is curly brackets is the next generation's genetic potential expressed as a weighted average of the parent generation's human capital endowment and a random draw, $\tilde{H}$, from the overall population capabilities distribution ($E\left[\widetilde{H}\right] = 1.35$ in simulations)
- The second term in curly brackets is a penalty that pushes an individual below their genetic potential if they suffered consumption shortfalls in the first critical five years of life.

Dynamic Model (endogenous human capital)

- With endogenous human capital, many of the vulnerable, asset smoothers, collapse to chronic poverty



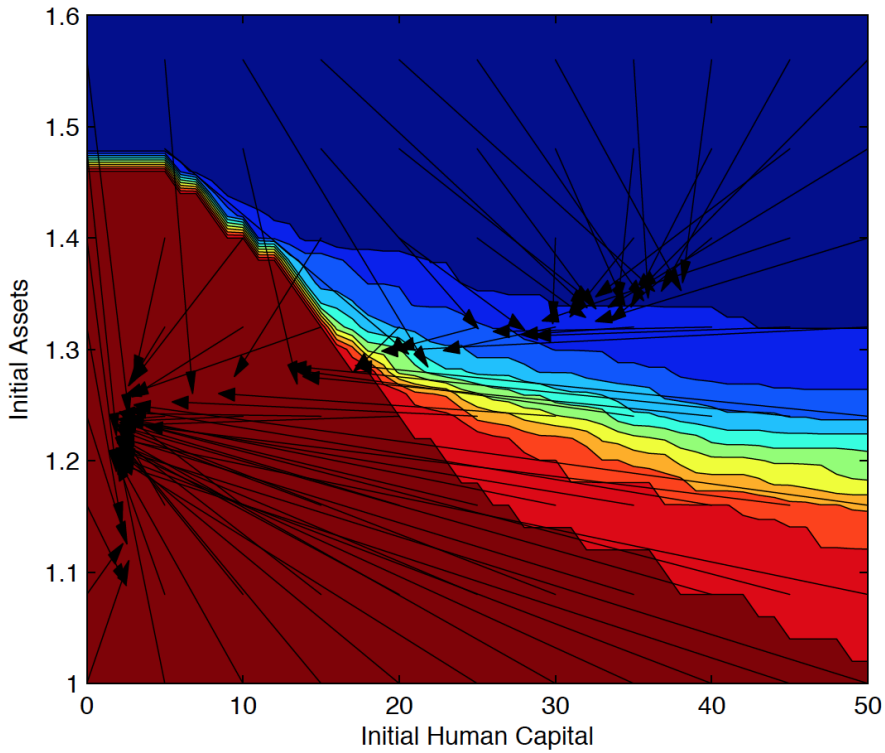
- Does not reflect short-sighted behavior as the alternative to asset smoothing is immediate collapse into poverty
- This outward shift in the long-term graduation frontier makes the descent of the vulnerable into destitution more common

Implications of Poverty Dynamics for Standard Social Protection

- Consider social protection through a standard 'CCT':
  - Needs-based and means-tested (only the poor qualify)
  - Transfers enough money to the destitute so that their children avoid the inter-generational nutrition shortfall penalty (assume conditionalities guarantee this expenditure)
  - Assume that government has sufficient funds to just raise all the initially poor above this nutritional poverty line, z
- What will be the long-run efficacy of this program using standard poverty measures as metrics of success

Implications of Poverty Dynamics for Social Protection

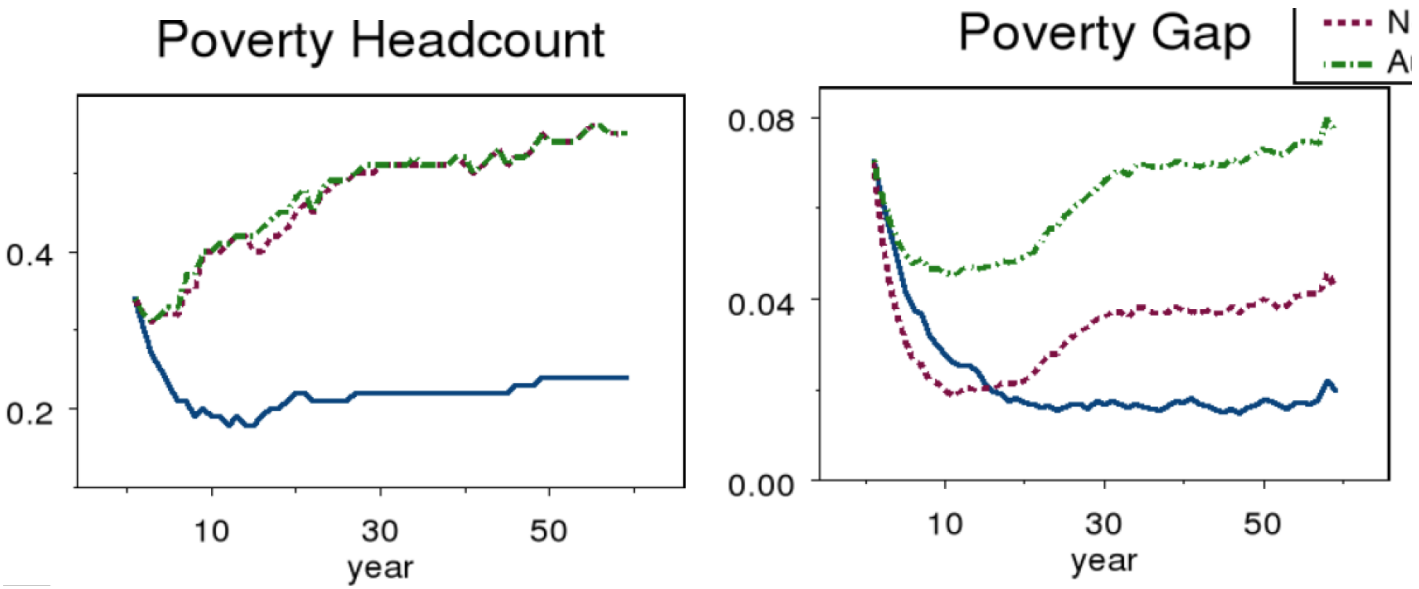
- Without social protection, see long-term deterioration of the human capital of the poor:



- With social protection, distribution of human capital will, ignoring dynamics, match that for the non-poor, opening up at least some probability of graduation

Implications of Poverty Dynamics for Social Protection

- Drawing on earlier work with Barrett and Ikegami, see the following evolutionary implications of poverty under standard social protection:



- where the dashed (red) line shows the evolution of poverty under the standard CCT

Implications of Poverty Dynamics for Social Protection

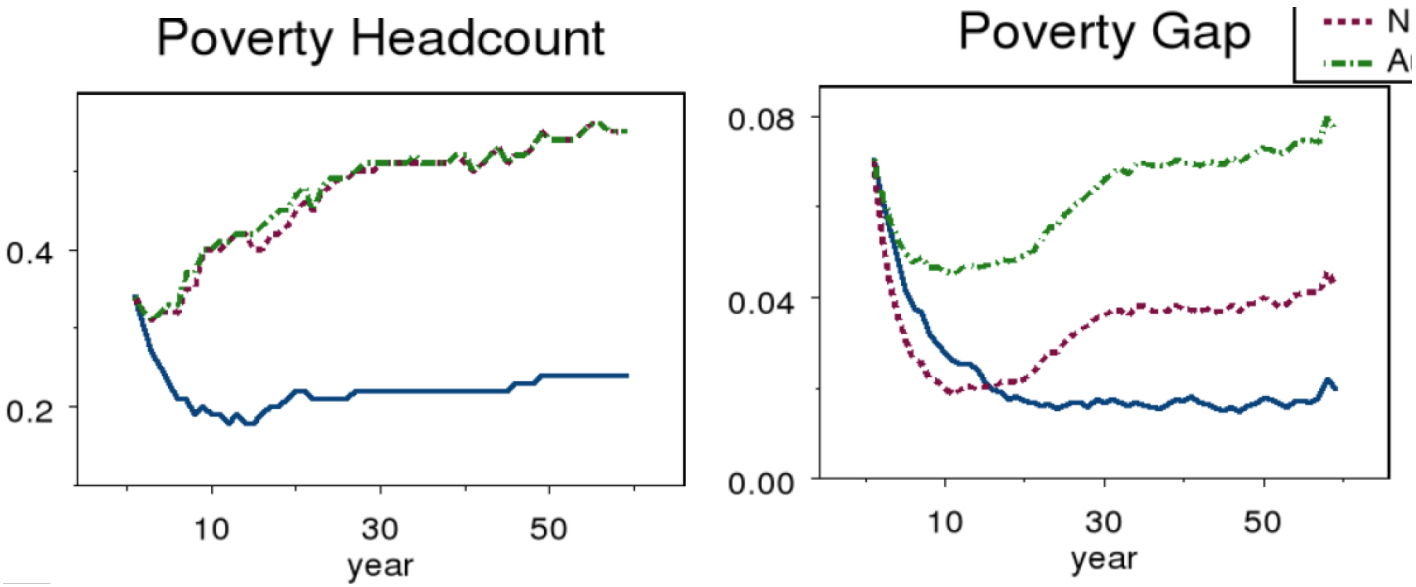
- Over time, dynamics drive more people into poverty, eventually offsetting the efficacy of the CCT as poverty gap grows
- This (preliminary) diagram does not capture graduations facilitated by the CCT
- But these graduations will no longer occur if the fixed budget will no longer cover transfers to avoid the nutritional penalty for the children of the chronically poor (as the number of transfer eligible poor grow)
- Could of course growth the social protection budget, but is there a better way?

Vulnerability-targeted Contingent Social Protection (VSP)

- The pernicious effects of the underlying system dynamics raises the question as to whether there can be a more effective deployment of the given social protection budget
- Consider a VSP scheme as one which:
  - Issues payments to the vulnerable anytime they are hit by a shock that could push them into chronic poverty
  - Prioritizes the vulnerable over the chronically poor (not advocating this, but just to make a point)

Vulnerability-targeted Contingent Social Protection

- Preliminary results based on the Barrett-Carter-Ikegami work (solid line is VSP priority regime)



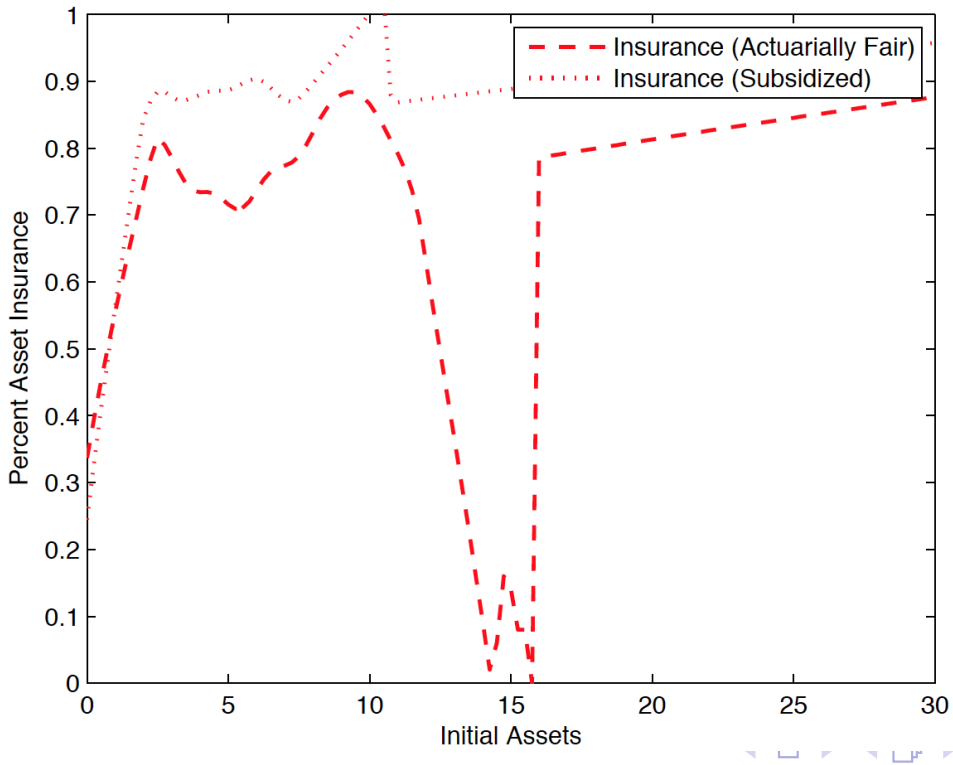
- Prioritizing VSP over the standard CCT works in the longer-term in terms of both poverty metrics,
- But in the short term it comes at the cost of intensified poverty for the chronically poor
- Can we avoid this tradeoff by using a mixed model of public and beneficiary finance?

VSP as Insurance

- In principal, contingent social protection is essentially an insurance contract that pays off in moments of need
- As already seen, such insurance can break the descent into poverty for the vulnerable
- Given these large private gains from contingent social protection, and the tradeoff implied for the poverty gap when budget is redirected from a CCT to a VSP, might it be possible for the vulnerable to pay for their own social protection
- To explore the willingness of the vulnerable to pay for this protection, we explore the pattern of demand for an index insurance contract set up to mimic a CSP
- In particular, will explore an implementable index insurance contract that pays off any time a covariant shock occurs (idiosyncratic shocks do not trigger payments, exposing the vulnerable to 'basis risk')

VSP as Insurance

- Drawing on related work, we explore the willingness of the vulnerable to purchase insurance
- Look only at household with an average level of human capital
- Despite the large inter-temporal gains to insurance for the vulnerable, we surprisingly discover that their willingness to purchase insurance at market prices is modest:

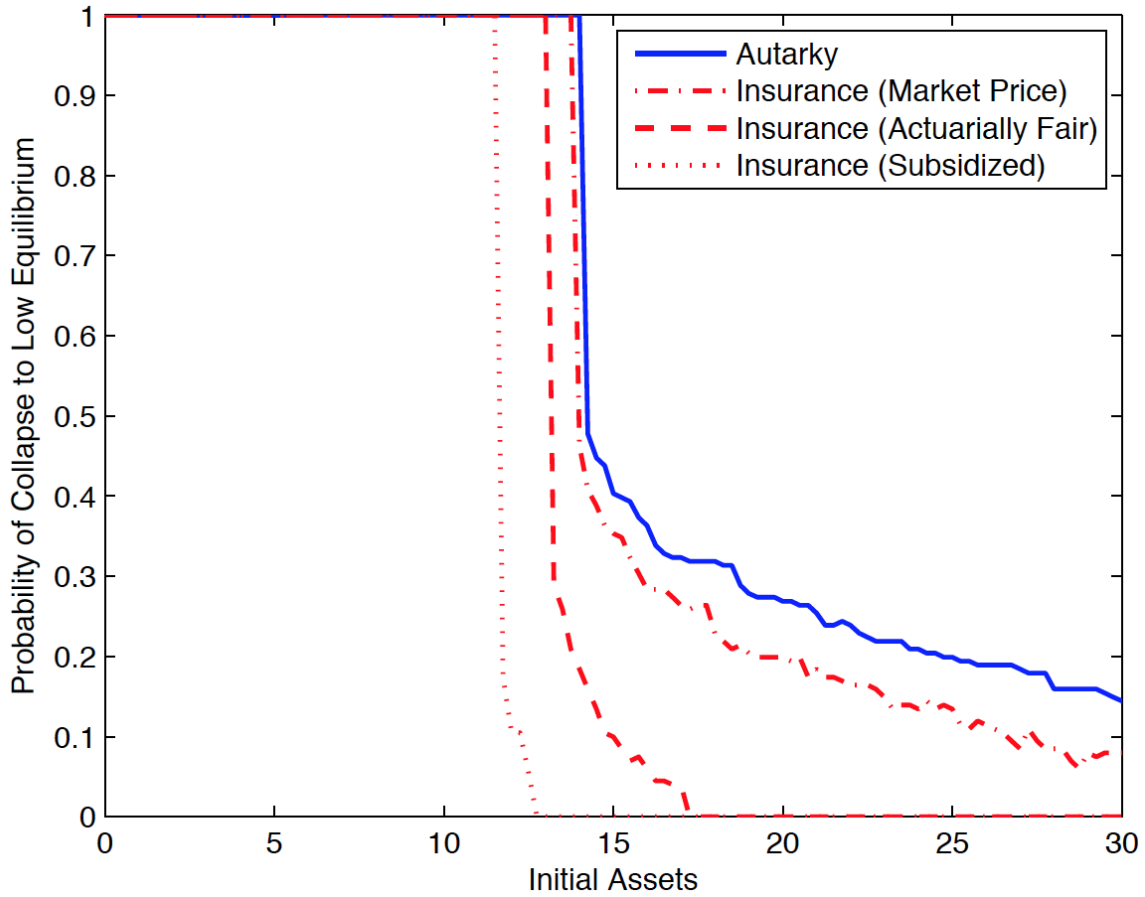


VSP as Insurance

- Surprisingly low demand by vulnerable happens because despite the fact that insurance is most valuable for this group, so is cash as a unit of insurance purchased comes at the cost of assets that also reduce vulnerability
- Indeed, insurance makes assets even more valuable

VSP as Insurance

- Several things to note:
  - Vulnerable pursue a 'mixed strategy' and do purchase insurance once they move away from the critical frontier
  - See this in the reduction in probability of chronic poverty



VSP as Insurance

- Because the problem is liquidity, not the value of insurance, it turns out the insurance demand of the vulnerable is quite price responsive
- Further work will explore the optimal allocation (in terms of poverty metrics) of our fixed budget between a CCT and partially funding a VSP via a partial insurance subsidy
- Governments of Kenya and Ethiopia, in collaboration with the Bank's AIDP program, are investigating this kind of mixed public-private finance for social protection

Conclusion

- Weather & other shocks may be an important driver of poverty
- Coping strategies of the vulnerable are partially effective in the short-term, but may fail in the longer-term as the consequences of reduced nutrition are transmitted through to the next generation
- Logic of contingent social protection for the vulnerable is clear:
  - Prevent the growth of the number of destitute (which crowds the social protection budget & increases the poverty gap)
  - Reduce the inter-generational transmission of poverty caused by asset smoothing
- Insurance can in principal serve at least a partially self-financed form of social protection for the vulnerable
- Need to still flesh out the sensitivity of optimal policy to risk environment
- There are also challenges to making insurance work, but that is a topic that merits its own discussion

Thank you!