Can Asset Transfer & Asset Protection Policies Alter Poverty Dynamics in Northern Kenya?

A proposal for a Randomized Evaluation of an Integrated Graduation and Contingent Social Protection Program

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Pastoralist and agro-pastoralist households in northern Kenya are vulnerable to natural disasters and to climate change.[1] Seven droughts struck Kenya between 1992 and 2012. In the worst of these droughts, households lost upwards of 50% of their productive wealth over the course of a few months. Overall, damages from the droughts that occurred between 2008 and 2012 are estimated to have cost 12.4 billion USD.[2]

The human and economic consequences of shocks of this magnitude are potentially enormous. Raising the stakes further is the accumulating evidence that severe losses in this region may be irreversible in the sense that recovery does not take place and households remain impoverished, unable to move forward after a severe drought event that pushes them below a critical minimum wealth threshold.[3] Even if this 'poverty trap' theory of zero resilience below a threshold is not strictly true, there can be no doubt that the accumulating costs as families struggle to recover are substantial, including lost human capital accumulation as nutritional and educational expenditures are cut.[4]

In this kind of environment, it would not be surprising to consistently find large numbers of severely food insecure households. Indeed, it is the large and predictable need for food aid every year in Northern Kenya that motivated the Kenyan government in 2008 to launch a regular cash transfer program (the Hunger Safety Net Program, or HSNP) targeted at indigent households (Hurrel & Sabates-Wheeler, 2013). HSNP transfers were intended to relieve the immediate suffering of those who had fallen into indigence, rather than address its root causes. Consistent with this intention, the impact evaluation of the HSNP by Hurrell and Sabates-Wheeler (2013) finds that while transfers allowed recipient households to economically tread water (even as their untreated neighbors sunk under the weight of continuing shocks), the transfers did little to help recipient households craft a pathway from poverty.

Similar to other countries that have found that cash transfers alone are insufficient to alter poverty dynamics, Kenya is now looking to construct a more comprehensive social protection system that can not only address the symptoms of poverty, but also address its causes and thereby reducing the extent and depth of poverty. In risk-prone areas like the pastoral regions of Northern Kenya, achieving this goal logically requires a system that:

- Promotes the "graduation" of poor households from poverty and their ascent to higher levels of economic wellbeing; and,

[1] Catley, Lind, & Scoones, 2013; McPeak, Little, & Doss, 2011.
[2] Government of Kenya, 2012.
[3] A number of empirical studies have demonstrated the existence of poverty traps and nonlinear asset dynamics in northern Kenya and southern Ethiopia, and the extreme difficulty for households to recover or accumulate assets once they have fallen below a critical livestock threshold (for example, see Lybbert et al., 2004). The existence of this asset threshold is related, among others, to herd size management and credit constraints (Toth, 2014).
[4] As Janzen and Carter (2013) note, models both with and without poverty traps indicate that vulnerable households will reduce consumption to preserve assets in the face of shocks. The impacts of such asset protection strategies on the intergenerational transmission of poverty are explored further by Carter and Janzen (2015).

- Protects non-poor, but vulnerable households from descent into poverty (including recent graduates).

Two recent pilot programs in Northern Kenya provide building blocks for an integrated social protection policy that can potentially alter poverty dynamics in these ways:

1. *The Rural Entrepreneur Access Project (REAP) Graduation Program:* Related to BRAC's ultra-poor program,[5] the REAP program was introduced in the region in 2011 by the NGO BOMA. The program provides beneficiaries with a package of financial and business education, confidence building and coaching, and culminates with a business asset transfer. By simultaneously increasing human capital, psychological assets and physical assets, REAP is hypothesized to create a large and permanent change in the economic well-being of poor households.

2. *Index-based Livestock Insurance (IBLI):* First introduced in 2009, the IBLI index insurance program created a mechanism that triggers payments to insured individuals contingent on remote sensing indicators of forage scarcity and livestock mortality. While not freely provided to households, IBLI is hypothesized to prevent downward descent by vulnerable households by helping families hold on to valuable assets and sustain their investments in their children even in the face of drought conditions; and, to promote upward ascent by making it more likely that families will not loose the productive assets in which they invest.

The impacts of both the REAP and IBLI programs have been separately analyzed. Gobin, Santos and Toth (2016) find that REAP generates impressive medium-term income impacts of 30%, a figure that is in line with other studies on graduation programs (see note 5). Less clear is whether these gains can be sustained, especially in risk-prone environments like northern Kenya where periodic shocks can almost overnight eliminate hard fought improvements. Analyzing the impacts of IBLI, Janzen and Carter (2016), show that insurance payments allowed households struck by severe drought in 2011 to hold on to more of their assets and better feed their families (preventing descent). In a separate analysis, Jensen *et al*. (2014) find evidence that IBLI insurance boosts investment (primarily in the quality if not the quantity of livestock). While these studies confirm important elements of the IBLI hypothesis, it is far from clear that the investment incentive effects of IBLI are sufficient by themselves to help destitute households accumulate assets and improve their well-being substantially.

While both programs have demonstrated effectiveness in isolation, they also would seem to offer important complementarities. Note that some of these complementarities are at the household level (*e.g.,* a household with both REAP and IBLI can be hypothesized to do better over the medium to long term than a household that had only one program or the other), whereas others are at the community level (*e.g.*, a community with both program can be hypothesized to have lower poverty headcounts and poverty gaps than an area with only one program). The primary goal of the research put forward here is to investigate the impacts of these programs—alone and in combination—at the level of individual household outcomes as well as in terms of local poverty measures.

[5] Bannerjee *et al.* (2015) summarize evaluations of graduation programs that span both middle and low-income countries. In a study that spanned 7 years, Bandiera et al. (2017) find that the impacts of the BRAC graduation program in Bangladesh were deep and long-lasting.

A second research goal is to understand the density with which graduation programs like REAP need to be offered. Graduation programs are not inexpensive to implement, and there is good reason to believe that some of their benefits spillover to women and families who do not directly participate in the program. The proposed research design thus takes a "saturation" approach that will allow us to measure spillovers and determine the most cost-effective density at which to offer a graduation program like REAP.

The third and final goal of this research—contingent on obtaining additional funding—is to explore the relative effectiveness of alternative mechanisms for delivering contingent payments to poor and vulnerable households in the wake of drought. Insurance contracts, like IBLI, are one way of delivering such contingent payments using a pre-financing mechanism in which costs can be shared between the public sector (insurance subsidies) and insured households. A second way to deliver those payments is through a scalable social protection program that increases the level and extent of cash transfer payments contingent on an index of drought pressure, such as forage scarcity.

The HSNP program is being expanded to include scaling of exactly this sort. Unlike insurance-based payments, the cost of this program is carried entirely by the public sector. Also unlike insurance, coverage levels cannot be adjusted at the margin by households that make investments and desire additional coverage. On the other hand, scalable social protection does not require investments by households, potentially offering greater coverage to the poor and vulnerable. As detailed later, the piloting of scalable social protection under HSNP may allow us the opportunity to evaluate the efficacy of this program versus insurance-based system of contingent payments.

The remainder of this proposal is organized as follows. Section 1 provides a summary of the economic theory that underlies the proposed research design and the hypothesized household and community level synergies between graduation and contingent transfer programs. Section 2 lays out the basic research design and the econometric models it is designed to support. This section also includes detailed descriptions of the interventions and presents basic power calculations. Section 3 discusses specific implementation challenges in terms of the placement and availability of government programs and lays out a timeline for the work. Finally, Section 4 summarizes.

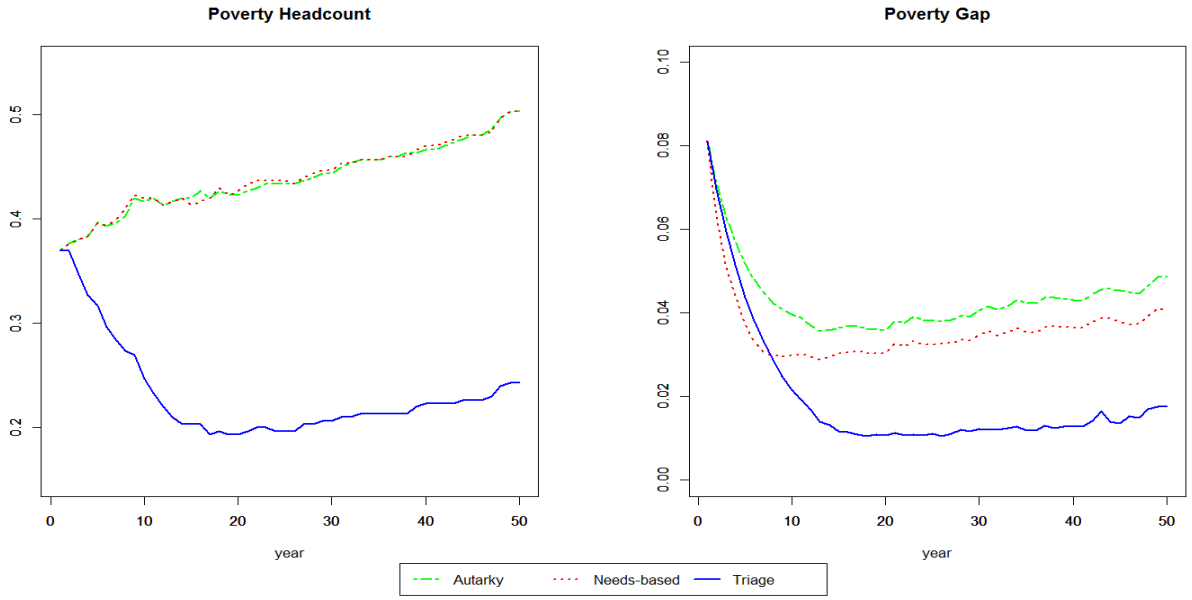
Section 1: Theoretical Perspectives on Social Protection and Poverty Dynamics in Risk-exposed Regions

This section draws on several recent theoretical papers that suggest a series of hypotheses about how and why asset transfers and contingent cash transfers work and interact with each other. In a paper that is especially relevant to the study proposed here, Ikegami *et al.* (2016) develop a dynamic economic model intended to mimic the economic and climatic structure of northern Kenya. Assuming that households are risk averse and choose levels of consumption and investment in order to maximize their stream of economic well-being, these authors explore how poverty evolves at the household and community levels under two alternative social protection regimes. The first regime is a standard, means tested cash transfer regime in which a fixed annual social protection budget is allocated with priority to the poorest households. The second regime is one in which the same social protection budget is allocated first to the vulnerable non-poor who have suffered shocks. After these contingent transfers are paid, any remaining budget is allocated as asset transfers that promote the graduation of the

potentially viable indigent households.[6] Finally, any remaining budget funds conventional cash transfers to remaining poor households. Because of this 3-level prioritization of social protection expenditures, the authors label this second regime a 'triage' policy.

While Ikegami *et al.* do not present this harsh, second regime as a serious policy proposal, their analysis does draw out how and over what time frame a reprograming of social protection expenditures alters poverty dynamics. Figure 1, taken from the Ikegami *et al.* paper, contrasts how the extent and depth of severe poverty evolve over time under the standard and triage policies. The solid, blue lines in the two graphs represent the evolution over time of poverty headcount and poverty gap measures under the triage policy, while the dashed curve represents those same measures for the standard means-tested transfers only regime. The available budget is fixed at the same level for both policies and is held constant over time.

Figure 1. Simulated Poverty Dynamics



In these simulations, the needs-based transfers are set to carry their beneficiaries to the poverty threshold, so that the population of poor grows as stochastic shocks drive new vulnerable households into poverty. As can be seen, over the long-term the triage policy—for the same total budget—outperforms the standard regime, as both the extent and depth of long-term poverty are lower under the triage policy that simultaneously ensures the welfare of the vulnerable and promotes the indigent. Allocating some social protection funds to protecting the vulnerable and assisting graduation creates a more favorable poverty dynamic and eventually eliminates what Ikegami *et al*. call unnecessary poverty or deprivation. Somewhat ironically, their analysis shows that in an environment where risk blunts graduation and spurs drives descent into poverty, the poor are *eventually* better off with a policy that

[6] In the Ikegami *et al.* model, household skills and ability complement accumulable productive capital. Households with too low a skill level lack the potential to become non-poor.

does not prioritize their well-being. Put differently, the standard policy that prioritizes the well-being of the already poor silently creates a tradeoff between the present and the future well-being of the poor.

This silent tradeoff occurs because the standard policy addresses the consequences, but not the root causes of poverty. However, the triage policy itself also presents a stark inter-temporal tradeoff. As can be seen in Figure 1, the poverty gap is lower under the standard than under the triage policy for the first 9 years of the simulation. Given this tradeoff, it becomes all the more important to ask if it is possible to tweak the triage policy such that its impacts increase and its costs are reduced.

In a second paper, Janzen, Carter and Ikegami (2016) explore whether the contingent transfers that underpin the triage policy can be more effectively and cost-effectively implemented through an insurance mechanism. The Ikegami *et al*. results illustrated in Figure 1 assume that the contingent transfers do not induce any increased investment on the part of the poor and the vulnerable.[7] In contrast, using the same model, Janzen and her co-authors show that the availability of insurance contracts optimally induces more investment and by itself spurs some graduation. In addition, similar to contingent payments, insurance payouts break the descent of vulnerable households into indigence.

In addition to this behavioral difference, another notable difference between contingent transfers and insurance is that the latter can at least in principal be paid for by its beneficiaries. While this would seem to open up needed space in the social protection budget for transfers to the indigent poor, Janzen *et al.* show that vulnerable households—who seemingly have the most to gain from insurance—will optimally buy little insurance when it is sold at full market cost. They also show, however, that these same households are very responsive to subsidies, increasing insurance purchase substantially when a 50% subsidy is offered.

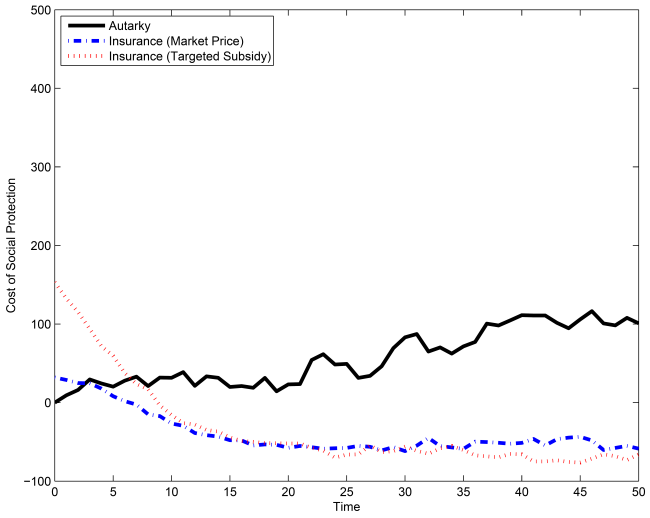
Janzen *et al.* then go on to analyze how a mixed model of contingent social protection would operate, with the government paying half the cost of insurance and households paying the balance. Figure 2 graphs the results of their analysis. Unlike the analysis in the Ikegami *et al.* paper, Janzen and co-authors do not include pro-graduation asset transfers. Instead they simply compare how much the government would have to pay over time to close the poverty gap for all households absent insurance versus how much the government would in total pay in insurance subsidies plus in standard social protection transfers needed to close the poverty gap.

The black, solid line in Figure 2 shows the evolution of expenditure under the standard (no insurance) policy. As can be seen, those expenditures steadily mount over time as the lack of graduation from poverty, and new entrants into poverty, drive up the caseload of indigent households. The red dotted line shows the full cost of the insurance-based policy (standard cash transfers integrated with a subsidized, insurance-based contingent transfer regime). As can be seen, there is an intertemporal budget tradeoff. In the early years of the simulation, total public social expenditures are higher under the insurance-augmented regime. By year 7 of the simulation and thereafter, however, total expenditures are lower under this regime. The reason behind this saving is that the insurance operates both to stem the downflow of new entrants into poverty and also incentivizes accumulation and

[7] The Ikegami *et al.* analysis does consider what happens when transfers are anticipated and shows that results are largely perverse, encouraging accumulation by a few, but largely discouraging it for vulnerable households who brake their accumulation in order to maintain their eligibility for contingent transfers.

graduation from poverty by some of the initially poor households. Interestingly, this simulation does not include any asset transfers, and the assent from poverty is driven purely by the fact that insurance enhances investment incentives. Overall, the discounted present value of all social protection expenditures is modestly lower under the insurance scheme and the poverty gap is closed every year for all poor households. Under this policy, there is no inter-temporal tradeoff in the well-being of the poor.

Figure 2. Cost efficiency of insurance-based contingent social protection



To summarize, the theory of integrated social protection for high-risk environments, such as Northern Kenya offers two key insights:

- Failure to allocate some social protection resources to programs that promote ascent and block descent creates a silent tradeoff between the well-being of the present and the future poor. In this regard, policies that promote ascent and prevent descent are natural allies and should result in not only more sustainable graduation, but also lower aggregate poverty rates in the future.

- The form in which contingent transfers to the vulnerable are made may matter a lot. Simple contingent cash transfers may fail to incentivize accumulation and income growth for poor households. In contrast, subsidized insurance may not only break the downfall of the vulnerable into poverty, but also create better incentives for investment and income growth amongst both poor and vulnerable non-poor households. They also require less resources from public social protection funds as recipient households are required to make some positive contributions.

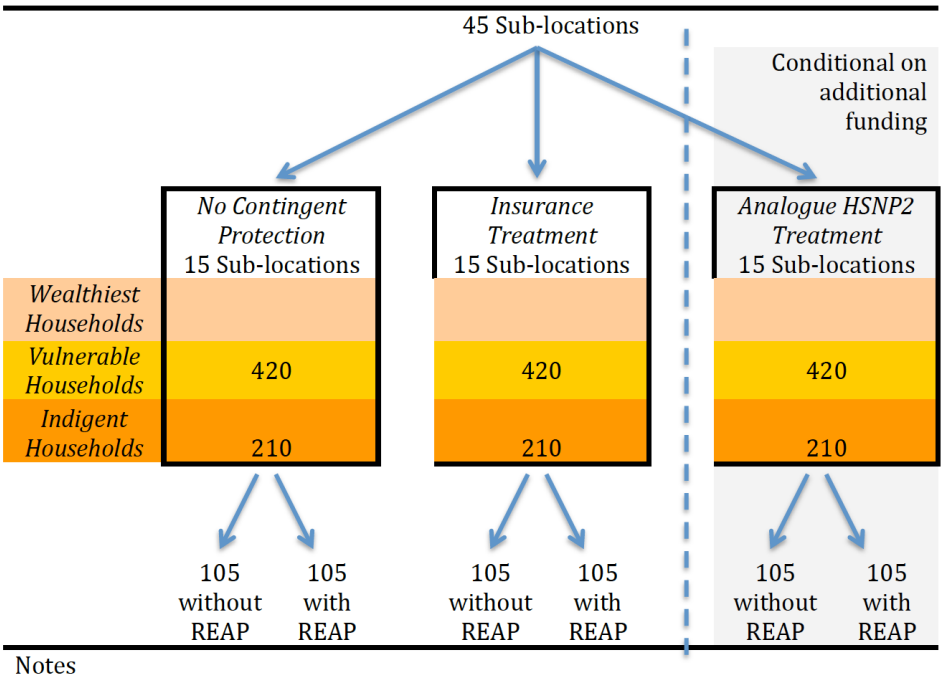
While provocative, these insights remain theoretical hypotheses. But they do highlight the critical importance of empirically testing them so as to provide the evidence base for cost-effective social protection schemes that can fundamentally alter poverty dynamics. The remainder of this proposal outlines our approach to answering this important question.

Section 2: Research Design and Statistical Approach

In order to study the impacts of different social protection policies on poverty dynamics, we will randomize REAP treatments among the poor and insurance treatments across the vulnerable, and track the economic well-being of households over time. Figure 3 sketches the overall research design. A set of 45 comparable sublocations in the pastoral regions of northern Kenya will be identified and allocated to one of three treatment blocs:

1. Those with no contingent social protection program;
2. Those with insurance-based contingent social protection; and,
3. Those with a contingent cash transfer scheme [subject to budget availability].

Figure 3. Research Design



Notes

- Working with BOMA, we will select 30 [45] Sub-locations in Samburu district and after pairwise {triplet] matching, these will be randomly assigned to the No Contingent Protection Treatment & the Insurance Treatment {& the HSNP2 treatment]
- Indigent households are those located in the first quartile of the local income distribution and are eligible for the REAP graduation program
- Vulnerable households are those located in the second and third quartiles of the local income distribution (Q2 eligible for Hsnp2)
- 50% of REAP-eligible indigent households will be randomly selected using a variable saturation strategy. With 60 women eligible in each Sub-location, we will randomly assign each Sub-location in each treatment arm to one of the following REAP saturation rates:
  - 5 get 5% saturation (3/60 offered REAP)
  - 2 get 25% saturation (15/60 offered REAP)
  - 1 gets 50% saturation (30/60 offered REAP)
  - 2 get 75% saturation 45/60 offered REAP)
  - 5 get 95% saturation (57/60 offered REAP)

The REAP treatment arms will be designated within each block according to the following process. Within each sublocation, a wealth ranking exercise will divide households into economic well-being quartiles.[8] In each sublocation, a random sample of 14 households will be randomly selected from each of the bottom 3 quartiles. Only households in the lowest quartile are eligible for the REAP graduation program and half of the sampled households in this lowest quartile will be randomly selected for inclusion in the graduation program. The offer of the graduation program will follow either a fixed saturation design (half of all eligible in all sublocations will be offered the program) or a variable saturation design (half of all eligible will be offered the program but the number of graduation program offers will vary by community in order to permit the study of spillovers of the graduation program).

2.1 Interventions to Be Evaluated

The following section provides a more detailed description of each intervention as well as the most relevant research questions in relation to them.

REAP Graduation Program

As mentioned in the introduction, the NGO BOMA has implemented a graduation intervention in the Kenyan ASALs following a model relatively similar to the BRAC interventions described in footnote 5 above. BOMA's REAP (Rural Entrepreneur Access Project), provides a support package consisting in cash grants for micro-enterprise start-up run by small women groups, as well as intense one-on-one mentoring. Concretely, the Poverty Graduation program targets the most vulnerable women in a given village and helps them to establish a sustainable income and savings through a two-year program of sequenced interventions:

1. Targeting of participants for the development of three-woman business groups;
2. Consumption support for six months;
3. Two years of mentoring;
4. Business skills training;
5. A seed capital jump grant of $US 150 to start the business;
6. Savings group training and a $US 50 progress grant (if the business remains in operation); and,
7. Access to credit through membership in savings groups

The objective of the Poverty Graduation program is to address three constraints faced by the poorest households in the ASALs: low income, irregular cash flows, and scare access to financial services. The goal is to lift households out of extreme poverty in two years, i.e. for graduating women to be able to face basic needs such as accessing food security, paying education and medical expenditures, and building a small saving base. According to the BOMA management team, the total cost per-beneficiary is approximately 36,000 KhS ($350) for the two-year intervention.

[8] In Marsabit, HSNP recently conducted a targeting exercise that classified households into wealth quartile. For the intended research areas in Samburu, the study will not benefit from the HSNP targeting system. Consequently, the study will need to mimic the HSNP targeting exercise (which will be conducted again in April 2017) in order to perform meaningful comparisons by wealth quartile. We will sample among the full population then to go through the HSNP community targeting process and retrospectively use our baseline survey to perform the Proxy Means Testing (PMT) and accordingly classify households into their respective quartiles. This method would avoid a costly, full targeting exercise in the two non-HSNP counties.

While the price of this intervention is somewhat modest compared to continuing cash transfers, the cost and intensity of the REAP and other graduation program raises the question as about how to lower its cost and more rapidly spread its benefits. If the benefits of programs like REAP emanate from their intensive mentoring, which bolsters confidence, raises hope and aspirations and more generally boosts what might be termed the psychological and attitudinal assets, then it becomes important to ask whether this boost in psychological assets can spillover locally from treated women to their friends and acquaintances. Evidence supporting the idea that aspirations and hope can spillover comes from a study of a somewhat similar program in Nicaragua by Macours and Vakis (2013). Those two authors find substantial spillover in aspirations and hope within communities. If this is correct, then the degree of such spillovers within a community might be expected to increase with the number of women within a community who participate in a graduation program. Defining the graduation saturation rate as the fraction of poor women in a community treated by the REAP program, a finding that the spillover benefits from treated to non-treated women are substantial at, say, a 25% saturation rate would have major implications for the design of cost-effective graduation scheme. In the research design summarized below, we propose to identify the extent of these spillover benefits from treated to non-treated households.

Contingent transfers via insurance: IBLI

IBLI has been piloted in Marsabit since 2010 as a contingent safety net intervention, with the objective of compensating pastoralists for livestock losses related to droughts.[9] The insurance relies on an NDVI satellite index to measure lack of pasture, predict animal losses and make insurance payments. Since its inception, IBLI has expanded to include five additional counties in Kenya—Isiolo (August 2013), Wajir (August 2013), Garrisa (January 2015), Mandera (January 2016), Tana River (January 2017)—and the Borena Zone of Ethiopia (August 2012).

Findings from various studies suggest that IBLI has the potential to alter poverty dynamics by preventing descent and promoting ascent of poor households. [10] These important impacts found coupled with the low demand for the commercial product suggest an opportunity for public support in the form of premium subsidies as well as other institutional and policy support.

In response to the need for a cost effective approach to social protection and the research around IBLI, the Government of Kenya recently launched the Kenya Livestock Insurance Program (KLIP), which an initiative aimed at protecting the livestock assets of the vulnerable. Initiated in Wajir and Turkana counties in October 2015 and offering coverage to 2,500 households in each county, KLIP provides targeted households with free insurance cover of 5 Tropical Livestock Units (TLU). The program has scaled up to 2,500 households in Marsabit, 2,500 households in Tana River, 2,000 households in Isiolo and 2,000 households in Mandera counties in October 2016 and announced intentions to scale up to 2,000 households in each of Baringo, Garrissa, Samburu, and West Pokot counties by October 2017. The design of the KLIP insurance product is similar to the IBLI design, functioning as an asset protection scheme that makes indemnity payments during droughts. Beneficiary households are not the poorest (eligibility requires owning 5 TLU) but the vulnerable, located approximately at the critical asset

[9] Chantarat, Mude, Barrett, & Carter, 2013.
[10] Jensen, Barrett, & Mude, 2014; Janzen & Carter, 2013.

threshold identified in empirical studies (see previous section). Beyond the 5 TLU freely insured, households are allowed to buy additional coverage at commercial or partially subsidized price. Those households are not eligible for any KLIP subsidies, but can purchase insurance at commercial rates.

KLIP provides free insurance for 5 TLUs, but does not provide any insurance beyond this 5 TLUs threshold. This design creates a very steep price gradient, with the marginal price of additional insurance jumping from 0 to the commercial price when reaching 5 TLU. This step increase does not take sufficiently into account poverty dynamics and deters insurance purchase for all types of households—especially vulnerable households (see Janzen et al., 2016). While insurance generally gives incentives to households to realize productive investments, such a price structure is unlikely to achieve this objective.

This research will examine an alternative support scheme. At the heart of this alternative scheme is a smoother, less discriminatory rate of subsidy on individually scalable contingent social protection. This design, which we call "Insurance with smooth subsidies" (ISS), would provide a level of insurance that households can adjust to their level of TLU holding. The level of subsidies is progressively phased out in order to avoid a discouragement effect introduced by the jump at 5 TLUs discussed for KLIP.

The ISS scheme would be available for all households in the first, second and third wealth quartile, in order to avoid exclusion of the poorest households which need to protect their nascent asset base. This feature makes the ISS easy to integrate with the REAP intervention in order to generate possible synergies between the two interventions. The exact pricing structure of the ISS will be subject to future discussions, but several options are considered, which gradually phase out the level of subsidies provided on each TLU with additional TLU coverage purchased. The randomization of the ISS intervention will be performed at the community level.

Contingent transfers via cash payments, HSNP2

The original HSNP program was launched in 2009 by the Government of Kenya with support from DfID. It provided about 70,000 households with unconditional bi-monthly cash transfers of between 2,150 and 3,500 KSh in four northern districts of Kenya (Marsabit, Mandera, Turkana and Wajir).[11] The objective of this program was to help households meet their immediate consumption needs and improve their future livelihoods. HSNP was found to reduce poverty and improve asset accumulation, health and education, although with heterogeneity among poor and non-poor.[12] This suggests a potential for integrated social protection that combines multiple policy instruments to better account for poverty dynamics to best meet the needs of the poor and non-poor.

Building on the experience of IBLI and HSNP pilot programs, the Government of Kenya has moved to a scaled-up, targeted program which provides cash transfers to the poorest households and drought-contingent cash transfers to the vulnerable. HSNP-2 was launched in 2013 by the Government of Kenya, with support from DfID and the Australian Department of Foreign Affairs and Trade, covering 100,000 chronically poor households. Proxy Means Test (PMT) targeting was combined with a community targeting exercise to select beneficiary households who now receive 4,900 KSh bi-monthly (about 50

[11] The transfer amount changed during the duration of the program to reflect inflation and worsening environmental conditions.

[12] Jensen, Barrett, & Mude, 2014; Merttens et al., 2013.

USD). An innovation of the HSNP-2 program is the addition of drought-contingent scalable transfers at the extensive margin, meaning the non-indigent vulnerable, became eligible for transfers when triggered by a drought event.

Although HSNP-1 style unconditional cash transfers have been studied extensively, contingent cash transfers, which are generally associated with ad-hock humanitarian interventions, are much less well studied. The gap in research results mainly from ethical issues associated with developing a strong research design that could affect the distribution of humanitarian aid. This proposed research takes advantage of an existing national policy and a geographic regression discontinuity design across an administrative boundary to examine this gap in knowledge. We are in continued discussions with DfID to provide the supplementary funding required to integrate this component to the REAP and IBLI elements of the study. DfID, who have supported a number of studies on IBLI, HSNP and REAP appear keen to contribute to an integrated study of their impact. We continue to be optimistic that they will provide the additional resources required but are in discussions with other potential donors, such as the World Bank.

2.1 Statistical Analysis and Power

Consider the following ANCOVA regression equation for analyzing the impacts of the proposed interventions on the livings standards of poor (quartile 1) households ($y^1_{h\ell t}$):

$$y^1_{h\ell t} = \alpha_1 y^1_{hl0} + \beta_I I_{\ell t} + \beta_G G_{h\ell t} + \beta_{IG} I_{\ell t} G_{h\ell t} + \delta_1 S_{\ell t} + \delta_2 S_{\ell t} G_{h\ell t} + \varepsilon_{h\ell t},$$

where the subscript *h* designates household, ℓ sublocation and t time period. The binary treatment variable $I_{\ell t}$ takes on the value of 1 for sublocations receiving the insurance treatment, and $G_{h\ell t}$ does the same for households offered the REAP graduation program. The saturation variable, $S_{\ell t}$, measures the fraction of eligible households in a sublocation that were offered the graduation program. This simple model allows us to measure the basic impacts of the two programs (β_I, β_G), any household level complementarity (β_{IG}). The term δ_1 allows us to measure whether graduation training spills over to non-treated households, while δ_2 allows us to see if spillovers occur between households selected for graduation.

A similar expression can be written for vulnerable, non-poor households (found in quartiles 2 and 3) which are not eligible for the REAP graduation program:

$$y^3_{h\ell t} = \alpha_1 y^3_{hl0} + \beta^3_I I_{\ell t} + \delta_1 S_{\ell t} + \varepsilon_{h\ell t}.$$

The coefficient β^3_I is the primary coefficient of interest for this group of households. Note that the insurance (or contingent payment) treatment is clustered at the sublocation level.

We can obtain an idea of the minimum detectable effects (MDEs) for our two binary treatment terms using standard procedures. For purposes of these calculations, we assume that we only collect data on the 30 sublocations shown to the left of the dashed vertical line in Figure 3.

To identify the direct impact of the graduation program (β_G), we will have individual randomization and a total sample size of 420 households split equally between those who were and were not offered the REAP graduation program. Figure 4 shows the MDEs for this kind of comparison as a function of the net uptake (or compliance) rate. For the BOMA program (shown by the green, dash-dot curve), we

anticipate that uptake will be quite high (perhaps 85%), indicating that this design will be able to detect changes in consumption as small as 8% between treated and non-treated households.[13]

To identify the direct impact of the insurance program on vulnerable non-poor households (β_I^3), the proposed study design will have to rely on a clustered (sublocation level) intervention. For the core design, we would have 840 households spread evenly across 15 treatment and 15 control sublocations. As shown by the solid red curve in Figure 4, with a compliance rates (insurance purchase) as low as 30%, the MDE for household expenditure changes is 15% or less, despite the clustered nature of the treatment.[14] While a 30% uptake rate for unsubsidized insurance would be robust, we believe it is realistic given the proposed subsidy scheme described above.

Under the proposed study design, Identification of the impact of insurance on the well-being of poor households relies comparison of 420 households with the same treatment clustering described above. As shown in Figure 4, the MDE for this effect is a relatively high 30%, as shown by the blue, dashed curve in Figure 4. Achieving a lower MDE for these impacts would require a substantial expansion of the sample size. Given that the contingent payment effects are secondary for this group, we are less concerned about precisely identifying their impacts.

The other key parameter of interest is the slopes of the saturation rate terms (δ_1 and δ_2). An economically meaningful slope coefficient would be one that implies that full saturation would deliver at least half the benefits of full treatment. Given that the Gobin et al. study identified an impact of REAP as 30% increase in living standards (raising incomes from roughly 10,000 KSH to 13,000), we would find a full saturation spillover effect that raised the incomes of non-treated households to 11,500 to be economically meaningful. A spillover impact of this magnitude would imply a slope $\delta_1 = 1500$. Following Dupont and Plummer (1998), we calculate the minimum detectable slope (MDS) under our proposed study design. For the critical δ_1 parameter that measures spillovers from treated to non-treated households, the MDS is 1192, while it is 1062 for δ_2. The proposed study is thus adequately powered to detect economically significant spillover benefits should they occur.

While these household level impacts are important in and of themselves, we are also interested in the impacts of the social programs on the extent and depth of poverty. We are thus interested in the precision with which we can estimate changes in sublocation level poverty headcounts and gaps. Consider, for example, the baseline average poverty gap in a sublocation ℓ:

$$G_\ell = \frac{\Sigma_{i=1}^{14}(P - y_i)}{nP},$$

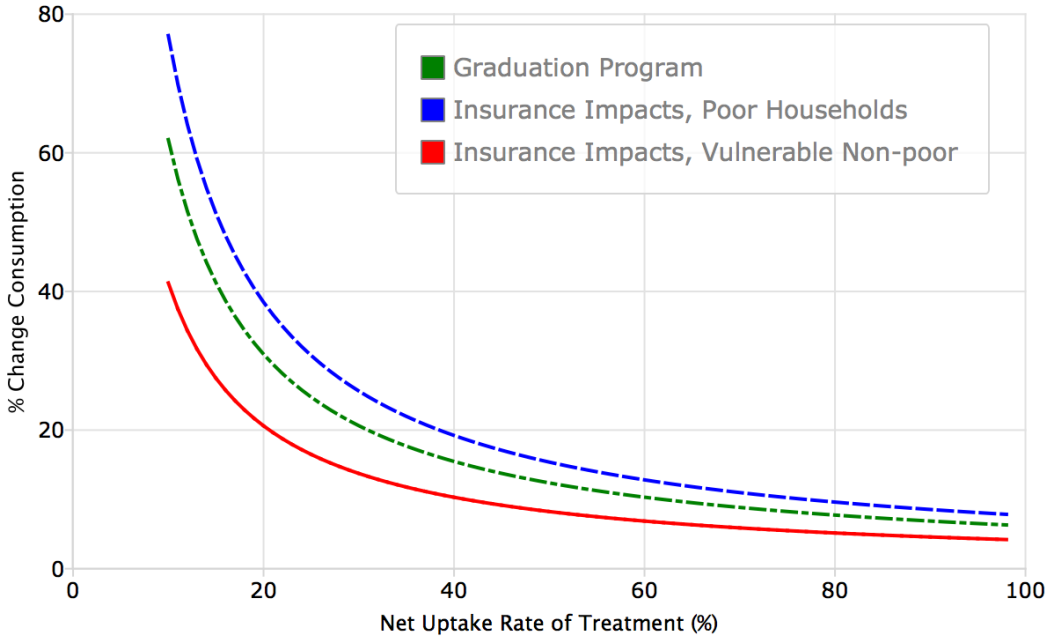
where *P* is the money metric poverty line. Under our design, we can estimate the average poverty gap with 14 observations of poor households in each of 30 communities. Because we estimate the average sublocation gap with much greater precision than we have for estimating an individual outcome, we are able to more precisely estimate changes in community level poverty indicators, despite having only 30

[13] MDE calculations are for 80% using tests with a standard 5% Type 1 error probability. To capture the impact of the saturation design, the MDEs shown for the graduation program is a simple average of MDEs for a completed clustered and non-clustered treatment design.

[14] The intra-cluster correlation coefficient used for this analysis (0.13) comes from the IBLI survey data.

communities with which to work. More specifically, our design should allow us to statistically detect effects in sublocation poverty measures that are as small as 4%. We should thus be adequately powered to detect changes in the rate and depth of poverty at the community level.

Figure 4. Minimum Detectable Effects for Different Interventions (Household Level)



Section 3: Implementation, Instruments and Risks

BOMA plans to rollout the REAP program to a new cohort of beneficiaries in Samburu County in September 2017. To date, REAP has targeted 17 out of the 108 sublocations in Samburu. Additional sublocations are currently being targeted for a cohort that will be brought into the REAP in May 2017. We do not yet know the number of sublocations that will be involved with this latest cohort, but we anticipate that there will be ample sublocations available for the study proposed here.

Identification of women eligible for the REAP program follows a 2 step process. First, BOMA implements a proxy means test for identifying women in the lowest quartile in each sub-location. Those women are then further screened for their interest and capability to potentially succeed in the REAP program. BOMA reports that this will yield on average a pool of 60 eligible women per-sublocation. As shown in Figure 3 above, each sublocation will be given a randomly selected budget that will determine what percentage of the eligible women will be offered the REAP program. Note that the REAP program treats 3 women at a time as every 3 women form a single, jointly owned and operated business. In order to

justify the two-level screening of women, at least one, 3 women business must be set up in each sublocation. Hence, the smallest number of REAP-treated women in any sublocation will be 3.[15] Once these assignments are made, 14 women from each quartile in each sublocation will be randomly selected for inclusion in the study.

In the second treatment arm (sublocations randomly selected for the insurance treatment), the research team will offer a still be finalized set of insurance subsidies through a lottery system at the individual level. The exact set of subsidies to be offered is currently under discussion with the State Department of Livestock (SDL) and will be chosen to maximize learning for the SDL while still respecting the principal of smooth subsidies described in Section 2 above. Subsidies will be set so that expected costs are similar to costs associated with the HSNP-2 scheme.

If funding becomes available for the third treatment arm (the HSNP-2 analogue contingent payment system), then the research team will work with local government and a service provider to deliver a set of contingent payments that mimics the HSNP-2 scheme, both in terms of amounts and in the triggering index which is used to determine whether payouts will be made.

3.1 Survey Instrument and Data Collection Timeline

The **survey instruments** will build on ILRI's expertise and past IBLI data collection efforts and also exploit other relevant data sources available targeting HSNP and BOMA assessment. The quantitative surveys will be supplemented by qualitative studies in order to better understand the mechanisms at play–-in particular in terms of gender dynamics and impacts. The design of the three interventions considered can be further improved with better understanding of gender targeting elements or gender impacts, which will also be monitored through the survey questionnaire.

In order to provide preliminary findings by 2018 while exploring longer-term welfare dynamics, **three rounds of surveys** are planned for this research program, conducted at the same time of the year: at baseline (year 0); at midline (year 1); and at endline (year 3). The first two years of data should generate interesting and relevant insights that can be extended and confirmed with the endline data. Specifically, the baseline survey will take place in June/July 2017. This means that the first follow-up survey would occur in June/July 2018, and the preliminary analysis would be performed before the end of 2018. The first two years of data should generate interesting and relevant insights to help guide policy debates around HSNP 3 more specifically and more generally to offer contributions to the broader discussions about the form of social protection programs and the benefits of integration around these interventions.

The final survey round is planned for June of 2020. This analysis provides insights into the gains associated with a second year of treatment and provides information on the lasting effects of the program.

[15] This plan is based on discussions with BOMA, but may be subject to revisions based on final negotiations with BOMA.

3.2 Risks to the implementation plan

The State Department of Livestock (SDL) is planning to extend KLIP into Samburu County in October 2017, after the execution of our proposed baseline. This could pose a risk to our research design if a large number of households in the *No Insurance* treatment arm started receiving insurance from the SDL. This risk is quite small for three reasons. First, if there were to be contamination, it would be nearly negligible because the coverage provided by KLIP is small—5 TLUs—and the number of KLIP beneficiaries has been quite small—on the order of 1-3% of the population—and not in every community. Second, the SDL has been implementing KLIP in close collaboration with the same ILRI team that is making this proposal. Third, SDL has expressed interest in this research and has signaled that they are willing to adjust implementation to account for our research design and avoid any contaimination.

A second risk is associated with the willingness of BOMA to follow the interventions. ILRI and BOMA have met on numerous occasions (most recently in February, 2017) and there is a great deal of mutual interest in this study. BOMA has provided the cost figure used in our budget and has expressed interest in coordinating on this research agenda. We fully expect to submit a joint proposal to DfID in order to secure the remaining funds required for the 3rd arm on the study.

A final risk is that offering insurance necessitates the involvement of an insurance firm. In February 2017, we briefed APA insurance, a main provider of IBLI in other Kenyan counties and a long-time partner of the ILRI BII team, on our research plan. They are enthusiastic and have expressed that they have the capacity and desire to coordinate. As agreed with APA and SDL, will shall develop an MOU governing the parameters of collaboration under this study.

Section 4: Summary

Kenya has been at the forefront of adopting a variety of social protection instruments. However, like many other countries, Kenya is looking for that approach to social protection that fundamentally alters poverty dynamics and does not simply ameliorates the immediate sufferings of those who have fallen into hard to reverse indigence. Building on graduation and insurance programs that have demonstrated effectiveness, and guided by careful theoretical analysis about how to most cost effectively change poverty dynamics, the proposed study is poised to make a fundamental contribution to the design and implementation of social protection in risk-prone rural regions.

The research proposed here will specifically answer three primary questions:

1. Using an innovative randomized controlled trial study design, we will first determine the poverty impacts of a graduation program (designed to promote the economic ascent of indigent households) when combined with a system of drought-contingent transfers delivered through a livestock insurance program (designed to prevent the economic descent of vulnerable households). The study is powered to explore these poverty impacts at both the household and community levels.

2. The proposed study design will vary the within community intensity (or saturation) with which the REAP graduation program is offered, going from as low as 5% of eligible women to as high as 95% of eligible women. Given our sample size, this design will allow us to determine the extent

to which the REAP program spills over from its direct beneficiaries and benefits neighbors and friends. Given the cost and complexity of delivering a program like REAP, it is important to discover if there is a program density that maximizes direct and spillover benefits so that the greatest poverty reduction benefit can be obtained from a given budget.

3. While the addition of drought-contingent transfers to a graduation program is conceptually attractive, it is unclear how to best deliver drought-contingent transfers. In principal reliance upon an insurance-based delivery system offers important incentive and cost benefits relative to an HSNP2-like defined contingent benefit plan. However, the efficacy of an insurance-based system ultimately depends on the uptake and understanding of the insurance. If additional funding is obtained to extend the study to a third treatment arm, then we will also explore this third issue.

In summary, the proposed research will provide critical information to the Government of Kenya for designing and implementing a pro-graduation social protection strategy. In addition, as indicated above, there are numerous important, generalizable, questions around the design and implementation of integrated, efficient social protection programs that the research should be able to answer and submit to the broader literature and to the benefit of policy-makers and development agencies the world over working to design such schemes. The fact that this research is being implemented in close collaboration with different implementing agencies (including BOMA, DfID, NDMA, SDL, and APA Insurance) will be critical to ensuring the validity, credibility and uptake of the findings.

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