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Review of Rural and Agricultural Finance in Sub-Saharan Africa
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Forward: The Rural and Agricultural Finance Learning Lab is a MasterCard Foundation initiative launched in 2015 to foster learning and collaboration that leads to better financial solutions provided to more smallholder farmers and other rural clients. Among other activities in support of the Foundation's Rural and Agricultural Finance (RAF) portfolio and the broader RAF community, the Learning Lab commissions and conducts research to identify answers to key learning questions that comprise its learning agenda. These questions are centered on impact and measurement, client demand, financial solution provision and ecosystem development.

At the impact level, the Learning Lab is interested in how rural and agricultural financial solutions contribute to poverty reduction and improved livelihoods for rural households. To lay the foundation for future work, the Lab commissioned Evans School Policy Analysis and Research (EPAR) to conduct a review of evidence to date on the impact of rural and agricultural finance on some of the key impact indicators in the Foundation's theory of change. This evidence informs the Learning Lab's understanding of the impact case for RAF as well as our perspective on where future research efforts should focus. Since we have not found any similar evidence review, and the results should be useful for the broader RAF community, EPAR and the Learning Lab are co-publishing this review. This is the first Learning Lab research brief and the first in its series on Impact and Measurement.

Note that the Learning Lab defines rural and agricultural finance as financial solutions (typically credit, savings, insurance, payments, or a combination thereof) targeting smallholder farmers (typically <1 hectare of land) or other rural customers. The Foundation's RAF portfolio is dedicated exclusively to Sub-Saharan Africa, and we believe this context is a critical factor in impact. In order to understand the evidence, however, the EPAR team looked at some solutions that were not necessarily tailored for rural customers but where impact on rural customers was reported. In addition, they examined key papers and findings from outside of Africa that were cited by studies in Africa.

Abstract

This report reviews and summarizes the existing evidence on the impact of access to financial services/products on measures of production, income and wealth, consumption and food security, and resilience for *smallholder farmers*¹ and other *rural customers* and their households in Sub-Saharan Africa. This study covers four main types of financial products/services: 1) credit; 2) savings; 3) insurance; and 4) mobile money and digital products. We also review the very limited evidence on the effectiveness of bundling these products/services together and of combining them with other offerings such as trainings or support for access to markets, and of providing them via digital channels. We note when financial products/services have been specifically designed to serve the needs of rural customers or smallholder farmers, since the needs of these groups are often very different from those of other stakeholders.

Key Findings:

- While empirical evidence on credit products is relatively plentiful, fewer high quality studies exist on the impacts of savings, transaction, or insurance products in rural Sub-Saharan Africa.
- Product design and outcome indicators vary by study and studies rarely compare multiple bundles of services, making it difficult to aggregate or compare impacts across products.
- Most of the 19 studies of credit products we reviewed find evidence of positive impact on at least one outcome indicator, though three find no significant effect. Few studies, however, show consistently positive and significant impacts across all outcomes areas measured in the study.
- We found little evidence to suggest that rural and agricultural financial products harm smallholder farmers, but many studies find no significant effect on outcomes measured and report only average effects across farmers. Particularly for credit products, heterogeneous impact may be a concern if averages mask large positive and

¹ "Smallholder farmers" are defined as farmers who typically cultivate less than two hectares of land.

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negative effects for particular individuals.

- Take-up for financial products appears low in many areas, but some evidence suggests that those with the highest marginal return are the most frequent adopters, implying that universal adoption may not be optimal.
- Some evidence suggests that individual and group-based savings products are associated with increased income and ability of households to cope with consumption shocks, however evidence on impact is mixed.
- Several index based weather insurance programs have been introduced to address the risk constraints faced by smallholder farmers in Sub-Saharan Africa but limited uptake and adoption make it difficult to determine their effectiveness.
- Overall, the evidence suggests rural and agricultural financial products are generally associated with modest positive impacts on consumption, food security, income, production, and resilience, however the magnitude of impact is debatable. In addition, the lack of consistent measures makes comparison and generalization difficult.

Introduction

Over the past three decades, a great deal of research has been conducted on microfinance interventions for the poor in developing countries, particularly around credit products and services. However, the majority of these studies have targeted urban populations or small business owners. This report summarizes the much smaller evidence base on credit, savings, insurance, and transaction product interventions in rural areas and programs that target smallholder farmers, focusing on work published since 2000.

Four outcome areas of interest for the review were identified by the MasterCard Foundation Rural Agricultural Finance Learning Lab: 1) production;² 2) income and wealth; 3) consumption and food security; and 4) resilience³. Other topics commonly studied by researchers include access to services and financial inclusion, and effects of financial services on health, empowerment, and other social outcomes, but we captured evidence on these additional outcomes only where they were addressed in studies that also reported our target impacts. Within these four outcome areas we review several product areas including credit, savings, insurance, and mobile payments and digital products. There are good reasons to believe that provision of these products and services could have important impacts on smallholder farmer welfare. Credit constraints may cause underinvestment in inputs, capital and labor, thereby constraining production and income. Savings allow households to make productive investments, cope with shocks, and build assets and wealth. Risks from weather or price fluctuations are a major source of uncertainty for small farmers and the inability insure against these risks likely constrains investment. The ability to provide services and payment on mobile platforms lowers transactions costs and may better connect farmers with markets. In each section below, we outline these channels in more detail and examine the evidence connecting each to the four outcomes of interest.

We begin by describing the evidence base identified through a systematic review of the literature. We go on to summarize the findings of the studies reviewed, grouping the evidence by financial product. Next we briefly compare this evidence to the findings from recent seminal literature in urban settings and outside of Sub-Saharan Africa. Finally, we present the gaps in the evidence base and our recommendations for future research.

Literature Search Results and Methodology

Through a systematic search of academic and grey literature databases, we identified a total of 1038 studies, 424 of which reported findings from Sub-Saharan Africa. We restrict our analysis to rural Sub-Saharan Africa for a number of reasons. Agriculture in rural Africa is largely rain fed, population densities are much lower than in many other regions, and cultivation strategies and crop varieties differ from other regions. For all these reasons rural finance might have a different structure and impact in Africa. We coded these 424 results for methodology, type of financial product, and type of impacts reported, as well as noting whether the study reviewed any digital products such as mobile money or other technology-

² Production includes measures of agricultural production as well as measures of farmer productivity such as yield or technical efficiency.

³ Resilience is defined as the ability to cope with shocks and/or smooth consumption.

based services⁴. Of these, 79 studies reported impacts on consumption, food security, production, income, or resilience for agricultural or other rural clients. The 345 studies excluded at this stage did not report impacts on any of these four outcomes, but instead provided theoretical frameworks, measured only access to financial services, or reported only on outcomes outside the scope of this report. We next screened our results by study quality, retaining for review all identified studies with rigorous methodologies that reported on savings, insurance, transactional, and digital products, as well as the experimental and quasi-experimental studies that reported on credit only. In this report, we consider experimental, quasi-experimental, and econometric methodologies with reasonable sample sizes and careful implementation to be high quality. “Experimental” studies are randomized control trials or other experiments. “Quasi-Experimental” studies include a comparison group created by matching or other techniques including methodologies such as difference-in-difference, propensity score matching, and regression discontinuity. “Econometric Analysis” studies involve a cross-sectional multivariate regression with control variables.

We reviewed the studies that did not meet these criteria to identify additional high-quality studies for inclusion in the report, and added two descriptive analysis studies and five regression or other econometric studies that reported on credit only. Additionally, we added ten relevant studies identified through the citations of other results. A total of 38 results were coded as summarized in Table 1. Appendix A describes our methodology in further detail and Appendix B provides a full list of coding questions used to review the studies that met our criteria for inclusion. Appendix C provides detail on the variety of indicators used to measure each outcome area.

As shown in Table 1, there is a well-developed literature on credit interventions, but evidence is scarce for other financial services/products, particularly mobile money products and digital financial services, which are relatively new innovations. Many studies, including randomized control trials, have measured the effects of credit on production, income, and consumption and food security. We found two or fewer studies that reported on the income or wealth impacts of insurance, consumption and food security impacts of insurance, mobile payment, or digital products, and the resilience impacts of transaction or digital products.

Table 1: Relevant Results by Methodology, Impacts, and Product Type

Impact on:	Production	Income/Wealth	Consumption/ Food Security	Resilience	TOTAL # of studies ⁵
<i>Experimental</i>					
Credit	3	5	5	1	7
Savings	2	3	3	2	5
Insurance	2	1	0	0	2
Mobile payments	2	1	1	0	2
Digital	1	1	1	0	1
TOTAL # of studies	9	10	9	9	16
<i>Quasi-Experimental</i>					
Credit	1	2	2	1	4
Savings	0	0	0	0	0
Insurance	0	0	0	1	3
Mobile payments	1	1	1	1	2
Digital	1	1	1	1	2
TOTAL # of studies	2	3	3	3	9
<i>Econometric Analysis</i>					
Credit	3	1	3	1	6
Savings	0	0	0	0	0
Insurance	1	1	0	1	3
Transaction	1	1	0	0	1
Digital	1	1	0	0	1
TOTAL # of studies	5	3	3	3	11
<i>Descriptive Analysis</i>					
Credit	1	1	1	0	1

⁴ “Digital” can apply to any of the four types of products/services, but is most common for transactional or savings mechanisms.

⁵ Note that many studies report on multiple types of financial services/products or on multiple outcome areas. Therefore, the total number of studies is often greater than the sum of the number of studies reporting on each service/product and outcome.

Savings	0	0	1	1	2
Insurance	0	0	0	0	0
Mobile payment	0	0	0	0	0
Digital	0	0	0	0	0
TOTAL # of studies	1	1	1	1	1

Empirical Evidence on Impacts by Type of Financial Service/Product⁶

The studies included in this review use a wide range of outcome indicators within each of the four outcome areas, making it difficult to aggregate impact findings across studies. For example, measures of income include wages, business income, business profit, household income, and farm revenue. Moreover, these terms are often defined differently by different authors or reported for widely varying time periods. For this reason, in the following sections we summarize the evidence on impacts for each type of financial service/product and also report study specifics on participants, type of product or service offered, and impact reported. Appendix C shows the variety of indicators used in each outcome area. Most of the studies report evidence on more than one outcome area, and nearly all find some evidence for positive impact of financial services on at least one indicator in the rural or agricultural context in Sub-Saharan Africa. The majority of the interventions studied were not designed specifically for rural or agricultural consumers (for example, health insurance, a savings account, or a business loan with repayment beginning immediately), but a small fraction were designed specifically to meet the needs of farmers (in-kind loans repayable at harvest, weather insurance, products bundled with extension services, mobile payment products for trade). We did not find compelling evidence that specialized products or services have greater impacts for rural populations than general products and services.

Credit Interventions

Credit interventions are hypothesized to impact outcomes for rural populations through two principal channels. Access to credit could allow farmers to invest in agricultural inputs such as labor, land area cultivated, equipment, improved variety seeds, or fertilizers which they might not otherwise be able to afford (Owuor, 2009; Diagne, 2002). Increased investment in inputs should lead to increased production that can then be sold or consumed. Additional income from sales and greater food consumption should improve household well-being (Beaman, et al., 2014; Berhane & Gardebroke, 2011, 2012; Ashraf, et al., 2009).

The pathway for small business loans is similar: a loan offer leads to borrowing, which in turn increases business investment. If this investment results in improved revenue, business profits should increase, which should increase household income (Tarozzi, et al., 2015; Awunyo-Vitor, et al., 2012; Crepon, et al., 2014). Again, increased household income is expected to lead to increased consumption, food security, ability to cope with shocks, and other improvements in well-being.

Additionally, access to credit is hypothesized to help poor households by giving them another strategy to cope with risk: in the case of a shock, the household could borrow money rather than liquefying assets, limiting consumption, or selling off-farm labor. This may allow households to avoid risk-reducing income diversification strategies and precautionary saving to instead invest in high-return activities (Diagne, 2002; Fink, et al., 2014; Ali, et al., 2014).

Because transaction costs for small loans are high and poor households often lack collateral, commercial banks do not typically provide sufficient services to meet the needs of poor rural households. Thus, microfinance institutions and other lending programs have emerged, often using joint liability and peer influence to substitute for collateral (Diagne, 2002). Typical microcredit loan products require regular, small repayments beginning soon after disbursement of the loan, but products that provide capital at the start of the growing season and collect after harvest, or at times of the year when crops can be sold at a high price, may be more appropriate for the needs of smallholder farmers (Beaman, et al., 2014; Burke, 2014).

Table 2 below summarizes the credit studies we reviewed. Most of the 19 studies of credit products we reviewed find evidence of positive impact on at least one outcome indicator, though three find no significant effect. We found little

⁶ All values in this section were reported as significant at the 5% or 1% level by the authors.

evidence to suggest that microcredit products harm smallholder farmers on average; only one study reported a negative effect on one outcome indicator. However, most studies report only average effects and heterogeneous impact may be a concern if averages mask large positive and negative effects for particular individuals or subgroups, particularly for the poorest individuals. We note also that publication bias may mean that studies with stronger results (either positive or negative) are more likely to get published. Though take-up rates are typically low, some evidence suggests that those with a high marginal return do adopt, implying that universal adoption may not be optimal. Some recent research examines products designed specifically for farmers, such as (in-kind) maize and input loans, and models with a balloon repayment due at harvest, since common microfinance products like group-liability loans with repayment beginning immediately may not meet the needs of smallholder farmers whose income is irregular.

Table 2: Summary of Impacts of Credit Interventions

Citation	Methodology	Sample Size (Number of randomization units, where applicable)	Country	Product	Liability	Production	Income/Wealth	Consumption/Food Security	Resilience	Other Outcome measures
Agriculture-Specific Products										
Adebayo, et al. (2012)	Propensity Score Matching	222 individuals	Nigeria	Loan + training	Any	NS		NS		
Ashraf, et al. (2009)	RCT	726 farmers (36 farmer groups)	Kenya	Loan + training	Group	+	NS			+
Beaman, et al. (2014)	RCT	7200 households (198 villages)	Mali	Balloon loan	Group	+				
Burke (2014)	RCT	1589 farmers (17 locations)	Kenya	Balloon loan	Individual		NS	NS		+
Fink, et al. (2014)	RCT	439 households (40 villages)	Zambia	Maize flour on credit	Individual		+	M	+	
Small Business Products										
Awunyo-Vitor, et al. (2012)	Propensity Score Matching	300 individuals	Ghana	Loan	Unspecified		+			
Crépon, et al. (2014)	RCT	5551 households (162 villages)	Morocco	Loan	Group		M	NS		NS
Kim, et al. (2009)	RCT	1409 individuals (12 villages)	South Africa	Loan + training	Group			M		+
Tarozzi, et al. (2015)	RCT	6412 households (133 peasant associations)	Ethiopia	Loan	Group		NS	-		M
General Products										
Ali, Deininger & Duponchel (2014)	Econometric Analysis	3600 individuals	Rwanda	Semiformal loan	Unspecified	+	+			
Bandara, et al. 2014	Econometric Analysis	3755 children and youth	Tanzania	Access to credit	Any				+	+
Berhane & Gardebroeck (2011)	Econometric Analysis	351 households	Ethiopia	Loan	Any			+		
Berhane & Gardebroeck (2012)	Propensity Score Matching	351 households	Ethiopia	Loan	Any			+	+	+
Boni & Dia Zira (2010)	Econometric Analysis	103 individuals	Nigeria	Loan	Unspecified	+				
Diagne (2002)	Econometric Analysis	404 individuals	Malawi	Access to credit	Any	M				
Doocy et al. (2005)	Cross-sectional survey	819 individuals	Ethiopia	Loan	Group			M	M	
Owuor (2009)	Propensity Score Matching	400 farmers	Kenya	Loan	Group		+			
Sackey (2005)	Econometric Analysis	13512 individuals	Ghana	Access to formal credit	Any			+		

Sharma & Buchenrieder (2002)	Review of Impact Evaluations	N/A	Multiple	Microfinance	Any	+	M	M		M
<p>+, Positive Impact; -, Negative Impact; M, Mixed: Captures any combination of Positive, Negative and/or Non-Significant Impacts but in practice, no studies reported both positive and negative results so M represents mixes of positive and non-significant results and in a few cases positive results but characterized by authors as potentially spurious. NS, No Significant Impact. A blank cell indicates the study did not measure the outcomes. All significant results are significant at the 5% level or higher.</p> <p>"Other outcome measures" are those not covered by the four main outcome areas, including health, education, social and empowerment outcomes, among others.</p>										

Agriculture-Specific Credit Products

Results from the five studies that examine agriculture-specific products suggested some positive impacts on production, use of formal financial services, and maize inventories but overall impacts are mixed. Many farm-specific products are designed to bundle training together with inputs to increase uptake and help ensure that resources received on credit translate into higher production and income. Other rural products are designed to take into account the highly seasonal nature of farm production, with repayments due after harvest. The evidence suggests that the timing of loan offers and repayments may be an important component of credit products and services in rural Africa.

Adebayo, Sanni, & Baiyegunhi (2012) used propensity score matching to study the impacts of access to the United Nations Development Program microcredit scheme among smallholder farmers in Kaduna State, Nigeria. The authors found that the scheme, which provided farm inputs on credit bundled with training on their use, had **no significant impact on crop production, food security status, or monthly food expenditures** of beneficiaries. 37 percent of borrowers reported that the loan they received was too small to have an impact, 34 percent that their interest rate was too high, and around 15 percent each reported that the repayment period was too short or that the loan process was too cumbersome.

Ashraf, Giné, & Karlan (2009) conducted a randomized control trial of an intervention among smallholder farmer groups in Kenya that was designed to encourage cultivation and marketing of export crops. An NGO provided a loan bundled with extension and marketing training and secured by a Transaction Insurance Fund created from the farmer's savings. Farmers participating in training only and training plus credit treatments were 19 percentage points more likely to grow export crops, and first-time growers of export crops (who made up 88% of the treatment group) had **higher volumes of production and lower marketing costs** than control farmers. Compared to a treatment group that received marketing and extension services with no loan, an offer of credit increased participation in the program, but **did not significantly change household income** except for first-time growers, who saw a 32 percent increase in household income compared to control farmers. While the offer of credit increased participation in the extension program, the treatment group offered credit did have higher income when compared with the treatment group offered training only. One year after the follow-up survey, the NGO providing the loans collapsed when the partner exporter stopped buying crops from participating farmers because they did not have the certification necessary for European markets and many farmers defaulted on their loans.

Through a randomized control trial in Zambia, Fink, Jack, & Masiye (2014) evaluated whether relaxing credit constraints through in-kind loans influenced the decisions of smallholder agricultural households to sell their labor off-farm, a strategy commonly used to smooth consumption during seasonal fluctuations in income. They found that providing loans of ground maize flour, repayable in-kind at harvest, led to a **decrease in off-farm labor supply of 25 percent** compared to control villages. Those farmers who chose to work saw an **increase in average wage rates of up to 49 percent**. The authors also found that farmers in treatment villages **increased meal frequency by 11 percent** over the control group. Residents of treatment villages were **45 percent less likely to miss a meal** than those in control villages. These results suggest that access to credit may reduce farm households' need to sell labor as a consumption-smoothing strategy, instead allowing them to allocate labor to maximize household income.

In a randomized control trial that offered group-liability loans due after harvest to rural women over two agricultural seasons in Mali, Beaman, et al. (2014) found that households in treatment villages increased family labor days by 8.7, fertilizer expenditures by USD 10.35, and expenditures on other chemical inputs by USD 5.08. The **value of agricultural harvest increased by USD 32 in these households**, but the **average change in profit (output minus input expenses, USD 17), varied widely and was not statistically significant**. The researchers also offered grants to randomly selected households in control villages and to some households in treatment villages who did not take up a loan. Grant recipients in loan treatment villages did not experience significant increases in agricultural output. Grant recipients in non-loan (control) villages did increase area cultivated, expenditures on agricultural inputs, and profit. This suggests that not all households

will benefit from access to agricultural credit: households in treatment villages that took up the loan appeared to have higher marginal returns to borrowing than those that refused the loan.

In an unpublished study, Burke (2014) conducted an experiment among One Acre Fund farmers in Kenya to test whether a cash loan offered at harvest would allow farmers to delay maize sales until prices were higher. Some farmers were offered a loan immediately after the harvest in October; others were offered a loan in January, a few months after harvest but when many bills, including school fees, come due. Farmers taking out either loan **held an average of 20% more maize inventory each month** over the nine months after harvest compared to control farmers. Their **maize net revenues (value of sales less value of purchases and interest) were significantly lower immediately post-harvest and significantly higher later in the year, indicating income smoothing, but the overall net increase was small and not statistically significant on average.** However, the subgroup of farmers who borrowed in October did significantly increase maize net revenues over the control, implying that the January loan, which was associated with a small and non-significant increase in maize net revenues, may have come too late to be effective. Furthermore, the author found that net revenue increases were significant in low-intensity treatment locations where only a few farmers were offered the loan, but not in high-intensity areas where many farmers could access it, suggesting the presence of a spillover effect that diminishes the loan's profitability at high saturation, most likely by affecting market prices.

Small Business Credit Products

Awunyo-Vitor, Abankwah, & Kwansah (2012) studied businesswomen's participation in microcredit in rural central Ghana. Using propensity score matching, they found that business income of women who received microcredit over a three-month loan cycle was **7.6 percentage points higher** than that of women who did not receive credit.

Crépon, et al. (2014) conducted a randomized control trial in a rural area of Morocco dominated by smallholder agriculture. The intervention provided group-liability loans for animal husbandry and non-farm businesses. Households identified as likely to borrow and who had access to microcredit (treatment villages) experienced a marginally significant (10% level) increase in business profit over likely-to-borrow households without access to credit (control villages), but this was partially offset by a reduction in employment income. Thus the study identified no significant gain in measured average income or in consumption. The authors estimated a **140 percent return to microcredit capital on business profit on average**, but noted very heterogeneous impacts, with 25 percent of borrowers earning negative profits. Among those household judged more likely to borrow based on household characteristics, microcredit led to an increased investment in assets for self-employment and an increase in profit, but the increased profit was offset by a reduction in casual employment and income and consumption measures did not increase. Additionally, they found that microcredit had **no significant impact on indices of female empowerment or economic participation**, though most borrowers were male. Households in the sample may have underreported borrowing: while 17 percent of households in treatment villages borrowed according to administrative data from the lender, only 11 percent self-reported taking a loan when surveyed. Borrowers also self-reported lower loan amounts than the lender disbursed. The authors suggested that this underreporting might have been due to an aversion to reporting borrowing among Muslims.

In a randomized control trial in rural Ethiopia, Tarozzi, Desai, & Johnson (2015) provided group-liability business loans which were bundled in some cases with family planning programs. Though the study found some evidence of increased economic activities, including an increase of one hour per week spent working outside the home by teenagers, it also found that receipt of microcredit was associated with **0.5 more months per year of food insecurity**. Because this finding conflicted with measures of economic activities showing modest but not statistically significant, improvement in wages, revenues, net revenues, and other income, the authors concluded the finding might have been spurious. The authors found **no evidence of an increase in nonfarm business creation, "net sales"** (the difference between annual revenue and input purchases), or **wages**.

Kim, et al. (2009) conducted a combined microfinance and health education intervention through a randomized control trial in South Africa. They measured economic wellbeing using nine indicators, and found that businesswomen in villages receiving the microfinance-only and microfinance plus training interventions both had **higher levels of economic well-being** than women in control villages. They also found that participants with the combined intervention had a reduced risk of intimate partner violence and practiced more HIV protective behavior.

General Credit Products

Ali, Deininger, & Duponchel (2014) measured the impacts of semi-formal credit provided by cooperatives, input suppliers, microfinance institutions, and NGOs in rural Rwanda using econometric methods. Removing all household-level credit constraints was estimated to **increase the total value of a household's agricultural output** by 17 percentage points, from USD 272 to USD 326. The authors also found that households that were unconstrained in credit markets were more likely to engage in and earn **income from off-farm wage labor and non-farm self-employment activities**, which may indicate increased willingness to engage in a riskier portfolio of activities among households with access to credit.

In a study of farmers' credit groups in Nigeria, Boni & Dia Zira (2010) found that credit supply had a significant **positive relationship with farm revenue**, but that supply of credit had decreasing returns to scale.

Diagne (2002) assessed the impacts of access to credit on maize and tobacco productivity in Malawi, finding that **household technical efficiency**,⁷ a proxy for productivity, was not significantly affected by access to credit except in the case of tobacco, for which it slightly improved technical efficiency.

Using a four-panel dataset from northern Ethiopia covering a 10-year period, Berhane & Gardebroke (2011, 2012) evaluated the effects of a range of formal credit products, including group-liability loans and microenterprise loans on rural poverty. They used fixed effects and random trend models and found that borrowing had long-term positive impacts on household consumption and housing improvements, and that short-term impact estimates may underestimate the total effect of access to credit on household welfare. **Household per-capita consumption increased by 5-12 percent** for each additional year a household borrowed, depending on the model specification. The **probability that a household improved their dwelling increased by 27 percentage points** for each year of credit taken (Berhane & Gardebroke, 2011). While this study is non-experimental, the authors are careful in their methodology and claims, providing important suggestive evidence that shorter-term studies could understate the medium and long-term impacts of access to credit.

In 2012, the authors updated their analysis using a propensity score matching technique and found that **average annual consumption of borrowers who participated earliest increased steadily over the study period**, including during drought and post-drought years. The average effect was 11 percent in the first year, and a cumulative total of 42 percent by the fourth year. In contrast, those who took a loan in the second or third cycles saw increased consumption during the year of the loan, but decreased consumption in the year following, perhaps because struggling households diverted loans to smooth consumption in drought periods, or because households had to repay their loans after one year and reduced other expenditures in order to make their payments (Berhane & Gardebroke, 2012). Given that all borrowers experienced drought years after taking the loan, the authors tentatively suggest that earlier participants may have had more time gain capacities to deal with shocks.

Doocy, et al. (2005) examined the impact of group-liability loans on food security. In one of the two study sites only, **respondents not offered the loan intervention were 3.2 times more likely to be malnourished than female borrowers and their children**, though non-borrowers were no more likely than male borrowers to be malnourished. Male borrowers and respondents not offered a loan were about twice as likely to have received food aid in the past year than female borrowers. No significant differences in dietary quality and quantity were found. They found **few significant differences in 15 indicators of coping capacity** between credit clients and non-borrowers

Owuor (2009) used propensity score matching to evaluate the effects of group-liability loans on smallholder farmers in Kenya, finding that participation **increased household incomes by USD 200-260 in a single production period, and over the course of a year by USD 478-641**, depending on the matching method.

In their review of evidence of the impact of microfinance on food security and poverty alleviation, Sharma & Buchenrieder (2002) found mixed evidence of credit on food security, with studies in Malawi (Diagne & Zeller, 2001) and Cameroon (Schrieder, 1996) showing no significant impacts. This stands in contrast to studies in Bangladesh, China, and Madagascar (Zeller & Sharma, 1998) that found positive effects on household caloric availability. The authors did find evidence of positive impacts on household income, with McNelly & Dunford (1998) showing positive impacts of a credit program in Ghana, and Mosley & Hulme (1998) finding in an evaluation of 13 microfinance programs that while income effects were positive on average, impacts were greater for households with a higher level of initial wealth.

⁷ Technical efficiency measures deviations from both potential output and marginal productivity.

Savings Interventions

Facilitating and mobilizing rural savings may enable households to smooth seasonal consumption and cope with income shocks or unforeseen expenditures. Savings allow individuals to self-insure, make investments in entrepreneurial activities, health, and education, as well as to build assets and wealth (Höllinger, 2006). Access to savings products that limit liquidity may allow households to resist social network demands (e.g. being able to say no to requests for money from peer or kinship groups), making resources available for productive use later on (Brune et al., 2014; Dupas & Robinson, 2013), or allowing households to avoid using coping mechanisms which draw on investment in future productivity for immediate consumption such as pulling children out of school to do farm work (Annan et al., 2013; Bandara et al., 2014), or underinvesting in agricultural inputs (Brune et al., 2014). A second pathway through which savings may lead to better outcomes is increasing the availability of collateral for loans, thereby easing credit constraints, however, evidence of this mechanism in action in the studies included here is limited (Brune et al., 2014; Schaner, 2015). Several authors also note that the impact of savings may be channeled through heuristic and behavioral mechanisms that are self-reinforcing once established (Dupas & Robinson, 2013; Schaner, 2015). Rural and agricultural households continue to have limited access to formal savings services in Sub-Saharan Africa, but products such as village savings and loan associations (VSLAs) or rotating credit and savings associations (ROSCAs) have become a popular platform for delivering savings interventions and are promoted by many non-governmental organizations (NGOs) and governments (Odell et al., 2011). We report findings on eight studies on savings products, including three delivered through groups, three through individual accounts, and one that covers overall levels of household savings.

Table 3: Summary of Impacts of Savings Interventions

Citation	Methodology	Sample Size (Number of randomization units, where applicable)	Country	Product	Production	Income/Wealth	Consumption/Food Security	Resilience	Other Outcome Measures
Formal Savings Products									
Bandara et al. (2014)	Econometric Analysis	3755 Children and Youth	Tanzania	Individual Savings Account				NS	
Brune et al. (2014)	RCT	2835 Farmers (299 Clubs)	Malawi	Individual Savings Accounts/Direct Deposit	+		+		+
Schaner (2015)	RCT	1558 Individuals (779 Couples)	Kenya	Subsidized Savings Account		+			NS
Informal/Group Based Savings Products									
Annan et al. (2013)	RCT	1595 Households (80 VSLAs)	Mali	Savings Groups- VSLA		+	+		NS
BARA/IPA (2013)	RCT + Qualitative	6000 Women (500 Villages)	Mali	Savings Groups - ROSCA	NS	NS	+	NS	NS
Dupas & Robinson (2013)	RCT	771 individuals (113 ROSCAs)	Kenya	Savings Groups - ROSCA				M	M
General Savings Products									
Sackey (2005)	Econometric Analysis	13512 Individuals	Ghana	Household Savings			+		
<p>+, Positive Impact; -, Negative Impact; M, Mixed: Captures any combination of Positive, Negative and/or Non-Significant Impacts but in practice, no studies reported both positive and negative results so M represents mixes of positive and non-significant results and in a few cases positive results that are characterized by authors as potentially spurious. NS, No Significant Impact. A blank cell indicates the study did not measure the outcomes. All significant results are significant at the 5% level or higher.</p> <p>“Other outcome measures” are those not covered by the four main outcome areas, including health, education, social and empowerment outcomes among others.</p>									

Individual Savings Products

In a randomized control trial of farmers' clubs participating in a savings intervention conducted in partnership with the Opportunity Bank of Malawi, Brune, et al. (2014) found **positive impacts of ownership of savings accounts on several measures of production and income**. Farmers were randomly assigned to either a control group which offered no savings facilitation, a treatment group which offered assistance setting up direct deposit into individual, liquid savings accounts, and a treatment group that offered assistance setting up direct deposit into individual ordinary savings accounts as well as additional accounts with commitment features. Participants in the group offered accounts with commitment features saw **significant increases in land under cultivation, input use, crop output, and farm profits** over the control. The treatment group offered only individual savings account saw increases in land under cultivation, but had non-significant results for the other measures. Changes in **household expenditures were positive and significant** for both treatment conditions.

Schaner (2015) found that subsidizing savings by eliminating minimum balances and providing a temporary interest bonus **increased bank account ownership and household income** in a study of 779 couples that opened bank accounts in 2009 in Kenya. Men who received higher subsidies were more likely to report higher income and asset ownership in a survey conducted 2.5 years after the subsidy was removed, and were more likely to engage in entrepreneurial activity. The same results were not reported by women, who had very low levels of bank account utilization despite having the opportunity to open individual accounts. Subsidies on couples who opened joint accounts, however, did show some increases in women's perceived ownership of household assets, although household asset ownership for these couples did not increase significantly suggesting this may be more related to greater equality in intra-household decision making than a change in wealth

Bandara, Dehejia, & Lavie-Rouse (2014) examined the relationship between access to financial services and the ability of households to cope with agricultural shocks. The authors considered the effect of having a bank account and access to credit on use of child labor, which is a common coping strategy in sub-Saharan Africa. Using data for 3,755 children collected in the Tanzania National Panel Survey (TZNPS), the authors found that **having a bank account was associated with a reduction of 8-10 child labor hours per month, and access to credit was associated with a reduction of 12 child labor hours per month**, however, these findings were only significant at the 10% level.

Group-based Savings Products

Annan, et al. (2013) conducted a randomized impact evaluation of an intervention to establish 80 village savings and loan associations (VSLAs) in Burundi. During the study period there was a 10 percent increase in the proportion of households living below the poverty line in control villages. In the same period, the percentage of VLSA-participating households living below the poverty line decreased from 67 percent to 63 percent, amounting to a **14 percent net reduction in poverty**. In addition, the intervention was associated with **increases in consumption and asset ownership in treatment households**. Mean per capita consumption expenditures were USD 5.80 higher in treatment households following the intervention than control households, and treatment households had assets of a value equal to roughly one additional head of cattle than control households. In contrast to the generally positive impacts on economic welfare associated with the savings intervention, a complementary family wellbeing intervention had no significant impacts on measures of child or family wellbeing.

Dupas & Robinson (2013) reported findings from an experiment to test the effect of informal savings and commitment technologies on health investment. The experiment involved 771 individuals who belonged to 113 rotating savings and credit associations (ROSCAs) in Kenya. ROSCAs were randomly selected into one of four treatment conditions which offered a combination of savings and commitment technologies: a lock box where the key is given to the group, a lock box where the key is held by a program official, creation of a health savings pool, and creation of individual health accounts within the ROSCA pool. Members of groups offered individual savings accounts were **12 percentage points more likely to be able to afford medical care than the control group** (31 percent vs. 19 percent). The two lock box technologies and health savings pool had minimal effects on households' ability to afford healthcare, although the lock box technologies were not designed specifically for this purpose. Both the lock box where the key was held outside the group and the **health savings pool increased investments in preventative health** by 66-75 percent and 128-138 percent respectively.

An impact evaluation of the Oxfam America/Freedom from Hunger “Saving for Change” program, implemented in Mali between 2009 and 2012, found that Rotating Savings and Credit Association (ROSCA) membership was associated with **modest decreases in incidence of poverty and food insecurity**. The study, however, did not find significant results for several indicators of expected savings use, including agricultural input use, value of livestock, entrepreneurial activity, or the ways in which households coped with agricultural or health shocks (BARA/IPA, 2013).

General Savings Products

In an analysis of data from the Ghana Living Standards Measurement Study, Sackey (2005) found that access to formal credit and/or having some personal savings to finance economic activities is respectively associated with a 9 and 6 percentage point **reduction in risk of households falling below the poverty line**.

Insurance Interventions

Risks from adverse weather or price fluctuations are considered to be barriers to smallholder productivity and adoption of improved production technologies. Informal strategies to self-insure against risk, such as diversification, may prevent smallholders from attaining economies of scale (Höllinger, 2006). Agricultural insurance products may help address these constraints by reducing farmers’ exposure to risk, since risk exposure affects production decisions such as how much land to cultivate or input investment levels (Hill & Viceisza, 2010, Norton et al., 2014). By protecting farmers from default on loans for adopting agricultural technologies, insurance may also ease constraints that result from voluntary withdrawal from credit markets (Gine & Yang, 2009). In recent years, weather-based index insurance products have largely replaced crop insurance products in many places, in part because de-linking payout to production reduces the risk of moral hazard (Binswanger-Mkhize, 2012). However, weather insurance still suffers from high transaction costs, low returns, and the presence of large covariate risks. Weather insurance also often requires heavy subsidies (Binswanger-Mkhize, 2012). Several innovative Index-based weather insurance programs have been introduced in sub-Saharan Africa to address some of these issues (Hess & Hazell, 2009), but limited uptake and usage have made it difficult to assess their impact. Given the limited impact evidence from active weather insurance programs, two of the three studies we report on use findings from experimental games designed to familiarize beneficiaries with insurance products and determine potential use.

Health insurance is recognized as an important tool to help rural households access health care and avoid the incidence of catastrophic health expenses. In addition to inducing greater use of health care facilities by reducing out-of-pocket expenses, health insurance may improve household welfare through improving labor supply as a result of better treatment and recovery in the case of illness, and by reducing the need to divert resources from that productive activities to health care (Yilma et al, 2015, Asfaw & Jutting, 2007; Shimeles, 2010). Private health insurance coverage in Sub-Saharan Africa has been limited by many of the same concerns about financial sustainability as agricultural insurance, but has been introduced more widely through public interventions, in particular, Community Based Health Insurance schemes have been seen as an important tool for reaching rural areas. In the following section, we report on three studies of the effects of publicly funded health insurance schemes, and one study of the impacts of private health insurance designed for rural households.

Table 4: Summary of Impacts of Insurance Interventions

Citation	Methodology	Sample Size (Number of randomization units, where applicable)	Country	Product	Production	Income/Wealth	Consumption/ Food Security	Resilience	Other Outcome Measures
Agricultural Insurance									
Gine & Yang (2009)	RCT	787 Farmers (159 Clubs)	Malawi	Index Based Weather Insurance					-
Hill & Viceisza (2010)	Randomized Experimental Game	(261 Farmers)	Tanzania	Index Based Weather Insurance	+	+			
Norton et al. (2014)	Randomized Experimental	(400 Farmers)	Ethiopia	Index Based Weather Insurance					+

	Game								
Health Insurance									
Asfaw & Jütting (2007)	Econometric Analysis	3200 Individuals	Senegal	Private Health Insurance				+	+
Shimeles (2010)	Quasi-Experimental	6900 Households	Rwanda	Community Based Health Insurance				+	+
Yilma et al. (2015)	Econometric Analysis	9455 Individuals, 1632 Households	Ethiopia	Community Based Health Insurance	+	+			
Mebratie et al. (2014)	Econometric Analysis	9455 Individuals, 1632 Households	Ethiopia	Community Based Health Insurance					M
Yilma et al. (2012)	Quasi-Experimental	400 Households	Ghana	National Health Insurance					NS
+, Positive Impact; -, Negative Impact; M, Mixed: Captures any combination of Positive, Negative and/or Non-Significant Impacts but in practice, no studies reported both positive and negative results so M represents mixes of positive and non-significant results and in a few cases positive results that are characterized by authors as potentially spurious. NS, No Significant Impact. A blank cell indicates the study did not measure the outcomes. All significant results are significant at the 5% level or higher. "Other outcome measures" are those not covered by the four main outcome areas, including health, education, social and empowerment outcomes among others.									

Agricultural Insurance

Gine & Yang (2009) randomize access to weather insurance among 787 farmers in central Malawi to see whether reducing weather risk through insurance would induce greater demand for loans to finance agricultural technology adoption, in this case high-yielding varieties of maize and groundnut. Contrary to their expectations, the authors found that **uptake of loans to purchase improved variety seeds was 13 percentage points lower when loans were bundled with insurance than when offered alone**. Farmers in the study who accepted loans and planted the improved varieties had between 12% and 37% higher yields than those using traditional seeds, suggesting that adding an insurance component to loans had a negative, although indirect, impact on productivity. The authors suggest that the limited liability contracts upon which the loans were made (i.e. some debt would be forgiven in the event of crop failure) offered an acceptable amount of risk coverage to the farmers, and the purchase of insurance effectively represented a higher interest rate.

Hill & Viceisza (2010) conducted an experimental game to determine the impact of insurance on risky agricultural investment. Farmers were provided with an initial cash endowment at the beginning of the game and asked to decide how many bags of fertilizer to purchase, then to randomly draw a weather risk allocation over four rounds. Earnings were determined as a function of fertilizer use, weather risk, and insurance and individually distributed at the end of each round and added to their endowment. Participants were informed at the beginning of the game that they would be able to keep all earnings at the end of the game. The authors found that **insured farmers were 29% more likely to purchase additional fertilizer**, which under the conditions of the game, **resulted in a 21.8% increase in farm income**. The authors found greater impact for farmers who showed more risk aversion or understanding of contracts in the baseline survey. Norton, et al. (2014) conducted a similar game experiment with 400 farmers who were participating in the HARITA program in Ethiopia. Farmers were provided with an initial allocation of funds and asked to allocate it to the purchase of insurance, contributions to a community risk pool, savings or cash. 99% of farmers allocated some funds to insurance, most favoring a high frequency low payout option to a low frequency high payout fund.

Health Insurance

In a study of 6900 households in Rwanda, Shimeles (2010) found that coverage of households by government-run Community Based Health Insurance Schemes (CBHIS) **reduced health-related consumption shocks due to catastrophic payments**, and that CBHI members were 15 percentage points **more likely to utilize health care facilities after an illness episode** than non-members. The authors did note, however, that the program may benefit wealthier households more than poor households due to its flat premium rate (of USD 2 per year per person), which is considered prohibitively expensive for many.

Yilma, et al. (2015) examined the impact of Ethiopia's pilot Community Based Health Insurance Scheme (CBHIS) through analysis of 9455 individuals in 1632 households in 16 districts in Amhara, Oromiya, Tigray, and the Southern Nations, Nationalities, and Peoples' (SNNPR) regions. The authors found that **insured households had higher crop output and household income, and were 4-5 percent less likely to be in debt**. In a study of the same intervention, the authors found that the CBHIS pilot project did not have a significant effect on household spending on healthcare, because the lower costs

of care achieved by the scheme were offset by increased utilization of public health care facilities (Mebratie et al., 2014)⁸. Similar to the findings of Shimeles (2010), the authors of these studies found that wealthier households benefitted from the program more than the very poor.

Using survey data collected by the World Health Organization in Senegal in 2002, Asfaw & Jutting (2007) examined the potential role of **health insurance for poverty reduction**, finding insured households were more likely to seek and be able to afford health care when needed. In addition, having insurance was associated with a **72 percent reduction in incidence of catastrophic out-of-pocket health expenditures** within the sample.

In a study of the risk of moral hazard due to insurance coverage, Yilma, van Kempen, & de Hoop (2012) examined the impact of coverage under Ghana’s National Health Insurance Scheme through analysis of panel data on 400 households. The authors found that there was **no significant difference in their measure of risky behavior** (proxied by bed-net ownership and use) between insured and uninsured households.

Mobile Payment Interventions

Mobile money, or products to make or receive payments of transfers of funds through digital or mobile technologies such as Short Message Service (SMS), has become an important alternative to traditional financial services, particularly in Sub-Saharan Africa where there has been limited penetration of formal financial service providers. While there may be many applications of mobile financial services, the current evidence suggests mobile money impacts household economic welfare primarily by facilitating remittances that ease liquidity constraints and help households cope with shocks. Other vehicles of transferring funds, such as wire services, or taking them in-person or sending them via bus, either require access to formal banking services, are prohibitively costly in terms of time or fees, or are risky due to poor security (Aker et al., 2014; Jack and Suri, 2014; Kirui et al., 2013; Kikulwe et al., 2014). We describe the findings of three studies covering mobile money products below, two of which cover general use of mobile money (primarily the M-PESA service in Kenya), and one which looks at the comparative impacts of making cash transfers through mobile platforms or in cash. We also present the findings of one study that examines the role of price pass-through in interlinked agriculture transactions, which is related to recent literature on value chain financing.

Table 3: Summary of Impacts of Mobile Payment Interventions

Citation	Methodology	Sample Size (Number of randomization units, where applicable)	Country	Product	Production	Income/Wealth	Consumption/Food Security	Resilience	Other Outcome Measures
Mobile Money and Mobile Payment Products									
Aker et al. (2014)	RCT	(1152 Individuals)	Niger	Mobile Transfers	M	+	+		+
Jack & Suri (2014)	Econometric Analysis	2283 Households	Kenya	Mobile Money			NS	+	
Kikulwe et al. (2014)	Econometric Analysis	320 Households, 640 Observations	Kenya	Mobile Money	+	+			
Kirui, Okello & Nyikal (2012)	Quasi-Experimental	379 Households	Kenya	Mobile Money	+	+			
+, Positive Impact; -, Negative Impact; M, Mixed: A combination of Positive, Negative and Non-Significant Impacts; NS, No Significant Impact. A blank cell indicates the study did not measure the outcomes. All results are significant at the 5% level or higher. "Other outcome measures" are those not covered by the four main outcome areas, including health, education, social and empowerment outcomes among others.									

⁸ Due to the non-random nature of uptake of the insurance program, the authors employ household fixed-effects, using both households in non-treatment areas and non-insured households in treatment areas as control groups to account for time-invariant unobserved variables. In addition, the authors control for effects of other social insurance programs in the study area such as the government of Ethiopia’s Productive Safety Net Program.

Kikulwe, Fischer, & Qaim (2014) found that mobile money use is associated with **increased input use, farm profits, household income, and receipt of remittances** in analysis of panel data of 320 smallholder banana-producing households in Kenya. The authors suggest that smallholders using mobile money are able to use remittances from friends and relatives to reduce liquidity constraints and improve agricultural commercialization. These results are similar to the findings of Kirui, et al. (2013), whose study of 379 farm households in Kirinyaga, Bungoma, and Migori Districts in Kenya found that use of mobile money was associated with a 37 percent **higher rate of commercialization**, USD 42 **higher value of input use**, and USD 224 **higher annual household income** on average.⁹

In an examination of a two period panel of 2,283 households in Kenya, Jack and Suri (2014) found that the lower transaction costs of sending and receiving remittances allowed mobile money users to better protect themselves from consumption shocks. Between 2008 and 2010, a period of poor harvests for Kenya, households with at least one M-PESA user saw consumption decline by 10 percentage points less on average than those with no mobile money users.

In an experiment comparing the effect of payment mechanisms to 1,152 women receiving unconditional cash transfers in Niger, Aker, et al. (2014) found that female beneficiaries who received mobile money transfers were **more likely to report involvement in household decision-making**, and more likely to have received funds without a male present than those who received cash transfers. Households receiving transfers through mobile money also had **10% higher diet diversity and consumed 30% more beans and fats** than households receiving cash, and were **more likely to produce women's crops** such as okra and Bambara groundnut, which may contribute to increased women's income.

Other Mobile Payment Products

Casaburi & Reed (2014) examined the relationship between wholesale prices in agricultural value chains and credit availability to farmers in an experiment using interlinked transactions between cocoa traders and farmers in Sierra Leone. The authors found that cocoa traders who received a price premium for cocoa were 14 percentage points more likely to provide credit to the farmers they purchased from than those who did not. The authors found no evidence of price pass-through, as **cocoa traders receiving premiums did not offer significantly higher prices to farmers than control traders**.

Comparison with Key Findings from Urban Africa and Other Developing Countries

Since high-quality evidence on microfinance's impact on consumption, food security, production, resilience, and income within the context of Sub-Saharan Africa is relatively limited, we include for comparison a summary of the findings of recent, seminal studies in other developing countries identified through citations in the studies we coded.

Credit Interventions

Much of the experimental research on the impacts of credit access has been conducted in urban contexts, particularly with a target population of small business owners. Several rigorous randomized experiments have been published in the last five years that did not meet the inclusion criteria for this evidence review, largely because they did not take place in rural Sub-Saharan Africa. While these findings are often consistent with results we report, in some cases findings from other regions contradict those we have reported thus far. This suggests that context may play an important role in financial product effectiveness and generalizations should be made with caution.

A series of six linked randomized evaluations of microcredit products across six countries demonstrated quite modest impacts on borrowers (Banerjee, Karlan, and Zinman, 2015; J-PAL, 2015). All six studies examined the impact of microfinance on business income and overall household income and well-being. Demand and take up rates for most products were modest, with the highest take-up rate at 31%. Access to credit helped some entrepreneurs invest more in their businesses, but this rarely resulted in increased profit, and none of the studies found a significant impact on average household income. No effects were found on women's empowerment or investment in children's schooling, but expanded

⁹ Both Kikulwe et al and Kirinyaga et al attempt to control for potential selection bias affecting the validity of their findings, given that mobile money users may differ systematically from non-users. Kikulwe et al. (2014) use a combination of Household Random and Fixed effects to control for unobserved heterogeneity between mobile money users and non-users. Kirui et al. (2012) use three matching techniques to compare the robustness of results.

access to credit did increase households' freedom of choice in income earning and management. Researchers did not find evidence of widespread harmful effects, even with individual-liability lending or a high interest rate.

These studies tend to find heterogeneous effects and do not examine effects on communities already being served by formal credit markets. Instead these studies look at populations as they gain access to credit as lenders move into new areas or randomize loan approval among marginally creditworthy clients. Studies generally do not report on profitability for the lenders. Two of these studies (Tarozzi et al., 2015; Crepon et al., 2014) took place in rural Africa and are reviewed above; we summarize the remaining four studies below.

Angelucci, Karlan, & Zinman (2013) conducted a cluster randomized trial with the microfinance provider Compartamos in Mexico. Group-liability loans were promoted to women in the study area and impacts were measured after three years. The authors found evidence that businesses grew, households were better able to manage liquidity and risk and that prospective borrowers had greater decision-making power within their households, but no evidence that profit, household income, or consumption increased. Evidence did not support the contention that credit expansion harms some borrowers.

In a randomized control trial in rural Mongolia, Attanasio et al. (2011) found that access to group loans had a positive impact on food consumption and entrepreneurship, increased the chance of owning a business by 10%, and caused business profits to rise over time. In contrast, individual lending had no significant impact on consumption or business ownership, and individuals in individual-lending villages were more likely to make informal transfers to family and friends than were borrowers in group-lending villages. There was no difference in repayment rates between the two programs.

Augsburg et al. (2013) assessed the impact of microcredit in Bosnia on poverty reduction, labor supply, and education among borrowers who would not otherwise have qualified for a loan. The authors found that borrowers' savings and consumption remained stable or declined, while business ownership increased (primarily among more educated borrowers). No significant changes were observed in income or business profits. They also found that children aged 16-19 increased their labor supply and decreased their school attendance after their household took a loan, while labor and school attendance did not change for younger children.

Banerjee et al. (2015) evaluated a group-lending microcredit program in Hyderabad, India over a period of three years, one of the longest study periods available. They found that while consumption did not increase among borrowers, business investment and profits grew among pre-existing businesses. Expenditures on durable goods increased while expenditure on "temptation goods" decreased. Borrowers did not differ significantly from the control group on health, education, or women's empowerment. After two years, when the control areas had gained access to microfinance, differences between the two areas were insignificant, even though the treatment area had borrowed over more time and in larger amounts.

Outside of these six studies, a number of other studies provide additional evidence outside of rural Sub-Saharan Africa. Karlan & Zinman (2010) explored the impacts of consumer credit at a 200% annual percentage rate for loan applicants at the margin of credit-worthiness in urban South Africa. Marginal applicants were randomly allocated into a treatment group in which loan officers could re-review applications and decide whether to offer credit. Among treated groups, researchers found significant positive average treatment effects on food consumption and economic self-sufficiency (employment and income), but found mixed effects on mental health indicators over a 15 to 27 month horizon. The loans were found to be profitable for the lender.

Karlan & Zinman (2011) used credit scoring to randomize individual-liability microloans among urban business owners in the Philippines who were on the margin of being approved for a loan. They found no evidence that microcredit influenced business growth or benefitted women more than men; the number of business activities and employees in the treatment group actually decreased relative to controls, and subjective well-being declined slightly. However, evidence did suggest that microcredit improved borrowers' ability to manage risk by providing an alternative to savings or insurance, strengthened community ties, and improved access to informal credit.

Fafchamps et al. (2011) conducted a randomized experiment among business owners in urban Ghana, finding that the manner in which capital was provided affects microenterprise growth. The researchers gave cash and in-kind grants to male- and female-owned microenterprises. Among women recipients, only the in-kind grants led to growth in business profits on average, but these profits were close to zero for women whose initial profits were below the median. Men also

experienced smaller impacts from the cash grant than the in-kind grant, but the difference was not as large. Because the study lacked a control group, only the relative impact of the two delivery methods can be concluded.

Field et al. (2013) conducted an experiment among poor urban women in India comparing an individual liability loan contract with repayment beginning immediately with a loan that had a two-month grace period. They found that the grace period increased short-run business investment and long-run profits, but also increased default rates. They estimated the monthly rate of return to capital among the sample at 13.0 percent, with a large 95 percent confidence interval of 1.0-26.0 percent. Borrowers of loans with a grace period were less likely to report very low or zero profits, and more likely to report high profits, relative to regular loan clients, and grace period clients had household income 19.5 percent higher than regular clients three years after loan disbursement.

Savings Interventions

Several recent studies examined the impact of increased access to savings on income and asset ownership through the expansion of state-sponsored as well as private programs. In general, the evidence suggests that expansion of formal savings opportunities to unbanked rural areas has positive impacts. Using panel data from India covering 1961-2000, Burgess and Pande (2005) found that the expansion of state-owned banks into unbanked rural areas in India was associated with reductions in rural poverty. In a quasi-experimental analysis of the effect of expansion of a government sponsored savings program in rural Mexico, Apportela (1999) found that the expansion was associated with higher savings rates and household income levels. In a more recent study, Bruhn and Love (2009), found that the opening in previously unbanked areas of Banco Azteca, a Mexican bank catering to low-income and rural clientele, was associated with increases in informal business ownership, employment, and income.

Some evidence also suggests that reducing behavioral constraints to savings can increase savings rates with positive impacts. In a randomized experiment that offered individuals commitment savings products in partnership with a rural bank in the Philippines, Ashraf, Karlan and Yin found an 81% increase in savings in the treatment group (2006), positive impacts on women's decision-making power within the household, and increases in ownership of female-oriented assets (2010). Callen et al. (2014) found that improvement in savings technology, in this case use of mobile point of service terminals to collect weekly deposits, were associated with higher rates of savings, increased household income, and changes in household labor allocation in an experiment in Sri Lanka. In a subsequent experiment, de Mel, McIntosh and Woodruff (2013) varied the frequency (biweekly vs. weekly) and method (central lockbox vs. door-to-door collection) of savings opportunities and found little evidence of changes in savings rates, suggesting there may be more sustainable alternatives for banks.

Expansion of savings and reducing barriers to savings in urban areas also appears to have positive effects. Kast and Pomeranz (2014) found that reducing barriers to formal savings by offering free individual accounts resulted in decreases in short-term debt and increased ability to cope with consumption shocks, and subjective well-being in a randomized experiment in Chile. These results are similar to those of Prina (2012), who found positive impacts on savings rates and asset ownership in a randomized experiment that provided savings accounts to women in 19 slums in Nepal.

Insurance Interventions

The evidence base on the impacts of weather insurance in developing country contexts is limited, in part because weather insurance is a relatively recent product and in part because adoption rates to date have been low (Cole et al., 2009). In a review of index-based insurance products across the developing world, Binswanger-Mkhize (2012) suggests that low rates of adoption may be caused in part by the low expected returns from purchasing index-based insurance. Wealthier farmers are able to self-insure relatively cheaply, so that if there is no payout from the insurance scheme they are worse-off than if they had not purchased it. Poor households, on the other hand, are too income and liquidity constrained to purchase most insurance products, even if they would be better off. The author suggests tying products to aggregators such as credit or mobile service providers may be one strategy to reduce costs enough to make weather insurance attainable by poorer smallholder households. Several recent reviews have provided overviews of weather index insurance applications and recent initiatives in the developing world (Barnett & Mahul, 2007; Morduch, 2006; Binswanger-Mkhize, 2012; Ceballos & Robles, 2014; Hazell et al., 2010; Hess & Hazell, 2009). The majority of the evidence has concentrated on barriers to, and

determinants of adoption (Clarke, 2012; Cole et al., 2013; Hill & Robles, 2011; Morsink & Guerts, 2011; Hill, Hoddinott, & Kumar, 2011).

Outside of sub-Saharan Africa, very few experiments have systematically tested the impact of weather insurance on household welfare or production decisions. Cai et al (2009) found that access to formal insurance was associated with increases in livestock production in a randomized natural experiment in China. Carter, Galarza & Boucher (2007) found that area-based yield insurance was positively associated with production in an econometric analysis of data from coastal Peru.

A systematic review of 159 studies of health insurance schemes in Africa and Asia found evidence to suggest that community based health insurance schemes and social health insurance schemes improve service utilization and improve resilience by reducing out of pocket expenditures, but very few of the studies (6 in Africa, and 18 in Asia) used experimental or quasi-Experimental design (Spaan et al., 2012).

Digital Payment Interventions

A well-established body of literature describes the economic impact of remittances to rural and agricultural areas (see Sander, 2003) but is not included in this review because they do not discuss the financial products used to send or receive them. Evidence examining the channel through which they are sent is much more limited (Aker, 2014). A growing body of evidence describes the use of mobile money and digital financial services in developing countries, particularly in Sub-Saharan Africa (Dernish et al., 2011; Duncombe & Boateng, 2009, Must & Ludewig, 2010; Morawczynski & Pickens, 2009, Pickens, 2009), but without formal testing for impact. Several recent publications have described the landscape of digital finance in Sub-Saharan Africa including the Consultative Group to Assist the Poor's (CGAP) review of recent interventions to serve the needs of smallholder farmers (Grossman & Tarazi, 2014), and Statham, Pfeiffer and Babcock's (2013) review of three private sector mobile finance products in Tanzania, Zambia and Malawi.

Findings on Complementary Research Questions

Aside from the core questions relating to the impact of financial products and services on consumption, food security, production, income, and resilience outcomes, we also coded the studies in our review for evidence of farmer perceptions of value, drivers of uptake and use, commercial sustainability, lessons from failure, and influence of the enabling environment. The evidence was very thin for most of these additional questions. This is due in part to our screening criteria that focused on the quality of study methodology. This screen tended to result in more quantitatively oriented studies and we did not conduct supplementary literature searches to look for qualitative studies. Nonetheless our search results also suggest that information on client demand and perceptions of products remains scarce. We present our findings on complementary questions in Table 6.

Table 6: Evidence for Complementary Research Questions

How do smallholder farmers perceive the value of financial services/products? Do perceptions align with available quantitative data?

- In Adebayo et al.'s (2012) study of microcredit among farmers in Nigeria, loans were not found to significantly impact production or food security. Farmers reported that their loan size was too small (37.5%), their interest rates were too high (34%), the loan process was time consuming or cumbersome (14.3%), and the repayment period was too short (16%).
- A BARA/IPA (2013) study of a ROSCA program for women surveyed women and technical agents to provide qualitative data about their experiences. A technical agent reported that while women were unsure about participating at first, most became committed to saving after seeing their success in the first year. Women were reported to find the training and advice aspect of the program helpful and educational. The researchers found that membership was associated with modest decreases in incidence of poverty and food insecurity, but did not find significant impacts on other indicators.
- Brune et al. (2014) reported positive client perceptions of a savings intervention with farmers' clubs. They found evidence of increases in land under cultivation, input use, crop output, and farm profits, and household

expenditures.

- Smith et al. (2010) reported that client perceptions of value of microinsurance were neutral.

Is uptake and usage a major constraint to delivering impact to smallholder farmers? What models have effectively catalyzed uptake and usage and deliver significant individual impact?

- Ali et al. (2014) found that the constraints to borrowing most commonly faced by households were high transaction costs in obtaining credit such as preparing loan applications, evaluating the value of collateral, and monitoring credit use and repayment, affecting 62 percent of the total sample and 90 percent of credit-constrained households.
- Take up of credit products was associated with several characteristics including literacy and formal schooling, larger landholdings and household size, larger investments in agriculture as well as larger agricultural outputs and profit, higher consumption at baseline, access to other sources of credit, female gender, off-farm employment, and access to extension (Ashraf et al., 2009; Awunyo-Vitor et al., 2012; Beaman et al., 2014; Owuor, 2009; Tarozzi et al., 2015). Ashraf et al. (2009) found that neither the wealthiest nor the poorest farmers tended to take a loan.
- Take-up rates of loans varied immensely among the studies reviewed, ranging from 17 to 91 percent of those receiving an offer, and were highly dependent on the loan product and characteristics of the sample.
- Beaman et al.'s (2014) evidence suggested that households that choose to borrow have higher marginal returns to borrowing than those who do not take loans. This study suggests that potential borrowers may be able to accurately assess their potential returns.
- Schaner (2015) found that in the third year after an intervention to provide subsidized savings accounts in Kenya, only four percent of men's accounts, three percent of women's accounts, and five percent of joint accounts were still in use. The author found that accounts with higher interest subsidies were more likely to still be in use, and that individual accounts were more likely to be used to store value than joint accounts.
- In contrast, three years after an intervention among ROSCAs in Kenya, 39 percent of participants were still using a savings box, 48 percent were still participating in a Health Pot, and 53 percent still had a Health Savings Account (Dupas & Robinson, 2013).
- In experimental games in Ethiopia, most farmers selected index insurance plans with higher premiums and higher frequency payouts, and 83 percent also purchased at least two of the five units of insurance available, implying that the very poor do not necessarily prefer low-cost, minimal-coverage insurance products (Norton et al., 2014).
- Despite widespread distrust of insurance, Kenyans have been more willing to take it up (1) for a risk that they are highly motivated to mitigate, and (2) when a risk is attached to a tangible product or service delivery, such as health services. An "anchor risk" is a risk that meets both these conditions, and take-up of insurance coverage in Kenya has been highest for "anchor risks" such as health risks, life and funeral risks, and agricultural production risks (Smith et al., 2010).
- Kikulwe et al. (2014) found that the probability of using mobile money was higher for larger households, those with formal schooling, and households with larger landholdings, but was not affected by market access variables, while Kirui et al. (2013) found that gender affected the likelihood of using mobile money, with male farmers more likely to use the service. In addition, farmers who lived farther from a mobile money agent were less likely to use the service, while farmers who lived farther from a commercial bank were more likely to use the service.

Which financial services/products with positive impact are most commercially sustainable?

- Aker et al. (2014) found evidence that a mobile money program was cheaper than manual cash distribution in terms of per-transfer costs, though the total cost per recipient when purchase of phones was included was more expensive than manual cash distribution. Additionally, they found that the marginal cost of a mobile money program was below the monetary value of time savings for participants.

- Ashraf et al. (2009) found that a credit program to encourage cultivation of export crops, which raised production volume and lowered marketing costs to participants before it collapsed, was not profitable over a six-month time horizon with a net loss of \$12 per client, though they note that it would be preferable to assess profitability over a longer period.
- Beaman et al. (2014) found that agricultural lending with balloon payments could be a commercially viable to increase farmer investment in agriculture.
- A literature review noted that many insurance companies in Kenya have failed over the past two decades (Smith et al., 2010).

What lessons can we learn from failures?

- Asfaw & Jutting (2007) noted that existing health insurance schemes in Senegal do not reach the poorest or illiterate rural populations. Shimeles (2010) concurred that poor households may not be able to afford community-based health insurance.
- Ashraf et al. (2009) find that credit for export crops increased income only for farmers who were not previously accessing export markets and note the need to focus on intensifying outreach to new farmers for credit products designed to increase export transactions. Even though the microlender collapsed because of lack of certification, the authors found that it succeeded in building trust with clients. They also concluded that the microlender should have secured resources to cover the cost of certification for farmers to avoid collapse and loan default.
- Schaner (2015) found that women quickly returned to their old savings and investment behaviors after a savings intervention, while men experienced long-run impact. They theorize that the experimental bank accounts did not meet women's needs, or that women did not have access to high-marginal-return investments outside the bank, while men's businesses had high marginal returns to capital.

How do different enabling environments (policy, regulatory, natural, social, economic) affect the effectiveness of the financial products/services being delivered to smallholder farmers?

- In the paper by Ashraf et al. (2009), poor understanding of certification requirements by the micro-lender and by farmers led to failure of the NGO micro-lender and default by many farmers.
- Kikulwe et al. (2014) find that even households in remote areas of Kenya are able to use mobile money services due to private telecom providers that have wide coverage and a network of shops in rural areas, and that this can help to overcome market access constraints.

Gaps in Evidence and Opportunities for Further Research

While the evidence base on microfinance interventions in rural Sub-Saharan Africa is generally thin, it is particularly scarce for mobile payment products and digital financial services, as well as for insurance. In respect to the four target outcome areas, we found no evidence on resilience outcomes of transaction or digital products, and two or fewer studies that reported on consumption or income impacts of insurance, mobile payment, or digital products. The results of these studies will need to be replicated in differing contexts in order to confirm their findings. Additionally, even the more plentiful studies on credit with rigorously designed randomized experiments typically report on only one financial intervention or bundle, making it difficult to conclude which types of products are most successful, especially considering that the literature measures a broad range of outcomes, often defined differently among studies.

There does appear to be a growing body of literature that may address some of these gaps in the near future, especially for insurance. Norton et al., 2014 included in this review, examines evidence from an experimental game conducted in rural Ethiopia as part of the Horn of Africa Risk Transfer for Adaption (HARITA) intervention conducted in partnership with the World Food Programme, Oxfam America, the Relief Society of Tigray (REST), local farmers and other members of the R4 Rural Resilience Initiative (R4). A final impact evaluation of the HARITA Intervention found mixed results for measures of resilience and production (Madajewicz, Tsegay & Norton, 2013). R4 has subsequently launched programs in Senegal, Malawi, and Zambia, with impact evaluations forthcoming (R4, 2015). The International Labor Organization's Impact Insurance

Facility (www.impactinsurance.org) has published numerous briefs on the sustainability, market development, and consumer perceptions of micro-insurance products in Latin America, South Asia, and Sub-Saharan Africa.

We included four studies on the use of digital financial products for payment services in this review, but recent innovations should provide additional evidence on delivery of credit, savings and insurance through mobile platforms in the near future. Examples of recent innovations include M-Shwari, a combined savings and loan product which acts as an extension of the highly successful M-PESA service in Kenya, and M-Pawa and Timiza, two mobile credit products operating in Tanzania through partnerships between mobile carriers and financial institutions (Chen & Faz, 2015). The use of mobile technology to deliver microinsurance products has also expanded to many parts of Asia and sub-Saharan Africa since 2006. While mobile platforms have most commonly been used for life or catastrophic accident insurance, there have been agricultural insurance products launched in India and Kenya in recent years (Prashad, Saunders, Dalal, 2013; Tellez & Zetterli, 2014).

Another research gap which has gained the interest of researchers is the evaluation of bundles of products. Researchers from the Savanna Agricultural Research Institute, Innovations for Poverty Action, and International Food Policy Research Institute, in partnership with the Ghanaian Ministry of Food and Agriculture are currently conducting a randomized evaluation of how extension services and input provision impact farmer productivity when combined with weather insurance (ATAI, 2015.)

In order to best answer questions about which financial services are most effective to alleviate poverty, increase production, grow incomes, and improve resilience, future research will need to test the effectiveness of different interventions or intervention bundles on a constant study population and with consistent outcome measures, similar to the study Dupas & Robinson (2013) conducted with informal savings technology bundles, or Aker et al. (2014) conducted with payment mechanisms.

Conclusions

A challenge in making generalizations across the body of evidence we reviewed is that the results of studies (both inside and outside Sub-Saharan Africa) may be context-specific and may not generalize to other populations. Another challenge is that the effectiveness of any given intervention depends on the quality of the product or service provided, which is often difficult to judge. Thus a credit intervention that finds no effects on agricultural production, for example, may imply that credit is not helpful for farmers in increasing output. Or it may be that the product itself was not well designed or implemented. In addition, financial interventions tested in randomized experiments tend to be quite specialized, especially if they are designed for rural or agricultural populations, so it is difficult to compare the effectiveness of results across studies unless the intervention is a very standard and widely available product. Even if the intervention is similar, the sample population may have specific characteristics, preferences, or needs that are not reflective of rural poor in other regions since studies are typically localized. Further complicating the aggregation of results by outcome, each study reports on a different set of indicators as Appendix C demonstrates, and even measures that seem comparable may differ substantially in interpretation. To preserve this complexity, we have reported outcomes by product type rather than synthesizing by impact area, and the generalized conclusions we can draw in this report are limited.

Please direct comments or questions about this research to Principal Investigator Leigh Anderson at eparx@u.washington.edu.

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Appendix A. Literature Review Methodology

The literature review focused on peer-reviewed literature supplemented with available ‘grey’ literature for areas of interest not covered by the academic literature.

Search Terms

To capture a broad range of literature related to rural and agricultural financial products and services and reduce the need for additional targeted searches, we used the search string (*rural OR agricultural OR farm OR farmer OR smallholder*) AND (*finance OR credit OR saving OR insurance OR mobile money OR lending OR borrowing*), restricting results to those published in or after 2000.

Search Locations

We first searched in two academic databases for peer-reviewed literature, Scopus and PAIS International, screening all search results for relevance. To capture relevant grey literature, studies published before 2000, and the most recent studies, we supplemented with searches of Google Scholar, for which we screened the first 200 results sorted by relevance from 1990-present to ensure we identified seminal studies, and the first 100 results sorted by relevance from 2014-present to ensure we identified the most recent studies. Additionally, we screened all microfinance studies published on the webpages of the Abdul Latif Jameel Poverty Action Lab (J-PAL), the International Initiative for Impact Evaluation (3ie), and Innovations for Poverty Action (IPA) to check for any relevant work that has not yet been published, as there is often a time lag before impact evaluations are prepared for publication.

Inclusion Criteria

Studies were identified for coding if they met the following criteria:

1. Reported on credit, savings, insurance, or transactional products or services
2. Reported on rural or agricultural populations
3. Reported on Sub-Saharan African (SSA) countries
4. Reported impact of financial services on poverty, production, income, or resilience outcomes
5. Current - research conducted post-1990
6. Available in full-text and in English to the University of Washington.

Further, studies were sorted by methodology to select the most rigorous evidence for coding. We selected all studies with rigorous methodologies¹⁰ that reported on savings, insurance, transactional, and digital products, as well as the experimental and quasi-experimental studies that reported on credit only. We screened the remaining results to identify additional high-quality studies for inclusion, and added two descriptive analysis studies and five regression or other econometric studies that reported on credit only. Additionally, we added nine studies we identified through the citations of other results. A total of 38 results were coded.

Because of the vast amount of evidence available for developing countries worldwide, and concerns about its transferability to the SSA context, we eliminated studies conducted outside of Africa. This decision could rule out new research that covers innovative products and services, outcome areas not represented by the body of evidence for SSA, or rigorous methodological techniques that provide stronger evidence of causation. Because of this, we will conduct a supplemental search for evidence on innovative products and services worldwide published since 2014, with our findings to be presented as an appendix to the final report.

¹⁰ “Experimental” studies are randomized control trials or other experiments. “Quasi-Experimental” studies may use random selection and/or a control group, and include methodologies such as difference-in-difference, propensity score matching, and regression discontinuity. “Regression or other Econometric Analysis” studies involve a cross-sectional multivariate regression with control variables. Results in these three categories, as shown in the table, are considered to be rigorous.

Search and Screening Results

Initial searches yielded 1038 results. We screened the titles and abstracts of these articles and where necessary, reviewed the full-text to determine whether they met screening criteria 1-3. We coded the 424 studies that did for methodology, type of financial product, and impacts reported, as well as noting whether the study reviewed any digital products such as mobile money or other technology-based services.¹¹ 79 results reported impacts on poverty, production, income, or resilience¹² for agricultural or other rural clients. We next selected by study rigor, retaining all identified studies with rigorous methodologies¹³ that reported on savings, insurance, transactional, and digital products, as well as the experimental and quasi-experimental studies that reported on credit only. We screened the remaining results to identify additional high-quality studies for inclusion, and added two descriptive analysis studies and five regression or other econometric studies that reported on credit only. Additionally, we added ten studies we identified through the citations of other results. A total of 38 results were coded.

Table 1. Selection of Studies for Inclusion

SEARCHING	Scopus PAIS International Google Scholar J-PAL, 3ie, IPA	1038 results
SCREENING STAGE 1	Targeted financial products Rural/agricultural Sub-Saharan Africa	424 remaining results
SCREENING STAGE 2	Reports on poverty, production, income, or resilience	79 remaining results
SELECTION FOR CODING	Rigorous methodology	28 remaining results
CODED RESULTS	28 remaining 10 studies identified through citations	38 results coded

Coding Approach

A team of two Research Assistants reviewed the articles according to the questions outlined in the review framework. The majority of coding questions were coded in a binary fashion with either a “no” or a “yes” to indicate whether the article described the activity, indicator, or outcome of interest. Binary variables allow the data to be extracted using pivot tables and charts. Other coding questions were answered qualitatively or quantitatively, depending on the question.

For each indicator in the framework, the RAs included a brief description explaining the coding on the basis of the information from the articles. The questions from the coding framework are included in Appendix B. The full coding framework for all of the articles reviewed will be included as an appendix to the final report.

¹¹ “Digital” can apply to any of the four types of products/services, but is most common for transactional or savings mechanisms.

¹² Resilience is defined as the ability to cope with shocks and/or smooth consumption.

¹³ “Experimental” studies are randomized control trials or other experiments. “Quasi-Experimental” studies may use random selection and/or a control group, and include methodologies such as difference-in-difference, propensity score matching, and regression discontinuity. “Regression or other Econometric Analysis” studies involve a cross-sectional multivariate regression with control variables. Results in these three categories, as shown in the table, are considered to be rigorous.

Appendix B. Questions from Review Framework

Study Characteristics (16)

- When was the research conducted?
- When was the study written/published (year)?
- Who conducted the research (author affiliation)?
- Who funded the research (funding source)?
- Is the study published?
- Number of citations
- What country (or countries) does the study report on (note “multiple” if more than one and list in description)?
- Does the study outline theoretical links between rural agricultural finance products/services and the outcome(s) studied?
- What is the methodology of the study (experimental, quasi-experimental, non-experimental, meta-analysis, literature review, theoretical review)?
- What is the level of the study (local, sub-national, national, or multi-national)?
- What is the size of the total population involved in the study (sample size)?
- What are the demographics of the study group?
- What are the criteria for participation in this study?
 - Is the study focused on rural households?
 - Is the study focused on agricultural households?
- Does the study include the use of a control group to compare against the group receiving the intervention?

Description of Financial Services/Products (12)

- Does the study report on credit products/services?
- Does the study report on savings products/services?
- Does the study report on insurance products/services?
- Does the study report on transactional products/services?
- Who/what organization is implementing or providing the financial service/product in the study (implementing organization)?
- Who/what organization is providing training or facilitation for the study (training organization)?
- Are other organizations involved in implementation or training for the study (other implementing organizations)?
- Are the financial products/services designed specifically for rural households?
- Are the financial products/services designed specifically for agricultural households?
- Are the financial products/services delivered or provided individually (i.e. as separate products) or as bundles (i.e. as a set of products)?
- Are the financial products/services combined with other complementary services (e.g. training, access to markets, etc.)?
- Does the study compare different models of financial products/services (e.g. two different credit programs, or programs with different bundles of services)?

Impacts on Poverty (11)

- Does the study report impacts on a measure of poverty?
- Does the study outline theoretical links between the financial products/services describes and poverty?
- What measure of poverty is reported on?
 - What is the overall impact on this measure of poverty (positive, negative, no impact, not significant)? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- List any other measure(s) of poverty reported on.
 - What is the overall impact on this (these) other measure(s) of poverty? Note “comparison” before stating the impacts if the study compares different financial products/services.

- Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- Does the study describe any potential lessons from failure (i.e. financial products/services that have no impact or negative impacts on this outcome area)?

Impacts on Production (11)

- Does the study report impacts on a measure of production?
- Does the study outline theoretical links between the financial products/services describes and production?
- What measure of production is reported on?
 - What is the overall impact on this measure of production (positive, negative, no impact, not significant)? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- List any other measure(s) of production reported on.
 - What is the overall impact on this (these) other measure(s) of production? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- Does the study describe any potential lessons from failure (i.e. financial products/services that have no impact or negative impacts on this outcome area)?

Impacts on Income (11)

- Does the study report impacts on a measure of income?
- Does the study outline theoretical links between the financial products/services describes and income?
- What measure of income is reported on?
 - What is the overall impact on this measure of income (positive, negative, no impact, not significant)? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- List any other measure(s) of income reported on.
 - What is the overall impact on this (these) other measure(s) of income? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- Does the study describe any potential lessons from failure (i.e. financial products/services that have no impact or negative impacts on this outcome area)?

Impacts on Resilience (11)

- Does the study report impacts on a measure of resilience?
- Does the study outline theoretical links between the financial products/services describes and resilience?
- What measure of resilience is reported on?
 - What is the overall impact on this measure of resilience (positive, negative, no impact, not significant)? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- List any other measure(s) of resilience reported on.

- What is the overall impact on this (these) other measure(s) of resilience? Note “comparison” before stating the impacts if the study compares different financial products/services.
- Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
- How do impacts differ among different client segments?
- Does the study describe any potential lessons from failure (i.e. financial products/services that have no impact or negative impacts on this outcome area)?

Other Impacts (11)

- Does the study report impacts on any other outcome measures?
- Does the study outline theoretical links between the financial products/services describes and resilience?
- What other outcome measure is reported on?
 - What is the overall impact on this other outcome measure (positive, negative, no impact, not significant)? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- List any other outcome measures reported on.
 - What is the overall impact on this (these) other outcome measure(s)? Note “comparison” before stating the impacts if the study compares different financial products/services.
 - Does the report compare impacts on different client segments (e.g. men and women, farmers and non-farmers, different value chains, levels of household income, age cohorts, etc.)?
 - How do impacts differ among different client segments?
- Does the study describe any potential lessons from failure (i.e. financial products/services that have no impact or negative impacts on this outcome area)?

Adoption, Usage, and Sustainability (12)

- Does the study report on client perceptions of the value of financial services/products?
- What are the overall client perceptions (positive, neutral, negative, don’t know)?
- Does the study report on client adoption of financial services/products?
- What is the level of client adoption?
- Does the study report on client usage of financial services/products?
- What is the level of client usage?
- Does the study report on drivers of adoption or usage?
- Does the study compare adoption and usage across different models of financial services/products?
- Does the study report on the commercial sustainability of different models of financial services/products?
- Does the study report on causes of failure of different models of financial services/products?
- Does the study report on the impact of the enabling environment on financial services/products?
- Does the study report on constraints to financial services/products (policy, regulatory, natural, social, economic)?

Appendix C - Indicators Used to Measure Outcome Areas

Measures of Consumption, Poverty and Food Security		
Study Name	Year	Indicator Used
Adebayo, C.O., Sanni, S.A., & Baiyegunhi, L.J.S.	2012	Food Security Index: calories consumed/calories required
Crepon Devoto Duflo & Pariente	2014	Total Monthly Per Capita Consumption (MAD)
Tarozzi, Desai, & Johnson	2015	# months of food insecurity
Kim, J., Ferrari, G., Abramsky, T., et al	2009	9 self-reported economic indicators: food security, household asset value, expenditure on home improvement, ability to pay back debt, membership in savings group, able to meet basic needs in past year, possesses bank account, better perception of economic well-being, has not had to beg in past month
Doocy, S., Teferra, S., Norell, D., Burnham, G.	2005	food security and malnourishment
Fink, G., Jack, B. K., & Masiye, F.	2014	Meal consumption
Burke, M.	2014	Total per capita household expenditure over the previous 20 days
Berhane G., Gardebroek C.	2011	Per Capita Consumption Expenditure
Berhane, G., Gardebroek, C.	2012	Annual Household Consumption Expenditures
Sharma, M., & Buchenrieder, G.	2002	Household Caloric Availability/Seasonality in Consumption
Sackey, H.	2005	Probability of being below the poverty line
Bureau of Applied Research in Anthropology (University of Arizona), Innovations for Poverty Action	2013	Number of HHs living under \$1.25/day
Brune, Gine Goldberg & Yang	2014	Total household consumption expenditure in last 30 days
Annan, J., Bundervoet, T., Seban, J., Costigan, J.	2013	% of households w/per capita expenditures under \$1.25 per day.
Aker, J. C., et al.	2014	Diet Diversity

Measures of Agricultural Production and Output		
Study Name	Year	Indicator Used
Diagne, A.	2002	Technical efficiency
Beaman, L., Karlan, D., Thuysbaert, B., & Udry, C.	2014	Agricultural output and profit
Ashraf, N., Gine, X., & Karlan, D.	2009	Total Crop Production (kgs)
Adebayo, C.O., Sanni, S.A., & Baiyegunhi, L.J.S.	2012	Total Crop production (Grain Equivalent)
Boni P.G., Dia Zira Y.	2010	Farm revenue
Ali, D. A., Deininger, K., & Duponchel, M.	2014	Value of total household agricultural output (USD)
Sharma, M., & Buchenrieder, G.	2002	Land under cultivation
Yilma, Z., Mebratie, A., Sparrow, R., Dekker, M., Alemu, G., Bedi, A.	2015	Value of total household agricultural output (ETB)
Gine & Yang	2007	Adoption of improved varieties
Hill & Viceisza	2010	Investment in Fertilizer
Bureau of Applied Research in Anthropology (University of Arizona), Innovations for Poverty Action	2013	Agricultural Input Use
Brune, Gine Goldberg & Yang	2014	Land Under Cultivation Value of Inputs used Agricultural Output Proceeds from Crop Sales Farm Profit
Kikulwe E.M., Fischer E., Qaim M.	2014	Banana Sales Value
Aker, J. C., et al.	2014	Total household Crop Production (kgs)
Casaburi, L., & Reed, T.	2014	Farm Gate Prices
Kirui O.K., Okello J.J., Nyikal R.A., Njiraini G.W.	2013	Agricultural Commercialization (Ratio of the value of sales to the value of total production)

Measures of Income and Wealth		
Study Name	Year	Indicator Used
Ashraf, N., Gine, X., & Karlan, D.	2009	Household Income (log)
Crepon Devoto Duflo & Pariente	2014	Total household income from farming, self-employment, or labor.
Tarozzi, Desai, & Johnson	2015	Farm and business net sales (yearly revenue - input purchases)
Owuor, G.	2009	Total household income from agricultural production (USD)
Fink, G., Jack, B. K., & Masiye, F.	2014	Wages (wage offers accepted - wages among those who chose to work)
Burke, M.	2014	Maize net revenue: value of all maize sales minus value of all maize purchases and interest payments
Ali, D. A., Deininger, K., & Duponchel, M.	2014	Non-farm income
Awunyo-Vitor, D., Abankwah, V., Kwansah, J.K.K.	2012	Business income
Sharma, M., & Buchenrieder, G.	2002	Household Income
Yilma, Z., Mebratie, A., Sparrow, R., Dekker, M., Alemu, G., Bedi, A.	2015	Total household Income (ETB)
Hill & Viceisza	2010	Hypothetical ROI from Fertilizer Purchased in Experimental Game
Bureau of Applied Research in Anthropology (University of Arizona), Innovations for Poverty Action	2013	Business Profits
Annan, J., Bundervoet, T., Seban, J., Costigan, J.	2013	Household Asset Ownership
Schaner, S.	2015	Total Average Monthly Income (Reported for Men only due to low uptake by women)
Kikulwe E.M., Fischer E., Qaim M.	2014	Total household Income from farm and non-farm activities, excluding remittances. (000 Ksh)
Aker, J. C., et al.	2014	Asset ownership
Kirui O.K., Okello J.J., Nyikal R.A., Njiraini G.W.	2013	Household Agricultural Income (Ksh.)

Measures of Resilience		
Study Name	Year	Indicator Used
Doocy, S., Teferra, S., Norell, D., Burnham, G.	2005	Self-reported use of 15 coping mechanisms
Fink, G., Jack, B. K., & Masiye, F.	2014	% of households Participating in Off-Farm Labor Market
Berhane, G., Gardebroek, C.	2012	Consumption Smoothing: Response in consumption in drought and post-drought years
Sharma, M., & Buchenrieder, G.	2002	Consumption smoothing (Changes in caloric availability, nutrition status, use of child labor, across periodic income fluctuations.)
Shimeles, Abebe	2010	Incidence of Catastrophic Health Expenditure
Asfaw & Jutting	2007	Ability to access/afford health care when needed.
Bureau of Applied Research in Anthropology (University of Arizona), Innovations for Poverty Action	2013	Ability to cope with Shocks - measures strategies available to SfC participants in absorbing income shock (i.e. taking out a loan, migrating, etc).
Dupas & Robinson	2013	Ability to cope with emergencies. (Could afford full medical treatment for an illness in the past three months)
Bandara, Dehejia, & Lavie Rouse	2014	Child labor
Jack, W and Suri, T.	2014	Changes in the response of consumption to shocks.
Tarozzi, Desai, & Johnson	2015	Nonfarm business creation