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Escaping the Poverty Trap: Formal Savings and Asset Accumulation in Rural Malawi

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Abstract

Formal savings accounts can be an effective device for households to accumulate assets over time and thus have more funds available to better afford an expensive one-time payment, in the form of either addressing an economic shock or paying for an important life event. I explore this relationship using a field experiment in rural Malawi conducted from 2008-2010, and find that adoption of a formal savings account has no effect on the frequency of economic shocks that a household experiences, nor does it affect how households respond to shocks. However, I find that account adoption does significantly increase the frequency of a household's expenditures on the life event of payment of secondary school fees. These findings indicate that, given enough time, adoption of a formal savings account allows a household to better accumulate its excess income, and therefore better afford expenditures that involve a decision by the household, as economic shocks tend to be exogenous and payments surrounding life events endogenous. These results support the effectiveness of a policy that extends formal financial services to rural, poor populations who may not have access to such services, as households can use excess funds to finance important life events that help future generations to escape a poverty trap.

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I. Introduction

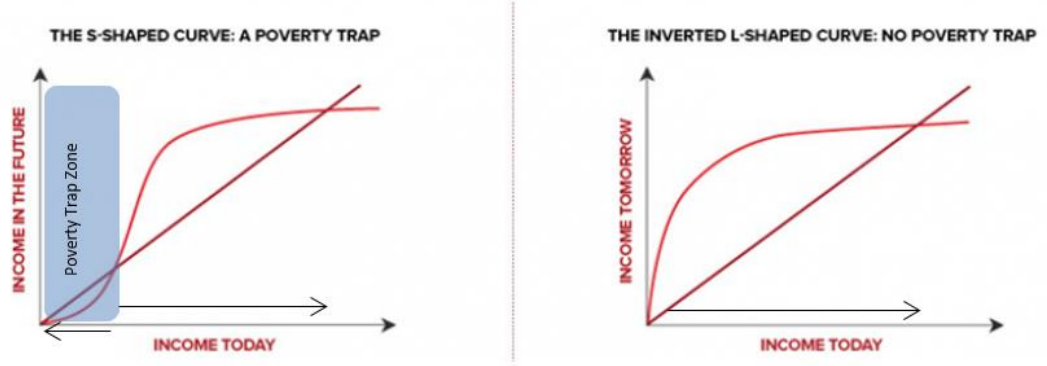
In the developing world, many families often find themselves unable to escape a state of severe poverty due to a myriad of factors, including an inability to afford important items that might make business more efficient and profitable, such as a track animal on a farm, or a large payment for a child to attend school. These burdens are often passed on to the next generation, and this can result in a trend of inescapable poverty and slow economic growth. However, with the help of the government or private organizations, there are certain tools that can be introduced to help these families escape poverty.

Formal savings accounts can have immense benefits for a poor, rural family in the developing world. With a safe place to store income comes improved ability to accumulate assets, which can help a family to afford a large lump-sum payment either in a time of turmoil, such as a severe economic shock, or in the case of an important investment, such as payment of a child's school fees. Furthermore, access to a savings account can help to mitigate income volatility, and households can dip into their savings account when a shock or opportunity for investment occurs, rather than take out a loan with a high interest rate, borrow from a neighbor, or sell productive assets. In sum, if a household regularly uses a savings account, they can take a variety of different actions to cope with an economic shock (Sebsted and Cohen, 2001) or life event. However, living in a rural area often means that a household has little or no access to formal financial institutions and is left to store cash at home in an unsafe manner, without incentive to make regular deposits, and with more temptation to spend available funds on a regular basis. If a family gains access to a formal savings account, it is likely that this household

would be able to save income over time and better afford production-related investments, which can help to boost future income and the income of generations to come.

In his book, *The End of Poverty*, Jeffrey Sachs outlines just how vital this increase in income can be for a poor family. He discusses how until a household reaches a certain income level, they will be unable to lift themselves out of poverty and find themselves in what Sachs calls a "poverty trap." This can happen when households have limited access to financial services and capital markets, live under a corrupt political system, have access to only very poor educational institutions, lack adequate health care, or face many more barriers. Sachs states that Sub-Saharan Africa is particularly prone to these types of poverty traps. Abijit Banerjee and Esther Duflo, in their book, *Poor Economics*, expand on this notion of the poverty trap and visually represent it in the form of S and L curves, as shown in Figure 1.

FIGURE 1: THE POVERTY TRAP AS SHOWN BY S AND L CURVES



Source: Japayya, *The Heinz Journal*; Duflo and Banerjee, *Poor Economics*.

In these graphs, the 45 degree line represents a situation in which "income today" is equal to "income tomorrow" (or, more broadly, in the future). This means that the potential to earn more income in the future is dependent on current income through avenues such as savings. However, many families face a poverty trap scenario, as in the S-shaped curve

on the left of Figure 1. In this situation, until a household can reach a certain income threshold, as defined by the first intersection of the S-curve and the 45 degree line (to the right of the shaded zone), their "income today" is less than "income tomorrow," and that household will therefore never reach the point in which the S-curve exceeds the 45 degree line. This area is the "poverty trap zone," and is a reality for many households (and their subsequent generations) in poor, developing countries. For example, say a farmer can produce a certain amount of corn that he can sell for $20 per week, representing his weekly income. Now, say that if the farmer had a track animal he could produce $50 worth of corn per week, but an oxen costs $200, which he is not able to afford without a loan from a formal financial institution. If he owned the oxen, he could easily pay off the $200 debt with his higher income. However, without access to formal financial institutions, it is unlikely that he would be able to afford the oxen in the first place, and therefore the farmer is unable to escape the poverty trap.

Alternatively, a poor family who is able to accumulate assets in a savings account might be better able to send a child to school by paying a one-time $300 fee. When this child is able to acquire more education than generations that came before her, she increases her human capital, and might therefore be able to find a job that provides her with an income that falls to the right of the poverty trap zone, finally escaping persistent intergenerational poverty. Without access to a formal savings account, however, the parents of this child might have never been able to afford the one-time payment that, while it might be burdensome at the time of payment, would increase future income (or income of the next generation) exponentially.

However, if income falls to the right of this poverty trap zone, a household will be able to increase its income over time. In wealthier, developed countries, the "income today" versus "income tomorrow" graph might look more like the graph on the right of Figure 1, or the "inverted L-curve" in which there is no poverty trap, and a household's earning potential is always greater "tomorrow" than "today." This model is particularly relevant in the study of the benefits of formal savings accounts. For countries that might resemble the S-curve, formal savings, which help families save income more efficiently and rapidly, could lead to a rotation of this S-curve upward and to the left about the origin (looking more similar to the L-curve), thereby lowering the threshold to escape the poverty trap and shrinking the poverty trap range of incomes as the intersection point between the S-curve and the 45 degree line moves to the left.

In terms of how often savings actually does take place for this population of interest that might lie within the poverty trap region, there is evidence that households that save usually do so informally, through methods such as keeping cash safe in their homes, forming a savings group with their peers, and buying durable assets such as livestock, which can be risky (Collins et al., 2009; Dupas and Robinson, 2013b; Karlan and Morduch, 2010; Rutherford, 2000; Prina, 2015). Access to more secure, formal savings accounts is a key component for long-term growth and poverty mitigation, but a large percentage of the world's poor do not have access to formal savings accounts or banking services (Demirguc-Kunt and Klapper, 2012; Prina, 2015). Additionally, when there are significant fees associated with opening or maintaining a savings account, people may be less able to afford an account. There is evidence that without these barriers to entry, the poor will be much more likely to open a savings account (Prina 2015).

Finally, distance from a formal financial institution can be a significant hindrance on a family's ability to open and utilize a savings account. Without the proper transportation, funding, or infrastructure, rural families may have no formal banking options.

Rural Malawi presents an excellent opportunity to examine these issues, because use of financial services is very low, but potential demand is high. Table 1 highlights the position of Malawi, in the World Bank's Global Financial Inclusion Database.

TABLE 1: GLOBAL FINANCIAL INCLUSION DATA

	Saved at a financial institution (% age 15+)	**Held an account at a financial institution (% age 15+)**
Malawi	7.1	16.1
Sub-Saharan Africa	15.9	28.9
Nepal	16.4	33.8
South Asia	12.7	45.5
India	14.4	52.8
World	27.4	60.7
Brazil	12.3	68.1
Euro Area	47.6	94.8

Source: World Bank's Global Financial Inclusion Database, 2014

Malawi's status as an especially rural country has a clear effect on the percentage of the population utilizing formal financial services. Only 7.1% of Malawi's population above 15 years of age saved at a financial institution in 2014, as compared to the 15.9% average for Sub-Saharan Africa, and well below the averages for South Asia, the Euro Area, and the World. We see a similar trend for the percentage of the population above 15 years of age holding any type of account at a financial institution. Malawi again ranks the lowest out of all countries and regions in the table for this figure at 16.1%. With little access to financial institutions comes little use of important services that can help families escape poverty traps and increase intergenerational income mobility.

In order to determine whether the intuition behind this logic is indeed correct, it is important to examine several empirical studies that analyze the relationship between formal savings and management of economic shocks, and formal savings and expenditures on life events such as education expenditures. There are only a few studies that analyze these relationships. An observational study (Alderman 1996) of Pakistan shows that any type of savings (formal or informal) enables households to cushion transitory shocks, and data from a field experiment in Kenya in Dupas and Robinson (2013a) indicates that informal, basic savings technologies like a lockbox can significantly reduce exposure to health shocks, most likely due to an increase in investment in preventative health products. Prina (2015) evaluates a field experiment in Nepal in which zero-fee bank accounts were randomly offered to a large sample of female household heads, and finds that adoption of a savings account is correlated significantly with a higher ability to cope with shocks using savings in a bank, and also with households' expenditures on education. Kimuyu (1999) finds that households in rural Africa that participate in Rotating Saving and Credit Associations (ROSCAs) are more likely to increase household expenditures in order to meet unusually high expenses such as school fees.

If a household is able and incentivized to make small, frequent payments into a formal savings account, they will most likely accumulate saved income more efficiently than if they are simply storing excess cash at home. Saving without a formal account may be difficult, as people might be tempted to spend spare cash when it is unnecessary, or because the cash could be susceptible to theft or damage. With the accumulation of assets and income in a formal, secure account, it will most likely be easier for a household to be

able to afford a large lump-sum payment that may be necessary in the case of an economic shock or life event. If during a lightning storm a tree falls on two income-producing cattle, or if a member of the family is infected with HIV/AIDS and needs immediate consultation with a doctor and treatment, a family might have no difficulty in maintaining their standard of living if they have a "rainy-day fund" saved away. However, if there are no excess funds in a bank account, a family might have to sell productive assets or cut back on expenses (in the form of skimpier meals, missed school fee payments, or poor healthcare). Lastly, access to savings might mean a reduction of income volatility, or even an increased income in general, meaning that the number of shocks that a family experiences in the first place could be reduced. For example, if a family can better afford high-quality fertilizer and pest control products, they might not experience the economic shock of a crop infestation. Additionally, if a family can afford regular doctor's visits and vaccinations, they might not experience the shock of a serious illness or death of a family member. Therefore, it is vital that formal financial institutions be available to poor families in order to mitigate these negative effects. These excess funds can also help a family to afford educational expenditures for their children, or wedding or funeral expenses. I hypothesize that with the adoption and regular use of a formal savings account, the rural poor should be able to better weather economic shocks and better afford significant life events. I will also explore whether the adoption of a savings account changes the frequency in which these shocks and events are experienced at all (meaning that the savings account is a *preventative* measure for economic shocks rather than just a coping mechanism).

The data used for this paper comes from household survey data in rural Malawi, first collected in 2008 and again in 2010. In late 2007, the Bill & Melinda Gates Foundation (BMGF) provided funding to Opportunity International Bank in Malawi (OIBM) to use a "mobile bank," or in other words, a large truck equipped with the latest information technology mechanisms, that drove out to randomly selected rural villages in Lilongwe, Mchinji, and Dedza, three districts in Central Malawi. The goal of this mobile bank was to increase access to financial services for thousands of people living in these rural areas where it might be hard to reach existing organizations that provided these services.

In sections II and III I provide background material on Malawi's economic, geographical and educational characteristics, and details on the methodology for the collection of the survey data and the delivery of the information intervention. Section IV contains descriptive statistics for the sample for shocks and life events, and section V outlines the methodology used for the econometric analysis used in the remainder of the paper.

Section VI, or the first results section, begins in part a by analyzing the observed changes in coping behavior for economic shocks and life events due to the adoption of a savings account. This simple analysis confirms that households that adopted savings accounts coped with shocks and life events using a bank account significantly more than households that did not, indicating that households who adopt savings accounts do indeed use them.

In part b I observe any changes in frequency of shocks and life events due to the adoption of savings accounts, to analyze if savings accounts can indeed be used as a

preventative measure for shocks as previously discussed, or if they allow families to finance life events more often. I find that only four of a total of eighteen shocks evaluated in the survey were significantly affected in frequency due to adoption of a savings account, indicating that most shocks are likely to be exogenous, meaning the frequency of their occurrence has mostly to do with factors outside of the household's control. Additionally, the two-year evaluation period may not have been enough time for the preventative effects of savings accounts on economic shocks to fully flourish. In this section I also found that the frequency of payment of secondary school fees (in the life events section) was significantly higher for families who adopted savings accounts, which I explore in much greater detail in section VII.

In section VII, I make use of the previously discussed randomized information intervention to determine a causal relationship between savings adoption and payment of secondary school fees. I use a two-stage least squares instrumental variable regression analysis, using the information intervention as an instrument for savings adoption, and determine that there is a 2.98 ($p<0.05$) to 3.04 ($p<0.10$) percentage point increase in payment of secondary school fees for families that adopt a savings account when restricting the sample to households located at least 3 kilometers from the mobile bank site, and controlling for household wealth and size. This result indicates that the adoption of a savings account does indeed help families to pay for school for their children more often, possibly through increased asset accumulation.

In section VII I also explore if there exists a relationship between savings adoption and the *amount* spent on secondary school fees. I find that, while my results show a positive effect, these effects are not significant. This suggests that while there is a

statistically significant effect of savings adoption on payment of secondary school fees on the extensive margin, there is not one on the intensive margin.

These results support the notion that access to formal financial services can be an effective way to combat long-term, intergenerational poverty, as households have proven to spend more on human capital investments, such as sending children to school, with the adoption of formal savings accounts. This finding can help to shape development policy, especially for countries with very rural populations who have large percentages of the population with no access to financial services.

II. Background on Malawi

Malawi is one of the poorest countries in the world, with many factors working against sustainable long-term growth, especially those factors which hinder families who rely on income from agricultural business. Climate change, namely man-made increases in carbon dioxide emissions and other greenhouse gases, may not be tangibly felt in developed, less temperament countries. However, in Malawi and much of Central Africa, these changes can be detrimental to the livelihood of rural citizens. With temperatures gradually rising, the rainy season has become shorter and more unpredictable. Households are plagued by droughts for much of the year, and when the long-anticipated rainfall finally arrives, it is so heavy that houses, crops and boats are all destroyed (Magrath and Sukali, 2009). For many families in rural Malawi, income depends on crop yield, and when crops are unexpectedly destroyed, families may need to sell existing assets, cut back on food consumption, or take their children out of school in order to

compensate for this lost income. Malawi faces a myriad of other issues related to health,[1] corruption, and an increasing population, but issues related to agricultural productivity are perhaps the most important to focus on, as more than 83% of Malawi's population is considered to be living in a rural area.

Statistics reflect these struggles, as shown by Table 2. Malawi ranks in the bottom four countries for GDP per capita, PPP, and ranks second for poverty headcount ratio and poverty gap (although only 56 countries have recorded data for this measure). Its GDP per capita in 2014 was $783.80, which is less than 6% of the world average of $14,273.50, and only 23% of the Sub-Saharan Africa average of $3,404.60. Its poverty headcount ratio is over four times that of the world. Data for Nepal is included in order to show that Malawi is an even better candidate than Nepal, analyzed in Prina (2015), for the effectiveness of formal savings introduction, as it has even higher levels of poverty.

TABLE 2: POVERTY DATA FOR MALAWI & WORLD COMPARISON

	GDP per capita, PPP	**Rural population, %**	**Poverty gap at $1.90 a day (%)**	**Poverty headcount ratio at $1.90 a day (% of population)**
Malawi	783.8	83.9	33.29	70.91
Nepal	2261.1	81.76	3.04	14.95
Sub-Saharan Africa	3404.6	62.77	-	-
World	14273.5	46.61	4.76	16.27

Source: World Bank World Development Indicators, 2014
Notes: GDP per capita, PPP is in constant 2011 international dollars; the poverty gap measures at $1.90 a day is in 2011 PPP dollars; the poverty measures use 2010 data, all others use 2014 data.

Table 3 shows that the central region of Malawi suffers even more in comparison to the country as a whole. Specifically, Lilongwe, Mchinji and Dedza rank well below national averages for education measures such as literacy rates and enrollment in

[1] Malawi ranks 9th in the world in HIV/AIDS prevalence, with 10.04% of adults age 15-49 living with the disease as of 2014 (Central Intelligence Agency, 2014).

secondary school, and above national averages for poverty measures such as the proportion of the population in poverty and ultra-poverty, poverty gap, and poverty gap squared.

Table 4 shows that the central region as a whole experiences high levels of economic shocks compared to national averages, especially for shocks related to negative agricultural outcomes, and health and wellness shocks. Additionally, the central region ranks the highest of the three for high levels of shock experience; 11.7% of households in the central region were affected by four or more shocks in 2010, whereas that figure is 7.2% for the northern region and 8.3% for the southern region.

Table 5 takes a deeper look at the root of educational attainment problems in Malawi. It is important to note that not having enough money saved up to pay for school is listed as the main reason for never having attended school. This highlights that even with low fees for primary school, the fees associated with secondary and post-secondary school are burdensome for households, especially households who may not have built up a savings account in which they can withdraw lump sums of cash when necessary.

TABLE 5. LITERACY AND EDUCATION STATISTICS FOR MALAWI

	Malawi	**Lilongwe**	**Mchinji**	**Dedza**
Literate	65.4	49.3	64.3	49.4
Never attended	21.1	20.8	20.3	34.4
No money	**44.0**	**50.9**	**50.2**	**57.5**
Not allowed	23.6	16.9	21.3	11.0
Not interested	18.1	14.9	15.7	20.0
Help at home	6.1	7.6	3.6	4.3
Other	8.2	9.7	9.2	7.3

Source: Malawi National Statistical Office, Integrates Household Survey, 2010/2011.
Notes: "Never attended" refers to the percent of the population that never attended school of any kind, and "No money," "Not allowed," "Not interested," and "Help at home" refer to the reasons for never attending school. The population is restricted to people ages 15 and above.

As discussed in Saggi (2014), Malawi has a very young population, as the median age of the population is 17.3 years old.[2] This can have positive and negative impacts. A benefit of a young population is a strong and capable workforce, who can benefit the nation's agricultural sector through fieldwork, boosting trade and increasing expected GDP for the country. On the other hand, a younger population is expected to boost population growth, as there is an average of 5.26 children born to each woman. With more people in each household, there are more mouths to feed, more school fees to pay for, and more health expenses to be incurred.

Malawi is an excellent case to study the effects of welfare-reducing economic shocks, because the unpredictable rainy season and only one yearly harvest can leave the rural population severely exposed to the risk of crop failure, and therefore a significant reduction in income. The country has also been one of the largest recipients of food aid due to food shortages caused by droughts and pests. It is also among the highest ranking countries in HIV/AIDS prevalence and malaria related deaths.

Malawi's high poverty rate, in addition to its large rural population, makes it an excellent case to analyze the effects of increasing access to formal savings accounts on poverty indicators such as susceptibility to economic shocks. Additionally, the low educational attainment levels and illiteracy rates make it an ideal case to study changes in school enrollment through payment of school fees. Moreover, the central region's struggle in comparison to the northern and southern regions in areas such as poverty, education, and economic shocks makes it ideal to analyze for this paper.

[2] Central Intelligence Agency (2013)

III. Sample Data and Experimental Design

a. Background, Sample and Data Collection

In order to test the relationship between access to formal savings accounts and the susceptibility to/ability to cope with economic shocks, I use data from a field experiment conducted in Lilongwe, Dedza, and Mchinji, which are the largest three districts in central Malawi. Malawi's location in Central Africa, and the location of the capital, Lilongwe, can be seen in Figure 2. In order to expand access to financial services to the rural poor population, a "mobile bank," in the form of a large van, drove out to six stops at trading centers in the aforementioned three districts. This van served as a roving bank branch that could carry out transactions in real time. Clients of the mobile bank could make deposits and withdrawals through a bank officer of a built-in automatic teller machine.[3]

FIGURE 2: MALAWI'S LOCATION IN AFRICA & THE CENTRAL DISTRICTS

Source: Gavi.org

[3] Clients could also make loan installment payments. Loan products were managed in part by loan officers residing in the communities of the clientele, while loan approvals were conducted at bank headquarters in Lilongwe.

With funding from the Bill & Melinda Gates Foundation, the Opportunity International Bank of Malawi (OIBM) worked in collaboration with Wadonda Consult and the IRIS/FSA team at the University of Maryland, MD to collect survey data from over 2000 households.[4] The baseline survey data was collected over February-April of 2008,[5] before the mobile bank treatment was implemented and any measurable use of the bank's services could be detected,[6] and the endline in the same period in 2010 after an information intervention to promote use of the bank was implemented, and after the effects of the treatment could be felt.

Almost 98% of the sampled household engaged in survey interviews ranging between 1.5 and 2.5 hours. The survey instrument was a 30-page questionnaire designed by the IRIS Center at the University of Maryland to assess the impact of OIBM's mobile bank experiment. The survey was translated into Chichewa, the local language, and then back into English to assure accurate translation. The questionnaire had 18 different modules, focusing on poverty assessment, economic activities (such as savings and loans behavior), asset ownership, income sources, economic shocks and significant life events, assets, and social capital. The same households were interviewed in both the baseline and the endline surveys. No rewards were given for completion of the survey interview.

[4] Wadonda Consult was the survey team in Malawi that conducted the household survey, and the IRIS/FSA team at the University of Maryland, MD reviewed the survey data.
[5] This data was collected during the pre-harvest "hungry" season, meaning food-stocks may be running low and resources may be limited. Many households in Malawi that rely on a farming income receive the majority of their yearly income during the harvest period, usually between April and June in Central Malawi.
[6] Almost no households in the baseline data reported using the bank's services, despite the fact that the mobile bank began operations before the baseline survey in 2007. This is most likely due to the fact that the information intervention was not implemented until February of 2008.

The sample was selected using a matched-pairs statistical design, with each pair consisting of two "Enumeration Areas" (EAs). Each EA consists of 2-4 villages, and a total of 118 EAs were sampled. The EAs were categorized based on distance from the mobile bank site[7] and on population size, which could be categorized as either high or low. After the EAs were categorized into a population-distance group, at least two EAs were randomly sampled from each group. One member of each pair was randomly assigned to a control group, and the other member to an information-treatment regarding OIBM's services and the mobile bank. There were 56 pairs (or 112 village-clusters) in the final panel, which accounted for approximately 325 villages and 2,006 households. In order to reduce potential spill-over effects of the information treatment into non-treated clusters, a minimum distance of 3 km between the two EAs in a pair was maintained. Within each village cluster selected for the treatment, the selected households were randomly selected by the intervention coordinators.[8]

b. The Information Intervention – A Randomized Experiment

It is important to recognize that adoption of financial services is likely correlated with many unobservable characteristics. For example, families with more motivated head-of-households might be more likely to both adopt a savings account, and to send his or her children to school. This variable, "motivation," is very hard to measure and therefore cannot be accounted for in regression estimates, but can falsely attribute payment of school fees simply with the adoption of a savings account, overstating the

[7] Categories included under 5 km, 5-10 km, and 10-12 km
[8] For more information on the experimental model, specifically regarding data collection methodology, see Flory 2012.

effects of adopting savings. In order to mitigate biases such as this, a randomized experiment was conducted within the sample to control for these unobservable characteristics.

In each cluster-pair, one cluster was randomly assigned to receive intensive marketing to increase cognizance of OIBM's financial services. This marketing consisted of public meetings, radio advertisements, promotional materials such as fliers, posters, and t-shirts, and encouragement from trained assistants. The methods of these trained assistants were modeled after extension workers who visited each randomly selected community once or twice a month for a few hours.[9] In Section VII the effects of this marketing campaign on savings adoption and household expenditures on school fees will be analyzed in detail.

[9] This model was consistent with the commonly used method of spreading information and education in these communities, and was also selected by focus-groups consisting of members of the community as the best way to provide information regarding formal savings accounts. The workers would travel to the selected communities by foot or bicycle on dirt paths and interact with the community.

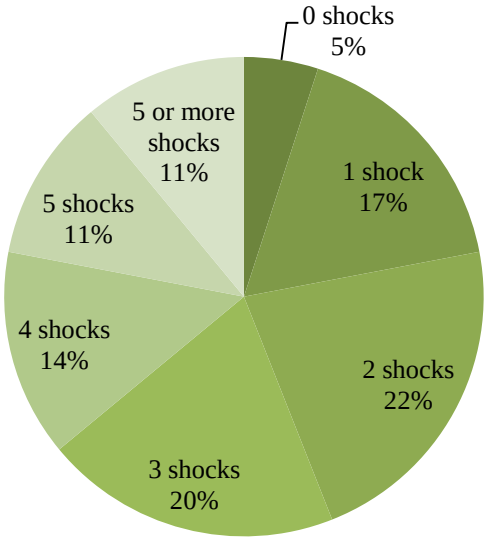
IV. Summary Statistics

a. Descriptive Statistics for Shocks and Life-Cycle Events

In order to get an idea of how prevalent economic shocks and life cycle events are in the sampled population, I look at the frequency of certain types of events, and at the financial burden felt by the affected families. Before the endline survey data was collected, Jeffrey Flory and Geetha Nagarajan wrote a paper outlining the major types of negative shocks that affect the population, coping mechanisms used by affected households, the role of social networks in responding to shocks, and how access to external finance affects responses.

Flory and Nagarajan found that for the 2,459 households evaluated after the baseline survey had been collected, the average yearly income was $182 USD. Almost 40% of the sample qualified as poor (with an income below the poverty line of PPP $2 per day), and 4% qualified as very poor (income below PPP $1 per day). Almost 96% of all households reported experiencing at least one shock, and the total number of welfare-decreasing shocks experienced by the sample was 7,605, or an average of three shocks per household. A little more than 20% of the sample reported experiencing two shocks, and another 20% reported three shocks.

FIGURE 3: NUMBER OF SEVERE SHOCKS EXPERIENCED BY HOUSEHOLD



Source: Flory and Nagarajan (2009)

Around 93% of the sample engaged in agricultural labor, and 66% owned livestock. This helps to explain why the most common shock reported was the theft or death of livestock or poultry, at about 56% of households reporting this shock at least once within the year before the survey was taken. A large increase in the price of food was the second highest reported shock at 47%, and an illness or accident affecting a household member came in third at 39%. It is also important to note that death of a household member among this sample is irregularly high. 239 households (about 10%) experienced the death of a household member. This roughly works out to 96 deaths per 1,000 households, and compared to the national average of 17.6 per 1,000, the death rate for this sample is unusually high. [10]

[10] A detailed breakdown of the frequency of each shock is included in Table 5.

In terms of shock severity and the impact on households, around three-fourths of reported shocks directly lowered household income, and around two-thirds required some form of coping response in order for the family to return to its former welfare level.

Flory and Nagarajan classify coping mechanisms into "low-stress" (such as working longer hours or reducing food consumption) "medium-stress" (such as using savings and loans) and "high-stress" (such as sale of assets).[11] They found that the majority of shocks were coped with using "medium-stress" mechanisms. Cash savings were used 80% of the time, which were held with an external agent and/or at home. Of the households that held a formal savings account, around 74% coped using savings. However, only about 40% of households that had access to a loan used a loan to cope with shocks. While not as many households used high-stress coping devices, there were some occurrences. Compared to households using medium-stress coping devices, those using high-stress mechanisms had slightly higher levels of assets and land, but also received more cash and food aid from the Malawian government or other charitable sources. Unsurprisingly, households with better access to formal financial institutions or social networks were more likely to use low- or medium-stress coping mechanisms, which are less likely than high-stress mechanisms to create income volatility and instability.

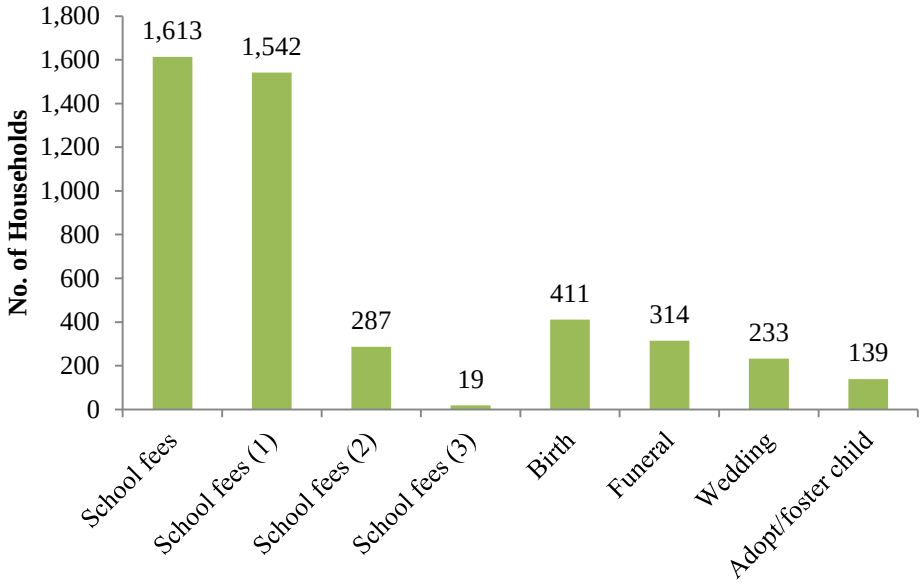
There were 2,945 reported life-cycle events in this baseline survey, which include events such as the birth of a child, a wedding, schooling, and funerals. About three-fourths of the sample reported at least one instance of a life-cycle event. Additionally,

[11] See Table 6 for a detailed breakdown of shock classification.

about 95% of these events necessitated that households dip into cash savings in order to pay for related expenses.

Figure 4 shows that payment of school fees was the most frequently experienced event, with 1,613 households experiencing this; specifically, 1,542 households paid primary school fees, 287 paid secondary school fees, and 19 paid post-secondary school fees. The birth of a child was the next most common event at 411 households, followed by funeral rites at 314, wedding within the household at 233, and the adoption or fostering of a child at 139.

FIGURE 4: NUMBER OF HOUSEHOLDS REPORTING LIFE-CYCLE EVENTS BY TYPE

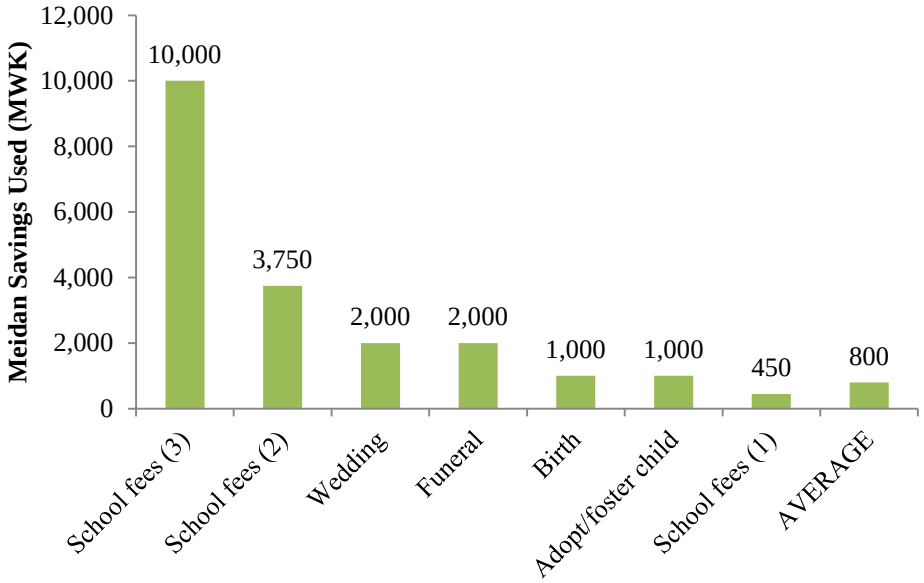


Notes: School fees (1) indicates primary school fees, (2) indicates secondary school fees, and (3) indicates post-secondary school fees.

While the frequency of primary school fees paid may indicate that this shock could be the most burdensome for a household, it is important to look at the monetary burden for each shock in order to understand what households must devote most of their funds to. Figure 5 shows that it is in fact post-secondary and secondary school fees that

cost households the highest value of their savings to pay for, with post-secondary fees costing families around 10,000 MWK (66 USD) of their cash savings on average and secondary fees costing around 3,750 MWK (24 USD) on average. Primary school fees, on the other hand, cost households only 450 MWK of their cash savings on average, which is only around 5 USD.

FIGURE 5: MEDIAN SAVINGS USED FOR LIFE-CYCLE EVENT



Notes: School fees (1) indicates primary school fees, (2) indicates secondary school fees, and (3) indicates post-secondary school fees.

The results in these figures point to an important observation that will be relevant in section VI: payment of secondary school fees, while less expensive than payment of post-secondary school fees, is much more common, with 287 households experiencing the former and only 19 experiencing the latter. Additionally, while primary school fees were paid at a much higher frequency than secondary school fees, secondary school fees are much more burdensome for households, costing on average 3,750 MWK of savings rather than only 450 MWK for primary school fees. Therefore, payment of secondary

school fees affects the households in the dataset more than the other two types of school fees, and this is reflected in the changes in payment of these school fees due to savings account adoption. This phenomenon will be discussed further in Section VII.

V. Methodology

a. Cluster-Robust Standard Errors

In each of my analyses, I use cluster-robust standard errors. This is because while individuals are randomly selected from within each cluster, the error terms within each cluster are likely to be correlated in some way (intra-cluster correlation). For example, if a dataset is clustered by school and students are randomly selected from these schools, there are likely to be correlations between students from school A, say high teacher quality or exposure to a certain policy that only affects schools in a certain district, while students school B have lower teacher quality and are not affected by that policy. If these correlations are not controlled for, OLS estimates are still unbiased but standard errors will likely be inaccurate, causing an incorrect interpretation of results. Therefore, we must assume independence across clusters but correlation within each cluster.

Since my dataset contains individual households within clusters of villages, cluster-robust standard errors are used to account for inherently correlated similarities between households within the same cluster. While these cluster-robust standard errors do increase the standard error values and therefore tend to reduce statistical significance, it is a much more conservative and therefore reliable measurement of significance.

b. Linear Regressions

I first use a linear regression model to estimate the relationship between:

1) Adopting a savings account and payment methods (selling assets, using cash, or borrowing cash) in response to an economic shock
2) Adopting a savings account and experiencing economic shocks
3) Adopting a savings account and paying for a life event

This savings account could be held at any formal institution, including a commercial bank (OIBM, National Bank, Standard Bank, NBS Bank, First Merchant Bank), a state bank (Malawi Rural Finance Company and Malawi Savings Bank), NGOs in the district, or savings and credit institutions. The savings account could also be held informally at home, with a friend or neighbor, or in a Rotating Credit and Savings Association (ROSCA). The details of the coping mechanisms and nature of the economic shocks and life events will be discussed further in the results section and in the relevant tables.

Because these regressions serve simply as an exploratory measure into the exogeneity of shocks and endogeneity of life events and to show that savings accounts are most likely changing behavior in paying for these variables, I leave out most control variables for this segment of my research.[12] I use this analysis to simply make the point that it is more valuable to continue my analysis focusing only on life events, specifically payment of school fees. I do not claim causality in any of these estimated relationships.

[12] Household wealth, as measured by owning a cell phone, is the only control variable used in this section of the analysis.

c. Two-Stage Least Squares Instrumental Variable Analysis

In order to determine how savings accounts affect whether or not households pay school fees, a simple linear regression of these two variables will not be sufficient. This is because adopting a savings account is likely to be correlated with many unobservable factors that also affect whether parents invest in their children's education. For example, the wealth of a household, the level of education attained by the head of household, or perhaps unobservable variables such as "motivation" of a parent or their values are likely to be correlated both with adopting a savings account and investing in education. Such correlations could create biases in causal estimates. Therefore, this analysis can only allow us to estimate correlation in the data, without allowing us to infer causal impacts from these estimates. This structural model is as follows:

$$(1) \qquad E_i = \beta_0 + \beta_1 A_i + u_1$$

where E_i is a binary variable for whether a household has paid school fees, β_0 and β_1 are coefficients, A_i is a binary variable for whether or not a family adopted a savings account between 2008 and 2010, and u_1 is the error term.

Because A_i is likely correlated with variables contained in the error term, I use the information intervention discussed in section III, which is randomly assigned and therefore uncorrelated with the error term but likely correlated with adopting a savings account, as my instrumental variable (IV) in a two-stage least squares IV regression. I first look at the reduced form equation to determine the effect of the information intervention on paying school fees:

$$(2) \qquad E_i = \pi_0 + \pi_1 T_i + v_2$$

where E_i is a binary variable for whether a household has paid school fees, π_0 and π_1 are coefficients, T_i is a binary variable for whether or not a household received the information intervention treatment, and v_2 is a new error term. If the information intervention is found to be a significant variable in the reduced form equation, it can be assumed that this significant effect is operating through the channel of savings adoption.

Next, I perform a two-stage least squares regression, in which the first stage regresses the household's adoption of savings accounts on the information intervention, and the second stage regresses the payment of school fees on the predicted adoption rate according to the first stage.

$$(3) \qquad A_i = \pi_0 + \pi_1 T_i + v_2$$

$$(4) \qquad E_i = \beta_0 + \beta_1 \widehat{A_\iota} + u_1$$

where $\widehat{A_\iota}$ is the predicted proportion of households that adopt formal savings accounts according to the first stage shown in equation 3.

d. Control Variables

Beginning in the 2SLS stage of my analysis, I use control variables in my regressions in order to get a more accurate estimate of the true relationship between adopting a savings account and paying school fees. Specifically, I focus on three different categories: household wealth, family structure, and educational attainment of the head of household (or the "decision-maker").

The wealth of a household is a clear candidate for a control variable since it very likely could affect a household's decision to adopt a savings account and its ability to afford school fees. A wealthier household will likely be more inclined to open a savings

account to keep their funds safe, and also more able to send their children to school as they may have excess funds after paying for basic life expenses such as food and shelter. There are a few different ways to measure wealth in my dataset: the value of a household's assets, its food security score, and whether or not any household members own a cell phone. In Table 6, I evaluate how each of these variables is related to paying secondary school fees and to adopting a savings account without control variables.

TABLE 6: MEASURES OF HOUSEHOLD WEALTH

	Paid Secondary School Fees			Adopted a Savings Account		
	(1)	(2)	(3)	(4)	(5)	(6)
Total household asset value	3.52e-06 (2.81e-06)			6.19e-06 (5.12e-06)		
Owns cellphone		0.0139* (0.00708)			0.214*** (0.0368)	
Food secure			0.0120* (0.00641)			0.0873*** (0.0284)
Observations	1,997	2,103	2,103	1,782	1,882	1,882
R-squared	0.022	0.005	0.004	0.002	0.034	0.008

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Because total asset value does not show a significant relationship to paying secondary school fees and adopting a savings account when using cluster-robust standard errors, I narrow my choice down to cellphone ownership and food security as a proxy for household wealth. From here, I choose cell phone ownership because it implies the same type of "excess cash" that might be used for school fees, whereas food security does not imply excess cash. Additionally, "food secure" is a binary variable defined as either "secure" or "mildly food insecure," and therefore might still not be a good representation

of wealth. Through this basic exploration of correlation between these variables, I conclude that cell phone ownership is the best measure of household wealth.

I also control for the variable observing the number of children in a household, as this is likely to affect how many children could be attending school, and therefore whether or not a family pays school fees. I also control for the highest educational attainment of the head of household, specifically binary variables for whether the head of household's highest attainment is completion of primary school, secondary school, or post-secondary school. My hypothesis is that if a parent is educated, they might value education more for their children and find a way to send them to school.

VI. Results: Changes in Coping Behavior and Shocks and Events Experienced

a. Changes in Coping Behavior

It is first important to evaluate whether households that have savings accounts are exhibiting the expected behavior of using funds from these accounts to finance economic shocks, and changing their behaviors for coping using other methods such as selling existing assets, using cash held at home, or borrowing from a friend, relative, money lender, or bank. To do this, I regress these coping behaviors on a binary variable for having a formal savings account in 2010, as shown in Table 7. I also control this using a binary variable for households that have experienced any shock, and for household wealth through a binary variable for cellphone ownership.

I find that for households that have a formal savings account, there is a positive but insignificant (p=0.124) effect for coping by selling assets; households that have a savings account are 4.46 percentage points more likely to sell assets to pay for an economic shock. Additionally, households that had savings account were significantly more likely to cope with economic shocks using cash at home. Both of these phenomena could be due to the fact that households that adopt savings accounts see an accumulation of overall income and assets, and both hold more cash and have more assets than those who do not adopt savings accounts. While the coefficient for borrowing from friends, relatives, money lenders, or banks was significant (p=0.102), there is a predicted negative effect of 3.15 percentage points on this type of borrowing for households that have savings accounts. This behavior seems logical, as households with savings accounts could have more income and assets, and therefore be less reliant on their friends, family, or formal lenders. It is important to note that these analyses should only be interpreted as

a correlation, not a causal relationship, between savings accounts and changes in coping behaviors, as having a formal savings account is likely to be correlated with variables not controlled for in the regression.

b. Changes in frequency of shocks

We can next look at how having a savings account affects the frequency of shocks that a household experiences, as it could be expected that with the use of a savings account comes a tendency to slowly accumulate more assets over time, and a disincentive to spend available cash (an individual might be less tempted to make unnecessary purchases if his or her cash is tied up in a bank account rather than sitting in his or her living room). My prediction is that households that have a savings account will experience fewer shocks of a certain type, as they might be able to better afford "shock-preventers" with their extra cash. For example, if a household has a higher income, they might be better able to afford pesticides and therefore avoid the economic shock of "crop disease or pests." Additionally, if a family has more disposable income, they might be able to better afford healthier foods and vitamins, and experience fewer instances of the shock of "illness or accident of a household member."

Table 8 shows the simple correlation between the binary variable of whether or not a shock was experienced, and the binary variable of whether or not a household has a savings account, while controlling for household wealth through the binary variable of cell phone ownership.[13] Only four of the 18 shocks in the survey produced a significant relationship with whether or not a family adopted a savings account. These were an

[13] Shocks with 1) observations under 100 households, and 2) insignificant results, have been excluded from the table. A detailed description of each shock type and its code can be found in the footnotes of Table 8.

unexpected increase in input (5.50 percentage points), a large fall in the sale prices for crops (13.7 percentage points), a large rise in the price of food (-9.06 percentage points), and the death of a working member of a household (-0.78 percentage points), although this last shock was experienced by only 11 households.

These results can show that shocks are not the best way of assessing a family's change in income due to accumulation of assets through the use of a savings account. This is because many of these shocks are most likely exogenous, meaning whether the shock occurs or not has mostly to do with external factors beyond a household's control, and therefore is unaffected by household characteristics. This can be shown by the fact that 14 of the 18 shocks in the survey are not significantly correlated with adopting a savings account. This makes studying shocks as an indicator of increased household wealth an unappealing approach, and therefore it will be more helpful to look at changes in the frequency of life events that are decisions actively made by a household, and much more likely to accurately reflect changes in income.

c. Changes in frequency of life events

Table 9 regresses each individual life event (as a binary variable for whether or not the event was experienced) on whether or not the household has a savings account (also a binary variable), again controlling for cell phone ownership. The estimated effect of savings account ownership is significant for the birth of a child, payment of funeral rites, and sending children to primary school, secondary school, and post-secondary school. Savings account ownership is estimated to decrease the likelihood of the event of the birth of a child by 3.72 percentage points ($p<0.10$), increase payment of funeral rites

by 4.86 percentage points ($p<0.05$), increase payment of primary school fees by 17.1 percentage points ($p<0.01$), increase payment of secondary school fees by 12.4 percentage points ($p<0.01$), and increase payment of post-secondary fees by 1.4 percentage points ($p<0.10$). This is likely due to the fact that families that use savings accounts are more likely to accumulate assets, and therefore have more of an ability to afford life events that they could not afford without an account, such as school for their children. As shown in Section VII, even when controlling for factors such as household wealth, number of children, or education attained by the head of household, I still find a significant positive relationship between paying secondary school fees and adopting a savings account.

However, due to the fact that there could be unobservable variables in the error term affecting both savings adoption and school expenditures, it is difficult to determine a causal effect between these two variables. Therefore, in the next section I will take advantage of the randomized information intervention in which roughly half of the households received a savings encouragement and the rest did not. By using a binary variable for whether or not a household received this information randomly, any endogeneity in my previous analysis can be removed.

VII. Results: Two-Stage Least Squares Analysis Using an Instrumental Variable

a. The Information Intervention and Savings Adoption

Using the methodology outlined in part C of section V, I test the relationship between receiving the information intervention promoting savings accounts, and payment of school fees. However, to support the notion that any reduced form effects of the

information intervention occur through the channel of account adoption, I first test the validity of the instrument as shown in Equation 3:

$$(3) \qquad A_i = \pi_0 + \pi_1 T_i + v_2$$

Table 10 shows the results from a simple linear regression of adopting a formal savings account on a dummy variable representing a household that has received the information intervention promoting the use of savings accounts and a variety of other controls, with and without cluster-pair fixed effects,[14] and standard errors clustered at the village-cluster level. In this analysis, the dependent variable is a {0,1} indicator for whether or not the household adopted a savings account between the baseline and the endline survey period, and thus the sample was restricted to households that did not have a savings account during the baseline period.

The results from Table 10 do indicate that there is a significant positive effect of the information intervention on adopting a savings account. Firstly, the changes in significance from column 1 to 2, and from 6 to 7, indicate that distance from the bank site is an important factor; on average, when the sample includes all households of all distances from the bank site in column 1, the information intervention raises savings adoption rates by approximately 2.97 percentage points (p=0.128), which is not statistically significant at conventional levels. However, when the sample is restricted to households that live a minimum of 3 kilometers from the bank site, this figure jumps to a 4.04 percentage point increase (p=0.054), which is significant at the 10% level. This pattern persists when controlling for cluster-pair fixed effects. For households of all

[14] For the remainder of this paper I will perform my analysis with and without cluster-pair fixed effects. Controlling for these cluster-pair fixed effects is important because each cluster-pair has a unique distance from the bank stop and population size, which could create fixed effects in these communities such as access to urban services, school quality, opportunity for informal loans, etc.

distances, there is a 3.08 percentage point increase in column 6 (p=0.028), and for the restricted sample, there is a 3.73 percentage point increase (p=0.013) (as shown in column 7). This highlights that households that live closer to the bank site might hear about the bank's services by word of mouth, or might happen to come across the mobile bank in their everyday lives, whereas households that live farther away are less likely to experience both of these events.

Columns 3 and 8 further control for household wealth with a {0,1} variable for whether or not any member owns a cell phone, restricting the sample again to households living farther from the bank site, with and without cluster-pair fixed effects. For both analyses, cellphone ownership was a significant predictor of savings adoption at the 1% level, associated with a 22.4 percentage point increase in adoption without fixed effects in column 3 and by 22.1 percentage points with fixed effects in column 8. When controlling for fixed effects, the information intervention was still a significant predictor at the 5% level (column 8), increasing savings adoption by 3.11 percentage points.

Columns 4 and 9 control for household wealth and the number of children in the household. Cell phone ownership remains significant at the 1% level, and the number of children is significant at the 5% level with and without fixed effects, increasing adoption by 1.34 percentage points without fixed effects and 1.31 percentage points with fixed effects. While number of children should intuitively not have an effect on savings adoption, it is included in this regression for the sake of consistency, as this variable is likely to have an effect on whether or not a household pays school fees in the next part of my analysis.

Columns 5 and 10 control for the educational attainment of the head of household. While the binary variable for head of household having primary education is significant at the 1% level both with and without fixed effects, the information intervention is still a significant predictor of savings adoption, increasing adoption by 2.87 percentage points with fixed effects (column 10).

b. Reduced Form Effect of Information Intervention on Different Types of School Fees

To test the "reduced form" relationship as outlined in Equation 2, I created three binary variables, each representing payment of a different type of school fee (primary, secondary, or post-secondary fees).

$$(2) \qquad E_i = \pi_0 + \pi_1 T_i + v_2$$

Table 11 shows the simple relationship between payment of each type of fee and the binary variable for whether or not a household received the information intervention, both for all households, and for the sample restricted to households located 3 or more kilometers from the bank site. All regressions control for cluster-pair fixed effects, and use cluster robust standard errors.

Only the relationship between payment of secondary school fees and receiving the information intervention produced a significant relationship, with the information treatment increasing secondary school fees payment by 3.50 percentage points for all households in column 3, and 4.18 percentage points when the sample is restricted to households 3+ kilometers from the bank site. Roughly 12.0% of households[15] paid secondary school fees, so this 4.18 percentage point increase represents a 34.8% increase

[15] 287 paid secondary school fees, of a total 2,395 households.

in payment of secondary school fees for the sample. Both of these figures are significant at the 1% level. It is unsurprising that only secondary school fees produced a significant relationship in this analysis. As discussed in section IV, while payment of primary school fees was experienced by 1,542 households, secondary school fees by 287 households, and post-secondary by 19 households, the monetary burden of primary school fees is minimal compared to secondary and post-secondary. The median amount of savings used to pay post-secondary fees was 10,000 MWK, 3,750 MWK for secondary school fees, and only 450 MWK for primary school fees. These two findings indicate that secondary fees are much more common than post-secondary fees, and much more burdensome than primary fees, and are therefore more likely to significantly affect households than the other two.

I next create a variable for the amount of money spent on each type of school fee to test if there is a relationship on the intensive margin of payment of school fees, in addition to the extensive margin as found in Table 11. I create a variable representing the sum of the amounts spent in cash, the sale of assets, and amount borrowed from a friend, relative, bank, money lender, or other institution. In Table 12, I restrict the sample to only the households that had paid each school fee, and then proceed to test the relationship between the amount paid for the school fees on whether or not the family received the information intervention. As in Table 11, I control for cluster-pair fixed effects, and test these relationships both for all households, and for households located more than 3 kilometers from the bank site.

The results in Table 12 indicate that there is no relationship between the amount paid on school fees and receiving the information treatment, conditioned on paying a positive amount of fees. This suggests that while there seems to be a relationship between

payment of school fees and the information treatment on the extensive margin, there does not seem to be evidence of a relationship on the intensive margin.

Table 13 uses the same dependent variable for amount paid on school fees as used in Table 12, but does not restrict the sample to only those households that paid the fees. I find a significant effect on amount spent on secondary school fees, which is consistent with the findings of Table 11. These findings indicate that this significance is likely due to a relationship on the extensive margin, and not on the intensive margin.

c. 2SLS Estimates: the Effect of Savings Adoption on Payment of Secondary School Fees

I next use the randomly assigned information intervention as an instrument for savings adoption in a two-stage least squares regression that estimates the effect of savings adoption on payment of secondary school fees. Using the information treatment as my source of exogenous variation, I remove the endogeneity problem discussed in section VI, part c, to obtain an unbiased causal estimate of the effect on the same 3 variables used in the previous section. As a reminder, this is modeled after equations 3 and 4:

$$(3) \qquad A_i = \pi_0 + \pi_1 T_i + v_2$$

$$(4) \qquad S_i = \beta_0 + \beta_1 \widehat{A}_\iota + u_1$$

where Equation 3 is the first stage of the 2SLS analysis, and Equation 4 is the second stage. First, the {0,1} variable for payment of secondary fees; second, the continuous variable for the amount a household has spent on school fees, conditional on the household paying school fees; and third, the same continuous variable but for all households.

i. Binary Variable for Payment of Secondary School Fees

Table 14 gives a summary of the results for the 2SLS analysis for the binary variable, with and without cluster-pair fixed effects. Panel A shows Intention to Treat (ITT) estimates from a linear regression of whether or not a household paid secondary school fees on a dummy variable for the savings information intervention. That is, it shows the reduced form effects of the information treatment. In this ITT estimation, all 8 estimates of the impact of the information intervention are significant at a minimum of the 5% level. Even when controlling for household wealth through a binary variable for cellphone ownership and the number of children in the household, the model estimates a 3.78 percentage point increase in payment of secondary school fees for households who received the information intervention without controlling for pair fixed effects ($p<0.05$), and a 3.71 percentage point increase when controlling for pair fixed effects ($p<0.05$).

Appendix Table A1 gives a more detailed account of these results, with controls for the highest educational attainment of the head of household during the baseline survey in 2008 (either completion of primary, secondary, or post-secondary school). Columns 5 and 10 indicate that with and without fixed effects and when controlling for the educational attainment of the head of household, the information intervention is a significant predictor of payment of secondary school fees, increasing payment of school fees by 3.51 percentage points without fixed effects ($p<0.05$) and by 3.46 percentage points with fixed effects ($p<0.01$). These columns also show that the head of household having primary education is a significant predictor of secondary school fee payment, as

are the number of children in a household. Completion of secondary or post-secondary education are not significant predictors in the regression, with or without fixed effects.

Panel B of Table 14 reports the results from the two-stage least squares regression, for which the savings information intervention is used as an instrument for savings adoption, again with and without pair fixed effects. Columns 5, 6, 7 and 8 show that savings adoption has a strong impact on payment of secondary school fees, increasing the probability of payment by 128.1 ($p<0.10$), 115.6 ($p<0.05$), 129.5 ($p<0.05$), and 1.291 ($p<0.10$) percentage points, respectively, with the same controls as Panel A.

Obviously, these results are not possible; the probability could not be increased by more than 100 percentage points. This overestimation could be due to a separate channel affecting payment of school fees in addition to the effect of savings adoption. For example, Flory (2012) finds that households induced by the information treatment to adopt savings accounts tend to give more cash gifts to other households. Specifically, if household A to adopts a savings account, thereby increasing its income, it might increase the number loans or payments that household A makes to household B, who received the information intervention but did not adopt a savings account. Household B could use this loan or gift to send their children to school. This phenomenon could overestimate the effect of the information intervention as an instrument for adopting a savings account. This is an issue that deserves further consideration through future research in which the true effect of the information intervention on other factors, rather than just savings accounts, is analyzed.

Appendix Table A2 gives more detailed results with the same controls as Table A1. Columns 6 through 10 show that savings adoption is a significant predictor of

payment of secondary school fees when controlling for factors such as the number of children in the household or the educational attainment of the head of household. No other variables in this part of the 2SLS regression analysis are significant at this point.

ii. Continuous Variables for Amount Spent on Secondary School Fees

Tables 16 and 17 follow the same analytical model as used in Table 14, but examine the effect of account adoption on the amount paid for school fees, rather than on the binary variable for whether or not they were paid at all. The continuous variable in Table 15 is conditional on the household having paid school fees. In other words, the sample is restricted to only those households who both paid secondary school fees, and did not have a savings account in 2008; the results can therefore be interpreted as the effect that the information intervention has on the amount that a household pays in secondary school fees. The intention to treat results in Panel A of Table 15 estimate that the information intervention increases the amount spent on secondary school fees by around 1,600 MWK[16] when controlling for pair fixed effects, and the Instrumented Effect in Panel B estimates an increase between 51,778 MWK (column 8) and 98,845 MWK (column 5) when controlling for fixed effects and controlling for various factors, discussed in the previous section. However, none of the results in this analysis were statistically significant, and therefore the effect of the information intervention on the amount spent on school fees should not be regarded as being strong. This could be due to large variation in a small sample, and future research should therefore ideally use a much larger sample to analyze these effects.

[16] The median amount spent on secondary school fees is 3,750 MWK.

Table 16 uses the same continuous variable used in Table 15 for amount paid on secondary school fees, but does not restrict the sample to only households who paid school fees. Panel A estimates that the information intervention increases the average amount paid by between 262.9 MWK ($p<0.01$) (column 5) and 335.7 MWK ($p<0.01$) (column 6), when controlling for fixed effects. As stated in section III, the median savings used for payment of secondary school fees is 3,750 MWK, so an increase of 335.7 MWK is roughly a 9.0% increase in the amount spent on secondary school fees. Panel B estimates that the instrumented effect of adopting a savings account on the amount paid for secondary school fees is between 9,287 MWK ($p<0.05$) (column 6) and 10,438 MWK ($p<0.05$) (column 8). These positive and significant results are likely due to the significance of the binary variable discussed in Table 14, rather than the continuous variable in Table 15. These results indicate that there is a significant effect of adopting a savings account on secondary school fee payment on the extensive margin, but not on the intensive margin. In other words, adopting a savings account increases the likelihood that a household will pay secondary school fees, but not that they will pay more in these fees conditional on the fact they are paid.

VIII. Conclusion

Access to formal financial institutions, specifically formal savings accounts, can be an important tool for poor households to accumulate assets, and better afford large lump-sum payments in response to events such as harmful economic shocks, like crop disease or an illness in the family, or important life events such as a wedding or the payment of a child's school fees. When a family is better able to afford these types of expenditures from a savings account, they will be less likely to have to sell important household assets or borrow from an acquaintance. As developing nations start to rely more on formal financial institutions, it is likely to be much easier for households to escape the poverty trap zone, reducing current poverty levels, and poverty levels for generations to come.

This unique, randomized field experiment allows me to contribute to a very small collection of literature surrounding these empirical effects. While Prina (2015) does look at a similar effect in Nepal, very few other studies observe changes in educational expenditures due to savings accounts. I show in this paper that this logic is consistent with empirical evidence; increasing access to formal savings accounts leads to increased payment of secondary school fees, indicating that more children are attending secondary school and achieving higher levels of education. Table 14 shows that this effect on the binary variable for payment of secondary school fees is positive and statistically significant.

It is important to note that these results should be interpreted with some limitations in mind. A small sample size (for example in the interpretation of Table 15

with only 164 observations) could mean that there is significant variation in my results, making them difficult to interpret. Additionally, the instrument of the information intervention for adopting a savings account is slightly weak. When controlling for variables such as the number of children, household wealth, and educational attainment of the head of household, the coefficient is positive but insignificant without fixed effects. This makes the IV-2SLS analysis and results slightly weak as well. Finally, the short time period of two years between the baseline and endline surveys might not be enough for the full effect of adopting and using a savings account on asset accumulation to take place, which could actually mean that the analysis in this paper is underestimating the true effect of savings accounts on economic shocks and life events. For future research, a larger sample size and longer period of observation would be ideal for analyzing these effects.

For countries like Malawi with largely rural populations, access to these vital financial services is limited by geographical barriers. With only 7.1% of the population older than 15 years old saving at a financial institution and 16.1% holding any type of account at a financial institution, a vast majority of the population has no opportunity to use this valuable tool to escape poverty. The results of this paper show that savings accounts lead to important human capital investments, which are vital instruments to increase the long-term wellbeing of citizens of developing countries; therefore, policymakers and government officials should direct funding and programs to increasing the reach of formal financial institutions to combat intergenerational poverty.

REFERENCES

Ahmed, Habib. 1999. "Operating Format of Microfinance Schemes, Negative Shocks, and Poverty." *Savings and Development* 23 (1): 57-66.

Alderman, Harold. 1996. "Saving and Economic Shocks in Rural Pakistan." *Journal of Development Economics* 51 (1): 343-365.

Banerjee, Abhijit, and Esther Duflo. 2012. *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. PublicAffairs.

Brune, Lasse, Xavier Giné, Jessica Goldberg, and Dean Yang. 2011. "Commitments to Save: a Field Experiment in Rural Malawi." *World Bank Policy Research Working Paper Series* 5748.

Central Intelligence Agency. 2014. *The World Factbook*. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2155rank.html.

Dupas, Pascaline and Jonathan Robinson. 2013a. "Why Don't the Poor Save More? Evidence from Health Savings Experiments." *American Economic Review* 103 (4): 1138–71.

Dupas, Pascaline and Jonathan Robinson. 2013b. "Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya." *American Economic Journal: Applied Economics* 5 (1): 163–92.

Duryea, Suzanne, David Lam, Deborah Levison. 2007. "Effects of Economic Shocks on Children's Employment and Schooling in Brazil." *Journal of Development Economics* 84 (1): 188-214.

Flory, Jeffrey. 2012. "Formal Financial and Informal Safety Nets of the Poor: Evidence from a Savings Field Experiment." Unpublished.

Flory, Jeffrey and Geetha Nagarajan. 2009. "The Poor and Their Management of Shocks." The IRIS Center, University of Maryland.

Frankenberg, Elizabeth, James Smith, Duncan Thomas. 2003. "Economic Shocks, Wealth, and Welfare." *The Journal of Human Resources* 38 (2): 280-321.

Hanlon, Joseph, Armando Barrientos, and David Hulme. 2013. *Just Give Money to the Poor*. Boulder: Kumarian Press.

Jayappa, Nathan. 2013. "How Randomized Control Trials Can Help Solve Africa's Poverty Trap." *The Heinz Journal*. Carnegie Mellon University, 2 Nov. 2013. Web. 8 Mar. 2016.

Karlan, Dean, Aishwarya Lakshmi Ratan, Jonathan Zinman. 2014. "Savings By and For the Poor: A Research Review and Agenda." *Review of Income and Wealth* 60 (1): 36-78.

Kimuyu, Peter Kiko. 1999. "Rotating Savings and Credit Associations in Rural East Africa." *World Development* 27 (7): 1299-1308.

Machinjili, Charles. 2011. Integrated Household Survey, 2010-2011: Household Socio-Economic Characteristics. Malawi National Statistical Office.

Magrath, John, and Elvis Sukali. 2009. ''Winds of Change: Climate Change, Poverty and the Environment in Malawi,'' OXFAM Report. http://www.oxfam.org.uk/resources/ policy/climate_change/downloads/winds_of_change_malawi.pdf.

"Malawi Map." 2016. Gavi.org. http://www.gavi.org/country/malawi/.

Sachs, Jeffrey. 2005. *The End of Poverty: Economic Possibilities for Our Time*. Penguin UK.

Saggi, Karan. 2014. "Who is the Customer? Identifying the Initial Adopters of Formal Savings. Field Evidence from Malawi." CMC Senior Theses. Paper 957. http://scholarship.claremont.edu/cmc_theses/957.

Sebstad, Jennifer and Monique Cohen. 2001. "Microfinance, Risk Management and Poverty." CGAP: World Bank, Washington DC.

Prina, Silvia. 2015. "Banking the Poor Via Savings Accounts: Evidence from a Field Experiment." *Journal of Development Economics* 115: 16-31.

TABLE 3. PROPORTION OF HOUSEHOLDS QUALIFYING FOR EDUCATION AND POVERTY MEASURES

	Malawi	Lilongwe	Mchinji	Dedza
Education				
Literacy Rate	65.4	49.3	54.3	49.4
Enrolment rates at primary school (net)	85.8	83.4	87.9	77.0
Enrolment rates at secondary school (net)	13.0	8.4	9.4	4.5
Poverty and Income Inequality				
Poverty (% population)	50.7	56.6	55.5	56.8
Ultra poverty (% population)	24.5	31.0	31.9	25.1
Poverty gap (estimate)	18.9	23.8	21.3	20.0
Poverty gap squared (estimate)	9.3	12.5	10.7	9.5

Source: Malawi National Statistical Office, Integrates Household Survey, 2010/2011.
Notes: The poverty line is defined at 37,002 MWK (or 226.24 USD) per person per year, and the ultra-poverty line is defined at 22,956 MWK (or 140.36 USD) per person per year. Currency conversion rates for end of 2011 [1 USD = approx. 163.5501 MWK].

TABLE 4. PROPORTION OF HOUSEHOLDS SEVERELY AFFECTED BY SHOCK BY REGION

	Total	North	Central	South
Agricultural				
Unusually high level of crop pests or disease	5.2	3.3	8.2	3.0
Unusually high level of livestock disease	5.7	6.8	7.7	3.7
Unusually high costs of agricultural inputs	26.2	26.0	36.5	17.3
Unusually low prices for agricultural output	12.2	10.1	20.4	5.6
Health and Wellness				
Death of income earner	1.2	1.0	1.0	1.5
Death of other household member	3.1	2.1	3.0	3.5
Serious illness or accident of household member	11.5	10.0	12.7	10.8
Conflict/violence	3.2	1.9	3.7	3.2
Affected by four or more shocks		7.2	11.7	8.3

Source: Malawi National Statistical Office, Integrates Household Survey, 2010/2011.
Notes: Total represents the total proportion for all of Malawi, and North, Central, and South represent proportions for the different regions of Malawi.

TABLE 5. FREQUENCY OF SHOCK BY TYPE

Shock	No. Reporting Shocks	% of Total Reporting Shocks
Livestock/poultry died or were stolen	1,382	56%
Large rise in price of food	1,155	47%
Illness or accident of household member	964	39%
Unexpected increase in input prices	841	34%
Large fall in sale prices for crops	715	29%
Crop disease, low crop yields due to drought, flood	639	27%
Business failure	357	15%
Theft	305	12%
End of regular assistance, aid, or remittance	282	11%
Death of household head, income earner or other household member	243	10%
Dwelling damaged, destroyed by fire, flood	127	5%

Source: Flory and Nagarajan (2009).

TABLE 6. CLASSIFICATION OF COPING MECHANISMS

Low-Stress Mechanisms	Medium-Stress Mechanisms	High-Stress Mechanisms
Sent children to live with relatives	Spent cash savings	Sold assets (tools, furniture, etc.)
Worked longer hours, worked more	Sold more crops	Sold farmland
Non-working household members started to work	Started a new business	Long term renting out of farmland
Went elsewhere to find work for more than one month	Borrowed money from relatives	Sold animals
Received help from NGO	Borrowed money from money lender	Removed kids from school to work
Received help from religious institution	Borrowed money from bank, MFRC, etc.	
Received help from government	Borrowed money from friend	
Reduced food consumption	Borrowed money from unspecified source	
Reduced non-food expenditures	Borrowed in-kind from grocer	
Consumer lower-cost, less-preferred food		
Spiritual effort (prayer, sacrifices, etc.)		
Received cash help from relatives		
Received in-kind help from relatives		
Received unspecified help from relatives		
Stopped selling, sold less, didn't sell crop(s)		
Stopped the business		
Received unspecified help from friends		

Source: Flory and Nagarajan (2009); Adaptation of classification from Montgomery (1996).

TABLE 7. EFFECTS OF USING SAVINGS ON COPING MECHANISMS FOR ECONOMIC SHOCKS

	(1) **Assets**	(2) **Cash**	(3) **Borrow**
Has formal savings	0.0446	2,775***	-0.0315
	(0.0288)	(966.7)	(0.0191)
Has cell phone	-0.0430	2,613*	0.00929
	(0.0295)	(1,553)	(0.0212)
Shock experienced	0.0565***	905.6***	0.0325***
	(0.0134)	(221.4)	(0.00867)
Observations	2,099	2,099	2,099
R-squared	0.075	0.044	0.058

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The full variable names are as follows: (1) Assets: Did you need to sell any assets, farmland, or livestock in response to a shock? (2) Cash: Did you need to spend any of your cash at home in response to a shock? (3): Borrow: Did you borrow money to cope? Shock experienced: "Over the past 12 months, was your household severely affected negatively by any of the following events." "Has formal savings" denotes that the household uses a formal savings account of any kind. "Has cell phone" denotes that any member of the household owns a cell phone. "Shock experienced" denotes that the household has experienced at least one shock.

TABLE 8. EFFECTS OF SAVINGS ACCOUNTS ON SHOCKS BY TYPE

	(1) Low yield	(2) Crop disease	(3) Livestock died	(4) HH biz fail	(5) Increase input	(6) Crop price fall	(7) Rise prices	(8) Illness HH	(9) Death HH work	(10) Death HH other	(11) HH Break-up	(12) Theft
Has formal savings	0.0316	-0.0162	0.0383	0.0113	0.0550*	0.137***	-0.0906***	0.0515	-0.00781***	0.00515	-0.0093	0.0144
	(0.0277)	(0.0253)	(0.0319)	(0.0224)	(0.0288)	(0.0431)	(0.0316)	(0.0316)	(0.00287)	(0.0115)	(0.00988)	(0.0200)
Has cell phone	-0.0520*	-0.0131	-0.0401	0.0551**	-0.0418	-0.0894**	-0.131***	-0.0368	0.00592	0.00191	0.00788	0.0572**
	(0.0289)	(0.0345)	(0.0413)	(0.0253)	(0.0289)	(0.0418)	(0.0325)	(0.0399)	(0.00666)	(0.0141)	(0.0130)	(0.0229)
Observations	2,089	2,089	2,089	2,089	2,089	2,089	2,089	2,089	2,089	2,089	2,089	2,089
R-squared	0.002	0	0.001	0.003	0.002	0.01	0.015	0.002	0.002	0	0	0.005

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The shock titles are merely abbreviations for the following full names: (1) Lower crop yields due to drought or floods, (2) Crop disease or crop pests, (3) Livestock died or were stolen, (4) Household business failure, non-agricultural, (5) Unexpected increase in input, (6) Large fall in sale prices for crops, (7) Large rise in price of food, (8) Illness or accident of household member, (9) Death of working member of household, (10) Death of other household member, (11) Break-up of the household, (12) Theft. In the interest of reducing redundancy, some shocks have been left out if they have a very low frequency (less than 100) and no statistical significance. The following shocks have been left out of the table: Loss of salaried employment or non-payment salary, End of regular assistance, aid, or remittances from outside HH (e.g. loss of fertilizer subsidy), Death of HH head, Dwelling damaged, destroyed, by fire, flood, vandalism, etc., Communal fights, and Other. "Has formal savings" denotes that the household uses a formal savings account of any kind. "Has cell phone" denotes that any member of the household owns a cell phone.

TABLE 9. EFFECTS OF SAVINGS ACCOUNTS ON LIFE EVENTS BY TYPE

	(1) Birth	(2) Adopt/foster child	(3) Wedding	(4) Funeral rites	(5) Primary school fees	(6) Secondary school fees	(7) Post-second. school fees
Has formal savings	-0.0372*	0.0141	-0.00674	0.0486**	0.171***	0.124***	0.0140*
	(0.0222)	(0.0195)	(0.00995)	(0.0208)	(0.0318)	(0.0252)	(0.00785)
Has cell phone	-0.0202	0.0545**	0.0209	0.0113	-0.0108	0.136***	0.00929
	(0.0273)	(0.0221)	(0.0142)	(0.0202)	(0.0392)	(0.0276)	(0.00670)
Observations	2,098	2,098	2,098	2,098	2,098	2,098	2,098
R-squared	0.002	0.005	0.001	0.005	0.017	0.05	0.012

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The life event titles are merely abbreviations for the following full names: (1) Birth, (2) Adoption/Fostering a new child, (3) Wedding within the household, (4) Funeral rites, (5) Paid primary school fees (incl. uniforms, books, etc.), (6) Paid secondary school fees, (7) Paid post-secondary school fees. "Has formal savings" denotes that the household uses a formal savings account of any kind. "Has cell phone" denotes that any member of the household owns a cell phone.

TABLE 10. EFFECTS OF INFORMATION INTERVENTION ON SAVINGS ADOPTION

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more km from bank site				All distances	3 or more km from bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Information	0.0297	0.0404*	0.0329	0.0314	0.0304	0.0308**	0.0373**	0.0311**	0.0295**	0.0287**
	(0.0194)	(0.0207)	(0.0201)	(0.0202)	(0.0192)	(0.0138)	(0.0147)	(0.0144)	(0.0146)	(0.0143)
Has cell phone			0.224***	0.224***	0.193***			0.221***	0.222***	0.195***
			(0.0461)	(0.0456)	(0.0453)			(0.0444)	(0.0439)	(0.0451)
Number of children				0.0134**	0.0144***				0.0131**	0.0140**
				(0.00542)	(0.00532)				(0.00544)	(0.00537)
Head has primary					0.112***					0.100***
					(0.0268)					(0.0278)
Head has secondary					-0.0128					-0.0289
					(0.0754)					(0.0694)
Head has post-secondary					-0.138					-0.0938
					(0.189)					(0.196)
Observations	1,782	1,591	1,591	1,591	1,591	1,782	1,591	1,591	1,591	1,591
R-squared	0.002	0.004	0.038	0.044	0.064	0.064	0.066	0.098	0.103	0.118

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is a binary variable for whether or not a household adopted savings. "Information" denotes a binary variable for whether or not a household received the savings encouragement. "Has formal savings" denotes that the household uses a formal savings account of any kind. "Number of children" denotes the number of children living in a household." "Head has primary/secondary/post-secondary" denotes the binary variable for the highest education attainment of the head of household.

TABLE 11. REDUCED-FORM EFFECT OF INFORMATION ON PAYING SCHOOL FEES

	Primary		Secondary		Post-secondary	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	3 km +	All	3 km +	All	3 km +
Information	-0.0157	-0.0122	0.0350***	0.0418***	0.00129	0.00142
	(0.0169)	(0.0177)	(0.0120)	(0.0117)	(0.00211)	(0.00233)
Mean in Controls	0.195	0.192	0.0607	0.0548	-0.00111	-0.00123
Observations	1,876	1,687	1,876	1,687	1,876	1,687
R-squared	0.075	0.079	0.052	0.055	0.027	0.026

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. "All" represents all distances from the bank site, "3 km +" represents a minimum distance of 3 kilometers from the bank site. Cluster-pair Fixed Effects are used in all regressions. This analysis includes all households in the dataset, and the dependent variable is a binary variable with 0 representing households who did not pay school fees and 1 representing households who did pay school fees. "Information" denotes a binary variable for whether or not a household received the savings encouragement.

TABLE 12. REDUCED-FORM EFFECT OF INFORMATION ON PAYING SCHOOL FEES

	Primary		Secondary		Post-Secondary	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	3 km +	All	3 km +	All	3 km +
Information	-92.59	-114.4	1,252	1,650	-132,000	-132,000
	(106.6)	(108.3)	(995.2)	(1,061)	(0)	(0)
Mean in Controls	728.8	750.6	1,248	850.0	143,000	143,000
Observations	652	588	192	171	5	5
R-squared	0.129	0.128	0.343	0.337	1.000	1.000

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. "All" represents all distances from the bank site, "3 km +" represents a minimum distance of 3 kilometers from the bank site. Cluster-pair Fixed Effects are used in all regressions. This analysis restricts the sample to households in the dataset that have paid school fees, as opposed to Table 13 which includes all households. "Information" denotes a binary variable for whether or not a household received the savings encouragement.

TABLE 13. REDUCED-FORM EFFECT OF INFORMATION ON PAYING SCHOOL FEES

	Primary		Secondary		Post-Secondary	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	3 km +	All	3 km +	All	3 km +
Information	-62.65	-61.59	262.9***	335.7***	-168.8	-186.3
	(40.12)	(42.48)	(95.23)	(93.00)	(127.6)	(140.7)
Mean in Controls	169.8	168.9	0.254	-62.66	145.7	160.9
Observations	1,876	1,687	1,876	1,687	1,876	1,687
R-squared	0.056	0.058	0.050	0.053	0.028	0.028

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. "All" represents all distances from the bank site, "3 km +" represents a minimum distance of 3 kilometers from the bank site. Cluster-pair Fixed Effects are used in all regressions. This analysis includes all households in the dataset, as opposed to Table 12 which restricts the sample to households that have paid school fees. "Information" denotes a binary variable for whether or not a household received the savings encouragement.

TABLE 14. EFFECT OF SAVINGS ADOPTION ON SECONDARY SCHOOL FEES (BINARY)

	Without Pair Fixed Effects				With Pair Fixed Effects			
	All distances	3 or more kilometers from the bank site			All distances	3 or more kilometers from the bank site		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Intention to Treat Estimates (ITT)								
Information	0.0369**	0.0432**	0.0398**	0.0378**	0.0350***	0.0418***	0.0392***	0.0371***
	(0.0171)	(0.0182)	(0.0180)	(0.0181)	(0.0120)	(0.0117)	(0.0115)	(0.0119)
Has cell phone			0.0990**	0.0994**			0.0908**	0.0925**
			(0.0381)	(0.0379)			(0.0368)	(0.0368)
Number of children				0.0187***				0.0176***
				(0.00475)				(0.00482)
Observations	1,781	1,592	1,592	1,592	1,781	1,592	1,592	1,592
R-squared	0.004	0.005	0.012	0.022	0.053	0.056	0.061	0.070
Panel B: Instrumented Effect of Adoption (ToT)								
Adopted savings	1.375	1.094*	1.232	1.223	1.281*	1.156**	1.295**	1.291*
	(1.050)	(0.656)	(0.860)	(0.901)	(0.670)	(0.510)	(0.660)	(0.701)
Has cell phone			-0.168	-0.166			-0.184	-0.183
			(0.199)	(0.208)			(0.161)	(0.170)
Number of children				0.00260				0.000937
				(0.0153)				(0.0132)
Observations	1,777	1,588	1,588	1,588	1,777	1,588	1,588	1,588

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is a binary variable with 0 representing households who did not pay school fees and 1 representing households who did pay school fees. "Information" denotes a binary variable for whether or not a household received the savings encouragement. "Has formal savings" denotes that the household uses a formal savings account of any kind. "Number of children" denotes the number of children living in a household."

TABLE 15: EFFECT OF SAVINGS ADOPTION ON SECONDARY SCHOOL FEES (AMOUNT, IF PAID)

	Without Pair Fixed Effects				With Pair Fixed Effects			
	All distances	3 or more kilometers from the bank site			All distances	3 or more kilometers from the bank site		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Intention to Treat Estimates (ITT)								
Information	766.6	1,079	979.5	996.5	1,252	1,650	1,643	1,662
	(891.8)	(936.3)	(944.8)	(960.4)	(988.2)	(1,053)	(1,060)	(1,073)
Has cell phone			1,986	1,996			2,484	2,502
			(2,222)	(2,225)			(2,842)	(2,847)
Number children				63.16				89.14
				(225.5)				(297.8)
Observations	185	164	164	164	185	164	164	164
R-squared	0.005	0.008	0.022	0.023	0.336	0.329	0.344	0.345
Panel B: Instrumented Effect of Adoption (ToT)								
Adopted savings	16,239	12,134	12,817	11,721	98,845	63,178	63,926	51,778
	(29,513)	(14,483)	(17,346)	(15,011)	(0)	(0)	(143,613)	(93,549)
Has cell phone			-1,210	-986.6			-7,003	-5,495
			(5,726)	(5,204)			(23,793)	(16,366)
Number children				-311.1				-1,456
				(549.8)				(3,216)
Observations	185	164	164	164	185	164	164	164

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This analysis restricts the sample to households in the dataset that have paid school fees, as opposed to Table 16 which includes all households. "Information" denotes a binary variable for whether or not a household received the savings encouragement. "Has formal savings" denotes that the household uses a formal savings account of any kind. "Number of children" denotes the number of children living in a household."

TABLE 16: EFFECT OF SAVINGS ADOPTION ON SECONDARY SCHOOL FEES (AMOUNT)

	Without Pair Fixed Effects				With Pair Fixed Effects			
	All distances	3 or more kilometers from the bank site			All distances	3 or more kilometers from the bank site		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Intention to Treat Estimates (ITT)								
Information	263.3**	329.8**	299.9**	289.1**	262.9***	335.7***	311.3***	299.8***
	(132.4)	(141.8)	(141.0)	(141.4)	(95.23)	(93.00)	(91.57)	(93.71)
Has cell phone			885.7**	888.0**			869.5**	879.0**
			(434.8)	(438.6)			(414.5)	(417.5)
Number children				98.89**				95.90**
				(38.55)				(39.63)
Observations	1,781	1,592	1,592	1,592	1,781	1,592	1,592	1,592
R-squared	0.003	0.005	0.013	0.018	0.050	0.053	0.060	0.064
Panel B: Instrumented Effect of Adoption (ToT)								
Adopted savings	9,830	8,374*	9,306	9,391	9,621**	9,287**	10,286**	10,438**
	(7,200)	(4,659)	(6,162)	(6,516)	(4,689)	(3,629)	(4,768)	(5,140)
Has cell phone			-1,129	-1,148			-1,323	-1,359
			(1,575)	(1,649)			(1,310)	(1,392)
Number children				-24.88				-38.03
				(110.6)				(102.1)
Observations	1,777	1,588	1,588	1,588	1,777	1,588	1,588	1,588

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This analysis includes all households in the dataset, as opposed to Table 15 which restricts the sample to households that have paid school fees. "Information" denotes a binary variable for whether or not a household received the savings encouragement. "Has formal savings" denotes that the household uses a formal savings account of any kind. "Number of children" denotes the number of children living in a household."

APPENDIX

APPENDIX TABLE A1. REDUCED FORM EFFECT OF SAVINGS ADOPTION ON PAYMENT OF SECONDARY SCHOOL FEES

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more kilometers from the bank site				All distances	3 or more kilometers from the bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Information	0.0369**	0.0432**	0.0398**	0.0378**	0.0351**	0.0350***	0.0418***	0.0392***	0.0371***	0.0346***
	(0.0171)	(0.0182)	(0.0180)	(0.0181)	(0.0169)	(0.012)	(0.0117)	(0.0115)	(0.0119)	(0.0112)
Cell phone			0.0990**	0.0994**	0.0538			0.0908**	0.0925**	0.0542
			(0.0381)	(0.0379)	(0.0389)			(0.0368)	(0.0368)	(0.0386)
Number of children				0.0187***	0.0198***				0.0176***	0.0186***
				(0.00475)	(0.00472)				(0.00482)	(0.00481)
Head primary					0.0641***					0.0488**
					(0.0219)					(0.0221)
Head secondary					0.116					0.115
					(0.0805)					(0.0776)
Head post-secondary					0.135					0.104
					(0.190)					(0.181)
Observations	1,781	1,592	1,592	1,592	1,592	1,781	1,592	1,592	1,592	1,592
R-squared	0.004	0.005	0.012	0.022	0.038	0.053	0.056	0.061	0.07	0.081

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX TABLE A2. IV 2SLS EFFECT OF SAVINGS ADOPTION ON PAYMENT OF SECONDARY SCHOOL FEES

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more kilometers from the bank site				All distances	3 or more kilometers from the bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adopted savings	1.375	1.094*	1.232	1.223	1.18	1.281*	1.156**	1.295**	1.291*	1.244*
	(1.050)	(0.656)	(0.860)	(0.901)	(0.899)	(0.670)	(0.510)	(0.660)	(0.701)	(0.695)
Has cell phone			-0.168	-0.166	-0.165			-0.184	-0.183	-0.178
			(0.199)	(0.208)	(0.183)			(0.161)	(0.170)	(0.154)
Number of children				0.0026	0.00306				0.000937	0.00132
				(0.0153)	(0.0159)				(0.0132)	(0.0134)
Head has primary					-0.067					-0.0739
					(0.100)					(0.0750)
Head has secondary					0.126					0.145
					(0.0917)					(0.0945)
Head has post-secondary					0.297					0.220
					(0.198)					(0.184)
Observations	1,777	1,588	1,588	1,588	1,588	1,777	1,588	1,588	1,588	1,588

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX TABLE A3. REDUCED FORM EFFECT OF SAVINGS ADOPTION ON AMOUNT PAID FOR SECONDARY SCHOOL FEES

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more kilometers from the bank site				All distances	3 or more kilometers from the bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Information	766.6	1,079	979.5	996.5	999	1,252	1,650	1,643	1,662	1,666
	(891.8)	(936.3)	(944.8)	(960.4)	(944.1)	(988.2)	(1,053)	(1,060)	(1,073)	(1,080)
Has cell phone			1,986	1,996	2,972			2,484	2,502	3,446
			(2,222)	(2,225)	(2,375)			(2,842)	(2,847)	(2,502)
Number of children				63.16	89.28				89.14	60.93
				(225.5)	(237.9)				(297.8)	(321.7)
Head has primary					-1,488					-1,969**
					(935.3)					(932.8)
Head has secondary					-2,270					-2,427
					(1,365)					(2,769)
Head has post-secondary					7,326					7,314
					(5,718)					(6,457)
Observations	185	164	164	164	164	185	164	164	164	164
R-squared	0.005	0.008	0.022	0.023	0.06	0.336	0.329	0.344	0.345	0.384

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This analysis restricts the sample to households in the dataset that have paid school fees, as opposed to Tables A5 and A6 which include all households.

APPENDIX TABLE A4. IV 2SLS EFFECT OF SAVINGS ADOPTION ON AMOUNT PAID FOR SECONDARY SCHOOL FEES

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more kilometers from the bank site				All distances	3 or more kilometers from the bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adopted savings	16,239	12,134	12,817	11,721	12,170	98,845	63,178	63,926	51,778	48,466
	(29,513)	(14,483)	(17,346)	(15,011)	(15,408)	(0)	(0)	(143,613)	(93,549)	(84,515)
Has cell phone			-1,210	-986.6	445.2			-7,003	-5,495	-2,732
			(5,726)	(5,204)	(4,456)			(23,793)	(16,366)	(12,576)
Number of children				-311.1	-308.9				-1,456	-1,486
				(549.8)	(595.0)				(3,216)	(3,114)
Head has primary					-1,499					-3,994
					(1,253)					(5,223)
Head has secondary					-4,439					-3,635
					(3,743)					(8,755)
Head has post-secondary					8,170					-762.7
					(8,735)					(19,447)
Observations	185	164	164	164	164	185	164	164	164	164

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This analysis restricts the sample to households in the dataset that have paid school fees, as opposed to Tables A5 and A6 which include all households.

APPENDIX TABLE A5. REDUCED FORM EFFECT OF SAVINGS ADOPTION ON AMOUNT PAID FOR SECONDARY SCHOOL FEES

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more kilometers from the bank site				All distances	3 or more kilometers from the bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Information	263.3**	329.8**	299.9**	289.1**	277.0**	262.9***	335.7***	311.3***	299.8***	288.6***
	(132.4)	(141.8)	(141.0)	(141.4)	(139.3)	(95.23)	(93.00)	(91.57)	(93.71)	(93.75)
Has cell phone			885.7**	888.0**	723.8*			869.5**	879.0**	772.2*
			(434.8)	(438.6)	(432.9)			(414.5)	(417.5)	(415.8)
Number of children				98.89**	102.4***				95.90**	97.20**
				(38.55)	(38.53)				(39.63)	(39.50)
Head has primary					135.1					27.25
					(145.6)					(146.5)
Head has secondary					71.96					20.11
					(355.0)					(351.9)
Head has post-secondary					3,131					2,845
					(2,577)					(2,465)
Observations	1,781	1,592	1,592	1,592	1,592	1,781	1,592	1,592	1,592	1,592
R-squared	0.003	0.005	0.013	0.018	0.026	0.050	0.053	0.060	0.064	0.070

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This analysis includes all households in the dataset, as opposed to Tables A3 and A4 which restrict the sample to households that have paid school fees.

APPENDIX TABLE A6. IV 2SLS EFFECT OF SAVINGS ADOPTION ON AMOUNT PAID FOR SECONDARY SCHOOL FEES

	Without Fixed Effects					**With Fixed Effects**				
	All distances	3 or more kilometers from the bank site				All distances	3 or more kilometers from the bank site			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adopted savings	9,830	8,374*	9,306	9,391	9,339	9,621**	9,287**	10,286**	10,438**	10,375**
	(7,200)	(4,659)	(6,162)	(6,516)	(6,599)	(4,689)	(3,629)	(4,768)	(5,140)	(5,188)
Has cell phone			-1,129	-1,148	-1,010			-1,323	-1,359	-1,175
			(1,575)	(1,649)	(1,430)			(1,310)	(1,392)	(1,265)
Number of children				-24.88	-30.22				-38.03	-46.54
				(110.6)	(116.8)				(102.1)	(106.4)
Head has primary					-903.0					-998.5*
					(775.0)					(577.8)
Head has secondary					153.0					279.4
					(647.7)					(720.7)
Head has post-secondary					4,412					3,810
					(3,247)					(3,304)
Observations	1,777	1,588	1,588	1,588	1,588	1,777	1,588	1,588	1,588	1,588

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. This analysis includes all households in the dataset, as opposed to Tables A3 and A4 which restrict the sample to households that have paid school fees.