High Hopes: Experimental Evidence on Saving and the Transition to High School in Kenya

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Abstract

We report results of a randomized control trial in which parents of primary school leavers were encouraged to open a convenient bank account operated over a mobile money platform. A lock savings account (LSA) was randomly promoted to half the treatment group. Treatment boosted account take-up by 25 percentage points. Intent-to-treat estimates show that being offered either account increased savings on the mobile phone. Total financial savings increased by 3-4 times, suggesting access to the mobile bank account crowded *in* other forms of savings. High school enrollment was 5-6 percentage points higher – representing a one third increase for compliers.

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1. Introduction

Despite the recent large expansion in secondary school enrollment, still more than one in five children of secondary school age are not enrolled (UNESCO 2015). Such low enrolment rates could be due to low perceived benefits (Jensen 2010), however high costs have been found to be binding in a number of contexts (see Garlick (2013), Blimpo, Gajigo and Pugatch (2015), Muralidharan and Prakash (2016), Brudevold-Newman (2017)). As in other domains (Tarozzi, et al. (2014)), in which liquidity constraints limit demand, without access to finance the hope of going to high school is just that, a high hope.[4] In this paper, we examine the extent to which financial inclusion can help parents and the children achieve such goals.

Access to versatile and affordable financial services, including payments, saving, credit, and insurance, is widely seen as an important component of strategies to lift households out of poverty.[5] Indeed, the World Bank's Global Findex report, based on data collected in interviews with 150,000 adults across 140 countries, concludes that "Financial inclusion is critical in reducing poverty and achieving inclusive economic growth. When people can participate in the financial system, they are better able to start and expand businesses, invest in their children's education, and absorb financial shocks." (Demirguc-Kunt et al 2015). This study adds to a growing body of experimental evidence in support of a link between access to financial services and productivity enhancing investments.[6]

Despite a recent expansion in financial inclusion, access to financial services in the developing world remains low, and utilization conditional on access is often limited. Dupas et al. (2012) document both supply side and demand side reasons, including lack of infrastructure, unreliable service, high transaction fees, and low levels of trust in financial institutions. The mobile money revolution in Kenya and other parts of the developing world has allowed some geographical barriers to access to be overcome.

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[4] Ozier (forthcoming) uses a regression discontinuity design to show that attendance of secondary school in Kenya increases cognitive achievement.

[5] See Dupas and Robinson (2013a), Bruhn and Love (2014), Prina (2015) and Burgess and Pande (2005) for recent work on the microeconomic impacts of financial access on downstream outcomes.

[6] See for example, Cole et al (2017), Cole et al (2013), Gine and Yang (2009), Karlan et al (2014) and Mobarak and Rozenzweig (2013) on the role of financial access and agricultural production decisions.

In this paper we study the impact of access to a convenient savings technology that uses Kenya's most successful and dominant mobile money platform, M-PESA,[7] operated by the country's largest mobile network operator, Safaricom. Launched in 2007 primarily as a mechanism to execute domestic remittances, M-PESA is now used by over 90 percent of Kenyan households, and, consistent with the conclusions of the Findex report, has been shown to have had important impacts on risk sharing, poverty, and labor allocation (Jack and Suri, 2014, and Suri and Jack, 2016), simply as a result of the remittance and payments functionality.

In November 2012, the mobile network operator and a local bank introduced a mobile bank account (MBA) known as "M-Shwari",[8] that provides more sophisticated banking services, including savings and credit, over the M-PESA platform. Savings balances earn interest on a sliding scale of between 2% and 5% APR, while one-month loans attract a 7.5% fee.[9] A commitment savings device, in the form of a lock savings account (LSA), was added to the MBA suite of services in June, 2014.[10] Balances on the LSA earn a bonus of 1% additional interest, which is forfeited if funds are withdrawn prior to an agreed term of between one and six months, and early withdrawals are only be available after a 48-hour waiting period.

We examine the impact of access to the MBA, and to the LSA, in a specific context in which users can be expected to have similar savings objectives. In particular, we promote the use of the financial services with parents of children half way through their *final* year of primary school, and with a focus on the importance of saving for the transition to high school six months later.

While school fees in public primary schools (up to 8th grade) were officially abolished in 2003 and in public secondary schools (9th to 12th grades) in 2008, parents still face costs of supplies, uniforms, and transport associated with the transition to secondary school, as

[7] "M" is for mobile, and "pesa" is money or cash in Swahili. Individual accounts are held by the mobile phone operator, which in turn deposits customers' account balances in a small number of accounts, under the company's name, with commercial banks.
[8] "Shwari" means "calm" in Swahili.
[9] Annual inflation in 2014 in Kenya was about 7 percent.
[10] To open an LSA, a customer must have the more basic MBA, through which the LSA is accessed.

well as fees for extra tutoring and academic support. Also, attendance at private boarding and day schools is common in Kenya, and indeed increased significantly after fees for public schools were reduced (Lucas and Mbiti (2012); World Bank, 2009).

We randomized promotion of the two savings interventions (the MBA and the LSA) to parents, plus a control, at the school level. Parents in all groups were informed about the importance of continued education, as supported by the Ministry of Education, and of saving for the transition to secondary school. We use administrative data from the mobile network operator and the bank, along with survey data, to measure changes in savings behavior and schooling decisions across experimental groups.

Karlan et al. (2011) and Kast and Pomeranz (2014) point to problems of attention and focus, motivating the idea that reminders can be effective tools to increase saving rates. In light of such findings, orthogonal to the savings account treatments, we randomized the opportunity to receive SMS messages that would remind participants to save in anticipation of the costs of high school. However, we find no effect of the reminders on any saving or behavioral indicators, suggesting that attention challenges did not represent a binding constraint, or at least that the SMS intervention as delivered did not relax it.[11]

Nearly all parents had an M-PESA account, or access to one in their households, at baseline, and while roughly 25% had an MBA, virtually none had an LSA at the time. After the encouragement, take-up of the MBA was closer to 60% in the two treatment groups, while take-up of the LSA remained close to zero in the control and MBA groups, but was 28% in the group to which it was promoted.

A number of empirical studies have highlighted the importance of commitment devices in boosting savings in the context of hyperbolic discounting.[12] However in the current study, while LSAs were opened and used by a non-trivial share of the LSA treatment group, we find no systematic differences in impact between the two treatment groups.[13] Thus, like

[11] The SMS reminder results are available on request, but we do not discuss them further in this paper.
[12] See, for example, Ashraf, Karlan and Yin (2006), Bernheim, Ray and Yeltekin (2011) and Brune, Giné, Goldberg and Yang (2012).
[13] This might have been at least partly due to a less than seamless LSA interface. LSA holders, most of whom used feature phones, had to remember and enter a USSD short code (*234#6), instead of being able to access the account from the M-PESA menu.

attention deficit challenges, commitment problems might not be especially binding in the current context. On the other hand, access to the MBA, with or without the LSA, had important effects compared to the control group, even though virtually all control group members used M-PESA, the mobile money transfer (but not banking) service.

First, using the administrative data, we find that savings held on mobile phones by parents in the two treatment groups show small but statistically significant intent-to-treat increases over the six-month period relative to the control group. However, this average effect masks the fact that the balances of about 66% of individuals in the two treatment groups changed by less than 50 KSh (50 US cents) over the period, [14] compared with about 62% of those in the control. The share of dissavers was similar across all groups (14-15%), but the share of individuals who saved more than 50 KSh was 5-6 percentage points higher in the treatment groups.

We also estimate effects on a broader measure of financial savings, including traditional bank accounts, informal savings groups, and cash, which show larger ITT impacts. Once again, a large share of respondents – about 50% - report zero change in financial assets. However, of those with non-zero changes, most report declines in financial holdings over the period, which included the widely celebrated Christmas festive season, during which certain unusual expenses (travel and other festivity-related consumption) might be incurred. While 5-10% of individuals in each group report positive savings, 30-40% report dis-saving over the period. But dis-saving by the dis-savers is twice as high for those in the control group as for those in the treatment groups. Access to financial services might thus militate against certain temptations, consistent with the findings of Dupas and Robinson (2013b), Banerjee et al. (2015) and for a survey article, Evans and Popova (2014).

Local average treatment effect estimates of changes in financial savings are economically meaningful, suggesting that those who opened mobile savings accounts in response to the experiment saved $US40-50 more than they otherwise would have. Assignment to either treatment arm also increased access to and utilization of credit – we observe a 50 percent increase, at the extensive margin, of utilization of credit. These kinds of savings rates, and

[14] Fifty shillings is about 3% of the average level of savings by those who saved, and 5% of the average dissaving by those who dissaved.

credit responses, could conceivably make a difference to school enrollment decisions, in light of the median cost of transition to high school reported at baseline of around $US380 across all groups.

Indeed, our endline survey shows large impacts of assignment to the savings arms on secondary school enrollment in January 2015. Seventy-two percent of control group respondents reported that their children entered high school in 2015, immediately following the intervention, while in the treatment groups, about 78 percent were enrolled. Correspondingly, the TOT estimates suggest that amongst the 25 percent of the sample who would not otherwise have opened an MBA account, doing so increased the likelihood of enrollment from about 62% to nearly 83% - an increase in enrollment of one-third. The TOT impact of the LSA was similar, increasing the enrollment rate of children of parents who would otherwise not have opened a commitment savings account from about 65% to 83%.

To explore the mechanisms that could underlie these large enrollment effects, we first model the impact of actual savings on the likelihood of enrolling in secondary school, instrumenting with treatment assignment. We find weak evidence that higher levels of mobile saving are associated with the transition to high school, and stronger evidence that increases in balances in the MBA itself boost enrollment. Putting money in the bank, not just on the phone, appears to be effective.

Next, we investigate impacts of treatment assignment on a number of intermediary outcomes, including test scores in the primary school exit examination, the source of finance used to cover the costs of high school, and the type of high school attended. However, we find little evidence of treatment effects on these variables.

Our results suggest that access to a convenient financial service with a relatively small deposit interest rate can be instrumental in generating higher levels of savings, and at least in this experimental context, in promoting enrollment in high school. Our results are consistent with a recent randomized study by Lipscomb and Schechter (2017) where individuals offered mobile savings accounts are more likely to purchase subsidized desludging services in Senegal. The next section documents our recruitment activities and

baseline data. Section 3 reports overall treatment effects on savings, while section 4 documents savings patterns and heterogeneous responses, and section 5 reports impacts on schooling outcomes. Section 6 concludes.

2. Recruitment and data

In June and July of 2014, half way through the Kenyan school year, we visited 337 primary schools in three counties,[15] and conducted meetings attended by a total of 4,802 parents of eighth-grade students, of whom 4,673 consented to take part in the study. Of those who consented to take part 4,082, or 85 percent, had a mobile phone with an M-PESA account. Of these, some 4,020 (98.5%) gave Administrative Data Sharing consent (ADS consent) – that is, they consented to allow the mobile network operator and the bank to share their administrative account data with the research team.

Randomizing at the school level, we promoted adoption and use of the mobile bank account (MBA) amongst one group of parents, and of the Lock Savings Account (LSA) amongst another. The number of parents and schools (in parentheses) in each of the three primary experimental cells are shown in Table 1, including in column (1) all those who consented to take part, in column (2) those who also gave ADS consent, and in column (3) those in column (2) who were interviewed at endline.

Parent meetings were held at the schools, during which members of all experimental groups, including the control, were presented with the same information about the importance of continued education, and of saving for the transition to secondary school.

As part of the baseline survey, we asked parents to record the expected cost of sending their child to secondary school, and to set an associated savings goal with this cost in mind. Those in the MBA treatment group were shown how to open both an M-PESA account and

[15] The counties were Kisumu, Nyeri, and Kilifi. Another RCT was being administered independently by the same PIs in the same set of primary schools. That project examined the impact of various interventions aimed at improving the delivery of school WASH (water, sanitation and hygiene) services, and involved students in grades *below* eighth grade. The randomizations in the two studies were orthogonal.

an MBA (if they didn't already have them), and how they could be used. Those in the LSA group were instructed additionally on how to open and operate the LSA.[16]

Table 2, panels A, B, and C, report balance tests for baseline respondent, child, and school level, characteristics respectively across the experimental groups. For those self-reported characteristics in the baseline survey, we use the sample of 4,673 who consented to take part. For information on variables that could only be discerned from the administrative phone data, we use the smaller sample of 4,020 who granted ADS consent.[17] Table 3 presents baseline characteristics by each of the two savings treatment groups and the control, and pairwise and three-way balance tests.

Sixty-eight percent of the parents at the meetings were women, and the average age of respondents was 44. Sixty-two percent had completed primary school, but only 19 percent had finished secondary school. Ninety-three percent owned a mobile phone, only 2 percent didn't have access to one, and nearly all of the 90 percent of the sample with a Safaricom SIM card also had an M-PESA account. There were nearly 5 children per household, half of whom were girls. Everyone reported expecting their children to go on to secondary school, and the average expected cost of doing so was about USD400, the median value of which was USD380. School level attributes are also reported, and are balanced.

We revisited the primary schools and successfully conducted face-to-face endline surveys of 3,994 of the 4,673 original sample of recruited parents. We followed this up with phone surveys of 854 of the remaining participants, for a total re-contact rate of 85.5 percent. The re-contact rate amongst those who gave ADS consent was 87.5 percent.

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[16] Upon opening a Lock Savings Account, a customer chooses the maturity of the account, an integer number of months, after which the funds can be accessed without penalty. However, in our study, we worked with the bank to allow a particular date to be specified, and actively encouraged respondents in the LSA treatment group to choose a maturity date of January 5th, 2015, for two reasons. First, students typically begin secondary school near the end of January each year, so having the funds available a few weeks ahead of the start of classes could have been valuable in financing the transition. And second, a maturity date after Christmas – a popular holiday and gift-giving time in much of Kenya (although less so in Kilifi, which has a sizeable Muslim population) – would ensure that funds would be available for schooling expenses, unless they had been withdrawn with penalty. Of the 399 respondents in the LSA arm who opened LSAs, 306 chose a maturity date of January 5th, 2015.

[17] Similarly, in our regressions involving both baseline and endline data, we use the sample of 4,673 individuals who consented to take the baseline survey, with attrited values treated as missing. In any regressions in which we use administrative data (with or without baseline or endline survey data), we use information on the smaller sample of 4,020, again treating attrited individuals as missing.

Table 3 reports attrition by experimental arm amongst both the full baseline sample, and for those who gave ADS consent. In both cases, attrition rates were 3-5 percentage points higher in the treatment groups than in the control. In our analysis below we report Manski bounds on treatment effects to account for the differential rates of re-contact.

Take-up rates of mobile financial services across the three savings arms are reported in Table 4 using administrative data from the 4,020 respondents who gave ADS consent. We report rates at which MBAs and LSAs were opened in each of the three experimental groups as of January 5th, 2015, six months after the intervention. About 34% of the control group had an MBA by that time, while the shares of the two treatment groups with an account were 24-25 percentage points higher. Virtually no-one in the control or MBA treatment group had an LSA by early 2015, while 27% of the LSA treatment group did. Thus, our encouragement design had non-negligible impacts on adoption of the two bank products, as intended.

Below we report impacts of the experimental interventions on a number of outcomes. In this section, we discuss these outcomes and their measurement in more detail, distinguishing between savings outcomes on the one hand, and those related to schooling decisions and behavior on the other hand.

We measure "mobile savings" using administrative data as the net change in total balances held on individuals' M-PESA accounts, regular MBA accounts, and LSA accounts. Along with the LSA, the MBA included both a transactional savings account as well as a loan account. We thus report both gross savings (the total change in balances on all mobile *savings* accounts) and net savings (gross savings minus net increase in outstanding debt in the MBA *loan* accounts).[18]

In the endline surveys we asked individuals to estimate the change in value of any other financial assets they held, including mobile money accounts held with other mobile operators, other bank accounts, deposits with SACCOs, ROSCAs, etc., and cash held at home

[18] Eligibility for loans on the MBA is based on a credit score generated from data on usage of mobile phone, mobile money, and MBA activity levels. Loan proceeds are transferred to the customer's M-PESA account, and the liability recorded in her loan account with the bank.

or with friends. Adding these savings to mobile savings gives us a value of what we refer to as "financial savings".[19]

Our primary schooling outcome of interest is enrollment in high school, which we elicit in the endline survey. We ask parents if their child had been enrolled in high school by the time of the survey (which took place at least one month after the beginning of the school year), what kind of school (private/public, co-ed/single sex, and whether it is a national, county, district, or local school), the cost of attendance, and other attributes. We also collect information on results of the end-of-primary school examinations, which determine eligibility for entrance into the different types of secondary school, along with parents' expectations about their child's performance, and parental decision-making roles.

The parents of children who enrolled in high school were asked how they financed the costs of the transition, with options including drawing on financial savings, the sale of assets, and borrowing from friends and relatives or from more formal sources.

3. Impacts on savings

In this section, we present our main results on parental savings over the course of the second half of their child's final year of primary school. When investigating the impact of having access to the MBA, we adopt two approaches: first we use assignment to either the MBA *or* LSA treatment group, compared with assignment to the control group; and second, we compare those assigned just to the MBA treatment group only with the control. When estimating the impact of the lock savings account, we compare those assigned to the LSA treatment with the control group on the one hand, and with the MBA treatment group on the other. The last comparison allows us to determine what marginal effect, if any, access to the commitment device had on saving behavior.

[19] We also asked respondents to report their ownership, purchase, and sales of real assets over the six-month period between recruitment and the beginning of the school year, including items such as livestock, household durables, and other items. This measure has very high variance and we expect suffers from considerable measurement error, due in part to the difficulty respondents likely had in estimating the value of assets held at baseline.

Three dimensions of saving are distinguished in the tables: gross vs net (to account for loans taken out on the MBA platform); mobile vs financial; and short-term (that is, until January 5th, 2014, just before the beginning of the new school year) and "long-term" (until January 31st, by which time high school transitional expenses are expected to have been incurred).[20] Within the category of mobile savings, we also estimate impacts on savings balances held at the bank, that is in the MBA or LSA, but not on the M-PESA account, as it reflects a move into interest bearing deposits within the more formal banking sector.

(a) Impacts on mobile savings

Table 5 presents estimates of treatment effects on short-term savings held on mobile accounts, ITT estimates in the upper panel, and the TOT estimates instrumenting with treatment assignment in the lower part of the table. The first four columns measure impacts on gross savings, and the middle four on net savings. The final four columns show changes in gross balances held at the bank, aggregated across both the MBA and LSA accounts.

In Column (1), the average treatment effects of access to the MBA across both groups are reported. The ITT and TOT estimates are both positive, but imprecise. In Column (2), those assigned to the LSA arm are excluded, and the impact of assignment to the MBA treatment group compared with the control is estimated. Being encouraged to open, and actually opening, an MBA have effects on mobile savings that are significant at the 10 percent level. Those who comply with the treatment accumulate 1,093 KSh (about USD11) more that they would have otherwise. For comparison, the corresponding level of savings of comparable compliers in the control group, reported in the lower part of the table, is 253 KSh. Treatment group compliers thus save about four times as much on their phones as similar individuals in the control group. The interest-bearing bank account itself seems to

[20] Our distinction between short- and long-term financial savings is imperfect. We can use the administrative data to calculate *mobile* savings up to any end date; but the *non*-mobile component of financial savings is reported as of the time of the endline survey, one to two months later, and does not differentiate between resources accumulated up to January 5th and January 31st. Thus short-term total financial savings are in fact a mix of changes in short-term mobile and longer term non-mobile balances.

be boost savings, even though the interest rate is low, and saving on M-PESA is just as convenient.[21]

Excluding the MBA group, impacts of assignment to the LSA group vis-à-vis the control (Column (3)) are smaller and insignificant. The fourth column compares the MBA and LSA groups directly, excluding the control. Although the point estimates on LSA assignment and treatment are both negative, they are insignificant, and it is not possible to distinguish between the effects of the LSA and the MBA.

Net mobile savings in Columns (5) to (8) exhibit very similar effect sizes with the same statistical properties, although the TOT estimate using both treatment groups, of the impact of opening an account, shown in column (5), can now be distinguished from zero at the 10 percent level.

Finally, Columns (9) to (12) show a clear shift of savings into the formal bank account. Comparing the point estimates in Columns (1) to (3), which are about half the size of those in Columns (9)-(11), we can infer that roughly half the increase in bank balances is due to "new" savings, while half is due to a shift from the mobile money account to the bank account.

In Appendix Table 1 we report Lee Bounds on the estimates in Table 5, accounting for attrition from the endline survey. Not surprisingly, the range of coefficients often includes zero, but in general the magnitudes suggest attrition is unlikely to have biased our results to a quantitatively large degree.

Table 6 reports the same set of regressions for "long-term" mobile-phone savings, up to January 31. All coefficients in Columns (1) through (8) are much smaller and highly insignificant. It thus appears that to the extent exposure to the MBA and/or LSA treatments increased mobile savings, these increments were depleted in the 2 to 3 weeks before the beginning of the new school year. Even so, columns (9) through (12) suggest that amongst those balances that were maintained on mobile accounts, a shift from the

[21] This could be due at least in part to the desire to build up a history of bank saving, so as to become eligible for a larger loan, although the credit score takes into consideration M-PESA balances as well as those on the MBA.

mobile money platform, M-PESA, to the formal bank accounts can be observed. The TOT estimates suggest that being induced to open an MBA increased bank account saving by between 1,000 and 1,500 KSh (USD10-15), and being induced to open an LSA increased them by about 500 KSh (USD5).

Being subject to the mobile bank account encouragement through either arm also increased the likelihood that parents would take out a loan on the platform. This is important as it provides an additional source of financing for education expenditures, although understanding whether access to credit crowds out saving is of course also of interest. Table 7 shows that between recruitment and January 5th, 2015, parents in each of the treatment groups were between 3 and 5 percentage points more likely to draw on an MBA loan, compared with an 8 percent rate in the control group (see Columns (1)-(4)). The TOT estimates suggest that between 12 and 18 percent of users who opened an account as a result of the encouragement took advantage of the credit option. Similarly, the average number of loans was higher in the treatment groups (Columns (5)-(8)), and the amounts borrowed were higher, but estimated with less precision (Columns (9)-(12)).

(b) Financial savings

It is important to assess the impact of access to bank accounts over the mobile platform on a broader measure of savings, so as to distinguish between simple shifts in asset holdings and increases in accumulated resources. To this end, we combine our data on mobile savings with information provided in the endline survey on other financial savings, such as holdings in other bank accounts, "under the mattress" savings, SACCO (savings and credit cooperative) and Chama (micro-savings groups) account balances, advance purchases, and savings with family or other entities.

As mentioned above, one short-coming of our data is that these non-mobile financial savings amounts were elicited at the time of the endline survey, which took place in February/March, after the beginning of the school year. We know already from the mobile savings that significant activity occurred during the month of January, as balances on mobile accounts were depleted. The same could of course be true for other financial assets.

We thus construct two outcome measures, in addition to the non-mobile financial savings variable. In the first, we add non-mobile savings reported in the endline survey to short-term mobile savings accrued through January 5th, drawn from administrative data; and in the second, we add reported non-mobile savings to long-term mobile savings, accrued through January 31st.

If the observed movements out of mobile savings in January were matched one-for-one by increases in non-mobile financial balances, then the combination of the latter with mobile savings through January 31st would provide a reliable indicator of both short- and long-term financial savings. On the other hand, it seems unlikely that families would necessarily engage in this kind of rebalancing behavior specifically in the month of January.

If instead the evolution of users' non-mobile savings balances followed a similar pattern to that of their mobile savings accounts, then the sum of non-mobile savings and mobile savings on January 31st would provide a reasonable estimate of long term savings, while the sum of non-mobile balances and mobile savings on January 5th would under-estimate short-term savings. We might further speculate that, under the assumption that the two kinds of savings move in tandem, that total short-term financial savings could be calculated as the sum of mobile savings as of January 5th and non-financial savings multiplied by the ratio of short- to long-term mobile savings.

Table 8 reports ITT and TOT estimates of the impact of treatment on non-mobile savings (Columns (1) through (4)) and financial savings as measured by the sum of non-mobile savings and mobile savings through January 5th (Columns (5) through (8)) and mobile savings through January 31st (Columns (9) through (12)). Imprecision hampers our ability to discern statistically significant effects, although the point estimates in all cases are positive and economically meaningful.

Focusing first on Columns (5) through (8), which report what are likely under-estimates of total short-term financial savings gross of loan proceeds, we document meaningful responses to assignment to both treatment groups, with ITT estimates of between 940 and over 1,400 KSh. The corresponding TOT estimates are in the range of 3,600 to nearly 4,800 KSh (about USD50). Compared with the (negative) estimated savings of compliers in the

reference group, these estimates suggest that for those who open an account in response to either the MBA or LSA encouragement, the incentive to dissave through January 5th is effectively eliminated.

From Tables 5 and 6, the ratio of the point estimates of short- to long-term mobile savings impacts of the two treatment groups combined, for example, is about 15. If non-mobile financial savings were to follow a similar temporal pattern to mobile savings, the short-term impact of treatment on the treated would be several hundred dollars – enough to cover most if not all of the cost of transition of high school.

4. Savings patterns and heterogeneous responses

To better understand the pattern of savings across individuals, Figures 1 and 2 illustrate the patterns of short-term gross mobile savings behavior and short-term financial savings behavior (as defined above) of members of the control group and the combined MBA and LSA treatment groups.[22] About 15 percent of individuals in each group exhibit mobile dissaving, while fully 40 percent show reductions in financial savings. On the other hand, about 20 percent show positive mobile savings, and a similar share show positive financial savings.

The treatment effects are reflected in differences between the cumulative savings behaviors, although point-wise interpretation depends on a strong monotonicity assumption. Nonetheless, under such an assumption, we would infer that individuals in the combined treatment groups who would otherwise have saved a positive amount on their phones, save more; and those who otherwise would have reduced their mobile balances, reduce them less.

When it comes to the broader concept of financial savings however, all the action appears to be amongst the dis-savers. Again assuming monotonicity, exposure to the MBA and/or

[22] In the control group, the graph is constructed by first ordering individuals by the net change in balances in the relevant accounts. For a large share, this change is zero. For those with negative changes, we calculate the cumulative reduction moving to the left, and for those with positive changes, the cumulative increase is calculated moving to the right. The resulting values are normalized by the number of individuals in the control group. A similar exercise is performed for those in the combined CBA and LSA treatment groups.

LSA appears to induce no change in positive financial saving behavior, but meaningful reductions in dissaving from financial assets.

These observations are quantified in the quantile regressions reported in Table 9. In the first three columns we observe positive impacts of assignment at the 10th and 90th percentiles of the distributions, with statistical significance at the top end. The effect at the median is zero. For financial savings (columns 4-6), the estimates at the median and the 90th percentile are all small, but the impacts at the bottom end are large, and in the case of LSA treatment arm, highly significant.

Table 10 reports marginal results of ordered logit regressions exploring the impact of treatment assignment on the likelihood of an individual saving a negative, zero, or positive amount over the six-month period. Using the predicted probability estimates for each outcome, we find that assignment to the MBA promotion reduces the likelihood of dissaving by just under 4 percentage points and increases the likelihood of positive savings by 4 percentage points. Assignment to the LSA promotion reduces the likelihood of dissaving by just over 5 percentage points and increases the likelihood of positive savings by nearly 6 percentage points.

Tables 11 through 13 report estimates of heterogeneous treatment effects along a number of dimensions. First, we ask if the identity of the survey respondent, in particular whether s/he is the primary financial decision-maker in the household, is associated with any difference in impact. When considering gross or net mobile savings (Columns (1) and (2)), the interaction effect between decision-maker status and treatment assignment is very small and insignificant. The effects on financial savings (Column (4)) are similarly imprecise. However, there appears to be a significantly larger impact of treatment on savings in the bank account itself when the respondent is the decision-maker. This could reflect the importance of in-person explanation about the features of the MBA and LSA.

Table 12 asks whether the impact of access to formal banking services differs for households in which women are the primary decision makers regarding financial matters. We report ITT estimates of the impact of assignment to either treatment arm on both gross and net mobile savings using administrative data. While access to M-PESA itself has been

shown to be especially beneficial for poor rural women in Kenya (see Suri and Jack, 2016), in the current experimental setting we find reasonably strong evidence to indicate that the savings of households in which the male made financial decisions were more responsive to improved access to digital financial services than were those of households in which women held the electronic purse strings.

Finally, Table 13 asks if households in which the parents assessed their children to have above-average school performance responded differently to others, perhaps because the prospect of secondary school enrollment was more salient, and the returns to further schooling larger. In fact however, there is little evidence of heterogeneity on this dimension.

5. Impacts on schooling

In the endline survey, which took place after the beginning of the following school year, we collected information from respondents regarding their children's enrollment in secondary school. Columns (1) through (3) of Table 14 report ITT and TOT estimates of the impact of the two treatments combined, and separately. Seventy-two percent of parents in the control group reported that their children were enrolled in secondary school. Panel A reports ITT impacts of 5-6 percentage points, which translate into TOT effects of between 18 and 24 points. Compared with compliers in the control group, about 60 percent of whom we estimate enrolled in secondary school, these TOT estimates suggest that opening a bank account is associated with a 27 to 40 percent boost to enrollment, which reached 83 percent for both groups.

To investigate these large impacts on the transition to high school, we ask if the inducement to save more causally increases the probability of enrolling. In particular, in Table 15 we regress enrollment outcomes on actual mobile savings, instrumenting with assignment to treatment. Columns (1) through (4) follow the same pattern as in previous tables, the first three comparing outcomes in either both or one of the treatment groups with the control, and the fourth comparing outcomes in the LSA group with those in the

MBA treatment. Savings are measured in thousands of Kenyan shillings (tens of US dollars).

The coefficients on gross or net mobile savings in Columns (1)-(3) of Panels A and B are uniformly positive, although mostly imprecisely estimated, but point towards a 20-30 percentage point increase in the likelihood of enrolling in secondary school for every thousand shilling increase in balances. There is again no apparent difference between the MBA and LSA effects (Column (4)). Panel C shows a more robust relationship between increases in *bank* account balances and school enrollment, suggesting once more a substantive impact of the use of formal banking services on parental behavior.

In Panel D, the impact of higher total financial savings on enrollment is assessed, using the definition of endline non-mobile financial savings plus short-term mobile savings as of January 5th. These regressions suffer from weak instrumentation, and yield smaller but still positive, if imprecise estimates of the impact of additional saving on high school enrollment.

What mechanism lies behind these large effects on school enrollment? We investigate a number of financial indicators to probe this question. In Table 16 we report ITT and TOT estimates of treatment on the cost of high school reported at endline (the cost for non-enrollees is treated as zero). In the ITT, those in the LSA group appear to have chosen schools that were on average about 10 percent *less* costly than those in the control and MBA groups, significant at the 10 percent level (Columns (3) and (4)). The TOT estimates on compliers are some four times as large, and are 25 percent of the cost of schools attended by comparison group compliers – that is, similar individuals in the control and MBA groups. The impact of assignment to the MBA group is much smaller and statistically insignificant. However, the fact that our enrollment effects were *larger* for assignment to the MBA group suggests caution in attributing those enrollment effects to selective targeting of lower cost schools.

We next asked respondents how they financed the costs of high school, as reported in Table 17. Of course, responses are only recorded for respondents with enrolled children, so the reported means in Table 17 reflect both selection and treatment effects. Only one of the 12

coefficients is significant (and then at the 10 percent level), and all are economically irrelevant, so treatment assignment appears not to have affected how parents finance school.

Finally, we ask if treatment assignment, or take-up of MBA and LSA accounts, could be associated with students focusing more on a future that included attendance at high school, higher aspirations, and greater effort in their final exams at the completion of primary school.[23] Self-reported exam scores, however show no significant relationship to treatment assignment (Table 18).

6. Conclusions

Financial inclusion through mobile technology could hold promise for expanding the opportunities of the poor to save and invest. In this paper, we have found that at least for parents of final year primary school children in Kenya, promoting mobile phone-based savings accounts appears to have led to increases in savings held on the mobile phone, and to larger increases in financial savings aggregated across instruments.

In contrast to some earlier studies, we find little evidence that increases in saving are due to attention problems on the one hand, as our SMS reminder intervention had little effect, or to commitment issues on the other, since the marginal impact of a locked savings account over and above a simple bank account was generally economically and statistically insignificant. Instead, the (admittedly low) interest-bearing feature of the bank account, and the access to short-term credit that it provided, both delivered over an easily accessible platform, were likely enough to nudge people towards saving more, or at any rate dissaving less.

Amongst the roughly one-quarter of our sample who opened accounts in response to the encouragement treatment, mobile savings over a six-month period increased by about USD10. Under some reasonable imputation assumptions regarding non-mobile financial assets, our results suggest that total financial savings by those who responded to the

[23] All school students in Kenya take a national examination at the end of primary school, results on which determine the kinds of secondary schools they will be eligible to attend.

encouragement could have increased enough to cover most of the costs of transitioning from primary school to high school.

Indeed, our most striking result is that treatment assignment is associated with higher rates of high school enrollment, on the order of 5-6 percentage points on an ITT basis, and 18-24 points for the TOT. The precise mechanisms by which these impacts are mediated are less easy to pin down. Accounting for endogeneity, higher savings, especially in the mobile bank account, appear to increase enrollment in high school, but, notwithstanding issues of fungibility, parents don't necessarily report *using* the savings to pay tuition and other costs. There is limited evidence that treatment group households chose less expensive schools for their children, and no evidence that financial inclusion affects aspirations in a way that might induce students to achieve higher end-of-primary school test scores.

Nonetheless, access to a mobile bank account, by moving the needle of secondary school enrollment, appears to be an innovation that could brighten the prospects of large numbers of children, giving them high hopes for the future.

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Table 1: Design

	Baseline	Baseline with ADS consent	Endline with ADS consent
Control	1,688	1,441	1,300
	(111)	(110)	(110)
MBA	1,431	1,227	1,056
	(110)	(108)	(108)
LSA	1,554	1,352	1,163
	(116)	(113)	(113)
Total	4,673	4,020	3,519
	(337)	(331)	(331)

Cell entries are number of parents interviewed. Number of schools per cell in brackets.

Table 2A: Balance test (Respondent)

	Means by Treatment Arms				Difference in Means		
	Control	MBA	LSA	Overall	C vs MBA	C vs LSA	MBA vs LSA
Gender - Female	0.70	0.70	0.66	0.68	0.00	0.04*	0.04
	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Age	43.57	43.04	44.33	43.66	0.53	-0.76	-1.29***
	(0.34)	(0.34)	(0.32)	(0.20)	(0.48)	(0.47)	(0.47)
Is primary decision maker in HH	0.41	0.41	0.41	0.41	-0.01	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.02)	(0.03)
Has completed primary schooling	0.61	0.65	0.60	0.62	-0.04	0.01	0.05
	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)	(0.04)	(0.04)
Has completed secondary schooling	0.20	0.19	0.19	0.19	0.00	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Has a formal job	0.11	0.09	0.10	0.10	0.01	0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Owns a mobile phone	0.91	0.93	0.95	0.93	-0.02	-0.04*	-0.01
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Can access a mobile phone	0.98	0.99	0.98	0.98	-0.01*	0.00	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Has a Safaricom SIM (all sample)	0.89	0.91	0.92	0.90	-0.02	-0.04*	-0.01
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Gave Admin. Data Sharing (ADS) consent (among Safaricom SIM owners)	0.93	0.92	0.92	0.92	0.01	0.01	0.01
	(0.01)	(0.02)	(0.03)	(0.01)	(0.02)	(0.03)	(0.03)
Has a Safaricom SIM (sample excl. Kilifi)	0.97	0.97	0.97	0.97	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Has a Safaricom SIM (Kilifi sample)	0.75	0.76	0.85	0.79	-0.01	-0.10**	-0.08*
	(0.03)	(0.04)	(0.03)	(0.02)	(0.05)	(0.04)	(0.05)
Has M-PESA	0.85	0.88	0.89	0.87	-0.03	-0.04*	-0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.02)	(0.02)
Has M-PESA (among Safaricom SIM owners)	0.96	0.97	0.97	0.96	-0.01	-0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
N	1688	1431	1554	4673	3119	3242	2985

Table 2B: Balance test (Children and Schooling)

	Means by Treatment Arms				Difference in Means		
	Control	MBA	LSA	Overall	C vs MBA	C vs LSA	MBA vs LSA
Nb. of children in HH	4.85	4.72	5.05	4.88	0.13	-0.20	-0.33*
	(0.14)	(0.12)	(0.14)	(0.08)	(0.18)	(0.19)	(0.18)
Share of girls among children	0.51	0.51	0.49	0.51	0.00	0.02	0.02
	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Share expected to attend secondary school	1.00	1.00	1.00	1.00	0.00	0.00**	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Share with above average grades	0.31	0.30	0.29	0.30	0.01	0.02	0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)
Log expectation of secondary school expenses	10.47	10.48	10.44	10.46	-0.02	0.03	0.05
	(0.04)	(0.03)	(0.03)	(0.02)	(0.05)	(0.05)	(0.05)
N	1688	1431	1554	4673	3119	3242	2985

Table 2C: Balance test (Schools)

	Means by Treatment Arms				Difference in Means		
	Control	MBA	LSA	Overall	C vs MBA	C vs LSA	MBA vs LSA
No. of Permanent Classrooms, Usable	10.80	11.16	11.22	11.05	-0.36	-0.42	-0.06
	(0.49)	(0.61)	(0.51)	(0.31)	(0.78)	(0.71)	(0.79)
Age of School	47.16	45.02	46.24	46.20	2.14	0.92	-1.22
	(2.28)	(1.56)	(2.14)	(1.19)	(2.76)	(3.12)	(2.64)
Enrollment Total (All Students)	539.56	483.91	546.97	524.95	55.66	-7.41	-63.06
	(34.96)	(34.55)	(35.61)	(20.35)	(49.05)	(49.80)	(49.51)
Pupil Teacher Ratio	37.00	35.22	38.01	36.79	1.78	-1.02	-2.79
	(1.42)	(1.67)	(1.44)	(0.87)	(2.19)	(2.02)	(2.20)
% students who attended secondary school (among last year graduates)	69.32	71.58	68.43	69.72	-2.26	0.89	3.15
	(2.74)	(2.66)	(3.10)	(1.65)	(3.81)	(4.13)	(4.07)
N	1688	1431	1554	4673	3119	3242	2985

Table 3: Attrition

	Full Sample	Full Sample with ADS Consent
MBA Treatment	0.035**	0.049***
	(0.014)	(0.014)
LSA Treatment	0.033**	0.042***
	(0.016)	(0.015)
Adjusted R-squared	0.02	0.01
Control Group Mean	0.127	0.098
Nb. Not Found	679	501
Observations	4673	4020

Column (1): Attrition for baseline sample
Column (2): Attrition for baseline with ADS consent
Standard errors clustered by school.
Estimation stratifies on county and wealth
* p<0.10, ** p<.05, *** p<.01

Table 4: Take up of MBA and LSA by treatment group

	MBA Take-up	**LSA Take-up**
MBA Treatment	0.246***	-0.008
	(0.025)	(0.007)
LSA Treatment	0.241***	0.268***
	(0.023)	(0.022)
Control Group Mean	0.336	0.015
Observations	4020	4020

Take-up rates reported from administrative data on Jan. 5th 2015.
Sample restricted to those with ADS consent
Standard errors clustered by school. Estimation stratifies on county and wealth
* p<0.1, ** p<0.05, *** p<0.01

Table 5: Mobile Savings (January 5th)

	Gross Mobile Savings				Net Mobile Savings				Gross CBA Savings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: ITT Estimates												
MBA/LSA treat	200				205				357***			
	(125)				(125)				(78)			
MBA Treatment		272*				278*				435***		
		(164)				(164)				(112)		
LSA Treatment			132	-116			134	-119			282***	-115
			(144)	(181)			(145)	(182)			(97)	(137)
Adjusted R-Squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
Panel B: TOT Estimates												
MBA Take-up	824	1093*			841*	1120*			1468***	1752***		
	(508)	(650)			(508)	(651)			(321)	(439)		
LSA take-up			490	-413			498	-425			1045***	-410
			(535)	(642)			(537)	(646)			(356)	(488)
F-Statistic for weak identification	149	102	154	155	149	102	154	155	149	102	154	155
Adjusted R-squared	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.02	-0.04	0.01	-0.00
Ref. Group Compliers' mean	399	354	225	1161	399	354	275	1270	0	0	-147	1407
Reference Group Mean	253	253	253	543	294	294	294	590	21	21	21	467
Reference Group	Control	Control	Control	MBA	Control	Control	Control	MBA	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control	None	LSA	MBA	Control	None	LSA	MBA	Control
Observations	4020	2668	2793	2579	4020	2668	2793	2579	4020	2668	2793	2579

Gross Mobile Savings = M-PESA savings + MBA savings + LSA savings

Net Mobile Savings = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings = MBA savings + LSA savings

Sample restricted to those with ADS consent

Standard errors clustered by school. Estimation stratifies on county and wealth

* p<0.1, ** p<0.05, *** p<0.01

Table 6: Mobile Savings (January 31st)

	Gross Mobile Savings				Net Mobile Savings				Gross CBA Savings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: ITT Estimates												
MBA/LSA treat	13				17				256***			
	(147)				(147)				(68)			
MBA Treatment		57				64				374***		
		(185)				(186)				(108)		
LSA Treatment			-19	-75			-17	-78			144**	-205*
			(159)	(177)			(159)	(178)			(66)	(116)
Adjusted R-Squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Panel B: TOT Estimates												
MBA Take-up	53	231			70	257			1053***	1506***		
	(602)	(739)			(602)	(742)			(282)	(437)		
LSA take-up			-71	-266			-63	-278			533**	-730*
			(588)	(626)			(587)	(633)			(252)	(410)
F-Statistic for weak identification	149	102	154	155	149	102	154	155	149	102	154	155
Adjusted R-squared	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	-0.01	-0.03	-0.00	-0.01
Reference Group Compliers' mean	780	819	552	920	780	819	602	1029	0	0	-284	1117
Reference Group Mean	476	476	476	552	517	517	517	598	24	24	24	409
Reference Group	Control	Control	Control	MBA	Control	Control	Control	MBA	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control	None	LSA	MBA	Control	None	LSA	MBA	Control
Observations	4020	2668	2793	2579	4020	2668	2793	2579	4020	2668	2793	2579

Gross Mobile Savings = M-PESA savings + MBA savings + LSA savings

Net Mobile Savings = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings = MBA savings + LSA savings

Sample restricted to those with ADS consent

Standard errors clustered by school. Estimation stratifies on county and wealth

* p<0.1, ** p<0.05, *** p<0.01

Table 7: Credit

	At least one MBA Loan				Number of MBA Loans				Total Amount of MBA Loans			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: ITT Estimates												
MBA/LSA treat	0.04***				0.40***				187.02			
	(0.01)				(0.12)				(114.58)			
MBA Treatment		0.05***				0.45***				190.29		
		(0.01)				(0.15)				(129.43)		
LSA Treatment			0.03***	-0.01			0.34**	-0.11			180.88	-14.47
			(0.01)	(0.01)			(0.14)	(0.16)			(144.18)	(153.21)
Adjusted R-Squared	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Panel B: TOT Estimates												
MBA Take-up	0.16***	0.18***			1.64***	1.82***			768.64*	765.73		
	(0.04)	(0.04)			(0.45)	(0.55)			(461.85)	(508.44)		
LSA take-up			0.12***	-0.05			1.26**	-0.37			670.27	-51.52
			(0.04)	(0.05)			(0.51)	(0.59)			(531.34)	(544.08)
F-Statistic for weak identification	149	102	154	155	149	102	154	155	149	102	154	155
Adjusted R-squared	0.12	0.13	0.06	-0.02	0.07	0.08	0.05	-0.01	0.03	0.03	0.02	0.00
Ref. Group Compliers' mean	0	0	0.13	0.30	0	0	0.99	2.62	0	0	380	1375
Reference Group Mean	0.08	0.08	0.08	0.12	0.75	0.75	0.75	1.19	415	415	415	604
Reference Group	Control	Control	Control	MBA	Control	Control	Control	MBA	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control	None	LSA	MBA	Control	None	LSA	MBA	Control
Observations	4020	2668	2793	2579	4020	2668	2793	2579	4020	2668	2793	2579

Standard errors clustered by school. Estimation stratifies on county and wealth

Sample restricted to those ADS consent

Loan variables calculated till Jan 5th

* p<0.1, ** p<0.05, *** p<0.01

Table 8: Financial Savings

	Non Mobile Gross Financial Savings				Gross Financial Savings (Jan5)				Gross Financial Savings (Jan 31)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: ITT Estimates												
MBA/LSA treat	950				1196*				1017			
	(613)				(624)				(631)			
MBA Treatment		604				940				728		
		(647)				(659)				(661)		
LSA Treatment			1253	712			1408*	555			1271	605
			(779)	(751)			(796)	(771)			(806)	(768)
Adjusted R-Squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00
Panel B: TOT Estimates												
MBA Take-up	3642	2327			4586*	3623			3898	2807		
	(2365)	(2512)			(2408)	(2564)			(2426)	(2563)		
LSA take-up			4308	2365			4841*	1843			4370	2008
			(2705)	(2504)			(2769)	(2567)			(2800)	(2559)
F-Statistic for weak identification	154	100	162	160	154	100	162	160	154	100	162	160
Adjusted R-squared	-0.01	-0.00	0.00	0.00	-0.01	-0.01	-0.00	0.00	-0.01	-0.00	-0.00	0.00
Ref. Group Compliers' mean	-4422	-3982	-6124	-4562	-3999	-3592	-5937	-3283	-3656	-3143	-5635	-3557
Reference Group Mean	-3752	-3752	-3752	-3262	-3470	-3470	-3470	-2619	-3257	-3257	-3257	-2617
Reference Group	Control	Control	Control	MBA	Control	Control	Control	MBA	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control	None	LSA	MBA	Control	None	LSA	MBA	Control
Observations	3519	2356	2463	2219	3519	2356	2463	2219	3519	2356	2463	2219

Sample: Restricted to those with ADS consent and found at endline. All missing values are treated as zeros
Standard errors clustered by school. Estimation stratifies on county and wealth
Using Gross Mobile Savings from Admin data till Jan5 for Column 5-8, and till Jan31 till for Column 9-12
Non Mobile Gross Financial Savings = Bank Account + Mattresses Savings + SACCO + CHAMA + Advanced purchases + Family + other
Gross Financial Savings (Jan 5) = Non Mobile Gross Financial Savings + Gross Mobile Savings Admin (Jan 5th)
Gross Financial Savings (Jan 31) = Non Mobile Gross Financial Savings + Gross Mobile Savings Admin (Jan 31st)

Table 9: Mobile Savings - Quantile Regressions

	Gross Mobile Savings			Gross Financial Savings		
	(1)	(2)	(3)	(4)	(5)	(6)
MBA Treatment	131	0	383*	2907	3	-317
	(201)	(0)	(218)	(2291)	(35)	(628)
LSA Treatment	236	0	397**	4984***	3	-60
	(156)	(0)	(202)	(1570)	(40)	(565)
Control Group Mean	253	253	253	-3470	-3470	-3470
Quantile	0.1	0.5	0.9	0.1	0.5	0.9
Observations	4020	4020	4020	3519	3519	3519

Gross Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings
Net Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings - MBA Loans
Gross CBA Savings (Jan 5) = MBA savings + LSA savings
Sample restricted to those with ADS consent
Standard errors clustered by school. Estimation stratifies on county and wealth
* p<0.1, ** p<0.05, *** p<0.01

Table 10: Ordinal Logit Margins - Gross & Net Mobile Savings

	Ordinal Var: Gross Mobile Savings	Ordinal Var: Net Mobile Savings
MBA		
Dependent Variable=1	-0.035**	-0.032**
	(0.016)	(0.016)
Dependent Variable=2	-0.004*	-0.005*
	(0.002)	(0.003)
Dependent Variable=3	0.039**	0.037**
	(0.018)	(0.019)
LSA		
Dependent Variable=1	-0.052***	-0.053***
	(0.016)	(0.016)
Dependent Variable=2	-0.006**	-0.008***
	(0.002)	(0.003)
Dependent Variable=3	0.058***	0.061***
	(0.018)	(0.018)
Pseudo R-squared	0.002	0.0023
Observations	4020	4020

* p<0.1, ** p<0.05, *** p<0.01
Ordinal Dep. Variable: = 1 if savings negative, =2 if savings zero and =3 if savings positive

Table 11: Mobile Savings by decision making respondent (ITT)

	Gross Mobile Savings	Net Mobile Savings	Gross CBA Savings	Gross Financial Savings (Jan5)
MBA/LSA treat	229	228	125**	550
	(236)	(237)	(51)	(1365)
Respondent is the decision-maker	173	192	-15	-546
	(178)	(179)	(41)	(1131)
MBA/LSA x Respondent is the decision-maker	-36	-30	270***	661
	(262)	(263)	(88)	(1466)
R-Squared	0	0	0.01	0
Adjusted R-Squared	0	0	0.01	0
Control Group Mean	256	297	21	-3406
Observations	4000	4000	4000	3508

Gross Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings

Net Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings (Jan 5) = MBA savings + LSA savings

Gross Financial Savings (Jan 5) = Non Mobile Gross Financial Savings + Gross Mobile Savings (Jan 5th)

Sample restricted to those with ADS consent for (1), (2) and(3), sample restricted to those with ADS consent and found at endline for (4)

Standard errors clustered by school. Estimation stratifies on county and wealth

* p<0.1, ** p<0.05, *** p<0.01

Table 12: Mobile Savings and Female Decision-maker

	Gross Mobile Savings	Net Mobile Savings	Gross CBA Savings	Gross Financial Savings (Jan5)
MBA/LSA treat	333**	337**	388***	1307*
	(151)	(152)	(93)	(750)
Female decision-maker	202	193	59	982
	(209)	(209)	(64)	(822)
MBA/LSA x Female decision-maker	-527*	-526*	-122	-346
	(268)	(268)	(147)	(1018)
R-Squared	0.00	0.00	0.01	0.00
Adjusted R-Squared	0.00	0.00	0.01	0.00
Control Group Mean	253	294	21	-3470
Observations	4020	4020	4020	3519

Gross Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings

Net Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings (Jan 5) = MBA savings + LSA savings

Gross Financial Savings (Jan 5) = Non Mobile Gross Financial Savings + Gross Mobile Savings (Jan 5th)

Sample restricted to those with ADS consent for (1), (2) and(3), sample restricted to those with ADS consent and found at endline for (4)

Standard errors clustered by school. Estimation stratifies on county and wealth

* p<0.1, ** p<0.05, *** p<0.01

Table 13: Mobile Savings and expectations of above average school performance

	Gross Mobile Savings	Net Mobile Savings	Gross CBA Savings	Gross Financial Savings
MBA/LSA treat	196	205	321***	1557**
	(132)	(133)	(81)	(682)
Expects above avg. school performance	51	92	5	591
	(205)	(205)	(73)	(794)
MBA/LSA x Expects above avg. school performance	-34	-48	122	-1414
	(294)	(295)	(186)	(1277)
R-Squared	0.00	0.00	0.01	0.00
Adjusted R-Squared	0.00	0.00	0.01	0.00
Control Group Mean	256	297	21	-3406
Observations	3976	3976	3976	3487

Gross Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings

Net Mobile Savings (Jan 5) = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings (Jan 5)= MBA savings + LSA savings

Gross Financial Savings (Jan 5) = Non Mobile Gross Financial Savings + Gross Mobile Savings (Jan 5th)

Sample restricted to those with ADS consent for (1), (2) and(3), sample restricted to those with ADS consent and found at endline for (4)

Standard errors clustered by school. Estimation stratifies on county and wealth

* p<0.1, ** p<0.05, *** p<0.01

Table 14: Take-up of MBA/LSA and Secondary School Enrollment

	(1)	(2)	(3)	(4)
Panel A: ITT Estimates				
MBA/LSA treat	0.06***			
	(0.02)			
MBA Treatment		0.06***		
		(0.02)		
LSA Treatment			0.05**	-0.01
			(0.02)	(0.02)
Adjusted R-Squared	0.10	0.09	0.10	0.09
Panel B: TOT Estimates				
MBA Take-up	0.21***	0.24***		
	(0.07)	(0.08)		
LSA take-up			0.18**	-0.04
			(0.08)	(0.07)
F-Statistic for weak identification	167	108	169	166
Adjusted R-squared	0.06	0.04	0.09	0.09
Reference Group Compliers' mean	0.62	0.59	0.65	0.94
Reference Group Mean	0.72	0.72	0.72	0.81
Reference Group	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control
Observations	3761	2521	2630	2371

Standard errors clustered by school. Estimation stratifies on county and wealth
Sample restricted to those with ADS consent and found at the endline
* p<0.1, ** p<0.05, *** p<0.01

Table 15: Savings and Secondary School Enrollment (TOT)

	(1)	(2)	(3)	(4)
Panel A				
Gross Mobile Savings	0.24	0.20	0.37	0.07
	(0.16)	(0.12)	(0.47)	(0.15)
F-Statistic for weak identification	3	4	1	1
Adjusted R-squared	-5.99	-3.90	-11.09	-0.54
Panel B				
Net Mobile Savings	0.24	0.19*	0.36	0.07
	(0.16)	(0.12)	(0.44)	(0.15)
F-Statistic for weak identification	3	4	1	1
Adjusted R-squared	-5.79	-3.81	-10.44	-0.54
Panel C				
Gross CBA Savings	0.14**	0.13**	0.16*	0.08
	(0.06)	(0.05)	(0.09)	(0.17)
F-Statistic for weak identification	24	17	10	1
Adjusted R-squared	-0.79	-0.69	-0.48	-0.42
Panel D				
Gross Financial Savings (Jan5)	0.06	0.09	0.04	-0.02
	(0.05)	(0.10)	(0.04)	(0.04)
F-Statistic for weak identification	2	1	2	0
Adjusted R-squared	-5.35	-10.08	-3.11	-0.55
Observations	3761	2521	2630	2371
Reference Group	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control

Gross Mobile Savings (Jan 5th)= M-PESA savings + MBA savings + LSA savings

Net Mobile Savings (Jan 5th) = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings (Jan 5th) = MBA savings + LSA savings

Gross Financial Savings (Jan 5) = Non Mobile Gross Financial Savings + Gross Mobile Savings (Jan 5th)

Sample restricted to those with ADS consent and found at the endline

Standard errors clustered by school. Estimation stratifies on county and wealth

Gross, Net, CBA and Financial savings are measured in units of thousands of KSh

* p<0.1, ** p<0.05, *** p<0.01

Table16: Realized Cost of School

	Total School Cost (incurred + expected)			
	(1)	(2)	(3)	(4)
Panel A: ITT Estimates				
MBA/LSA treat	-1953			
	(1830)			
MBA Treat		330		
		(2194)		
LSA Treat			-3692*	-3736*
			(1968)	(2093)
Adjusted R-Squared	0.01	0.01	0.02	0.01
Panel B: TOT Estimates				
MBA take-up	-7488	1272		
	(7114)	(8415)		
LSA take-up			-12691*	-12409*
			(6941)	(7141)
F-Statistic for weak identification	154	100	162	160
Adjusted R-squared	-0.02	0.01	-0.00	-0.01
Ref. Group Compliers' mean	33906	31340	44976	45160
Reference Group	Control	Control	Control	MBA
Reference Group Mean	31729	31729	31729	32103
Treatment Instrument Used	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control
Observations	3519	2356	2463	2219

Standard errors clustered by school. Estimation stratifies on county and wealth

Sample: Everyone who gave Baseline and Admin Data Sharing (ADS) consent and was found at the endline

* p<0.1 ** p<0.05 *** p<0.01

Table 17: Financing School

	Saved Money	Borrowing Money	Sold Farm prod. or livestock	Sold HH items	Gift items or money	other
MBA Treat	-0.02	0.01	0.01	-0.00	0.01	-0.00
	(0.02)	(0.02)	(0.02)	(0.00)	(0.01)	(0.01)
LSA Treat	-0.04*	0.01	0.03	-0.00	0.02	-0.01
	(0.02)	(0.02)	(0.02)	(0.00)	(0.01)	(0.01)
Adjusted R-Squared	0.03	0.03	0.03	-0.00	0.01	0.00
Reference Group Mean	0.48	0.24	0.24	0.00	0.09	0.09
Observations	3519	3519	3519	3519	3519	3519

Standard errors clustered by school. Estimation stratifies on county and wealth

Sample: Everyone who gave Baseline and Admin Data Sharing (ADS) consent and was found at the endline

Table 18: Standardized Test Scores

	(1)	(2)	(3)	(4)
Panel A: ITT Estimates				
MBA/LSA treat	0.01			
	(0.06)			
MBA Treatment		-0.01		
		(0.07)		
LSA Treatment			0.05	0.05
			(0.07)	(0.07)
Adjusted R-Squared	0.03	0.02	0.03	0.04
Panel B: TOT Estimates				
MBA Take-up	0.05	-0.03		
	(0.22)	(0.24)		
LSA take-up			0.15	0.17
			(0.24)	(0.21)
F-Statistic for weak identification	178	120	148	144
Adjusted R-squared	0.03	0.02	0.04	0.04
Reference Group Compliers' mean	0.00	-0.03	0.01	0.00
Reference Group Mean	0.00	0.00	0.00	0.00
Reference Group	Control	Control	Control	MBA
Treatment Instrument Used	Both	MBA	LSA	LSA
Arms Excluded from Sample	None	LSA	MBA	Control
Observations	3249	2218	2255	2025

Standard errors clustered by school. Estimation stratifies on county and wealth

Standardized test scores using mean and standard dev. of control group

Sample restricted to those with ADS consent and found at the endline

* p<0.1, ** p<0.05, *** p<0.01

Table A1: Leebounds for Table5 (Mobile Savings)

	Gross Mobile Savings				Net Mobile Savings				Gross CBA Savings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lower	-136	66	-236	-485**	-135	73	-240	-492**	70	247	15	-410***
	(217)	(465)	(167)	(221)	(218)	(465)	(167)	(235)	(129)	(299)	(66)	(143)
upper	405***	410	341**	31	408***	416	343**	27	397***	480***	298***	-151
	(156)	(326)	(140)	(188)	(156)	(324)	(141)	(190)	(76)	(141)	(79)	(138)
Arms Excluded from Sample	None	LSA	MBA	Control	None	LSA	MBA	Control	None	LSA	MBA	Control
Observations	4673	3119	3242	2985	4673	3119	3242	2985	4673	3119	3242	2985

Gross Mobile Savings = M-PESA savings + MBA savings + LSA savings

Net Mobile Savings = M-PESA savings + MBA savings + LSA savings - MBA Loans

Gross CBA Savings = MBA savings + LSA savings

Sample restricted to those with baseline consent

Standard errors clustered by school. Estimation stratifies on county and wealth

* p<0.1, ** p<0.05, *** p<0.01

Table A2: Leebounds for Table8 (Financial Savings)

	Non Mobile Financial Savings				Gross Financial Savings (Jan5)				Gross Financial Savings (Jan31)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lower	-1325**	-1759***	-931	714	-1071*	-1389**	-782	493	-1217**	-1567**	-899	554
	(577)	(665)	(757)	(4149)	(596)	(695)	(772)	(4163)	(602)	(698)	(782)	(4163)
upper	2076***	1632***	2479***	880	2469***	2139***	2768***	673	2411***	2049***	2739***	732
	(536)	(589)	(698)	(1405)	(560)	(634)	(721)	(1801)	(559)	(626)	(725)	(1756)
Arms Excluded from Sample	None	LSA	MBA	Control	None	LSA	MBA	Control	None	LSA	MBA	Control
Observations	4020	2668	2793	2579	4020	2668	2793	2579	4020	2668	2793	2579

Sample: Restricted to those with baseline and ADS consent.

Standard errors clustered by school. Estimation stratifies on county and wealth

Using Gross Mobile Savings from Admin data till Jan5 for Column 5-8, and till Jan31 till for Column 9-12

Non Mobile Gross Financial Savings = Bank Account + Mattresses Savings + SACCO + CHAMA + Advanced purchases + Family + other

Gross Financial Savings (Jan 5) = Non Mobile Gross Financial Savings + Gross Mobile Savings Admin (Jan 5th)

Gross Financial Savings (Jan 31) = Non Mobile Gross Financial Savings + Gross Mobile Savings Admin (Jan 31st)

Figure 1: Cumulative short-term gross mobile savings

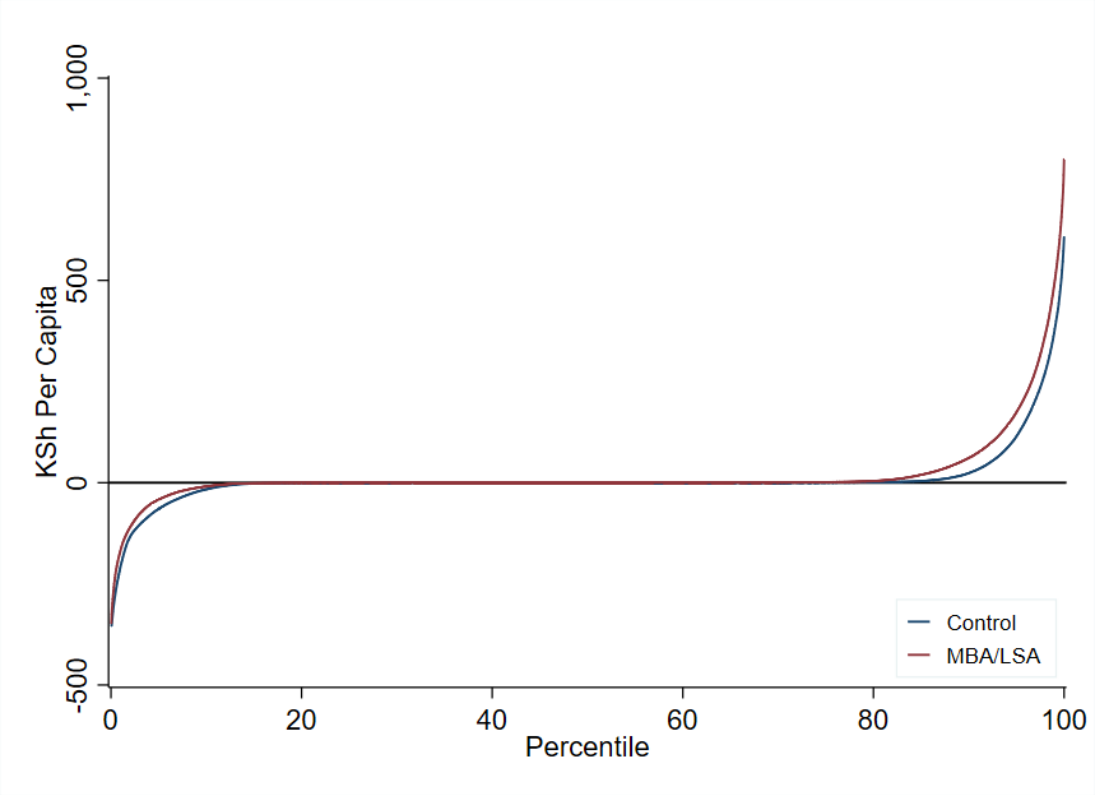

Figure 2: Cumulative short-term financial savings