



Subsidies versus mental accounting nudges: Harnessing mobile payment systems to improve sanitation[☆]



Molly Lipscomb^a, Laura Schechter^{b,*}

^a UVA, USA

^b UW Madison, USA

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ABSTRACT

The proliferation of mobile money across developing countries has led to an increase in availability of mobile payment systems. This decreases the organizational complexity of allowing more flexible payment terms for customers. We test whether subsidies, deposit requirements, and access to a mobile money savings vehicle increase the propensity of households to purchase an improved but more expensive sanitation service. While high subsidies increase purchases of the improved service, interventions inspired by mental accounting such as deposit requirements and earmarked savings accounts do not. The option to save in earmarked accounts using mobile money caused households to substitute away from purchasing the improved service in the general market and towards purchasing it through our providers, rather than substituting away from the unimproved service. We discuss implications for mental accounting-based policies compared to more traditional subsidies.

1. Introduction

Low demand for health-enhancing products and services imposes substantial welfare costs on communities as health and sanitation goods have large spillover effects. Households tend to be price elastic in their demand for health-enhancing technologies (Ashraf et al., 2010; Cohen and Dupas, 2010; Kremer and Miguel, 2007). In addition, households may have larger willingness to pay than ability to pay as a result of liquidity constraints and the difficulty of saving or borrowing for these items (Dupas and Robinson, 2013; Guiteras et al., 2016; Tarozzi et al., 2014). It has been widely shown that large subsidies can increase the take-up of these goods (Bates et al., 2012), but subsidy programs are expensive. We analyze the potential for mobile payment systems to increase take-up of sanitation services through interventions aimed at

relaxing budget constraints and liquidity constraints.

More flexible payment plans involving credit are one way to increase take-up and have worked in other settings. Ben Yishay et al. (2017) finds that the willingness to pay for latrines increases substantially when households are offered the chance to pay for the latrine over time. In our setting, the sanitation technology is a service rather than a durable, so lending is more difficult: after the service is provided, there is no collateral to encourage households to repay their loans. Because studies such as Guiteras et al. (2016) and Afzal et al. (2017) find that borrowing and saving are substitutes, we focus on relaxing liquidity constraints through saving interventions rather than borrowing interventions.

Access to financial products allowing households to save remains a major problem for households in developing countries

[☆] Lipscomb is associate professor of Economics and Public Policy at University of Virginia's Batten School. Schechter is professor of Agricultural and Applied Economics and Economics at UW Madison. This paper is a revision of a paper titled: "Mobile Payment Systems: The Impact of Earmarked Savings on Sanitation Purchases." We thank Madelyn Bagby, Josh Deutschmann, Shoshana Griffith, Sarah Nehrling, Heidi Schramm, and Jessica Zhu for excellent research assistance. We are grateful to the Bill and Melinda Gates Foundation for funding this project and research. Thanks to Mbaye Mbeguere and the members of the Senegal Office of Sanitation as well as Water and Sanitation for Africa for their collaboration. Pascaline Dupas, Jessica Goldberg, Terry Johnson, Dean Karlan, Nick Magnan, Diego Ubfal, and seminar participants at IPA's Financial Inclusion Conference, MWIEDC, UVA, and UW-Madison provided helpful comments.

* Corresponding author.

E-mail address: lschechter@wisc.edu (L. Schechter).

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(Dupas et al., 2018; Karlan et al., 2014), but has improved substantially through increased access to mobile money (Suri and Jack, 2016). While MPESA has been found to provide informal insurance and reduce exposure to risk in Kenya (Jack and Suri, 2014; Suri et al., 2012), mobile money has quickly become more versatile and has been used with increasing frequency to make payments to workers and households (Blumenstock et al., 2015; Brune et al., 2016). To our knowledge, there is less research available on using mobile money to facilitate installment payments for specific goods. Allowing individuals to make partial payments in advance in earmarked accounts, or forcing them to do so by requiring pre-paid deposits, could increase purchases of the good. This is both because having an account gives a household a place to save money and because the earmarking and mandatory deposit encourage mental accounting.

Mental accounting models suggest that households have several spending categories and only allow themselves to make a purchase when they have available funds targeted to that category (Thaler, 1985). Such models would predict that providing households with accounts earmarked for a specific purpose will increase the amount of spending households dedicate to that use. Households may also be more likely to purchase a product if they feel that they have already invested a “sunk cost” (Thaler, 1999). Requiring households to pay a deposit in order to reserve their improved sanitation service could serve as a sunk cost and increase purchases.

Commitment savings mechanisms have been implemented to improve households’ ability to save for important but infrequent expenditures, but they have had mixed success in a variety of settings (Ashraf et al., 2006; Blumenstock et al., 2018; Brune et al., 2016; Dupas and Robinson, 2013; Karlan and Linden, 2014; Kast et al., 2012). Dupas and Robinson (2013) finds that earmarked savings mechanisms help individuals save for health emergencies, but are much less effective at helping people save for the type of preventative health purchases that we study. Mobile money may be one way to facilitate commitment savings. Habyarimana and Jack (2018) evaluates the use of mobile money to increase savings for high school education expenses. Similar to our results, they find no additional benefit from having an earmarked locked account over having a non-earmarked account.

In this paper, we test the relative impact of mental accounting nudges to increase savings through mobile payment systems versus subsidies in increasing the take-up of sanitation products. Households in Dakar, which are off of the networked sewage lines, need to purchase this service approximately once every six months.¹ They can choose a manual desludging which is cheaper but less sanitary, or a mechanized desludging which is more expensive but more sanitary. We test the impact of mental accounting nudges such as earmarked savings and sunk cost deposits relative to more traditional subsidies on the service.

We offer households the opportunity to sign up in advance for a subsidized mechanized desludging subscription with subsidies randomized between two levels. We randomize components of the payment process in order to measure the impact of mental accounting nudges. In order to test the importance of deposits, we randomize the requirement that households make a deposit of \$6 (either 12.5% or 17.6% of the full price depending on their subsidy level) toward the purchase price in order to sign up for access to the service during the baseline survey.

In order to test whether mental accounting nudges can help households save for the desludging, we randomize whether the desludging account will accept deposits of amounts less than the full price. The group which is allowed to make non-final deposits is further randomized into two groups: a group that is asked to make consistent partial advance payments each month (monthly billing), and a group that is asked to save whenever they have available funds (save at will). The

monthly-billing system was meant to help clients purchase a desludging through nudging them toward consistent monthly payments equivalent to the average smoothed costs of desludging services over a year. The save-at-will treatment was meant to allow households maximum flexibility in saving for the service. Control group households (pay in full) are not able to deposit partial payments into their accounts. This approximates the status quo system in which a household pays the desludging operator in full for their work at the time of service. All households receive monthly reminders of the program and the availability of the desludging adapted to their treatment group and must have deposited the full price of their desludging prior to receiving the service.

We find that subsidies do encourage households to switch to more sanitary desludging services. Households are eight percentage points more likely to purchase a mechanized desludging from the program and three percentage points more likely to purchase a mechanized desludging overall when offered a large subsidy relative to a small subsidy. On the other hand, earmarked accounts, pre-paid deposits, and monthly billing do not have an impact on overall sanitation purchases. There are a few potential reasons for this divergence from the predictions of mental accounting theories. First, desludging purchases are infrequent and somewhat unpredictable expenses, which may make tracking them as a dedicated mental account more difficult. Second, targeting funds to a specific spending category may be more useful for some types of consumers. We only randomize access to the earmarked savings accounts among individuals who first signed up for the subscription desludging service. It could be that earmarking money towards desludging purchases has a smaller effect on those who at baseline already plan to purchase the subsidized mechanized desludging (the subscribers). It is possible that these accounts might have had a larger impact acting as an added incentive for individuals who did not originally sign up for the desludging subscription.

While the earmarked mobile money accounts do not cause households to switch from manual to mechanized desludgings, they do cause households to purchase the subsidized desludging through us rather than on the open market. Households increase their purchases of our program desludgings by five percentage points and have a corresponding similarly sized decrease in their use of non-program desludgings. The reason why individuals in the save-at-will group are significantly more likely to purchase the subsidized service appears to be that they appreciate the ability to deposit amounts below the full price of the good, and the ability to save in anticipation over longer periods of time. Households in our save-at-will group wait nearly 50% longer between their first deposit and the use of the desludging than households in the pay-in-full group. The monthly-billing treatment has no such positive effect on purchases of the subsidized services, frequency of smaller deposits, and time spent saving in anticipation of purchase. This suggests that the save-at-will treatment gives people a way to earmark their money for a specific service, and that individuals prefer the flexibility in payment terms that the save-at-will treatment offers them but the monthly-billing treatment does not.

We explore heterogeneous effects of the subsidy and savings interventions across those with risky and those with stable incomes. We also look at heterogeneous impacts across those with different mechanized desludging histories. Subsidies increase the use of more sanitary desludging techniques and this is especially true for individuals whose sanitation decisions may be most influenced by the price of a desludging: those with a salaried job and those who have purchased a mechanized desludging in the past but not in the year before the baseline.

The different mobile money and deposit treatments which attempt to take advantage of mental accounting do not change general sanitation purchase behavior overall or for any subgroup. Yet, some people who were going to purchase a mechanized desludging anyway such as those who have used a mechanized desludging in the past year, and those who need more help saving such as those without a regular paying job, do at least seem to appreciate and take advantage of the

¹ In a developed country context, this is similar to rural households needing to have their septic tank emptied periodically. In developing countries this is an issue in urban areas as well as rural areas.

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