

Does the adoption of Mobile Money affect Savings? Evidence from Burkina Faso¹

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Abstract. In this paper, we investigate whether the use of mobile money can help individuals build savings to face predictable events, e.g. develop their activity and/or unpredictable shocks such as health emergencies. To do so we use a logistic model and hand-collected data obtained from individuals-level survey that we conducted between May and June 2014 in Burkina Faso. Our main results show that, although using mobile money services has no impact on overall savings or savings for predictable events, it does increase the ability of individuals to save for health emergencies. We also find robust evidence that using mobile money increases the ability of disadvantaged groups such as rural, female, less educated individuals and individuals with irregular income to save for health emergencies. In our further investigations, we address the mechanisms underlying these savings behavior and find that perceptions of mobile money as a safe place to make deposits and secure than holding cash as well as the possibility it offers of transferring money throughout the country and from sub-region are the factors that may explain why mobile money users are more able to save for health emergencies than non-users. These results are in line with current policy agendas of governments and international organizations that are sparing no effort to increase the outreach of financial services and improve financial inclusion by promoting mobile technologies. (JEL Classification C83, D14, G21, G23, O12)

Keywords: Sub-Saharan Africa, Burkina Faso, financial inclusion, mobile money, savings

¹ This paper benefited immensely from the discussions and guidance of Alain Sauviat. We are also grateful to Idrissa M. Ouédraogo, Kassoum Zerbo, Mahamoudou Ouedraogo, Tidiane Ouedraogo, Jules Kaboré, Shadrack Ouédraogo, François Seck Fall, Nasr Ouedraogo and Denis Akouwerabou for their assistance. The usual disclaimer applies.

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1.Introduction

In Burkina Faso as well as in other developing countries limited access to formal financial institutions makes informal networks provide an important means by which individuals and households build up savings. Such informal saving mechanisms include saving in livestock or jewels, saving at home “under a mattress”, saving with a neighbor or in a more organized way participating in a Rotating Savings and Credits Associations (ROSCAs)³. Relying on these informal savings devices is however less by choice than necessity because the insurance they provide is well known to be risky, inappropriate and incomplete. For instance, to deal with unexpected events such as poor health which is very common in sub-Saharan Africa, people need to have access to liquid assets for example to consult a doctor or pay a prescription. Yet holding much cash is not an appropriate solution at least for two reasons. First, this way of saving is subject to theft or “taxes” by friends or relatives for assistance. Second, savers face self-control problems through “temptation goods” that make it difficult for them to postpone an important part of their consumption (Banerjee and Mullainathan 2010).

Our goal in this paper is to examine the impact of using mobile money, as a commitment device, on individuals saving behavior. This growing financial innovation is the use of a cell phone as an electronic wallet (e-wallet) that allows individuals to transfer purchasing power by simple short messaging services (SMS) technology and to store value inside through cash in and cash out functions. Mobile money allows its users to deposit funds for free while withdrawals are taxed. Thus, by storing value inside, people are insured against theft and unneeded expenditures because of the withdrawals fees which encourage them to cash out only whenever the need arises.

Mobile money has recently risen to the forefront of development agendas in less developed countries as many countries pioneer this new technology. Considerable number of research has been done on this field although most of them have been concentrated on the case of M-PESA in Kenya. Key findings that emerge from these previous investigations show that mobile money adoption reduces monetary and security costs of transferring money compared to traditional means such as Western Union, MoneyGram or transport companies (Mbiti and Weil

³Rotating Savings and Credits Association (ROSCAs) is a saving group involving many parties who know one another that meets on a regular basis. At each meeting, group members make a fixed mandatory contribution which goes into a “pot” that is then assigned to one of the members. For more details, see (Ambec and Treich 2007; Dupas and Robinson 2013b; Smets 2000).

2011). In a similar vein, it is shown that by reducing transaction costs, mobile money adoption has substantial impact on the size and the frequency of remittances that ultimately allows households to smooth consumption and share risk (Jack and Suri 2014). Close to our investigation, few studies describe how mobile money could also be used to create a safe pseudo-savings account, where individuals can deposit smaller savings amounts for more immediate needs (Mas and Mayer 2011). Complementary to this line of argument, other studies document that for long-term saving people rather use tools that limit access to cash (such as bank accounts or participation into a ROSCA) while they may prefer mobile money account to keep money for emergencies (Mbarathi 2014; Morawczynski and Pickens 2009). In our investigation of the potential impact of mobile money adoption on saving behavior, we therefore pay attention at this aspect and separate savings needs for immediate purposes from savings for long-term purposes.

Our choice to focus on saving cannot be overemphasized. Indeed, saving is one of the key aspects of financial practices that any individual has to assume himself instead of relying on someone else or relatives. As stated already, savings help people manage vulnerabilities by allowing them to face negative shocks and build an asset base which can be used to lessen the risk (Hulme, Moore, and Barrientos 2009). In developing countries, more than any other place, people often face a variety of negative shocks related to ill-health or a family member death which can overwhelm their means and hence hamper economic activity and development at large. This is why in such an environment, providing people with an appropriate mean to save can help them avoid falling back into misery and deal with unpredictable life events (Christen and Mas 2009). In this regard, building on recent empirical findings by Dupas and Robinson 2013b⁴ that show that simply providing a safe place to keep money is sufficient to increase health savings, we investigate whether using mobile money can help individuals increase their health savings, particularly those with less access to formal financial instruments.

Our paper contributes to the literature on mobile money in two main ways. First, to the best of our knowledge, it is the first to empirically test the impact of mobile money adoption on

⁴Dupas and Robinson (2013b) perform a field experiment on 771 individuals in rural Kenya to test the effects of four innovative commitment saving devices through the “mental accounting”. The Safe Box and the Lockbox were provided, to two groups, a box with and without the key respectively to save for preventative healthcare expenses. The Health Savings Account and the Health Pot held at a ROSCA used social pressure to encourage members to save for emergencies health expenses. They find that earmarking for health emergencies increase people’s ability to cope with shocks.

saving behavior. While there exist a fair number of studies that describe the potential impact of mobile money on savings, our paper is the first to empirically test those predictions. The lack of empirical studies in this area may simply be due to the scarcity of data as there are no available databases ready for use. The only way to have such data is to collect them manually which is tedious and costly. We therefore take advantage of a unique hand-collected data set. Second, the very few empirical studies we are aware of almost exclusively focus on the case of M-PESA in Kenya. Our study is carried out in the case of Burkina Faso, a country where many initiatives are increasingly implemented to improve the expansion of mobile money.

We use a logistic model to study the impact of mobile money on people saving behavior in Burkina Faso. Our analysis uses data from individual-level survey conducted between May and June 2014. We present evidence drawn from our full sample of the impact of mobile money on the ability of individuals to save for unpredictable and predictable purposes. The results show that using mobile money services has a positive impact on the ability of individuals to save for unpredictable purposes, such as health emergencies. We do however, find no effect of mobile money on overall saving or saving for predictable purposes. By taking into account existing disparities in the access and usage of formal financial services, our results show that mobile money increases the ability of rural, female, less educated and irregular incomes individuals to save for health emergencies. These results taken together have obvious and important policy implications. Facilitating mobile money adoption appears to be an important way to help excluded population build their savings to face unexpected shocks.

The remainder of the paper is organized as follows. In the next section we provide background information on the adoption of mobile money and the state of existing financial services in Burkina Faso. In section 3 we present a discussion of our research framework and follow this with a description of our survey data and summary statistics in section 4. In section 5 we present our model specification and section 6 the results. Section 7 presents the discussion of potential mechanisms through which mobile money can affect saving behavior and we conclude in section 8.

2. Background on mobile money and Access to financial services in Burkina Faso

Burkina Faso is a low-income country with a GDP per capita estimated at just 684 USD and about 46.7% of the population living under the national poverty line (World Bank, 2014). The country's financial system is still in its infancy even in comparison to other African low-income countries. There are about 13.35 percent of the population that have an account at a formal financial institution; in contrast, this rate is around 29.43 percent in Ghana, 42.34 percent in Kenya and 53.65 percent in South Africa (World Bank, 2011). The access to formal financial services remains limited in the country and the central bank(BCEAO)⁵ estimates the bankarization rate at about 4.6 percent(BCEAO 2011). In Burkina Faso, among individuals living in urban area, about 35.44 percent have a formal financial account, while in rural area only 11.78 percent have formal financial account (Global Financial Inclusion Database, 2011). This disparity in the access to formal finance is not confined to the living area, approximately 10.81 percent of female have an account at formal financial institution compared to 15.70 percent of male. Savings mobilization is crucial for individual and societal welfare. At the macroeconomic-level, savings rates are positively associated with future economic growth. At the individual-level, savings help people smooth consumption, cope with unexpected events and finance productive investments. However, evidence suggest that in less developed countries as in Burkina Faso, people lack access to formal financial services especially saving account that decrease their ability to save. The lack of banking infrastructure and their low coverage network, high transaction costs, financial illiteracy and the lack of information are often cited as a cause of the inaccessibility of populations to formal financial services (Dermish et al. 2012; Jack and Suri 2014; Ondiege 2010).The unbanked individuals are generally poor, live in rural area with precarious and irregular incomes and often lean against microfinance and informal finance to realize their financial projects. Microfinance institutions play an important role in providing formal financial services to the excluded people, and collecting more deposits than that of commercial banks (Ondiege 2010). In many developing countries, they have made a critical contribution by providing first microcredits and in later micro-savings and locating their branches in places that larger commercial banks were neglecting. However, the cost of operating microfinance institutions remain very high leading to a high transactions cost supported by customers. There is

⁵ BCEAO: Banque Centrale des Etats de l'Afrique de l'Ouest. It is the Central Bank of the eight countries including Burkina Faso, of West Africa Economic and Monetary Union (WAEMU).

evidence that people need more access to appropriate financial products that meet their needs especially good savings and payments services including remittances, and insurance (Beck, Demirgüç-Kunt, and Honohan 2009; Karlan and Morduch 2009).

Over the course of the past decade, cell phone or mobile phone coverage and adoption in Burkina Faso has increased substantially. While about 0.20 percent of the population had access to mobile phone in 2000, this increases to over 45 percent in 2011, and continued to rise dramatically in the past few years as 59.75 percent in 2012 and 65.44 percent in 2013 (Wireless intelligence, 2014). In addition to mobile phone based services (calls, SMS), others services have been introduced into Burkina Faso over the past two years, namely, mobile financial services or mobile money. This is a new channel through which mobile operators in association with commercial banks used cell phone to offer financial services to a large fringe of the population including poor individuals. In the country, there are three mobile operators including Airtel, Telmob and Telecel, only the first two offered mobile money services launch respectively in 2012 (Airtel Money) and 2013 (MobiCash). The first mobile money initiative was undertaken by an e-money issuer INOVA launch in 2009. In our study we attempt to highlight the impact of mobile money on saving behavior of the population covered by our survey irrespective of mobile money providers.

Since the launch on mobile money, the number of registered mobile money users has increased slightly, and in May 2014 it had reached about 949,691 accounts. Ignoring multiples accounts held by individuals into each mobile money providers, this implies that about 5 percent of the adult population had gained access to mobile money in two years. The number of mobile money agents has also grown as the number of mobile providers increased since 2009. There were about 62 agents in 2009, 531 in 2012 to reach 2,237 agents in May 2014. However, the number of agents between 2012 and 2014 appear to be those of Airtel Money as in 2012, INOVA didn't work well and MobiCash was not yet launch and we don't have any data about the number of agents. The number of agents plays a key role in the adoption of mobile money by creating a dense network of agents who convert cash to e-money and vice versa for customers. Typically, there is no exclusive partnership between agents and each mobile money providers. Some agents operate other business, which are often related to the mobile phone industry (such as cell phone

retails outlets, airtime distribution stores), but also including grocery stores, shopkeepers, bank branches.

The introduction of mobile money into Burkina Faso, offers a new opportunity to improve people's financial behavior. Mobile money is characterized by some unique features that equip it with certain advantages: ubiquity, affordable, fast, safe and secure through a Personal Identification Number (PIN). Using mobile money, individuals can exchange cash for e-money at par with any mobile money agents respectively to the mobile operator across the country, and transfer these balances via SMS to any other mobile phone in the country or overseas (especially in Ivory Coast⁶), even if the recipient is not registered with the mobile money and even if the phone operates on a competing network. It is essential to ensure that mobile money users have convenient access to cash in/out options to convert their cash into electronic money and vice versa. Liquidity might be available at all retailer agents to enable people to convert their electronic money into cash. This supports the proposition of mobile money based on "choice and control" allowing people to cash in or out when they want and monitor the amount of transactions realized through their electronic wallet. , Mobile money appear to be a very competitive mean of money transfer through the country. BCEAO (2012) report that for transferring about 100 000 FCFA (about \$186.89), Airtel charges about 3 percent, INOVA 1.18-3 percent and ECOBANK⁷ charges around 3.8 percent via western union and 1.18 percent via STAR. Depositing funds is free of charge. For transferring an amount between 500 to 3 000 000 FCFA (\$0.95 to \$5,680.4 USD) there is a fixed fees of about 100 and 600 FCFA (about \$0.19 to \$1.14 USD) per SMS transfer according to the mobile money provider. While these fees are about 0.20% when amount transferred is more than 3 000 000 FCFA (\$5,680.4 USD). Withdrawals are charged according to the amount, there are fixed fees of about 350 to 2 000 FCFA (\$0.66 to \$3.79 USD) for an amount comprised between 500 and 2 000 000 FCFA (\$0.95 and \$3,789.21 USD), and 1% fee for more than 2 000 000 FCFA. All these fees are deducted from users' accounts and shared by the mobile operator on a commission basis with the relevant agent. No interest is earned on account balances, and all mobile money providers does not make loan. According to international

⁶A large community of Burkinabe live in Côte d'Ivoire (Ivory Coast). A recent study by (Susie, Meritxell, and Rita 2013) shows that there are about 6 millions of mobile money subscribers in Côte d'Ivoire in December 2013. Mobile money seem to be a channel through which Burkinabe immigrants could send money at home.

⁷ECOBANK is a commercial bank that allows customers to remit money using Western union and through STAR a software for interbank transactions.

standard-setting body for Anti-money laundering and Combating Financing of Terrorism, the central bank⁸ regulations limited mobile money transactions at 100,000 FCFA (\$191.25) and imposed a cap of 3,000,000 FCFA (\$5,737.02) on account balances.

3. Research Framework

Our paper is at the intersection of different strands of the literature, addressing formal financial access and usage, mobile money, and savings patterns. Investigating the effects of mobile money on people saving behavior is relevant to both policy agendas of governments and international organizations that are sparing no effort to improve people lives. Drawing from the existing literature, the potential impact of mobile money adoption on saving behavior may depend on two important aspects described below: the purpose of saving and the exogenous characteristics of the individuals.

3.1. Mobile money adoption and Savings patterns

In Burkina Faso as well as in other developing countries, the majority of population does not have access to formal financial services such as saving accounts and therefore, people mainly use alternatives savings mechanisms like informal savings methods to manage their finances. Against this backdrop, several initiatives have been undertaken either by private or government entities to promote branchless banking such as mobile money. Previous research shows that people with less access to formal financial services mainly use their mobile money account to keep money, particularly when they are small amounts. Morawczynski (2009) in a fieldwork in Kenya documents that mobile money acts as a complement of others saving mechanisms. Some people use their mobile money account to separate their business savings from their personal savings, others withdraw their money from the bank account to save it into their mobile money account or just use it to accumulate money and remit it to relatives when they reach the target amounts. These findings appear to reflect that mobile money affect the saving behavior of users through a breakdown of saving amounts. In this context, mobile money should have no effect on

⁸The Central Bank (BCEAO) requires the identification of individuals holding in their mobile money account, an amount greater than or equal to 100 000 F CFA. Similarly, unit or split payment may not exceed 10 000 F CFA per operation for non-identify individual.

the behavior of individuals to save more, then keeping the overall level of saving unchanged. However, Demombynes and Thegeya (2012) who consider a Kenyan sample as well reach an opposite conclusion. They find that M-PESA usage increases savings as a simple storage device. They argue that while it does not pay interest, mobile money is considered as a device to store funds safe from dangers of theft and inaccessible to relatives. Hence, it can be relevant to highlight the impact of mobile money usage on individual savings behavior and in some manner on savings patterns such as unpredictable and predictable objectives.

Many people save using a saving group (ROSCA), or invest in land, jewels and livestock, which can be used both as a form of saving and as productive assets. In some cases people hold cash, exposing them to theft or unneeded expenditures. These forms of informal savings are used both to deal with unpredictable and predictable life events, while remain inappropriate. Indeed, to deal with predictable events as to start up or develop a business, people can easily sell their physical assets since the achieving date is preset. For individuals participating in ROSCA, they can preset the startup date according to date they are assigned to receive the pot, as many ROSCAs use a predetermined order to allocate the savings pot. Yet, the inappropriateness of these types of saving includes the fact that individuals must plan their investment projects according the predetermined order of the savings pot allocation. In addition to physical asset depreciation, individuals may be obliged to postpone their investment achievement. In this context, we suppose that mobile money can enhance individuals saving behavior and help them realized their investment project by keeping money inside. As the mobile money account is personal, individuals can determine their own target to reach in order to realize their investment project. However, it has been proved that planning for long term objectives requires less access to the money (Mbarathi 2014; Morawczynski and Pickens 2009). As mobile money increases access to cash its impact on saving for predictable events can be mitigated.

Selling land, jewels or animals quickly in response to unexpected health shocks is not easy. In the case where individuals participate in a ROSCA, since there is a typically predetermined order, it is impossible to access the money immediately. When an emergency comes up, it is impossible for individuals to access their money immediately. Some people would ask relatives for help, while relatives would have to sell an asset or work more (Collins et al. 2009; Dupas and Robinson 2013b). Dupas and Robinson (2013b), in a field experiment in Kenya

show that simply providing a safe place to keep money was sufficient to increase health savings. This appears to stem from the fact that saving for unpredictable events required more access to cash than tangible or illiquid assets which cannot be easily converted into liquidity. Mobile money is particularly prominent in this regard by providing more access to cash to face unexpected emergencies. In this framework, using mobile money should have a positive impact on individuals' saving behavior for unpredictable health emergencies. While, a more liquid savings option, accessible anywhere and anytime, could increase family assistance problems. As far as mobile money taxes on withdrawals it can help people resist unneeded expenditures on the one hand but it may discourage them to put money aside and diminish its effects on savings on the other hand.

3.2. Mobile money adoption, Savings Patterns and the “Triple whammy”

Given that there are some disparities on the lack of access to formal financial services depending on, among other things, the living place, the gender, the level and types of incomes of population, it is crucial to take this dimension into consideration while examining the potential impacts of mobile money on the savings behavior. In their famous book *The portfolios of the poor*, Collins et al. (2009) highlight the fact that in developing countries people not only have to cope with low incomes but that these incomes are irregular and that too few financial instruments are available to help them manage those low and irregular incomes. They term this the “*triple whammy*”.

3.2.1. Low, irregular versus High, regular incomes

In Burkina Faso where, about 46.7% of the population live under the national poverty line (World Bank, 2014), poor people's incomes are not just low, but also irregular. Mas (2010), argued that two factors perpetuate poverty, low and stagnant labor productivity and the occurrence of adverse shocks most often health or weather related which overwhelm family finances and may prevent them from hanging on to accumulated assets. Poor people can save and save in order to meet life cycle needs, cope with emergencies, acquire assets and develop business (Rutherford 1999). The option to save for predictable purposes (self-funded investments) and unpredictable

purpose (self-insure against adverse and unexpected events) should be at the heart of a financial-services proposition for poor people. Deaton (1997) argued that precautionary savings are often a better fit for poor people as their face volatility in their income and have inability to borrow to smooth consumption. It has been proved that poor individuals save small amount of money through a variety of informal mechanisms (Banerjee and Duflo 2007; Chowa, Masa, and Sherraden 2012; Christen and Mas 2009; Collins et al. 2009; Mas 2010). Furthermore, informal savings arrangements tend to be risky due to theft and/or asset depreciation. If poor individuals had good savings tool such as mobile money that is reliable and available, safe and affordable, they would be able to well manage their money and overcome unpredictable shocks and predictable events. Thus, the challenge of improving poor people life through saving to cope with unpredictable and predictable events using mobile money needs to be examined.

3.2.2. Few versus Many available financial instruments

The place of residence (rural vs. urban), gender and the level of education are key determinants of accessibility to formal financial services. Indeed, the breakdown of financial infrastructure shows disparities between rural and urban areas. In most sub-Saharan Africa countries rural areas are the most populated, representing 60 percent of the total African population but where the activities of commercial banks remain underdeveloped (Dupas et al. 2012; Mas 2010; Ondiege 2010). In Burkina Faso 73.5 percent of the population (BCEAO, 2011) live in rural and the main activity of population relies on agricultural. About 37.2 percent of the rural people that happens to build saving, only 7.04 percent save in a formal financial institution, while 20.14 percent in urban area (Global Financial Inclusion Database, 2011). In the country, almost all formal financial institutions are concentrated in urban disadvantaging rural individuals. People living in rural areas compared to those in urban areas have less access to a wide range of financial services to cope with unpredictable and predictable events. Mobile money can be suitable to help bridge this gap with 90 percent of Burkina Faso territory coverage by the mobile network. This huge access to mobile money for both rural and urban individuals should have different impact on their saving behavior. Morawczynski (2009) show that in Kenya, people living in urban area are less likely to use their M-PESA account to save because they have enough saving mechanisms to meet their needs. Other arguments include the fact that people may

need to keep their money into a bank account to build a relationship with the financial institution to access credit in the future. In the urban area, the impact of mobile money on individuals saving pattern both unpredictable and predictable, should be less or none. Furthermore, Dupas et al. (2012) show in rural area in Kenya that the lack of formal bank account make it more difficult for people to save, they will be unlikely to have enough saved up to deal with unexpected emergencies such as household illness. In this context, providing individuals with the mobile money can increase their ability to save for unpredictable events. However, people in rural area are engage in informal saving mechanisms that seem more appropriate for long term needs. As mobile money increase access to cash, its impact on individual behavior to save for predictable events could be smaller or null. Poor health is common in Sub-Saharan African countries as well as in Burkina Faso, and providing people with appropriate tools can improved their saving behavior (Aker and Mbiti 2010; Christen and Mas 2009; Dupas and Robinson 2013b).

All else being equal (income and education levels for instance), women remain more excluded from the financial sector and hence they have less access to formal financial services such as savings and loans than men (Demirgüç-Kunt, Klapper, and Singer 2013). Without a bank account, it is more difficult for women to build up savings at formal financial institutions and receive public benefits or remittances from family members living abroad (Demirgüç-Kunt et al. 2013). Many women and to lesser extent men participate in ROSCAs to lend their savings to each other, others saved with local money-lenders, with credit union or Microfinance which are essentially larger and much more formally organized. However, these savings practice are found to be appropriate for long term savings while less appropriate to cope with an immediate needs or unexpected emergencies. Dupas and Robinson (2013a) provide robust evidence that shows how women are more in need of formal saving devices than men. In a randomized field experiment in Kenya, they find that increasing access to basic saving bank account which does not pay interest, increases women saving while men saving is not impacted. This is why one may conjecture that financial alternatives such as mobile money services could play a prominent role in extending access to formal financial services without any discrimination. Based on the findings of Dupas and Robinson (2013a) mobile money usage should have more impact on women saving behavior than men. Mbarathi (2014) indicates in a study on rural women in Kenya that respondents combined multiple tools to plan their expenditures such as ROSCA for predictable purposes and mobile money for immediate needs. Mobile money has the potential to cut back gender

inequalities. We therefore highlight its effects on savings patterns taking into account this gender aspect.

Financial literacy or financial knowledge is yet to receive enough attention although there has been growing attention in the recent past. Recent research shows that across developed and developing countries the level of financial literacy remains very low (Karlan, Ratan, and Zinman 2014; Lusardi and Mitchell 2014). The link between financial knowledge and education level is that less educated individuals are less likely to be knowledgeable about basic financial literacy. In Burkina Faso, without surprise, the unbaked population is mainly that with low education level. Hence, it is difficult for the less educated individuals to understand the various services that are available to them and to fill out loan applications. Less educated are generally poor individuals using informal saving methods to protect themselves against unexpected shocks. In our case study, individuals with high education level are more students and unemployed implying that they have low incomes level. As mobile money remain affordable and easy of use for all individuals, it can be worthwhile to uncover its impacts on the savings behavior of both less and more educated individuals.

If mobile money can significantly allow individuals to enhance their saving behavior, especially for a specific purpose, our case study suggests the following testable hypotheses:

- (i) Users of mobile money should have more ability to cope with unpredictable health shocks than non-users;
- (ii) To the extent that mobile money is affordable, easy of use and available anywhere through the country, disadvantaged individuals such as rural, female, less educated, low and irregular incomes level individuals should be more impacted.

We test these hypotheses by using individuals-level data on the usage of mobile money combining with socio-demographics information collected through our survey in the country during 2014. In this next section, we describe our empirical specifications and identification assumptions.

4.Data and summary statistics

In May 2014, we undertook a survey of 500 randomly selected people across one region of Burkina Faso. The country has 13 regions divided into many rural and urban municipalities. The area covered by the sample frame is the center region included 13.3 percent of Burkina's population. For our study, we randomly selected one rural municipality "Saaba" and one urban municipality "Ouagadougou", and two departments into each municipality then four departments were retained for our survey area. This choice is justified by the fact that at first of all our aim is to grasp the effects of usage of mobile money on people savings behavior. The center region is the most populated and where are concentrated the supply of formal financial institutions and in some extent the supply of mobile money institutions⁹. Budgetary constraints did not allow us to extend the survey throughout the territory. The target population was split between 50 percent of users and 50 percent non-users of mobile money. A paper-based questionnaire was distributed to a total of 500 participants with 500 FCFA (about \$1 US) unit of call time incentive. The questionnaire combined qualitative and quantitative questions to elicit in-depth information about users and non-users of mobile money including individual's socio-demographic characteristics. All research variables were measured using multiple-item scales and based on previous studies with some changes to tailor them to the mobile money context. Most of the items were coded on dichotomous responses and on 5-point Likert scale.

For the main sample we choose 50 percent of women and 50 percent of men. However, the number of non-users and users of mobile money within the gender was randomly selected in each municipality. The main sample of our study comprised 405 respondents interviewed from 20 May to 28 June 2014. Participants who do not have any access to the mobile money were classified as non-users, while participants who have access to the mobile money through their own cell phone or another cell phone were classified as users. The final sample consisted of 405 respondents at the end of our survey.

Table 1 (in the next section) reports summary statistics for the analysis of the full sample. Virtually, all individuals in our sample saved and this support the fact even the low incomes individuals can save. The share of individuals that reported saving is about 92 percent, and among them 89 percent report saving for emergencies(illness) and 53 percent saved to develop an

⁹ The center region is the second after the western region where mobile money agents are concentrated (28.57% for center region and 44.73% for western region).

activity. About 48 percent reported married and the mean of age is about 30.55 years. As well 53 percent reported having person in charge, and more than half of all individuals had at least secondary education level (more than six years of school). For the employment status, about 84 percent reported having a gainful activity, while 16 percent were unemployed included students. More than half of all individuals had an incomes level range from \$86.43 to \$259.31 US, and about 48 percent of all individuals had irregular incomes.

In our data, 99.26 percent of our sample use a mobile phone. Almost all mobile money users use the service to make person-to-person remittances 79.41 percent receive transfer and 65.68 percent send transfer. It is use to buy airtime by 71.08 percent of users, and a small share (0.98-1.96 percent) use it to pay bills and services. About 90.20 percent of users report saved during the past 12 months and 34.31 percent saved using mobile money. However, 85.29 percent of users report saved to cope with emergencies and 44.61 percent saved to develop an activity. Of the 204 users individually interviewed during the survey, 53.43 percent report using it at occasionally a month.

5. Model Specification

We use a logistic model to examine the impact of mobile money on savings patterns by comparing the effects on save for emergencies and save to develop an activity of mobile money users and non-users in the following specification:

$$\text{logit}[P(y = 1)] = \alpha_i + \beta_1 MM_i + \beta_2 X_i + \varepsilon_i$$

where y is our threemain dependent variables, overall savings, savings for emergencies and savings to develop an activity that we use separately. These dependent variables are dummies, for instance, equal to 1 when respondents indicated saving, and 0 otherwise; saving for emergencies and saving to develop an activity are also encoded the same, α_i ($i = 1, 2, \dots, n$) is an individual fixed effects, MM_i is the variable of interest, the use of mobile money, a dummy variable equal to 1 if the individual reports use the mobile money, X_i is a vector for controls (age, gender, marital situation, person in charge, education level, living place, occupation or employment status, level and types of incomes). Our data on saving and saving patterns (health emergencies and develop

an activity) were collected as follow: “During the 12 past months, do you save some of your money? Respondents who report saved were asked “During the past 12 months, do you save: “to develop an activity?”; “to cope with emergencies (illness)?” Here many other propositions were offered to the respondents but as our study aims to highlight the impact of mobile money on savings for unpredictable and predictable purposes, we retain saving to cope with emergencies and to develop an activity.

If both users and non-users of mobile money have the same ability to save for emergencies (also to develop an activity), the coefficient β_1 should not be significantly different from zero. If users of mobile money have more ability to save for emergencies (also to develop an activity) than non-users, then β_1 should be positive and statistically different from zero.

For equation (1) to identify the causal effect of mobile money on saving for emergencies and to develop an activity, we must assume that the term user of mobile money is exogenous, or uncorrelated with error term and other controls variables. Here, we describe the situations under which this assumption holds. The exogenous of usage of mobile money may be due for three reasons: first, individuals were asked in the survey to report if they use or not mobile money; second, usage of mobile money don't systematically imply that users of mobile money save for emergencies and save to develop an activity; And, third, save for emergencies and save to develop an activity don't imply that individuals are users of mobile money.

However, mobile money usage could have different impact on savings for emergencies and to develop an activity when considering subsamples build on individuals characteristics. This means that β_1 from equation (1) can only be interpreted as showing the global impact of mobile money on savings patterns for all of individuals in the main sample. To deal with this, we propose to use equation (1) on subsamples according the living place, the gender, the education level, the level and types of incomes. The interpretation of β_1 should be the same as in the core analysis according to subsamples considered.

Table 1. Summary statistics and variables description

Variable	Definition	Obs.	Mean	Median	Std. Dev.
Save	Reply to the question: During the past 12 months, did you save some of your money? Encoded as yes = 1, no = 0	402	0.92	1	0.27
Save for emergencies	Reply to the question: During the past 12 months, did you save to cope with emergencies (illness)? Encoded as yes = 1, no = 0	374	0.89	1	0.32
Save to develop an activity	Reply to the question: During the past 12 months, did you save to develop an activity? Encoded as yes = 1, no = 0	372	0.53	1	0.5
Mobile money user	Reply to the question: Do you use mobile money services? Encoded as yes = 1, no = 0	405	0.5	1	0.5
Individuals characteristics					
Age	Indicate the age of respondents	404	30.55	29	7.19
Male	Indicate the gender of respondent, Encoded as Male = 1, Female = 0	405	0.51	1	0.5
Married	Indicate the marital situation of respondent, Encoded as Married = 1, Single = 0	405	0.48	0	0.5
Person in charge	Indicate if the respondent have or not dependent, Encoded as Having dependent = 1, otherwise = 0	401	0.53	1	0.5
Education	Indicate the education level of respondent, Encoded as Illiterate = 1, Primary = 2, Secondary = 3, University = 4	402	2.67	3	0.95
Rural	Indicate the living place of respondents, Encoded as Rural = 1, Urban = 0	405	0.52	1	0.5
Occupation	Indicate the status of respondents, Encoded as (Employed, Entrepreneur, Merchant, Farmer) = 1, (Unemployed, Student) = 0	391	0.84	1	0.37
Income	Indicate the incomes level of respondents, encoded as less than 10 000 F CFA = 1, 10 000 to 50 000 F CFA = 2, 50 000 to 150 000 F CFA = 3, 150 000 to 300 000 F CFA = 4, 300 000 to 500 000 F CFA= 5, More than 500 000 F CFA = 6	405	2.61	3	0.77
Irregular incomes	Indicate the type of incomes of respondents, encoded as Irregular = 1, Regular = 0	403	0.48	0	0.5

Notes: Throughout, F CFA (Franc of the African Financial Community) refers to the local currency. The exchange rate during the survey period was about 500 F CFA = \$1 US.

6.Results

Table 2 presents results for our overall sample. Column 1 reports results on saving, in column 2 saving for emergencies and saving to develop an activity column 3. Across these columns, we show the coefficients of the variable of interest positive and significantly different from zero in column 2. But in column 1 and 3, this coefficient is negative and not statistically significant. Thus, mobile money has a positive impact on users' behavior to save for health emergencies than non-users, while this effect is null on overall saving and when individual build up saving to develop an activity. These results imply that mobile money users are more able to cope with health emergencies than non-users, while there is no difference between users and non-users to save or save to develop an activity. Our findings support the fact that as mobile money increase access to cash, individuals would use it to plan for immediate needs like health emergencies however saving for a predictable purpose or long term planning that supposes less access to the cash they would prefer other means.

In each estimation, we include socio-demographic characteristics. Our results show a hump-shape relationship between saving to develop an activity and age but this result is only significant in column 3. This result is consistent with the life-cycle hypothesis that individuals spread their lifetime consumption over their lives by accumulating savings during earning years and maintaining consumption levels during retirement. The marital situation is an important feature in determining individual's savings behavior but has an ambiguous effect. On the one hand, individuals who are married can be motive to save more for family projects, and on the other hand they can dissave because of higher consumption. In column 3 our results show the coefficient of individuals who are married affect negatively and significantly saving to develop an activity. This result confirm a "size effect" that a household of more than one individual has less ability to save especially to develop an activity. We expect the similar results from individuals having dependents to have less ability to save even for emergencies and to develop an activity than individuals who depend of other or living alone. However, the coefficient is negative and non-significant in all columns. Our results show the coefficient of education level positive and significant in column 2 and negative and significant in column 3. Illiterate and low financial literacy are more common in less developed countries and often cited as a cause of under-saving. However, ours findings imply that more education individuals have more ability to save for emergencies, while they are less able to save to develop an activity. One explanation of

Table 2. Logit Model on all sample

	Full sample		
	Save	Save for emergencies	Save to develop an activity
	(1)	(2)	(3)
Mobile money user	-0.345 (0.496)	0.922** (0.379)	-0.142 (0.295)
Age	-0.130 (0.314)	0.070 (0.261)	0.438** (0.181)
Age squared	0.004 (0.006)	-0.000 (0.004)	-0.006** (0.003)
Married	0.299 (0.727)	-0.084 (0.550)	-0.936*** (0.356)
Rural	-0.682 (0.482)	0.143 (0.400)	-0.949*** (0.359)
Male	-0.536 (0.494)	0.006 (0.386)	0.254 (0.329)
Occupation	1.354** (0.664)	0.896 (0.576)	2.842*** (0.938)
Irregular incomes	-1.264* (0.679)	-0.113 (0.451)	2.499*** (0.376)
Person in charge	-0.044 (0.400)	-0.036 (0.331)	-0.014 (0.284)
Education	-0.034 (0.385)	0.382* (0.208)	-0.610*** (0.185)
Income	1.391 (1.254)	-0.675 (1.402)	-1.334 (1.222)
Incomes squared	-0.195 (0.238)	0.100 (0.223)	0.346* (0.198)
Constant	1.047 (4.261)	-0.830 (3.801)	-7.576** (3.242)
Observations	379	352	350
Pseudo R2	0.184	0.075	0.359

Notes: Dependents variables: save, save for emergencies and save to develop an activity. Robust standard errors in brackets. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomessquared. We do not interpret columns 1, 3, 5 and 7, for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

these results is that in our sample more educated individuals are largely university students while less educated individuals are employed suggesting that they will have more inclination to save for developing an activity.

Regarding geographical situation, we assume that individuals living in urban area are more able to save for long term purpose as formal financial institutions are more concentrated in urban area. This is consistent with our results in column 3 showing negative and significant effect of rural on saving to develop an activity. Our finding suggest that individuals living in rural area are less ability to save to develop an activity than individuals living in urban area. It has been documented that although women remain excluded from the formal financial services, women usually save more than men. But we don't find any evidence in our results. Individual's employment status gives important information that can be determinant in their saving behavior. Intuitively individuals having a gainful activity would have more inclination to save even for emergencies as to develop an activity than individuals without gainful activity (unemployed and students). The results show the coefficient of individual's employment status positive and significant in columns 1 and 3. These results imply that individuals having a gainful activity are more ability to save and especially save to develop an activity. Regarding income level the coefficient is positive in column 1, and negative in column 2 and 3. These results imply that an increase in the incomes level induce individuals to build up saving, while a decrease in the incomes level lead individual save for emergencies and to develop an activity. We also find similar results for individuals having irregular incomes as incomes uncertainty has been cited as motive that influences individual's saving behavior. In column 1, the coefficient is negative and significant implying irregular incomes are less ability to save than one with regular incomes. In column 3 the coefficient is positive and significant implying that irregular incomes individuals are more likely to save to develop an activity. These results reflect a precautionary behavior of individuals with irregular incomes that are more care to stabilize their incomes. This is consistent with the permanent-income hypothesis assuming that people attempt to maintain a fairly constant standard of living even though their incomes may vary considerably.

In Table 2, comparing results of saving for emergencies and saving to develop and activity, the coefficients indicated that mobile money affects saving behavior leading to an increase in the ability of saving for health emergencies than to develop an activity by individuals covered by our survey. One concern may be that mobile money usage affect the ability of individuals to save for emergencies in particular when we used the full sample this may obscure the full effect of mobile money when considering rural area versus urban area, female versus

male, less educated versus more educated, irregular incomes versus regular incomes and lower incomes versus higher incomes.

Table 3 presents estimates of the impact of mobile money on saving for health emergencies and save to develop an activity in rural and urban area. In column 2, the coefficient of mobile money usage is positive and significant while not statistically significant in column 4. These findings support our main results that mobile money affects positively the ability of users than non-users to save for health emergencies in rural area. However, in urban area all the coefficients of variable of interest are not statistically significant. These results imply that mobile money impacts saving behavior of individuals living in rural area than those in urban. Interestingly, our findings appear to reflect that as access to formal financial services is very low in rural area, mobile money tends to settle this gap.

Table 3. Logit model on individuals living in rural and urban area

	Rural area				Urban area			
	Save for emergencies		Save to develop an activity		Save for emergencies		Save to develop an activity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MM user	1.061** (0.523)	1.041* (0.578)	-0.467 (0.295)	-0.423 (0.458)	0.893* (0.498)	0.823 (0.552)	-0.281 (0.303)	0.042 (0.525)
Controls included	No	Yes	No	Yes	No	Yes	No	Yes
Observations	194	179	193	165	180	173	179	172
Pseudo R2	0.037	0.087	0.010	0.309	0.025	0.118	0.004	0.481

Notes: Dependents variables: save for emergencies and save to develop an activity. Robust standard errors in brackets. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not interpret columns 1, 3, 5 and 7, for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4 presents results on save for emergencies and save to develop an activity for female and male. Through all columns, the coefficient of our variable of interest is positive and statistically significant only in column 2. Female users of mobile money are more ability to save for emergencies than non-users, but there are no effects to save to develop an activity. While for male users of mobile money there are no evidence. These results is consistent with the findings of Mbarathi (2014) that mobile money is a useful device that help women to prevent themselves from unexpected risks and vulnerabilities. Mobile money also increase the ability of women to plan for immediate needs and in certain manner can contribute to reduce inequalities between women and men in the access of formal financial services.

Table 4. Logit model for female and male

	Female				Male			
	Save for emergencies		Save to develop an activity		Save for emergencies		Save to develop an activity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MM user	1.654*** (0.575)	2.024*** (0.633)	-0.464 (0.300)	-0.027 (0.484)	0.452 (0.481)	-0.017 (0.579)	-0.235 (0.291)	-0.292 (0.444)
Controls included	No	Yes	No	Yes	No	Yes	No	Yes
Observations	182	170	181	144	192	182	191	181
Pseudo R2	0.078	0.177	0.010	0.289	0.007	0.115	0.003	0.358

Notes: Dependents variables: save for emergencies and save to develop an activity. Robust standard errors in brackets. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not interpret columns 1, 3, 5 and 7, for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 5 reports results of estimation on low and high education level subsamples. Our findings show that the coefficient of variable of interest is only significant in column 2. Implying that users of mobile money with low education level have more ability to save for health emergencies than non-users. According to high educated individuals, none of coefficients of

usage of mobile money are significant. These results support our main results that mobile have positive effects on saving for health emergencies. Furthermore, in developing countries, less educated individuals have no access to formal finance due to financial illiteracy. If mobile money take away or mitigate the problem of financial literacy as it required not enough financial knowledge, enhancing access to mobile money may be prominent.

Table 5. Logit model for individuals having low and high education level

	Low education level				High education level			
	Save for emergencies		Save to develop an activity		Save for emergencies		Save to develop an activity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MM user	1.795*** (0.642)	1.725** (0.682)	-0.488 (0.360)	-0.369 (0.486)	0.342 (0.482)	0.321 (0.547)	-0.0252 (0.281)	0.036 (0.446)
Controls included	No	Yes	No	Yes	No	Yes	No	Yes
Observations	160	149	158	147	214	205	214	205
Pseudo R2	0.082	0.151	0.010	0.242	0.004	0.091	0.000	0.411

Notes: Dependents variables: save for emergencies and save to develop an activity. Robust standard errors in brackets. Low income individuals are those with less than 50 000 F CFA (around \$100US) per month. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not interpret columns 1, 3, 5 and 7, for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Across Table 6, we report results on individuals having irregular incomes and regular incomes. The coefficient of mobile money users is significant (column 2), indicating that mobile money users with irregular incomes have more ability to save for emergencies than non-users. Considering individuals with regular incomes, the coefficients of users of mobile money are not significant. Throughout all columns, our finding suggest that mobile money only impact individuals with irregular incomes by increasing their ability to save for health emergencies. These results suggest that increase access to more formal financial services, such as mobile

money, can be relevant for these people to manage their irregular incomes and deal with unexpected events that may raises in wrong moments.

Table 6. Logit model for individuals having irregular incomes

	Irregular incomes				Regular incomes			
	Save for emergencies		Save to develop an activity		Save for emergencies		Save to develop an activity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MM user	1.621*** (0.582)	2.092*** (0.701)	-0.526 (0.380)	-0.715 (0.506)	0.537 (0.468)	0.201 (0.547)	-0.534* (0.312)	0.092 (0.440)
Controls included	No	Yes	No	Yes	No	Yes	No	Yes
Observations	174	165	173	164	198	187	197	186
Pseudo R2	0.077	0.174	0.011	0.218	0.010	0.138	0.012	0.356

Notes: Dependents variables: save for emergencies and save to develop an activity. Robust standard errors in brackets. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not interpret columns 1, 3, 5 and 7, for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

From Table 7, we present results on individuals living with low and high incomes level. Reported results show that for low incomes individuals the coefficient of interest is not significant (column 2). Yet in column 4, the coefficient is negative and significant at 10 percent. These findings suggest that the effects of mobile money are subject to a “threshold income” effect beyond which the use of mobile money have positive impact. As far as high incomes individuals, columns 6 show positive and significant coefficient of usage of mobile money on save for health emergencies. These results support our assumption that beyond a “threshold income” users of mobile money have more ability to save for health emergencies than non-users.

Table 7. Logit model for individuals having low and high incomes level

	Low incomes				High incomes			
	Save for emergencies		Save to develop an activity		Save for emergencies		Save to develop an activity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MM user	0.429 (0.467)	0.407 (0.513)	-0.734** (0.318)	-0.813* (0.450)	1.668*** (0.583)	1.824*** (0.652)	-0.221 (0.296)	0.395 (0.474)
Controls included	No	Yes	No	Yes	No	Yes	No	Yes
Observations	174	161	173	160	200	191	199	184
Pseudo R2	0.006	0.044	0.023	0.325	0.081	0.190	0.002	0.461

Notes: Dependents variables: save for emergencies and save to develop an activity. Robust standard errors in brackets. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not interpret columns 1, 3, 5 and 7, for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

7. Discussion of potential Mechanisms

One of our main results shows that a simple use/adoption of mobile money increases people ability to save for health emergencies. This result raises the following question: Why do mobile money users have more ability to save for health emergencies than non-users? – Is it due to the safety, low cost of services, quality and/or accessibility of the mobile money? Since our data does not enable us to conclusively answer this question, we instead use this section to make some conjectures as to possible answers and area to further investigations.

We see two possible reasons why users of mobile money have more ability to save for health emergencies. The first is that to save for health emergencies individuals need a saving account that allows them to avoid unneeded expenditures. Holding cash money individuals may be tempted to spend it (Banerjee and Mullainathan 2010), so that they cannot face healthcare expenses until they have kept aside the next discrete unit. The second explanation may be that people usually rely on saving mechanisms with a relative high degree of commitment as ROSCA

that make it difficult for them to get money when emergencies come up. This is because saving for unpredictable events requires easy access to liquidity. Costlessly and quickly liquidating land or livestock when a shock were to occur is not possible, so that it is necessary for people to save against unanticipated illness shocks outside these illiquid assets. Mobile money provides people with an individual account that allows them to free deposit their money. The networks of mobile money agents who insure cash in and cash out services allow users to access cash when the needs arise. However, withdrawals from the mobile money account are a fee charged around 1%. When individuals decide to save through their mobile money account, this involves implicitly their willingness to support withdrawal fees. These fees may therefore play as a commitment which benefits individuals with self-control issues to build up savings by avoiding unneeded expenditures.

Shefrin and Thaler (1988) show that self-control problems including temptation, as a part of a broader set of time-inconsistent preferences, play a key role when studying saving behavior. Self-control implies that the trade-offs between short term gratification and long term benefits entails a conflict that manifests through temptations. Individuals usually face “Temptation goods” which give utility in the present but not in the future, and “non-temptation goods” which give utility both in the present and the future (Banerjee and Mullainathan 2010). When people, particularly from poor countries such as Burkina Faso that we study, spend their money in “temptation goods” as cigarettes, coffee, alcohol, it becomes more difficult for them to put aside a little portion of their money. So that, declining temptations through a commitment saving product should increase savings and therefore increase people's ability to save for unpredictable shocks. However, the effectiveness of a saving product in overcoming these barriers depends on the type of commitment it provides. Dupas and Robinson (2013b) show that simply providing savings technology with a soft commitment such as a box with a lock and key, allows people to build up savings for health emergencies. While, Ashraf, Karlan, and Yin (2010) find that providing individuals with a high commitment saving product¹⁰ that restricts withdrawals until they reach a specific goal or a specified month when large expenditures were expected, for example the beginning of school or Christmas, increased individuals' savings. These findings appear to reflect that soft commitment savings devices are adequate to plan for unexpected shocks.

¹⁰They called it SEED for Save, Earn, Enjoy Deposits.

Towards our aim (i.e. understanding why mobile money use/adoption increases saving for health emergencies), we start by determining factors that may incentivize people to use their mobile money wallet to make deposits. Mobile money services such as transferring money, buy airtime, pay bills or goods and more importantly for our investigation, saving, can be accessible through initial deposits in the mobile money account. We then consider mobile money deposits as an indicator of mobile money usage. As mobile money allows free deposits, we identify four broad explanations that may motivate mobile money users to make deposits in their mobile money account. *First*, people lack access to a safe and secure saving account to keep their money that is readily accessible to deal with emergencies (Dupas and Robinson 2013b). The perception of mobile money as safe and secure may lead individuals to make deposits through their mobile money account. *Second*, people lack access to affordable financial services that make it difficult for them to access savings account to manage their money. One of the features of mobile money is its potential to reduce the monetary costs of financial services (Mbiti and Weil 2011). These monetary costs associated with the mobile money include withdrawals costs (about 1 percent of the amount), there is however no minimum balance required and no fees of account maintenance. There are also costs of sending money (about 0.2 to 1.5 percent of the amount) that appear to be low than other available money transfer systems. Previous research finds that mobile money, by reducing transaction costs, increases the size and number of remittances allowing individuals to smooth consumption and face negative shocks (Jack and Suri 2014). Consistent with this line of research, the perception of mobile money services as affordable may, on the one hand, induce individuals to make deposits in their mobile money account (Morawczynski 2009). On the other hand, individuals may keep money outside of their mobile money account to avoid withdrawals fees or temptation to easily send remittances for relative assistance. *Third*, lower quality of financial services may prevent individuals' usage of financial services (Dupas et al. 2012; Karlan and Morduch 2009). People need financial services that fit their needs that they can easily use themselves. This is why the perception of mobile money as "easy of use" should motivate individuals to make deposits in their mobile money account. Furthermore, the discretion of operations associated with using the mobile money account may increase the willing of individuals to make deposits. *Fourth*, the access to mobile money agents plays an important role in the expansion of mobile money. As shown in Kenyan experience, the rapid adoption of M-PESA was in part due to the growth of mobile money agents' network that provided cash in and

cash out services (Jack and Suri 2014). Thus, the perception of proximity of mobile money agents may lead individuals to make deposits in their mobile money account. The rapidity of transferring money through instantaneous text SMS may also increase their willingness to use their mobile money account through depositing money. To sum up, in either case, using mobile money that is safe, affordable, with better quality and access to mobile money services, might increase individual's ability to increase their deposits in their mobile money account.

Table 8 looks at determinants of mobile money deposits. We restrict our sample to mobile money users. Mobile money deposits are measured through the following question, "Do you use mobile money deposits services?" and responses are encoded as yes = 1, no = 0. Then, we regress mobile money deposits on users' perceptions of the mobile money, which are: trust, security, costs, ease of use, discretion, rapidity and proximity. In columns 1 and 2, we report results on all factors that may affect deposits in the mobile money account by including alternatively trust and security that are strongly correlated¹¹. The results show that the coefficient of service costs are positive and significant (Columns 1 and 2), while the coefficient of proximity of mobile money agents is positive and significant only in the column 1. Implying that costs of mobile money services play an important role in the decision of users to make deposits in their mobile money account. From columns 1 to 7, we include the factors one by one to avoid correlation issues and having biased coefficients. The results show that all the coefficients are positive and significant. These findings suggest that trust, security, costs, ease of use, discretion, rapidity and proximity are all factors that motivate individuals to make deposits in their mobile money account.

The next step we take is to address the following question: do these mobile money deposits impact the decision to save in the mobile money account? As reported above, deposits in the mobile money account can be used to realize many electronic operations other than savings. Our goal here is to directly determine if deposits made by users in their mobile money account can be used as savings and if it is the case, this may therefore increase their ability to face unexpected shocks. To deal with this, we regress savings through mobile money on mobile money deposits. Savings through mobile money account is measured, in our questionnaire, as follows: "Where do you save?" For individuals that report saved in their mobile money account we encoded as 1, otherwise 0.

¹¹ See the correlation matrix in the Appendix A.2

Table 8. The determinants of deposits in the mobile money account.

	Users of mobile money sample								
	Deposits in the mobile money account								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Trust the operators	-1.416 (1.062)		1.935*** (0.437)						
Security of services		0.503 (0.708)		2.425*** (0.447)					
Costs of services	2.048*** (0.555)	2.145*** (0.547)			2.949*** (0.429)				
Ease of use	1.942 (1.255)	1.278 (1.147)				2.940*** (0.468)			
Discretion of operations	1.116 (0.796)	1.065 (0.772)					2.722*** (0.419)		
Rapidity	-1.190 (1.200)	-1.210 (1.316)						1.718*** (0.554)	
Proximity of operators	1.192* (0.671)	0.447 (0.670)							2.536*** (0.409)
Constant	-0.759 (0.849)	-1.296 (0.933)	-0.143 (0.380)	-0.492 (0.384)	-0.523* (0.316)	-0.847** (0.399)	-0.251 (0.292)	-0.134 (0.519)	-0.274 (0.305)
Observations	202	202	203	203	203	203	202	203	203
Pseudo R2	0.386	0.376	0.096	0.153	0.271	0.224	0.243	0.046	0.208

Notes: Dependent variable: Deposits in the mobile money account. Robust standard errors in brackets. We use a logistic model and the same equation specified in section 5. The reasons of deposits in the mobile money account by users are measure as follow. In our paper-based questionnaire, we ask respondents to indicate the reasons of the usage of their mobile money account: “Trust the operators”, “Security of services”, “Costs of services”, “ease of use”, “Discretion of operations”, “Rapidity of services”, “Proximity of operators”. The responses are encoded as yes = 1, no = 0.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 9 presents estimates of the impact of deposits in mobile money on savings through mobile money account with and without controls. Our findings show that the coefficient of deposits in the mobile money is positive and highly significant. Implying that individuals that report using mobile money deposits services are more likely to save through their mobile money account. In fact, these savings may be used to face both unpredictable and predictable events. However, it has been proved that saving for short-term events requires savings product with a soft degree of commitment(Dupas and Robinson 2013b; Karlan, Ratan, and Zinman 2014). This is consistent with our main results that using mobile money, as a savings account with a soft degree of commitment, increases users' ability to save for health emergencies.

Table 9. The impact of deposits in the mobile money on savings through the mobile money

	Users of mobile money sample	
	Save in the mobile money account	
	(1)	(2)
Deposits in the mobile money account	2.497*** (0.750)	2.374*** (0.829)
Controls <i>included</i>	No	Yes
Observations	184	173
Pseudo R2	0.084	0.230

Notes: Dependent variable: savings through the mobile money account. We use a logistic model and the same equation specified in section 5. In our paper-based questionnaire we first ask individuals “During the past 12 months, do you save some of your money?” Individuals that report saved were asked to indicate where they saved through the following question “Where do you save?” answer propositions are “Mobile money account”, “Bank account”, “Credit union?”, “Microfinance institution?” “Others (ROSCA). Responses are encoded 1 if respondents use indicate mobile money account, and 0 otherwise. Robust standard errors in brackets. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not interpret columns 1 results for variables omitted biases.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

To provide additional evidence on the mechanisms through which mobile money users have more ability to save for health emergencies than non-users, we regress savings for emergencies on individuals' willing to use or continue using mobile money. Our objective in doing this is to provide further sources of the gap in the ability to save for emergencies between users and non-users of mobile money. To achieve this, we use specific questions on the willing of users to continue to use mobile money and the willing of non-users to start using the mobile money. We compute proxies of usage and willing to use or continue using mobile money as follows. We create a dummy variable of the willing of use or continue using mobile money that takes the value 1 and 0. For instance, the variable takes the value 1 when the answer to the question «Does mobile money as a safe place to save would motivate you to use or continue to use mobile money?» is 4 or 5 (Important and very important) and takes the value 0 when the answer is 1 or 2 (Not at all important and not important). Thus, the proxies take the value 1 when respondents are users of mobile money and the perception of mobile money is 1, and take the value 0 when the respondents are non-users of mobile money and the perception of mobile money is 0. We suppose here that when the proxy takes the value 0, non-users of mobile money considered “other savings mechanisms” as safe than the mobile money account to deposit their money.

If the coefficient of the proxy is positive and significant this implies that mobile money account as a safe place to make deposits outweighs the “other savings mechanisms” leading to an increase in the ability of mobile money users to save for health emergencies than non-users. If the coefficient is not significant this implies that mobile money account and the “other savings mechanisms” are perceived similarly in terms of safety for making deposits leading to no difference between users and non-users to save for health emergencies.

Table 10 presents the impact of these proxies on saving for emergencies. The results show the coefficient of users of mobile money who perceive mobile money as safe place to make deposits is positive and significant (Column 1). This result suggests that using mobile money and the perception that it is safe to make deposits increase users' ability to save for health emergencies than non-users who perceive mobile money as not a safe place to make deposits. Thus, the perception of mobile money as a safe place to make deposits can be considered as a factor of the gap between users and non-users of mobile money to save for health emergencies.

Table 10. The impact of usage and perception of mobile money on saving for health emergencies

	Full sample				
	Save for emergencies				
	(1)	(2)	(3)	(4)	(5)
Mobile money user and perception of:					
Safe place to make deposits	2.080*** (0.704)				
Secure than cash		2.142* (1.183)			
Low costs of transfers			0.982 (0.866)		
Transfers throughout Burkina Faso				0.983** (0.441)	
Transfers within the sub-region (Côte d'Ivoire)					2.427*** (0.861)
Controls included	Yes	Yes	Yes	Yes	Yes
Observations	159	137	138	289	125
Pseudo R2	0.215	0.335	0.249	0.092	0.386

Notes: Dependent variable: Save for health emergencies. Robust standard errors in brackets. We use a logistic model and the same equation specified in section 5. Controls included: age, age squared, married, rural, male, occupation, irregular incomes, person in charge, education level, incomes level and incomes squared. We do not report results without controls.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

These results support the findings Dupas and Robinson (2013b) that providing people with a safe place to save increases savings for health emergencies. Our results also show that the coefficient of users of mobile money who perceive mobile money more secure than holding cash is positive and significant (Column 2). Thus, using mobile money and the perception that it is secure than cash increase users ability to save for health emergencies than non-users who do not perceive

mobile money as secured than holding cash. In column 3, the coefficient of users of mobile money who perceive mobile money as lowering cost of money transfers is not significant implying that mobile money transfers is not the only transfer system with low costs of transfers that allow individuals to receive transfers and in some way to face health shocks. Across columns 5 and 6, coefficients of using mobile money and perception of possibility to remit throughout Burkina Faso and the perception of receiving money transfers from sub-region (Côte d'Ivoire) are positive and significant. These results suggest that the possibility to transfer money throughout the country and receive transfers from sub-region increases mobile money users' ability to save for health emergencies. Overall, our findings suggest that the increase in the ability of mobile money users to save for health emergencies may stem from the usage and the perception of mobile money as safe and secure, and the possibility of transferring money throughout the country and within the sub-region (especially Côte d'Ivoire).

Overall, we find that using mobile money has positive and significant impact on individuals' inclination to save for unpredictable events. Our study also tries to uncover the mechanisms or pathways through which mobile money helps people build up their savings. Nevertheless, a key outstanding question left for future investigation is what this innovative saving product would do to existing financial behavior such as the use of informal and formal finance. An empirical study of De Koker and Jentzsch (2013) on the role of transparency in the usage of formal or informal finance in eight African countries finds that a share of the population continues to use informal services despite being financially included customers. Hence, an increase in access to formal services such as mobile banking has therefore not resulted in an immediate reduction of usage of informal services. Future research is needed to provide evidence on the role of mobile money as a complement of formal finance or a substitute of informal finance.

8. Conclusion

In Burkina Faso as well as in other less developed countries, limited access to formal financial services lead people to rely mainly on informal finance. In the presence of predominant use of informal saving mechanisms, self-insurance against unexpected life events such as health shocks can go unrealized. This may lower the productivity which in turn negatively impacts the

economic activity and growth. In this context, providing people with an appropriate device to save can reduce their vulnerabilities to health emergencies. For low income countries, financial access is likely to have important implication on people well-being and poverty reduction.

The objective of this paper is to analyze the impact of mobile money as a commitment device on saving behavior. We use an original dataset from a survey conducted in Burkina Faso in both rural and urban area. Our results are consistent with previous findings on the effects of commitment devices on saving for health emergencies. In line with Dupas and Robinson (2013b), we find that mobile money adoption positively impacts saving for health emergencies in Burkina Faso. Indeed, mobile money users are more prone to save for unexpected health shocks than non-users, while there is no difference between users and non-users of mobile money to save for predictable events. In further investigations, we also show that mobile money increases the ability of rural, female, less educated and individuals with irregular incomes to save for health emergencies.

The potential for mobile technology, and mobile money specifically, to transform the lives of the poor, while palpable, is so far little documented in Burkina Faso. The government and especially the Central Bank (BCEAO), have done a lot in this sense to increase the supply of mobile money services throughout the country. However, despite these efforts, mobile money adoption remains low compared to the success in Kenya or that of the neighbor Côte d'Ivoire. Specific strategies are therefore needed to increase the access and usage of mobile money. One leverage on which the Central Bank may act is through the expansion of electronic money issuers and retailers agents. By doing so, it may reinforce competitiveness in the financial system and hence reduce costs and increase efficiency. The involvement of the government in the development of mobile money can also increase the confidence of population to this new financial innovation. More specifically, partnerships could be established between the government and mobile money issuers for employee's payments and for the collection of taxes. The traceability of the various operations conducted through mobile money could also be put forward for the credibility of this new system.

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Appendix

A.1. Correlation matrix for the full sample.

	Save	Save for emergencies	Save to develop an activity	Mobile money users	Age	Age squared	Married	Rural	Male	Occupation	Person in charge	Education	Income	Income squared
Save	1.0000													
Save for emergencies	0.2061	1.0000												
Save to develop an activity	0.0788	-0.0431	1.0000											
Mobile money users	-0.0624	0.1505	-0.0859	1.0000										
Age	0.1772	0.1248	0.1843	-0.0266	1.0000									
Age squared	0.1694	0.1150	0.1538	-0.0447	0.9900	1.0000								
Married	0.1327	0.0885	0.1017	0.1312	0.6069	0.5789	1.0000							
Rural	-0.0150	0.0642	0.0405	0.1455	0.2514	0.2446	0.2264	1.0000						
Male	0.0151	0.0265	0.0305	0.0073	0.2666	0.2536	0.1066	0.0316	1.0000					
Occupation	0.2196	0.0832	0.3895	-0.0776	0.4301	0.3839	0.3478	0.1585	0.1145	1.0000				
Person in charge	-0.0121	0.0023	0.0562	0.1070	-0.0025	-0.0094	0.0239	-0.0297	-0.0081	0.0471	1.0000			
Education	-0.0434	0.0740	-0.3360	0.1622	-0.1475	-0.1394	-0.1693	-0.2270	0.0174	-0.3908	-0.0129	1.0000		
Income	0.1597	0.0693	0.1788	0.0708	0.4410	0.4261	0.3577	-0.0524	0.2713	0.3416	0.0551	0.1268	1.0000	
Income squared	0.1383	0.0696	0.1723	0.0698	0.4272	0.4174	0.3490	-0.0775	0.2548	0.2966	0.0629	0.1351	0.9765	1.0000

A.2. Correlation matrix of determinants of mobile money deposits. (Corresponding to Table 8).

	Deposits in the mobile money	Trust the operators	Security of services	Costs of services	Ease of use	Discretion of operations	Rapidity	Proximity of operators
Deposits in the mobile money	1.0000							
Trust the operators	0.3406	1.0000						
Security of services	0.4348	0.7757	1.0000					
Costs of services	0.5615	0.3520	0.3741	1.0000				
Ease of use	0.5265	0.6385	0.6234	0.4975	1.0000			
Discretion of operations	0.5225	0.6694	0.6175	0.4878	0.7002	1.0000		
Rapidity	0.2388	0.3785	0.3152	0.3144	0.5191	0.4629	1.0000	
Proximity of operators	0.4908	0.6910	0.5369	0.4881	0.5895	0.7894	0.4455	1.0000