

Southern Africa Labour and Development Research Unit



Mobile money and household consumption patterns in Uganda

by

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Abstract

Financial services in low income countries are often not well developed, thus, individuals rely heavily on informal means of financial services to send, receive and save money, with a large number of the population unbanked. Mobile money, a type of financial innovation, enables individuals to transfer, deposit and save money using cell phone technology. It not only has the potential to improve access to financial services but could also have an effect on household consumer behaviour and improve individuals' livelihoods. This paper investigates the difference in consumption patterns between mobile money users and non-users in Uganda, one of the countries that have seen significant increases in mobile money usage, since its introduction in 2009. It is based on the Financial Inclusion Tracker Surveys (FITS) household level data that was conducted in 2012. Using ordinary least squares and seemingly unrelated regression estimation techniques, the results suggests that mobile money users are less likely to spend on food, a necessity, and more likely to spend on luxury goods, than non-users. In addition, mobile money users are more likely to receive more remittances and, as a result, they are able to spend more efficiently on particular commodities than non-users. This suggests that mobile money could indeed potentially improve individuals' livelihoods.

Keywords: Mobile money, Consumption patterns

JEL classification: O33, D12

1. Introduction

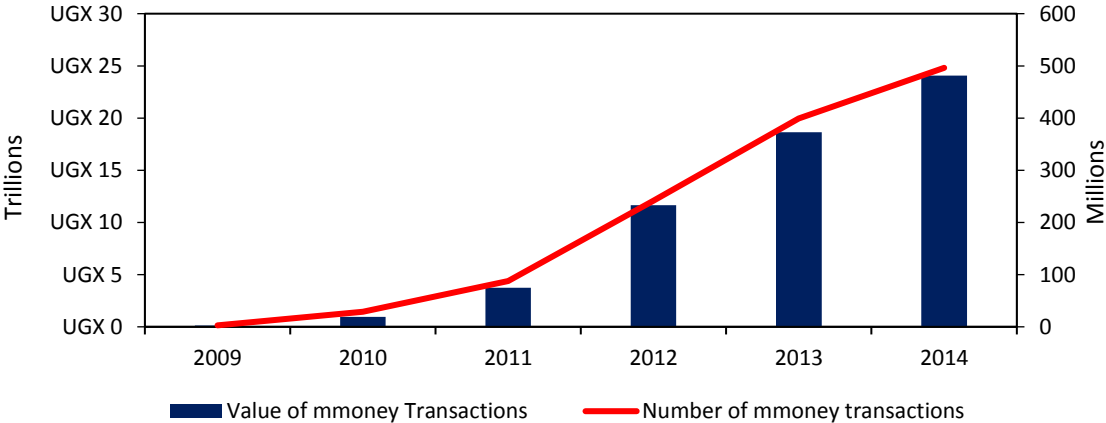
Developing countries, particularly in Sub-Saharan Africa, often have financial markets that are not well developed, leading to a reliance on informal methods to access financial services. In the last few years, however, the region has seen development of financial innovations such as ATM cards, debit cards, and, most recently, mobile money³, which have the potential to improve access to financial services. They can also benefit the real economy, as Beck et al. (2012) and Laeven et al. (2015) linked financial innovation to economic growth and Lerner and Tufano (2011) argued that it has an influence on households' new investment and consumption choices. Mobile money, in particular, has a potential to lead to more efficient consumption patterns through an increase in remittances (Ramada-Sarasola, 2012). In addition, it can help households in consumption smoothing, as users are more likely to insure themselves against negative shocks than non-users through the remittances they receive. Jack and Suri (2014) find this to be the case for Kenyan households and Munyegera and Matsumoto (2016) finds similar evidence for rural Ugandan households. Studies of the relationship between mobile money and household consumption patterns are, however, limited in number and scope. Jack and Suri (2014) compare their results of the effect of mobile money on total consumption to food consumption, but fail to analyse the impact on various household consumption patterns, while Munyegera and Matsumoto (2016) also compare the effect of mobile money on food and non-food items, but fail to investigate this effect on several household consumption patterns, as their focus of the study is on household consumption per capita. Their study is also limited to rural Uganda and is not representative of the country despite mobile money being popular among the urban households as well.

This paper adds to the limited literature by providing a case study of Uganda one of the most successful countries in mobile money usage, which has one of the highest number mobile money users in the world. It considers Uganda rather than the more obvious Kenya because of data availability. To the best of our knowledge, no studies representative of the whole country have been conducted on the difference in consumption patterns between mobile money users and non-users in Ugandan households. Mobile money was first launched in Uganda in 2009 by Uganda's

³ Mobile money was first introduced in Kenya in 2007 by Safaricom and quickly spread to other countries such as Uganda, Rwanda, and Tanzania. It relies on cell phone technology and can be used to transfer money, save, pay bills and purchase goods and services without necessarily having a bank account (Jack and Suri, 2011)

leading telecom company MTN. However, unlike the Kenyan success story, mobile money in Uganda did not grow as fast initially and only picked up momentum after 2011. There were only 10,000 customers at the start in March 2009, but by November 2014, the number of customers had risen to 18.9 million, more than half the population of Uganda, which stands at about 37 million according to CIA (2015). The value of mobile money has also since increased to 24 trillion Uganda shillings (\$9.3billion) in 2014, up from 133 billion Uganda shillings (\$65.2 million) in 2009. Similarly, the number of transactions rose from 2.8 million in 2009 to 496.3 million in 2014 as shown in Figure 1.

Figure 1: Trend in Mobile Money Values and Number of Transactions (2009-2014)



Source: Bank of Uganda (2014)

This paper provides an analysis of the difference in consumption patterns between mobile money users and non-users. Using the framework of consumer demand theory, a demand system is estimated with the Financial Inclusion Tracker Surveys (FITS) household level survey conducted in 2012⁴. It is a rich dataset, that is representative of the country and not limited to the rural areas and, most importantly, it included several vital questions related to mobile money. The rest of the paper is structured as follows. A literature review of the relevant demand analysis, remittances and household consumption is presented in Section 2 followed by a presentation of the theoretical model and estimation methods used in section 3. The dataset is then discussed in section 4, followed by a discussion of the results in section 5 and, finally, some conclusions are presented in Table 5.

⁴ The first wave of the FITS wave was used as it was the only one available at the time of the study.

2. Consumer Behaviour and Mobile Money

In analysing the impact of mobile money on consumer behaviour in developing economies using survey data the studies that do exist have taken their starting point as the estimation of Engel curves⁵, following on from, for example, Burney and Khan (1991) analysis of consumption patterns in Pakistan and Ndanshau (1998-2001) study of Tanzania. The basic Engel curve have been extended to include household size (see Houthakker, 1957; Burney and Khan, 1991), demographic variables such as occupation, age, sex, urbanisation and education (Subramanian and Deaton, 1991; Ndanshau, 1998-2001; Phipps and Burton, 1998). The literature has more recently moved to use systems of demand equations and to consider the impact of transfers and remittances, with Maitra and Ray (2003) finding that private transfers play an important role in explaining household expenditure patterns in South Africa and Adams Jr and Cuelcuecha (2010) who found remittances to be important in explaining consumption patterns in Guatemala. Despite this, few studies have considered the developing mobile money technology can make such transfers easier. Those studies that do exist have tended to focus on consumption and welfare effects, with Jack and Suri (2014) finding evidence of consumption smoothing among M-PESA users in Kenya and Munyegera and Matsumoto (2016) finding a positive effect on consumption in rural Ugandan households, largely due to the remittances received.

Mobile money potentially affect consumer behaviour through remittances received in two ways. First, remittances received through mobile money could be used to smoothen consumption when a temporary shock occurs (Deaton, 1997). Since households, particularly the poor, often have incomplete or imperfect markets, undeveloped financial markets are unbanked and lack formal means of insurance to help guard against uncertainties, as result, they are more likely to insure themselves through informal methods, which because of transaction costs are likely to be incomplete (Jack and Suri, 2014). New financial innovations, such as mobile money, provide opportunities (Morduch, 1995). Indeed, Jack and Suri (2014) found households with M-PESA were unaffected by income shocks, while non-users saw a 7 percent decline in consumption and Munyegera and Matsumoto's (2016) found consumption per capita increased by 69 percent for mobile money users in rural Ugandan households, suggesting that households with mobile money were able to smoothen their consumption better than non-users. While both studies

⁵ motivated by Engel's law, that as income increases, the proportion of income spent on food falls

argued that remittances played a role in the change in consumer behaviour of mobile money users, but neither considered the difference in consumption patterns between mobile money users and non-users. Munyegera and Matsumoto (2016) concentrate on the effect of mobile money on welfare using consumption per capita and do not consider its composition. Ramada-Sarasola (2012) do consider this effect, arguing that affected households are likely to spend more on luxuries, and less on necessities, such as food, which may lead to more efficient consumption patterns.

Another way mobile money could potentially affect consumer behaviour is through the remittances received, these could lead to a change in household consumption patterns. Remittances could potentially lead to a rise in income, which could have an impact on household consumption patterns. When households experience an increase in income as a result of remittances received from mobile money, they are likely to spend more on particular goods, such as luxuries, and less on necessities, such as food. Thus, mobile money has the potential to lead to more efficient consumption patterns due to the increase in the number of remittances (Ramada-Sarasola, 2012). Given the data limitation, this analysis can be carried out using one time period, unlike the investigation of the likely impact on consumption smoothing that would require at least two time periods. The next section develops the theoretical model and estimation method.

3. Theoretical Model and Estimation Method

To provide the basis for an empirical analysis of consumer behaviour a good starting point is standard consumer theory. Following Deaton and Muellbauer (1980a), the utility maximization function depicted below is used to generate the demand functions.

$$\text{Maximize } u = u(y_1, y_2, y_3, y_4 \dots y_n) \quad (1)$$

s.t

$$\sum p_i y_i = x$$

Where u represents the utility, y represents the goods consumed and p represents the price of goods, and x is the total expenditure. Following utility maximization in equation (1), the traditional demand function generated is as depicted in equation (2) below.

$$y_i = f_i(x, p) \quad (2)$$

As indicated in equation (2), demand is a function of price and expenditure. As earlier mentioned in the literature, prices are assumed to be similar for all households in cross section data. Thus, the functional form in equation (2) can be adjusted to capture the identical prices by all households which Deaton and Muellbauer (1980a) refers to as the Engel curve depicted in equation (3)

$$y_i = f_i^*(x) \quad (3)$$

The Engel curve originally contained income as the only explanatory variable with the assumption of constant price as indicated in equation (3), but household size and demographic variables have also been introduced. Mobile money can now be included in the Engel curve as it makes the receipt of remittances easier, which could increase income and affect household demand for various goods. Thus equation (3) can be modified to include mobile money (m) and other control variables (z) based on theory as depicted in equation (4):

$$y_i = f_i^*(x,m,z) \quad (4)$$

Using the Working Leser model with linear budget shares and logged total expenditure since it is consistent with the adding up restriction (Deaton and Muellbauer, 1980a), gives:

$$\omega_i = \alpha_i + \beta_i \ln x + \theta_i m + \delta' z + \varepsilon_i \quad (5)$$

where ω_i the dependent variable, is the share of consumer good i, food, clothing, housing, transport, medical and miscellaneous goods. As theory predicts, the adding up restrictions are met if $\sum \omega_i = 1$, $\sum \alpha_i = 1$, and $\sum \beta_i = 0$. x represents the total expenditure, while m represents the variable of interest, mobile money. z stands for a vector of control variables including household size, age, urban dummy, gender dummy and education attainment. The disturbance term is represented by ε_i , while α_i represents the constant term for each consumer good i. The coefficient on income (total expenditure) measures income elasticity and is positive ($\beta_i > 0$) for luxury goods or negative ($\beta_i < 0$) for necessities⁶. (Subramanian and Deaton, 1991).

⁶ Total expenditure is often used as a proxy for income in consumption pattern studies since most developing countries lack data on income. Moreover, when available, it is generally susceptible to measurement errors (Houthakker, 1957; Burney and Khan, 1991)

4. Data

Limited data availability has meant there are few studies of the effect of mobile money on household consumption. Recently a rich data set has become available that includes several vital questions relating to mobile money. The dataset is the Financial Inclusion Tracker Surveys (FITS) Project, which is a “partnership between global research non-profit intermedia and Bill and Melinda Gates Foundation’s financial services for the poor program” (FITS, 2012). Only the first wave of the panel was available to researchers at this point.⁷

This survey includes 3000 Ugandan households who were randomly sampled from 300 enumeration areas using equal probability sampling techniques (FITS, 2012). The survey was conducted in 2012, a time period that is quite relevant since mobile money use in Uganda only started increasing tremendously after 2011. It is a household level survey, and certain variables such as age, education, gender and occupation that are difficult to capture on a household level, the head of household was used as a representative of the household data. This study also excludes households with any missing data, those who recorded more than 1 head of household, and those that either refused to answer a question, or answered “do not know” to a question. These adjustments meant the data that was finally used in this analysis contained less than 3000 households. Details of the variables are presented in Table 1.

While some variables were captured as dummy variables (such as mobile money, urban/rural dummy, gender, mobile phone use, mobile phone ownership, storage instruments, remittances sent and received), others were captured as categorical variables (for example, educational attainment and occupation). Household size was measured as the total number of individuals in the household, and age was captured based on the age of the adult head of household (at least 15 years). Only food and non-food commodities were considered for the total annual expenditure on consumption goods⁸. Total expenditure was constructed by summing up the food and non-food

⁷ At the time this paper was written, only the first wave out of three waves was released.

⁸ Durable goods as a consumption category were dropped. Deaton and Muellbauer (1980a) argue that there is no real consensus on how durable goods should be treated with some studies dropping the variable while others include it. However, what is clear, they say, is the fact that these durables often last more than 1 year, they are not bought as frequently, and the purchases of these durables do not always equal consumption. Therefore, durables were excluded from this analysis since this data only considers cross section data for 1 year, and food and non-food items are more frequently bought compared to durable goods.

expenditures and the questionnaire retrieved food expenditure based on the last 7 days, with total food consumption for the year derived by multiplying the total weekly consumption by 52 weeks in a year.

Table 1: Variable Description

Variable	Variable Description
Mobile Money	1 if at least one mobile money user in the household, 0 otherwise
Household Size	Number of individuals in the household
Age of Head of Household	Age of household head > or = 15 years(Adults)
Urban/Rural Dummy	Urban/rural dummy 1 for urban 0 rural
Gender of Household Head	Gender of household head 1 female 0 male
Mobile Phone Ownership	1 if at least one person in the household owns a mobile phone, 0 otherwise
Mobile Phone Use	1 if at least one person in the household uses a mobile phone, 0 otherwise
Storage/Saving Instruments <i>Bank Account</i>	1 if at least one household member stores/saves money in the bank or MDI/MFI, 0 otherwise
<i>Mattress</i>	1 if at least one household member stores/saves money in the mattress/cashbox/hiding place, 0 otherwise
<i>Sacco</i>	1 if at least one household member stores/saves money in the Sacco, 0 otherwise
<i>Merry go round/informal group</i>	1 if at least one household member stores/saves money in the merry go round/informal, 0 otherwise
<i>VSLA(village savings and loan)</i>	1 if at least one household member stores/saves money in the VSLA, 0 otherwise
<i>Mobile Money Account</i>	1 if at least one household member stores/saves money in the mobile money account, 0 otherwise
<i>Family Member</i>	1 if at least one household member stores/saves money with family/friend, 0 otherwise
<i>Advance purchase/shopkeeper deposit</i>	1 if at least one household member stores/saves money with advance purchase/shopkeeper, 0, otherwise
<i>Stocks and Shares</i>	1 if at least one household member stores/saves money in shares/stocks, 0 otherwise
<i>Pension/Retirement fund</i>	1 if at least one household member stores/saves money in pension/retirement fund, 0 otherwise
Remittances Received	1 if at least one household member received remittances(money) and 0 otherwise
Remittances Sent	1 if at least one household member sent remittances(money) and 0 otherwise
Education Attainment of Household Head	
<i>No Education</i>	0 if no formal education
<i>Primary School</i>	1 if primary formal school is the highest education attainment
<i>Secondary School</i>	2 if secondary formal school is the highest education attainment
<i>Tertiary/University</i>	3 if tertiary formal university is the highest education attainment
Occupation of Household Head(main)	
<i>Farmer/Farm worker</i>	0 if farmer/farm worker
<i>Professional</i>	1 if professional
<i>Business/Shop Owner</i>	2 if business/Shop owner
<i>Other</i>	3 if other
Unemployed	4 if unemployed
<i>Public/Health Service worker</i>	5 if public/health service worker
<i>Carpenter/Mason</i>	6 if carpenter/mason
<i>Driver</i>	7 if driver
<i>Tailor</i>	8 if tailor
<i>Bodaboda (motorcycle taxi)</i>	9 if bodaboda (motorcycle taxi)
Consumption Shares	
<i>food share</i>	Annual food expenditure/ Annual total expenditure
<i>clothing share</i>	Annual clothing expenditure/ Annual total expenditure
<i>housing share</i>	Annual housing expenditure/ Annual total expenditure
<i>transport share</i>	Annual transport expenditure/ Annual total expenditure
<i>medical share</i>	Annual medical expenditure/ Annual total expenditure
<i>miscellaneous share</i>	Annual miscellaneous expenditure/ Annual total expenditure

Total Expenditure (Shs.)	Annual Total Expenditure (in Uganda Shillings)				
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Source: FITS (2012)

Table 2: Summary Statistics (ALL)

Variable	Obs	Mean	Std.Dev.	Min	Max
Mobile Money	2,370	0.26	0.439	0	1
Household Size	3,000	4.953	2.581	1	12
Age of Head of Household	2,917	42.27	15.14	15	95
Urban/Rural Dummy	3,000	0.133	0.34	0	1
Gender of Household Head	2,942	0.253	0.435	0	1
Mobile Phone Ownership	2,370	0.805	0.396	0	1
Mobile Phone Use	2,997	0.791	0.407	0	1
Storage/Saving Instruments Dummy Variables					
<i>Bank Account</i>	3,000	0.17	0.375	0	1
<i>Mattress/cashbox/hiding place/other</i>	3,000	0.667	0.471	0	1
<i>Sacco</i>	3,000	0.104	0.305	0	1
<i>Merry go round/informal group</i>	3,000	0.280	0.449	0	1
<i>VSLA(village savings and loan)</i>	3,000	0.062	0.241	0	1
<i>Mobile Money Account</i>	3,000	0.086	0.281	0	1
<i>Family Member/Friend</i>	3,000	0.097	0.296	0	1
<i>Advance purchase/shopkeeper deposit</i>	3,000	0.030	0.172	0	1
<i>Stocks and Shares</i>	3,000	0.021	0.142	0	1
<i>Pension/Retirement fund</i>	3,000	0.005	0.0728	0	1
Remittances Received	3,000	0.209	0.407	0	1
Remittances Sent	3,000	0.237	0.426	0	1
Education Attainment of Household Head(percent)					
<i>No Education</i>	2,942	0.222	0.416	0	1
<i>Primary School</i>	2,942	0.458	0.498	0	1
<i>Secondary School</i>	2,942	0.258	0.438	0	1
<i>Tertiary/University</i>	2,942	0.062	0.24	0	1
Occupation of Household Head(percent)					
<i>Farmer/Farm worker</i>	3,000	0.669	0.471	0	1
<i>Professional</i>	3,000	0.046	0.21	0	1
<i>Business/Shop Owner</i>	3,000	0.071	0.257	0	1
<i>Other</i>	3,000	0.118	0.323	0	1
Unemployed	3,000	0.010	0.0979	0	1
<i>Public/Health Service worker</i>	3,000	0.012	0.11	0	1
<i>Carpenter/Mason</i>	3,000	0.036	0.187	0	1
<i>Driver</i>	3,000	0.013	0.115	0	1
<i>Tailor</i>	3,000	0.012	0.11	0	1
<i>Bodaboda(motorcycle taxi)</i>	3,000	0.012	0.107	0	1
Consumption Shares					
<i>food share</i>	2,999	0.754	0.173	0	1
<i>clothing share</i>	2,999	0.060	0.0951	0	0.839
<i>housing share</i>	2,999	0.044	0.0731	0	0.715
<i>transport share</i>	2,999	0.053	0.0727	0	0.855
<i>medical share</i>	2,999	0.044	0.0827	0	0.8
<i>miscellaneous share</i>	2,999	0.045	0.0571	0	0.75
Total Expenditure (Uganda Shs.)	3,000	4,926,000	4,644,000	0	60,600,000

Source: FITS (2012)

In addition, the food expenditure also included the values of goods consumed in form of gifts and own production. The various total non-food expenditures were divided into five categories: clothing (including footwear), housing (including utilities), transport, medical, and miscellaneous. These were captured on a monthly basis, and to retrieve annual total non-food expenditures, the monthly expenditures were multiplied by 12 for these commodities. The food share and the non-food expenditure (consumption) shares were derived by simply taking the ratio of food expenditure to total expenditure and non-food expenditure to total expenditure, respectively.

Table 2 provides summary statistics of the data and shows the food share taking up the largest share of income (75.4%). It also shows that, while 81 percent of the households own at least one mobile phone, 79 percent of the households claim to use one. Table 3 provides a breakdown by mobile user and non-user households and shows that some mobile money user households (2%) do not own a mobile phone. In fact half of those who do not own a mobile phone, borrow a phone to access mobile money. While mobile money households only make up about 26 percent of the sample, they receive 39 percent of total remittances compared to only 17 percent received by non-users (Table 3) and out of the 39 percent of the total remittances, a large percentage (77 percent) of this is received via mobile money. This is reflected in the low savings/storage rates for mobile money users (8.6%). Uganda is a cash economy and the majority of households still save or store money under the mattress or cash box (67%) with only (17%) saving their money in the bank account (Table 2). Interestingly, there are more mobile money users that have bank accounts, 43% compared to 13% of non-users. The data also indicate that there are more female headed households that use mobile money than non-users with 24 percent and 22 percent, respectively. These percentages are slightly smaller than the average percentage of female headed households that stands at 25 percent based on the overall data in Table 2. This percentage is close to the data from the World Bank (2015) which depicts that 29.5 percent of households are headed by females.

Ugandan households in the sample were found to have approximately 5 individuals per household on average, with an average adult age of 42. While the majority of the households had some formal education, 22 percent of the households did not have any formal education. The majority of the households had at least a primary level education (46%), 26 percent had a

secondary school level education, and only 6 percent had tertiary level education. Although the data contains only 13 percent of urban areas (see Table 2), there are more mobile money users located in urban areas (33%) than non-mobile money users (10%), as depicted in Table 3. This suggests that it is important to analyse mobile money with consideration of both urban and rural areas to have a complete understanding of the effect of mobile money on household behaviour. Uganda's economy is largely based on agriculture. Thus, it is not surprising that the most popular occupation in the sample is farming (67%), as depicted in Table 2, with only 1 percent of the households in the sample unemployed.

Table 3: Summary Statistics of Mobile Money Users and Non-Users

Variable	Mobile Money Users			Non-Mobile Money Users		
	Obs	Mean	Std.Dev.	Obs	Mean	Std.Dev.
Household Size	616	5.13	2.46	1754	5.15	2.62
Age of Head of Household	602	40.39	13.14	1700	40.93	14.17
Urban/Rural Dummy	616	0.33	0.47	1754	0.10	0.30
Gender of Household Head	602	0.24	0.43	1717	0.22	0.42
Mobile Phone Ownership	616	0.98	0.14	1754	0.74	0.44
Mobile Phone Use	616	1.00	0.00	1754	1.00	0.00
Bank Account	616	0.43	0.50	1754	0.13	0.34
Remittances Received	616	0.39	0.49	1754	0.17	0.37
Remittances Sent	616	0.46	0.50	1754	0.20	0.40
Education Attainment of Household Head						
<i>No education</i>	602	0.08	0.28	1717	0.21	0.41
<i>Primary School</i>	602	0.28	0.45	1717	0.51	0.50
<i>Secondary School</i>	602	0.45	0.50	1717	0.25	0.43
<i>Tertiary/University</i>	602	0.19	0.40	1717	0.03	0.18
Occupation of Household Head						
<i>Farmer/Farm worker</i>	616	0.42	0.49	1754	0.69	0.46
<i>Professional</i>	616	0.12	0.32	1754	0.03	0.18
<i>Business/Shop Owner</i>	616	0.13	0.34	1754	0.07	0.26
<i>Other</i>	616	0.22	0.41	1754	0.10	0.30
<i>Unemployed</i>	616	0.01	0.11	1754	0.00	0.06
<i>Public/Health Service worker</i>	616	0.02	0.15	1754	0.01	0.11
<i>Carpenter/Mason</i>	616	0.03	0.18	1754	0.04	0.21
<i>Driver</i>	616	0.03	0.17	1754	0.01	0.11
<i>Tailor</i>	616	0.01	0.11	1754	0.01	0.11
<i>Bodaboda(motorcycle taxi)</i>	616	0.00	0.07	1754	0.02	0.13

Source: FITS (2012)

Table 4 breaks down the expenditure shares by quintile and by users and non users of mobile money. It shows the bottom 2 quintiles (the lowest 40 percent) spent 17.4 percent of the total food expenditure and only 6.3 percent of the total non-food expenditure, while the richest 40 percent spent more on non-food than food items, 66 percent of the total food expenditure and 84.4 percent of total non-food expenditure. These statistics are similar to World Bank (2015)

findings, which show the income share by the top 40 percent makes up 69.85 percent and 16.15 percent for the bottom 40 percent, suggesting that the FITS data is reasonably representative of the Ugandan households.

Table 4: Mobile Money Use across Quintiles (in Percent)

Quintiles	Full Sample(Mean)			Mobile Money Users(Mean)			Mobile Money Non- Users(Mean)		
	Total Expend	Food	Non Food	Total Expend	Food	Non Food	Total Expend	Food	Non Food
1	5.6%	6.2%	1.6%	6.3%	6.6%	1.6%	5.9%	6.5%	1.7%
2	10.3%	11.2%	4.7%	10.1%	10.8%	4.5%	10.6%	11.5%	4.8%
3	15.1%	16.2%	9.3%	14.7%	15.5%	9.1%	15.4%	16.8%	9.4%
4	22.2%	23.1%	19.1%	21.5%	22.6%	18.7%	22.8%	23.7%	19.3%
5	46.7%	43.3%	65.3%	47.5%	44.4%	66.0%	45.3%	41.6%	64.7%

Source: Author's computations from FITS (2012)

Comparing the mobile money users and non-users across the quintiles, shows a surprising similarity in distribution. The percentage of users and non-users increases by expenditure quintile, a result similar to Jack and Suri (2011) who found that the percentage of M-PESA users increased by expenditure quartile. For total expenditure the shares of the users is only larger for the first and fifth quintiles and for the lowest it is only a marginal difference. This is also true for food and for non-food only the fifth quintile is larger.

5. Empirical Demand Analysis Results

Estimating equation 5 using ordinary least squares (OLS) gave the results in Table 5 and using seemingly unrelated regressions (SURE) gave the results in Table 6. This is a singular system, so all coefficients add up to 0 across the categories and the constant term coefficients sum to 1. The results show total expenditure to have a significant negative coefficient, while positive for clothing, transport and medical goods. These results indicate that food is a necessity, while clothing, transport and medical goods are considered luxury goods and is evidence that Engel's law holds for Ugandan households. These results are similar to Ndanshau (1998-2001) for the case of Tanzania, Burney and Khan (1991) for rural and urban Pakistan households. Surprisingly, for housing and miscellaneous total expenditure is insignificant.

Mobile money, the main variable of interest, is statistically significant and negative for food and clothing, significant and positive for housing and transport goods, and insignificant for medical and miscellaneous goods. These results suggest that households that use mobile money are less likely to spend on necessities, such as food, and more likely to spend on luxury goods, such as housing and transport, compared to households that do not use mobile money. This is not surprising given that mobile money using households tend to be better off than non-users and so can afford to spend more on luxury goods. The household size is also significant and positively related to food while negatively related to non-food items, such as housing and miscellaneous goods (see Table 5).

Table 5: Effect of Mobile Money on Consumption Patterns using OLS

	(1) Food share	(2) Clothing share	(3) Housing share	(4) Transport share	(5) Medical share	(6) Misc share
Mobile Money	-0.017** (0.008)	-0.009* (0.005)	0.018*** (0.003)	0.008* (0.004)	-0.000 (0.004)	0.001 (0.003)
Log of Total Expenditure	-0.066*** (0.005)	0.037*** (0.003)	0.003 (0.002)	0.008*** (0.003)	0.016*** (0.003)	0.000 (0.002)
Urban/Rural Dummy	-0.067*** (0.010)	-0.016*** (0.006)	0.093*** (0.004)	0.002 (0.005)	-0.010* (0.005)	-0.003 (0.004)
Household Size	0.004*** (0.001)	-0.001 (0.001)	-0.003*** (0.001)	-0.000 (0.001)	0.001 (0.001)	-0.001** (0.001)
Age of Head of Household	0.000 (0.000)	-0.0005*** (0.000)	-0.000 (0.000)	-0.0001 (0.000)	0.0003** (0.000)	0.0003*** (0.000)
Education Attainment of Household Head						
<i>Primary School</i>	-0.023** (0.010)	0.015*** (0.006)	-0.000 (0.004)	0.014*** (0.005)	-0.007 (0.005)	0.002 (0.004)
<i>Secondary School</i>	-0.038*** (0.011)	0.014** (0.006)	0.010** (0.005)	0.023*** (0.005)	-0.021*** (0.006)	0.012*** (0.004)
<i>Tertiary/University</i>	-0.085*** (0.016)	0.010 (0.009)	0.042*** (0.007)	0.026*** (0.008)	-0.026*** (0.008)	0.034*** (0.006)
Gender of Household Head	0.011 (0.008)	-0.014*** (0.005)	0.012*** (0.003)	-0.014*** (0.004)	0.005 (0.004)	0.000 (0.003)
Constant	1.750*** (0.080)	-0.486*** (0.046)	-0.011 (0.033)	-0.077** (0.038)	-0.203*** (0.041)	0.027 (0.029)
Observations	2301	2301	2301	2301	2301	2301
F-statistic	52.832***	23.930***	127.959***	10.705***	8.743***	7.033***
R-Squared	0.172	0.086	0.335	0.040	0.033	0.027

* p -value <0.10 , ** p -value <0.05 , *** p -value <0.01 (.) represent the standard errors

Surprisingly, gender is insignificant for food items, but positive and highly significant for housing goods and negatively related to clothing and transport items, suggesting female headed households are more likely to spend on housing and less likely to spend more on clothing and transport goods than male headed households. Age appears to play a minor role in determining food consumption patterns and while it is statistically significant and negatively related to clothing, it is positively related to medical and miscellaneous shares. The size of the coefficient is relatively small.

As one might expect, households located in urban areas spend less on food, clothing and medical items, but more on housing than those households located in rural areas. Although there are fewer urban areas than rural areas in the dataset, urban areas tend to have larger expenditures and thus more willing to spend more on luxury goods, such as housing, and less on necessities, such as food. One possible reason that could explain urban areas demanding fewer medical items could be due to the fact that rural areas are largely comprised of poor people who are prone to diseases. As a result, they spend a reasonable amount of their expenditure on medical goods compared to households in urban areas.

Households with any level of education are less likely to spend on food than households without education, but are more likely to spend on transport items than those without an education. Education is highly significant for most of these commodities, except primary level education, which is insignificant for housing, medical and miscellaneous commodities. Tertiary level education is insignificant for clothing. In contrast, secondary education is significant for all commodities. The highly educated (secondary and university) demand more housing items and miscellaneous goods than the uneducated; they also demand less medical goods than households with no education. This suggests that households with higher education are probably more financially stable and less likely to fall sick. Consequently, they can afford to spend more on housing and less on medical items. Finally, primary and secondary school education is statistically significant and positively related to clothing, an indication that these households demand more clothing items compared to households with no education.

Table 6: Effect of Mobile Money on Consumption Patterns using SURE

	(6) Food share	(7) Clothing share	(8) Housing Share	(9) Transport share	(10) Medical Share
Mobile Money	-0.018** (0.008)	-0.009* (0.005)	0.018*** (0.003)	0.008** (0.004)	-0.000 (0.004)
Log of Total Expenditure	-0.065*** (0.005)	0.036*** (0.003)	0.003 (0.002)	0.009*** (0.003)	0.016*** (0.003)
Urban/Rural Dummy	-0.066*** (0.009)	-0.015*** (0.006)	0.093*** (0.004)	--- ---	-0.009* (0.005)
Household Size	0.004*** (0.001)	--- ---	-0.003*** (0.001)	-0.000 (0.001)	0.001 (0.001)
Age of Head of Household	0.000 (0.000)	-0.001*** (0.000)	--- ---	-0.000 (0.000)	0.0003** (0.000)
Education Attainment of Household Head					
<i>Primary School</i>	-0.023** (0.010)	0.015*** (0.006)	0.001 (0.004)	0.013*** (0.005)	-0.008* (0.005)
<i>Secondary School</i>	-0.038*** (0.011)	0.014** (0.006)	0.011** (0.004)	0.023*** (0.005)	-0.022*** (0.006)
<i>Tertiary/University</i>	-0.086*** (0.016)	0.010 (0.009)	0.044*** (0.007)	0.026*** (0.008)	-0.028*** (0.008)
Gender of Household Head	0.015** (0.007)	-0.013*** (0.005)	0.012*** (0.003)	-0.014*** (0.004)	--- ---
Constant	1.745*** (0.079)	-0.476*** (0.044)	-0.016 (0.033)	-0.080** (0.038)	-0.199*** (0.041)
Observations	2301	2301	2301	2301	2301
R-Squared	0.172	0.086	0.334	0.040	0.033
Breusch-Pagan Test of Independence[χ^2]	1829.262***				

p*-value<0.10, *p*-value<0.05, ****p*-value<0.01 (.) represent the standard errors

One concern with these estimates is that the error terms between the separate consumer good equations may be correlated then methods that do not assume zero covariances, such as Seemingly Unrelated Regression (SURE) will be better suited. This method will estimate the equations as a system and uses feasible generalized least squares (FGLS), which can produce more efficient estimates than OLS and also allows cross equation parameter restrictions to be imposed (Cameron and Trivedi, 2009; Cameron and Trivedi, 2005). If no evidence of correlation

between the error terms of the various equations is found, then OLS is preferred. A Breusch Pagan test of independence test was significant at the 5 percent level and so the system was estimated using SURE and the results are presented in Table 6. With SURE, one of the miscellaneous share equation is dropped because of the adding up restrictions. Since SURE results reduce to OLS if the same number of explanatory variables are used in each equation (Cameron and Trivedi 2009), the household size, age, urban/rural dummy and gender dummy were excluded from the clothing, housing, transport and medical equations, respectively.

The SURE estimates (Table 6) are similar to the OLS estimates for most variables, including mobile money, with the precision of food, transport and medical equations improved with SURE. In contrast to the OLS results where the gender coefficient was insignificant, female headed households seem to demand more food items than male headed households. For the transport equation, the precision of the mobile money coefficient increased compared to the OLS equation. Lastly, for the medical goods equation, primary education attainment is now significant.

Overall, both sets of results confirm that Engel's law holds and, most importantly for this paper, that mobile money has an effect on Ugandan household consumption patterns. The results suggest that mobile money users are able to allocate their resources more efficiently than non-users, demanding more luxury goods than necessities, such as food.

6. Conclusion

While mobile money has the potential to affect household consumption behaviour, few studies have investigated this relationship. Studies as Jack and Suri (2014) for Kenya and Munyegera and Matsumoto (2016) for rural Uganda found evidence that mobile money enables households to smooth their consumption through the remittances they receive, they however, fail to analyse its impact on the various household consumption patterns. Moreover, none of these studies have considered a representative sample of Uganda, despite the high number of mobile money users in the country. This paper has contributed to the literature by investigating the difference in consumer patterns between mobile money users and non-users in Uganda, using the FITS, a country representative dataset.

Mobile money users were found to be less likely to demand goods such as food and clothing than non-users, and more likely to demand housing and transport items. This result suggests that

mobile money users are efficiently able to allocate their resources better than non-users due to the increase in income received from the remittances. In other words, they are less likely to spend on food, a necessity, and more likely to spend on luxury goods, such as housing and transport items (with the exception of clothing).

Since there was evidence that Ugandan households are more likely to demand more food as expenditure (income) increases, this indicates that Engel's law holds. The results also showed that larger households were found to demand more food than non-food commodities. Other important variables such as the location of the household, the education attainment and the gender of household head all play a role in the household demand for various goods. Age was found to play a minor role in the demand for various household commodities. Despite the fact that age was found to be significant for clothing, medical and miscellaneous items, it had very small coefficients.

These findings have important policy implications. Mobile money users could potentially improve their household consumption patterns given the fact that users spend less on necessities and more on luxuries. This suggests that mobile money not only enables individuals to receive more remittances, but also enables them to spend more efficiently on particular commodities than non-users. This is an indication that mobile money could potentially improve individuals' livelihoods.

This study has some limitations in analysing household consumption patterns. Specifically, the FITS dataset used was only available for the first wave by the time this paper was written and, as a result, this study could not be carried out using a panel dataset. As data becomes available, it would be interesting to investigate the effect of mobile money on various household consumption goods in order to have a clear picture of the true impact of this innovation over time, particularly its likely effect on individuals' livelihoods.

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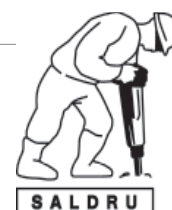
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southern africa labour and development research unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.



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