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Institutions' effect on households' savings in Kenya: A ranked ordered multinomial/conditional probit model approach

Githinji Njenga, Susan M. Onuonga and Moses Muse Sichei

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Full Length Research Paper

Institutions' effect on households' savings in Kenya: A ranked ordered multinomial/conditional probit model approach

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Savings is a vital source of investment funds especially for developing economies. However, like in many developing countries, domestic savings in Kenya remain low. Hence, posing a significant development challenge. Household savings contribute a sizeable share of domestic and national savings in both industrial and developing countries. Households should not however, be considered as fully autonomous actors without the influence of institutions. Institutions influence behavior and therefore outcomes. The institutional theory of saving thus indicates that institutional factors significantly affect the ability to save. This study uses a ranked ordered multinomial/conditional probit model to analyze the effect of institutions on households' savings in Kenya. Data from the Financial Access National 2006, 2009, and 2013 surveys was used in the analysis. The study results show that institutional factors including the travel cost to access a saving option, trust in a saving option, information and saving expectations influence the saving levels in Kenya. It is therefore important to address the travel cost of accessing the saving options through the promotion of non-traditional means of provision of saving services, build trust in saving options, and enhance financial education in the country. Further, enhancing formal education, income levels and reducing gender gaps is important in order to improve saving performance in the country.

Key words: Kenya, institutions, households, saving levels.

INTRODUCTION

Savings, defined as deferred consumption, assists in the accumulation of capital which can be used in producing further output that can possibly be consumed in future. Savings permit increases in income and consumption as well as smoothing consumption when uncertainty arises (Gersovitz, 1988). Savings facilitate investment leading to

an increase in economy's productive capacity (Rillo and Miyamoto, 2016). Indeed, the importance of savings in economic development is recognized. For example, Rostow's (1956) stages of growth assert that the preconditions for take-off include an initial ability to mobilize domestic savings. Lewis's growth theory

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indicates that saving is necessary for growth because investment has to be matched by savings (Lewis, 2013). Further, the neo-classical paradigm asserts that sustained growth of output is possible only when there is an increase in the propensity to save and invest (Sahoo et al., 2001).

The literature however identifies domestic savings as a fundamental source of investment especially in developing economies (Feldstein and Horioka, 1980; Feldstein, 1983; Gersovitz, 1988; Mason, 1988; Wood, 1995). Elbadawi and Mwega (2000) argue that in sub-Saharan Africa, domestic savings are crucial in increasing investment finance required to enhance economic growth. Other benefits of higher national saving rate are a decline in vulnerability to an economy's dependence on foreign capital (Hussein et al., 2017). Indeed, Bresser-Pereira and Nakano (2002) underline the need to increase the internal savings capacity. As Mason (1988) indicates, a higher national saving rate is an important macroeconomic objective for a sizable number of developing countries.

Kenya's vision 2030 is a long term plan aimed at propelling the country to new heights of economic growth with the principal target of making Kenya a middle income country. Under Vision 2030, the economy is expected to achieve a consistent annual growth rate of 10%. To achieve this objective, the financial sector is expected to mobilize additional savings to support higher investment rates of above 30% of gross domestic product (GDP). The country has however, continued to experience low rates of savings. For example, the gross national savings (as a % of GDP) decreased from 15.9% in 2007/2008 to 11.3% in 2011/2012, well below the Medium Term Plan 1 (2008-2012) set target of 24.4%. In 2013, the savings rate stood at 11.8% against a target of 27.7% (Republic of Kenya, 2007, 2013). In 2014 and 2015, the savings rate marginally increased to 12.2% and 12.7% (Kenya National Bureau of Statistics, 2016). Low savings generates low savings behaviour hence low capital accumulation (Hussein et al., 2017). Low savings therefore, remain a key development challenge to achieving Vision 2030 goals.

Like in other countries, households in Kenya contribute a significant part of national savings. It is therefore important to find ways of encouraging households to save in order to boost the national savings. Using the traditional savings theories, the saving literature attempts to link aspects of household saving behavior to household members' demographics and economic factors. The institutional theory of savings however, argues that institutions play a crucial role in promoting savings (Sherraden et al., 2003). According to the institutional model of saving, savings in households mainly happen through institutional arrangements and there are institutional constructs that lead to savings.

The literature on institutions' and households' saving behavior is scarce in Kenya. This study therefore

endeavors to improve the understanding of saving behavior in Kenya through a close investigation of the institutional theory of saving as a crucial framework which can assist in explaining Kenya's saving performance. Hussein et al. (2017), assert that while creating economic policies for investment and growth, it's vital to understand savings behaviour. The study uses a ranked ordered multinomial/conditional probit model to analyze the effect of institutions on households' saving behavior in Kenya. Data from the Financial Access National Surveys (2006, 2009, 2013) is used in the analysis.

LITERATURE REVIEW

Several traditional savings theories have been identified in the literature. These include the Keynesian saving theory by John Maynard Keynes in 1936; relative-income hypothesis by James S Duesenberry in 1949; the permanent income hypothesis (PIH) by Milton Friedman in the 1950s; and the life-cycle hypothesis proposed by Modigliani and Brumberg in 1954 and Ando and Modigliani in 1963. These theories have led to empirical studies which test demographic and economic factors as determinants of saving behavior.

The Keynesian approach assumes that current consumption is a function of disposable income and is a good description of consumption and savings behavior at very low levels of income, where subsistence is a predominant concern and inter-temporal considerations are absent. Keynes reasoned that as income falls relative to recent levels, people will protect consumption standards by not cutting consumption proportionally to the drop in income, and conversely as income rises, consumption will not rise proportionally. This implies that the level of income positively influences saving (Wood, 1995; Branson, 2003)

The relative-income hypothesis is based on two principles (Branson, 2003). Firstly, consumers are not concerned about their absolute level of consumption but rather their consumption relative to that of the rest of the population. Thus, the consumption behavior of individuals is interdependent and not independent. The second principle states that present level of absolute relative income and levels of consumption attained in previous periods influence present consumption. It is harder to reduce a level of consumption once reached than to reduce the portion of income saved in any period. Hence, over time, consumption relations are irreversible. This principle implies that the aggregate ratio of saving to income depends on the level of present income relative to previous peak income. As present income rises relative to its previous peak, the aggregate ratio of saving to income increases, and vice versa. Branson (2003) indicates that Duesenberry's theory has however not been successful in terms of acceptance among economists.

The PIH was first proposed by Milton Friedman in the 1950s who used the term permanent income to signify the average income the household should expect over a long time horizon (Sachs and Larrain, 1993). According to PIH, consumption responds to permanent income, defined as an average of present and future incomes. Transitory income is the difference between the current and the permanent income. The prediction that transitory income is entirely saved or more generally that saving and borrowing are used solely for consumption smoothing purposes has formed the basis for a number of empirical tests of the PIH in developing countries (Agenor, 2004). This is despite Snyder (1974) asserting that the PIH was difficult to test because of measurement problem.

The life cycle hypothesis argues that income fluctuates in a systematic manner over the course of a person's life. Therefore, personal saving behavior is significantly established by one's stage in the life cycle. When people are young, their incomes are low, and they often go into debt (dissave) because they know that they will be earning more money later in their lives. During their working years, income rises to reach a peak at around middle age, and they repay the debt incurred earlier and save for their retirement. When retirement comes, income from work goes to zero and people consume their accumulated resources (Sachs and Larrain, 1993).

According to the emerging institutional theory of saving, institutional factors significantly affect the ability to save. Savings and asset accumulation are largely as a consequence of institutional arrangements entailing explicit connections, rules, incentives and subsidies (Sherraden, 1991). Indeed, such institutional factors shape and influence opportunities (Neale, 1987; North, 1990; Weaver and Rockman, 1993; Beverly and Sherraden, 1999; Guy Peters, 1999). The institutional theory of saving advances access to saving services, incentives, information, facilitation and expectations as five key institutional constructs important in influencing saving and asset building behavior especially amongst households with low incomes (Beverly and Sherraden, 1999; Sherraden, 1991, 1999; Sherraden et al., 2003).

Empirical studies on the traditional saving theories reveal various factors as determinants of saving behavior. These findings show that the dependency ratio negatively affects the saving rates, age of the household head (main income earner) positively influences household saving behavior, household income has a positive effect on households' saving, household head's education is an important determinant of households' savings, household size has a negative effect of financial savings of households, urbanization negatively impacts on saving rate, household saving is affected by gender of household head, and marital status negatively affects savings. Studies on the institutional theory of savings show that institutional factors are associated with saving performance. A summary of selected empirical literature

is summarized in Appendix 1.

RESEARCH METHODOLOGY

Theoretical framework

The choice theory forms the theoretical foundation of this study. This is because the study analyzes the effect of institutions on households' choice of saving levels. Random utility model is the main common theoretical basis of choice models and is more in line with the consumer theory. The model assumes as does the consumer theory that the decision maker has a perfect discrimination capability (Ben-Akiva and Lerman, 1985; Ben-Akiva and Bierlaire, 1999). The individual is continually assumed to choose the alternative with utmost utility. However, the utilities are not known with certainty and are hence treated as random variables. In order to reflect uncertainty, the utility is therefore modeled as a random variable. For example, the utility that decision maker n associates with alternative i in the choice set C_n is expressed as:

$$U_{in} = V_{in} + \varepsilon_{in} \quad (1)$$

where V_{in} is the deterministic (systematic part of utility) and ε_{in} is the random term capturing the uncertainty. The alternative with the highest utility is chosen. Hence, the probability that alternative i is chosen by decision maker n from a choice set C_n is:

$$P(i | C_n) = P[U_{in} \geq U_{jn} \quad \forall j \in C_n] = P[U_{in} = \max_{j \in C_n} U_{jn}] \quad (2)$$

Empirical model specification

A multinomial choice model is used in this study, where the probability that decision maker i chooses the j th alternative is:

$$p_{ij} = \Pr[y_i = j] = F_j(x_i, \beta), \quad j = 1, 2, \dots, m, \quad i = 1, 2, \dots, N \quad (3)$$

where x_i are regressors and β is a vector of regressor coefficients. The functional form for F_j should be such that probabilities lie between 0 and 1 and sum over j to 1. Different functional specifications for F_j , however, leads to different multinomial choice models.

The expected utilities can be modeled in terms of characteristics of alternatives (herein referred to as institutional factors) rather than the attributes of the decision maker (McFadden, 1974):

$$U(\text{Choice } j \text{ for } i|z) = U_j(i) = \gamma z_{ij} + \varepsilon_{ij} \quad (4)$$

where z_{ij} represents a vector of institutional factors of the j th alternative for decision maker i and ε_{ij} represents the random individual specific terms which are assumed to be independently

distributed each with an extreme (Gumbel) distribution. The model in Equation 4 termed a conditional logit (CL) model, however, suffers from the independence of irrelevant alternatives (IIA) assumption or the red bus-blue bus problem. This is because the model assumes that the random terms are independent across alternatives and therefore adding another alternative does not change the choices by the decision maker (Cameron and Trivedi, 2005; Wooldridge, 2002). The IIA assumption therefore leads to unrealistic predictions.

While the multinomial probit (MNP) model solves the IIA problem, it is only able to capture the decision maker attributes. The MNP model (Cameron and Trivedi, 2005; Mwangi and Sichei, 2011) is a m choice multinomial model, with utility of decision maker i from the j th choice expressed as:

$$U_{ij} = V_j(x_{ij}; \beta) + \varepsilon_j, i = 1, 2, \dots, N, j = 1, 2, \dots, m \quad (5)$$

where U_{ij} represents the utility derived by decision maker i from choosing alternative j , x_{ij} is the observed attributes of decision maker i and alternative j chosen, $V_j(x_{ij}; \beta)$ is the deterministic component of the utility, and ε_j is the error term denoting the random component of the utility. In an MNP model, the errors are assumed to follow a multivariate normal distribution and are correlated across the choices:

$$\varepsilon \sim MND(0, \Omega), \text{ with } \Omega = I_m \otimes \Sigma \text{ and } \Sigma = E(\varepsilon_j \varepsilon_j') = \begin{bmatrix} \sigma_{11} & \dots & \dots & \sigma_{1m} \\ \sigma_{21} & \dots & \dots & \sigma_{2m} \\ \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \\ \sigma_{m1} & \dots & \dots & \sigma_{mm} \end{bmatrix}$$

where \otimes is a Kronecker product. The probability that decision maker i will select j is therefore expressed as:

$$p_{ij} = \Pr[V_j + \varepsilon_j > V_k + \varepsilon_k, \forall k \neq j | x_{ij}; \beta] \quad (6)$$

Hence, this study uses the multinomial/conditional probit model because it captures both the institutional factors and the decision maker attributes; and fully solves the IIA problem. To get a multinomial/conditional probit model, Equation 5 is reformulated so that the utility derived from choosing alternative j depends on the institutional factors and the decision maker attributes:

$$U_{ij} = \gamma Z_{ij} + V_j(x_{ij}; \beta) + \varepsilon_j \quad (7)$$

where Z_{ij} represents a vector of institutional factors that vary across choices.

To analyze the effect of institutions on households' choice of saving levels, we assume that a decision maker i , ranks the choices of saving levels in order of the choices indices,

$k = 1, 2, \dots, k$, such that choice k is the preferred choice and choice 1 is the least preferred. We therefore fit a rank ordered multinomial/conditional probit model to estimate the probability of this ranking of choices as follows:

$$\Pr[y_i = k] = \gamma Z_{ik} + \beta x_{ik} + \varepsilon_k$$

where $\Pr[y_i = k]$ is the probability that $P_{i,k-1} - P_{i,k} \leq 0$ and $P_{i,k-2} - P_{i,k-1} \leq 0, \dots$ and $P_{i,1} - P_{i,2} \leq 0$, (Z_{ik}) are the institutional factors, that is, access, incentive, information and expectations, and (x_{ik}) are the decision maker attributes, that is, age, gender, level of education, income, region, marital status and number of dependants.

Definition and measurement of variables

The dependent variable is the choice of saving levels. In a model of individual savings, an individual (decision maker) decides on the level of savings (Gersovitz, 1988). This means that each household has a different saving rate calculated as the ratio of household saving to household disposable income (Schmidt-Hebbel et al., 1992). It is therefore assumed that households choose their level of savings as follows: Low saving levels (<1/2 of monthly income); Moderate saving levels (=1/2 of monthly income); and High saving levels (>1/2 of monthly income).

The measurement of independent variables is shown in Table 1.

Data type and sources

This study uses three cross-sectional data sets from the Financial Access 2006, 2009 and 2013 national surveys. Though, the respondents were not the same in the three surveys, they share similarities. These three surveys were conducted by the Financial Access Partnership which is a public-private partnership comprising the government of Kenya and its agencies, financial sector providers, research organizations and development partners. The main goal of these surveys was to measure financial access landscape in Kenya (Financial Sector Deepening Kenya and Central Bank of Kenya, 2006, 2009, 2013). The surveys were national representative with the sampling undertaken by the Kenya National Bureau of Statistics. Across the three surveys, similar questions were asked to the respondents. This study therefore uses data from these similar questions to do the analysis across the three periods. Further, the institutions' (whose effect is being analyzed in this study) environment is assumed to have remained fairly the same across the three periods of analysis.

The surveys' respondents were individuals within households which were randomly selected throughout the country based on the rural and urban clusters. Every individual aged 16 years and above was eligible to participate in the surveys. In each household, however, only one individual was sampled for the interview. The total respondents were 4,418 (2006), 6,598 (2009) and 6,449 (2013). According to the choice theory which forms the foundation of this study, the decision maker requires a decision rule to arrive at a unique choice from a choice set containing two or more alternatives. Since the individuals with multiple choice of a saving option did not conform to the decision rule, they were eliminated from the study's sample size. The final sample size was 1,503, 2,430 and 1,843 respondents in 2006, 2009 and 2013 data sets, respectively.

Table 1. Independent variables.

Variable	Measurement	Expectation	Explanation
Institutional factors			
Access	Travel cost to get to the nearest Bank , Sacco, MFI or Ascas/Roscas: (1) High (0) Low	(-)	Making the saving process more available and less costly, increases the savings.
Incentive	Banks', Saccos', MFIs' or Ascas/Roscas' interest rate on savings: (1) High (0) Low	(+)	An incentive increases savings.
	Trust on Banks, Saccos, MFIs or Ascas/Roscas: (1) High (0) Low	(+)	
Information	Source of financial advice is Bank , Sacco, MFI or Ascas/Roscas: (1) Most (0) Least	(+)	Awareness of savings options and opportunities, increases savings.
Expectations	Expectations to use savings in the bank , Sacco, MFI or Ascas/Roscas to deal with the highest risk; (1) High (0) Low	(+)	Having specific savings expectations increases savings.
Decision maker attributes			
Age	Age of decision maker in years	(+)	The age is positively related to one's ability to hold financial savings during the working period
Gender	A dummy given as 1 if decision maker is female, 0 otherwise	(+)	Being female, an individual tends to be more cautious in spending thus increasing savings.
Level of education	Highest level of formal education completed by the decision maker: (1) None, (2) Some primary, (3) Primary completed, (4) Some secondary, (5) Secondary completed, (6) Technical training, and (7) University	(+)	Educated individuals are likely to earn more thus higher savings
Income	Decision maker's monthly income per month in Kenya shillings (Proxied by total monthly expenditures)	(+)	Level of income exerts a positive influence on savings
Region	A dummy given as 1 if decision maker resides in urban area, 0 otherwise	(+)	Lack of saving facilities in rural areas forces one to hoard cash at home instead of banking it.
Marital status	A dummy given as 1 if decision maker is married, 0 otherwise	(+,-)	Indeterminate
Number of dependants	Decision maker's total number of dependants	(-)	The more the dependants, the lower the savings.

Sacco: Savings and Credit Cooperatives; MFI: Micro Finance Institutions; Ascas: Accumulating Savings and Credit Associations; Roscas: Rotating Savings and Credit Associations.

Table 2. Descriptive statistics for the dependent and independent variables (Author's calculations based on the study data).

Variable	2006		2009		2013	
	N	%	N	%	N	%
Dependent variable: Saving levels						
Low saving levels	776	76.53	1252	65.79	486	33.96
Moderate saving levels	189	18.64	430	22.60	410	28.65
High saving levels	49	4.83	221	11.61	535	37.39
Total	1,014	100	1,903	100	1,431	100
Independent variable	N	Mean	N	Mean	N	Mean
Institutional factors						
Travel cost	-	-	2,430	0.81	1,581	0.94
Interest rate	1,503	0.49	-	-	939	0.25
Trust	1,503	0.45	2,430	0.24	1,489	0.2
Information	-	-	2,430	0.64	1,642	0.25
Expectation	-	-	2,416	0.95	1,527	0.6
Decision maker attributes						
Age	503	37.20	2,430	40.17	1,745	37.21
Gender	503	0.61	2,430	0.62	1,843	0.64
Level of education	495	3.24	2,430	3.24	1,843	3.43
Income	-	-	2,429	15,783.80	1,785	10,921.61
Region	503	0.33	2,430	0.29	1,843	0.39
Marital status	481	0.65	2,429	0.68	1,842	0.72
Number of dependants	503	2.59	2,430	2.03	1,843	4.40

-: Means data missing

RESULTS AND DISCUSSION

Descriptive statistics

Table 2 present the summary statistics for the dependent and independent variables.

In 2006 and 2009, majority of the respondents preferred low saving levels, that is, 76.5% (in 2006) and 65.8% (in 2009). However, in 2013, majority of the respondents (37.4%) preferred high saving levels. On institutional factors, the perceived average travel cost to access the nearest saving option is high. The mean travel cost is 0.81 and 0.94 in 2009 and 2013, respectively. These two figures are above the perceived low travel cost of accessing a saving option. The perceived average interest rate on savings is high. In 2006, the average interest rate on savings is 0.49, while in 2013, the average is 0.25. These mean figures are above the perceived low interest rate on savings. On trust in a saving option, the mean values are 0.45 in 2006, 0.24 in 2009 and 0.2 in 2013. This indicates that the perceived average trust in all the three periods of the study is high. On average, the saving option chosen is the most source of financial advice. This is revealed by the mean values of 0.64 in 2009 and 0.25 in 2013. Lastly, expectations to use savings in the saving option to deal with the highest

risk are on average perceived to be high. The mean values of 0.95 in 2009 and 0.6 in 2013 are above the low perceived expectations to use savings in the saving option to deal with the highest risk.

The decision maker attributes included in this study are age, gender, level of education, income, region of residence; marital status and the number of dependants. The average age was 37.20 years in 2006, 40.17 years in 2009 and 37.21 years in 2013. The proportion of females was higher in all the three periods, that is, 61% in 2006, 62% in 2009 and 64% in 2013. The average level of education completed was primary school. This indicates that the education status across the three periods of the study is low.

On income, the average was Ksh. 15,784 in 2009 and Ksh. 10,922 in 2013. The distribution of income was uneven as indicated by the high standard deviation figures. In terms of region of residence, less than a half of the respondents lived in urban areas, that is, 33, 29 and 39% in 2006, 2009 and 2013, respectively. Most of the decision makers were married, that is, 65% in 2006, 68% in 2009 and 72% in 2013. Finally, the average number of dependants was 2.59 in 2006, 2.03 in 2009 and 4.40 in 2013. In all the three periods, the minimum number of dependants was zero with maximum being 20 dependants.

Table 3. Wald test for independent variables: Rank ordered multinomial/conditional probit model estimates for saving levels option (Source: Author's calculations).

Year	2006		2009		2013	
	Chi ²	Prob>chi ²	Chi ²	Prob>chi ²	Chi ²	Prob>chi ²
Institutional factors	44.68	0.0000	53.15	0.0000	6.14	0.2928
Decision maker attributes	71.99	0.0000	134.51	0.0000	15.67	0.4762

Ho: All coefficients associated with given variable(s) = 0

Estimation results

The regression results from a rank ordered multinomial/conditional probit model are presented in Appendix 2. A post-estimation diagnostic Wald test is subsequently done to determine the model's fitness. The Wald test results are shown in Table 3.

The Wald test results for the 2006 and 2009 periods of study reject the null hypothesis that all coefficients associated with institutional factors and the decision maker attributes are equal to zero. The Chi² statistics for the institutional factors and decision maker attributes in 2006 and 2009 are statistically significant at 1% significance level. Hence, the coefficients associated with the institutional factors and the decision maker attributes in these periods are jointly significant. However, the test results for the 2013 period does not reject the null hypothesis that all the coefficients associated with the institutional factors and the decision maker attributes are not jointly significant. Therefore, the Wald test results in Table 3 confirm the model's fitness in 2006 and 2009 data sets. Table 4 presents the institutional factors' marginal effects on choice of saving levels.

The result shows that institutions affect the saving levels as anticipated. A perceived high travel cost to access a saving option is associated with a low probability of having significant saving levels. When the travel cost to get to the nearest bank is perceived to be high instead of low, the probability that an individual will have significant saving levels in a bank will decrease by 2.4% in 2009. Conversely, the probability of having significant levels of saving in MFIs, Ascans/Roscans and Saccos increases by 0.4, 2 and 0.8%, respectively.

Also in 2009, the probability of significant saving levels in MFIs will decrease by 1.3% when the travel cost to get to the nearest MFI is perceived to be high instead of low. In the same period, however, the probability of significant saving levels in banks, Ascans/Roscans and Saccos will increase by 0.4, 0.8 and 0.1%, respectively. The results also show that when the travel cost to get to the nearest Sacco is perceived to be high instead of low, the probability of having significant saving levels in a Sacco reduces by 0.06%. Correspondingly, the probability of saving significant levels in banks increases by 0.1%. The probability of having significant saving levels in MFIs also increases by 0.03%.

The trust in a saving option and significant saving levels are positively related. When the trust in banks is perceived to be high instead of low, the probability of having significant saving levels in banks will increase by 0.65% in 2006 and 0.4% in 2009. However, the probability of saving significant levels in MFIs will reduce by 0.6% in 2009. Also, the probability of having significant saving levels in Ascans/Roscans will reduce by 0.7% in 2006 and 0.3% in 2009. Lastly, the probability of having significant saving levels in Saccos will reduce by 0.5% and 0.2% in 2006 and 2009, respectively.

Similarly, when the trust in MFIs is perceived to be high instead of low, the probability of having significant saving levels in MFIs will increase by 0.3% in 2009. In the same period however, the probability of having significant saving levels in banks, Ascans/Roscans and Saccos will decline by 0.07, 0.2 and 0.02%, correspondingly. The trust in Ascans/Roscans and significant saving levels are also positively related. When trust in Ascans/Roscans is perceived to be high instead of low, the probability of significant saving levels in Ascans/Roscans will increase by 9% in 2006. On the other hand, the probability of saving significant levels in banks, MFIs and Saccos declines by 7.47, 0.2 and 1.3%, respectively. Lastly, when the trust in Saccos is perceived to be high instead of low; the probability of saving significant levels in Saccos increases by 4.5% in 2006. Conversely, the probability of saving significant levels in banks, MFIs and Ascans/Roscans reduces by 3, 0.03 and 1.3%, respectively.

The results also indicate a positive relationship between the source of financial advice and significant saving levels. The probability of having significant saving levels in a bank increases by 1.1% in 2009 whenever the bank is perceived to be the most rather than the least source of financial advice. The probability of significant savings levels in Ascans/Roscans and Saccos however reduces by 0.4 and 0.2%, respectively. Also, whenever the MFI is perceived to be the most instead of the least source of financial advice, the probability of significant saving levels in MFIs increases by 0.5%. However, the probability of significant saving levels in banks, Ascans/Roscans and Saccos decline by 0.2, 0.2 and 0.04%, respectively.

Saving expectations affect significant saving levels. The probability of significant savings in banks increases by 11% whenever the expectation to use savings in

Table 4. Saving levels rank ordered multinomial choice: Institutional factors' marginal effects for rank ordered multinomial/conditional probit model.

Saving option/ Institutional factors	Bank			MFIs			Ascas/Roscas			Saccos		
	2006	2009	2013	2006	2009	2013	2006	2009	2013	2006	2009	2013
Cost												
Bank	-	-0.024***	-0.011	-	0.004***	-0.0003	-	0.002	0.0005	-	0.001*	-0.0001
MFIs	-	0.004***	0.03	-	-0.013***	-0.003	-	0.006	0.003	-	0.0003**	-0.00007
Ascas/Roscas	-	0.02***	-0.041	-	0.008***	0.003	-	-0.0007	-0.004	-	0.0002	0.00006
Saccos	-	0.008***	-0.136	-	0.001***	-0.006	-	-0.00009	-0.002	-	-0.0006**	-0.0003
Interest rate												
Bank	0.001	-	0.021	0.00004	-	-0.002	-0.011	-	0.0005	-0.005	-	0.005
MFIs	0.001	-	0.028	0.0002	-	0.02	-0.0003	-	0.002	-0.0004	-	-0.004
Ascas/Roscas	-0.001	-	0.008	-0.0001	-	0.02	0.014	-	0.006	-0.002	-	0.004
Saccos	0.0009	-	0.008	-0.0001	-	-0.003	-0.002	-	-0.005	0.007	-	0.005
Trust												
Bank	0.0065**	0.004***	0.013	0.0002	-0.0007**	0.001	-0.0747***	-0.0005	0.002	-0.03***	-0.0003	-0.00004
MFIs	-0.006**	-0.001	0.034	0.001	0.003***	0.013	-0.002**	0.0001	0.01	-0.003***	0.00007	-0.00006
Ascas/Roscas	-0.007***	-0.003***	-0.047	-0.006	-0.002***	-0.014	0.09***	0.0002	0.005	-0.013***	0.00003	-0.00005
Saccos	-0.005**	-0.002**	-0.011	-0.009	-0.0002**	0.006	-0.013***	0.0002	0.00008	0.045***	0.0001	0.00006
Information												
Bank	-	0.011**	0.003	-	-0.002***	0.012	-	-0.004	-0.003	-	-0.0002	-0.007
MFIs	-	0.001	0.0001	-	0.005***	0.001	-	0.0002	-0.012	-	0.0001	-0.007
Ascas/Roscas	-	-0.004**	-0.003	-	-0.002***	0.0006	-	0.003	0.014	-	0.00005	-0.009
Saccos	-	-0.002**	0.006	-	-0.0004**	-0.0008	-	0.0004	-0.00005	-	0.0003	0.0001
Expectations												
Bank	-	0.11***	0.003	-	-0.008***	0.006	-	-0.0005	0.003	-	0.0003	0.003
MFIs	-	-0.005	-0.0001	-	0.075**	0.0005	-	-0.003*	0.034	-	-0.001**	-0.003
Ascas/Roscas	-	-0.011***	0.002	-	-0.0009***	-0.006	-	0.001**	0.008	-	0.0001	-0.013
Saccos	-	-0.006**	0.0005	-	-0.004**	0.004	-	-0.003***	-0.033	-	0.005**	0.01

***, ** and * denote statistical significance at the 1, 5 and 10% levels, respectively. -: Means data missing.

banks to deal with the highest risk is perceived to be high instead of low. The probability of significant saving levels in Ascas/Roscas and Saccos in contrast, declines by 1.1 and 0.6%,

respectively. Also, the probability to have significant savings in MFIs increases by 7.5% when expectation to use savings in MFIs to deal with the highest risk is perceived to be high

instead of low. However, the probability to have significant savings in banks, Ascas/Roscas and Saccos reduces by 0.8, 0.09 and 0.4%, correspondingly.

Table 5. Saving levels rank ordered multinomial choice: Decision maker attributes' marginal effects for rank ordered multinomial/conditional probit model.

Saving option/ Decision maker attributes	Bank			MFIs			Ascas/Roscas			Saccos		
	2006	2009	2013	2006	2009	2013	2006	2009	2013	2006	2009	2013
Age	-0.006	-0.012*	0.012	-0.0005	-0.0002	-0.009	-0.069	0.001	-0.003	-0.01	0.0006	0.002
Age squared	1.7e-06	2.3e-06	-6.8e-07	5.7e-08	1.8e-07	9.2e-07	0.0008***	-9.8e-08	-2.4e-07	0.00005***	-1.3e-08	-8.3e-07
Income	-	0.003***	-0.002	-	0.003	0.002	-	5.4e-06	-0.0004	-	0.00003	-0.003
Education	0.0176**	0.002**	-0.006	0.002	0.004***	0.009	-0.26***	0.0002	-0.003	0.074***	0.0001	-0.003
Gender	0.006	-0.006**	0.008	-0.0004	-0.005	-0.005	0.149***	-0.0001	-0.003	-0.054***	-0.0002	0.011
Marital	-0.007	-0.001	-0.003	-0.001	-0.0008	0.0011	0.016	0.00006	0.001	0.046	0.00004	0.009
Number of dependants	0.004	-0.001**	0.0007	0.0002	-0.002*	0.0004	-0.019	-0.00004	-0.001	-0.035**	-0.00004	-0.0013
Region	0.013**	0.007*	-0.002	0.0007	0.008*	0.0003	-0.151***	0.00002	0.002	0.008	0.00002	0.002

***, ** and * denote statistical significance at the 1, 5 and 10% levels, respectively. -: Means data missing.

Saving expectations also affect significant saving levels in AscAs/RoscAs. Whenever the expectation to use savings in AscAs/RoscAs to deal with the highest risk is perceived to be high instead of low, the probability of significant savings in AscAs/RoscAs increases by 0.1%. However, the probability to have significant savings in MFIs and Saccos reduces by 0.3% each. Finally, the probability of significant savings in Saccos increases by 0.5% whenever the expectation to use savings in Saccos to deal with the highest risk is perceived to be high instead of low. The probability of significant savings in MFIs subsequently decreases by 0.1%.

The results on institutional factors conform to the institutional theory of saving which advances access (travel cost) to saving option, incentives (trust), information (financial advice) and expectations as important constructs in predicting saving behavior. As predicted, the travel cost to access the saving option, trust in the saving option, saving option being the most source of financial advice and saving expectations have a statistically significant relationship with significant

saving levels. A perceived high travel cost to access the saving option is associated with reduced probability of having significant saving levels. Also, high trust in the saving option affect significant saving levels positively. The source of financial advice also positively affects significant saving levels. Lastly, the expectations to use savings to deal with the highest risk have a positive association with significant saving levels.

These results are consistent with the findings of other studies. In their study in Kenya, Kibet et al. (2009) found that higher transport costs had a negative effect on saving habits. Chowa et al. (2012) also showed that in Uganda, proximity to the saving option, financial education and financial incentives had positive association with higher saving performance. The implications of these results is that institutional factors including the travel cost to access a saving option, trust in a saving option, information and saving expectations influence the saving levels in Kenya.

Table 5 shows the decision maker attributes' marginal effects on the choice of saving levels. The results show that only income, education

level, gender, number of dependants and region affect significant saving levels. On income, a one shilling increases in income beyond Kshs 15,783.80 in 2009 increases the probability of significant saving levels in banks by 0.3%. According to the Keynesian theory of saving, the level of income positively influences saving. Therefore, as income increases, the probability of significant saving levels also increases.

On education, an increase in one level of education beyond the primary level increases the probability of significant savings levels in banks and Saccos by 1.76 and 7.4%, respectively in 2006. Also in 2009, an increase in one level of education beyond the primary level increases the probability of significant savings levels in banks and MFIs by 0.2 and 0.4%, respectively.

However, an increase in one level of education beyond the primary level reduces the probability of significant savings levels in AscAs/RoscAs by 26% in 2006. With a higher level of education, one is likely to earn more income due to one's ability to earn more. This leads to higher savings. Similar results have been found by other studies

(Kibet et al., 2009). However, as income increase, one's probability to choose formal finance rather than informal finance increases (Carpenter and Jensen 2002; Ouma and Rosner 2003; Mbutia, 2011).

The results in general indicate that compared to males, females have a lower probability of having significant saving levels in banks and Saccos but have a higher probability of having significant saving levels in Ascans/Roscas. A female's probability of having significant saving levels in banks was lower than that of a male by 0.6% in 2009. Also in 2006, a female's probability of having significant saving levels in Saccos was lower than that of a male by 5.4%. However, in 2006, a female's probability of having significant savings levels in Ascans/Roscas was higher than that of a male by 14.9%. These results are consistent with the literature that women participation in informal finance (e.g. Ascans/Roscas) is higher than that of men (Anderson and Baland, 2002).

On dependants, an increase in one dependant beyond 2 dependants reduces the probability of having significant saving levels in banks and MFIs by 0.1 and 0.2% in 2009, respectively. Also, an increase in one dependant beyond 2.59 dependants reduces the probability of having significant saving levels in Saccos by 3.5% in 2006. An additional dependant can lead to a higher household expenditure leading to reduced significant saving levels. This finding is consistent with the literature on savings including Kibet et al. (2009).

Urban residence is associated with a higher probability of having significant saving levels in banks and MFIs. The results indicate that in 2006 and 2009, urban residents' probability of having significant saving levels in banks was higher than that of rural residents by 1.3 and 0.7%, respectively. Also, the urban residents' probability of having significant saving levels in MFIs was higher than that of rural residents by 0.8% in 2009. However, the urban residents' probability of having significant saving levels in Ascans/Roscas was 15.1% lower than that of rural residents in 2006. According to Atieno (2001), location in urban area positively affects the choice of a formal saving option. This is because formal finance is more predominant in urban than in rural areas.

CONCLUSIONS AND POLICY IMPLICATIONS

This study establishes that institutions influence saving levels in Kenya. A perceived high travel cost to access a saving option is associated with reduced probability of having significant saving levels. Also, a perceived high trust in a saving option increases the probability of having significant saving levels. The source of information (financial advice) also affects significant saving levels. Lastly, the expectations to use savings to deal with the highest risk have a positive association with significant saving levels. On decision maker attributes, only income,

education level, gender, number of dependants and region affect saving levels. As income increases, the probability of having significant saving levels in banks increases. An increase in one level of education beyond the primary level increases the probability of having significant savings levels in banks, Saccos and MFIs but reduces the probability of having significant savings levels in Ascans/Roscas. On gender, the results in general indicate that compared to males, females have a higher probability of having significant saving levels in Ascans/Roscas. An increase in one dependant reduces the probability of having significant saving levels in banks, Saccos and MFIs. This is because an additional dependant can lead to a higher household expenditure leading to reduced saving levels. Urban residence is associated with a higher probability of significant saving levels in banks and MFIs. However, the urban residents' probability of having significant saving levels in Ascans/Roscas is lower than that of rural residents.

This study draws the following policy implications that can be used in enhancing saving levels in Kenya. There is need to address the travel cost of accessing a saving option by promoting and leveraging on digital innovation in provision of saving services. Thus, developing sustainable digital services that are affordable to low income households is crucial. These digital services must be also secured to promote their wide adoption. Further, savers need to be assured that their savings are safe for them to trust the saving services providers. This in turn will have a positive effect on their savings performance. Promotion of financial education is important because it equips savers with knowledge and information. When people are financially literate, they make better financial decisions and improve their saving actions. The national government should continue with its efforts to boost education in the country since formal education is important in enhancing saving performance. There should therefore be adequate funding of the education sector at all levels including the adult education program. Designing income re-distribution policies is critical in enhancing income levels in the country. The higher the income levels, the higher the probability of saving performance. Lastly, there is need to boost women saving performance in formal saving options by increasing their participation in the labor market in order to enhance their incomes.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Appendix 1. Summary of selected empirical literature.

Author	Country	Findings	
Studies on traditional savings theories			
Kelley (1980)	Kenya		
Muradoglu and Taskin (1996)	30 developing and industrial countries		
Mwegu (1997)	15 African countries		
Obwona and Ddumba-Ssentamu (1998)	Uganda		
Loayza et al. (2000)	69 countries(20 industrial & 49 developing)		
Baliamoune and Chowdhury (2003)	Morocco		
Amimo et al. (2004)	Mozambique	Dependency ratio negatively affects the saving rates	
Thanoon and Baharumshah (2007)	Malaysia		
Kibet et al. (2009)	Kenya		
Ur Rehman et al. (2011)	Pakistan		
Yang et al. (2011)	China		
Gedela (2012)	India		
Apergis and Christou (2012)	16 African countries		
Ahmad (2015)	Pakistan		
Amimo et al. (2004)	Mozambique		Age of the household head (main income earner) positively influenced household saving behavior
Kibet et al. (2009)	Kenya		
Gedela (2012)	India		
Oluwakemi (2012)	Nigeria		
Nwankwo et al. (2013)	Nigeria		
Schmidt-Hebbel et al. (1992)	10 countries		
Khan (1993)	Pakistan		
Muradoglu and Taskin (1996)	30 developing and industrial countries		
Ogaki et al. (1996)	Low, middle & upper income countries		
Obwona and Ddumba-Ssentamu (1998)	Uganda		
Elbadawi and Mwegu (2000)	Sub-Saharan Africa		
Kiiza and Pederson (2002)	Uganda		
Baliamoune and Chowdhury (2003)	Morocco	Household income had a positive effect on households' saving	
Amimo et al. (2004)	Mozambique		
Thanoon and Baharumshah (2007)	Malaysia		
Kibet et al. (2009)	Kenya		
Yang et al. (2011)	China		
Gedela (2012)	India		
Girma et al. (2013)	Ethiopia		
Finlay and Price (2014)	Australia		
Soharwardi et al. (2015)	Pakistan		
Obwona and Ddumba-Ssentamu (1998)	Uganda		Education household head identified as important determinants of households' savings
Amimo et al. (2004)	Mozambique		
Kibet et al. (2009)	Kenya		
Mbuthia (2011)	Kenya		
Girma et al. (2013)	Ethiopia		
Amimo et al. (2004)	Mozambique	Household size has been identified as important determinants (a negative effect) of financial savings of households	
Abdelkhalek et al. (2010)	Morocco		
Oluwakemi (2012)	Nigeria		
Soharwardi et al. (2015)	Pakistan		

Appendix 1. Contd

Loayza et al. (2000)	69 countries (20 industrial & 49 developing)	Urbanization negatively impacts on the private saving rate
Bicevska et al. (2009)	Latvia	
Kibet et al. (2009)	Kenya	Household saving is affected by gender of household head
Abdelkhalek et al. (2010)	Morocco	
Gedela (2012)	India	
Ur Rehman et al. (2011)	Pakistan	Marital status negatively affects savings
Khan (1993)	Pakistan	
Studies on institutional theory of saving		
Sherraden et al. (2003)	US	Institutional factors are associated with saving performance
Ouma and Rosner (2003)	Kenya	
Ssewamala and Sherraden (2004)	US	
Grinstein-Weiss et al. (2006)	US	
Grinstein-Weiss et al. (2007)	US	
Thanoon and Baharumshah (2007)	Malaysia	
Kibet et al. (2009)	Kenya	
Mbuthia (2011)	Kenya	
Delafrooz and Paim (2011)	Malaysia	
Grinstead et al. (2011)	US	
Chowa et al. (2012)	Uganda	
Turner and Manturuk (2012)	US	
Mahdzan and Tabiani (2013)	Malaysia	
Samantaraya and Patra (2014)	India	
Gatt (2014)	Malta	
Heckman and Hanna (2015)	US	

Appendix 2. A rank ordered multinomial/conditional probit model results: Saving level option (Author's calculations).

Variable	2006	2009	2013
Institutional variable	Coefficient	Coefficient	Coefficient
Access: Travel cost	-	-0.9204208*** (0.133)	-0.038035 (0.338)
Incentive: Interest rate	0.0891859 (0.0824)	-	0.23416 (0.174)
Incentive: Trust	0.5660344*** (0.0904)	0.186219*** (0.049)	0.414518 (0.219)
Information		0.3003597*** (0.078)	0.5758102 (0.304)
Expectation		0.631534*** (0.452)	0.110057 (0.258)
MFIs: Decision maker attributes			
Constant	1.371147 (2.264)	-5.363875*** (1.917)	-0.8977375 (2.688)
Age	-0.2221725 (0.732)	0.2706917 (0.641)	-0.2615603 (0.767)
Age squared	0.0001 (0.0002)	-0.0000799 (0.0002)	0.0000272 (0.0002)
Income	-	0.1240295 (0.106)	0.0596842 (0.127)
Education	0.4310894* (0.224)	0.2310977*** (0.063)	0.2714857 (0.247)
Gender	--0.0320893 (0.202)	-0.110274 (0.175)	-0.1407947 (0.274)
Marital	-0.0275233 (0.221)	-0.0465464 (0.184)	0.0348265 (0.251)
Number of dependents	-0.3640044* (0.193)	-0.0675927 (0.057)	0.0095955 (0.0721)
Region	-0.2766157 (0.227)	0.3860178* (0.206)	0.0118555 (0.345)

Appendix 2. Contd

Ascas/Roscas: Decision maker attributes

Constant	5.629967*** (2.108)	0.5126812 (0.754)	2.41268 (2.923)
Age	-0.4778988 (0.640)	0.3862331* (0.222)	-0.6170114 (0.988)
Age squared	0.0004*** (0.0002)	-0.0002*** (0.00006)	0.0000431 (0.0002)
Income	-	-0.1335909*** (0.04)	-0.0627623 (0.133)
Education	0.559293*** (0.285)	-0.0874732*** (0.027)	-0.4936718* (0.279)
Gender	0.854345*** (0.205)	0.438613*** (0.083)	-0.5183082* (0.311)
Marital	-0.0243411 (0.191)	0.0089078 (0.068)	0.3036551 (0.291)
Number of dependents	-0.2052355 (0.169)	0.0679782*** (0.022)	-0.2039207** (0.101)
Region	-0.9248745*** (0.221)	-0.1293155* (0.077)	0.2643706 (0.385)
Constant	-1.677422 (2.18)	-3.745463*** (1.056)	-1.513883 (4.712)
Age	-0.2707398 (0.696319)	0.6034265** (0.296)	0.2463939 (1.527)
Age squared	0.0004** (0.0002)-	-0.0000768 (0.00007)	-0.0000764 (0.0004)
Income	-	0.0314499 (0.049)	-
Education	0.4954137** (0.211)	0.118388*** (0.034)	-0.1397804 (0.516)
Gender	-0.4015168** (0.198)	-0.4424226*** (0.095)	-0.4561683 (0.473)
Marital	0.5860384 (0.224)	0.0893616 (0.089)	0.2889573 (0.490)
Number of dependents	-0.5117295*** (0.195)	-0.0496129** (0.025)	-0.7148431* (0.421)
Region	-0.157473 (0.219)	-0.1237393 (0.102)	0.3175233 (0.498)
No. of observations	4016	7568	2439
No. of cases	1004	1892	813
Wald chi-square statistic	90.19	143.52	180.21
Prob>chi-square	0.0000	0.0000	0.0000

Base category is Banks option. ***, ** and * denotes statistical significance at the 1, 5 and 10% levels, respectively. - : Means data missing
Standard errors in parenthesis.

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