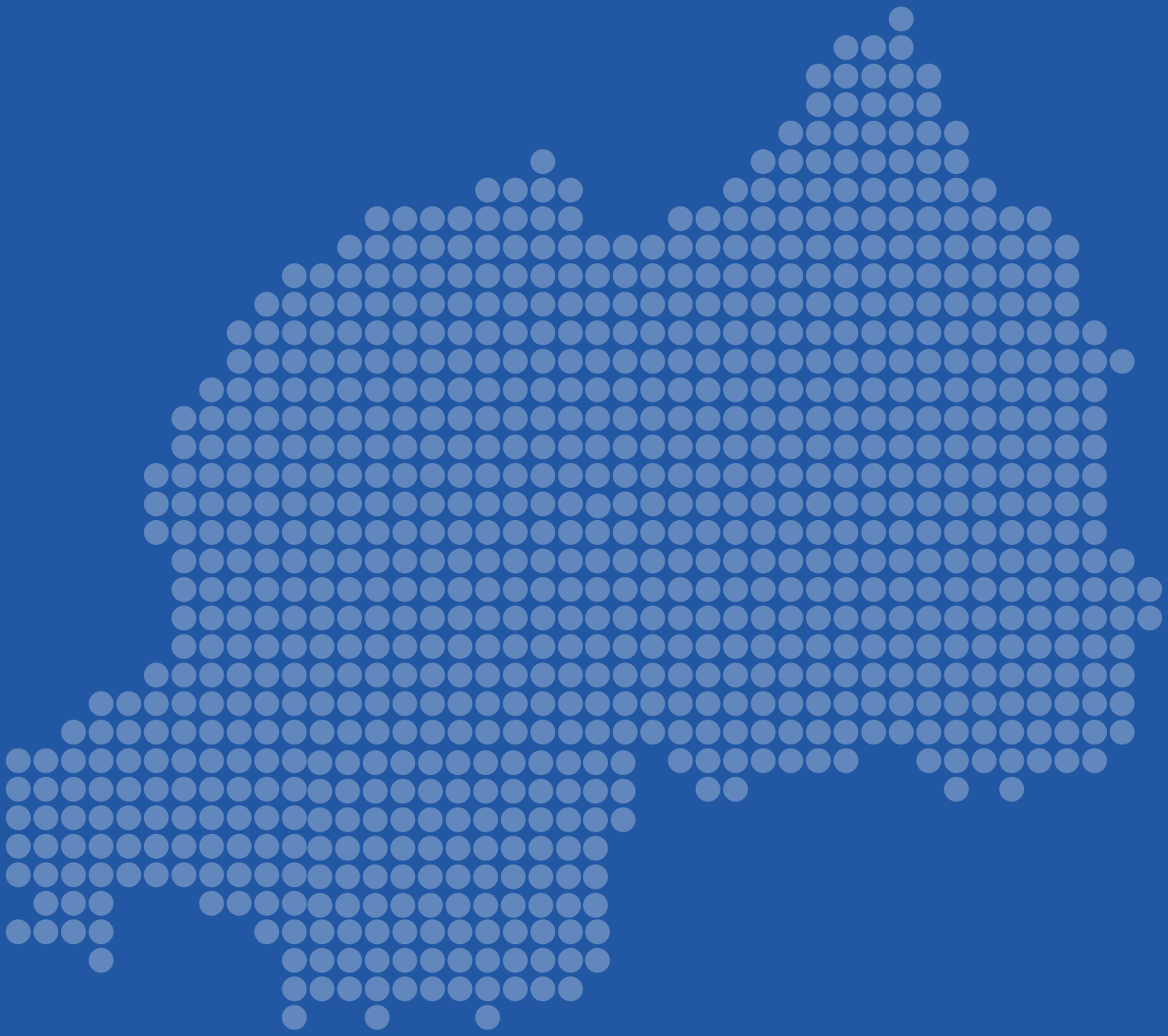

DETERMINANTS OF HOUSEHOLD SAVING IN RWANDA

Institute of Policy Analysis and Research - Rwanda

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Working paper submitted by
The Institute of Policy Analysis and Research-Rwanda (IPAR-Rwanda)

To the Macroeconomic and Investment Policies (MIP) Program

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Background

Despite the rapid growth of its economy in the last decade, Rwanda remains a low-income country. In recent years the country elaborated its "National Strategy for Transformation (NST1)" intending to become a middle-income country[1] by 2035 (Republic of Rwanda, 2017). One key pillar of this strategy is to accelerate sector-led economic growth through increased domestic savings (Republic of Rwanda, 2017), as a sufficiently high rate of domestic saving is a key determinant of a nation's economic growth (Athukorala and Sen, 2004).

Savings represent the portion of income not spent today. That portion is mainly accumulated to serve as a future investment, future consumption, and/or as a way to protect against future contingencies. At the macro level, domestic savings in the form of capital formation are recognized as compelling for economic growth, considering that they increase capital stock thereby boosting the economy to generate future higher incomes (Donkor and Duah, 2013). It is worth noting that Athukorala and Sen (2004) have stressed the prominent role played by domestic savings rather than foreign debt in boosting domestic investments, hence enhancing the country's economic growth.

Succeeding to enhance national economic growth through domestic savings requires more than public savings and capital formation. It also needs to considerably increase private savings, particularly household savings to release substantial resources that would steer up economic growth through financing domestic investments. It is in this line that in Rwanda, the macroeconomic framework for the NST1 identifies private saving as an important driver that will boost both domestic investments and GDP growth to reach the desired 9.1percent average growth over the NST1 period. In this regard, the focus is on enhancing private savings, with the target to increase domestic savings from 12.1percent in 2017 to 23.9percent in 2024, for the country to remain on its path of economic transformation. If achieved, these targets will help reduce Rwanda's reliance on Overseas Development Assistance (ODA), which has funded 42percent of public investment in 2018/19.

To raise private savings and household savings, in particular, it is important to investigate the fundamentals that determine household savings. Unfortunately, in Rwanda, like most developing countries, the existing empirical literature related to the latter is lopsided. Most cross-country studies that have been conducted on determinants of savings have focused on aggregate private savings rather than household saving, using macro-econometric models, probably due to the nature of data availability, which is mostly quantitative data on aggregate private saving. Limitations in such macro studies reside in the national account data, where consumption and savings are residual and often not very accurate, collecting the sum of measurement errors in other items. Such studies include among others; Hussein and Thirlwall (1999), Iragena (2013), Gjonnes (2015), and UNDP (2018). These considerations point to the need for an in-depth analysis of household saving behaviour as well as the underlying driving forces of household saving by combining both quantitative and qualitative information to build a sound empirical foundation for informing policymakers.

At the micro-level, limited studies have been conducted so far, analysing the determinants of household savings. Those studies include Kulikov et al. (2007) who studied the micro-econometric analysis of household saving in Estonia. The study found a significant relationship between household saving and income, possession of durable goods like cars, other forms of financial assets, age, and education level. Another study by Abdelkhalek et al. (2010) was conducted on a micro-econometric analysis of household savings determinants in Morocco using a simple regression model and Instrumental Variables. This study found that factors such as income, literacy of household head, the gender of household head, and household size have a significant effect on household saving. Moreover, Laurine et al. (2013) conducted a study on the micro-econometric analysis of determinants of savings behaviour in Zimbabwe, using logit and poison regression model. This study found that individual (or household) savings were influenced by age, education level, religion, position in the household, employment status, income, and account type. It further found that factors such as age, gender, marital status, level of education, household size, type of accommodation, place

1 Rwanda's aspirations are translated as becoming an upper-middle income country (UMIC) by 2035, and a high-income country (HIC) by 2050. (Vision 2050, GoR 2019)

of accommodation, income, account type, the interaction of gender and income, interaction of age and saving, and education income interaction significantly influence the frequency of money deposits in the bank.

So far and to the best of our knowledge, there has been no national analysis of the determinants of savings at a micro/household level in Rwanda. Therefore, the proposed study aims at identifying and examining the contributing forces that drive the Rwandan household's decision to save. This is hence the first study in Rwanda trying to understand the saving behaviour of households. This study, by the use of primary and secondary data, draws a first picture of the potential determinants of saving, which goes beyond the usual findings from budget surveys which are not geared toward studying saving.

In terms of policy relevance, this study is useful to reveal the contributing factors of household savings in Rwanda and the possible policy interventions on incentivizing saving patterns in the country. The rest of the paper proceeds as follows. The next section provides the objective and the scope of the study. Section 3 describes the methods and the data used for the sake of this study. In section 4, we analyse trends and determinants of household savings in Rwanda using national households' survey, while in section 5 we analyse saving characteristics and behaviours using primary data, which we complement by an analysis of the determinants of savings in Annex B. Section 6 concludes and discusses the way forward.

Objectives and scope of the study

The objective of this study is to identify the factors driving households' saving in Rwanda, with the help of both comprehensive secondary data from three successive nationwide representative household surveys and primary data from a small sample, specially designed to collect information on household saving behaviour.

(i) ***Identifying determinants of saving using Secondary data (EICV4-5)***

In examining the driving factors of saving in Rwanda, we first use the household survey data, extracted and pooled from the third, fourth, and fifth Integrated Household Living Conditions Survey of Rwanda (EICV3, EICV4, and EICV5), respectively conducted in 2010/11, 2013/2014 and 2016/2017 by the National Institute of Statistics Rwanda (NISR). The surveys encompass the entire country in all five provinces and 30 districts including both rural and urban households. Since the EICV data represents the national households and contains some questions related to amounts saved in an account or contributed in tontine by household members in a given period, its use provides enough statistical power to identify potential contributing factors of saving among the Rwandan households. However, the limited number of variables regarding the types of saving, (excluding e.g.: the flow of saving in forms of cash) and the saving behaviour (e.g: preferences regarding saving institution, the purpose of saving, etc.) calls for additional information, which is provided through the primary data collection.

To achieve our objective, both demographic and household attributes influencing household saving have been identified and the definitions of all variables that we aim to use in this study are provided in Table 1. Based on findings from empirical literature, the household characteristics considered by this study include consumption, age of household head, household size, the gender of household head, and education level household head, land area (expressed in hectares) owned by household, the value of the stock of assets and livestock, dummies for farm and own activities, health insurance, and education expenditures. Policies such as Girinka (one cow per family) or VUP public works are also studied, among others.[2] The outcome variables include the amount deposited on a saving account and the amount contributed to Tontine over the year.

(ii) ***Identify, Collect and Analyse saving characteristics and behaviours through primary data***

In addition to existing data from NISR, we have collected primary data, both for qualitative and quantitative analysis. The data/variables to be collected were informed by the secondary data analysis of EICVs questions and the need for additional quantitative and qualitative information. We have administered a survey (412 households), which serves as a pilot and complements the existing quantitative data by adding new variables, which were not previously available. We have also collected qualitative data, which enables us to further explore the saving behaviour of households in Rwanda. Qualitative data, collected in the form of key informant interviews and Focus Group Discussion provided further insights on what motivates households to save (what do they save for?), how they save, what are the challenges they encounter when saving and what are the drivers (or determinants) of saving.

2 Girinka program provides One cow to eligible family, in order to boost productivity, income and health and promote reconciliation. VUP provides a minimum number of working days to eligible workers to ensure a minimum income to them. For more on these policies see "Citizen's participation: An analysis of Upward and Downward Information Flow In Decision Making. A case of Girinka and Vision 2020 Umurenge Programs", Institute of Policy Analysis and Research – Rwanda, February 2020.

Methods and Data

Identifying determinants of saving using Secondary data (EICV3-4-5)

The empirical analysis uses data from the third, fourth, and fifth Integrated Household Living Conditions surveys of Rwanda (EICV3, EICV4 and EICV5), respectively, conducted in 2010/11, 2013/14, and 2016/17 by the National Institute of Statistics of Rwanda (NISR). The surveys provide valuable information on household welfare indicators such as education, health, policies, occupation, household expenditure and saving patterns. From the pooled EICV3, EICV4, and EICV5, we have a total of 43,307 households.

To analyze the determinants of household saving, Girma *et al*., 2013; Obayelu, (2012) used a Tobit model; while Amsalu *et al*., 2013 and Lidi *et al*. (2017) used a double hurdle model. In this study, we follow the double hurdle model. We use the Cragg model, which combines both the probit on the decision to save with the Tobit on the amount saved. We prefer this to the simple Tobit model as it is based on the assumption that all variables affecting the decision to save will influence the extent of saving in the same way. In other words, the Tobit model assumes that the dependent variable is only zero in case there is censoring or unobserved observation; thus an individual cannot decide not to save (in an account or Tontine), which contradicts our qualitative findings.

On the other side, the double hurdle model assumes that an individual decides to save in an account or in tontine (or not) and the amount of money to save. In terms of policy, this is of particular interest as the first tier of the model determines the characteristics of households that are (not) saving in account or tontine, hence indicating who should be targeted if one wants to increase the number of savers in account or tontine, and what the focus should be to make these people start saving on account or tontine. The second tier describes the behaviour of households when they are saving, hence indicating who to target and what should be the focus to increase the amount saved per person. For example, the model identifies that women are less likely to save (both in account and in tontine) but once they do, they tend to save more. This implies that sensitization to women should mainly concentrate on the benefits of saving through account and tontine, and the target of such intervention is to make the first saving deposit. On the contrary, men tend to save on account or contribute to tontine, but when they do so they save a lower amount. Sensitization to men should focus on increasing the share of income they save and the target of such intervention is to increase the amount they deposit in their saving account.[3]

In a nutshell, the Cragg model allows us to consider a two-step estimation procedure. First, if "yes" or "no" the person decides to save (deposit saving) in an account or a Tontine; what are the determinants of saving in account or tontine (vs not saving), and second consider the amount of saving by household contingent on the decision to save. This study hence uses the Cragg model to determine the respective directions and magnitudes between savings and tontine and their respective determinants.

Formally, the Cragg model is a two-step estimate procedure (Cragg, John G. 1971), which combines

1. Probit model for the discrete decision of whether or not the dependent variable (savings) is zero or positive.

$$Prob(z = 1|X) = \Phi(X'\alpha) \quad (1)$$

Where z is the output variable which takes the value one when the dependent variable (y) is strictly positive and 0 otherwise; X is the vector of independent variables, α represents the coefficient of the X and is the cumulative distribution function of the standard normal distribution. We run the model for both the decision to save in an account and to participate in tontine. The first step is followed by:

2. The Tobit truncated regression model for the continuous decision (for the amount saved y|y>0)

$$E(y|y > 0) = X'\beta + \delta\lambda(X'\beta)$$

Where y is the output variable for the truncated sample of strictly positive values of y (i.e: amount deposited into saving account or contributes to tontine), X the vector of independent variables, represents the coefficient of the X. We run the model for both the amount deposited in an account and amount contributed to tontine (both in logs). More details about the Cragg model are provided in Annex A.

3 Note that the Cragg model enables to remove the sample selection bias resulting fro the non-random selection of savers. Its classic application is the estimation of female wage. If reservation wages for non-working females are higher than for working ones, e.g. because they are married or have to look after kids, restricting the sample to females that are working results in a sample selection bias.

Identify, Collect and Analyse saving characteristics and behaviours through primary data

In addition to secondary data from EICVs, the study also used primary data for empirical analysis. The data used were obtained through a survey administered to 412 respondents from three districts selected purposively to have one Urban district and two rural districts, namely; Gasabo, Gicumbi, and Ruhango.[4] The survey provides valuable information about household welfare indicators such as household income, savings and loan, and household saving behaviours and preferences, information not contained in the existing data from NISR. The main purpose of these primary data collected is to complement the existing data to explore the motivations of households saving in Rwanda.

Here, we provide the non-parametric distributions of the household flow of savings during the last year, consumption and annual income levels among household with and without saving account in Rwanda and we further describe the general statistics of variables collected. We also explain the determinants of saving using parametric estimates. However, these results must be taken with caution and not generalized, as our sample is not representative of the Rwandan population.

Finally, we provide a qualitative analysis, which complements the quantitative analysis. The qualitative data is processed using thematic analysis, the themes being related to the quantitative analysis.

4 In each District, a minimum of 13 villages were randomly selected and in each village a minimum of 10 households were randomly selected.

Determinants of household savings in Rwanda

4.1. Descriptive statistics

Table 1 provides the definitions of all variables considered under this study (more information is provided in the second column of *Table 1*), which uses the national household surveys (EICV3, 4, and 5).

Notes: Monetary variables are expressed in Frws: Rwandan Francs. Noting that the average exchange rate in 2014 was: 1 $=689.66 Frws;

First, we provide mean statistics of the variables – both explained and explanatory- for three categories:

(i) The whole population,
(ii) The population of households who have deposited on a saving account over the last 12 months before at least one of the three surveys. More precisely, this category contains households who reported having deposited a positive amount on their savings account in either a commercial bank, microfinance institution, cooperative bank and/or savings and credit cooperative.
(iii)
(iv) The population of household who has contributed to tontine over the last 12 months before at least one of the three surveys.

It is worth noting that categories (ii) and (iii) are sub-categories of the overall population. In addition (ii) and (iii) are not mutually exclusive as a household depositing on an account and contributing to tontine appear in categories (ii) and (iii). It is worth noting that overall 29% of households do not save in account or in tontine, 31% save exclusively in tontine, 16% exclusively in account and 24% use both.

While the analysis of the secondary data covers the whole population of Rwanda over a period of 6 years, some limitations of the study must be noted. First, savings and/or a saving account is not defined and hence, it may well include current account deposit. Second, the study considers saving in account or in tontine, which means that other forms of saving, such as cash holdings, are left out. Third, the data allows to study the amount deposited over a period and not withdrawal, meaning the studies is looking at the flow of positive saving over the period and not net saving. Fourth, income is omited from the list of explanatory variables given the difficuly to compute it and we call for a specific study to determine a proper measure of income.[5] Expenditure is hence preferred to any measure of income. However, expenditure is expressed in form of equivalized expenditure following NISR definition. Comparing saving levels to this measure of expenditure or trends of ratios of savings to expenditure would be misleading as the first one is equivalized consumption at constant prices, while saving amount are actual aggregate amount at current prices.

All the variables in monetary terms are expressed in local currency (Rwandan francs).[6] As compared to the overall population, households saving on an account are, on average more, likely to be educated, to live in urban areas, and with a male as the head of household. The household is larger but with a lower share of dependents. The share of household members working off farm is higher, and the household head is more likely to work off-farm, for a salary or running its own business. Households saving on an account are also more likely to benefit from VUP and be covered by health insurance. The total value of their asset is on average lower, but the value of their livestock is higher. They also own more land, on average. They consume much more and also spend more on health and education.

On average households contributing to tontine are less likely to be educated, more likely to live in rural areas with a male as the head of household. On average, the household is larger but with a similar share of dependents. The share of household members working off-farm is similar to the whole population, and the household head is as likely to work off-farm or on-farm. Households contributing to tontine are also more likely to benefit from girinka and VUP and be covered by health insurance. The total value of their asset is on average lower, but the value of their livestock is higher. They also own more land, on average. They consume on average less and also spend less on health and education.

5 The primary data in Section 5 proposes a measure of self-reported monthly income.
6 Standard deviation is provided below statistics.

Table 1: Descriptive Statistics of household attributes (by category)

Variable	Variable description	Population	Savers on account	Tontine contributors
	Savings			
Amount deposited on account	Hh savings amount desposited in past 12 months	557,787 9220269	1,395,046 14541703	408,119 3078046
Amount contributed to Tontine	Hh tontine contribution in past 12 months	52,916 312692	95,245 481093	96,374 417004
	Household characteristics			
Age (hh head)	Age of hh head	44.78 15.77	44.48 15	44.46 14.61
No education (hh head)	Hh head has no education (1) otherwise 0.	0.67 0.47	0.5 0.5	0.65 0.48
Urban	Hh leaves in urban area	0.17 0.38	0.26 0.44	0.13 0.33
Female (hh_head)	Hh head is a female	0.26 0.44	0.21 0.41	0.22 0.42
Size of hh	Number of members in the household	4.57 2.15	4.94 2.28	4.88 2.07
Share of dependent	Ratio of dependents members to hh size	0.46 0.25	0.43 0.24	0.46 0.24
Disability in hh	Share of person with disability in hh	0.14 0.35	0.14 0.34	0.13 0.34
	Occupation			
Share of_off_farm workers	Share of hh members working off farm	0.28 0.27	0.34 0.28	0.28 0.25
Farm salary	Hh head receives salary from agricultural sector (dummy yes=1; no=0)	0.35 0.48	0.2 0.4	0.35 0.48
Off farm salary	Hh head receives a salary from nonagricultural sector (dummy yes=1; no=0)	0.38 0.48	0.45 0.5	0.37 0.48
Off farm business owner	Hh head owns a business in non-agricultural sector (dummy yes=1; no=0)	0.23 0.42	0.28 0.45	0.27 0.44
Farm business owner	Hh head owns a farm (dummy yes=1; no=0)	0.78 0.42	0.69 0.46	0.83 0.38

Variable	Variable description	Population	Savers on account	Tontine contributors
	Government policies			
Received a cow	Hh received a cow from gov.	0.06	0.06	0.07
		0.23	0.24	0.26
Participated in VUP	Hh member received gov support through VUP	0.08	0.12	0.09
		0.27	0.33	0.28
Has health insurance	Hh member has health insurance	0.78	0.88	0.81
		0.41	0.33	0.39
Wealth				
Assets	Total hh assets	427,078	366,749	131,056
		23685387	3109635	1914405
Livestock value	Total hh livestock value	60,903	80,857	76,008
		108006	124806	116813
Land area	Total land area owned by hh in ares	51.9	64.76	60.12
		173.67	231.56	183.69
Expenditure				
Consumption	Hh Aggregate yearly consumption/ ae in Jan14 Prices	314,324	465,551	290,731
		480165	680827	385275
Health expenditure	Hh health expenditures past 12 months	1,367	2,400	1,072
		48903	76824	10818
Education expenditure	Hh education expenditures past 12 months	63,282	129,755	56,001
		269328	404199	212605
Observations		43,307	17,192	23,812
Share of population (hh)		100%	40%	55%

4.2. Trend analysis

Before explaining the determinants of saving in Rwanda using parametric estimates, we first provide the non-parametric distributions of household annual savings, tontine contribution, and consumption. In *Figure 1*, we plot the distribution of household savings and tontine contribution over the last twelve months. The figure indicates that about 45% of Rwandan households do not contribute to tontine and that 60% of Rwandans do not save in formal institutions (in an account). Once Rwandans start to save, the minimum amount they save in saving institutions can be very small (1920 Rwf for the percentile 1% of savers) but increases rapidly to be over 50,000Rwf annually for 3 out of 4 of them and to 156,000 for the median saver. It is worth noting that 1 out of 4 saver saves more than 620,000 Frw per year and one out of 10 more than 2,3millions. From *Figure 1*, it is noteworthy to mention that while more households use tontine, they contribute lower amounts in tontine than they deposit in saving accounts. Overall, the annual deposit in the saving account in 2016/17 was more than ten times the total contribution to the tontine.

Figure 1: Distribution of annual household savings and Tontine contribution in Rwanda

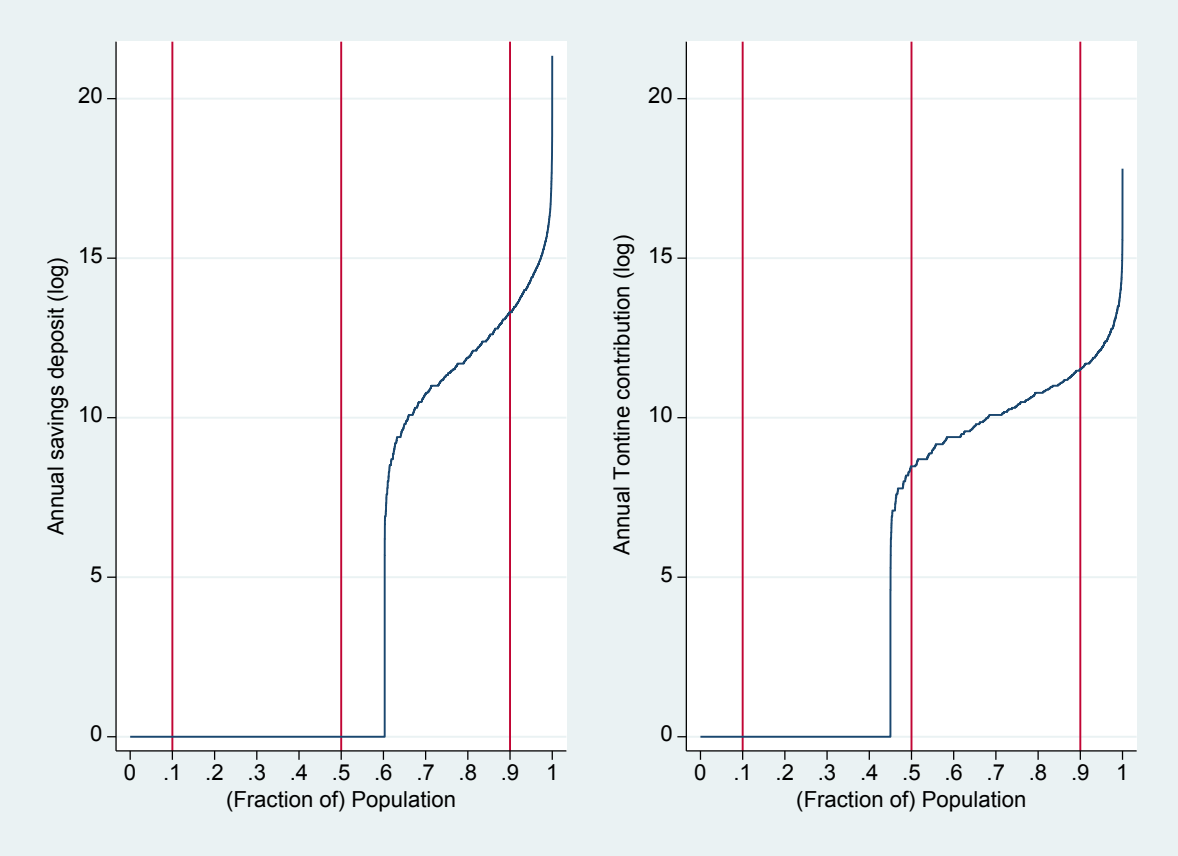
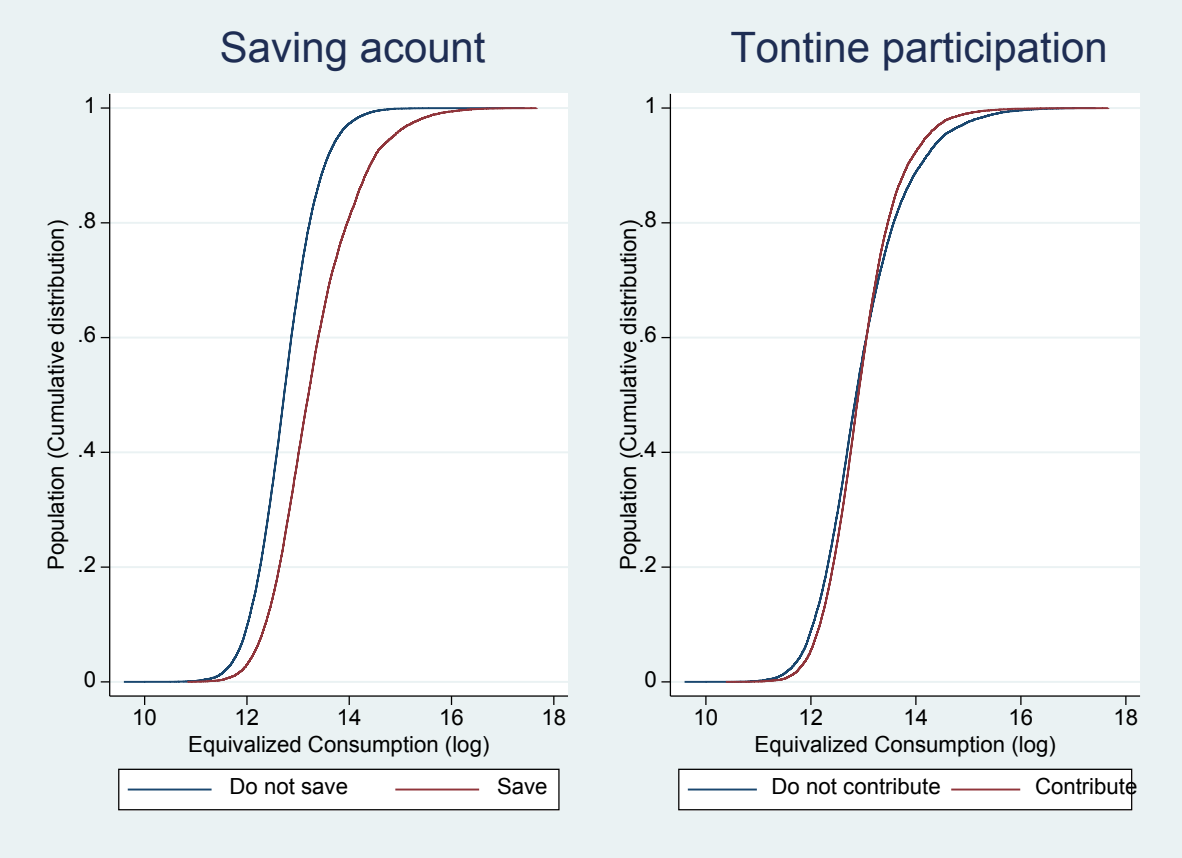


Figure 2 exhibits the distribution of cumulative density function (CDF) for household consumption per adult equivalent between (i) the households depositing savings on their account (vs no saving) and (ii) households contributing to tontine. In the first case, we found that households depositing saving on their account are likely to have higher consumption than households not saving on the account. Running the analysis on a subset of observations for income shows similar results. However, we do not find a clear association for households participating in a tontine.

Figure 2: Cumulative Distribution of equivalized consumption per capita



4.3. Factor analysis of household saving

We now derive the determinants of household savings in Rwanda using equations (1) and (2). The main outcomes in examining the determinants of saving in Rwanda are (i) whether the household has deposited in a saving account or not over 12 months before each of the three surveys and (ii) the amount deposited over the last twelve months before the survey; and (iii) whether the household contributed to a Tontine or not for 12 months before each of the three surveys and (iv) the amount contributed to tontine over the last twelve months before the surveys. Table 2, 3 (3a & 3b) and 4 (4a & 4b) contain factors that affect these outcomes.

In Table 2 the first column describes the variables, the consecutive columns provide the effect of the variables. The second column shows how variables affect the decision to save (or not) in an account which is proxied by whether a household has deposited (or not) on a saving account over the last twelve months (yes=1; no=0).[7] The third column describes the effect of each variable on the

7 The regression coefficients on the decision to save in a saving account (resp. tontine) should be interpreted as follows. For level and dummy variables (Household characteristics, occupation, government policies), an increase by one unit would increase the probability to save in an

amount deposited on the saving account (log) over the last twelve months. The fourth column describes how variables affect the decision to save (or not) through tontine (yes=1; no=0) which is proxied by whether a household has contributed (or not) to tontine over the last twelve months (yes=1; no=0). The fifth column describes the effect of each variable on the amount contributed to the tontine (log).[8]

We include year and district fixed effects to absorb common survey year and district specificities. While Table 2 provides general results, Tables 3 and 4 specifically look at differences in outcomes regarding female vs male-headed households and urban vs rural households, respectively. We interpret five categories of variables: household characteristics, occupation, policies, wealth, and type of expenditure. In this respect, the coefficients reflect (i) the impact of a dummy characteristic (urban household) or the semi elasticities of values (e.g: consumption) on the probability to save in an account or participate to tontine (Step 1) and (ii) the semi-elasticity of a characteristic (urban household) or the elasticity of the values (e.g: consumption) toward the amount saved in an account or tontine (Step 2).

Household characteristics

The findings from Table 2 indicate that the age of the household head has a positive effect on the decision to participate in tontine (Column 4), and the age effect is much more pronounced for women-headed households than for men headed households(Table 3b). In addition, the older the household head, the lower the amount contributed to tontine (Table 2 – Column 5), which is also more pronounced for female-headed households, though not significant (Table 3b – Column 3). Urban households are the only group for which the decision to save into an account and the amount deposited therein is significantly associated with age. The older the household head, the more likely they are to save in an account (Table 4a – Column 2), and the higher the amount deposited therein (Table 4a – Column 3). The negative effect on age square indicates that as the household head gets older, the household continues to use and deposit saving, but to a lesser extent (Table 4a – Columns 3 & 4). In a nutshell, households with older heads are associated with a higher probability to save in account or tontine, except for the case of rural households using the account.

The urban location of the household has a significant positive effect on the decision to save in an account and the amount deposited on the saving account increases by 10 percent when a household is located in an urban area.[9] However, the result is negative but not significant on the decision to save in an account for female-headed households. This implies that the decision to save in an account is mainly associated with male-headed households living in urban areas. On the other hand, the association between tontine and urbanity is negative for the decision to participate in a tontine but positive for the amount contributed to tontine (+24%), indicating that urban households tend to use less tontine, but once they do, they contribute a larger amount.

Female-headed household is associated with lower participation both in account and in a tontine. Looking at the amount deposited in an account in rural areas, female-headed households tend to deposit a larger amount on the saving account (+17%), while it is the opposite in urban areas (Table 4a). Analysing the amount contributed to tontine, female-headed households tend to contribute a lower amount, with a more pronounced effect in rural areas (-12%). This implies that female-headed households tend to use less account and tontine, and when they do use it, they save lower amounts, except for the ones saving in account and located in rural areas, who tend to save a larger amount.

account (in a tontine) by the value of the coefficient. For log variables (Wealth and expenditure), an increase by one percent would increase the probability to save in an account (in a tontine) by β/100 units, where β is the coefficient.

The regression coefficients on the amount saved in a saving account (resp. tontine) should be interpreted as follows. We note that since the dependent variable is expressed in log, for level and dummy independent variables (Household characteristics, occupation, government policies), an increase by one unit would increase the amount saved in an account (resp. in a tontine) by percent. For log variables (Wealth and expenditure), an increase by one percent would increase the amount saved in an account by β percent (resp. in a tontine), where β is the coefficient

8 Tables 3a describes the effects of variables on (i) depositing (or not) on an account for female headed households (Column 2) and (ii) the amount deposited on the saving account for female headed households (column 3) (iii) depositing (or not) on an account for male headed households (Column 4) and (iv) the amount deposited on the saving account for male headed households (column 5). Table 3b provides de same information for Tontine.

Tables 4a describes the effects of variables on (i) depositing (or not) on an account for urban households (Column 2) and (ii) the amount deposited on the saving account for urban households (column 3) (iii) depositing (or not) on an account for rural households (Column 4) and (iv) the amount deposited on the saving account for rural households (column 5). Table 4b provides de same information for Tontine.

9 For the sake of clarity, references to the Tables are not mentioned in the text. However, general results refer t Table2. Gender specific results refer to Table 3a (for saving in account) and Table 3b (for tontine). Rural/urban specific results refer to Table 4a (for saving in account) and Table 4b (for tontine). Columns heading in each table are slef explanatory.

Table 2: Determinant of household saving in Rwanda

(1) VARIABLES	(2) Save on account (Yes/No)	(3) Amount deposited on account (log)	(4) Participate in tontine (Yes/No)	(5) Amount contributed to Tontine (log)
Household characteristics				
Age (hh head)	-0.000	0.001	0.017***	-0.006*
	(0.003)	(0.005)	(0.003)	(0.003)
Age square (hh head)	0.000	-0.000	-0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
No education (hh head)	-0.351***	-0.272***	-0.017	-0.073***
	(0.016)	(0.024)	(0.016)	(0.018)
Urban	0.085***	0.095***	-0.233***	0.216***
	(0.026)	(0.037)	(0.024)	(0.030)
Female (hh_head)	-0.037*	0.072**	-0.095***	-0.119***
	(0.019)	(0.030)	(0.017)	(0.021)
Size of hh	0.090***	0.176***	0.031***	0.117***
	(0.005)	(0.007)	(0.005)	(0.006)
Share of dependent	-0.035	0.166***	0.072**	-0.133***
	(0.037)	(0.057)	(0.034)	(0.042)
Disability in hh	0.013	-0.084***	-0.051***	-0.048**
	(0.020)	(0.031)	(0.019)	(0.023)
Occupation				
Share of_off_farm workers	0.297***	0.380***	0.321***	0.472***
	(0.039)	(0.060)	(0.036)	(0.045)
Farm salary	-0.154***	-0.287***	-0.012	-0.186***
	(0.017)	(0.030)	(0.016)	(0.019)
Off farm salary	0.124***	0.048*	-0.037**	-0.088***
	(0.019)	(0.028)	(0.018)	(0.020)
Off farm business owner	-0.007	-0.039	0.157***	0.177***
	(0.019)	(0.028)	(0.018)	(0.020)
Farm business owner	-0.115***	-0.273***	0.125***	-0.111***
	(0.023)	(0.033)	(0.021)	(0.026)
Government policies				
Received a cow	0.109***	-0.086*	0.015	-0.069**
	(0.030)	(0.044)	(0.029)	(0.031)
Participated in VUP		0.227***	0.072***	0.007
		(0.036)	(0.025)	(0.028)
Has health insurance	0.350***	0.249***	0.079***	0.030
	(0.019)	(0.033)	(0.016)	(0.020)

(1)	(2)	(3)	(4)	(5)
VARIABLES	Save on account (Yes/No)	Amount deposited on account (log)	Participate in tontine (Yes/No)	Amount contributed to Tontine (log)
Wealth				
Initial level of saving (log)	-0.088***	-0.095***	0.013***	-0.000
	(0.003)	(0.004)	(0.003)	(0.003)
Assets (log)	0.049***	0.046***	0.029***	0.037***
	(0.002)	(0.004)	(0.002)	(0.003)
Livestock value (log)	0.011***	-0.007***	0.025***	0.004**
	(0.002)	(0.002)	(0.001)	(0.002)
Land area (log acre)	0.041***	0.001	0.075***	0.036***
	(0.006)	(0.009)	(0.006)	(0.007)
Expenditure				
Consumption (log)	0.598***	1.147***	-0.001	0.618***
	(0.014)	(0.019)	(0.012)	(0.015)
Education expenditure (log)	0.025***	0.022***	0.009***	0.010***
	(0.002)	(0.003)	(0.002)	(0.002)
Health expenditure (log)	0.002	0.009***	0.016***	-0.004*
	(0.002)	(0.003)	(0.002)	(0.002)
Constant	-8.422***	-30.701***	-2.261***	-7.499***
	(0.213)	(0.646)	(0.173)	(0.644)
Observations	43,307	17,192	43,307	23,812

The education of the household head has a consistent effect on using a saving account as well as on participating in a tontine. No educational attainment reduces by 0.35 points the probability of using a saving account and it reduces by 24% the amount deposited thereon. The results are of similar magnitude for male and female-headed households as well as when we differentiate by urban and rural location. Looking at the effects of education on tontine, the results are of a similar direction but of lower magnitude. The probability of participating in tontine drops by 0.02 points when the household head has no education (the result does not significantly differ from 0) and the amount contributed to the tontine drops by 7 percent. Here the results are stronger for female-headed households who see the amount of the contribution decreasing by 14 percent when they have no education (vs 6 percent for male-headed households). The effect is also stronger in rural areas as compared to urban areas. This implies that education is an important determinant for boosting savings in all its forms and more especially for female-headed households and in rural areas.

The size of the household has a consistently positive effect and the effect is statistically robust for both the decision to deposit on a saving account and to participate in a tontine as well as for the amount of money deposited in both the saving account and tontine. Findings from Table 2, columns 2 and 4, indicate that a unit increase in household size increases the household's probability of depositing money on the saving account and participating in tontine by 0.09 and 0.03 points, respectively. Further, findings from Table 2, columns 3 and 5, show that a unit increase in the average household size increases the deposit of money in a saving account and tontine by 19 and 12 percent, respectively. The findings also reveal the significant positive effect of household size in both urban and rural households, and both female-headed and male-headed households (Table 3 and 4). This result has to be complemented by the analysis of the share ofa dependent. Surprisingly, the share of dependents in rural areas and male-headed households is positively associated with the amount deposited in an account. Similarly the share of dependents is positively associated with the participation to tontine in urban areas and for male-headed households. Those ambiguous results contradict Abdelkhalek *et al*. (2010) who found that an additional member in the household significantly reduces household savings. Our results are more balanced and indicate that household size is a factor affecting positively savings when the additional member is not a dependent. Also, the share of disabled member(s) among the household reduces the decision and the propensity to save, both through saving in account or tontine.

Occupation

Our analysis of occupation distinguishes farm and off-farm activities as well as working in its own business or for a salary. Results from Table 2 show that the share of off-farm workers within the households has a consistent and strong positive effect on the different forms of saving and the amount deposited, both if we consider tontine or saving account.

Further, the type of employment influences household savings. In general, households running a non-farm business have a higher probability of participation to tontine (+0.16 point) and they contribute a larger amount (+19%). The effect is particularly strong in urban areas. On the contrary, we find a negative effect of running its own business on the decision to save and amount deposited on a saving account, although the results are not significant. The latter result is in line with Kulikov *et al*. (2007) who found that the receipt of entrepreneurial income has a large negative relationship with household saving rate. Findings imply that off-farm entrepreneurs show a preference for tontine vs saving in an account.

Moreover, running a farm business is negatively associated with using an account but positively associated with participation in tontine. However, once they save using an account or tontine, the amount contributed is negatively associated with running a farm business. This means that by having its farms a household tends to rely more on tontine but is likely to save a lower amount, and this effect is more pronounced in rural areas.

Working for a salary has opposite effects on saving if we compare off-farm versus farm salary jobs. Working off-farm for a salary has a positive effect on the probability of using a saving account (+0.12 point) and on the amount deposited thereon (+5 percent). Looking at farm salary jobs, findings show the opposite direction, that is, a lower probability to use a saving account (-0.15 point) and a lower amount deposited thereon (-25%). The effect of working for a salary (both off-farm and on-farm) is negatively associated with participating in tontine (though not significant for farm salary) and on the amount contributed to tontine, where the effect is more pronounced for farm salary workers.

Government policies

We now move to the analysis of government policies, and more especially to the effects of the following programs on savings in account and tontine: The one cow per family program (Girinka) and its similar initiatives, which is expected to provide additional income, improve nutrition, improve yields productivity and promote reconciliation by

providing one cow to the poor eligible households; the Vision 2020 Umurenge Program (VUP), which provides, among others, a minimum number of days of public works for eligible households to lift them out of poverty; and the "Mutuelle de santé" program and the other types of health insurance, which aim at mitigating the health-related risk on households poverty.

Receiving a cow from the government has a positive effect on the probability to use a saving account and participate in tontine (the effect on tontine is not significant). The effect on the decision to save in account is significant for rural households (+0.11 point), while the effect on tontine participation is significant for urban households (+0.24 point). These results may be driven by the fact that rural households are already participating in tontine in rural areas before they receive their cow. Looking at the effect on the amount saved in the account or tontine, we observe a negative association between receiving a cow and the amount saved. This negative association is observed in all sub-groups, although not significant in each of them. The results could have different explanation such as a diversification of the types of saving, an increase in expenditure, or a negative income effect, among other. The main causes of this relation between receiving a cow and depositing a lower amount in saving account and tontine have to be further explored and are beyond the scope of this study.

Receiving VUP support has positive effects on saving. The effect on saving in an account is biased as the VUP payment is done through a SACCO account. We hence focus on participation to tontine and the amount contributed thereon. Being part of the VUP program increases the probability to participate in a tontine by 0.07 points. The effect is significant for male-headed households and is more pronounced in urban areas (+0.28 point) versus rural areas (0.06 point). This points to a positive effect of VUP on saving.

Finally, having health insurance has a positive and consistent effect on both saving in an account and participating in tontine as well as on the amount deposited or contributed thereon. Looking at saving accounts, being insured against health issues increases the probability to use an account by 0.35 point and the amount deposited on the account increase by 28 percent. The effect is consistent across all sub-groups of male and female-headed households as well as for rural and urban households. The effect on tontine goes in the same direction but is of lower magnitude with a 0.08 point higher probability to participate in a tontine and a significant 4 percent increase in the amount contributed to the tontine for rural households.

Wealth

We now analyse how different sources of wealth affect the propensity to save. We look at different indicators including land area owned, livestock value, assets, and the initial level of saving. All these indicators are variables of stock and hence capture part of the overall household wealth at the time of the survey.

We first look at how the initial level of saving is associated with the decision to save (again) and the amount deposited on the account. Findings show a negative association, meaning that the more you have on your saving account the less likely you are to deposit more money on this account. Looking at the effect on Tontine, the results show that a higher initial saving amount on the account increases the probability of Tontine participation but has a neutral effect on the amount contributed. The results show that households having a higher initial level of saving are less likely to continue saving in account but would rather diversify saving with tontine.

Not surprisingly, most of the indicators of wealth have a positive and consistent effect on both the probability to save either through an account or tontine and on the amount deposited on the account or contributed to tontine. The exception is the effect of the livestock value on the amount saved in an account, which is negative. Findings show that doubling assets is associated with an increase of 5 percent of the amount of savings deposited in the account and 4 percent of the contributed amount to tontine. Doubling land areas would lead to a non-significant increase in the amount deposited on the saving account and to a 4% increase in a tontine.

Expenditure

We now analyse how expenditure is associated with savings. We first look at equivalized consumption and then move to the link between education expenditure, health expenditure, and savings. Overall consumption has a positive impact on the probability to save in account, but not in a tontine, and on the amount saved in both accounts or tontine. The effect is particularly strong for the amount deposit on the saving account whereby a 1 percent increase in consumption would lead to a 1.15 percent increase in the amount saved, meaning that the relative propensity to save (as a share of expenditure) increases with expenditure. If we derive income as the sum of saving and consumption, this suggests that an increase

in household income would also increase household saving ratios. This confirms Athukorala and Sen (2004) who found that in India household' saving rate increases with both the level and rate growth of disposable income. Specifically, their study found that absolute income levels have a large effect on saving rates, where, 40 percent of households with pre-tax income more than one standard deviation below the mean have no net saving category compared to 40 percent of households who are one standard deviation above the mean. As household income increases, the household will be able to cover all its expenditures and remain with the money for saving.

Finally, education expenditure is positively associated with the amount deposited on the saving account and the amount contributed to tontine. Doubling education expenditure is associated with a 2 percent increase in the amount deposited on the saving account, and this association is observed across sub-groups. Similarly, education expenditure is also positively associated with the amount contributed to tontine. These results tend to show that households save for their children's education, as described in the qualitative part of the study presented below. The effect on the amount contributed is also positive (+3%) and consistent across subgroups, except for urban households where it is positive but not significant. We also observe a positive association between the amount spent on health and the level of savings. This implies that households showing a saving behaviour tend to have higher income, consume more, and have higher levels of education and health expenditure.

In addition to secondary data from EICVs, the study also used primary data for empirical analysis. The data used was obtained through a survey administered to 412 respondents from three districts, namely; Gasabo, Gicumbi, and Ruhango. The survey provides valuable information about household welfare indicators such as household income, savings, and loan over the last year, as well as the purpose of saving, the form of saving, the institution in which households save, and why they save in this institution as well as the type, source, and purpose of loans. The primary data collected hence complement the existing data and allows to provide additional insight on the households saving behaviours and characteristics in Rwanda. A parametric analysis is also provided in Annex B.

Saving behaviours and characteristics

5.1. Sample characteristics

Our sample is mainly made of households from Ubudehe Category 2 (41%) and Ubudehe Category 3 (46%). The Ubudehe category 1 constitutes 12 percent of the sample and the Ubudehe category 4 is negligible (0.24%). Farming is the main source of income for 64% of respondents, followed by off-farming salaries/wages at 18% and off-farming business at 8%. In our sample, 73 percent of respondents are saving part of their income and 26% of them had a household member with a loan. Note that the sample is not representative and the results should not be generalized beyond the surveyed respondents.

5.2. Saving behaviours

Savings

Qualitative data suggests that there is a change in mentality about saving. Many households now save and the saving culture is improving. The following was reported by a key informant during an interview:

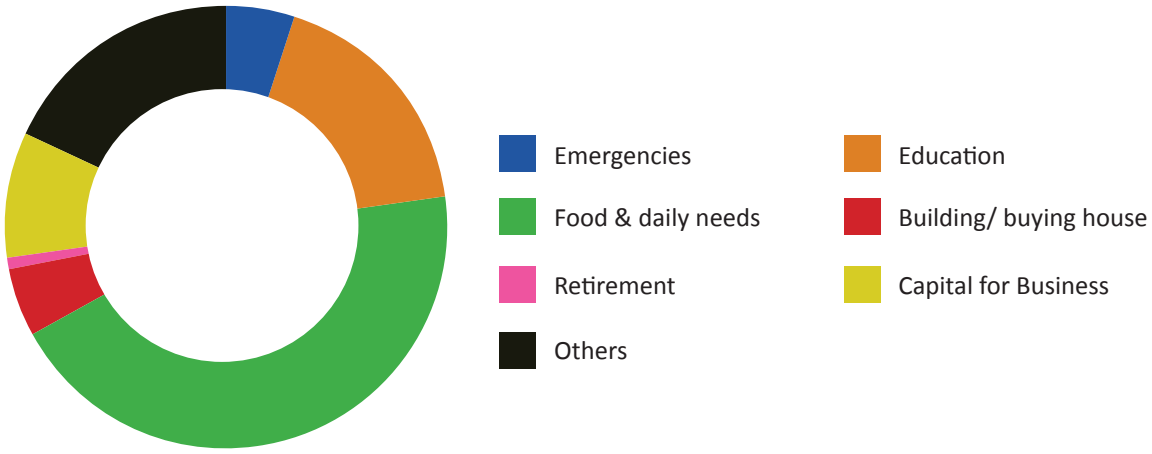
> *"Compared to the last 3years, there is a significant change and improvement because previously the villagers used to keep the money in their homes; some would bring it here with rat bites on it, but now they bring it to the SACCO or even the bank as well." (KI, Ruhango)*

In terms of saving frequency, among the 73percent of households saving, 10 percent save part of their income annually, 12 percent save per harvest season, 37 percent save monthly and 34 percent save weekly. The larger proportion of households saving part of their income weekly and monthly reflects the impact of tontine mobilization across the country, particularly in rural areas. Interviews revealed that saving depends on the expenditure cycle:

> *"The savings depend on the payment period of health insurance (Mutuelle de Santé). From March to June, most of the people pay the health insurance for the next year, hence during that period savings drop. After June they save for health insurance for the other year. " (SACCO accountant)*

Regarding households' reasons for saving, *Figure 3* reveals that 44% of respondents save to sustain food and other daily needs in case of emergencies, 18 percent save for the education of their children, and 9% save to increase the capital of their business. Similarly, the qualitative findings indicate that most of the households save for health insurance (Mutuelle de Santé) which is a part of their daily needs. This is mostly the case for those who save in both microfinance (for example SACCOs) and/or tontine (Amashyirahamwe, imitamenwa, care, etc.). Other main reported reasons for saving during FGDs include education, where households save to pay for school meals and materials for their kids. Besides, they also reported having saved to buy land, build a house, buy livestock and increase the capital of the small business.

Figure 3: Reason for saving



The study also discusses the reasons for not saving. Among the 27 percent of respondents who are not saving, 57 percent of them argued they do not save because they do not have enough money for both subsistence and saving. Another reason for not saving includes the lack of knowledge about saving. The qualitative findings support the above results. The large proportion of households that do not save (because they do not have extra money from subsistence) indicates that rural areas still account for a large number of poor who barely cover their daily expenditures, or produce what they consume. More specifically, interviewees (FGDs And KIIs) indicated that poverty, mindset, and lack of saving knowledge are the main reasons for not saving, while the main reported causes of poverty include unemployment, crop diseases, bad weather for agriculture, and large family among others. Mind-set was mentioned some times during interviews. The following illustrates how it can be a hurdle to saving:

> *"People do not save due to two causes: unemployment and mindset. There is a need to have an income to save. Due to a poor mindset; some people get money but they do not think about saving. Such people are following the old Rwandan proverb "amavuta y'umugabo ni amuraye ku mubiri" or "ibyejo bibara abejo" which means "you have to spend all your income" or you "should not think about the future, as it is not certain". (FGD participant, Gasabo)*

Another important factor reported relates to the lack of family planning, which increases poverty and decreases household savings especially in rural areas. A key informant described the issue:

> *"In general, the family planning is quite good and people understand well the family planning; because they know that life is not easy due to scarcity of land. But some people do not understand the importance of family planning due to their mindset; they are having many children and think that government will raise their children." (KII, Gicumbi)*

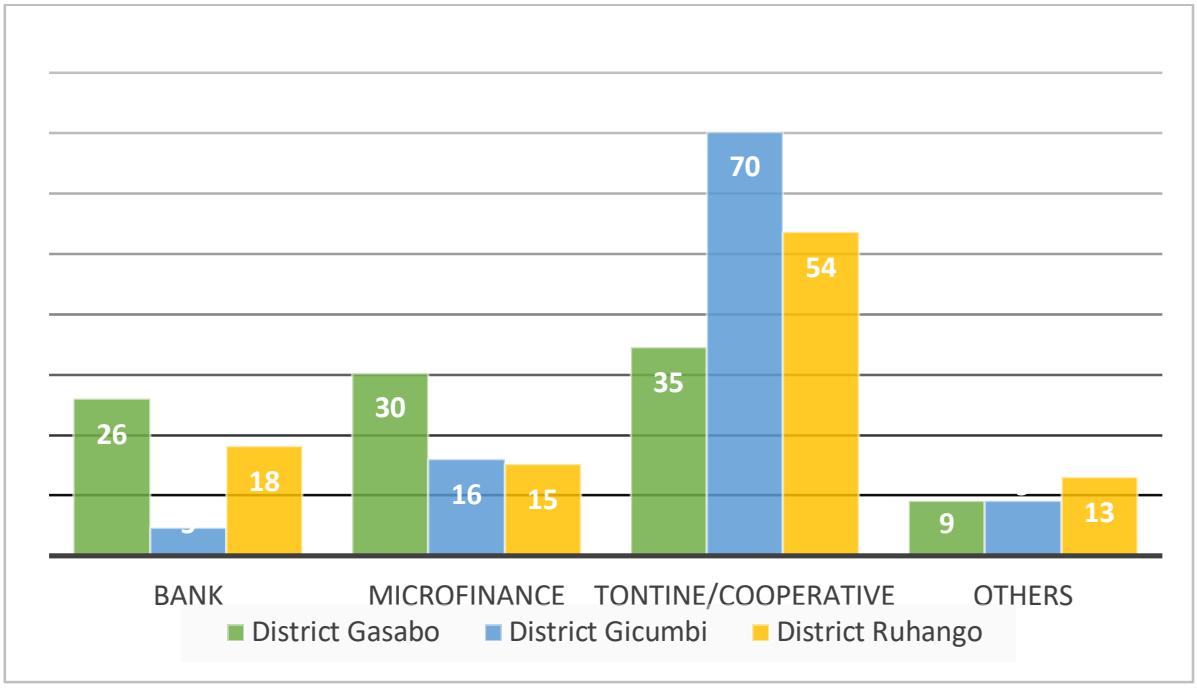
Furthermore, information about the different forms of savings is provided. *Figure 4* presents the forms of savings used by households across surveyed districts. Tontine or cooperative saving groups are the most commonly used form of saving in Gicumbi and Ruhango districts, where respectively 70 percent and 54 percent of households saving opt for this form. In Kigali, the picture is different, with more than 50 percent of households saving in banks and microfinance institutions. This indicates that households in urban areas are more likely to save formally whereas rural households are more likely to save informally. The preference for tontine and/or cooperatives in rural areas may be attributed to the structure and easy access to tontines, which makes it far easier for low-income earners to save in, as compared to banks and microfinance institutions.

Qualitative findings reinforce the argument. Precisely, low-income earners in rural areas are farmers and casual labours who save little money, for example, RWF100 or 200 on a weekly or biweekly basis. They save to pay for health insurance, to buy livestock, and to consume during festival days. They use tontine/cooperative, which are closer to them. Most of them do not save in banks, because bank offices are confined in few areas (For example in Gicumbi) and they have to travel a long distance to reach the nearest microfinance/bank office. The qualitative interviews further show that banks do not work with people who only have little money to save nor banks invest in high-risk economic activities. As such, banks do not finance economic activities such as buying livestock. The different role of tontine and bank was well captured during a KII:

> *"People save in tontine because they do not have enough money to save in the bank. It is based on the capacity of people because banks do not help starters. Banks help people who have some money to start a business or a project. […] It is very risky to give a loan on acquiring livestock because animals may get stolen."*

Conversely, in the urban sector (Gasabo) many people doing business and casual work save in banks/microfinance, which is close to them and enable them to secure loans. Some combine it with tontine but not to a large extent. Few people still keep money in their houses. Savings are used to buy assets such as land and livestock.

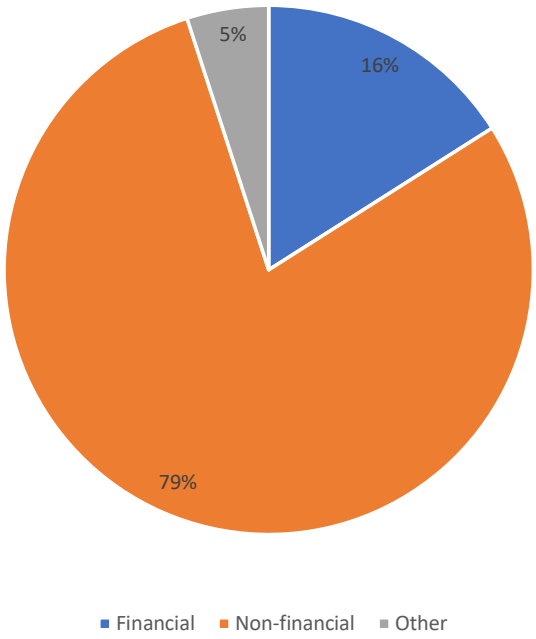
Figure 4: Forms of saving



Concerning the type of account owned by households, 59 percent of households have a current account while only 8 percent have a saving account. This is an indication that formal saving is still very low among Rwandan households. Likewise, the large proportion of current account ownership among households may be explained by the limited understanding of the difference between a current and a saving account.

The study also captures the reasons for choosing a specific form of saving. Several reasons were mentioned by respondents, which were grouped into financial and non-financial reasons. Financial reasons include the cost related to saving like the bank administrative cost, the interest rate on saving/loan. The non-financial reasons include the easy access to the service, the proximity of the service, the reputation and trust, and the provision of collateral. *Figure 5* shows that in 79% of the cases, the form of saving is chosen mainly for non-financial reasons. The most important criteria for selecting the form of saving are access and trust. It is worth noting that the interest rate on saving is the main criteria guiding the form of saving for only 2% of the sample respondents. Similarly, qualitative interviews revealed that people join tontine because of a set of strengths: They are closer to them, they are trustful, it is easy to get a loan and no collateral is required, the interest rate for a loan is low, the process to join is easy and you can have limited financial capacity.

Figure 5: Main reason to choose the form of saving



Loans

The study also provides information about household loans. As mentioned above, 26 percent of households in our sample contain a member who has a loan. This low percentage of loan taking may be explained by the fact that in rural areas, those involved in business mostly take formal loans yet the majority of residents are occupied by agriculture.

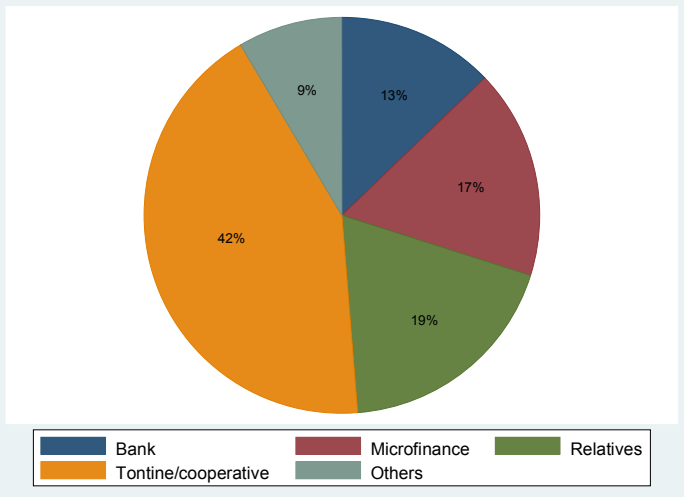
Most households reported that they got their loan in tontine or cooperatives (See *Figure 6*). Fully, 42 percent of respondents mentioned tontine or cooperatives as their source of loan. The second source is relatives accounting for 19%, followed by MFIs (17%) and banks (9%). Again, these results may be driven by the operational structure of tontines, which provide easy access to loans as compared to banks or microfinance institutions.

The qualitative results indicate that most people join tontine because it provides loans easily, while banks/ microfinance requires conditions, such as having an account and deposit, writing project proposal, etc. Further, banks/micro finances do not offer a loan for households in Ubudehe category one while tontine [Amatsinda, Amashyirahamwe, Care, Imitamenwa, etc.] does it. This is because tontine is based on trust among its members. The following two quotes illustrate this:

> *"The banks have unnecessary bureaucracies which make them undesirable for the common person. Bank credit also takes time and money to get. Also, those in category one cannot be given credit in banks yet it is possible in the small groups because of trust." (FGD, Ruhango)*

> *"Banks do not provide the loan in agriculture because it is very risky due to, among other, climate change. They might not get produce to pay back loans. People prefer to use tontine because the loan is given easily and the interest rate is lower compared to the interest rate in the bank. To get a loan in banks, they ask many requirements while in tontine they ask only two requirements: to be wise and save in tontine regularly." (KII, Ruhango)*

Figure 6: Sources of Loan



Finally, the major purposes of these loans include getting in-house materials, school fees, and buying land. Other purposes of taking loans may include increasing capital and buying farm inputs.

Conclusion and recommendations

In this study, we use both primary and secondary data to examine the driving forces of household savings in Rwanda in two steps. First, using the EICV household data, we have estimated the factors that influence the decision to use a bank account or to participate in tontine and the amount deposited or contributed therein. To enrich the discussion, primary data, both qualitative and quantitative, has been collected and analysed.

Who saves and How much?

Overall the portion of households saving (in the account or through tontine) has increased between 2011 and 2014, from 62 to 75 percent, and has remained constant between 2014 and 2017, which is the last data point available. In 2017, 58 percent of Rwandan households were contributing to tontine and 41% were saving in a formal institution (in an account). Once Rwandans start to save, the minimum amount they save in saving institutions can be very small (1920 Rwf for the percentile 1% of savers) but increases rapidly to be over 50,000Rwf annually for 3 out of 4 of them and to 156,000 for the median saver. It is worth noting that 1 out of 4 saver saves more than 620,000 Frw per year and one out of 10 more than 2,3millions. While more households use tontine, they contribute lower amounts in tontine than they deposit in saving accounts in banks.

On average households saving in an account or contributing to tontine are more likely to be educated and to live in urban areas. The household is larger but with a lower share of dependents. The share of household members working off-farm is higher, and the household head is more likely to work off-farm, for a salary or running its own business. The total value of their asset and livestock is higher and they own more land, on average. They consume much more and also spend more on health and education.

Why do Rwandans save for?

Findings reveal that 44 percent of respondents save to sustain food and other daily needs in case of emergencies, 18 percent save for the education of their children where they pay school meals and materials, 9 percent save to increase the capital of their business. Most of the households also save for health insurance (Mutuelle de Santé) which is considered part of their daily needs. Also, some reported having saved to buy land, build a house and buy livestock.

And why some of them do not save?

Among the 27 percent of respondents who are not saving, 57 percent of them argued they do not save because they do not have enough money for both subsistence and saving. Another reason for not saving includes the lack of knowledge about saving. The large proportion of households that do not save (because they do not have extra money from subsistence) indicates that rural areas still account for a large number of poor who barely cover their daily expenditures, or produce what they consume. More specifically, interviewees indicated that poverty, mindset, and lack of saving knowledge are the main reasons for not saving, while the main reported causes of poverty include unemployment, crop diseases, bad weather for agriculture, and large family among others. Mind-set was mentioned several times during interviews.

How do Rwandans choose the form of saving?[10]

In 79 percent of the cases, the form of saving is chosen mainly for non-financial reasons. The most important criteria for selecting the form of saving are access and trust. Other non-financial reasons include reputation and the provision of collateral. It is worth noting that the interest rate on saving is the main criteria guiding the form of saving for only 2% of the sample respondents. Other financial reasons include administrative costs. Interviewees revealed that they join tontine because of a set of strengths: They are closer to them, they are trustful, it is easy to get a loan and no collateral is required, the interest rate for a loan is low, the process to join is easy and you can have limited financial capacity.

10 Idem.

What determines the level of household savings?

A. Saving in account

The factor analysis identified household characteristics affecting the decision to save or not in an account. Findings show that no education and living in a rural area reduces the probability of using a savings account. It also shows that female-headed households tend not to save in account (compared to male-headed households). The type of occupation also matters. Working in farm-related activities reduces the likelihood to save in an account.

More generally, wealth is positively associated with the decision to use a saving account. We also note that the more the households spend on education, the more it is likely to have a saving account. Finally, Government policies such as Girinka and Mutuele de Santé are positively associated with the decision to save in an account, showing a good side effect of these policies.

These results (i) indicate that being poorer and not part of the social protection programs highly reduce the decision to save in an account and (ii) provide valuable information on the characteristics of the households that are influencing the decision to save in an account. These findings ComplementKey informants' interviews, which revealed that several saving products exist on the market, but that they do not always clearly identify who they are targeting.

Looking at the amount deposited in an account, the factor analysis provides information on what is the leverage to increase private savings, which could, in turn, increase domestic investment, a key priority identified during key informant interviews with Government officials. First of all, keeping other factors constant, education is a key factor affecting the amount deposited on an account and is the most important in terms of magnitude. Another important factor is urbanicity, whereby households living in urban areas deposit more savings than the households living in rural areas. Looking at occupation, working in the off-farm sector is highly positively associated with the amount put on a saving account.

Interestingly, there is no consistent relation between wealth indicators (initial level of saving, value of assets, value of livestock, land area) and the level of savings in the account, meaning that as wealth increases saving in banks may not be the preferred option of Rwandan households. On the contrary, the higher the consumption, the higher the propensity to save in an account, which transpires a culture of saving in the country. More specifically, the positive association between saving and health and education expenditure shows that households are saving in account for their children's education and health.

B. Contributing to Tontine

Contributing to Tontine is different from saving in an account. Some argue that there is a saving ladder, where Rwandans first use tontine before they move to banks.[11] The factors affecting the contribution to tontine are hence different from the ones affecting savings in the account. Looking at the decision to participate in a tontine, there are negative association to urban areas, female and youth headed households. While education is not a significant factor of tontine participation, larger families with more dependents are positively associated with participation in tontine. Looking at occupation, salary workers participate less. Finally, while wealth is positively associated with tontine participation, consumption is not, which highlights the social role of a tontine.

Looking at the amount contributed to tontine, the association with education is now significant and positive, so it is with urbanicity. Similarly, consumption is now positively associated with the amount contributed to tontine. Other factors have similar effects on the decision to participate in tontine and the amount contributed. These findings may help pro-tontine policies target specific population groups.

Recommendations

Three out of four Rwandan households save. However most of them save little amounts, and the saving product they use depends on what they know, what they trust, and what is accessible to them. Our small sample survey indicated that the financial attractiveness of a saving product may not be the main determinant for choosing a saving product. This means that traditional tax incentives tools to boost savings may only have an effect on a small share of the population. Besides, the profile and the needs of savers are very different and this diversity needs to be reflected in the range of saving products available. Bringing together supply and demand for saving products will contribute to the growth of saving. It is in this respect that it is recommended to:

11 See the different papers form the Institute of Policy analysis (IPAR-Rwanda) and the Chronic Poverty Advisory Network (CPAN) on poverty in Rwanda.

1. *Identify, describe and assess the saving products available* (eg: Ejo Heza, mutual fund, Zamuka Mugore), their goals, and target population. Saving product providers should make sure that they offer tailor-made products to the needs of different profiles of Rwandans and that these products are accessible (eg: through mobile technology). The list of saving products should be shared with the Financial Sector Working Group to assess the simplicity and relevance of the products vis a vis their target population. This exercise should inform the awareness campaign and make sure no group is left behind.
2. *Strengthen and coordinate awareness campaigns on the necessity to save and on the different saving products available*. While several saving products are available, Rwandans should be advised on which saving product to use depending on their specificities (eg: off-farm vs farm workers, younger vs older), their goals (pensions, business development…), and how they can be accessed (in person, mobile technology). An inventory of awareness-related activities should be kept at the sector level and an institution appointed to coordinate these campaigns.
3. *Increase the number of households saving in account and tontine in Rwanda by targeting specific groups.* A large share of households does not save in account or tontine. Some specific groups sharing common characteristics are less likely to save. Households with the following characteristics should hence be the target of awareness campaigns related to formal saving in account: Rural, female-headed, no education attainment, farm workers, poor, and not benefiting from government policies. Similarly, households with the following characteristics should be the target of the tontine awareness campaign: Urban areas, female-headed households, youth, and salary workers.

Today most Rwandan savers save for daily needs including contributing to Mutuelle de Santé and to cover the cost of education. These costs tend to maintain households in poverty[12]. It is in this respect that together with awareness-raising and financial literacy campaign and to immediately increase the capacity to save it is recommended to:

4. *Introduce fee waiver for public school indirect costs*, including the cost of material and meals, to re-direct (part of) these expenditures into saving and investment at the household level. These waivers should be first piloted to understand their overall impact on poverty and saving.
5. *Reinforce fee waiver for vulnerable groups Mutuelle de Santé's contribution* (eg: female-headed households, rural salary farmers) to re-direct (part of) these expenditures into saving and investment at the household level. These waivers should be first piloted to understand their overall impact on poverty and saving.

These interventions imply a short-term increase in public expenditure. However, both education and anti-poverty-related investment are expected to bring returns, both in terms of consumption growth (long run) and investment capacity through additional savings (medium run). Debt (or ODA) should be considered as a means to finance these interventions.

In order to increase domestic investment by boosting private saving deposited in formal account, it is important to:

6. *Prioritize long-term policies reinforcing Education, Economic transformation towards off-farm activities, and Urbanization*, as these policies are expected to lead to a more educated population, working in off-farm activities, and living in urban center, which are key characteristics of households depositing a larger amount of saving in the account.

Finally, to ensure focus and proper monitoring of savings in the coming years, it is further recommended to:

7. *Renew the national saving mobilization strategy and describe its monitoring framework.* Targets should be realistic and measurable. Evaluation of the achievements against set targets as well as lessons learned should be conducted periodically.
8. *Strengthen data provision related to saving* by including saving behaviour questions in the EICV survey or by conducting a periodic study on savings (first best). To date, the current national available data either provide limited information on the saving behaviour or on the intensity (amount) of saving, limiting the possibility of analysis.

12 See IPAR(2020),

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Annex

Annex A

Model characteristics are as follows (See Burke (2009)).

The major drawback of the tobit model is that the choice of y>0 and the value of y, given that y>0, is determined by the same vector of parameters (β from above). For example, this imposes that the direction(sign) of a given determinant's marginal effect will be the same on both the probability that y>0 and the expectation of y, conditional or otherwise. As an alternative, Cragg proposed the following, which integrates the probit model to determine the probability of y>0 and the truncated normal model for given positive values of y.

$$f(w,y|x_1,x_2) = \{1-\varphi(x_1\gamma)\}^{1(w=0)}[\varphi(x_1\gamma)(2\pi)^{-\frac{1}{2}}\sigma^{-1}\exp\left\{-\frac{(y-x_2\beta)^2}{2\sigma^2}\right\}\varphi\left(\frac{x_2\beta}{\sigma}\right)]^{1(w=1)}$$

where w is a binary indicator equal to 1 if y is positive and 0 otherwise. Notice in Cragg's model the probability of y>0 and the value of y, given y>0, are now determined by different mechanisms (the vectors γ and β, respectively). Furthermore, there are no restrictions on the elements of and , implying that each decision may even be determined by a different vector of explanatory variables altogether, which is not the case in our study. The tobit model is nested within Cragg's alternative because if = and γ = β/σ, the models become identical. For a more thorough discussion of this and other double-hurdle alternatives to tobit, refer to Wooldridge (2002, 536–538).

Regression results for rural/urban and male/femaleare subgroups are presented in Table 3 and 4 below.

Table 3a Determinants of households savings (in account) by Female/Male headed households

(1) VARIABLES	(2) Save on account (Yes/No)	(3) Amount deposited on account (log)	(4) Save on account (Yes/No)	(5) Amount deposited on account (log)
	Female-headed households		Male headed households	
Household characteristics				
Age (hh head)	-0.003	-0.005	0.005	0.002
	(0.006)	(0.009)	(0.004)	(0.006)
Age square (hh head)	0.000	0.000	-0.000*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
No education (hh head)	-0.312***	-0.249***	-0.351***	-0.272***
	(0.038)	(0.057)	(0.018)	(0.027)
Urban	-0.065	0.058	0.142***	0.107***
	(0.051)	(0.078)	(0.031)	(0.041)
Size of hh	0.110***	0.193***	0.082***	0.169***
	(0.010)	(0.014)	(0.006)	(0.008)
Share of dependent	-0.182***	-0.170*	-0.007	0.217***
	(0.060)	(0.097)	(0.048)	(0.071)
Disability in hh	0.013	-0.033	0.018	-0.090**
	(0.038)	(0.059)	(0.024)	(0.037)
Occupation				
Share of_off_farm workers	0.265***	0.583***	0.298***	0.318***
	(0.073)	(0.111)	(0.048)	(0.071)
Farm salary	-0.179***	-0.404***	-0.141***	-0.255***
	(0.035)	(0.058)	(0.020)	(0.035)
Off farm salary	0.425***	0.075	0.075***	0.049
	(0.051)	(0.070)	(0.021)	(0.031)
Off farm business owner	-0.015	-0.216***	-0.016	-0.013
	(0.043)	(0.062)	(0.022)	(0.031)
Farm business owner	-0.103*	-0.090	-0.118***	-0.294***
	(0.055)	(0.079)	(0.026)	(0.037)
Government policies				
Received a cow	0.108*	-0.050	0.124***	-0.084*
	(0.059)	(0.087)	(0.035)	(0.051)
Participated in VUP		0.310***		0.126***
		(0.062)		(0.044)
Has health insurance	0.325***	0.209***	0.341***	0.230***
	(0.038)	(0.068)	(0.021)	(0.038)

(1)	(2)	(3)	(4)	(5)
VARIABLES	Save on account (Yes/No)	Amount deposited on account (log)	Save on account (Yes/No)	Amount deposited on account (log)
	Female-headed households		Male headed households	
Wealth				
Initial level of saving (log)	-0.077***	-0.094***	-0.091***	-0.095***
	(0.006)	(0.009)	(0.003)	(0.005)
Assets (log)	0.037***	0.020***	0.055***	0.060***
	(0.004)	(0.007)	(0.003)	(0.005)
Livestock value (log)	0.009***	-0.003	0.011***	-0.009***
	(0.003)	(0.005)	(0.002)	(0.003)
Land area (log are)	0.017	-0.044**	0.052***	0.010
	(0.013)	(0.019)	(0.007)	(0.010)
Expenditure				
Consumption (log)	0.541***	0.888***	0.617***	1.190***
	(0.028)	(0.039)	(0.017)	(0.022)
Education expenditure (log)	0.026***	0.019***	0.026***	0.024***
	(0.004)	(0.005)	(0.002)	(0.003)
Health expenditure (log)	0.005	0.005	0.002	0.010***
	(0.004)	(0.006)	(0.002)	(0.003)
Constant	-8.553***	-0.925	-9.906***	-5.737***
	(0.410)	(0.578)	(0.247)	(0.320)
Observations	11,417	3,607	31,890	13,585

Table 3b Determinants of households tontine contribution by Female/Male headed households

(1) VARIABLES	(2) Participate in tontine (Yes/No)	(3) Amount contributed to Tontine (log)	(4) Participate in tontine (Yes/No)	(5) Amount contributed to Tontine (log)
	Female-headed households		Male headed households	
Household characteristics				
Age (hh head)	0.030***	-0.011	0.011***	-0.002
	(0.005)	(0.007)	(0.003)	(0.004)
Age square (hh head)	-0.000***	0.000	-0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
No education (hh head)	-0.056	-0.122***	-0.012	-0.060***
	(0.036)	(0.043)	(0.017)	(0.019)
Urban	-0.202***	0.262***	-0.247***	0.194***
	(0.047)	(0.062)	(0.028)	(0.034)
Size of hh	0.045***	0.146***	0.026***	0.106***
	(0.009)	(0.011)	(0.006)	(0.006)
Share of dependent	-0.009	-0.155**	0.133***	-0.108**
	(0.054)	(0.071)	(0.044)	(0.053)
Disability in hh	-0.052	0.013	-0.051**	-0.066**
	(0.035)	(0.044)	(0.023)	(0.026)
Occupation				
Share of_off_farm workers	0.401***	0.366***	0.290***	0.523***
	(0.066)	(0.082)	(0.045)	(0.054)
Farm salary	0.057*	-0.132***	-0.034*	-0.202***
	(0.032)	(0.039)	(0.019)	(0.022)
Off farm salary	-0.059	-0.032	-0.033*	-0.102***
	(0.047)	(0.057)	(0.020)	(0.022)
Off farm business owner	0.189***	0.141***	0.146***	0.181***
	(0.039)	(0.046)	(0.021)	(0.023)
Farm business owner	0.136***	-0.259***	0.119***	-0.081***
	(0.050)	(0.071)	(0.024)	(0.029)
Government policies				
Received a cow	0.084	-0.157***	-0.013	-0.032
	(0.056)	(0.061)	(0.035)	(0.035)
Participated in VUP	0.045	0.021	0.090***	-0.008
	(0.042)	(0.051)	(0.032)	(0.033)
Has health insurance	0.078**	0.031	0.078***	0.026
	(0.032)	(0.042)	(0.019)	(0.023)

(1)	(2)	(3)	(4)	(5)
VARIABLES	Participate in tontine (Yes/No)	Amount contributed to Tontine (log)	Participate in tontine (Yes/No)	Amount contributed to Tontine (log)
	Female-headed households		Male headed households	
Wealth				
Initial level of saving (log)	0.012**	-0.008	0.013***	0.002
	(0.005)	(0.006)	(0.003)	(0.003)
Assets (log)	0.021***	0.035***	0.032***	0.038***
	(0.004)	(0.005)	(0.003)	(0.003)
Livestock value (log)	0.025***	0.006*	0.025***	0.003
	(0.003)	(0.003)	(0.002)	(0.002)
Land area (log are)	0.079***	0.048***	0.072***	0.033***
	(0.011)	(0.015)	(0.007)	(0.008)
Expenditure				
Consumption (log)	0.076***	0.543***	-0.024*	0.637***
	(0.024)	(0.032)	(0.014)	(0.017)
Education expenditure (log)	0.008**	-0.003	0.011***	0.015***
	(0.003)	(0.004)	(0.002)	(0.003)
Health expenditure (log)	0.019***	-0.003	0.015***	-0.004*
	(0.004)	(0.005)	(0.002)	(0.003)
Constant	-3.490***	2.769***	-1.491***	1.347***
	(0.352)	(0.482)	(0.207)	(0.262)
Observations	11,417	5,352	31,890	18,460

Table 4a Determinants of households savings (in account) by urban/rural

(1) VARIABLES	(2) Save on account (Yes/No)	(3) Amount deposited on account (log)	(4) Save on account (Yes/No)	(5) Amount deposited on account (log)
	Urban households		Rural households	
Household characteristics				
Age (hh head)	0.018**	0.018**	-0.004	-0.007
	(0.008)	(0.009)	(0.003)	(0.005)
Age square (hh head)	-0.000**	-0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
No education (hh head)	-0.363***	-0.362***	-0.344***	-0.248***
	(0.042)	(0.051)	(0.018)	(0.027)
Female (hh_head)	-0.193***	-0.158***	-0.004	0.156***
	(0.048)	(0.056)	(0.021)	(0.035)
Size of hh	0.075***	0.175***	0.091***	0.162***
	(0.013)	(0.012)	(0.006)	(0.009)
Share of dependent	-0.017	-0.057	-0.044	0.170***
	(0.107)	(0.120)	(0.039)	(0.066)
Disability in hh	-0.023	-0.017	0.019	-0.093***
	(0.060)	(0.068)	(0.022)	(0.035)
Occupation				
Share of_off_farm workers	0.438***	0.254**	0.273***	0.474***
	(0.101)	(0.114)	(0.044)	(0.071)
Farm salary	-0.276***	-0.166	-0.151***	-0.330***
	(0.065)	(0.110)	(0.018)	(0.032)
Off farm salary	-0.005	0.105*	0.147***	0.029
	(0.053)	(0.058)	(0.021)	(0.032)
Off farm business owner	-0.114**	0.070	0.011	-0.072**
	(0.052)	(0.057)	(0.021)	(0.033)
Farm business owner	-0.104*	-0.151**	-0.115***	-0.341***
	(0.057)	(0.061)	(0.026)	(0.040)
Government policies				
Received a cow	0.010	-0.245	0.114***	-0.073
	(0.137)	(0.174)	(0.031)	(0.046)
Participated in VUP		0.352**		0.171***
		(0.159)		(0.037)
Has health insurance	0.332***	0.312***	0.350***	0.225***
	(0.050)	(0.069)	(0.020)	(0.038)

(1) VARIABLES	(2) Save on account (Yes/No)	(3) Amount deposited on account (log)	(4) Participate in tontine (Yes/No)	(5) Amount contributed to Tontine (log)
Wealth				
Initial level of saving (log)	-0.065***	-0.079***	-0.095***	-0.102***
	(0.006)	(0.008)	(0.003)	(0.005)
Assets (log)	0.084***	0.124***	0.046***	0.040***
	(0.008)	(0.013)	(0.002)	(0.005)
Livestock value (log)	0.008*	-0.010**	0.012***	-0.005*
	(0.005)	(0.005)	(0.002)	(0.003)
Land area (log are)	0.035**	-0.003	0.050***	0.010
	(0.014)	(0.014)	(0.007)	(0.011)
Expenditure				
Consumption (log)	0.641***	1.097***	0.569***	1.073***
	(0.035)	(0.034)	(0.016)	(0.024)
Education expenditure (log)	0.030***	0.016***	0.024***	0.024***
	(0.004)	(0.005)	(0.002)	(0.003)
Health expenditure (log)	0.007	0.007	0.002	0.009**
	(0.005)	(0.005)	(0.002)	(0.004)
Constant	-10.600***	-5.546***	-9.126***	-3.413***
	(0.495)	(0.458)	(0.245)	(0.374)
Observations	6,950	4,266	36,357	12,926

Table 4b Determinants of households tontine contribution by urban/rural

(1) VARIABLES	(2) Participate in tontine (Yes/No)	(3) Amount contributed to Tontine (log)	(4) Participate in tontine (Yes/No)	(5) Amount contributed to Tontine (log)
	Urban households		Rural households	
Household characteristics				
Age (hh head)	0.018***	-0.005	0.017***	-0.006*
	(0.007)	(0.011)	(0.003)	(0.004)
Age square (hh head)	-0.000***	-0.000	-0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
No education (hh head)	0.010	-0.066	-0.029*	-0.073***
	(0.038)	(0.056)	(0.017)	(0.018)
Female (hh_head)	-0.088**	-0.032	-0.096***	-0.128***
	(0.042)	(0.066)	(0.019)	(0.022)
Size of hh	0.035***	0.113***	0.037***	0.115***
	(0.010)	(0.016)	(0.005)	(0.006)
Share of dependent	0.338***	0.032	0.019	-0.147***
	(0.093)	(0.146)	(0.037)	(0.044)
Disability in hh	-0.051	0.029	-0.046**	-0.056**
	(0.052)	(0.076)	(0.021)	(0.024)
Occupation				
Share of_off_farm workers	0.556***	0.661***	0.277***	0.447***
	(0.089)	(0.139)	(0.041)	(0.048)
Farm salary	-0.062	-0.251***	0.010	-0.180***
	(0.056)	(0.082)	(0.017)	(0.019)
Off farm salary	0.030	-0.146**	-0.045**	-0.068***
	(0.045)	(0.066)	(0.020)	(0.021)
Off farm business owner	0.224***	0.251***	0.143***	0.166***
	(0.044)	(0.064)	(0.020)	(0.022)
Farm business owner	0.096**	-0.089	0.141***	-0.097***
	(0.048)	(0.069)	(0.024)	(0.029)
Government policies				
Received a cow	0.241*	-0.047	-0.004	-0.077**
	(0.126)	(0.153)	(0.030)	(0.031)
Participated in VUP	0.276**	-0.156	0.062**	0.016
	(0.124)	(0.155)	(0.026)	(0.028)
Has health insurance	0.102**	-0.026	0.074***	0.037*
	(0.045)	(0.071)	(0.018)	(0.021)

(1) VARIABLES	(2) Save on account (Yes/No)	(3) Amount deposited on account (log)	(4) Participate in tontine (Yes/No)	(5) Amount contributed to Tontine (log)
Wealth				
Initial level of saving (log)	0.012**	-0.004	0.013***	0.000
	(0.006)	(0.008)	(0.003)	(0.003)
Assets (log)	0.031***	0.045***	0.029***	0.035***
	(0.007)	(0.011)	(0.002)	(0.003)
Livestock value (log)	0.010***	-0.014***	0.026***	0.006***
	(0.004)	(0.005)	(0.001)	(0.002)
Land area (log are)	0.051***	0.025	0.080***	0.050***
	(0.011)	(0.016)	(0.007)	(0.008)
Expenditure				
Consumption (log)	-0.152***	0.602***	0.074***	0.608***
	(0.026)	(0.041)	(0.014)	(0.017)
Education expenditure (log)	0.002	0.008	0.013***	0.011***
	(0.004)	(0.006)	(0.002)	(0.002)
Health expenditure (log)	0.009**	0.004	0.016***	-0.005**
	(0.004)	(0.007)	(0.002)	(0.002)
Constant	-0.214	1.856***	-2.947***	1.695***
	(0.364)	(0.596)	(0.218)	(0.262)
Observations	6,950	2,859	36,357	20,953

Annex B

We provide the primary data non-parametric distributions of household asset values among households with and without saving account as well as those with and without tontine memberships in Rwanda. *Figure 7* exhibits the distribution of cumulative density function (CDF) for household asset values between tontine and non-tontine households. The figure indicates that households with tontine membership are more likely to have higher asset values than households without tontine membership.

Figure 7: Distribution of household asset values between tontine and non-tontine household

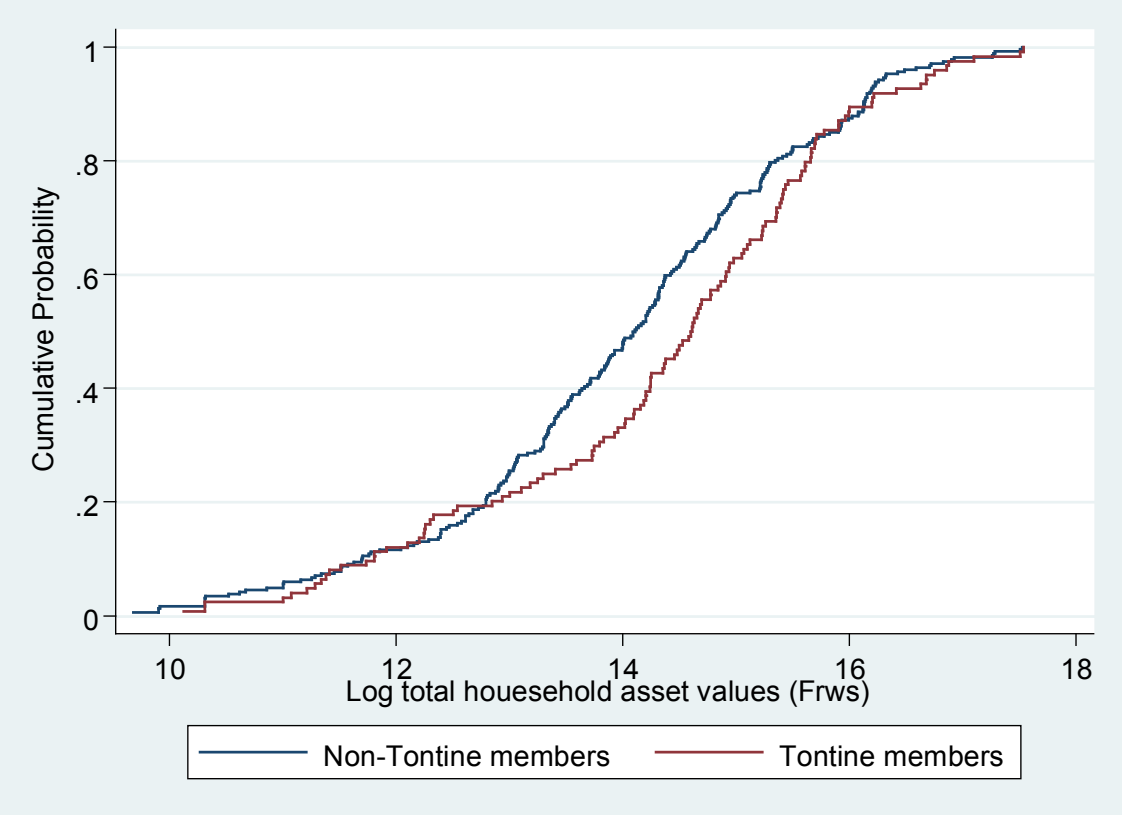
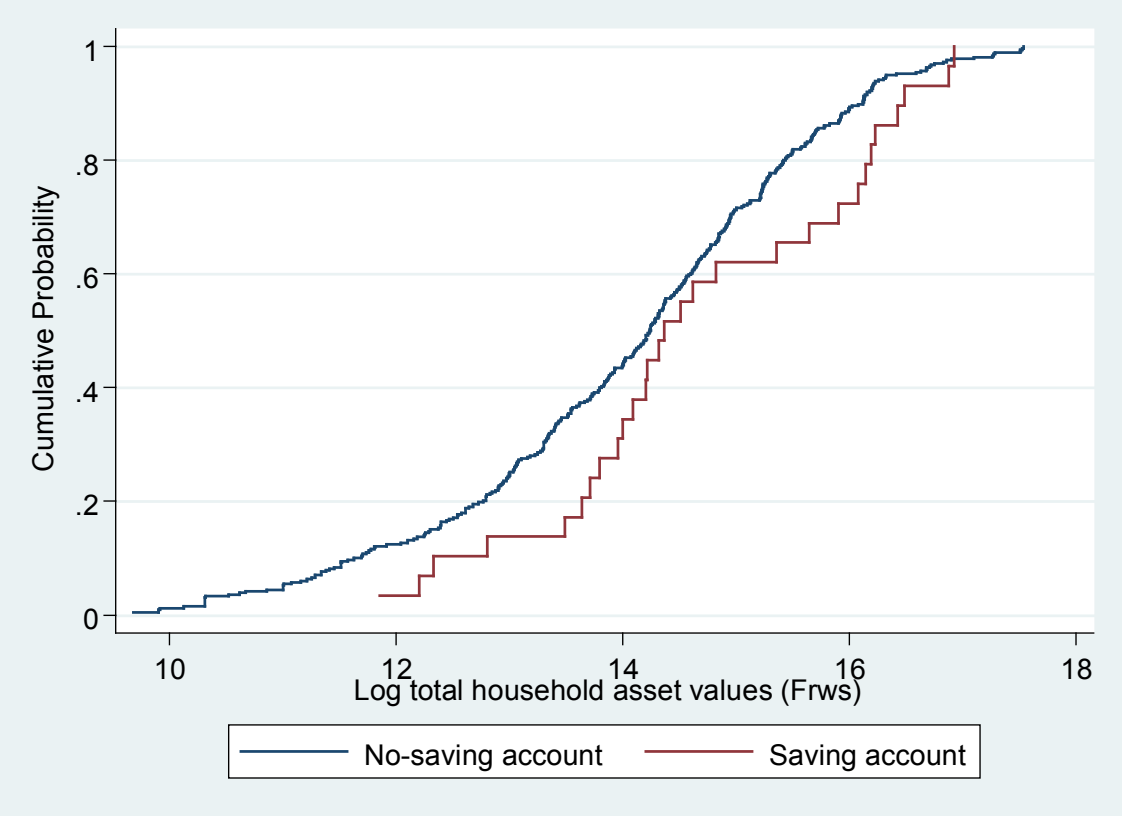


Figure 8 presents the distribution of cumulative density function (CDF) for household asset values between households with and without saving account. In this case, we found that the household with saving account are likely to have higher asset values than households without saving account.

Figure 8: Distribution of household asset values between household with and without saving A/C



We then derive the determinants of household savings in Rwanda using OLS and similar repressors as defined earlier.[13] The main outcomes in examining the determinants of saving in Rwanda in this part consist of logs for household bank savings over the past 12 months before the survey, total household asset values[14] , and the dummy of whether there is any household member in Tontine. The first outcome variable is provided in the second and third columns of Table 5, the second outcome variable in the fourth and fifth columns while the third outcome variable is provided in the sixth and seventh columns of Table 5. Further, Table 5 contains factors that affect the household amount saved in an account and/or tontine participation. We include Ubudehe category fixed effects to absorb the common factors across Ubudehe categories. In the third, fifth, and seventh columns we include district fixed effects to absorb unobserved factors across the districts.

13 OLS works well for continuous dependent variables while Tobit may fail to converge.

14 Includes furniture, vehicles, land, housing, livestock.

Table 5: Savings, Household assets values, and Tontine Membership: OLS estimate

Variables	Savings	Savings	Asset	Asset	Tontine	Tontine
Household head is Female	-1.501*	-1.434	-0.497*	-0.482*	0.094	0.080
	(0.873)	(0.883)	(0.292)	(0.289)	(0.078)	(0.077)
Household size	0.074	0.072	0.101*	0.101*	-0.003	-0.003
	(0.154)	(0.154)	(0.057)	(0.056)	(0.012)	(0.012)
Household with wage	-0.489	-0.408	0.507***	0.460***	0.108**	0.085*
	(0.545)	(0.555)	(0.167)	(0.166)	(0.048)	(0.048)
Non-farm business in household	1.007	0.959	0.098	0.144	-0.023	-0.007
	(0.622)	(0.630)	(0.200)	(0.204)	(0.056)	(0.056)
Monogamy household	0.193	0.160	0.326	0.337	0.146*	0.159**
	(0.882)	(0.884)	(0.311)	(0.309)	(0.078)	(0.079)
Age of household head	0.094	0.097	0.072*	0.070*	0.008	0.008
	(0.115)	(0.115)	(0.039)	(0.039)	(0.010)	(0.010)
Age square household head	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Household head with primary	0.684	0.673	0.236	0.244	0.037	0.040
	(0.581)	(0.584)	(0.183)	(0.182)	(0.054)	(0.054)
Household head with secondary	0.551	0.516	0.470*	0.458*	0.019	0.028
	(1.199)	(1.217)	(0.273)	(0.274)	(0.102)	(0.100)
Household member in VUP	0.228	0.353	-0.151	-0.125	0.192**	0.159*
	(1.123)	(1.129)	(0.411)	(0.422)	(0.097)	(0.095)
Constant	3.850	3.684	11.608***	11.579***	-0.129	-0.101
	(2.732)	(2.743)	(0.887)	(0.883)	(0.255)	(0.247)
Control for Ubudehe category	Yes	Yes	Yes	Yes	Yes	Yes
Control for district location	No	Yes	No	Yes	No	Yes
Observations	402	402	394	394	409	409
R-squared	0.062	0.064	0.135	0.142	0.048	0.071

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. We have three outcome variables. The first dependent variable is the log of savings from a household bank account which is provided in the second and third column of Table 5. The second dependent variable is the log of total household asset values which is provided in the fourth and fifth column of the same table while the third dependent variable is the dummy of whether there is any household member in Tontine which is also reported in the sixth and seventh column of the same table.

The findings from Table 5 reveal that having a female household head has a negative and statistically significant effect on both the amount saved in a bank account and household asset values when only Ubudehe category fixed effects are controlled. The findings presented in Table 5 indicate that households having a female household head save a lower amount in a bank account and add lower asset values, respectively than households with a male household head. Interestingly, the female-headed household seems to participate more in tontine associations than male-headed household although the estimates are not statistically different from zero. Conversely, when both Ubudehe category and district fixed effects are controlled, the effect of having a female household head is only statistically significant on household asset values. According to the results in column 5 of Table 5, households having a female household head have to increase asset values by less than 62percent compared to households with a male household head.

The size of a household has a consistently positive effect and the effect is statistically robust solely on household asset values, for when Ubudehe category fixed effects are solely controlled as well as when both Ubudehe category and district fixed effects are controlled. Findings from Table 5 columns 4 and 5 indicate that a unit increase in household size increases the household's asset values by 11 percent. This implies that larger households are more likely to have higher asset values. The possible explanation for this is that as the size of the household increases, household assets such as chairs and tables become a necessity.

Concerning the effect of wage/salary, the effect of having someone with a wage/salary on household asset values and on having a tontine membership is consistently positive and statistically significant. The results from Table 5 columns 4 and 5 indicate that households having someone with a wage/salary have higher probabilities of higher asset values (by 66 and 58 percent, respectively) than those not having someone with a wage/salary. Further, households having someone with a wage/salary have 11 and 9 percent higher probabilities of having a tontine membership, respectively, than those not having someone with a wage/salary. This suggests that households with someone earning a wage/salary are more likely to have a tontine membership as well as to have higher asset values. The possible reason for increased probability for having tontine membership could be that the wage/salary earned is little, in most of the cases, that it is easier for households to save in tontine than in banks or microfinance institutions.

This regression result is in line with the qualitative findings which reported that most of the households surveyed except Remera sector do casual work mainly in agriculture while few of them work in VUP, construction, and other temporary work. Thus, they manage to save a little money from their wage in a tontine. Participants in focus group discussions revealed these.

> *"Life in kanombe cell depends on subsistence agriculture producing for home consumption with a limited surplus for the market. The main jobs people do is working on other people's farms like digging for a day which is between 500frw to 800frw during planting season." (FGD participant, Gicumbi)*

> *"Tontine is part of our life. Someone gets a loan from tontine and repays with an interest rate of 5% in a given time. My tontine has 45 people and everyone has to provide 100 francs per week. Then after a year, we share dividends for everyone who participated a whole year. Most of us are casual labour or temporary workers, mostly in the agriculture sector. When getting money, we do provide money for tontine and even for home consumption." (FGD participant, Ruhango)*

Regarding assets, the qualitative survey indicated that earning wage/salary helps most of the households to save and borrow from tontine to buy assets such as land, forest, building, mattresses, iron sheets, and kitchen materials among others. Also, many people identified low income/poverty and unemployment as the major reasons for not saving.

Going back to the regression results, the age of the household head has a statistically significant effect only on household asset values, in both cases when UBUDEHE category fixed effects are solely controlled and when the UBUDEHE category and district fixed effects are controlled, and the effect is positive. Findings presented in Table 5 columns 4 and 5 indicate that a unit increase in the age of the household head increases the probability of the household having higher asset values by about 7 percent. This implies that older household heads are more likely to increase their asset values.

The education level of the household head has a consistent effect on household asset values but statistically significant for household heads with secondary level education. According to Table 5 columns 4 and 5, household heads with secondary school levels have higher asset values by 60 percent. This implies that households that are headed by people with secondary school levels are more likely to increase their asset values than others.

Concerning the effect of VUP, the effect of having a member in VUP on having a tontine membership is consistently positive and statistically significant. This suggests that households with someone in VUP are more likely to have a tontine membership. The qualitative survey found that the majority of households who participate in VUP are paid through SACCOs on a weekly or monthly basis and withdraw all their wages when they are paid. As quantitative analysis reported that being a VUP member increases the probability of participating in a tontine, thus, they withdraw wages from SACCOs and save in tontine which is based on social cohesion among neighbours or cooperatives members. Another reason is that it is compulsory for VUP beneficiaries to have a SACCO account, as they are paid their wages through SACCOs. Interviews revealed the following:

> *"The people who get wages from VUP programs mainly the public works withdraw all their money once it reaches SACCOs" (KII, Ruhango)*

> *"Households participating in VUP must have accounts in SACCOs because they receive wages through Sacco otherwise they should not have those accounts" (FGD participant, Ruhango)*

Table 6 indicates that having a female household head has a consistently negative and statistically significant effect on both food expenditures and net savings. The findings presented in Table 6 indicate that households having a female household head have about 35 percent fewer food expenditures than households with a male household head.

Table 6: Food, Non-food expenditure and Annual household Net Savings: OLS estimate

Variables	Non-food	Non-food	Food	Food	Net saving	Net saving
Household head is Female	-0.202	-0.192	-0.320*	-0.301*	-4.173***	-4.205***
	(0.210)	(0.204)	(0.184)	(0.166)	(1.550)	(1.545)
Household size	0.075**	0.073**	0.057	0.056*	-0.319	-0.318
	(0.038)	(0.035)	(0.035)	(0.032)	(0.310)	(0.304)
Household with wage	-0.150	-0.055	-0.197	-0.102	1.024	1.385
	(0.137)	(0.137)	(0.122)	(0.124)	(1.142)	(1.155)
Non-farm business in household	0.304*	0.162	0.242	0.110	-0.447	-0.790
	(0.182)	(0.175)	(0.164)	(0.157)	(1.324)	(1.318)
Monogamy household	-0.144	-0.119	-0.229	-0.203	-3.833**	-3.777**
	(0.220)	(0.209)	(0.200)	(0.177)	(1.559)	(1.588)
Age of household head	0.014	0.009	0.021	0.017	-0.291	-0.306
	(0.031)	(0.030)	(0.027)	(0.026)	(0.195)	(0.196)
Age square household head	-0.000	-0.000	-0.000	-0.000	0.003	0.003*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Household head with primary	0.006	0.027	-0.008	0.003	4.604***	4.556***
	(0.151)	(0.141)	(0.127)	(0.122)	(1.094)	(1.086)
Household head with secondary	0.993***	0.963***	0.611***	0.591***	-1.942	-2.100
	(0.269)	(0.261)	(0.189)	(0.187)	(2.604)	(2.626)
Household member in VUP	0.601**	0.611**	0.712***	0.764***	-6.254***	-6.350***
	(0.275)	(0.285)	(0.265)	(0.262)	(2.109)	(2.074)
Constant	11.291***	11.334***	12.503***	12.499***	15.618***	15.616***
	(0.722)	(0.687)	(0.633)	(0.604)	(4.814)	(4.848)
Control for Ubudehe category	Yes	Yes	Yes	Yes	Yes	Yes
Control for district location	No	Yes	No	Yes	No	Yes
Observations	394	394	398	398	375	375
R-squared	0.111	0.174	0.154	0.235	0.102	0.114

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. We have three outcome variables. The first dependent variable is the log of non-food expenditure which is provided in the second and third columns of Table 6. The second dependent variable is the log of household food expenditure which is provided in the fourth and fifth column of the same table while the third dependent variable is the log of household net savings (the difference between annual household income minus consumption) which is also reported in the sixth and seventh column of the same table.

Besides, the results presented in Table 6 show that female-headed households have much lower net savings than households with a male household head. Qualitative survey results show that most of the women, especially, in rural areas do subsistence agriculture and casual work on farms. Thus, they revealed that they get lesser agricultural produce and wage and save part of it in tontine to solve their basic needs. Participates in women focus group discussion in Ruhango and Gicumbi district respectively revealed these.

> *"It is like our culture around here, it is very uncommon to see a wife doing business. Most of the women do cultivation and joining care for survival. We participate in tontine after working as casual labours from different fields of different people."*

> *"Life in Nyiragasuruba and Byumba mainly depends on subsistence farming and family has small lands where they produce mainly for home consumption. The business environment is difficult for women because of lack of capital."*

The size of a household has a consistently positive and statistically robust effect on household non-food expenditures. Findings from Table 6 columns 2 and 3 indicate that a unit increase in household size increases the non-food expenditures by about 7 percent. This implies that larger households are more likely to increase their non-food expenditures. On the other hand, the size of a household has a positive and statistically significant effect on food expenditures when both the UBUDEHE category and district fixed effects are controlled. According to Table 6 column 5, a unit increase in household size increases the household's food expenditures by 6 percent, and lower savings but not statistically significant.

Concerning the effect of non-farm business ownership, running a non-farm business has a positive and statistically significant influence solely on non-food expenditures and only when UBUDEHE category fixed effects are solely controlled. The results from Table 6 column 2 indicate that households running their own non-farm business have 36 percent higher non-food expenditures, than those without a non-farm business. The possible reason for this may be the fact that households with non-farm businesses have more income than those without the business, hence can purchase commodities that are otherwise considered to be luxurious.

About household head education, the findings indicated in Table 6 column 6 and 7 that household head with primary education has a positive and statistically significant effect on household net savings. According to Table 6 columns 6 and 7, household heads with primary education levels have much higher net savings than households with no-education heads. Some reasons may back these results, most of the households in the sample have not been to school, many others completed primary school and only a few households have completed secondary schools and above. As result, the number of households with primary school positively influenced net savings.

The qualitative survey indicates that most of the households have not reached the secondary school level. That is, they have not been at school and the majority of them who have been to school completed only primary school. Accordingly, they are involved in farming and business, thus, some of them can produce for home consumption and market while also saving part of their income. For, example, some households supply milk and tea to agro-processing called blessed milk dairy and Mulindi tea respectively in Byumba and get income. Households in Ruhango district supply cassava to Kinazi cassava plant and get income. Similarly, households in Rutunga sector, Gasabo district supply milk and vegetables in the city and get income. Rutunga SACCO is among the SACCOs which have a lot of money in the district. These indicate that those households with primary education level involved in agriculture and businesses have money to save which ultimately raises their net savings. Men and women in focus group discussion in Ruhango and Gicumbi district respectively have revealed this argument that more people have primary school level.

> *"One respondent says that they are not educated and among those present in the group, none reached the secondary level of education."*

> *"Asked whether people are educated in the area, they responded that most of the people around completed primary level but did not continue with education because of poverty."*

The results presented in Table 6 revealed that household head with secondary school level has a positive and statistically significant effect on household spending on non-food and food items. Specifically, in Table 6 columns 2 and 3, household heads with primary education levels have much higher non-food expenditure. Again, in Table 6 columns 4 and 5, household heads with secondary school levels have higher food expenditure. This suggests that households that are headed by people with secondary school and primary education respectively are more likely to increase their spending on both food and luxurious items than others.

Having a VUP member has a positive and statistically significant effect on household spending on non-food and food items. This is valid when the UBUDEHE category and district fixed effects are controlled, respectively. Specifically, in Table 6 columns 2 and 3, a household with VUP member spend 82 percent more on non-food expenditure. Again, in Table 6 columns 4 and 5, a household with VUP members spend also more on food expenditure. This denotes that households that have VUP members are more likely to increase their spending on both non-food and food items than others.

Regarding net savings, having a VUP member in the household has a negative and statistically significant effect on household surplus or net savings. This is valid when the UBUDEHE category and district fixed effects are controlled, respectively. This implies that households that have VUP members are likely not to have net savings. Thus, the possible reason is that VUP beneficiaries earn a lower wage which helps them to meet daily needs.

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