

# Household Savings Decision in Debre Markos Town, Ethiopia: An Application of Double Hurdle Model

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**Abstract-** Household saving is one of the most important inducing factors of capital accumulation for investment and growth. In fact, several studies try to understand savers' behavior. Nevertheless, added to inconsistent conclusions, there is an observed knowledge gap owing to the methods of analysis. Most studies used Ordinary Least Square (OLS) and Tobit models by ignoring the two-stage nature of household saving decision which results in biased parameter estimates. Hence, the study tries to investigate the determinants of household savings participation and the amount decision independently. To this end, Cragg's double hurdle model was applied to data collected from a cross-sectional survey of households in Debre Markos Town, Ethiopia. The estimated results revealed that income and remittance significantly and positively affect both savings participation and magnitude of savings while educational status and family size reduces the likelihood of participation and the amount of money saved. On the other hand, age, sex and perception on incentives affect participation and magnitude decisions with different directions, whereas occupation dummies influence only the amount decision. The result clearly puts in to light that household savings participation and amount decisions treatment should view the incidences as conditionally independent decisions to embark on appropriate and target specific savings mobilization.

**Key Words:** Double Hurdle, Savings Decision, Savings Institutions, Determinants

## 1 INTRODUCTION

Savings is an important development and economic variable through its impact on investment, growth, and emergency reserves [14]. Development efforts of individuals and nations can be financed by domestic capital formation. Domestic capital investment uses household saving as a main source of finance that spurs economic growth [26]. This assertion is supported by both theory and practice. For instance, the Harrod-Domar theory of economic growth (1960) states that, the rate of GDP growth, among others is a function of net national savings ratio. The theory further elaborates that the rate of national income in a given country is positively and linearly related to the savings ratio. This indicates greater growth of GDP will be achieved if the tendency of an economy to save and invest is better [24].

For economic agents or households in developing countries, savings are a coping mechanism to shocks that result from unstable economic conditions, climate risks, little social security coverage and undeveloped credit and insurance markets which result in frequent income variability. As a result, this leaves the households to be vulnerable to hardships with little or no means to cope with risks. In such circumstances, savings become vital to shield households from asset depletion and disruption of livelihoods [5], [26].

Ethiopia is not an exception. In this country, savings serves as a mechanism for smoothing income in uncertain times, enhancing household welfare and ensuring social security. Being cognizant of this, the government and commercial banks devise different promotion and mobilization strategies to accumulate local capital for investment. Though its importance is well recognized, savings mobilization in Ethiopia is rather low even by African standards. As a result, there is very little domestic capital available for investment in the country [4], [13], [14], [15]. Data from the World Bank (2015) revealed that gross domestic savings as percent of the country's GDP is only 22.5% resulting in a huge financial resource gap as compared to gross domestic investment (Gross Capital formation) which is 40.3% of the GDP. Added to the macro level instances, statistical report by the National Bank of Ethiopia (2011) clearly puts in to light that an Ethiopian household on average saves 875 ETH Birr per annum in financial institutions. Although not well studied, only a little bit bigger household saving figures are observed in community level financial institutions and less effort is made to mobilize finance from these informal structures. By any means, this is very low to support viable economic growth and development in the country.

Different theoretical explanations can be inferred to explain the incidence of low savings situation, but most of the theoretical enlightenments were produced with developed nations realities and macro level perspective which underperform to show household or micro level realities in developing countries [14]. Theoretical enlightenments to explain household saving behavior has long been established, but a well-known compilation of theories enlightening determinant factors affecting individuals' behavior and decision in relation to savings is developed by Keynes (1936) and later presented with an addition and modification by Browning and Lusardi (1996). The list includes the life cycle hypothesis in which agents' do save to smooth consumption over time by equalizing the marginal utility of money between now and the future; the precautionary motive- to recover from uncertain shocks; the inter-temporal substitution motive - to enjoy the interests being paid and gain appreciation on their savings practices; the improvement motive - to make their living standard unvaried or loss down ward as a result of increase in expenditure; the independence motive- to developed a sense of independence without any target; the enterprise motive- to invest in life changing activities; the bequest motive - to accumulate capital for successors; the avarice motive - to satisfy individual's usual habit of insisting against the act of expenditure and the down payment motive- savings to purchase durable goods [8]. Moreover, the theoretical concepts of permanent and relative income hypothesis are also well known in giving highlights on households' behavior in saving decision.

The difficulty in the theoretical explanation of household savings behavior is the problem to describe individuals with different characteristics by one single theory or motive of saving since they have varied preference and responses for every situation they confront [29]. As well, many of the motives are complementary. For instance, households that save for retirement will also build up huge financial reserves to recover from shocks, which indicate the overlapping of life cycle and precautionary motives [7].

On the other hand, although several micro-level empirical evidences identified factors that determine household savings decision, observed gaps still remain which warrant further investigation using robust and sound methods. One is that, studies at the micro level highlights different socioeconomic variables to be major determinants of savings decision at household level [3], [18], [21], [26]. Nevertheless, the findings of these studies come - up with inconsistent results with the direction and level of influence the variables impose on household savings decision which are difficult to tally and clearly figure out the determining factors. For instance, according to [18], [21], the effect of education on household savings is negative. But it is explained to have a positive and insignificant influence on household savings in a study by [26]. Likewise, results do not tally when it comes to variables such as age, savings institution preference and family size, which need further estimation to shape our understanding of the determinants of household savings decision.

The other gap in the literature of savings is that, though many studies pertaining to identify determinant factors of household savings decision are available, most micro level studies applied Ordinary Least Square (OLS) [1], [11], [18], [19], [21], [22] and Tobit [14], [20], [26] model as a mechanism to identify determinants of household savings. Using OLS in household level savings data where the likelihood of households to participate results in many zeros causes a biased parameter estimate since the estimated regression line simply fits the scatter of points and does not consider that the data is limited at the value of zero. Although many people assume that Tobit would be the appropriate model to handle this problem, restricting the estimated result in a single parameter estimate by ignoring the two-stage nature of household savings decision is still a key limitation [9]. Cognizant of this fact that household savings involves simultaneous decisions of participation and the amount of savings, using Cragg's Double Hurdle model gives us the flexibility to better understand the determinants of household's savings decisions and overcome these problems. Relying on this methodology, the study tries to identify the behavior and determinants of households' monetary saving decision.

## 2 METHODOLOGY

The study is based on a cross-sectional survey randomly selected 264 household heads from Debre Markos Town in Ethiopia. Accordingly, primary data are collected from households through questionnaires in which

interview was held with the household heads while secondary data is collected to support the study with supplementary information.

The study uses both descriptive and inferential statistics to analyze the data. The characteristics of households and the general savings environment are explained using descriptive statistics supported by t-test and chi-square test to understand group disparity in saving practice. On the other hand, through the application of Cragg's Tobit alternative or double hurdle model, originally developed by Cragg (1971), we tried to identify the determinants of savings participation and the amount of savings decisions of the household.

### 2.1 Model Specification

Savings decision at household level involves two distinct stages of decisions, the participation decision and the amount decision. Different classes of models are suggested to handle such cases. However, the usual OLS method of estimating the coefficients fails spectacularly to show the true results of the household savings decision predictors as the parameters are biased since the estimated regression line simply fits the scatter of points and does not consider that the household savings data is limited at the value of zero at times when households do not save. In view of handling the presence of many zero values in the data, most econometric literatures suggest the use of the Tobit model as a better alternative than the previous model. Nevertheless, the key limitation of the Tobit model is that, it is too restrictive in a way that a single mechanism governs the household's participation decision on saving practice and the amount decision, i.e. the coefficient of 'x' predictors [9] [28]. Given this estimation and restriction problems, the study used Cragg's double hurdle or Tobit alternative model. The model provides the opportunity to overcome these problems and handle better both the discrete and continuous savings decisions to understand determinants of household savings.

The double hurdle model to understand the two-stage savings decision of households given a set of predictors can be specified by using different latent variables for each decision process [12],[28], with a Probit model to determine participation decision and a truncated normal model to determine the savings amount decision.

Therefore, the model can be specified as:

$$\begin{aligned}
 y_{*11} &= w_i a + u_i \dots\dots\dots \text{Participation decision} \dots\dots\dots 1A \\
 y_{*12} &= x_i \beta + v_i \dots\dots\dots \text{Savings amount decision} \dots\dots\dots 1B \\
 y_i &= x_i \beta + v_i \dots\dots\dots \text{If } y_{*11} > 0 \text{ and } y_{*12} > 0 \dots\dots\dots 1C \\
 y_i &= 0 \dots\dots\dots \text{Otherwise} \dots\dots\dots 1D
 \end{aligned}$$

Where:

- $y_{*11}$  = A latent dependent variable representing the household's participation decision in the practice of savings
- $y_{*12}$  = A latent dependent variable representing the household's decision on amount of money to save
- $y_i$  = is the observed dependent variable
- $w_i$  = is a set of variables that explain participation decision of households on the savings practice
- $x_i$  = is independent variables that explain household decision on magnitude of savings
- $u_i$  and  $v_i$  = are independent normally distributed random terms for the participation and amount decision models respectively

The parameters of the model are estimated by using maximum likelihood technique with a log likelihood given as follows.

$$\mathcal{L}\mathcal{L}_{\text{Double Hurdle}} = \sum_0 \ln[1 - \Phi(w_i \alpha) \Phi\left(\frac{x_i \beta}{\sigma_i}\right)] + \sum_+ \ln[\Phi(w_i \alpha) \frac{1}{\sigma_i} \phi\left(\frac{y_i - x_i \beta}{\sigma_i}\right)] \dots\dots\dots (2)$$

Moreover, the four values of interest which include the probability of savings equals to zero given 'w' predictors, the probability of positive savings given 'w' predictors, the conditional expected value of savings given savings is positive and the overall expected values of savings unconditional on the value of savings given the 'x' predictors can be calculated for the samples using the estimated model.

The estimated parameters of the model cannot be interpreted directly, rather the marginal effects shows interpretable magnitude of predictors effect. Hence, the marginal effect on the probability of a positive savings value, the conditional expectation of savings and the unconditional or overall expectation of savings were determined as follows respectively.

$$\frac{\partial P[y_i > 0 / x]}{\partial x_j} = a_j \phi(w_i a) \Phi\left(\frac{x_i \beta}{\sigma_i}\right) + \beta_i \Phi(w_i a) \phi\left(\frac{x_i \beta}{\sigma_i}\right) \dots \dots \dots (3)$$

$$\frac{\partial E[y_i > 0, x]}{\partial x_j} = \beta_j - \beta_j * \left[ \frac{\phi\left(\frac{x_i \beta}{\sigma_i}\right)}{\Phi\left(\frac{x_i \beta}{\sigma_i}\right)} \right] * \left[ \frac{x_i \beta}{\sigma_i} + \left( \frac{\phi\left(\frac{x_i \beta}{\sigma_i}\right)}{\Phi\left(\frac{x_i \beta}{\sigma_i}\right)} \right) \right] \dots \dots \dots (4)$$

$$\frac{\partial E[y_i / x]}{\partial x_j} = \frac{\partial P[y_i > 0 / x]}{\partial x_j} * E[y_i / y_i > 0, x] + \frac{\partial E[y_i > 0, x]}{\partial x_j} * P[y_i > 0 / x] \dots \dots \dots (5)$$

As a micro level effort to assess household savings behavior, the variables used in the study with their expected sign are presented in Table 1.

Table 1: Description of Variables and Expected Signs

Variables	Description of variables	Measurement	Expectation
<b>Dependent variables</b>			
Participation decision	Whether the households save or not	Dummy variable	
Decision on the amount of savings	Average monthly savings of the household	Continuous	
<b>Independent Variables</b>			
Income	Average monthly income of the household head	Continuous	+
Occupation	Primary occupation of the household head	Categorical	+/-
Distance	Distance of the household living area from nearest formal savings institution	Continuous	-
Availability of remittance	The amount of remittance received per month	Continuous	+
Marital status	Dummy variable 1= married and 0= unmarried	Dummy	+
Educational Level	Educational level of the household head in years of schooling	Continuous	-
Average household education	Average educational level of the family members in years of schooling	Continuous	+
Age of the household head	Age of the household head	Continuous	+
Sex of the household head	Dummy variable 1= if HH head is male 0 if the HH head is female	Dummy	-
Family size	Number of individuals in the household	Discrete	-
Preference of savings institution	Dummy variable 1= if the HH prefers formal institutions and 0= otherwise	Dummy	+
Perception of incentives	Perception of the household head on the attractiveness of incentives for household savings by formal savings institutions. 1 if yes and 0 otherwise	Dummy	+

### 3 RESULTS AND DISCUSSIONS

#### 3.1 Households' Participation and Amount of Savings Decision

Savings in Debre Markos town is practiced in both formal and informal savings institutions. First hand descriptive statistics result indicated that from the total samples of the study, 150 (57%) of the households are observed to have a positive savings while the rest 114 (43%) of the households are not participating in saving practice. The level of participation and savings amount decision by the households varies greatly with respect to the demographic, social and institutional related characteristics.

Table 2: Household savings participation and  $\chi^2$  test of independence

Background characteristics	Savings Participation				$\chi^2$ test	p-value
	1		0			
	N	Percentage	N	Percentage		
<b>Sex</b>						
Female	71	64.5	39	35.5	4.69	0.032
Male	79	51.3	75	48.7		
<b>Marital Status</b>						
Married	105	56.1	82	43.9	0.12	0.733
Unmarried	45	58.4	32	41.6		
<b>Type of Occupation</b>						
Government Employee	18	47.4	20	52.6	27.71	0.000
Private Employee	69	46.3	80	53.7		
Self-Employee	63	81.8	14	18.2		
<b>Preference of Savings Institution</b>						
Formal	45	38.1	73	69.9	30.35	0.000
Informal	105	71.9	41	28.1		
<b>Perception on Attractiveness of Incentives on Household savings</b>						
Yes	38	45.8	45	54.2	6.01	0.014
No	112	61.9	69	38.1		
<b>Overall Participation Decision</b>						
Total	150	56.82	114	43.18		

Table 2 clearly depicts that female household heads, married ones, self-employed households, household heads that prefers to save in informal savings institutional structures and households that perceive the incentives by formal savings institutions is less attractive participate more in the savings practices than their counterpart group categories. The  $\chi^2$  test signifies the statistical significance of the variability in the level of participation in savings is clearly dependent on the observed background characteristics of household heads except the case of marital status.

The other perspective, decision pertaining to the amount of savings is wide-ranging among the households. It ranges from zero savings to the highest amount of 6500 ETH Birr on average per month for the whole sample while the minimum value becomes 50 ETH Birr for the truncated sample.

Table 3: Households amount of savings and t-test of mean difference

Background characteristics	Total Respondents					Respondents with observed savings					
	Descriptive Statistics			t-test statistics		Descriptive Statistics			t-test statistics		
	Sex	N	Mean	SD	MD*	t	N	Mean	SD	MD*	t
Female	110	720.1	1,148.4			71	1,115.6	1,267.3			
Male	154	1,177.9	1,555.3	- 457.9	-2.6	79	2,296.2	1,464.3	- 1180.6	-5.3	
<b>Marital Status</b>											
Unmarried	77	764.7	1,157.5			45	1,308.4	1,259.5			
Married	187	1,078.7	1,502.9	-314.1	-1.6	105	1,921.2	1,550.9	-612.8	-2.3	
<b>Institutional Preference</b>											
Informal	146	1,426.9	134.9			105	1,984.1	157.1			
Formal	118	443.0	75.5	983.9	5.97	45	1,161.7	144.2	822.4	3.2	
<b>Perception on Attractiveness of Incentives</b>											
No	181	1,246.9	112.2			112	2,015.2	137.99			
Yes	83	420.5	107.3	826.4	4.6	38	918.6	208.21	1096.6	4.1	

\*Note: MD = Mean Difference in savings amount

Considering the group difference in savings amount decision as presented in Table 3, the mean monthly savings amount of male household heads in contrary to their participation decision, married households, those household heads that prefer to save in local informal savings structures like “Equb, Edir” and household heads that perceive incentive for savings in formal financial institutions are less attractive is much better from their respective categories for the whole samples as well as truncated samples. The t-test of mean difference in savings amount between groups testify the presence of significant mean difference based on household head’s sex, preference of savings institutions and perception of incentives attractiveness for the total and truncated samples. On the other hand, the mean difference is only significant for households with observed savings in the case of marital status.

### 3.2 Econometric Results

The Double hurdle model applied basically assumes conditional independence of hurdles, homogeneity or normality of error terms and a truncated normal distribution of the dependent variable with parameters that vary freely from those in the Probit model of participation [28]. The savings amount decision and the error terms from the participation and magnitude models examined for the fulfillment of assumptions using normal probability plots and other methods where results are found to be in line with the assumptions. On the other hand, the application of Wald Chi-square test to examine the overall fit of the model specification testifies the joint explanatory power of variables in the model with a chi-square test statistic of 941.32 significant at 1%.

Looking further, one of the viewpoints is that savings involve two-stage decision on participation and magnitude, the use of Tobit restricts and biases parameter estimates. The uses of likelihood ratio test of nested model also witnessed the advantage of using a double hurdle model over Tobit model.

Table 5: likelihood ratio test of Tobit vs. Cragg’s Double Hurdle models

<b>Likelihood ratio test</b>	
Restricted (H0):	
Tobit Log-likelihood	-1241.48
Unrestricted (H1):	
Cragg's Double Hurdle Log-likelihood	-1192.49
Test statistic:	
(-2*(Restricted-Unrestricted))	97.96
Critical value 5%	23.68
P-value	0.0000

The results of the test as shown in Table 5 favors the use of double hurdle model and rejects the restrictive assumptions implied by the Tobit model with a significant test statistic at 1% level. The rejection of null hypothesis enables to accept the notion that participation and savings amount decisions of households may not pass through the same underlying process to support the appropriateness of using the double hurdle model to handle the two stage household savings decisions.

The result also supports the conditional independence assumption of the participation decision and amount decision models as the test result favors the two-stage estimation and it is clearly evident in the coefficients of some variables like age, sex, average educational status of the household and perception on incentives which differs in the direction as well as the magnitude of influence on the two decision stages of household savings.

Moreover, another key point in working with the double hurdle model is the need for imposing exclusion restrictions in the savings participation decision equation where the economic literature provides no base as decision criteria. Exclusion restriction is hard to come by since it is difficult and arbitrary to find something affecting savings participation and have no influence on amount decision [28]. The economic literature also does not provide any reference though different applications tried their own way [16]. Consequently, the study applies a likelihood ratio test to give an impression of the need for exclusion restriction. Restriction on the parameters of the household savings participation model is made possible by excluding economic variables of income and remittance to test the parameter of the predictors is zero.

Table 6: likelihood ratio test of exclusion restriction in the Double Hurdle model

<b>Likelihood Ratio Test</b>	
Restricted (H0):	
Restricted model Log-likelihood	-1237.19
Unrestricted (H1):	
Full model Log-likelihood	-1192.49

Test statistic: (-2*(Restricted-Unrestricted))	89.39
Critical value 5%	5.99
P-value	0.0000

The likelihood ratio test result in Table 6 confirms that restricting the model by removing these two variables did not help in improving the model fit. In contrary, it reduces the fit of the model as the test favors the full model with a calculated Chi-square value higher than the corresponding critical value at 1% level of significance.

### 3.2.1 Probabilities and Expected Values of Household Savings

The fitted Cragg’s double hurdle model provides us the possibility to discover the probabilities and expected values of saving based on the estimates of the participation and saving amount decision equations. First, the probability of households to have a zero savings given the predictors in the participation decision model was derived from:

$$P[y_i = 0 / x_{1i}] = 1 - \Phi(x_{1i}\gamma) \dots \dots \dots 6$$

Based on such estimates, the propensity of the household heads to have unobserved savings is 0.435 with a bootstrapped P-value of 0.000 at 150 replications. Even though this probability is less as compared to the probability of positive savings, given savings serves as a means of security as well as investment efforts, the proportion of households with zero savings is still higher in the study area. The result is consistent with the findings which put savings culture in Ethiopia as very poor and households tend to have a low habit of saving, as they regularly concentrate on purchasing of physical assets as a means of security [4]. Moreover, qualitative arguments indicate that absence of surplus money beyond consumption expenditure due to low income status, less attractiveness of putting money in cash as it constantly depreciates in value and absence of financial planning habits for expenditure and saving practices are the prominent reasons explaining the relatively higher probability of non-participation.

On the other hand, the probability of the household saving decision to be positive from the participation decision equation was computed using:

$$P[y_i > 0 / x_{1i}] = \Phi(x_{1i}\gamma) \dots \dots \dots 7$$

The result shows that the probability of household head’s to be observed as a saver is about 0.565 with a bootstrapped P-value of 0.000. Given this statistic, most of the respondents have a little bit better probability to be observed as savers. Though savings culture is low as compared to other developed and East Asian developing countries, the slightly better situation of savings practice observed in this study could partly relate to the urban living environment where most of the dwellers struggle to make life better through different mechanisms in which savings is one. From individual’s perspective a wide range of theoretical explanations as motivating factors of savings were provided [8]. Even though, different reasons become visible, qualitative reasons forwarded gives a clue that precautionary and bequest motive from the list of theoretical explanations are the dominant theoretical basis to explain motivating factors of households’ saving decision in the study area.

Looking into the expected values, the expected value of savings conditional on the households’ savings decision being observed as positive from the magnitude decision equation was derived from:

$$E(y_i | y_i > 0, x_{2i}) = x_{2i}\beta + \sigma \times \lambda(x_{2i}\beta/\sigma) \dots \dots \dots 8$$

The result demonstrates that the conditional expected mean value of savings for the household heads is 1228.69 (0.000) Ethiopian Birr per month, which is significant at 1% level. The conditional mean is pretty less than the truncated sample average monthly savings of the respondents’ i.e. 1737.37 Ethiopian Birr. This is because, although both of them rely on the observed savings situation the former one is exposed to conditioning further

by social, economic and demographic characteristics ( $X_2$ ) of the households to give a better intuition of the real savings performance.

Generally, the unconditional expected values of household savings given all the social, demographic, institutional and economic predictors of the household participation and saving decision as well as the probability of a positive value in the study:

$$E(y_i | x_{1i}, x_{2i}) = \Phi(x_{1i}\gamma) \{x_{2i}\beta + \sigma \times \lambda(x_{2i}\beta/\sigma)\} \dots \dots \dots 9$$

The overall expected savings value for the sampled household heads computed using the above stated function is 981.19 Ethiopian Birr which is significant at 1%. Hence, the result indicates that considering all situations in the saving process household head's from the study area is expected to save 981.19 ETH Birr on average per month which can be further decomposed into different target groups to get a better impression of the group variability.

### 3.2.2 Determinants of Household Savings Decisions

The coefficients from maximum likelihood estimates of Cragg's double hurdle model are the vectors of predictors of the households' likelihood of participation and magnitude of savings. Since the estimated coefficient of this model is based on the latent dependent variable the magnitude of the maximum likelihood estimates are not directly interpreted, rather it is better to depend on marginal effects in such cases. In the meantime, the sign and the level of significance appeared in these estimates can be naturally interpreted to identify the determinant factors of savings participation and magnitude decisions.

Starting with the observed influence of economic variables, average monthly income of households significantly (p-value = 0.000) and positively affects the households' propensity to save as well as the amount of money they save. Households with the opportunity to get better mean monthly income have a relatively high probability of savings participation. The result is consistent with most literatures on household savings. For instance, at the micro level presents similar finding that income positively affects the household savings. Whereas, the situation in the case of remittance is somewhat different in which the variable is found to be significant only to determine savings amount decision positively at 1% level of significance. This is partly due to the fact that a smaller number of participants are likely to have access to get remittance form abroad, which would have a larger effect on magnitude than participation.

Among the demographic predictors of savings participation and magnitude of household savings age of the respondents negatively affects the likelihood of participation in savings (P = 0.000). Likewise, it is found to be a significant (P= 0.027) explanatory factor for the amount of money saved by the households, though the direction of influence goes to the opposite to have a positive effect. The hurdle model allows the direction of influence exerted by age to be different for the two-stage decision of household savings. The observed low level of participation among respondents with higher age group and the reverse high magnitude of savings could be linked to the fact that when individuals get older they are exposed to more experience resulting in more pays as employees and or involvement in much profitable activates as self-employed persons coupled with the advantage of being calm in their overall living situation. In this regard, a study forwarded that in most micro economic evidences, it is difficult to observe clearly elderly people dis-save because of their old age as they tend to practice savings with better experience which is in line with the findings of this study [17]. As well, findings from another study shows age is positively related to savings of individuals with a justification that age specific factors of savings motivations as a possible view point to explain the pattern [11].

The other demographic factor, family size, has a significantly negative influence on the probability of households' participation in savings and the amount of money they save at 5%. This is partly linked to the fact that having a relatively larger family size tends to divert the attention of the households more on the fulfillment of consumption expenditures for sustenance rather than savings for emergency and life changing development investments. The estimated results of the study tally with the hypothesized effect and the results

of most household level researches as where they found an inverse relationship of savings and family size [11], [21], [23].

Sex of the household head, on the other hand, follows a different direction of effect on the household heads savings participation and magnitude decision. As a discrete indicator, being male negatively and significantly affects the likelihood of participation in the saving practice while those participated male household heads are likely to save a higher amount of money than female household heads. This can be a strong manifestation of women’s empowerment and interventions in the study area. Even though, many institutions and the government claimed increased participation of women in every aspect of value adding economic activities as well as social engagements their real empowerment is not as such significantly improving as they are mostly unable to save more other than their spending to support family businesses. Different studies end up with varied results, one evidence found a result to support this finding that women’s participation is better than men as a manifestation of their conservative decision regarding investment [26]. On the other hand, supporting the presence of higher savings amount among men’s another evidence found that even if women tend to have a better participation opposite result is observed when the interaction of gender and income is considered where men are observed to have a positive savings coefficient [1].

Table 7: Maximum likelihood estimates of the Double Hurdle model on household savings decisions

Variable	Participation		Savings Amount	
	Coef.	P-value	Coef.	P-value
Age	-0.0433	0.000**	22.351	0.027*
Average Monthly Income	0.0010	0.000**	0.394	0.000**
Average Monthly Remittance	0.0090	0.000**	0.235	0.006**
Educational Status	-0.0930	0.008**	-39.992	0.027*
Family Size	-0.1680	0.018*	-116.426	0.003**
Average Educational Status of the household	0.1149	0.027*	-0.513	0.982
Distance from nearest formal savings institutions	-0.1266	0.205	88.849	0.107
Sex (Male = 1)	-1.0367	0.000**	338.719	0.012*
Marital Status (1= Married)	0.2065	0.486	41.552	0.790
Preference of savings institutions (1=Formal)	-0.9398	0.001**	-320.860	0.020*
Perception on Attractiveness of incentives (1=Yes)	1.1557	0.001**	-405.952	0.024*
Occupation= Private employee Dummy	-0.3745	0.317	1094.166	0.001**
Occupation= Self Employed Dummy	0.0702	0.877	1241.860	0.001**
Constant	1.44468		-1592.929	
Number of obs.	264			
Pseudo log likelihood	-1192.493			
Wald chi2(13)	448.96 (0.000)			
Sigma	628.5282 (0.00)			

P-value significant at \*5% and \*\*1% level of significance

Occupation base category= Government employee dummy

Looking forward, household head’s educational status is more likely attributed to have a significant negative direction of influence, at 1% and 5% level of significance, on both saving participation decision and the amount of money households do save. As the study area is found to be in an urban location with better educational background, educated persons are concerned about their living standard, which makes them to spend more on life improving and daily consumption needs of their household and associated children educational spending. Another perspective in this regard is that this situation is partly due to the longer trend where the more the person educated, the higher the probability of him or her to be a government recruit which is found to be among the low saver target groups. Similarly, a study come up with the same result that educated household

heads spend more on their children's education and wish to provide higher studies which pave the way for more spending and less savings behavior to be observed [21]. In contrary to this result, average educational status of the whole household members is seen to have a significantly positive effect on the participation decision of the households' saving process at 5% level of significance. The tendency of the household head to have a positive participation increases when the family members are educated since the burden of dependency diminished to some extent as a result of possible income sharing for consumption expenditures.

The other variables with a partial effect on saving decision of households include self-employed and private employee's dummy which have a significant positive effect on the savings amount decision. The result brings into light that with reference to households with government employment both self-employed and private organization employees have higher amount of savings. The low magnitude of savings manifested could be partly attributed to their perception of that pension payment contribution that can be used as a social security for retirement and partly because their salary payment is low as compared to the current level of living standard. Though little empirical evidence is available on this variable a study revealed that self-employed households save more money because of continuous flow and more uncertain nature of their income [4].

Furthermore, the institutional related variables included in the model, preference of savings institutions and perception of incentives for household savings in a formal financial institution, significantly affects the likelihood of savings participation and amount decision in different directions. It revealed that those households who prefer to save in formal financial institutions like banks are less likely to participate in savings and save a smaller amount of money than those who prefers to save in informal local financial savings structures like '*Equib or Mahiber*'. This may be possibly linked to the basic consideration of the households that savings in informal structures are more flexible and responsive to their need. They are easily accessed in time of emergence and investment as they are collected and drawn in a round based lottery system. The result is also an indication of the huge amount of money mobilized out of the formal system.

Finally, as a new addition to the economic literature of household saving behavior variable representing perception of attractiveness of incentives for savings in formal institution tends to have a positive significant deterministic power on savings participation. On the other hand, those with good expectation are observed to have a decreased amount of savings. This may be associated with the fact that most of them are found in the lowest income quintile and with relatively moderate educational status which are mostly linked to lower savings behavior.

### 3.2.3 Estimated Marginal Effects

The effect of explanatory variables on household saving decision cannot be understood and interpreted sensibly by using directly the coefficients from the maximum likelihood estimates. The marginal effects in this regard provide a better insight. They can also be further decomposed into three parts to show the average partial effect of explanatory variables on the probability of positive savings, conditional expected value of saving and unconditional expected value of savings among households.

Looking into the marginal effect of independent variables on the probability of savings to be observed as positive for the households' preference of savings institutions and the perceived attractiveness of incentives for household savings in a formal financial institution contribute highly in decreasing and increasing the average likelihood of positive household savings respectively. Keeping other variables controlled, the propensity to have a positive savings value decreases on average by 12.04% for those who prefer formal savings institutions to save their money. National evidence put forward informal savings are widely practiced in Ethiopia across all social groups to offset the practice of savings in formal financial institutions [2]. On the other hand, the likelihood of positive savings increases on average by 14.8% if the household perceived incentives for household savings at formal institutions is attractive. This average variation in the likelihood of positive savings clearly sets that the participation decision of households is highly sensitive to the financial institutions related factors.

The sex of the household head is also significantly tied to the higher propensity of savings. Female respondents possess on average 13.3% higher probability to have a positive savings value than male household heads, keeping all other variables constant. This may be taken as a reflection of their intention to have better savings participation decision. In supporting this premise, a study points out that female labor participation is usually determined to have a positive effect on savings behavior [6].

In this study, family size, educational status, age, average monthly income and remittance are found to have a significant moderate to low level of marginal effects on the probability of positive household savings on both directions of influences. For instance, family size and educational level inversely affect the likelihood of observed savings. An increase in the value of these regressors will lead to a proportional decrease of 2.2% and 1.2% in the probability of the household to have a positive savings value. Studies also associate the negative effects on the probability of positive savings to the higher consumption expenditure of large families, better living standard expectation of educated persons, higher investment on children and higher likelihood recruitment than doing their own business, utmost linked to low level of savings practice [11], [21], [23].

Table 8: Marginal effect estimates on households’ savings decisions

Variable	$P[y_i > 0   x_1]$		$E[y_i   x_2, y_i > 0]$		$E[y_i   x]$	
	Coef.	P-value	Coef.	P-value	Coef.	P-value
<b>Age</b>	-0.0055	0.0000	13.3240	0.0440	5.6070	0.1760
<b>Average Monthly Income</b>	0.0001	0.0000	0.2350	0.0000	0.2580	0.0000
<b>Average Monthly Remittance</b>	0.0012	0.0010	0.1400	0.0300	0.8980	0.0000
<b>Educational Status</b>	-0.0119	0.0080	-23.8410	0.0450	-25.1640	0.0020
<b>Family Size</b>	-0.0215	0.0360	-69.4060	0.0020	-64.1460	0.0010
<b>Average Educational Status of the household</b>	0.0147	0.1130	-0.3060	0.9840	9.9850	0.4080
<b>Distance from nearest formal savings institutions</b>	-0.0162	0.2430	52.9660	0.1500	26.3260	0.3310
<b>Sex (Male = 1)</b>	-0.1328	0.0000	201.9230	0.0280	51.1620	0.4080
<b>Marital Status (1= Married)</b>	0.0265	0.5170	24.7700	0.8170	35.9080	0.6310
<b>Preference of savings institutions (1=Formal)</b>	-0.1204	0.0000	-191.2760	0.0260	-	0.0010
					219.1200	
<b>Perception on Attractiveness of incentives (1=Yes)</b>	0.1480	0.0020	-242.0030	0.0200	-69.0240	0.3820
<b>Occupation= Private Employee Dummy</b>	-0.0480	0.3890	652.2720	0.1120	429.3800	0.0950
<b>Occupation= Self Employed Dummy</b>	0.0090	0.8980	740.3180	0.0010	531.3220	0.0030

Occupation base category= Government employee dummy

Concerning the marginal effects on conditional and unconditional expected values of savings, a unit change in the respondents’ age, average monthly income and remittance will result in an associated positive increment of 13.32, 0.24 and 0.14 Ethiopian Birr on the conditional expected value of savings respectively. Except age the other two variables impose a 0.26 and 0.90 unit improvement on the overall expected value of savings. In relation to these, studies also come up with the same finding that improved income results in increased household savings amount [10], [23], [26].

On the other hand, educational status of the household head, family size and preference of savings institution significantly and negatively affect the conditional and unconditional expected values of savings. The result made it clear that an increase in family size and educational status will result in a decrease of 25.16 and 64.15 Ethiopian Birr in the overall savings amount of the household respectively, keeping other variables constant. Whereas, the effect of preference of savings institution is much larger where a discrete change of preference to save money from informal savings institutions to formal once reduces the overall expected value of money to be saved by 219.12 Ethiopian Birr. This can be seen as a manifestation for widespread and common practice of mobilizing money outside of financial institutions which is a usual feature of the study area since most households consider it as flexible and need responsive.

Much larger differences in expected value of savings was observed when the household is self-employed. Table 8 depicts that with reference to government employees self-employed household heads have on average 531.32 Ethiopian Birr higher amount of overall expected value of savings. The involvement of self-employed household mostly in commercial activities and higher expectation of uncertainty in their income could be linked to the higher expected savings value.

Finally, variables like age, sex, perception of attractiveness of incentives for household savings in formal savings institutions and private employment dummy are found to pose sizable effect on the probabilities as well as conditional expectations when considered independently, but turned out to be insignificant when overall situations are considered to have inconclusive effect as can be seen from the result.

#### 4 CONCLUSIONS

Household savings contribute a lot to capital formation. Thus, in order to mobilize financial resources for capital investment, there should be a nuanced understanding about the behavior of households' saving decision in response to diversified social, economic, demographic and institutional factors using robust approaches. With this backdrop, the study found that the propensity to have a zero savings value,  $p = 0.43$ , is still an indication to the fact that many households do not have a savings culture and lack planning for regular savings for their emergency and investment need.

The study also demonstrates that economic variables i.e. income and remittance tend to have a greater positive magnitude of influence on the expected values of savings than on the probability to have a positive savings participation. Likewise, due to household heads involvement in business and diversified activities self-employment is linked to enhanced expected values of savings amount. On the other hand, family size and educational status tend to lower both probabilities and expected values of savings as a result of higher consumption expenditure, children related spending and better living standard expectation. Moreover, although female household heads participate more in savings practice the amount they save is far less significant than males. Age of the household head also affects the probabilities and expected values of savings in different directions where young aged household heads possesses better probability to participate in the saving process while the magnitude of their savings is lesser as compared to adults and old age household heads. Astonishingly, the study also found a strong link between household savings decisions and the institutional preference of households for saving their money which urges for target savings mobilization and strategies to attract money circulated in the informal institution.

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