

The Welfare Impact of Household Loans: An Analysis for Ghana

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Abstract In recent times, household loans, which is a tool for development for most households have gained much importance especially in developing countries. This can be attributed to the fact that they are likely to have a significant impact on the welfare of the households. This study provides evidence on the impact of household loans on the welfare of households in Ghana. The study also examines the factors that influence the probability that households will have access to loans. Data for the empirical analysis are obtained from the sixth round of the Ghana Living Standards Survey (GLSS6). The study employs the Heckman probit, a probit model with sample selection, to determine the factors that influence the probability that households will be granted loans. The analysis reveals that 90.6% of the total household heads who applied for loans were granted and determinants such as marital status (previously in a union) and educational level (tertiary level) of the household head influence the probability that loans will be granted to households. The propensity score matching (PSM) technique is used to analyse the impact of household loans on household welfare. The analysis shows that household loans have a positive and significant impact on household welfare.

Keywords: household loans, welfare, propensity score matching, heckman probit, well-being

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1. Introduction

The role of financing is particularly important in improving the well-being of the household. Some households, particularly those in the rural areas are financially constrained and the lack of access to finance constitutes a significant constraint to improving the living standards or welfare of those households. Individuals, regardless of their income, can distribute their consumption in an appropriate manner irrespective of their current income and this can be possible by borrowing [1]. In addition, for individuals whose wages are not increasing, in order to maintain their standard of living, they rely on borrowing. A broader access to credit removes the constraint associated with income and increases the purchasing power of individuals in the middle-low income groups [2].

Obtaining loans from the banks and other financial institutions by households may be difficult considering the requirements to qualify for the facility including the demand for collateral. Therefore, the informal credit often takes care of poor households and borrowers in the rural areas who cannot meet the requirements demanded by formal financial institutions. These informal credits are from sources such as family/friends, money lenders, employer, suppliers/customers. Access to credit, enable the individual or households to smoothen consumption

even when their incomes vary. It also helps them to engage in activities that will increase their value and move them out of poverty [3].

Household debt in the broader sense can be detrimental to economic growth. However, when households borrow to finance their expenditure, consumption increases thereby, improving economic growth in the long run. Ref [4] have shown that although borrowing stimulates the economy, high levels of debt may restrict spending in future and slow economic growth. When banks find out that households are not creditworthy, they impose credit constraints that deter households from borrowing. Although lack of credit collateral prevents households from getting access to credit, other reasons why a household will not borrow is when it has lost trust or confidence in the banking system because of imperfect credit system or high transaction cost governed by asymmetric information. Also, when the interest rates on loans increase, households will reduce their consumption and will rather re-allocate funds to repaying their debts. A poor household, with constraint income which does not borrow, cannot smooth its consumption and its standard of living will continue to be low.

Ref [5], although there has been significant improvement in the provision of credit by microfinance institutions, there are still other ways in which the provision of credit can further be improved. [6] argued that poverty reduction in developing countries is better explained by understanding how the financial institutions, whether formal and informal

work and also by the determinants of household's access to credit. In addition, the impact of credit has been assessed on various indicators of well-being such as household investment, income, physical infrastructure, healthcare [7]. But income measures of poverty do not define the meaning of poverty by economists and that, poverty is best defined by using consumption. Moreover, [8] made mention of the fact that the household standard of living can be understood from the pattern of consumption and that consumption is an important measure of the household welfare level.

As a result of endogeneity and self-selection problem, evaluating the impact of credit has become a problem and agreement has not been reached on the suitable method for its estimation yet [9]. For instance, the fact that a household that takes a loan perform better than a household that does not take a loan does not mean that taking the loan has a positive effect. It could rather be due to exposure of the performing household to certain resources that the other household lacks, such as good roads, good transportation system, good educational system, low dependency ratio, etc. To know the actual effect of credit, the problem of endogeneity due to non-randomness of the observations, the problem of self-selection, resulting from the process of granting a loan and other unobserved characteristics should be controlled.

A number of econometric methods have been used in estimating the impact of credit and different outcomes have been achieved. Ref [10] used fixed effect cross-sectional analysis to analyze a household data from Bangladesh using landholding size to create a control group. Ref [11] looked at the impact of credit but those that consider the endogeneity problem are few. Studies have been done on the determinants of credit in Ghana [7] and the impact of credit on some wellbeing indicators for various groups including farmers [12]. Others looked at the impact of microfinance and the determinants of credit from microfinance institutions [13]. To the best of our knowledge, though there has been works on household loans in Ghana [3] there has not been any study that considered the factors that influence the probability that households will be granted a loan and assessed the impact of the loans on household's total consumption expenditure in Ghana. This study adds to existing literature by looking at the factors that influence the probability that households will be granted a loan and further look at the impact of loans on household well-being by using household consumption expenditure as a proxy for welfare. The objective of this study is to examine the factors that influence the probability that households will be granted a loan, and to estimate the impact of household loans on household wellbeing in Ghana.

2. Literature Review

Wellbeing or welfare is assumed to be derived from income and consumption [14]. Just as in [7], wellbeing is based on microeconomic growth particularly household consumption expenditure, which is related to measures of poverty. The wellbeing of a household is a state whereby a household has a good standard of living. One of the indicators of individual and social welfare is household

expenditure [15]. According to [16], since income in developing countries is not reliable and stable, consumption expenditure represents a good measure of the welfare of a household. One institution that is concerned about the development of a country and reducing the severity of poverty leading to improvement of the wellbeing of its citizens or members is microfinance [17]. A microfinance institution has an objective of providing loans for poor individuals or households constrained by borrowing from banks or other financial institutions. It helps improve the well-being of poor households. Although its aim is to provide credit by the rural poor, any household or individual can access micro-credit from the microfinance institution. Credit from microfinance source helps to reduce the extent of poverty in a country by enabling poor households to smoothen their consumption if not to increase it and also to venture into profitable businesses which will provide them with income.

2.1. Trend of Credit in Ghana

The supply of credit facilities by domestic financial institutions as a percentage of GDP from 1988 to 2017 is presented in Figure 1. From the figure, the provision of credit by domestic financial institutions has not been stable, though an upward trend can be perceived. Starting with a percentage of approximately 20.5% in 1988, an approximate 0.647% increase in 1989 was followed by successive falls till it got to 16.38% in 1991. Subsequently, there was fluctuations till the highest percent (39.3%) was realized in the year 2000. After a drop to 21.10% in 2006, an upward trend was observed till 38.2% was achieved in 2014 which was succeeded by a downward trend ending with 30.55% in 2017.

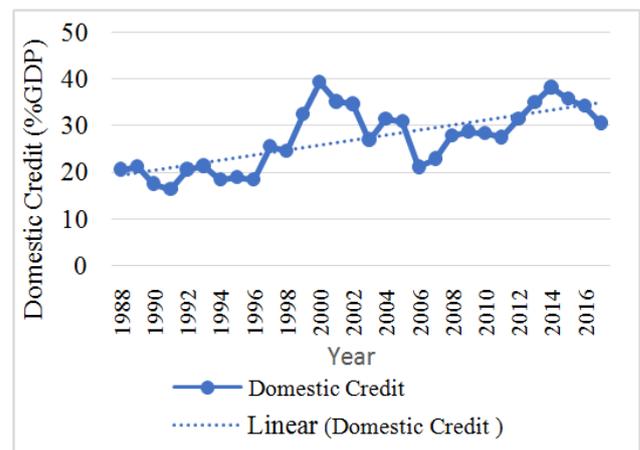


Figure 1. Trend of Domestic Credit by Financial Sector in Ghana

The trend of non-performing loans as a ratio of gross loans over a ten-year period (2008-2017) is depicted in Figure 2. In 2008, a non-performing loan ratio of approximately 7.7% was recorded. This subsequently increased to 18.1% in 2010. The ratio successively experienced a downturn from 2011 to 2014. However, an upward trend was recorded in the subsequent years till it reached 21.59% in 2017, the highest over the period considered. Generally, an upward trend can be observed in the ratio of nonperforming loans to gross loans over the periods considered in this analysis.

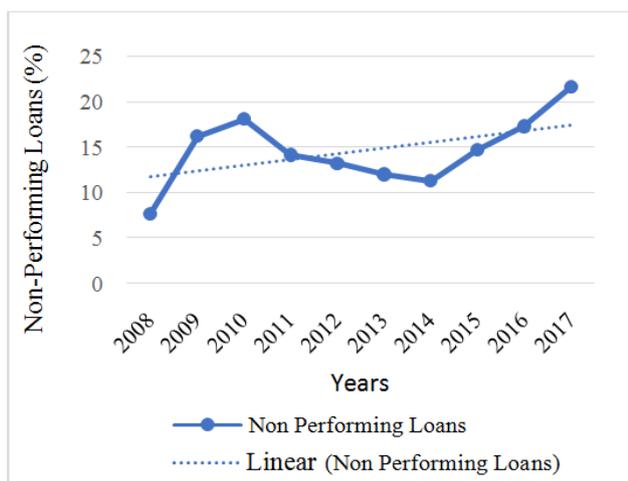


Figure 2. Trend of Non-Performing Loans in Ghana

2.2. Empirical Literature

2.2.1. Studies on Determinants of Access to Credit

Ref [18] observed that because men own assets that are used as collateral when applying for loans, they are more likely to demand credit than their female counterparts who do not have access to these assets. However, on the part of [19] most of the credit institutions have been set up with women as their focus by providing credit to them and based on that most women take advantage of these credit systems and demand credit more than men with the view that they are vulnerable and disadvantaged as compared to men. Also, [20] indicated that households with low educational levels try to avoid going in for credit since more documents are required to be filled. Households with higher levels of education tend to borrow more at younger ages [21]. Since the requirements of getting access to credit include being able to prove that one has good records of doing business, those who are literate are more likely to borrow because they put down records and therefore there is a high probability that they will be granted the loan [13].

A study by [22] argued that, since productive assets give more opportunities for investment, they increase the probability of demand for credit in the formal institutions. A similar argument by [18] was found. They found that since assets are needed as collateral when demanding for credit, farmers with more assets are more likely to demand credit. Furthermore, the duration of the loan is an important factor that influences access to credit. When the loan takes a long period to mature, more households will demand it. Households prefer credits that have longer maturity periods, not short ones that lenders choose in order to minimize costs.

Also, the purpose of the loan is taken into account so far as granting credit to households is concern. Households should be able to prove that the loan will be used for something profitable that can generate income to enable them to pay back the loan. The households examine which expenditure they need the loan to fund whether education, mortgage, health, and consumption purpose [20]. In addition, most households are granted loans based on their income. Income is sometimes used as a benchmark for households to be able to pay back the

loan. Although collateral is required, income is considered as the wealth of the household and its flow of revenue. According to [20], the probability to participate or demand credit is linked to wealth positively.

2.2.2. The Relationship Between Household Loans and Household Well-Being

There are studies that have shown a positive relationship between financial access and poverty. Ref [3] studied the relationship between receiving credit and poverty reduction in the Upper East region of Ghana among households living in the rural areas. They found out that credit has a positive influence on poverty reduction with microfinance having 0.12% reducing effect on poverty. According to [23], microcredit aids in reducing poverty in the sense that households are able to increase their consumption when they borrow. Other studies have also shown that access to finance increases the severity of poverty [24]. There has been an improvement in household welfare through expansion of rural financial services and this was revealed through a research conducted in Pakistan and India by [25]. Also, [26] revealed that microfinance is an essential instrument for increasing household income and consumption levels, decreasing the severity of income inequality and improving well-being. Some studies have also shown the existence of a positive relationship between household characteristics, borrowing patterns and expenditure levels [27].

Nevertheless, other studies have shown a negative relationship between access to credit and welfare. These studies include [28] who found a limited impact of access to credit on per capita incomes, food security and on the nutritional status of credit program beneficiaries. Ref [29] investigated the impact of microfinance on household welfare in Botswana and found out that, microfinance has no significant impact on the welfare of households but rather found educational level, household assets and being in paid employment in the public/private sector to affect household welfare positively and significantly. Ref [30] also found microfinance to have no significant effect on household welfare.

Ref [31] studied the impact of Microfinance on poverty reduction. The paper aimed to investigate the role of Malaysian microfinance on household income. They found a positive impact of microfinance, which provides credit as an effective tool for poverty reduction and socioeconomic development on household income of women borrowers who spent three years in the scheme compared to borrowers who were new and did not receive any treatment. A study by [27] focused on knowing the relationship between credit and the income of poor households in the rural areas of Vietnam. They observed that the income of the poor has increased by 30% compared to the average income of the households. Credits from formal sources were found to increase the income of the poor by double amount compared to those from the informal sources. Apart from income, credit was found to have a positive effect on education, gender, ethnicity, region and the proportion of non-agricultural income as well. However, negative impacts on health and the size of poor households were found. Ref [32] studied the effect of microcredit on the welfare of women

borrowers in Tanzanian households and found out that households who borrow are able to acquire living houses than those who do not borrow. It was also revealed that those who borrow are able to acquire more households' assets compared to those who do not borrow. The loans were used for financing children education, medical treatments and financing pressing needs like paying the previous debt of the households.

3. Methodology

3.1. Heckman Probit Model

The Heckman selection model is used in a situation where there are two equations and the explanatory variables of the first equation can be observed if only those of the second equation can be observed. That is, if we have two models denoted by Y_1 and Y_2 , the explanatory variables of Y_1 can be observed if and only if those of Y_2 can be observed. In this study, sample selection bias would occur when the unobservable characteristics that determine household's demand for loan (loan application) is correlated with the unobservable characteristics that determine household's access to loan. Failing to include an estimate of these unobservable factors, would lead to incorrect inferences about the observable factors that influence the probability that households will be granted loan (access to loan).

The test used to detect selection bias is the likelihood ratio test. The test is based on a null hypothesis which states that there is no correlation between the error terms of the outcome and selection model. If the null hypothesis is rejected, it means there exists a correlation between both error terms and it will be rejected when the value of the correlation is statistically different from zero which implies there exist a selection bias and this proves the use of the Heckman probit selection method. The Heckman probit model is simple and flexible and provides constituent estimates since it eliminates the specification error of the samples [33].

With reference to the model used by [34], the model used for the estimation is specified below:

$$\text{Demand}_i = \beta_1 \begin{pmatrix} \text{household head,} \\ \text{household characteristics} \end{pmatrix} + \mu_i \quad (1)$$

$$\text{Granted}_i = \beta_2 \begin{pmatrix} \text{household head,} \\ \text{household characteristics} \end{pmatrix} + \varepsilon_i \quad (2)$$

where:

- Equation (1) and (2) represents the selection and outcome equations respectively.
- Granted_i is a variable that is used to estimate the probability that a household will be granted a loan. It is assigned a value of 1 if the household has applied for a loan and the loan has been granted and 0, if the household was not granted. This is the dependent variable for the model of interest which is the outcome model.
- Demand_i is a binary variable that measures the probability that a household will apply for loan. It is assigned a value 1 if the household applied for loan

and 0 otherwise. This represents the dependent variable of the selection model.

- *Household head characteristics* is a vector of explanatory variables that describe the characteristics of the household head that influence both the outcome and selection model. *Household head characteristics* = {marital status, age, sex, employment status, educational level}
- *Household characteristics* is a vector of explanatory variables that represent the characteristics of the household that influence the probability that a household will apply and be granted a loan. *Household characteristics* = {household size, location of the household, income of the household}
- β_i represents a vector of the parameters in both models.
- μ_i is the error term which represents other variables which affect the probability that household will apply for loan, but these variables cannot be observed.
- ε_i is the error term which represent other variables which affect the probability that a household will be granted a loan, but these variables cannot be observed.

The household is observed to have its loan granted if and only if it applied for the loan. That is, if $\text{Prob}(\text{Granted}_i) = 1$ and only if $\text{Prob}(\text{Demand}_i) = 1$. The assumptions underlying this model is that $(\varepsilon_i, \mu_i) \sim N(0,1)$ meaning both error terms are normal and independent of the explanatory variables X_i , and also $\text{corr}(\varepsilon_i, \mu_i) = \rho$ which means there exists a correlation between the error terms.

The selection equation should contain at least a variable that is not present in the outcome variable in order to ensure that the model is well specified. In this case, the number of explanatory variables that influence loan application must exceed the number of explanatory variables that influence whether loan will be granted to ensure a consistent estimation of the parameters of the model. This study includes household location in the selection model since it influences the household decision to apply for a loan, but it does not have a direct influence on whether they will be granted or not.

3.2. Propensity Score Matching (PSM)

The propensity score matching (PSM) method is going to be used for assessing the impact of household loans on household welfare. PSM matches a household that got access to a loan to a household that was not granted a loan by using propensity scores which is the estimated probability of being granted a loan. The average treatment effect can be obtained by comparing the outcome of those who receive the loans to the outcome of those who were not granted the loan. Also, we can obtain the average treatment effect on the treated by comparing the outcome of households that were granted loans to what their outcome would have been if they had not been granted a loan. The propensity score which is defined as the probability of receiving a loan, given observed characteristics of a household is presented formally as below:

$$P(D = 1|X) = P(X) \quad (3)$$

The propensity scores are estimated using logit or probit. And it provides the probability that a household will be granted a loan given their characteristics. We express equation (3) as a probit model as below:

$$\begin{aligned} P(D=1|X) &= P(y^* > 0|X) \\ &= P(u > -X\beta|X) = 1 - G(-X\beta) = G(X\beta) \end{aligned} \quad (4)$$

Since equation (4) is non-linear, it is estimated using a maximum likelihood estimator. Where $0 < G(X\beta) < 1$ for all values of X

$$X\beta = \sum_{j=1}^k \beta_j X_j$$

G is a standard normal cumulative function.

Equation (4) satisfies this property $Y^0, Y^1 \perp D|P(X)$ which means that, households with the same characteristics have positive probability of borrowing. That is $0 < P(D=1|X) < 1$. Which is the PSM estimator is free from selection bias. The PSM estimator is defined as below:

$$\begin{aligned} \Delta_{TT}^{PSM} \\ = E_{P(X)|D=1} [E(Y^1|D=1, P(X)) - E(Y^0|D=1, P(0))] \end{aligned} \quad (5)$$

One advantage of using PSM is that it does not assume linearity and even though explanatory variables of the treatment and control group may overlap, it is still valid.

3.2.1. Empirical Models for Impact Estimation

Treatment effect model:

$$\begin{aligned} welfare &= \lambda_0 + \lambda_1 marstatus + \lambda_2 hage \\ &+ \lambda_3 hhsex + \lambda_4 \log_pc_nonwage + \lambda_5 edulevel \\ &+ \lambda_6 hsize + \lambda_7 employstatus + \lambda_8 agesq + \eta_1 \end{aligned} \quad (6)$$

$$\begin{aligned} hgranted &= \phi_0 + \phi_1 marstatus + \phi_2 hage + \phi_3 hhsex \\ &+ \phi_4 \log_pc_nonwage + \phi_5 edulevel + \phi_6 hsize \\ &+ \phi_7 employstatus + \phi_8 agesq + \nu_1 \end{aligned} \quad (7)$$

Both equation (6) and (7) are estimated together. The treatment effect model is proceeded by the estimation of a probit model for the loan status.

3.3. Source of Data, and Definition and Measurement of Variables

The data source for the study is the Ghana Statistical Service. The study uses secondary data from the Ghana Living Standards Survey (GLSS) round 6 which was collected from 18th October 2012 to 17th October 2013. The survey was a nationwide survey that covered all ten regions in the country. A sample size of 18 000 households was selected from 1200 enumeration areas. And out of this sample, 93.2% which represent 16,772 households, were successfully enumerated. Its main purpose was to produce data on household living conditions in the country. Table 1 represents the definition of the variables used in the study.

Table 1. Description and Measurement of Variables

Variables	Description and Measurement
WELFARE	Continuous: real household consumption expenditure per capita per adult equivalent. Consumption is used as a welfare indicator in this study because it has been known as a more reliable indicator of the welfare of households as compared to income. Household expenditure reflects current income, savings and expected future income rather than only their current year's earnings.
GRANTED	Binary: outcome of the previous application for loan; 1, if the household's application for loan is granted and 0, if otherwise
DEMAND	Binary: 1, the household applied for loan in the previous year and 0, otherwise.
Marital status	Categorical: the relationship status of the household head: 1 if currently in a union (married or in a consensual union); 2 if previously in a union; and 3 if never married.
Sex of HH	Binary: 1 if the household head is a male and 0 female
Age of HH	Continuous: number of years the household head has lived
Age Squared /100	Continuous: the square of the number of years the household has lived divided by 100
Employment status of HH	Categorical: 0 if unemployed; 1 if wage employed; 2 if non-agriculture self-employed; and 3 if agriculture self-employed.
Educational level of HH	Categorical: educational attainment of household head: 1 no education; 2 lower level; 3 secondary level; and 4 tertiary level.
Household size	Continuous: number of people in the household
Location	Binary: 1 if the household is located in an urban area; and 0 rural area
Log of Income	Continuous: the flow of revenue of the household. It is the log of the per adult equivalent nonwage income of the household

4. Results

4.1. Descriptive Statistics

From Table 2, out of 1453 households that applied for loans, 996 household heads (approximately 69%) were males and 457 household heads (approximately 32%) were females and out of 13,861 households that did not apply for loans, 10,147 household heads (approximately 73%) were males and 3714 household heads were females. Approximately, 9% out of the total male household heads applied for loans while 11% out of the total female household heads applied for loans. This shows that more female household heads applied for loans as compared to the number of male household heads that applied for loans when the totals of male and female household heads are considered. From Table 2, 908 (69%) male household heads were granted loans and approximately 31% of those that were loans were females. In addition, out of the total household heads that were not granted loans, the percentages of male and female household heads that were not granted is approximately 65% and 35% respectively. Moreover, out of the total number of male household heads that applied for loans, approximately 91% of them were granted loans. Whereas, approximately 89.5% out of the total number of female household heads that applied for loans had their loan application approved. Compared to the male household heads, less female household heads had their loan application approved. In addition, the consumption per capita (welfare) of the households has a

mean of GH¢3,332 and it ranges from as low as GH¢39 to a maximum of GH¢96,421.

Table 2. Descriptive Statistics of Dependent Variables

Dependent Variable	Definition	Frequency	Percentage (%)	
	<i>Applied</i>			
	Male	996	68.5	
<i>Application for loan (Demand for Loan)</i>	Female	457	31.5	
	<i>Did not Apply</i>			
	Male	10 147	73.2	
	Female	3714	26.8	
	<i>Granted</i>			
	Male	908	68.9	
<i>Loan status (Access to Loan)</i>	Female	409	31.1	
	<i>Not granted</i>			
	Male	88	64.7	
	Female	48	35.3	
	Mean	St Dev.	Min	Max
<i>Welfare</i>	3331.8	3495.0	39.4	96421.3

The descriptive statistics of demographic and socio-economic characteristics of household heads are presented in Table 3. A categorical variable was used to capture the marital status of the household head. It has a mean value of 1.4. Household size is a count variable that ranges from 1 to 29 with a mean value of 4.3. Both the age of the household head and the square of age divided by 100 are count variables. They range from 16 to 70 and 2.56 to 49 respectively. Also, the mean and the standard deviation for age is 42.8 and 12.8 respectively and that of the squared of age divided by 100 is 2.1 and 1 respectively. Both employment status and educational level are categorical variables. Employment status ranges from 0 to 3 and educational level ranges from 1 to 4. Their means are 2.1 and 1.8 respectively and also have standard deviation values of 1.0 and 0.9 respectively. The income of the household is a count variable with the log of income recording a mean and standard deviation of 4.1 and 2.1 respectively. It has a minimum value of 0 and a maximum value of 11.6

Table 3. Descriptive Statistics of Independent Variables

Variables	Mean	St Dev	Min	Max
<i>Marital status</i>	1.4	0.7	1	3
<i>Household size</i>	4.3	2.7	1	29
<i>Sex of household head</i>	0.7	0.5	0	1
<i>Age of household head</i>	42.8	12.8	16	70
<i>Age Squared / 100</i>	20.0	11.5	2.6	49
<i>Employment status of HH</i>	2.1	1.0	0	3
<i>Educational level of HH</i>	1.8	0.9	1	4
<i>Location of household</i>	0.5	0.5	0	1
<i>Log of Income</i>	4.1	2.1	0	11.6

Household head indicated some reasons for not applying for loans. Out of 13861 responses, 60.52% reported not to be in need of loans while 19.33% perceived the interest rate to be too high. The demand for collateral security deterred 9.41% from applying for loans with some 1.69% already burdened with high debt. The inability to obtain the needed amount served as the reason why 5.27% did not apply, while those that did not apply for some other reasons that was not captured in the data were 3.8%.

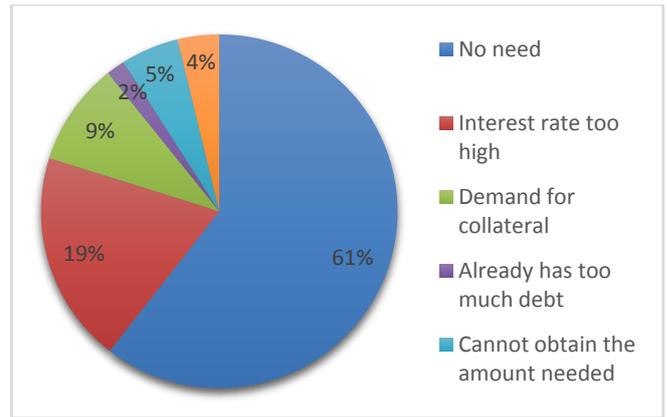


Figure 3. Reasons Why Household Heads Did Not Apply for Loans

4.2. Results from Heckman Probit Estimation

Table 4. Heckman Probit Estimation Results

Variables	Granted (Loan Status)	Demand (Loan Apply)
<i>Marital Status of HH</i>		
• Previously in a union	-0.262* (0.136)	0.0892* (0.0457)
• Never married [Base: Currently in a union]	-0.195 (0.242)	-0.158*** (0.0598)
<i>Household size</i>	-0.0365** (0.0185)	0.0218*** (0.0061)
<i>Sex of HH</i>		
• Male [Base: Female]	-0.00713 (0.155)	-0.169*** (0.0405)
<i>Age of HH</i>		
	-0.0138 (0.0368)	0.045*** (0.00918)
Square of age divided by 100	0.0246 (0.0396)	-0.0506*** (0.010)
<i>Employment Status of HH</i>		
• Wage employment	0.0695 (0.366)	0.456*** (0.0744)
• Non-Agriculture self-employment	-0.149 (0.307)	0.430*** (0.072)
• Agriculture self-employment [Base: Unemployed]	-0.155 (0.294)	0.327*** (0.072)
<i>Educational Level of HH</i>		
• Lower level	-0.0594 (0.117)	0.151*** (0.0349)
• Secondary level	0.0901 (0.227)	0.294*** (0.0475)
• Tertiary level [Base: No Education]	0.838 (0.574)	0.534*** (0.0628)
<i>Log of Income</i>	0.00865 (0.0267)	0.0209*** (0.00713)
<i>Location</i>		
• Urban [Base: Rural]	-	-0.153*** (0.0339)
Rho (ρ) =	-0.483 (0.742) [0.525]	
Observations =	15314	

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
P-values in Brackets.

The results presented in Table 4 shows that previously in a union household heads and household size are the only significant covariates which determine both loan application and status. Larger households are more likely to apply for loans since they are more likely to have

higher dependency ratio which will increase their needs for credit, however, such households spend more on consumption and are unable to save and this signals credit providers that larger households have a lower loan repayment ability.

The correlation coefficient between the error terms of both the outcome (GRANTED) and the selection model (DEMAND) is characterized by $\rho = -0.483$ (see Table 4). This shows that the unobservable determinants that influence the demand for loans are negatively related to the unobservable determinants that influence access to loans. The likelihood ratio test of independence between both models [$(P > \chi^2) = 0.525$] shows that the probability value of the correlation coefficient is not statistically significant. Based on this result, we fail to reject the null hypothesis that there is no correlation between the two models. This contradicts the results by [35] which show that there is self-selection among households in the credit market, but similar to that of [36] who also proved that there is no self-selection in the credit market. This means that households' decision to apply for loans does not affect the probability that they will be granted. This proves that separate estimation for both models is as good as the Heckman probit model. Hence, a standard probit model is used to for estimating both the demand for loans model and the access to loans model since these estimates are consistent and unbiased [36].

4.3. Probit Estimation Results

The results obtained from the standard probit estimation (in Table 5) show that the demand for loans is statistically influenced by marital status, household size, sex, age, employment status, educational level, location of household and income. But the focus of this study is more on access to loans which was significantly influenced by marital status and educational level of the household head. Firstly, access to loans by households is significantly related to marital status (previously in a union). The negative coefficient suggests that households that have divorced, separated or are widowed are less likely to have access to credit than households who are currently in a union (married or in a consensual union). The marginal effect shows that household heads who were previously in a union have approximately 4 percentage points lower access to credit compared to household heads who are currently in a union. This is because household heads who are no longer in a union, may not have support to do productive business which will enable them to pay back the amount borrowed. It could also be that, since they might be single handedly catering for the household, their expenditure restricts them from paying back the loans even if the loan is used profitably.

The study by [16] showed that if a household head is married, the expenditure of the household is less as compared to a household head who is not married with the reason being that, married household heads benefit from efficiencies in purchasing food which is possible by joint decision-making. This finding contradicts that of [20] who found that access to loans is positively influenced by whether the household head is married or not. In addition, there is a positive and significant relationship between tertiary level education and access to loans. This means

that household heads with tertiary level of education are more successful in their access to loans as compared to those with no education, the reason being that the more educated the household head is, the more he understands the terms and condition of the loan application, and the more likely he is to use the loan for a profitable business so that he can pay back the amount borrowed. The marginal effect shows that household heads with tertiary education level have approximately 10 percentage points higher probability of having access to loans compared to household heads with no education. This is similar to the result of [35] who found a strong positive significant relationship between tertiary level education and loan access.

Table 5. Probit Estimation of Demand and Access to Loans

Variables	Access to loans Marginal effect	Demand for loans Marginal effect
<i>Marital Status of HH</i>		
Previously in a union	-0.0436 [°] (0.0264)	0.0155 [°] (0.00818)
Never married [Base: Currently in a union]	-0.0495 (0.0402)	-0.0234 ^{***} (0.00815)
<i>Household size</i>		
	-0.00489 (0.00312)	0.00359 ^{***} (0.000996)
<i>Sex of HH</i>		
Male [Base: Female]	-0.0114 (0.0212)	-0.0291 ^{***} (0.00732)
<i>Age of HH</i>		
	0.000280 (0.00539)	0.00740 ^{***} (0.00151)
Square of age divided by 100	0.00124 (0.00591)	-0.00832 ^{***} (0.00164)
<i>Employment Status of HH</i>		
• Wage employment	0.0355 (0.0460)	0.0629 ^{***} (0.00889)
• Non-Agriculture self-employment	-0.000247 (0.0449)	0.0582 ^{***} (0.00814)
• Agriculture self-employment [Base: Unemployed]	-0.00400 (0.0450)	0.0410 ^{***} (0.00766)
<i>Educational Level of HH</i>		
• Lower level	-0.00169 (0.0193)	0.0233 ^{***} (0.00546)
• Secondary level	0.0327 (0.0241)	0.0499 ^{***} (0.00883)
• Tertiary level [Base: No Education]	0.0956 ^{***} (0.0174)	0.105 ^{***} (0.0150)
<i>Log of Income</i>		
	0.00286 (0.00399)	0.00345 ^{***} (0.00117)
<i>Location</i>		
Urban [Base: Rural]	-	-0.0247 ^{***} (0.00554)
Observations	1453	15 314

Standard errors in parentheses [°] $p < 0.1$, ^{**} $p < 0.05$, ^{***} $p < 0.01$.

4.4. Propensity Score Matching Estimation

Table 6 shows a summary of the characteristics of households who had access to loans and those who did not get access. The table clearly shows that there exist some differences between the means of households who got access to loans and those who did not, with respect to the outcome and independent variables. The full sample consists of 1453 household heads and it represents the number of household heads that applied for loans, out of which 1317 of them were granted loans and they

constitute the treated group. This means that out of the household heads that applied for loans, the majority of them (90.64%) were granted the loans. The individual means and standard deviations for both households who were granted loans and those who were not granted are also shown in Table 6. The mean welfare of household heads who were granted loans is 4140 and that of those who were not granted loans is 3171. This clearly shows that the welfare of household heads who were granted loans is higher than those who were not. This suggests that access to loans improves welfare.

Table 6. Descriptive Statistics of Loan Access and Non-Loan Access to Households

Variable names	Granted (1) N=1317(90.64%)		Not granted (0) N=136(9.36%)		Diff in means
	Mean	SE	Mean	SE	
Outcome Var.					
welfare	4140.11	4289.55	3171.27	2430.21	968.84
Independent Var.					
Marital status	1.37	0.6	1.45	0.64	-0.08
Household size	4.50	2.69	4.90	2.88	-0.40
Sex of HH	0.69	0.46	0.65	0.48	0.04
Age of HH	43.31	11.46	42.14	11.08	1.17
Age squared divided by 100	20.07	10.43	19.00	9.86	1.07
Employment status of HH	2.02	0.91	2.27	0.83	-0.25
Educational level of HH	2.00	1.00	1.63	0.71	0.37
Income	4.23	2.12	4.20	2.02	0.03
Location	0.45	0.50	0.42	0.50	0.03

Note: Diff= mean (1) - mean (0). Treatment Variable = Granted.

We estimated the impact of loans, which is the treatment-dependent variable, on the outcome variable which is the welfare of household heads who were granted the loans (presented in Table 7). Marital status of the household head, the household size, sex and age of the household head, the age squared of the household head divided by 100, income, employment status and educational level of the household head were used as treatment independent variables. The propensity score model used, is a probit model. When we estimated the average treatment effect of the population (a measure that defines the difference in means outcomes between units assigned to the treatment and units assigned to the control [ATE]), loans had a significant impact on the welfare of household heads. It was found that the welfare (that is, real household consumption expenditure per adult equivalent) of household heads who were granted loans were on average GH¢487.2 larger than the welfare of household heads who were not granted or did not receive loans. Our finding is consistent with that of [7]. He found that access to credit positively and significantly contributes to household economic wellbeing. A possible explanation for this is that household heads engaged in activities that improved the welfare of the household with the amount borrowed.

From the data, the highest percentage (24.91%) for the purpose of the loans was for business expansion. This can be associated with increased profit which can improve the welfare of the households. Borrowing for the purpose of

education of self, children and sibling constitute the second highest percentage (15.79%). Higher levels of education influence household welfare positively compared to the lower level of education. This clearly shows that increasing education improves welfare. Therefore, borrowing for the purpose of education has a positive effect on the welfare of households. When we estimated the average treatment effect on the treated (ATET), loans had an impact on the welfare of household heads that were granted loans, and that the result is statistically significant at the 5% level. It was found that the welfare (that is, real household consumption expenditure per adult equivalent) of household heads who were granted loans were on average GH¢521.2 larger than their welfare if they had not been granted the loans.

Also, for robustness check, the nearest-neighbor matching and inverse-probability weighting treatment effect estimations were also carried out to assess the impact of loans on the welfare of households. Both estimations showed that the impact of loans on household welfare is positive and significant. The results are presented in Appendix A and Appendix B in the appendix.

Table 7. Treatment Effects from Propensity Score Matching Method

	ATE Welfare	ATET welfare
Impact of household loans (granted vs not granted)	487.2** (235.7)	521.2** (243.9)
Observations	1453	1453
Treated (granted)	1	1
Control (not granted)	0	0

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5. Conclusion

A conclusion was drawn from the study that tertiary level of education positively influences the probability that household heads will be granted loans. The reason for this could be that the more educated the household head is, the more he understands the terms and conditions of the loan application, and the more likely he is to use the loan for a profitable business so that he can pay back the amount borrowed. However, descriptive statistics showed that household heads with a tertiary level of education were few (6.02%). Hence in order for the majority of household heads to be granted loans, they should be encouraged to increase their education to the tertiary level and also, the government should subsidize tertiary education and make the processes of attaining it more flexible so that majority of household heads can enroll. Through education, the understanding of the benefits of household loans for the development of the household will be enhanced and household heads will be encouraged to embrace household loans. In addition, the government should come up with monetary policies that will contribute to the lowering of the lending rate to encourage household heads and other individuals to access loans to increase the development of the household and the economy as a whole.

Furthermore, in regard to limitation of the study, the data provided information on the reason why a household

head will demand credit, thus, the purpose for applying for a loan, however the data does not capture what the household heads really used the loans for after their loan applications have been approved. The absence of this information made it impossible to analyze what household heads used the loans for. There is the need for future studies to focus on what the loans are actually used for after they have been obtained. In that way, it could be examined whether the loans are used for productive purposes or for non-productive purposes.

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Appendix

Appendix A: Nearest neighbor matching estimation for loan impact on welfare

	ATE welfare	ATET welfare
Impact of household loans {granted vs not granted}	940.0 ^{***} (208.8)	1017.8 ^{***} (215.5)
Observations	1453	1453
Treated (granted)	1	1
Control (not granted)	0	0

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix B: Inverse-Probability Weighting Estimation for Loan Impact on Welfare

	welfare ATE	welfare ATET
Impact of household loans {granted vs not granted}	508.6 ^{**} (239.4)	547.5 ^{**} (248.8)
(granted vs not granted not granted)	POmean 3551.1 ^{***} (218.8)	POmean 3592.6 ^{***} (227.5)
Observations	1453	1453
treated	1	1
control	0	0

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.



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