

EURASIAN JOURNAL OF BUSINESS AND MANAGEMENT

www.eurasianpublications.com

MEASURING FINANCIAL INCLUSION AND ITS DETERMINANTS AMONG THE SMALLHOLDER FARMERS IN ZIMBABWE: AN EMPIRICAL STUDY

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Received: June 12, 2020

Accepted: September 17, 2020

Abstract

The study sought to assess the levels of financial inclusion among the smallholder farmers and to investigate its determinants among the same. The study employed a household measure to measure the level of financial inclusion and multiple regression to assess the determinants of financial inclusion. The results indicated that the level of financial inclusion among the smallholder farmers was low because the percentage of households who were actively participating in the formal financial system was below 27 per cent below 50 per cent. The investigation on the driving factors of financial inclusion indicated that off-farm income, education level, distance, financial literacy and age of the household were the significant variables in explaining the determinants of financial inclusion among the smallholder farmers in Manicaland Province of Zimbabwe. Therefore, the study discovered that it is important for the government of Zimbabwe and financial institutions to form partnerships to come up with policies that ensure that smallholder farmers are included in the formal financial market and these policies should motivate households to use the formal financial services. Also, the crafted should strive to remove all the barriers to financial inclusion among the smallholder farmers. For instance, looking at farmers, many farmers are finding it difficult to access loans due to lack of collateral security, so banks need to come up with services and products that are tailor-made for the smallholder farmers especially on credit, services that allow smallholder farmers to borrow.

Keywords: Determinants, Financial Inclusion, Measuring, Smallholder Farmers, Zimbabwe

1. Introduction

Financial inclusion is important in fostering economic growth and sustainable poverty reduction through widening access to affordable finance (Sharma and Ari, 2017). Financial inclusion promotes the allocation of savings efficiently thereby promoting investment and the overall growth of the economy (Sharma and Ari, 2017). The main aim of financial inclusion is to ensure

that the unbanked population participate in the formal financial sector of the economy by allowing people to have access to credit, savings, insurance and payments and transfers (Otiato, 2016). While financial inclusion is regarded as crucial to the growth and development of the economy and poverty alleviation, the levels of financial inclusion in Zimbabwe are not impressive. The Zimbabwe National Financial Inclusion Strategy 2016-2020 (ZINFIS) published by the Reserve Bank of Zimbabwe (RBZ) indicated that approximately 70 per cent of the total population in Zimbabwe is not part of the formal financial market while only 30 per cent is financially active (RBZ, 2016). The survey conducted by Finscope in 2014 also estimated that only 30 per cent of the Zimbabwe population was financial active. The information on financial inclusion also showed that financial inclusion is biased in favour of urban population as opposed to the rural population (Chitokwindo *et al.* 2014). According to Chitokwindo *et al.* (2014), the levels of financial inclusion in Zimbabwe are lower in rural areas despite 65 per cent of the population living in rural areas. It is alleged that financial inclusion in urban areas is approximately 89 per cent against 62 per cent of the rural households (Masiyandima *et al.* 2017).

Similarly, it was discovered that financial inclusion in sub-Saharan Africa also appears to be a big problem (Chaia *et al.* 2009). Allen *et al.* (2014) noted that approximately 80 per cent of adults in sub-Saharan Africa are unbanked while in Asia the figure is less than 60 per cent and for developed countries, the figure stands at 8 per cent. Furthermore, authors like Masiyandima *et al.* (2017); Chitokwindo *et al.* (2014) together with Mago and Chitokwindo (2014) argued that part of the poverty experienced in Zimbabwe is associated with financial exclusion. It is believed that the inability of various groups like the smallholder farmers, small businesses, women, youth and the disabled, to have access to affordable and sustainable financial resources exacerbates poverty. The argument put forward by the authors is that the ability to access financial resources by the disadvantaged groups in the economy promotes inclusive growth and better livelihoods of all the people.

In the same way, Park and Mercado Jr (2015); Beck *et al.* (2008); Honohan (2008) and the WBG (2018a) support the view that increased financial inclusion improves commitment savings, investment decisions, reduction of information and transaction costs, technological innovation and long-run growth which will have an influence on poverty over an extended period. For instance, WBG (2018b) contests that financial inclusion can help to attain the targets of at least seven of the SDGs, chief among them goal one, of no poverty, which aims at ending poverty in all its forms everywhere by 2030 (Masnita and Triyowati, 2019). Studies which tries to investigate the drivers of financial inclusion are available but studies which investigated the determinants of financial inclusion among smallholder farmers as well as measuring it at the household level are limited. Many studies available investigated the determinants of financial inclusion in general without specifically focusing on smallholder farmers, for example, Sanderson *et al.* (2018); Akileng *et al.* (2018); Uddin *et al.* (2017). These studies were looking at the determinants of financial inclusion without directly investigating the determinants of financial inclusion on smallholder farmers.

Saqib *et al.* (2018) in Pakistan examined the factors influencing farmers' access to agricultural credit in a flood disaster risk-prone area using the weighted least squares regression. The results of the study found that education level, experience in farming, the size of land owned, income earned per month and household size were the factors influencing farmers' access to credit facilities. Similarly, Chandio *et al.* (2017) examined the farmers' access to credit, with the question as to whether collateral is an important matter in the Sindh province of Pakistan using a probit regression technique. It was discovered that factors like the gender of the household head, the size of the household, the level of education, the size of the farm, level of income and whether collateral was available were factors which influenced farmers' access to credit positively. The two studies by Saqib *et al.* (2018) and Chandio *et al.* (2017) agree on many factors such as household size, land size, income level, education level as determinants of access to credit.

Likewise, in Kenya, Kiplimo *et al.* (2015) also investigated factors influencing access to credit among the smallholder farmers using the logit model estimation technique. The study discovered that the level of education, nature of occupation and access to agricultural extension

services were the main factors influencing access to credit among the smallholder farmers positively. Annual household income and the distance from the financial institution had negative influences on access to credit. This study in Kenya agreed with Saqib *et al.* (2018) and Chandio *et al.* (2017) who investigated the same subject in Pakistan where income level was also significant in influencing access to credit among the smallholder farmers.

In terms of measuring financial inclusion, Sarma (2008) was the first to use the indicators of financial inclusion to measure financial inclusion. Many different methodologies were employed to calculate the index of financial inclusion (Park and Mercado Jr, 2018). However, it has been established that the development of the index of financial inclusion has been strongly linked to data availability has been the major huddle in coming up with a well-informed index (Sarma, 2008). Motivated by these revelations, this study sought to investigate the factors that matter for financial inclusion and to come up with a household measure of financial inclusion in Zimbabwe using data collected from Manicaland province of Zimbabwe. The rest of the document is organized as follows: the first section gives the background and the introduction followed by the theoretical and empirical literature review. The methodology is in the third section followed by a discussion of the results. The last section gives the conclusion and policy recommendations.

2.Theoretical and empirical literature review

2.1. Definition of financial inclusion

Financial inclusion is defined differently by many authors as reflected in the literature. Sarma (2008, p. 4) also defined financial inclusion as “the art of ensuring ease of access, availability, and usage of the formal financial system to everyone in the economy”.

Arun and Kamath (2015, p. 4) also added their version to the class of definitions of financial inclusion as the situation where “people who can use financial products and services have full access to quality financial services, provided at affordable prices, in a convenient manner and with dignity for all the clients”. On the other hand, financial exclusion is defined in another form even though the terms can be used interchangeably. Leyshon and Thrift (1995) defined financial exclusion as the conditions which limit individuals in societies and some social groups from accessing the financial system. Also, Sinclair (2001) defines financial exclusion as a situation where individuals are unable to have access to necessary financial services in an appropriate form.

2.2. The origin of the theory of financial inclusion

Leyshon and Thrift (1993) argued that the phrase ‘financial exclusion’ was used for the first time in 1993 by geographers who were worried about lack of physical access to banking services due to bank branch closures. However, before 1993, during the period of the 1990s, there was growing research on the obstacles which people from some parts of the society face in accessing the conventional financial system. However, the growing debate on factors influencing financial exclusion has changed the trajectory from the geographical access aspect to involve other real factors which contribute to the problem (Hogarth and O'Donnell, 1999; Kempson, 2000). The European Commission in response came forth with a clear outline of the types of exclusion based on financial services such as banking exclusion, saving exclusion, credit exclusion and insurance exclusion (Claessens, 2006). It is argued that these various services should be accessed by all the people in society.

For the first time, Bagehot (1873) founded the theory where the financial system is an important aspect of economic growth and development. More importantly, the arrival of Bagehot's (1873) work in Great Britain appeared to be a logical phenomenon. During that time, Britain was one of the great world powers with one of the most highly developed financial systems (Stolbov, 2013). In his work, Bagehot (1873) gave a detailed description of how processes in the financial domain were associated with the conditions in the real economy.

Bagehot (1873) gave many examples in his demonstrations of how the various activities on the British money market influence capital spillovers in the country searching for the most

profitable ways of applying them. It is assumed that loanable funds encourage economic activity through a variety of channels. The argument given was that, when loanable funds are allocated to different investors, this will motivate the adoption of new technology (Bagehot1873). When new technology is adopted, the production of goods and services in an economy will improve in quality and quantity and the process will slowly spill over into the economy systems (Stolbov, 2013). Similarly, Goldsmith (1975) pioneered in the introduction of the index of financial inclusion which was expressed as a financial interrelation ratio (Leyshon and Thrift, 1995). The main argument of Goldsmith's (1975) index was to explain the level of penetration of the financial system concerning the number of branches, customers as well as capitalization of the bank. Even in today's time, the analysis by Goldsmith (1975) has gained a lot of significance.

In recent years, financial inclusion has grown to be a significant and important policy objective in many governments. Governments, financial regulators and the various financial institutions at country and the world level have come up with new approaches for financial inclusion and new legislative rules have been initiated in economies, hence the need to study the various theories of financial inclusion.

2.3. The empirical literature on the measures of financial inclusion

A review of various measures of financial inclusion will be presented in this section. A deep analysis of literature on the index of financial inclusion will be reviewed. Many studies done on how financial inclusion is measured will be reviewed especially on the methodology for the computation of the index. This will help the current study in coming up with the proper methodology on the measurement and development of the index of financial inclusion. The subject of financial inclusion is relatively new in literature. This review of literature available will help to find the possible methodology for measuring financial inclusion. Measuring financial inclusion is important in this study because this study seeks to establish the impact of financial inclusion on poverty hence the need to measure it.

After a deep analysis of literature on how to measure financial inclusion, it was observed that in 2007 indicators were first used to measure financial inclusion by many researchers (Sarma, 2008). Many different methodologies were employed to calculate the index of financial inclusion. However, it has been established that the development of the index of financial inclusion has been strongly linked to data availability. The availability of data in computation of the index of financial inclusion has been the major huddle in coming up with a well-informed index.

Many of the measures of financial inclusion employed in the literature are not comprehensive because of the limitation in accessing data. As a result, the literature lacks a measure of financial inclusion which considers both demand-side and supply-side data. Additionally, the literature on how to measure financial inclusion is relatively new but growing. How financial inclusion is measured is premised on how it is defined (Sarma, 2008). Initially, the literature presented individual measures of financial inclusion, where financial inclusion was measured by many indicators. The number of bank accounts per 1000 adult persons, the number of bank branches per million people, the number of ATMs per million people, the amount of bank credit and the number of bank deposits were the common indicators used (Sarma, 2008). Such indicators were giving limited information on financial inclusion in an economy and they were divorced from the reality of the situation which may be existing at household level leading to misleading results (Sarma, 2012).

A good measure of financial inclusion is the one which can be used to monitor the levels of financial inclusion in different economies, different districts, and provinces. When the measure of financial inclusion is good, it will be an easy thing to evaluate and monitor policies meant to achieve financial inclusion (Sarma, 2015). A good measure can provide answers to long time questions on whether high financial inclusion leads to low levels of poverty (Kempson *et al.* 2004). To fully investigate the question, there is a need for a robust index of financial inclusion which is simple to develop and calculate. The measure should be able to include many dimensions of financial inclusion to give a true picture of the level of financial inclusion (Kempson *et al.* 2004).

The weaknesses associated with individual measures of financial inclusion lead to the development of many indexes or measures of financial inclusion. Firstly, Sarma (2008) proposed an index to measure the level of financial inclusion. This index takes values between 0 and 1. The value of 0 indicates complete financial exclusion while 1 represents complete financial inclusion. The multidimensional method commonly used by UNDP was employed in developing the index. The measure by Sarma (2008) captured information on many dimensions using a single number. The index used to access financial products and services, usage of financial products and services and availability of financial products and services as dimensions of financial inclusion.

In Sarma's index the dimension index d_i is computed by the following formula in the equation:

$$d_i = w_i \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

From the formula, w_i represents the weight attached to the dimension i such that $0 < w_i < 1$. This indicates the relative importance of dimension i in quantifying the inclusiveness of a financial system. A_i represents the actual value of dimension i , m_i is the lower limit on the value of dimension i , fixed by a pre-specified rule. M_i is the upper limit on the value of dimension i fixed by some pre-specified rule? The actual index used by Sarma (2008) is such that the index of financial inclusion is given as:

$$IFI = \frac{1}{2} [X_1 + X_2] \quad (2)$$

According to Park and Mercado Jr (2018), the advantage of the approach used by Sarma (2008) is that it is relatively simple to calculate as it does not need many different weights for the different dimensions. Also, Honohan (2008) also developed a measure of financial inclusion using a regression-based method to develop a measure of financial inclusion. The method used by Honohan (2008) captured only one dimension of financial inclusion and the data used in the process captured only part of the adult population in the selected countries with data available on access to financial services. Per capita GDP and the number of individuals with bank accounts were the indicators used in nations without available data. This measure of financial inclusion was biased because it used one dimension to measure the level of financial inclusion though it was relatively simple to compute, and it used household data which indicates what happens at the household level.

Furthermore, Camara and Tuesta (2014) developed another measure of financial inclusion. This measure relied on demand and supply-side data for eighty-two developed and less developed nations. Usage, access, and barriers were the three dimensions assumed to influence the degree of financial inclusion by Camara and Tuesta (2014). Two stages principal component analysis was used to allot weights to the dimensions endogenously. The definition of financial inclusion by Camara and Tuesta (2014) emphasized usage, access, and minimization of barriers. This definition captured demand and supply-side data on financial inclusion. Although the methodology used by Camara and Tuesta (2014) sounded to be effective especially on the selection of a variety of dimensions, there was a weakness in drawing weights from available data rather than following the discretion of the researcher so that potential bias is detected and accounted for.

Additionally, Arora (2010) calculated a measure of financial inclusion premised on Sarma (2008) assumptions and reasoning using data drawn from developing and developed nations. Only 98 economies were used for the study because of data availability. Arora (2010) added many indicators in the outreach dimension. This dimension was measured as depth and availability by Sarma (2008). Demographic and geographic penetration was captured by Arora (2010) and dimensions such as ease of transactions and the cost of different transactions were added in the index. Arora (2010) presented three different dimensions, outreach, ease, and cost of the transaction, and in her research financial inclusion is measured mainly in terms of

transactions. The measure by Arora (2010) included many indicators in the dimensions which improved the reach of the measure.

Moreover, Chakravarty and Pal (2010) used the Min-Max rule following an axiomatic approach in index construction. This index was used to evaluate the impact of different policies of banks on financial inclusion in India from 1972 to 2009. The measure used panel data econometric methods to examine different banking policies. The index reiterated that increasing the volume of credit and geographic penetration can act as brilliant policy measures which can improve financial inclusion. The index was further improved by Chakravarty and Pal (2013) where they used the axiomatic approach to develop the index of financial inclusion where the percentage contributions of each dimension were computed.

Similarly, Chattopadhyay (2011) came up with an axiomatic measurement to measure financial inclusion. The developed index was done in such a way that factor-wise components can be generated from the index which shows the percentage contribution of each dimension. Each dimension was given the same weight and the financial inclusion calculated for Kolkata region was between 0 and 1. Where 1 shows complete financial inclusion and 0 shows complete financial exclusion. The index by Chattopadhyay (2011) was viewed as a suitable measure especially for making policies for improving financial inclusion. Also, the index was employed in such a way that cross country comparisons can be made where financial inclusion is concerned.

In the same fashion, Gupte *et al.* (2012) developed a measure of financial inclusion for India through building on the works of Sarma (2008) and Arora (2010). The index was computed in such a way that all dimensions of financial inclusion were considered like usage which was not included by Arora (2010) and dimensions like ease and cost which were not in Sarma's (2008) measure. The Index was developed using the World Bank database of 2008. In addition to that, the computation of the index was done as a geometric mean of four dimensions: accessibility or outreach penetration, usage, ease of transactions, and cost of transactions.

The study followed the United Nation Development Program's methodology, the one used in developing the Human Development Index HDI in 2010. The methodology used in this study is different from the ones used in earlier studies, Gupte *et al.* (2012) adopted the methodology used on HDI in 2010 which clarifies the use of geometric mean which includes the imperfect substitutability of all the dimensions. All other studies used the method used by UNDP before 2010. The methodology used by Gupte *et al.* (2012) avoided the weakness of the linear aggregation formula which permitted the imperfect substitutability of all the dimensions. In the index, sub-indices of all the dimensions were calculated first and the indicators were transformed into indices between 0 and 1 by coming up with the maximum and minimum values.

Again, Kainth (2013) developed a measure of financial inclusion, followed the multidimensional approach to come up with the measure of financial inclusion. Kainth (2013) followed similar methods used by UND to develop indices like HDI, the Human Poverty Index. The dimension index for each dimension was calculated first. The formula used by Sarma (2008) was the same formula used by Kainth (2013) to calculate the dimension index for i^{th} dimension d_i . The proposed index by Kainth (2013) takes values in the interval of 0 and 1 just like in the case of Sarma (2008). Availability, usage, and penetration dimensions were used in computing the index.

3. Methods and data

The study used data collected using a structured questionnaire developed and approved by North-West University Education, Management and Economic Sciences, Law, Theology, Engineering and Natural Sciences Research Ethics Committee (NWU-EMELTEN-REC). The ethics clearance number obtained from the university is NWU-00354-19-2A. The study was also cleared by the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement in Zimbabwe. The survey targeted the Manicaland province of Zimbabwe. The development of the questionnaire was necessitated by the fact that household data on financial inclusion used

macro or country-level data, for instance, Demetriades and Hussein (1996); Beck *et al.* (2009); Beck *et al.* (2007) and Demirguc-Kunt and Klapper (2013). Usually, using country-level data, to investigate the behaviour of economic variables at the household level poses risks of omission, generalization, and oversimplification of reality. The data comprised of a total of 600 households who were interviewed using the structured questionnaire. Among the 600 households interviewed 195 of them were not involved in farming. As a result, a total of 405 households who indicated that were in farming were used for the current study.

3.1. Hypotheses of the study

In this study, the hypotheses to be tested is presented below:

H_0 : The various socio-economic factors like age, education level and off-farm income do not influence financial inclusion in Manicaland Province.

H_1 : The various socio-economic factors such as age, education level and off-farm income influence financial inclusion in Manicaland Province.

3.2. Measuring financial inclusion

This section will help to show how financial inclusion was measured building on other methodologies used. Different measures of financial inclusion were using selected dimensions using macro-level data in almost all cases. For example, Arora (2010); Sarma (2012); Demirguc-Kunt and Klapper (2013); Amidzic *et al.* (2014); Camara and Tuesta (2014); Mojica and Mapa (2015); Park and Mercado, Jr (2018); and Chattopadhyay (2011).

A detailed description of how Sarma (2008); Camara and Tuesta (2014) and Park and Mercado Jr (2018) developed the index of financial inclusion was important to inform the current study on the methodology to employ. Sarma (2008) and Park and Mercado Jr (2018) used to access, availability, usage, cost, and quality dimensions of financial inclusion to develop the index of financial inclusion. In these studies, each indicator for all the dimensions is computed as:

$$X_{i,d} = \frac{x_i - m_i}{M_i - m_i} \quad (3)$$

where x_i is the real value of indicator i , m_i is the lowest value of indicator i , M_i is the maximum value of dimension i ¹. $X_{i,d}$ is the standardized value of indicator i of dimension d . The principal component analysis was used by Park and Mercado Jr (2018) and Camara and Tuesta (2014) to aggregate each indicator to a dimension index. According to Park and Mercado Jr (2018), the study denoted $\lambda_j (j = 1, \dots, p)$ as the j^{th} eigenvalue, subscript j refers to the number of principal components that also coincides with the number of standardized indicators p . There was an assumption that $\lambda_1 > \lambda_2 > \dots > \lambda_p$ and $P_k (k = 1, \dots, p)$ was denoted as the k^{th} principal component just like Park and Mercado Jr (2018). Then, each dimension index was derived according to the weighted averages as:

$$D_d = \frac{\sum_{j,k=1}^p \lambda_j P_k}{\sum_{j=1}^p \lambda_j} \quad (4)$$

where D_d dimension is d index and $P_k = X \lambda_i$. λ_i represents the variance of the k^{th} principal component (weights) and X is the indicators matrix. The weights attached to all the components were declining, so that the greater proportion of the variation in each dimension was explained by the first principal component and so on (Park and Mercado Jr, 2018). According to Camara and Tuesta (2014) and Park and Mercado Jr (2018), there was the need to account for 100 per

¹ Following the work of Park and Mercado Jr (2018) as well as Sarma (2015), the study the value of each indicator was set to 0.

cent of the total variation in the dimension indices to prevent disposing of information that was supposed to provide an estimation of the overall household financial inclusion index. After calculating the dimension indices, the studies ran another principal component analysis to derive the dimension weights for the overall financial inclusion as in equation 4.

$$IFI_i = \frac{\sum_{j,k=1}^p \lambda_j P_k}{\sum_{j=1}^p \lambda_j} \quad (5)$$

where IFI_i is the aggregate financial inclusion index for individual i . $P_k = X\lambda_j$, λ_j represents the variance of the k th principal component (weights of each dimension) and X is the matrix of the dimension. The weights given to each component are also declining and account for 100 per cent of the total variation in the IFI. Equation 5 can also be written as:

$$IFI_i = \omega_1 D_{1i} + \omega_2 D_{2i} + \omega_3 D_{3i} \quad (6)$$

where ω are the weights derived from principal component analysis and D_i are the dimensions? Equation (9) states that the index of financial inclusion for the sample of households is a weighted average of individual dimensions. Applying all the equations on the list of indicators outlined above will imply financial inclusion for households which ranges from 1 to 100 per cent, where low percentages are associated with low financial inclusion while high percentages like 100 per cent imply high financial inclusion for the households.

Informed by the works of Sarma (2008), Camara and Tuesta (2014) as clearly highlighted above, the present study attempted to measure financial inclusion by considering many dimensions and indicators to get a comprehensive measure of financial inclusion. This measure builds on the dimensions and indicators that have been considered so far by various authors which include access, availability, usage, cost, and quality dimensions of financial inclusion. The measure also used household data to investigate the level of financial inclusion at the household level. Any effort applied to measure financial inclusion needs to include many dimensions of financial, and the measure must in a way use household-level data because macro-level data has weaknesses of oversimplifying what is happening at the household level (Park and Mercado Jr, 2018). This measure of financial inclusion developed in this study is based on the household data collected through a survey from 600 households of which 405 were smallholder farmers. The idea to construct the index was to get the level of financial inclusion at the household level, with the overall objective of establishing whether financial inclusion.

From the different dimensions of financial inclusion used in this study, different indicators were derived. The indicators used include but were not limited to the following: number of adults having an account with a formal financial institution, the share of adults who saved and borrowed using a formal account, shares of adults with credit/debit cards, and share of adults who used internet banking and those with insurance. These indicators were captured in the questions asked in the structured questionnaire.

The following 11 questions were used to generate the different indicators: Do you have a bank account? Can you provide the best reason for opening a bank account? How many members of your household have bank accounts? (households with at least a member or more than two attracted a higher score (11) while those without any member attracted a lower score 0, in this case, have you saved with any of the formal financial service providers? Have you saved with any of the formal financial service providers other than the bank? Have you applied for a loan from a formal financial institution? Do you use internet banking? Do you have an ATM card? Do you have insurance with any formal financial institution? Do you receive remittances through the bank? Do you normally perform financial transactions through bank agents? From the 11 questions, a scale was developed ranging from 0 to 11 where 0 represents weak financial inclusion and 11 represents strong financial inclusion. In the questions, a 'yes' represented strong financial inclusion while a 'no' represented weak financial inclusion. From the scale, an index of financial inclusion was developed. The index developed was used to investigate the determinants of financial inclusion.

3.3. The econometric model to investigate the determinants of financial inclusion

The model used in the analysis was tested for heteroscedasticity and the results from the Breusch Pagan/Cook-Weisberg test indicated that there was no problem of heteroscedasticity. Also, the Pearson correlation matrix was used to test multicollinearity and the results indicated that there was no problem of multicollinearity. The linear regression was used to investigate the determinants of financial inclusion. This model is shown by the equations below.

$$Y = \beta_0 + \sum_i^n \beta_i X_i + \varepsilon \quad (7)$$

where Y is the dependent variable, in this case, is the index of financial inclusion as explained before. While β_0 is the intercept term, which is the value of Y when X is zero. $\beta_{i..n}$ are the slope coefficients for each corresponding experimental variable, $X_{i..n}$ represents the independent variables which in this case are the various demographic and socio-economic factors which can influence financial inclusion. Table 1 explains all the independent variables used in the analysis and their respective apriori expectations.

Table 1. Independent variables

Variable	Unit	Expected Sign
Education level	Number	+
Gender of Household head	Male =1, Female = 0	+/-
Age of household head	Number	+/-
Household size	Number	+/-
Off-farm income	Unites States Dollars	+/-
Land Size	Hectors	+
Informal Credit Participation	Dummy Variable: Participation = 1 Non-Participation = 0	-
Agricultural Extension Service	Dummy Variable: Participation = 1 Non-Participation = 0	+/-
Transaction cost	Cost of withdrawal, Opening Account	+/-
Distance from the financial institution	Distance in Kilometers	+/-
Financial Literacy	Knowledge about Financial Products	+/-
Marital Status	Married=1 and 0 otherwise	+/-

Source: Author's analysis

Table 1 explains the independent variables used in the analysis and their expected signs. The independent variables include education level, the gender of household head, age of household head, household size, off-farm income, land size, informal credit participation, agricultural extension service, transaction cost, distance from the financial institution, financial literacy and marital status.

3.4. Dependent variable

The dependent variable is the index of financial inclusion. In this case, the dependent variable was a continuous variable measured on a scale of 0-11 where 0 represents weak financial inclusion and 11 represents strong financial inclusion. The model will be specified as shown below:

$$IFI = \beta_0 + \beta_1 EDUCL + \beta_2 GENDHH + \beta_3 AGEHH + \beta_4 HSIZE + \beta_5 OFF - FARM + \beta_6 LANDSIZE + \beta_7 INFINPART + \beta_8 AGREXTSERVI + \beta_9 DISTANCE + \beta_{10} TRANSCOSTS + \beta_{11} FINLIT + \beta_{12} MT + X_v + \varepsilon \quad (8)$$

where IFI is the dependent variable which is the index of financial inclusion well explained. $\beta_0 - \beta_{11}$ are coefficients to be estimated with β_0 representing the constant or intercept term. While EDUCL, GENDHH etc. are variables that will be considered as determinants of financial inclusion. The following section will explain the logit model where the dependent variable is now taken as bank account ownership as argued and supported by different authors (Sanderson *et al.* 2018). X_v represents the control variables, to control individual household's characteristics and the precision of our estimates.

4. Results and discussion

4.1. Descriptive statistics

Table 2 gives the gender composition of the sample. It shows the total number of females and males represented in the sample.

Table 2. Gender composition of the Sample

Gender composition of the households in the sample		
	Number	Percentage
Female	142	35%
Males	263	65%
Total	405	100%

Source: Author's calculations

Table 2 shows that out of the 405 households interviewed, 65 per cent of them were males and 35 per cent were females. This indicates that the sample had few female-headed households compared to male-headed once. Table 3 shows the proportion of farmers with bank accounts in the sample.

Table 3. The proportion of farmers with bank accounts

Farmers with a bank account		
	Number	Percentage
With bank account	180	44%
Without a bank account	225	56%
Total	405	100%

Source: Author's calculations

The sample also indicated that 44 per cent of households had bank accounts while 56 per cent of the households had no bank accounts. The higher number of households without a bank account could have been because many farmers reside in rural areas where they travel long distances to get to the bank or financial institution. This was supported by Sanderson *et al.* (2018) who found out that place of residence and distance to the financial institution are among the determinants of financial inclusion.

4.2. Financial inclusion status

The aggregation of the high scores indicated that the level of financial inclusion in the province was low. The level of financial inclusion was 27 per cent which was below 50 per cent even though 44 per cent of the households had bank accounts. The use of household data allowed the study to be more current and reflective of the initiatives that are currently being advocated for by governments, banks and Non-Governmental Organizations (NGOs) to improve the level of financial inclusion (Kozarevic and Vehabovic, 2020). Also, the use of household survey data permitted the measure of financial inclusion to be more indicative of the extent of financial

inclusion at provincial. It is also possible to measure the levels of financial inclusion at household, district, provincial, country levels.

4.3. Results and discussion on the determinants of financial inclusion through multiple regression

This section presents the results from the multiple regression of the determinants of financial inclusion using the developed index of financial inclusion. Table 4 gives the results.

Table 4. Results of the determinants of financial inclusion through multiple regression

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-2.488	0.602		-4.135	0.000
Off-farm Income	0.205	0.050	0.396	4.109	0.000***
Education level	0.077	0.102	0.033	0.758	0.049**
Agricultural extension service	0.309	0.196	0.067	1.577	0.116
Distance	-0.249	0.047	0.228	5.307	0.000***
Household size	0.609	0.057	0.334	4.308	0.676
Marital status	-0.051	0.186	-0.011	-0.272	0.786
Transaction costs	0.033	0.024	0.074	0.860	0.238
Financial literacy	1.023	0.185	-0.005	-0.127	0.039**
Gender of the household head	0.118	0.188	0.026	0.626	0.532
Age of the household head	0.081	0.007	0.469	11.189	0.000***
Observations	405				
Adjusted R Square	0.348				
F	26.472				
Std. Error of the Estimate	1.84774				

Note: Predictors: (Constant), Age, Gender, Marital status, Financial Literacy, Agricultural extension service, Education level, Distance, Household size, Off-farm income (significant at 1 per cent ***, 5 per cent**, 10 per cent *) ANOVA Sum of Squares, Regression 723.026, residual 1352.001, total 2075.027, Df Regression 8, Residual, 386, Total 404; , Mean Square regression 90,378, residual 3.414 Sig 0.000***

Source: Author's calculations

The model summary in Table 4 shows that R was 0.590, which represents a simple correlation. This value shows that the degree of correlation was not too high. R squared was 0.348 while adjusted R squared was 0.335. The adjusted R squared indicates that 33.5 per cent of the variation in the dependent variable was explained by the independent variables. The ANOVA table is also important as it shows how well the regression equation fits the data and how the regression predicts the dependent variable. The ANOVA table above indicates that the regression model predicts the dependent variable (financial Inclusion) significantly well since the regression shows that the regression model is statistically significant. Here, $p < 0.0005$ which is less than 0.05. This indicates that the model is a good fit for the data. The model statistically significantly predicts the outcome variable of financial inclusion. The coefficient table below provides information needed to predict the influence of the various factors like age and gender on financial inclusion.

The results of the regression equation in Table 4 show that off-farm income, education level, distance, financial literacy and age of the household were the significant variables in explaining the determinants of financial inclusion among the smallholder farmers in Manicaland Province of Zimbabwe. On the other hand, the distance was the only variable with a negative influence on financial inclusion. The results further indicate that off-farm income was significant

at 1 per cent level of significance (P-value, 0.000). The variable off-farm income had a positive influence on financial inclusion. In this way, a unit change in off-farm income leads to a 0.205 increase in the level of financial inclusion. This result is logically sensible in that the increase in the amount of income an individual has somehow influenced the desire for an individual to either invest or keep the money in the bank. This result was supported by several studies that found similar results that the amount of income an individual has influences the individual to participate in the formal financial institution (Musabanganji *et al.* 2015; Chandio *et al.* 2017).

Also, the level of education of the household as a determinant of financial inclusion. The variable was significant at 5 per cent level of significance (P-value, 0.049). The results show that there was a positive relationship between education and financial inclusion. The coefficient of education of 0.077 implies that a unit change in the level of education leads to a 0.077 increase in the level of financial inclusion. In this way, the education level of the households influences the income stream of the households which will influence them to do different forms of investment. When that happens, financial inclusion will improve as the households invest in various financial products. This finding concurred with the findings of Masiyandima *et al.* (2017); Sanderson *et al.* (2018); Akileng *et al.* (2018) and Uddin *et al.* (2017) who also revealed that the level of education or literacy level influences financial inclusion of the households.

On the variable agricultural extension service, though not significant, its positive influence on financial inclusion was supported by many scholars and the a priori expectation of the study. Gani and Hossain (2015) and Sebatta *et al.* (2014) supported this finding. In Bangladesh, Gani and Hossain (2015) examined the decision to participate in the credit market by smallholder farmers using the probit estimation model. One of the variables found to have a positive influence on credit market participation by smallholder farmers was agricultural extension service. This was supported by Sebatta *et al.* (2014) in Zambia who also found that the level of education of the household head gained either through extension services influenced the decision to have access to financing. However, in this model, the agriculture extension was not a significant determinant of financial inclusion (P-value, 0.116).

The results in Table 4 also show that distance to the nearest financial institution was a significant variable in influencing financial inclusion at 1 per cent level of significance (P-value, 0.000). With distance, a unit change in distance from the nearest financial institution decreases the level of financial inclusion among the smallholder farmers by 0.249. These results were supported by various scholars (Chandio *et al.* 2017). The scholars argued that long distances from the nearest financial access point can be a barrier to participation in the financial sector and hence reducing the chance of financial inclusion. Also, the statistics showed that of the many households who were in farming in Manicaland Province almost 96 per cent used a car or many farmers use tax to reach the nearest financial access point. The negative sign on distance was in line with these statistics presented before.

Also, the regression results reveal that financial literacy had a positive influence on financial inclusion. The variable was significant at 5 per cent level of significance (P-value, 0.039). The results indicate that financial knowledge of the various products provided by the bank can act as a motivation for households to use these services. This was supported by Kodongo (2018) who examined the connection between financial regulation and financial inclusion. The study revealed that agency banking regulations and financial literacy were factors which can improve financial inclusion.

Moreover, the variable age of the household was also significant in influencing financial inclusion at 1 per cent level of significance with a P-value of 0.000. The results indicated that a unit change in the age of the individual is associated with a 0.081 increase in the level of financial inclusion. The study by Uddin *et al.* (2017) in Bangladesh supported the findings where age was a determinant of financial inclusion. Also, Tuesta *et al.* (2015) and Chithra and Selvam (2013) supported the findings. Chithra and Selvam (2013) supported the findings in the study that investigated the determinants of financial inclusion in India using the index of financial inclusion by Sarma (2012). Tuesta *et al.* (2015) investigated the factors influencing financial inclusion using Argentina as a case study. The study found that the individual's level of education, income level and age of the household were the determinants of financial inclusion. The findings summarized that the level of off-farm income, financial literacy, age of the

household and education level had a positive significant relationship with financial inclusion while distance had a negative relationship with financial inclusion with an increase in the distance leading to a decline in the level of financial inclusion.

5. Conclusion and policy recommendations

The study sought to measure the level of financial inclusion among the smallholder farmers and to investigate the driving factors of financial inclusion among the smallholder farmers. The results indicated that the level of financial inclusion among the smallholder farmers was low. This means that the number of smallholder farmers participating in the informal financial market is low. As a result, the government of Zimbabwe should come with mechanisms that encourage smallholder farmers to participate in the formal financial market like educating them about the importance of financial inclusion, encouraging financial institutions to come up with digital platforms that help small farmers to use financial products at low cost. The investigation on the driving factors of financial inclusion indicated that off-farm income, education level, distance, financial literacy and age of the household were the significant variables in explaining the determinants of financial inclusion among the smallholder farmers in Manicaland Province of Zimbabwe. Therefore, the government and financial institutions need to form partnerships to come up with policies that motivate households to use formal financial services. These policies should strive to remove all the barriers to financial inclusion among the smallholder farmers. For instance, looking at farmers, many farmers are finding it difficult to access loans due to lack of collateral security, so banks need to come up with services and products that are tailor-made for the smallholder farmers especially on credit, services that allow smallholder farmers to borrow.

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