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Article

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An assessment of over-indebtedness among microfinance institutions' borrowers: The Tanzanian perspective

Pendo Shukrani Kasoga^{1*} and Amani Gratian Tegambwage²

Abstract: The introduction of microfinance institutions is viewed as the best alternative source of financial services for low-income earners as a means to raise their income and reduce poverty. However, empirical research has indicated that the majority of microfinance institutions' borrowers are over-indebted. Over-indebtedness has negative consequences for debtors, creditors, and for the economy as a whole. Since over-indebtedness is a context-specific phenomenon, it lacks universally accepted indicators. This study aims to validate indicators of over-indebtedness and examine the situation of over-indebtedness among micro-borrowers in the context of Tanzania. A survey of 535 micro-borrowers was conducted using a semi-structured questionnaire. Descriptive, thematic, and logistic regression techniques were employed for data analysis. Findings show that debt-to-income ratio, multiple borrowing, and delinquency have a positive and significant effect on over-indebtedness. Further, findings indicate that over-indebted micro-borrowers in Tanzania spend 75% or more of monthly income on servicing debts; are in the state of delinquency; are unable to meet basic needs due to loan repayment expenditure, have three or more credit commitments, and are in delinquency. To reduce over-indebtedness and hence poverty among micro-borrowers,



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PUBLIC INTEREST STATEMENT

Over-indebtedness has negative consequences for debtors, creditors, and for the economy as a whole. Over-indebtedness among microfinance institutions' borrowers is expanding around the world and Tanzania inclusive. This situation implies that the purpose of establishing microfinance institutions to provide poor people with access to finance, and thus reduce their poverty has not been realized. Since over-indebtedness is a context-specific phenomenon, and lacks universally accepted indicators across countries, this study seeks to validate the indicators of over-indebtedness in the context of Tanzania. The knowledge of indicators of over-indebtedness among low-income borrowers in Tanzania will not only help poor people to avoid excessive accumulation of debts, leading to poverty reduction, but also will be useful to microfinance institutions in making effective lending decisions that prevent over-indebtedness among micro-borrowers, leading to reduction of the risk of default, and in-turn enhance their sustainability.

microfinance institutions are advised to monitor debt levels among micro-borrowers, and reschedule loan repayment plans to already over-indebted micro-borrowers.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: Indicators of over-indebtedness; microfinance institutions; micro-borrowers; Tanzania

1. Introduction

In an attempt to increase access to finance to the poor people who are excluded from the formal financial institutions and reduce poverty, the government of Tanzania introduced microfinance institutions (Kasoga, 2014). Accordingly, a large number of microfinance institutions have been established, leading to a good access to finance among the poor. However, the increased access to finance has led to the prevalence of over-indebtedness among micro-borrowers in Tanzania, a phenomenon that has been commonly reported in industrialized nations (Maurer & Pytkowska, 2011). The issue of family debt has expanded around the world (Karwowski et al., 2019; Mian et al., 2017), as the average debt-to-income ratio has expanded almost twice in most countries (OECD, 2020). Currently, the issue is not little access to finance but excessive finance (Hiilamo, 2018; Wałęga & Wałęga, 2020).

Industry stakeholders have been worried that the expanding indebtedness among microfinance (institutions' borrowers has become a developing issue in most of the countries including Tanzania, causing deterioration in borrowers' social and economic well-being, leading to poverty (Coletta et al., 2019; Ramsay & Williams, 2020). Further, over-indebtedness puts microfinance institutions' portfolio quality and institutional stability at risk, with outcomes spreading to investors, donors, and the industry as a whole (Kappel et al., 2010). Despite this, over-indebtedness remains one of the most pressing yet unexplored subjects in the microfinance business (Theres et al., 2019; Wałęga & Wałęga, 2020).

Over-indebtedness happens when a client is continuously struggling to comply with repayment deadlines and has to make unduly high sacrifices related to his/her loan obligations (Brett, 2006; Gonzalez, 2008). Past researches have established indicators of over-indebtedness across different countries such as Poland, Thailand, Norway, Ghana, etc. (Schicks, 2013; Theres et al., 2019; Wałęga & Wałęga, 2020). However, borrowers' behavior differs from one country to another, and even within the same country (Ferretti & Vandone, 2019), the generalizability of the findings may be limited. This suggests that the revealed indicators of over-indebtedness in the literature would not necessarily be the indicators of over-indebtedness among microfinance institutions' borrowers in Tanzania. Moreover, there is no accepted indicator to predict over-indebtedness across the world, as over-indebtedness is a context-specific phenomenon (Anderson et al., 2016; Ferretti & Vandone, 2019).

Most countries in Sub-Sahara Africa, including Tanzania face a problem of microcredit debt payment leading to delinquency (Buss, 2005). Charles and Mori (2017) observed a substantial increase in multiple borrowing among micro-borrowers in Tanzania, due to limited information sharing among lenders. The study by Mpogole et al. (2012) concentrated on multiple borrowing and loan repayment among microfinance clients in Iringa region, Tanzania. To the best of our knowledge, there is no study which has addressed over-indebtedness in Tanzania. The most employed indicators of over-indebtedness in the literature are debt-to-income ratio, multiple borrowing, and delinquency (Keese, 2009; Oxera, 2004). As mentioned previously, over-indebtedness is a context-specific phenomenon, and thus lacks universally accepted indicators (Betti et al., 2007). Therefore, the ability of the commonly used indicators of over-indebtedness in the literature to predict over-indebtedness in Tanzania requires further investigation. Hence, this

study seeks to validate the commonly used indicators of over-indebtedness in the literature and examine the situation of over-indebtedness among micro-borrowers in the context of Tanzania.

This knowledge is essential to policy-makers in the process of developing policies to prevent over-indebtedness among microfinance institutions' borrowers. To the microfinance institutions, the knowledge gained from this study will help them to monitor debt levels, and provide appropriate support to already over-indebted micro-borrowers in resolving their problems, thus reduce poverty.

This paper is organized as follows: Section two offers a theoretical review, and hypotheses of the study. The third section outlines the research methods, while the fourth section presents the results and discussion of the findings. The final section presents conclusions and recommendations.

2. Literature review

2.1. Theoretical review

Since its conception, the life-cycle-permanent-income (LC-PI) theory (Friedman, 1957; Modigliani, 1966) has become the predominant theory for understanding the idea of the consumption/saving behaviour of the consumer. The LC-PI theory clarifies that over-indebtedness happens due to unexpected adverse shocks to the consumer's expenditure, especially future income. The theory further clarifies that in reality, both positive and negative unexpected events happen to the value of consumer financial and fixed assets, health, family structure, employment, interest rates, household resources, and basic expenditure requirements. Hence, over-indebtedness can emerge when the consumer's present resources are not adequate to balance the current value and future obligations.

LC-PI theory argues that short-sighted consumers may mismanage resources, and hence become more vulnerable to external shocks, and subsequently turn into victims of over-indebtedness than consumers who are far-sighted planners. Essentially, Krusell and Smith, Jr. (1998) outline that an optimal planner could likewise be frustrated by the presence of a liquidity constraint, when he/she is not allowed to borrow because his/her current income is temporarily below the permanent-income level. Although the presence of a liquidity constraint may lead to under-borrowing when income is expected to rise, it can likewise intensify the debt problem when negative shocks happen as the consumer's possible capacity to smooth consumption is severely affected.

The implication of the LC-PI theory for understanding consumer indebtedness is that it is optimal for a consumer to be indebted in specific situations, and at specific phases of the life cycle. If there is no sudden change to total resources or consumption prerequisites, the consumer's current assets will be adjusted by the present value of his/her debts over all future periods. This inter-temporary budget limitation will hold, and the consumer won't be over-indebted. Also, the presence of future uncertainty and the precautionary intention should give further protection against over-indebtedness.

2.2. Hypothesis development

2.2.1. Debt to income ratio and over-indebtedness

The most fundamental indicator of debt issues in the literature is the amount of debt a borrower holds as compared to their income (Chichaibelu and Waibel, 2018). World Bank (2019) demonstrated that larger debt per capita as compared to income is one of the main indicators of customers' over-indebtedness. Also, Eurofound (2020) showed that in Europe higher amounts of debt relative to income are negatively related to an individual's level of psychological well-being. Most investigations put the cut-off at 30 or 40 percent of debt-service to income as an indicator of

over-indebtedness (D'Alessio & Iezzi, 2016; Sánchez-Martínez et al., 2016; Terraneo, 2018). In nations with well-developed credit markets (e.g., Great Britain, USA), 50 percent cost of debt-to-income ratio is considered as a threshold beyond which households are deemed a significant burden (Oxera, 2004).

Due to lack of empirical studies on over-indebtedness and its indicators in Tanzania, this study takes 50 percent as a limit on the debt-to-income ratio to predict over-indebtedness in this context. A number of empirical studies have employed a 50% debt-to-income ratio as a cut-off point to predict over-indebtedness (e.g., Del-Río and Young, 2005; DeVaney & Lytton, 1995; Garrido et al., 2020; Jappelli et al., 2013; Keese, 2009; Schicks, 2013). The aforementioned studies have found a positive link between debt-to-income ratio and over-indebtedness. Given these findings, this study hypothesizes that:

H1: There is a positive relationship between debt to income ratio and over-indebtedness.

2.2.2. Multiple borrowing and over-indebtedness

Multiple borrowing happens when the borrower holds several debt contracts at the same time (Paxton et al., 2000). This occurs because microfinance industry credit bureaus are very rare, and microfinance institutions regularly don't have an idea that their loan applicants already have other outstanding loans. Consequently, borrowers exploit information asymmetries to borrow from several lenders in parallel. Kempson (2002) identified a strong relationship between individuals reporting debt repayment difficulties, and having four or more credit commitments in Britain. Similarly, the study by Mpogole et al. (2012) in Tanzania revealed that over 70% of the respondents had problems in loan repayment because of having multiple loans. Anioła-Mikołajczak (2017) found out that over-indebtedness in Poland is associated with individuals taking multiple loans from different lenders. Many other researchers have identified a link between over-indebtedness and multiple borrowing (e.g., Haq et al., 2018a; Wałęga & Wałęga, 2020). Thus, this study hypothesizes that:

H2: There is a positive relationship between multiple borrowing and over-indebtedness

2.2.3. Delinquency and over-indebtedness

Delinquency is a common indicator of debt problems, inferring the reality of reimbursing a loan later than it is due, or in the worst case not repaying all or part of it (Kappel et al., 2010). Mpogole et al. (2012) found that incidences of failure to repay the loan on time were high among micro-borrowers in Tanzania. They further revealed that about 71 percent of all survey respondents admitted to often face the problem of delinquency. Similarly, Charles and Mori (2017) found out that micro-borrowers in Tanzania face increased debt levels and thus an increased inability to meet their repayment obligations. Gonzalez (2008) suggested that inability to repay, or unwillingness to repay is associated with over-indebtedness in Bolivia. Since sacrifices made by borrowers due to difficulties in meeting their repayment commitments are not always sufficient to ensure repayment, the sacrifices are likely to be connected to actual delinquency (Betti et al., 2007). Delinquency represents a late-stage manifestation of debt problems. Along these lines, the study hypothesizes that:

H3: There is a positive relationship between delinquency and over-indebtedness.

3. Methods

3.1. Study area

The study was conducted among micro-borrowers from two major microfinance institutions in Tanzania, namely: FINCA (T) and BRAC (T). These microfinance institutions have branches across the country. Tanzania mainland was partitioned into six (6) clusters: Northern cluster (Tanga, Kilimanjaro, Arusha, and Manyara regions), the Southern cluster (Ruvuma, Njombe, Iringa, Lindi, and Mtwara regions), the Lake Victoria cluster (Mwanza, Mara, Shinyanga, Kagera, Geita, and Simiyu regions), the Eastern Cluster (Coast, Dar es Salaam and Morogoro regions), Western cluster (Kigoma, Katavi, Mbeya, and Rukwa regions) and the Central cluster (Dodoma, Singida, and Tabora regions). The multi-stage exercise was conducted by picking one region from each cluster through a simple random sampling procedure. The regions picked were Manyara, Njombe, Mara, Dar es Salaam, Mbeya, and Dodoma.

3.2. Data collection

This investigation utilized a cross-sectional survey design. The cross-sectional design is relatively simple, quick, and inexpensive to apply in data collection (Saunders et al., 2019). A random sample of 535 participants was chosen from a sampling frame of all joint liability borrowers from BRAC (T) and FINCA (T) in the study setting. The random sample provides the ability to generalize to a population (Babbie, 2007). Previous empirical studies on over-indebtedness have utilized a sample size of 535 and above (e.g., Gonzalez, 2008; Pytkowska & Spannuth, 2012; Schicks, 2013).

Data were collected personally by the researchers with the help of well-trained research assistants, using a semi-structured questionnaire. During data collection, the researchers assumed full responsibility for maintaining the confidentiality and anonymity of respondents. The questionnaire was composed of four sections. The first section captured general information about the respondents (control variables), namely: age, gender, marital status, level of education, housing type, number of children and other dependents, employment status, returns on investment, income volatility, and health status. The second section contained questions that capture the common indicators of over-indebtedness from the literature, namely: debt-to-income ratio, multiple borrowing, and delinquency (Oxera, 2004). The third section consisted of questions used to identify over-indebted borrowers, based on Betti et al. (2007) criteria: whether a borrower is in arrears, sell or pawn assets to repay the loans, does not afford medical expenses, enough food for the family, and cost of education for his/her children

Lastly, the fourth section captured the situation of over-indebtedness among micro-borrowers. Specifically, respondents were requested to state their average monthly income and the total amount of debt to be repaid in a month (Oxera, 2004), the period in arrears on credit commitments and household bills (Betti et al., 2007), and the number of credit commitments, both secured and unsecured (Kempson, 2002). Respondents were further asked whether the income available, after paying debts, was sufficient to meet the basic needs of life such as food, education for their children and medical expenses, whether they sell or pawn assets to repay their loans, and whether their assets have been seized by microfinance institutions for a missed repayment (Betti et al., 2007; Keese, 2009; Schicks, 2013). This item was used as the indication of the “real” feeling of over-indebtedness.

3.3. Data analysis

Descriptive analysis, thematic analysis, and logistic regression analysis were conducted in this study. Descriptive analysis was used to produce descriptive statistics for demographic characteristics in Table 2. Thematic analysis was employed to examine the situation of over-indebtedness among micro-borrowers. Specifically, this analysis was used to analyze qualitative data obtained from open-ended questions during the survey (Creswell, 2013). Common themes were identified and summarized in Tables 3–6.

Logistic regression technique was used to test the effect of common indicators of over-indebtedness from the literature: debt-to-income ratio, multiple borrowing, and delinquency on

over-indebtedness. Further, this technique was also employed to test the effect of control variables, namely; age, gender, marital status, level of education, housing type, number of children and other dependents, employment status, return on investment, income volatility, and health status on over-indebtedness. According to Pallant (2020), logistic regression explains relationships between one dependent binary variable and one or more independent variables.

Since this study does not analyze causality but is testing the quality of indicators of over-indebtedness as predictors of over-indebtedness, neither endogeneity nor omitted variable bias affects the interpretation of our findings (Schicks, 2013). To test the formulated hypotheses (H1-H3), the study estimated the following logit model:

$$OI_i = \alpha + \beta_1 DI_i + \beta_2 MB_i + \beta_3 DQ_i + \beta_4 BC_i + \varepsilon_{it} \quad (i)$$

Whereby for each respondent i , OI_i is a binary measurement of the “real” feeling of over-indebtedness, measured by 1 if the borrower is persistently struggling to fulfill reimbursement deadlines, and is in arrears, sells or pawns assets to repay the loans, does not afford medical expenses, enough food for the family, and cost of education for his/her children (Betti et al., 2007; Keese, 2009; Schicks, 2013), and 0 otherwise. DI_i is the debt-to-income ratio measured as the borrower’s monthly repayment burden related to monthly income (Betti et al., 2007; Rinaldi and Sanchis-Arellano, 2006). MB_i is multiple-borrowing i.e. loans from different lenders measured as a binary variable equal to 1 if the borrower had borrowed from several lending institutions and 0 otherwise (Charles & Mori, 2017), and DQ_i is delinquency, i.e. a dummy that takes the value of 1 for a borrower who is in arrears of at least one day on an outstanding loan at the time of the survey, and 0 otherwise (Schicks, 2013). BC_i represents borrower-specific controls. The study controls for borrower characteristics including age, gender, marital status, level of education, housing type, number of children and other dependents, employment status, return on investment, income volatility, and health status.

3.4. Measurement of variables

3.4.1. Over-indebtedness

There is no agreement in the literature on the definition of over-indebtedness and the best way to quantify it (Betti et al., 2007; Guérin et al., 2009). Many definitions of over-indebtedness in the literature appear to focus on how borrowers struggle to repay their loan (e.g., Bańkowska et al., 2015; Bourova et al., 2019; D’Alessio & Iezzi, 2016). Over-indebtedness is a setting-specific phenomenon (Betti et al., 2007). Thus, the borrowers’ subjective perceptions of what constitutes a sacrifice and how acceptable the different sacrifices are, depends on the local contexts and individual borrower attributes (Bourova et al., 2019; D’Alessio & Iezzi, 2016). Nevertheless, this subjective measure considers significant bits of knowledge into the genuine idea of over-indebtedness (Copestake, 2008).

Gonzalez (2008) contends that over-indebtedness can happen from an unwillingness to repay, an inability to repay, or costly actions that are required to repay. Further, he argued that borrowers are considered over-indebted if they need to decrease expenditures beyond the level they are accustomed to or make more sacrifices than expected. Likewise, Canner and Lockett (1991) point out that sacrifice by a borrower is an indication of over-indebtedness. They argued that if borrowers who manage to meet their reimbursement commitments, yet who should remove kids out from school or skip suppers to do so ought to be considered as over-indebted. Similarly, an individual is regarded over-indebted when his/her income, despite a decrease of the living standard, is not enough to make all payment commitments over a longer period (Haas, 2006). Most researchers consider borrowers over-indebted if their obligation issues are tireless throughout a specific time, and borrowers struggle with unhealthy debt balance (Collins, 2008).

This study adopts a definition of over-indebtedness that is generally utilized in the literature as suggested by Brett (2006): A microfinance institutions’ borrower is over-indebted if he/she is

persistently struggling to fulfill reimbursement deadlines, and needs to make high sacrifices related to his/her loan obligations that have more than short-lived impacts (Brett, 2006): This definition depends on the idea that, if loans aggravate borrowers, as the sacrifices surpass the advantages, at that point these loans can cause over-indebtedness.

Accordingly, following previous research on over-indebtedness (e.g., Betti et al., 2007; Guérin et al., 2009; Schicks, 2013), this study used subjective approach to identify an over-indebted borrower based on the sacrifices made related to his/her loan obligations. The sacrifices included in this study to identify an over-indebted borrower are: whether a borrower is in arrears, sell or pawn assets to repay the loans, does not afford medical expenses, enough food for the family, and the cost of education for the children (Betti et al., 2007). Numerous researchers emphasize the benefits of a subjective measurement of over-indebtedness (Betti et al., 2007; Guérin et al., 2009). These researchers consider borrowers as the best-appointed authorities of their debt circumstance. Specifically, over-indebtedness was measured as a dummy variable that takes the value 1 if the borrower is persistently struggling to fulfil reimbursement deadlines, and is in arrears, sells or pawns assets to repay the loans, does not afford medical expenses, enough food for the family, and cost of education for his/her children, and 0 otherwise (Betti et al., 2007; Keese, 2009; Schicks, 2013), as indicated in Table 1.

3.4.2. Indicators of over-indebtedness

The literature provides several indicators that predict over-indebtedness based on the quantitative ratios. The most-employed indicators of over-indebtedness across many studies are: debt-to-income ratio, multiple borrowing, and delinquency (Schicks, 2013). Similarly, this study used debt-to-income ratio, multiple borrowing, and delinquency to predict over-indebtedness among micro-finance institutions borrowers in Tanzania. Debt-to-income ratio represents the amount of monthly debt relative to the borrower's monthly income (Betti et al., 2007; Rinaldi et al., 2006). Multiple borrowing represents the number of loans the borrower has from different lenders (Kempson, 2002). This was measured as a dummy variable that takes the value of 1 if the borrower has multiple loans, and 0 otherwise (Charles & Mori, 2017). Delinquency represents a state in which a borrower repays a loan later than it is due, or in the worst case not repaying all or part of it (Kappel et al., 2010). Again, this was measured as a dummy variable that takes the value 1 for a borrower who is in arrears of at least one day on an outstanding loan at the time of the survey, and 0 otherwise (Schicks, 2013). Table 1 presents a list of all variables employed in this study and their corresponding measures.

4. Results and discussion

This section presents the results and discussion of the indicators of over-indebted among micro-finance institutions borrowers' in Tanzania.

4.1. Demographic characteristics of respondents

Table 2 shows the demographic characteristics of respondents in the study setting.

The findings in Table 2 reveal that the majority (96%) of respondents were female. This implies that most of the micro-borrowers are women. The results also show that the majority (78%) of respondents were in the age group of 26 to 45, suggesting that young micro-borrowers are productive, and have family and other societal responsibilities. This is supported by the fact that the majority (86%) of the respondents were married. Further, the findings indicate that most of the respondents (90.3%) were self-employed. These findings imply that microfinance institutions provide loans to low-income borrowers who have established their own small businesses, and thus seek loans to expand their businesses. However, these respondents (100%) were found to use loans for business and other purposes, such as food, education for their children, and other family responsibilities, contrary to their primary purpose, hence exposing themselves to the risk of over-indebtedness.

In addition, results in Table 2 show that the majority of respondents have three or more children (88%), one or more dependents (77%), and living for a rent (55.4%), suggesting higher family

Table 1. Measurement of variables

Variable	Measure
Independent variables	
Debt to income ratio	Represents the amount of monthly debt relatively to income of a borrower measured by monthly debt/ monthly income (Betti et al., 2007; Rinaldi et al., 2006).
Multiple borrowing	Represents the number of loans the borrower has from different lenders. Dummy variable that takes the value of 1 if the borrower has multiple loans, and 0 otherwise (Charles & Mori, 2017).
Delinquency	Represents a borrower repaying a loan later than it is due, or in the worst case not repaying all or part of it. Dummy variable that takes the value 1 for a borrower who is in arrears of at least one day on an outstanding loan at the time of the survey, and 0 otherwise (Schicks, 2013).
Dependent variable	
Over-indebtedness	Represents a “real” feeling of over-indebtedness measured as a dummy variable that takes the value 1 if a borrower is in arrears, sells or pawns assets to repay the loans, does not afford medical expenses, enough food for the family, and cost of education for his/her children (Betti et al., 2007; Keese, 2009; Schicks, 2013), and 0 otherwise.
Control variables	
Gender	Represents sex of a borrower. Dummy variable that takes the value of 1 if a borrower is female, and 0 if male.
Age	Continuous variable representing number of years lived by a borrower.
Marital Status	Categorical variables representing marital status of a borrower: 1 if single, 0 otherwise; 1 if married, 0 otherwise; 1 if divorced, 0 otherwise; 1 if widowed, 0 otherwise.
Level of Education	Categorical variables representing the level of education attained by a borrower: 1 if no formal education, 0 otherwise; 1 if primary education, 0 otherwise; 1 if secondary education, 0 otherwise; 1 if tertiary education, 0 otherwise.
Number of Children	Categorical variables representing the number of children of a borrower: 1 if no children, 0 otherwise; 1 if one child, 0 otherwise; 1 if two children, 0 otherwise; 1 if three children, 0 otherwise; 1 if four children, 0 otherwise; 1 if five children, 0 otherwise; 1 if more than five children, 0 otherwise.
Housing Type	Categorical variables representing housing type lived by a borrower: 1 if living for rent, 0 otherwise; 1 if living in family housing for free, 0 otherwise; 1 if living in his/her own house, 0 otherwise.
Number of other dependents	Categorical variables representing the number of other dependents of a borrower: 1 if no dependent, 0 otherwise; 1 if one dependent, 0 otherwise; 1 if two dependents, 0 otherwise; 1 if three dependents, 0 otherwise; 1 if four dependents, 0 otherwise; 1 if five dependents, 0 otherwise; 1 if more than five dependents, 0 otherwise.
Loan use	Represents the use of the loan. Dummy variable that takes the value of 1 if the loan is used for business only, 0 otherwise.

(Continued)

Variable	Measure
Employment status	Represents employment status of a borrower. Categorical variables that takes the value of 1 if permanently employed, 0 otherwise; 1 if self-employed, 0 otherwise; 1 if student, 0 otherwise; 1 if temporary employed, 0 otherwise.
Return on investment	Represents a borrower's return on investment. Categorical variables that takes the value of 1 if there is a permanent increase in earnings, 0 otherwise; 1 if increase in earnings is not sufficient to repay the loan, 0 otherwise; 1 if no permanent increase in earnings, 0 otherwise; 1 if no investment, 0 otherwise.
Income volatility	Represents a borrower's income volatility. Categorical variables that takes the value of 1 if no income volatility, 0 otherwise; 1 if little income volatility, 0 otherwise; 1 if high-income volatility, 0 otherwise.
Health status	Represents the health status of a borrower. Categorical variables that takes the value of 1 if no health problem, 0 otherwise; 1 if little health problem, 0 otherwise; 1 if very high health problem, 0 otherwise.

responsibilities. Further, an increase in return on investment was not sufficient to repay the loans for most respondents (49.3%), while other respondents (38.3%) have no permanent increase in earnings. 6.4% of respondents have no investment, suggesting that they obtained loans by cheating due to information asymmetry. The majority of respondents face little income volatility (69.5%), have primary education (72%), and have no health problems (62.1%).

4.2. The situation of over-indebtedness among micro-borrowers in Tanzania

The situation of over-indebtedness among micro-borrowers was investigated with respect to the three widely employed predictors of over-indebtedness: debt-to-income ratio, multiple borrowing, and delinquency, as well as the sacrifices made in relation to loan obligations. The investigation was conducted through thematic analysis of qualitative data from open-ended questions. The common themes identified are summarized in [Tables 3–6](#).

4.2.1. Debt to income ratio

The findings in [Table 3](#) show that the majority of respondents (94 percent) spend more than 75 percent of their monthly income on servicing debts both secured and unsecured. This finding implies a high ratio of debt to current income or a high level of income gearing, suggesting future income shock. DeVaney and Lytton (1995) show that when debt repayments exceed 50% of a borrower's income, indicates a significant risk of over-indebtedness. Since debt-to-income ratio has been validated in this study as a significant predictor of over-indebtedness ([Table 8](#)), the majority of micro-borrowers in Tanzania are over-indebted.

However, contrary to DeVaney and Lytton (1995), our findings indicate that borrowers whose debt-to-income ratio exceed 50% but less than 75% afford food, education and medical expenses, do not pawn assets to repay loans and their assets have not been seized by microfinance institutions for a missed repayment ([Table 6](#)), suggesting that they are not over-indebted (Betti et al., 2007; Keese, 2009; Schicks, 2013). One explanation for this surprising finding is that these borrowers might be receiving free financial assistance from close relatives and friends, which were not disclosed to the researchers.

4.2.2. Multiple debts

[Table 4](#) indicates the number of credit commitments of borrowers. The findings reveal that the majority of borrowers (94%) had three or more credit commitments, both secured and unsecured.

Table 2. Demographic characteristics of respondents

Variables	N = 535		
		Frequency	Percent
Gender	Male	21	4
	Female	514	96
Age (Years)	18–25	88	17
	26–35	223	42
	36–45	194	36
	>45	30	5
Marital Status	Single	27	5
	Married	461	86
	Divorced	25	5
	Widowed	22	4
Level of Education	None	13	2
	Primary School	383	72
	Secondary	127	24
	Tertiary	12	2
Number of Children	None	5	1
	One	17	3
	Two	45	8
	Three	176	33
	Four	61	11
	Five	165	31
	> Five	66	13
Housing Type	Living for rent	490	55.4
	Living in family housing for free	22	21.4
	Living in my own house	23	23.2
Number of other dependents	None	125	23
	One	181	34
	Two	136	26
	Three	40	8
	Four	29	5
	Five	13	2
	> Five	11	2
Loans use	Business only	0	0
	Business and other purposes	535	100
Employment status	Permanent employment	29	5.4
	Self-employed	483	90.3
	Student	0	0
	Temporary employment	23	4.3

(Continued)

Variables	N = 535		
		Frequency	Percent
Return on investment	Permanent significant increase in earnings	32	6.0
	Increase not sufficient to repay the loans	264	49.3
	No permanent increase in earnings	205	38.3
	No investment	34	6.4
Income volatility	No income volatility	3	0.6
	Little income volatility	372	69.5
	High-income volatility	160	29.9
Health status	No health problem	332	62.1
	Little health problem	118	22.1
	Very high health problem	85	15.9

Having three or more credit commitments is widely regarded to put a borrower at a significant risk of the financial problem causing over-indebtedness (Betti et al., 2007). Since multiple borrowing has been validated in this study as a significant predictor of over-indebtedness (Table 8), the majority of micro-borrowers in Tanzania are over-indebted.

In addition, 32 respondents (6%) who had one credit commitment afford food, education and medical expenses, do not pawn assets to repay loans and their assets have not been seized by microfinance institutions for a missed repayment (Table 6). This suggests that they are not over-indebted (Betti et al., 2007; Keese, 2009; Schicks, 2013). Our findings are consistent with Aniola-Mikolajczak (2017) and Schicks (2013) who identified a strong relationship between individuals reporting debt repayment difficulties and having many credit commitments.

4.2.3. State of delinquency among micro-borrowers

Table 5 summarizes the results of the state of delinquency among micro-borrowers. The findings indicate that the majority (94%) of the borrowers were in the state of delinquency on credit commitments. Arrears with repayments for credit are widely regarded as symptoms of financial difficulty (Oxera, 2004). Accordingly, being in arrears for longer than 2 months is a strong predictor of over-indebtedness (Betti et al., 2007; Montgomerie & Tepe, 2019). Since delinquency has been validated in this study as a significant predictor of over-indebtedness (Table 8), the majority of micro-borrowers in Tanzania are over-indebted.

Table 3. Percentage of debt to income

Indicator	Frequency	Percent
Percentage of gross monthly income spent on total borrowing repayments both secured and unsecured (debt to income)		
< 75%	32	6
75%	112	21
> 75%	391	73
Total	535	100

Table 4. Number of credit commitments

Number of credit commitments	Frequency	Percent
One	32	6
Two	0	0
Three	132	25
> Three	371	69
Total	535	100

In addition, 32 respondents (6%) who were not delinquent afford food, education and medical expenses, do not pawn assets to repay loans and their assets have not been seized by microfinance institutions for a missed repayment (Table 6). This suggests that they are not over-indebted (Betti et al., 2007; Keese, 2009; Schicks, 2013).

4.2.4. Sacrifices made by micro-borrowers related to loan obligations

In addition to the three most widely employed predictors of over-indebtedness: debt to income ratio, multiple borrowing, and delinquency, this study also investigated the situation of over-indebtedness among micro-borrowers based on the sacrifices made in relation to their loan obligations as suggested by Betti et al. (2007), Keese (2009), and Schicks (2013). The findings are summarized in Table 6.

Findings in Table 6 reveal that the majority (94%) of borrowers do not afford enough food for their families; the cost of educating their children; medical expenses; sell or pawn assets to repay the loans, and their assets have been seized by microfinance institutions for a missed payment. The inability of the borrower to meet the basic needs of life is an indication that the borrower's spending on total borrowing repayments takes him/her below the poverty line (Bettocchi et al., 2018; D'Alessio & Iezzi, 2016). Many studies have employed sacrifices made by borrowers in relation to their loan obligations to identify over-indebted borrowers (Betti et al., 2007; Guérin et al., 2009; Schicks, 2013). Accordingly, we can say that the majority of micro-borrowers in Tanzania are over-indebted. These findings are in line with numerous studies that reported over-indebted borrowers having limited income left after paying debts (D'Alessio and Iezzi, 2013; Mian et al., 2017; Ntsalaze & Ikhede, 2016).

4.3. Correlation results

Table 7 shows the correlations between the variables. The findings show that there is no multi-collinearity problem among independent variables because the variables did not relate to each other, as the correlation among variables was below 0.7 (Kennedy, 2008). The results of the correlation analysis between the independent and dependent variables show preliminary support of the study hypotheses. The positive correlation between debt to income and over-indebtedness ($r = 0.314$, $p < 0.01$) imply that debt to income matters a lot in terms of increasing over-indebtedness, supporting H1. The finding concurs with Garrido et al. (2020) who have found out

Table 5. State of delinquency among micro-borrowers

Delinquency	Frequency	Percent
Not delinquent	32	6
Delinquent: A borrower was at least one day late with at least one installment on outstanding debt.	503	94
Total	535	100

Table 6. Sacrifices made by micro-borrowers related to loan obligations

Sacrifices made	Frequency	Percent
Afford food, education and medical expenses, do not pawn assets to repay loans and their assets have not been seized by microfinance institutions for a missed repayment.	32	6
Do not afford food, education and medical expenses, do not pawn assets to repay loans and their assets have not been seized by microfinance institutions for a missed repayment	503	94
Total	535	100

that the debt-to-income ratio is related to over-indebtedness. Similarly, the study found out that multiple-borrowing has a positive correlation with over-indebtedness ($r = 0.322$, $p < 0.01$), implying that multiple borrowing is a source of over-indebtedness, supporting H2. This finding is in line with Haq et al. (2018a) who have found out that over-indebtedness is related to the number of loans a borrower holds. Likewise, a positive correlation was found between delinquency and over-indebtedness ($r = 0.430$, $p < 0.01$) implying that delinquency among borrowers is a sign of over-indebtedness, supporting H3. The finding is consistent with Kappel et al. (2010) who found that repaying a loan later than it is due or in the worst case not repaying all or part of it at all, is an indicator of over-indebtedness.

The results in Table 7 indicate that over-indebtedness has a positive and significant correlation with all control variables, except employment status and health status: marital status ($r = 0.058$, $p < 0.05$); level of education ($r = 0.065$, $p < 0.05$); employment status ($r = 0.017$, $p > 0.05$); return on investment ($r = 0.320$, $p < 0.01$); income volatility ($r = 0.280$, $p < 0.01$); housing type ($r = 0.175$, $p < 0.01$); number of children ($r = 0.270$, $p < 0.01$), and number of dependents ($r = 0.271$, $p < 0.01$). These results are supported by Table 2, which indicates that the majority of over-indebted borrowers are married, and with low levels of education. In addition, the majority of over-indebted borrowers run businesses with low return on investment, high-income volatility, live in rented houses, with many children and dependents. With respect to employment status, findings show a positive and insignificant correlation between employment status and over-indebtedness ($r = 0.017$, $p > 0.05$), implying that employment status is not associated with over-indebtedness. As for the health status, results indicate a negative and insignificant correlation between health status and over-indebtedness ($r = -0.180$, $p > 0.05$). This finding is supported by Table 2 which indicates that most of the borrowers have good health. Thus, health status is not associated with over-indebtedness.

4.4. Logistic regression results

Table 8 provides the findings from the logistic regression. The effect of debt-to-income ratio on over-indebtedness is positive and significant ($\beta = 0.843$, $p < 0.01$), supporting H1. This finding implies that an increase in debt-to-income ratio leads to an increase in over-indebtedness. The finding is in line with the LC-PI theory that when income is lower than expenditure, the likelihood of over-indebtedness increases due to adverse shocks. Similarly, the finding concurs with Mian et al. (2017) and Garber et al. (2018) who contend that high levels of expenditure as compared to income increase the chances of over-indebtedness among households.

Likewise, the effect of multiple borrowing on over-indebtedness is positive and significant ($\beta = 0.973$, $p < 0.01$), supporting H2. The finding implies that the probability of over-indebtedness

Table 7. Correlation matrix

	DQ	MB	DI	MST	LE	ES	RI	IV	HS	NC	HT	ND	OI	Variables
DQ	1													
MB	-.749**	1												
DI	-.732**	.391**	1											
MST	.074	-.039	-.045	1										
LE	-.051	.123**	-.092*	-.213**	1									
ES	.039	-.081	.095*	.086*	-.124**	1								
RI	.745**	-.497**	-.558**	.128**	-.024	-.024	1							
IV	.130**	-.099*	-.034	.132**	-.308**	-.093*	.369**	1						
HS	.420**	-.301**	-.211**	.266**	-.387**	.078	.523**	.428**	1					
NC	.148**	-.124**	-.064	.343**	-.271**	.244**	.319**	.261**	.436**	1				
HT	.119**	-.083	-.122**	-.004	.265**	-.019	.019	-.268**	-.055	-.069	1			
ND	.654**	-.442**	-.483**	.073	.110*	-.037	.542**	.192**	.195**	.174**	.147**	1		
OI	.430**	.322**	.314**	.058*	.065*	.017	.320**	.280**	-.180	.275**	.175**	.271**	1	

** , * imply significance < 0.01 levels, and 0.05 levels (2-tailed) respectively. Debt to income ratio (DI); Delinquency (DQ); Number of multiple borrowing (MB); Debt to income (DI); Marital Status (MST); Level of Education (LE); Employment status (ES); Returns on investment (RI); Income volatility (IV); Health status (HS); Number of Children (NC); Housing Type (HT); Number of other dependents (ND); Over-indebtedness (OI).

Table 8. Logistic regression results

Variables	β	S.E	Sig.
Constant	2.755	.182	**
Debt income ratio	0.843	0.345	**
Multiple borrowing	0.973	0.169	**
Delinquency	0.815	0.692	**
<i>Controls</i>			
Gender	0.710	0.189	**
Age	0.461	0.235	*
Marital Status	0.413	0.309	*
Level of Education	0.391	0.262	*
Number of Children	0.158	0.124	*
Housing Type	0.168	0.668	**
Number of other dependents	1.297	0.229	**
Employment status	0.163	0.417	
Returns on investment	0.980	0.418	**
Income volatility	2.473	0.464	**
Health status	-0.861	0.112	

-2Log likelihood = 148.936
Cox & Snell R^2 = 0.160
Nagelkerke R^2 = 0.440

**, *imply significance < 1%, and 5% respectively

increases with the increase in multiple borrowing. Other researchers have also reported multiple loans as an indicator of over-indebtedness (Wałęga & Wałęga, 2020). Similarly, the effect of delinquency on over-indebtedness is positive and significant ($\beta = 0.815$, $p < 0.01$), supporting H3. The finding implies that over-indebtedness increases with the increase in delinquency. One explanation of these borrowers is that they have higher consumption than income and presumably constitute a significant proportion of the hand-to-mouth type borrowers, and struggles to meet day-to-day spending leading to delinquency.

With respect to the control variables, Table 8 shows that gender exerts a positive and significant effect on over-indebtedness ($\beta = 0.710$, $p < 0.01$). This is supported by results in Table 2, which indicate that the majority of over-indebtedness borrowers are female. One explanation for this is that most of the female borrowers are poor, with many family responsibilities, and thus borrow more leading to over-indebtedness. The effect of age on over-indebtedness was found to be positive and significant ($\beta = 0.461$, $p < 0.05$). This is revealed by a large number of young people who are over-indebted as shown in Table 2. These findings are in line with Wałęga and Wałęga (2020) who reported a high risk of over-indebtedness among young people due to many family responsibilities.

The findings in Table 8 also indicate a positive and significant effect of marital status on over-indebtedness ($\beta = 0.413$, $p < 0.05$). This explains a higher percentage of over-indebted married borrowers in Table 2. Again, married borrowers have many family responsibilities which lead them into over-indebtedness. Likewise, the level of education was found to have a positive and significant effect on over-indebtedness ($\beta = 0.391$, $p < 0.05$). This is supported by a large number of over-indebted borrowers with a low level of education as shown in Table 2. This finding is in line with French and McKillop (2016) who emphasize the importance of financial education in reducing the occurrence of over-indebtedness. However, employment status was found to exert a positive but insignificant effect on over-indebtedness ($\beta = 0.163$, $p > 0.05$), implying that employment

status does not explain over-indebtedness among micro borrowers. This finding is supported by the results in Table 2, which indicate that the majority of over-indebted borrowers are self-employed.

Dependent variable: Over-indebtedness

Further, Table 8 indicates a positive and significant effect of return on investment on over-indebtedness ($\beta = 0.980$, $p < 0.01$). This finding is supported by a prevalence of low return on investment among most businesses owned by over-indebted borrowers, as shown in Table 2. The positive and significant effect of income volatility on over-indebtedness ($\beta = 2.473$, $p < 0.01$) supports LC-PI theory (Friedman, 1957) which maintains that high-income volatility increases the probability of over-indebtedness. Housing type was also found to have a positive and significant effect on over-indebtedness ($\beta = 0.168$, $p < 0.01$). Since majority of over-indebted borrowers live in rented houses (Table 2), they are obliged to pay house rent. This increases the likelihood of being over-indebted, given other family responsibilities shouldered by them.

Similarly, the number of children and other dependents exert positive and significant effects on over-indebtedness ($\beta = 0.158$, $p < 0.05$ and $\beta = 1.297$, $p < 0.01$, respectively). These results are supported by a prevalence of a large number of children and other dependents among over-indebted borrowers, as shown in Table 2. The findings suggest that borrowers with many children and other dependents appear to be particularly vulnerable to financial problems due to huge family responsibilities. On the contrary, findings in Table 8 and 9 indicate a negative and insignificant effect of health status on over-indebtedness ($\beta = -0.861$, $p < 0.05$). This finding is supported by the existence of good health among the majority of over-indebted borrowers, as shown in Table 2. Thus health status was not the reason for over-indebtedness in this study.

5. Conclusion and recommendations

Based on the findings of this study, it can be concluded that the most widely used indicators of over-indebtedness in the extant literature: debt-to-income ratio, multiple borrowing, and delinquency are significant predictors of over-indebtedness in the Tanzanian context. In addition, the study concludes that gender, age, marital status, level of education, number of children, and other dependents, return on investment, housing type, and income volatility exert positive and significant effects on over-indebtedness. However, employment status, and health status exert insignificant effects on over-indebtedness. Further, an investigation of the situation of over-indebtedness among micro-borrowers in Tanzania has revealed that an over-indebted micro borrower spends 75 percent or more of monthly income on servicing debts both secured and unsecured, has three or more credit commitments, is in the state of delinquency, and is unable to meet basic needs due to loan repayment expenditure.

This study contributes to the body of knowledge by validating the most widely used indicators of over-indebtedness, namely debt-to-income ratio, multiple borrowing, and delinquency in the Tanzanian context. The unveiling of the positive and significant effect of the debt-to-income ratio, multiple borrowing, and delinquency on over-indebtedness in Tanzania was necessary given the fact that there is no accepted indicator to predict over-indebtedness across the world, as over-indebtedness is a context-specific phenomenon (Anderson et al., 2016; Betti et al., 2007). In addition, the study contributes to the body of knowledge by revealing the situation of over-indebtedness among micro-borrowers in Tanzania. For example, although most of the previous studies have documented a 50% debt-to-income ratio as a cut-off point to predict over-indebtedness (e.g., Del-Río and Young, 2005; DeVaney & Lytton, 1995; Garrido et al., 2020; Jappelli et al., 2013; Keese, 2009; Schicks, 2013), the situation in Tanzania indicates that the majority of over-indebted micro-borrowers have a 75% or more debt-to-income ratio. This finding suggests a severe situation of over-indebtedness among micro-borrowers in Tanzania.

As for the practical implication of this study, since over-indebtedness has negative consequences for debtors, creditors, and for the economy as a whole, microfinance institutions in Tanzania are advised to monitor debt levels among micro-borrowers, provide financial advice to borrowers, and reschedule loan repayment plans to already over-indebted micro-borrowers to reduce over-indebtedness and hence poverty. Further, policy makers are advised to pay more attention on preventing over-indebtedness from arising in the first place, as well as procedures to manage debt levels among micro-borrowers. For example, the establishment of credit information systems that collect negative and positive information about credit relationships and payment patterns of borrowers could help microfinance institutions to make sound lending decisions.

As in most survey-based studies, our study has some limitations. Specifically, this study used cross-sectional data. To gain more insights on this topic, panel data could be used for future studies. Further, the fact that this study was conducted in Tanzania, affects the generalizability of its findings to other contexts. Thus, similar studies should also be conducted in other contexts.

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