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Abstract

This study investigates the extent to which debt repayments pose a burden for household borrowers. We question the use of arbitrary thresholds to determine the over-indebtedness status of a household and introduce a new 'opportunity cost approach' to provide the first objective measures of the incidence and severity of over-indebtedness in Ghana from the client's perspective. Using two waves of nationally representative survey data, we employ maximum likelihood and instrumental variable estimation techniques to determine the influence of loan amount and loan use on the probability and intensity of over-indebtedness and examine the effect of over-indebtedness on households' living standards. The findings suggest that 41 per cent of household borrowers are over-indebted, and 23 per cent endure severe over-indebtedness by sacrificing food expenditures. An increase in the loan size and unproductive loan use strongly increases the probability of over-indebtedness. Other influential factors include rural residence, low education, female-headed households and insurance. In addition to small loan sizes and unproductive loan use, the risk of severe over-indebtedness is associated with low education, female-headed households, rural residence and informal employment. Over-indebtedness also reduces household living standards by 24 per cent. This research provides crucial information to aid policy decisions on households' vulnerability due to sacrifices for debt repayment. Such sacrifices could ultimately affect future poverty levels and the attainment of the sustainable development goal to eradicate extreme poverty by the year 2030.

Keywords: debt-burden; over-indebtedness; credit; standard of living; sub-Saharan Africa; sacrifices.

1. Introduction

Finance for development matters, but the potentially insidious nature of household over-indebtedness could hinder the prospects of eradicating extreme poverty by 2030. Inquiry into over-indebtedness gained momentum at the peak of consumer credit in Europe (Betti et al., 2007; European Commission, 2008; Leandro & Botelho, 2022). It is a complex phenomenon involving arrears, defaults, multiple borrowing, high debt-servicing and subjective debt problems. Due to its inherent threat to borrowers, institutions and governments, the microfinance blast aroused investigations into the extent, severity and drivers of over-indebtedness, particularly in low- and middle-income countries. These focused on areas of prolific microfinance delivery, especially in Asia and Eastern Europe (Guérin et al., 2009; Khandker et al., 2013; Liv, 2013; Maurer & Pytkowska, 2011). Evidence emerging from the European continent continues to trumpet the potentially deleterious nature of the over-indebtedness problem (Wałęga et al., 2022).

In sub-Saharan Africa, recent studies have focused on the phenomenon from the southern sector (Fatoki, 2015; Mutsonziwa & Fanta, 2019; Ntsalaze & Ikhide, 2016). In Ghana, the rigorous expansion of microfinance generated concerns about multiple borrowing and clients' perceptions of their debt burden (Grammling, 2009; Schicks, 2013). While these issues prevailed and may have been compounded by the country's financial crisis, the COVID-19 pandemic has marshalled renewed concerns about over-indebtedness (Bank of Ghana [BOG], 2020; Brickell et al., 2020). In response to the earlier alarm, recent evidence revealed that in Ghana, over a third of microfinance borrowers have multiple loans, which could lead to over-indebtedness and its attendant implications (Ewusie et al., 2021). Hence, existing evidence of multiple borrowing, extraordinary sacrifices and increasing vulnerabilities are signals of a possible debt overhang.

In spite of its insidious nature, there is a dearth of evidence on over-indebtedness from the continent, and the fragility depicted by recent concerns in Ghana provides an impetus for examining the over-indebtedness problem. The only existing study in Ghana found that 30 per cent of urban borrowers are over-indebted (Schicks, 2013). It focused on personal impressions of the debt burden from borrowers of one microfinance institution (MFI) in the capital city to highlight repayment struggles and repeated sacrifices for debt repayment. Since then, household indebtedness has increased by 25 per cent amidst an environment of tenuous incomes and increasing poverty (GSS, 2014, 2018). Despite the implications, there is no objective, nationally representative evidence on the extent, severity, factors and effect of over-indebtedness to complement existing perceptions of debt burden.

Investigating over-indebtedness requires a comprehensive and contextual approach. For an objective inquiry, there are identified gaps that begin with its measurement.

D'Alessio and Iezzi (2013) suggest that the debt service indicator (DSR) is an accurate measure of the debt burden.[1] This indicator is fraught with inherent biases due to the subjective nature of the cut-off points adopted (Betti et al., 2007; European Commission, 2008; Liv, 2013). Another problem is the existing evidence on small loan sizes and high interest rates (Schicks, 2013). The reference to loan adequacy suggests a prevailing credit constraint for the affected Ghanaian household borrowers, as corroborated by the prevalence of multiple borrowing (Ewusie et al., 2021). Therefore, some borrowers accumulate larger loan amounts from the same or a different provider to alleviate the small loan problem. Although access to larger loan sizes can mitigate credit insufficiency, it could also trigger severe repayment challenges (Khandker et al., 2013; Liv, 2013). Similarly, the opportunity to increase the loan size could present repayment difficulties, especially for low-income household borrowers in Ghana.

The earlier subjective study by Schicks (2014) that analysed data collected over a decade ago, suggests that unproductive loan use increases the risk of over-indebtedness. Despite the evidence, an emerging concern is a noticeable increase in consumption loans (GSS, 2014, 2018). The data suggest that 26.8 per cent of loans are secured for consumption, which signifies an increase of 22 per cent over the consumption component in the previous survey. The percentage represents over a quarter of total household loans. Therefore, the rise in consumption loans, especially by borrowers on low incomes, can lead to over-indebtedness. Given the current trend, an objective approach will provide more insights. Liv (2013) found no significant relationship between loan use and repayment challenges in Cambodia. The outcome was attributed to data on intended but not actual usage. Hence, the underlying intuition that unproductive loans could lead to over-indebtedness is outstanding and can be examined by actual loan use. These issues raise concerns regarding two primary factors of indebtedness - loan size and loan use - that could lead to the burden of debt servicing and its severity.

Emerging evidence also suggests that over-indebtedness can reduce living standards (Brickell et al., 2020; Mutsonziwa & Fanta, 2019). On repayment sacrifices, Liv (2013) suggests that 48 per cent of borrowers sacrificed on food quality and 44 sacrificed on the quantity of food intake. Schicks (2013) also reveals that 60 per cent of Ghanaian borrowers postpone crucial expenses, 43 per cent struggle regularly, and somewhat disconcertingly, 62 per cent reduce food quantity and quality. The preceding evidence highlights that repayment difficulties affect food consumption and the quality of borrowers' livelihoods. If so, the overarching question is, what is the extent and severity of over-indebtedness, are larger loan sizes and unproductive loan use influential, and can repayment sacrifices lower household living standards?

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[1] This is simply the ratio of debt servicing costs to total household income and ranges from using 25 per cent of monthly income to service unsecured debts to 30 or 50 per cent for total borrowing.

This study presents a sequel to Schicks (2013). It investigates over-indebtedness objectively from the client welfare perspective by focusing on the burden of debt repayment. Hence, it uses the debt-service ratio (DSR) and contributes to knowledge from three perspectives: the measurement, determinants and effect of over-indebtedness on living standards. The study's objectives are to (i) question whether employing arbitrary DSRs is meaningful for estimating the debt burden in a low- and middle-income country context and present a contextual derivation of the DSR thresholds, (ii) determine the influence of loan amount, credit use and other contributing factors on the probability and intensity of over-indebtedness and, (iii) examine the effect of over-indebtedness on household living standards.

We find that 41 per cent of household borrowers are over-indebted, and an increase in the loan size and unproductive loan use increases the risk of objective-burden over-indebtedness. Other influential controlling factors include rural residence, low education, female-headed households and insurance. Severe over-indebtedness affects 23 per cent of household borrowers and is influenced by small loan sizes, low education, informal sector employment, rural residence and being a female head of household. Over-indebtedness also reduces household living standards by 24 per cent. Given the resonance of economic vulnerabilities across the continent, this study has implications for credit and its effect on households in sub-Saharan Africa.

The report proceeds as follows. Section 2 reviews the literature on the concept, definitional and measurement heterogeneities, determinants, and effect of over-indebtedness. Section 3 presents the motivation for the hypotheses. Section 4 outlines the methodology. It describes the data and the derivation of the DSR thresholds using expenditure components from a national living standards survey. It also includes the descriptive statistics, model specification and estimation techniques. Section 5 presents the results and discussion. Section 6 submits the conclusion and policy recommendations, and Section 7 provides the references and appendix for additional tables and figures.

2. Literature Review

The Concept of Over-indebtedness

Traditionally, the Life Cycle-Permanent Income Hypothesis (LC-PI) has been the central theory embodying the concept of indebtedness and its attendant effects. According to the LC-PI hypothesis, a representative consumer is rational and operates in an environment of perfect knowledge to maximise utility in the current and future periods. With unlimited information, a consumer can smooth consumption through saving or borrowing in an institutional setting designed to facilitate the use of financial services (Betti et al., 2007). The confidence surrounding positive income level expectations produces the capacity to save or borrow. With borrowing, the primal factor is a positive income stream. Therefore, taking a loan with a capacity to pay or being indebted results in an optimal situation, which also depends on other personal, institutional and external factors prevailing in the two periods. Any adverse change in the factors that maintain the income stream can distort optimal consumption and present repayment challenges for the borrower.

Over-indebtedness refers to problems associated with the use of credit. Betti et al. (2007) provide a conceptual framework of indebtedness based on the LC-PI hypothesis from the perspective of a rational consumer. Their derivation attributes over-indebtedness to uncertainty from unexpected events, such as adverse idiosyncratic shocks to current or future income. These can arise from loss of employment, illness, or changes in family structure such as birth, death, separation or divorce. Other studies and reports also present similar contributing factors (Anderloni & Vandone, 2008, 2011; European Commission, 2008; 2013; Leandro & Botelho, 2022; Vandone, 2009). Betti et al. (2007) explain further that the intensity of the shocks may also differ due to a borrower's socio-economic and demographic factors such as age, education, sex, marital status, household size, number of dependents, household expenditure and accrued assets. According to subsequent studies, social behavioural factors such as risk preferences and social proclivities can also intensify the risk of debt challenges (Brown et al., 2013; Ferretti & Vandone, 2019; Meyll & Pauls, 2019). Therefore, uncertainties that create adverse shocks to income and their intensity are crucial in determining the safe use of credit.

In addition to borrower-centred factors, institutional and other wider external events can equally trigger repayment challenges. On the supply-side, lending behaviours can also lead to some institutional factors, such as small loan sizes and high interest rates (Coletta et al., 2019; Frade & Lopez, 2009; Grant, 2007; Krishnaswamy, 2007; Schicks, 2013; Vogelgesang, 2003). Internal or external shocks, which occur through natural disasters, political disturbances, financial crises and pandemics, adversely affect a country's economic situation and negatively impact business performance, which also triggers business failures and reduced returns from investments (Armendáriz & Morduch, 2010; Japelli et al., 2013; Khandker et al., 2013; Wheelan et al., 2017). These scenarios create shocks to income and cause challenges for contractual loan terms. According to Betti et al. (2007), income shocks can 'force a consumer to a lower consumption path' and severely affect a household's standard of living (p.141). Based on the three multi-dimensional aspects, theoretical expositions on over-indebtedness categorise the contributing factors into the borrower, lender and external influences from the microfinance and consumer credit perspectives (Leandro & Botelho, 2022; Schicks, 2013).

Definitional and Measurement Heterogeneities: The Need for a Contextual Approach

Over-indebtedness is a heterogeneous concept with intricate definitional and measurement underpinnings. The concept emerged at the height of consumer credit in Europe. Subsequently, studies and reports focusing on the European Union (EU) examined its complex issues of definition and measurement (Anderloni & Vandone, 2008; BIS, 2010; D'Alessio & Iezzi, 2013; European Commission, 2008). The European Commission (2008) report, in particular, provides detailed information on definition and measurement. One striking observation is that the report identifies over thirty definitions of over-indebtedness. It suggests that the basic definitional elements are the number of financial commitments, borrowers' capacity to repay, liquidity position, temporal considerations and standard of living (European Commission, 2008).

For a low- and middle-income country context, there is the need to evaluate the myriad of definitions since they focused on what is 'relevant and operational' (European Commission, 2008, p.6). One crucial indicator in the definitional elements specified is the borrower's 'standard of living', which is particularly vital in a developing country context. The closest definition that explicitly exemplifies the nature of the 'standard of living' expected is the Austrian IFS-Debt Agency version provided in the European Commission report. It states, "*Individuals or households can be regarded as over-indebted if after deduction of current cost of living expenses like food, clothes, rent, social and cultural needs/requirements, they are not able to discharge all payment obligations*" (European Commission 2008, p.34).

Although the definition emphasises the importance of borrowers satisfying their minimum living standards, it prioritises the cost of living expenses ahead of debt repayment obligations. One problem with this definition is that, while it favours borrowers' welfare, it could have negative consequences such as encouraging 'opportunistic unwillingness to repay' (Gonzalez, 2008). The preceding refers to borrowers who may have the means to repay, yet manage to avoid settling their repayment obligations by electing to focus on their consumption expenditures. While such borrowers are over-indebted due to their 'supposed' inability to repay, their intrinsic actions could compromise institutional sustainability through possible defaults and delinquencies. This outcome could be quite deleterious for institutions in low-income countries. Therefore, in a context where financial inclusion is paramount, any commitment to meeting debt obligations is positive for financial sustainability and, borrowers' social capital that has implications for self-esteem and future borrowing opportunities.

Consequently, there is utility in focusing on a borrower's commitment to debt repayment to avoid the preceding complications. However, in an environment of precarious financial circumstances, a commitment to debt repayment can result in an inevitable trade-off – borrowers may be compelled to sacrifice their basic consumption expenditures, as noted by Schicks (2013). Such sacrifices reflect the opportunity cost of debt servicing. This enduring commitment, therefore, calls for a definition of over-indebtedness, which recognises loan repayment that favours financial sustainability, and equally highlights the challenges that borrowers encounter. This perspective should ensure that practices in the credit market safeguard the interests of both borrowers and lenders.

On measurement differences, the European Commission report classifies three categories depending on whether they are objective (based on observed data), subjective (borrowers' value judgements) or administrative. Each category has its corresponding indicator(s). Objective measures comprise the debt-to-income ratios (DTIs), debt service-to-income/asset ratios (DSRs), being in arrears for more than three months, and number of credit commitments held by the borrower. The subjective indicator is mainly value-based and solicits borrowers' self-assessment of their financial difficulties. In the administrative category, the indicators employed are the rate of credit delinquencies and the number of bankruptcies (European Commission, 2008). Although each of the indicators has its inherent lapses, researchers have adopted one or the other based on the purpose or interest of the study (Betti et al., 2007; D'Alessio & Iezzi, 2013).

Since the purpose is to focus on repayment challenges and their implications for borrowers' living standards, it is vital to adopt an indicator that highlights the debt burden from a borrower's perspective. Some studies suggest that the DSR captures the debt burden more accurately because it is the ratio of total debt-servicing costs to total household income. Consequently, it is known as the objective debt-burden indicator (D'Alessio & Iezzi, 2013; Liv, 2013; Wałęga et al., 2022). This measure illuminates the burden of debt servicing and is, therefore, the focus of this study. A major setback with the DSR is the arbitrariness embedded in the thresholds that classify a borrower as over-indebted. Adopted thresholds range from 20 to 50 per cent and from 75 per cent for those that preferred the net-indebtedness index (Betti et al., 2007; Disney et al., 2008; Khandker et al., 2013; Liv, 2013; Russell et al., 2011).

The first study, which conducted an econometric evaluation of over-indebtedness across Europe, was by Betti et al. (2007). This study reviewed over-indebtedness measures to estimate the extent of consumer over-indebtedness among countries in the EU. It highlights the debt-to-income (DTI) and debt-to-asset (DTA) ratios as debt burden indicators. However, the study does not explore these further due to the difficulty in establishing a cut-off point that should classify a borrower as over-indebted. In their methodological analysis of the DSRs, D'Alessio and Iezzi (2013) provide examples such as using more than 25 per cent of gross monthly income to service unsecured debts and 30 or 50 per cent for total borrowing. Although uncommon in the literature, their analysis also examined the debt-poverty indicator that is peculiar to the study, and various specific DSR thresholds for both collateralised and non-collateralised loans. Their findings reveal that the DSR with a threshold of 15 per cent showed the most sensitivity to a borrower's classification as over-indebted, following the debt-poverty indicator, which had the highest response. Their conclusion on the indicators analysed suggests that thresholds lower than the values found in the literature may be ideal in situations of higher vulnerability.

While arbitrary thresholds may be suitable for particular contexts, the level of precarity in low- and middle-income countries requires a deeper contextual approach for deriving DSRs. This approach can meaningfully unravel embedded implications to inform policy and facilitate the targeting of possible interventions. A contextual approach must start by assessing the related Austrian IFS-Debt Agency definition to formulate an appropriate version that promotes repayments and highlights the unintended effect on borrowers' living standards. From the revised definition, data on borrowers' living expenses can be used to develop relevant and meaningful cut-off points for the DSR. Therefore, this research addresses the measurement setback in the DSR by improving on the absolute arbitrariness of the thresholds from a low- and middle-income country perspective.

Determinants of Over-indebtedness in Advanced Economies

Empirical studies on determinants of consumer over-indebtedness have been growing in advanced countries in the past two decades. Available studies continue to resonate with complexities in the concept and, therefore, its measurement. Despite the growing literature, few contributions investigate the factors of over-indebtedness using the DSR. Crucially, studies specifically focusing on repayments, where the data specifies additional credit charges, are rare. This review, therefore, cautiously examines a few related studies.

In one of the earlier studies employing qualitative and quantitative data, Disney et al. (2008) investigated the drivers of over-indebtedness for households in the United Kingdom. They analysed two data sets for British Households - the Family and Children Survey (FACS), which is a module of the Survey of Low-Income Families (SoLIF) and the British Household Panel Survey (BHPS) covering the period 1995, 2000 and 2005. The former had a higher representation of lone parents and female-headed households, while the latter provided suitable representative data. The study used the arrears, debt-to-income ratios (DTIs), the subjective indicator and a sample of 2000 households. Even though the BHPS analyses use the DTI of 30 per cent, these were applied to mortgage arrears. The results suggest that loss of employment, business failure, marital status and ill-health influence over-indebtedness.

Another study resonating with the previous research focused on the debt burden and the severity of over-indebtedness in Germany (Keese, 2009). The study employed relative over-indebtedness indicators derived from income, debt repayments and subsistence levels. Using the Socio-Economic Panel Data (SOEP) of 5,378 households from 2002 to 2007, the study finds that unemployment, having children, and a home mortgage are triggers of severe indebtedness. Although it addresses the debt burden, the study does not investigate issues of loan size or the purpose of credit use that is pertinent to the over-indebtedness problems in low- and middle-income countries. The data focuses more on unpaid tax obligations, rent arrears, defaults on phone subscriptions and mail orders. This distinction is crucial because on average, the loans contracted in low- and middle-income countries are intended for investment in productive economic activities.

A recent study that also examines the use of the DSR to investigate over-indebtedness, is by D’Alessio and Iezzi (2016). For the debt-burden indicator, the study considers income and debt servicing costs using data from the Survey on Household Income and Wealth (SHIW) from 2008 to 2014. On this measure, the study examined households that make high repayments relative to income and used a sample of 8,000 households. The authors use the traditional thresholds of 30 per cent of gross monthly income on total payments (secured and unsecured) and 25 per cent DSR for unsecured payments. Although this study focuses extensively on DSRs, compared to the other indicators, its main purpose was to examine the incidence of over-indebtedness. The analysis compares the extent of over-indebtedness in some European households using different indicators.

The most recent analysis of over-indebtedness focuses on a survey of indebted Polish households conducted in 2018. It had a sample of 1,107 households. The study by Wałęga et al. (2022) analysed a logit model using the DSR of 30 per cent. It considers the number of loans held and the type of loan but not the specific loan amount or the purpose of the loan. The study suggests that the probability of over-indebtedness increases with the number of loans held, household size and education. Despite the use of the DSRs, the literature reveals intrinsic differences. A very small percentage examines low-income households in advanced countries that could have implications for borrowers in low- and middle-income countries.

Determinants of Over-indebtedness in Low-and-Middle Income Countries

To our best knowledge, econometric studies on over-indebtedness in low- and middle-income countries, which use the DSR to estimate debt burden, are rare, especially in sub-Saharan Africa. Recent studies on South Africa reflect an upper-middle income scenario and are not conducted from an econometric perspective.[2] The related quantitative study examined over-indebtedness and its welfare effect on households using the FinScope Consumer Survey conducted for 11 countries within the Southern African Development Community (SADC). These surveys were undertaken between 2013 and 2016. The study also investigated the determinants of over-indebtedness using a logistic regression model for over 50,000 individuals. It suggests that a lack of financial literacy, multiple borrowing and low incomes are the main drivers of household over-indebtedness (Mutsonziwa & Fanta, 2019). However, this study

[2] See Fatoki (2015) and Karambakuwa & Ncwadi (2021).

employed an aggregate index of over-indebtedness that does not consider debt-service indicators. Hence, it does not reflect representative evidence from the debt burden perspective.

On the determinants of over-indebtedness in low- and middle-income countries, we identify a study by Chichaibelu and Waibel (2018) conducted on rural households in two Asian countries. It investigates over-indebtedness and its persistence for 1,600 rural households in Thailand and Vietnam using defaults or arrears and a DSR of 50 per cent. Data for the study constitutes a balanced panel of four surveys conducted from 2007 to 2011, except the year 2009. It employed a Heckman random effects dynamic probit model. Some of the determinants include poverty, low education and household size. While the study considers repayment challenges, the arbitrary DSR of 50 per cent may not reflect the practical situation of the study context.

Khandker et al. (2013) focused on the microfinance industry to examine whether borrowers in Bangladesh are over-indebted. They conducted an ordinal logit estimation using one of their three longitudinal datasets - the 2010/2011 cross-sectional survey data with 2,287 households. This study uses two measures to focus on the short and long-term effects of borrowing on over-indebtedness. The stock-based measure is a long-term indicator using household assets, and the flow-based is the ratio of yearly debt liability to yearly household income. For both measures, they select a DSR threshold of 20 per cent, meaning that households at or below this threshold are considered unindebted. From 20 to 40 per cent, households in this category have moderate financial challenges. Those considered over-indebted have a threshold of 40 to 60 per cent, and severe over-indebtedness affects borrowers who use over 60 per cent of their income to service debts.

This cross-sectional analysis of determinants does not include the amount borrowed or loan use. From the moderate indebtedness analysis, the probability of indebtedness increases for male households and reduces with age and education. The dependent variable is not significant. Credit analyses from the fixed effects estimation using the stock-based measures suggest that cumulative borrowing decreases indebtedness over the long term, as may be expected; however, short-term sacrifices on debt repayments cannot be sufficiently deduced from this perspective.

In another related study on the drivers of over-indebtedness in Cambodia, Liv (2013) investigated over-indebtedness in saturated areas of microfinance delivery. The study uses the indebtedness index and a multinomial logistic estimation of 1,480 borrowers. Although Cambodia and Ghana may have similarities in underlying economic conditions, the approach adopted differs from Khandker et al. (2013), which aligns relatively better due to the DSRs used. This study applies the monthly indebtedness formula, which is the ratio of monthly instalments to monthly net income. A borrower is considered indebted when the net indebtedness index exceeds 100 per cent. Unlike the yearly data employed in the Bangladesh study, the measurement may not facilitate easy comparison.

Although relevant, another critical issue is that the study does not indicate whether the debt instalments include additional repayment charges, such as missed payment fees that could increase the debt burden. The study also uses purposive sampling to focus on saturated areas of lending activity, and the authors highlight that the results are not nationally representative. Despite these observations, it is the only identified objective study that empirically addressed loan use as a probable source of over-indebtedness. It also found that over-indebtedness increases with multiple loans. However, results for a single loan size and unproductive loan, including household size, education and gender, are not significant.

In Ghana, Schicks (2014) examined factors determining over-indebtedness from the subjective perspective. This study analysed a sample of 530 urban micro-borrowers in 2010. The multinomial logistic regression revealed that the probability of over-indebtedness increases with negative income shocks, low profits, unproductive loan use and for male-headed households. While over-indebtedness increases with debt literacy, general knowledge of financial numeracy and literacy does not reduce the risk of over-indebtedness. Due to its focus on subjective perceptions, the study does not adopt DSRs, nor does it focus specifically on the loan size. It is, therefore, imperative to have an objective study that examines the amount borrowed, complements results on loan use and examines the role of these factors in influencing the probability and severity of over-indebtedness using nationally representative data.

Effect of Over-indebtedness on Living Standards

The subject of over-indebtedness and living standards has become paramount due to its potentially deleterious effects. One crucial element in the definition of over-indebtedness is its implications for living standards. The effect of over-indebtedness on borrowers' livelihoods has been examined broadly from the perspectives of poverty and well-being (Hartfree et al., 2014; Wałęga et al., 2022). Conceptually, these two phenomena are also multi-faceted. Poverty encapsulates income and multidimensional aspects, while well-being covers the quality of life, such as material and economic well-being, social interactions and health conditions – physical, emotional and mental. Due to the vast complexity and limited evidence, the review on over-indebtedness and living standards will draw on studies focusing on income/consumption poverty or the economic dimensions of well-being. This approach should limit the review to the standard of living element in the over-indebtedness definition as exemplified through the satisfaction of basic needs.

As highlighted, studies on over-indebtedness and living standards that consider repayment costs and subsequent sacrifices are quite rare. From the ex-ante studies in Europe, Betti et al. (2007) examine whether there is a noticeable difference in the consumption/income ratio of un-indebted and over-indebted households. The study used the European Community Household Panel Survey (ECHP) and the (European) Household Budget Surveys (HBS), which had commensurate data for member states in 1996. From the subjective approach, they found that normal households have a higher consumption/income ratio than over-indebted households. One revealing observation is that irrespective of the similarities in the income levels, households in financial difficulties had a significantly lower consumption level than the average household. Therefore, the study concluded that 'it appears over-indebted households have to reduce their consumption to repay their debts' (p.151). This crucial observation could have significant implications, especially for borrowers in low- and middle-income countries.

Hartfree and Collard (2014) conducted the most recent review on over-indebtedness and poverty. It concentrated on published studies undertaken in the last 15 years and comprised evidence from the United Kingdom, United States, Canada, Australia, Northern Europe and Scandinavian Member States. This review assessed the extent to which problem debt causes poverty. As the only identified review, it emphasised the limited availability of literature on debt and poverty. However, due to the multi-faceted nature of over-indebtedness and poverty, comparability across studies became an inevitable challenge due to the different measures employed. It, therefore, settled on arrears for the indebtedness indicator and used low income and unemployment as proxies for poverty. While the goal was to find causal factors, the review did not identify any evidence due to the lack of robust analyses. However, it suggests that indebtedness effects can degenerate borrowers' living standards as debt servicing diminishes available household income.

Although 'arrears' is an objective indicator, D'Alessio and Iezzi (2013) suggest that debt-service indicators best measure a debt burden that affects living standards. Hence, employing arrears as a measure of over-indebtedness in the review conducted by Hartfree and Collard (2014) may not sufficiently highlight the burden borrowers endue as they service debt obligations. Using the DSR on Italian households, D'Alessio and Iezzi (2013) found that the 30 per cent (A30) threshold reduces the consumption of overindebted households by 17.8 per cent, lower than non-borrower households. They also test the possible effect of low cut-off points, especially for non-collateralised loans. Unsurprisingly, the authors find that the cut-off point of 15 per cent (C15) is a robust measure of economic distress and is highly associated with economic poverty. Therefore, evidence suggests that over-indebtedness from debt servicing is associated with lower household consumption.

Recent evidence by Wałęga et al. (2022) employs the DSR in a developed country context. In addition to its findings on determinants of over-indebtedness, this study also focuses on how over-indebtedness affects the well-being of borrowers in Poland. Due to the complexity of conceptualising well-being, the study addresses economic well-being, which utilises income as the primal factor. This economic perspective resonates with the income/consumption approach adopted in other studies. The 30 per cent DSR suggests that two-thirds of households were over-indebted. After discounting for loan repayments, the income distribution analysis also suggests that

86 per cent of borrowers have per capita income that falls below the poverty line. From the economic perspective, the study finds that educational level, age, and household size positively improve living standards.

While knowing the effect of over-indebtedness on living standards is crucial for borrowers in low- and middle-income countries, the preceding studies do not adequately highlight the sacrifices endured by borrowers in this context. Mutsonziwa and Fanta's (2019) study that examined the determinants of over-indebtedness using a composite index also analysed its welfare effect on households in South Africa. The findings suggest that over-indebtedness can reduce the quality of livelihoods. However, this outcome is based on the broader concept of poverty using the capabilities approach rather than the income/consumption measure. A few studies conducted from the low- and middle-income country perspective on the microfinance sector suggest that sacrifices for debt repayment can reduce basic household consumption. For instance, Liv (2013) refers to borrowers sacrificing food quality and quantity. The study revealed that 48 per cent reduced food quality while 44 per cent sacrificed the quantity of food intake. Schicks (2013) also reveals that 62 per cent of borrowers sacrifice the quality and quantity of food while some borrowers sacrifice other needs to repay their loans.

Generally, the sparse evidence gathered suggests that over-indebtedness could be linked with low living standards, especially for low-income borrowers. As a first study employing objective data, it is vital to investigate whether the sacrifices endured by borrowers can reduce their living standards as determined by the income/consumption approach.

Contribution

This study contributes to knowledge of over-indebtedness from three perspectives. First, it extends the work of Schicks (2013) in terms of measurement by using the debt-burden approach (DSRs) to highlight borrower sacrifices from an objective perspective. In this work, we propose a more practical method for determining the over-indebtedness threshold from a low- and middle-income perspective. We use the proportions of annual household expenditure components from a nationally representative living standards survey to determine the percentage of cost-of-living expenses and income remaining for debt repayment. This derivation is dubbed the 'Opportunity Cost Approach'. From the determined cut-off points, we provide the first objective estimates of the extent and severity of over-indebtedness in Ghana. Second, we present a better understanding of the primary drivers of over-indebtedness from the debt burden perspective. Due to the need for more objective evidence on borrowing and its use, the study focuses on these two essential factors (Schicks, 2014). Our study provides the first objective evidence on loan size and loan use by affirming that larger loan sizes and loans utilised for unproductive purposes increase the risk of sacrificing living standards to meet debt repayment obligations. Third, the study highlights that repayment sacrifices affect living standards. While theoretical references attest to the possibility of this occurrence, empirical evidence is rare, especially from the sub-Saharan perspective. We contribute knowledge on the negative effect of over-indebtedness on household living standards from the income/consumption approach to complement the analysis by Mutsonziwa and Fanta (2019).

3. Hypotheses

The above literature review suggests that studies addressing the objective-burden perspective of over-indebtedness are limited, especially from the sub-Saharan perspective. Although there is evidence from a subjective perspective suggesting that borrowers are over-indebted in Ghana, no evidence derived from objective data exists on the determinants of over-indebtedness or its effect on household living standards. The premiere study referred to small loan sizes and high interest rates (Schicks, 2013). Recent data suggest that while the average loan amount is approximately GH¢ 2,284.00, half of the borrowers have loans of GH¢ 800.00 or less (GSS 2014, 2018). Comparing the median amount to the average, it may be evident why some borrowers consider their loans' small' even though they are subject to institutional policies and repayment capacity. This notwithstanding, perceptions of small loan sizes trigger the uncertainty of whether loans granted are adequate to provide the positive results expected. Another concern is that these 'small loans' can be easily dissipated due to the economic pressures on households and the low profitability surrounding businesses mainly conducted in the informal sector.

Studies that attempted to link over-indebtedness objectively with quantitative data in comparable countries were conducted in Bangladesh and Cambodia by Khandker et al. (2013) and Liv (2013). On loan amount, the former considers the effect of cumulative borrowing for data spanning over 20 years. Even though over-indebtedness can be structural, it has immediate consequences that could worsen over time. The immediate, palpable effect on low-income households presents the need to examine short-term sacrifices, which could have negative long-term effects if not identified and addressed. The study also refers to the possible trigger for using a loan purely for consumption smoothing or economic activities with a low potential of yielding sufficient returns. However, this crucial factor is not addressed. On loan use, Liv (2013) found no statistical significance. Hence, no objective evidence exists on loan use. The lack of evidence requires further investigation as the current data suggest that borrowing for consumption has risen by a quarter over the last two surveys (GSS 2014, 2018).

Another issue of pivotal relevance for low-income households is whether over-indebtedness can negatively affect household living standards. Liv (2013) revealed insights into borrower sacrifices. Schicks (2013) also highlighted the same for Ghanaian urban micro borrowers, revealing that 62 per cent reduced food quantity and quality. These outcomes can be disquieting for borrowers already on low incomes. Consequently, it is pertinent that while existing vital evidence is from a subjective perspective, any opportunity to use nationally representative data to investigate the effect of over-indebtedness on living standards is approached with utmost urgency.

Therefore, there is a need to examine whether increasing a loan amount to address the issue of small loans can lead to sacrifices of basic consumption for debt repayment or whether using the loan for consumption purposes can also result in such sacrifices. Finally, the issue of borrower sacrifices reducing living standards requires further interrogation with objective data. Hence, the study hypothesises that:

i. An increase in the amount borrowed can increase the probability and intensity of over-indebtedness

ii. Loans used for consumption purposes can increase the probability and intensity of over-indebtedness.

iii. Over-indebtedness leads to a reduction in household living standards.

4. Methodology

Data

The study uses two waves of nationally representative household survey data to conduct an objective analysis of over-indebtedness. These are the Ghana Living Standards Survey (GLSS) Rounds 6 and 7 collected in 2013-2014 and 2016-2017, respectively. These two datasets marked the beginning of data collection on ‘Household Access to and Use of Financial Services’. The new module on credit use contains crucial credit information from financial institutions. It holds vital household variables on financial services such as the amount borrowed, amount repaid (including interest rates and fees), savings, assets, insurance, remittances, financial literacy, purpose of loan and source of loan.

The dataset also holds relevant information on socio-economic variables such as household composition, age, sex, marital status, educational attainment, health status, employment status, rural and urban location, and region of residence. Household expenses for food, health, education, housing, clothing, footwear and transportation are also pertinent for deriving the threshold for over-indebtedness. Additionally, the data holds information on the consumption expenditure per equivalent adult, which permits the analysis of household living standards using the welfare scores. The data is disaggregated at the individual and household levels.

The GLSS Rounds 6 and 7 comprised 16,772 and 14,009 households, respectively. Total number of observations at the household level is 30,781. The number of household heads who applied for a loan is 2,650. Of this, 2,428 applicants were successful, and 222 were refused a loan. All borrowers who had a loan made repayments, including the interest rates and additional charges incurred by respective borrowers. Hence, the final sub-sample for examining over-indebtedness from the debt-burden perspective is 2,428. The indebtedness index is derived from information on annual repayments and annual household income covering the twelve months. The GLSS data validity and reliability derive from its use as an essential tool for monitoring living standards. It is the primary data for micro-level planning and policy-oriented research in Ghana.

Threshold Derivation: An Opportunity Cost Approach

This study employs the DSR to focus on borrower sacrifices to repay debts. It contributes a contextual ‘opportunity cost approach’ to determine the indebtedness threshold at which a borrower is considered over-indebted and the subsequent categories of the intensity of over-indebtedness. We begin with the over-indebtedness definition to highlight borrower sacrifices. Using the closest definition in the 2008 European Commission report provided by the Austrian IFS-Debt Agency, we transpose it to project borrowers’ inability to meet basic consumption expenditures due to their commitment to debt repayments, which has implications for living standards. Hence, the working definition derived for the study is: *“Individuals or households can be* *regarded as over-indebted, if, after discharging payment obligations, they are unable to meet current basic cost of living expenses like food, clothes, rent, utilities, education, health, and transportation requirements."* While the related definition suggests defaults or arrears, this working definition is more appropriate because it illuminates the burden endured by households as they commit to debt repayments – a burden expressed in the sacrifices of basic consumption and a possible lowering of living standards.

For the cost-of-living expenditures, we adopt evidence from the Ghana Living Standards Survey Round Six (GLSS6), the first survey to collect information on households' access to and use of financial services. Table 4 is a replica of the GLSS6 average annual household per capita expenditure, classified by the United Nations Statistical System that categorises individual consumption according to purpose. The table classifies household expenditure into food and non-food components. According to the GLSS6 main report, the non-food component comprises clothing and footwear; housing, water, electricity, gas and other utilities; health, education, recreation, personal care and durable goods. From Table 4, we derive an objective rather than a subjective basis for the over-indebtedness thresholds.

A crucial feature of the over-indebtedness definition is the element of borrowers' standard of living. We employ the basic needs concept to determine the *minimum* standard of living appropriate for the study. The International Labour Organisation (ILO) report for the 1976 World Employment Conference defines basic needs to include food, clothing, housing, education, healthcare and public transportation. Therefore, we restrict elements of the basic needs expenditure to the ILO definition. The restriction is to avoid including non-essential expenditures. The GLSS data present average annual household expenditure and proportions of individual components. We use the proportions of basic elements to determine the total percentage of average expenditure committed to such basic needs. The expenditure for basic needs should provide an idea of the residual income for debt-servicing without any sacrifices. From the data, the average annual household per capita expenditure is GH¢ 9,466, of which 45.8 per cent is spent on food. The food component includes imputed values from own produce.[3] Expenditure on non-food items is GH¢ 5,793, representing 54.2 per cent of total household expenditure.

We use the percentage distributions presented under Appendix Table 4 Column 3, comprising food, health, education, housing; water, electricity, gas; clothing and footwear; and transportation to estimate the percentage of total household expenditure reflecting households' basic needs that should satisfy their minimum standard of living. The total is 82.5 per cent, as indicated in the row for 'Total Basic

[3] It also includes expenditure on non-alcoholic beverages, and it is acknowledged that this element may not be considered a basic need in a low- and middle income country, especially for low income borrowers even though it may be a norm for average households in advanced economies. However, the data does not allow for a disaggregation of the explicit cost and the imputed component symbolises an occasional accompaniment, whose percentage may fail to significantly augment the overall food expenditures for the majority of borrowers.

Consumption Expenditure.' From the table, Column 4 suggests that rural households spend 55 per cent of their income on food. It is, therefore, vital that in attempting to compute the basic standard of living for borrowers, the proportion spent by rural households is captured. Using the 55 per cent statistic, the total household expenditure, which assures a minimum standard of living for a borrower in the rural area, is 91.7 per cent, as shown in Column 4. We derive an average for the national and rural estimate, which gives an overall basic consumption expenditure of 87.1 per cent (Row 8 of Columns 3 and 4). Therefore, the difference between total income (100%) and the percentage spent on basic consumption expenditure (87.1%) is 12.9 per cent.

Hence, in the Ghanaian context, the critical threshold (income remaining after the deduction of minimum household expenses) above which borrowers begin to make sacrifices to repay debts and below which debt servicing is containable is approximately 13 per cent. Given that this is a newly derived threshold from living standards data, we ascertain how it compares with thresholds in the empirical literature. D'Alessio and Iezzi (2013) depict that the threshold for financial stress could be lower, especially at lower income levels. For debt repayments, the preceding resonates with the fact that household wealth and social safety nets may be more limited in low- and middle-income countries than in advanced economies. In their different thresholds of the objective-burden indicators, the authors employ an arbitrary cut-off point of 15 per cent for borrowers of non-collateralised loans and test for its sensitivity to financial distress (p.17). The study concluded that the 15 per cent threshold is highly sensitive to debt distress. Therefore, a 13 per cent threshold computed from a national survey on borrowers' living standards is comparable and closely consistent with the literature.

Earlier in the analysis, it was highlighted that the non-alcoholic component of the food expenditure could not be disaggregated. Since this may be a very small component due to its occasional nature, a 2 per cent allowance is made to restrict the food component to food expenses only. This results in an over-indebtedness cut-off point of 15 per cent, up from the initial 13 per cent. While the objective is to have a realistic and relevant threshold, the adjusted 15 per cent threshold has been tested by D'Alessio and Iezzi (2013). Based on its existing empirical validity, this study, therefore, uses a DSR of 15 per cent for robustness and to facilitate ease of comparability with existing literature. The 15 per cent DSR threshold implies that households spending more than 15 per cent of their income to service debts can only do so by sacrificing their minimum expenditures and are, therefore, classified as over-indebted. Column 6 of Table 4 is used to create a taxonomy of over-indebtedness, as presented in Appendix Figure 5. These thresholds are no longer entirely arbitrary but contextual and depend on the components of household expenditure necessary for meeting a borrower's minimum household needs.

Under the objective burden approach, an over-indebted individual or household faces challenges with debt-servicing obligations. Hence, in this context, a borrower is classified as over-indebted as long as a sacrifice is made to service debts, which affects their ability to satisfy their minimum standard of living. The 15 per cent threshold depicts the residual income available for debt repayment, beyond which a borrower begins to make sacrifices for debt repayment.

The proportion of income (PoI) committed to loan repayments and their associated sacrifices translate into the intensifying thresholds of over-indebtedness, as explained below.

- *A borrower spending less than 15 per cent of income on repayment is not sacrificing basic needs expenditures to repay debts and is classified as "not over-indebted."*
- *A borrower spending between 15 and 30 per cent of income on repayment sacrifices clothing, footwear and transportation expenditures and is considered "moderately over-indebted."*
- *A borrower spending between 30 to 55 per cent of income on repayments sacrifices expenditure on health, education, housing, water, electricity and gas. Borrowers in this category experience an intensification of sacrifices over categories B and C and are described as "fully over-indebted."*
- *A borrower spending between 55-100 per cent on repayments sacrifices on food. Due to the extremities involved in this type of sacrifice, borrowers in category D are designated as "severely over-indebted."*

Descriptive Statistics

Appendix Table 1 presents the summary statistics, and Table 2 focuses on the frequency distributions of categorical variables. The latter suggests that about 9 per cent of loans were GH¢5000.00 and above. Thirty per cent of loans fall between GH¢1000.00 and GH¢5000.00 and another 30 per cent range from GH¢100.00 to GH¢500.00. Approximately 78 per cent of borrowing falls within a range of GH¢100.00 to GH¢5000.00. These categories should illuminate the influence of various loan amounts on over-indebtedness. From Table 1, the average loan amount is GH¢ 1,981.06. However, the percentile distribution reveals that the maximum amount borrowed is GH¢ 250,000 and the median loan amount is GH¢ 800.00, implying that half of household borrowers have a loan amount of GH¢ 800 or less. Only four observations exceed GH¢ 50,000, and 99 per cent of borrowers had a loan of GH¢ 20,000 or less. The remaining one per cent took loans from GH¢ 20,001 to GH¢ 250,000. The lower one per cent also borrowed up to GH¢ 20.00.

The mean household income is GH¢ 7139.01.[4] The median income of GH¢ 3178.04 suggests that half of the household borrowers earn less than half (45%) of the average household income.

The average debt servicing cost (amount repaid) is GH¢1050.50, and the average household expenditure amounts to GH¢ 11,268.16, with a median value of GH¢ 9057.00. The average value for household assets is GH¢11,390.00, and the mean of household welfare scores is GH¢ 4,304.78. The latter is the consumption expenditure per equivalent adult, also known as welfare scores. It is the measure of household living standards.[5] The average age of the household head is 45 years, and the average household size is five. Each household has an average of three dependents.

Large standard deviations of the quantitative variables indicate that they are affected by variability in the borrower sub-sample. To align with the nature of the loan amount variable, the top and bottom one per cent are winsorised to deal with the outliers identified. Corresponding values for the income, expenditure, amount repaid, assets, and welfare scores have also been winsorised. Missing values for the income and asset variables are set to the mean. For the inferential analyses, we address skewness by taking the natural logarithms of the amount borrowed, household expenditure, welfare scores and assets.

For the categorical variables, we discuss their associated frequencies. From Table 2, the highest proportion of borrowing constitutes loans for business start-ups and expansion and agricultural improvements (45.34%). Loans for consumption purposes constitute the next highest proportion (27%). These were acquired for funeral and medical expenses, weddings and other daily expenditures. The next categories are borrowing to invest in education (15.62%) and to acquire assets (12.23%). Generally, most borrowing is used for productive purposes, including education, agricultural investments, assets and starting or expanding a business (73%). On loan size and loan use, Figure 1 suggests that the highest proportion of the lowest loan category was used purely for consumption. The next lowest range was largely used for agricultural investments.

On employment status, 18 per cent of borrowers are in the public sector, 9 per cent are private sector workers, 27 per cent are self-employed, engaged in non-agricultural activities, and 37 per cent are own account holders in the agricultural sector. The remaining 8 per cent are either unemployed, retired or inactive. Most borrowers are self-employed in the agriculture and non-agricultural sectors (64%). The data suggest that most borrowers are in the informal sector. From Figure 2, borrowers in the

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[4] Figures quoted in Ghana cedis (average rate for 2013-2017: USD1 = GH¢3.50).

[5] To draw implications of over-indebtedness for household living standards, we refer to the national poverty figures. According to the GSS (2014), the national poverty line is GH¢ 1,314.00, and the extreme poverty line is GH¢ 792.05. The current poverty report suggests that the new absolute and extreme poverty lines are set at GH¢ 1,760.8 and GH¢ 982 (GSS, 2018). However, it states that since there were no significant changes to the consumption basket, these are equivalent to the 2012/13 poverty lines after accounting for inflation.

informal sector took the largest percentage of loans for agricultural investments, businesses and consumption.

The locational background of borrowers suggests that more than half of borrowers (59%) are rural dwellers, while 41 per cent are in urban areas. Further insights from the data reveal that approximately 87 per cent of borrowers who are poor reside in rural areas. On educational background, household heads with no education or whose education is below the basic level contracted the highest percentage of loans (42.3%), as depicted in Figure 3. Household heads who attained a Basic Education Certificate (BECE) level and those with a Middle School Leaving Certificate (MSLC) make up approximately 31 per cent of the distribution. Borrowers with a Senior Secondary School (SSS) and Secondary School qualification form 9.2 per cent, 8.2 per cent have a Vocational/Technical/Teacher training qualification, and an additional 9.3 per cent have a tertiary education. The data suggests that almost three-quarters of borrowers (73%) have education below BECE/MSLC.

When grouped into Microfinance Institutions (MFIs) and non-MFIs, the data suggests that 39 per cent of households secure loans from MFIs and 61 per cent borrow from non-MFIs.[6] On gender, 67 per cent of borrowers are males and 33 per cent are females. Married household heads form 69 per cent of the distribution compared to 31 per cent who are unmarried, divorced or widowed. Out of the borrower sample, 72 per cent of borrowers do not have an insurance policy, and given that 57 per cent of borrowers have no education or possess basic education, less than half of household borrowers (43%) have pursued a literacy training course which would facilitate their appreciation and further implementation of knowledge gained from financial literacy training.

Prevalence and Intensity of Over-Indebtedness

Figure 4a shows the national estimates of the prevalence and severity of over-indebtedness. According to the objective-burden indicator, 41 per cent of households are over-indebted, meaning that these borrowers sacrifice their cost-of-living expenses for debt repayment. Compared with Figure 4b, which uses the residual income of 13 per cent as the threshold, the estimate of 44 per cent is higher by 3 per cent due to the lower threshold. Hence, a higher threshold reduces the number affected by over-indebtedness, as expected by adopting the empirically tested 15 per cent threshold.

On the intensity of over-indebtedness, the ‘opportunity cost’ approach translates to the sacrifices made towards debt repayment obligations. The sacrifices range from clothing, footwear and transportation expenses to the more severe scenario of sacrifices of food intake. Figure 4a suggests that one in nine (11 per cent) is moderately over-indebted and spends 15-30 per cent of their income to service their loans.

[6] MFIs comprise money lenders, susu, savings and loans, non-governmental organisations (fNGOs) and cooperatives/ credit unions, and non-MFIs include state banks and government agencies, private banks, traders, employers and other sources.

Borrowers in this category sacrifice their clothing, footwear and transportation expenditures. One in fourteen (7 per cent) is fully over-indebted. Such households spend between 30-55 per cent of income on debt repayment and sacrifice crucial expenses on education, health and utilities. Severely over-indebted borrowers constitute 23 per cent, implying that one in four households spends over 55 per cent of household income on debt repayments and sacrifices their food intake.

Model Specification and Estimation Technique

This study's empirical analyses are in two parts. The first focuses on the determinants and tests the hypotheses on loan size and credit use as the main variables of interest while controlling for other socio-economic, institutional and external factors influencing over-indebtedness. The second examines the effect of over-indebtedness on borrowers' living standards. According to the conceptual framework by Betti et al. (2007) and the theoretical antecedents presented by Schicks (2013) and Leandro and Botelho (2022), factors of over-indebtedness are determined from borrower, institutional and external perspectives. [7] Individual-related factors include socio-demographic and economic predictors such as age, education, sex, marital status, household size, number of dependents, income, expenditure, assets, employment status, welfare scores, financial literacy and insurance.

Creditor-related factors attributed to financial institutions' pressure and lending strategies are proxied by borrowing from the MFI sector or other non-MFI sources, including mainstream financial banking institutions. The macroeconomic environment also influence borrowers' economic conditions. These conditions differ by region and locality – urban or rural. Therefore, these factors are proxied by the location and region in which borrowers conduct their daily economic lives. [8] For both analyses, the principal and control variables and their expected influence are derived from the three broad theoretical perspectives as highlighted. Due to the complexities in the measurements employed in empirical analyses, there is disparate evidence on some factors that are also expected to be positive or negative in this context. Hence, the a-priori expectations derive from theoretical literature and insights from related

[7] From the GLSS, the study benefits from comprehensive data for analysing over-indebtedness at the national level. As the first objective study on the debt burden, we consider the relevant variables suggested by both theory and empirical evidence, which might influence the probability and effect of over-indebtedness, especially from a sub-Saharan African perspective. However, the survey data is limited by the lack of specific institutional variables such as interest rates and products offered. These are captured in the loan amount repaid as it includes interest rates and fees and by the source of borrowing as proxied by the type of institution and their lending practices to account for the effect of differentials in interest rates and transaction costs. Others include observed data for financial literacy and the death of a family member, which contributes to a borrower's probability of being over-indebted. This notwithstanding, the data provide sufficient variables to examine the debt burden from the client's perspective, using demand, supply and external factors.

[8] Differences in regional economic developments and poverty levels determine their inhabitants' economic opportunities and income profiles. Generally, income levels are higher in the capital city, which is the base reference for living standards analysis. This work is based on the sixth and seventh rounds of the Ghana Living Standards Survey, which reflect the existing ten regions. The study benefits from comprehensive variables for analysing over-indebtedness at the national level.

studies. Table 3 provides variable definitions, measurements and associated a-priori expectations for analysing the determinants and effect of over-indebtedness on living standards.

Determinants of Over-indebtedness

On determinants, the study employs the logit and ordinal logit models to investigate the probability and intensity of over-indebtedness. Over-indebtedness is the outcome variable determined by the DSR, which is the ratio of total annual debt servicing costs to total annual household income. From the 'opportunity cost approach,' the initial over-indebtedness threshold is at a cut-off of 15 per cent. For the predictors, the study focuses on the loan amount and credit use, controlling for other contributing factors as suggested by the theoretical framework. The probability model estimated by the maximum likelihood technique is given by:

$$Pr\,(Ovi=1|\boldsymbol{X}_i) = \beta_0 + \beta_1 lnloan + \beta_2 ln\_size + \beta_3 ln\_use + \beta_4 hhexp + \beta_5 hhsize + \beta_6 female + \beta_7 agey + \beta_8 agesqr + \beta_9 lnassets + \beta_{10} edu + \beta_{11} rural + \beta_{12} depend + \beta_{13} mfi + \beta_{14} hlth\_shk + \beta_{15} insure + \_\beta_{16} emp\_stat + \beta_{17} lit\_fin + \beta_{18} marstat + \beta_{19} region + \beta_{20} survyear + \varepsilon_i \quad (1)$$

where, *Ovi* is the outcome variable, a dummy which determines whether a borrower is over-indebted or not, $\boldsymbol{X}$ is a vector of exogenous determinants of which the loan amount and loan use are the principal variables of interest, $_i$ represents each indebted household head, and ε_i denotes the unobserved factors.

Variable definitions, measurements and their corresponding expected signs are presented in the third column of Table 3. For the first and second hypotheses, the coefficients β_1 *and* β_2 test for the continuous and categorical loan amount and β_3 tests for the influence of credit use. Since borrowing differences cannot be determined from the cumulative amount borrowed, the categorical form highlights variations in loan sizes and their influence on over-indebtedness. Depending on individual loan absorption capacity, an increase in loan size is expected to either increase or decrease the propensity for repayment difficulties. On loan use, it is expected that the coefficient would be positive.

From the theoretical antecedents of the control variables and in the context of this study, it is expected that being a male-headed household, living in a rural area, an increase in the number of dependents and suffering from an illness would increase the propensity of over-indebtedness. Conversely, an increase in working adults (household size), age, assets, insurance, financial literacy and being employed or married would reduce the probability and intensity of over-indebtedness. Institutions with favourable lending conditions and regional development that promote economic activity are expected to reduce the likelihood of over-indebtedness. Using equation

(1), we adopt the ordinal logit model to determine the intensity of over-indebtedness for the principal variables of interest. The binary dependent variable is replaced by the ordinal variant with four categories: not over-indebted, moderately over-indebted; over-indebted, severely over-indebted.

Effects of Over-Indebtedness on Living Standards

To examine the effect of over-indebtedness on living standards, we regress a household's welfare score (a measure of its living standard) on its over-indebtedness status while accounting for other controlling factors. Following Coulombe and Wodon (2007), the model estimating the determinants of household living standards as measured by welfare scores is expressed as follows:

$$lnCExp_i = \delta_0 + \delta_1 Ovi^* + \delta_2 lnloan + \delta_3 ln\_use + \delta_4 hhsize + \delta_5 female + \delta_6 agey + \delta_7 agesqr + \delta_8 lnassets + \delta_9 edu + \delta_{10} rural + \delta_{11} depend + \delta_{12} mfi + \delta_{13} hlth\_shk + \delta_{14} emp\_stat + \delta_{15} lit\_fin + \delta_{16} marstat + \delta_{17} region + \delta_{18} survyear + \varepsilon_i \qquad (2)$$

where *lnCExpi* is the natural logarithm of consumption expenditure per equivalent adult, which represents welfare scores for each household, Ovi^* captures the over-indebtedness status of the household, ***i*** refers to the indebted household, and ε_i is the error term. From the above equation, δ_1 tests the third hypothesis regarding the effect of over-indebtedness on household living standards and is expected to have a negative sign.

For the contributing factors, suffering a health shock, having more dependents and living in a rural area are also expected to have a negative effect on a household's living standards. Depending on the extent of household expenses, the amount borrowed, and the use of the loan, these predictors can either positively or negatively affect household living standards. Likewise, is the age, gender, education, marital status and economic development of the borrower's region. Factors such as the number of working adults in the household, the level of assets, having an insurance policy and being financially literate are expected to increase a household's living standards. The a-priori expectations are presented in the fourth column of Table 3.

Investigating the effect of over-indebtedness on living standards, a careful examination of equation (2) suggests possible endogeneity from reverse causality. Being over-indebted can affect living standards, and a borrower's low standard of living can trigger a situation of objective-burden over-indebtedness. There are also measurement errors associated with income in survey data since over-indebtedness isderived from household income. The implied endogeneity suggests that OLS parameter estimates will be biased, inconsistent, and attenuated (Stock & Watson, 2012).[9] The first stage regresses the endogenous variable on the instrument(s) and a set of covariates to estimate the predicted value of the endogenous regressor, which would then determine its exogenous variation on the outcome variable (Pokropek, 2016). This is given as:

$$x_i = I_\gamma + Z_\delta + \zeta_i \qquad (3)$$

where x_i represents the endogenous predictor (Ovi), $\boldsymbol{I}$ denotes a vector of instruments, γ estimates the slope parameters of the instruments, Z is the design matrix of covariates (control variables from individual, credit and macroeconomic factors), δ is the slope parameters and ζ_i is the error term. In the second stage, the outcome variable is regressed on the predicted value of the endogenous regressor (Oviˆ) and a set of exogenous control variables.

Murnane and Willet (2010) suggest three categories for the proposed instruments: proximity to institutions, institutional rules, and personal characteristics and deviations from cohort trends. In the data, proximity to financial institutions indicates how borrowers gain knowledge of these institutions. This mode of access is observed as the 'knowledge of financial institution'. One important factor influencing credit and related matters is how people access loans. Due to the commercialisation drive, institutions approach clients directly or through other advertising media. Clients also proactively approach institutions as enabled by proximity or through recommendations by friends and family. Therefore, the mode of knowledge of financial institutions plays a critical role in access to credit and determines borrowers' preparedness for credit management and how they are affected or influenced by institutions' conditionalities and practices. Hence, it is expected that this variable would be directly correlated with the over-indebtedness status of a household and indirectly affect borrowers' living standards through the endogenous variable. This instrument should, therefore, satisfy the relevance and exclusion criteria.

Where borrowers secure insurance for their businesses, it can also affect the likelihood of being over-indebted in two ways. Insurance payments could add to credit financing costs, increasing debt repayment difficulties and reducing living standards. Alternatively, if borrowers receive insurance payments to cover business losses or natural disasters, this could mitigate their over-indebtedness and positively affect their living standards. As depicted by the analysis of the determinants, insurance is correlated with the endogenous variable. It should affect living standards indirectly through over-indebtedness in the alternatives provided. This variable is, therefore, expected to meet the instrumental variable restrictions. Hence, the two proposed instruments, mode of knowledge of financial institutions and insurance, should be relevant and valid: they should correlate with over-indebtedness and indirectly affect household borrowers' living standards.

[9] We select two instruments for an over-identified model.

Although the 2SLS is sufficient for addressing endogeneity, we conduct further analyses to check the robustness of our estimations. Instead of an exactly identified model, this study adopts two instruments for an overidentified estimation. We test for robustness by comparing the performance of the externally identified instruments to internally generated instruments derived from the Lewbel identification by heteroscedasticity approach.[10] This model compensates for the absence of valid instruments and avoids the problem of weak identification, which leads to biased estimates (Lewbel, 2012). We adopt this estimation for robustness to assess the effectiveness of the external instruments used compared to the internally generated ones. We then compare the post-estimation diagnostics for these approaches. The unit of analysis is the household, and all analyses are conducted with the Stata econometric software package.

5. Results and Discussion

Determinants of Over-Indebtedness

The loan amount variable specified in the first hypothesis was tested in two forms – continuous and categorical. From Table 5a, Column (1) presents the continuous loan variable and Column (2) provides results for the categorical loan amount, which offers the opportunity to determine the influence of different loan sizes. The strong positive relationship between over-indebtedness and both forms of the loan amount variable confirms the first hypothesis that an increase in the loan size increases a borrower's probability of being over-indebted. Column (3) tests the possibility that non-significant variables in Column (2), which is the model of interest, may distort inference about other parameter estimates. Consequently, we conduct further robustness tests for the final constrained model of Column (3), which tests for the relevance of the nonresponsive variables. The model comparison results of Table 5a suggest that the constrained model is preferred. Therefore, results for the determinants are reported from Column (3). Table 5b in the Appendix provides results for the control variables.

[10] See Lewbel (2012).

Table 5a: Determinants of Over-indebtedness

VARIABLES	(1) Absolute Loan Amount	(2) Loan-Size Full	(3) Loan-Size Nested
Loan Amount	0.124***		
	(0.00843)		
GH¢ 101-500		0.111***	0.108***
		(0.0265)	(0.0267)
GH¢ 501-1000		0.300***	0.294***
		(0.0337)	(0.0337)
GH¢ 1001-5000		0.415***	0.411***
		(0.0337)	(0.0339)
GH¢ 5001-20,000		0.564***	0.561***
		(0.0460)	(0.0465)
Consumption	0.586**	0.235**	0.395**
	(0.0180)	(0.0183)	(0.0183)

GLSS 6&7, N = 2428; sample is restricted to household borrowers who made loan repayments. Marginal effects reported - discrete change from the base-level reported for factor variables. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. From further analyses, Model (3) restricts age square, health shock and dependents. We conduct a likelihood ratio test which confirms the hypothesis. Lrtest: [(LR chi2(1) = 1.34; Prob > chi2 = 0.2466); (Adj R^2 = 0.212 – constrained; 0.211- full); (Full: AIC 2597.774; BIC -16076.209; Constrained - AIC: 2594.649 ; BIC -16055.700)].

The continuous loan variable in Column (1) indicates that a 1 per cent increase in the amount borrowed increases the probability of over-indebtedness by 12.4 percentage points, which is highly significant at the 1 per cent level.[11] Although the result is informative, this variable does not indicate the influence of particular loan sizes. In

[11] See Uberti (2017) on the marginal effects of log-transformed models.

contrast, differences in the loan sizes shown in Column (3) indicate that larger loan amounts are associated with a steady increase in the influence of over-indebtedness.

Compared to the base category (GH¢20-100), borrowing GH¢101-500 increases the probability of over-indebtedness by 11 percentage points. The next GH¢ 501-1000 category increases the probability of over-indebtedness by 29 percentage points. Those who borrow between GH¢1001-5000 are more likely to be over-indebted by 41 percentage points, and loans over GH¢5001 increase the probability of over-indebtedness by 56 percentage points. These results are all highly statistically significant at the 1 per cent level. For robustness purposes, Table 5c of the Appendix presents results for the 13 per cent threshold. These results corroborate the findings of Table 5a and also provide relatively higher magnitudes for the loan amount and the loan-use variables, suggesting a larger effect for the principal variables of interest due to a lower cut-off point.

From the analysis, increasing the amount borrowed engenders over-indebtedness, and larger loan sizes precipitate higher levels of over-indebtedness. This outcome confirms the first hypothesis that increasing the amount borrowed can increase the probability of over-indebtedness. The results corroborate with findings from Liv (2013). It concludes that there is a relationship between the total number of loans and over-indebtedness but finds no relationship when only one loan is considered. Hence, the finding adds to the knowledge that larger loan sizes increase the probability of over-indebtedness.

The descriptive statistics indicate that larger loan amounts are invested in new or existing businesses. Admittedly, these may not be short-term investments and will take time to yield anticipated profits. In the context of this study, it is understandable that borrowers of larger loans invested in new businesses or used to expand existing ones may initially endure higher sacrifices to service the debt. The preceding affirms a significant and probably unavoidable risk of over-indebtedness associated with increasing the amount borrowed. Therefore, borrowing small or large amounts may have attendant benefits and costs and requires a tailored lending approach to borrowers who require specific amounts for a particular purpose. Larger loan amounts may require more proactive risk management from lending institutions since, beyond an intolerable point of sacrifice, the inevitable consequence will be to default.

The outcome on loan use in Column (3) confirms the second hypothesis that utilising a loan for unproductive purposes is positively related to the probability of over-indebtedness. Compared to productive usage, using the loan for consumption increases the propensity of over-indebtedness by 40 percentage points. This outcome is statistically significant at the 5 per cent level. Loan use has been widely acknowledged as a potential driver of over-indebtedness. Usually, the intended purpose stated at the time of application tends to differ from the actual loan use (Khandker et al., 2013; Schicks, 2013). Hence, the probability of over-indebtedness may increase or decrease depending on actual loan utilisation.

Using observations from actual loan use, the study indicates that unproductive loan use makes a borrower more likely to be over-indebted. Liv (2013) found no relationship between over-indebtedness and unproductive loan use. The outcome was attributed to the data, which reports intended loan use from loan files rather than the actual usage. In contrast, this study uses nationally representative data on actual loan use and reveals that unproductive usage is associated with the probability of over-indebtedness. This outcome has intrinsic practical implications for institutions regarding their eligibility criteria since the data suggest that, over the two surveys, the proportion of loans contracted for consumption purposes has risen by approximately 27 per cent. Schicks (2014) found that unproductive loan use increases the debt burden in Ghana. Therefore, this study confirms that loans used for funerals, weddings and other uneconomical purposes will incur repayment sacrifices, especially if contracted by most borrowers, who derive their economic livelihoods from the informal sector and have low education and low incomes.

Analysing the effect of borrowing and loan use on over-indebtedness also allows the investigation of control variables that drive the phenomenon. The results suggest that the strongly statistically significant variables with a relatively higher influence include rural residence, low education, being a female-headed household, and having an insurance. From Column (3) of Table 5b in the Appendix, rural residence is associated with an 11 percentage point probability of over-indebtedness. The locational analysis is unique to this study as previous evidence on this particular variable is rare in the literature. From the data, a larger proportion of borrowers are in the rural area. Given its peculiar context regarding poverty levels, rural borrowers tend to have low incomes. This circumstance implies that they are prone to sacrificing basic consumption expenditures for debt repayments, which increases their risk of over-indebtedness. The objective outcome complements the subjective analysis by Schicks (2013), which focused on urban borrowers.

The education variable shows a positive effect with over-indebtedness for three categories. Borrowers with a BECE/MLSC qualification are more likely to be over-indebted by 8 percentage points. This result is sharply significant at the 1 per cent level and is consistent with theoretical and related empirical evidence that low levels of education are linked to over-indebtedness. Using repayment-to-income ratios and the European Union Living Standards Survey (EULS), The European Commission report concludes that 11 per cent of households in which the reference person has no qualifications are most likely to be over-indebted (European Commission, 2013). Khandker et al. (2013) also found that education was marginally significant in their ordered logit estimation. Similarly, current studies confirm the positive relationship between over-indebtedness and low levels of education (Chichaibelu & Waibel, 2018; Wałęga et al., 2022). Therefore, this study's finding corroborates the positive link between low education and over-indebtedness.

Compared to a male-headed household, a female-headed household is more likely to face the risk of over-indebtedness by approximately 9 percentage points at a significance level of 1 per cent.

The outcome of the gender variable in this study presents another dimension to Khandker et al. (2013) and Schicks (2014), who indicate that the risk is higher for male-headed households. According to the data, many female borrowers have no education and are predominantly engaged in the informal sector. Given the precariousness of livelihoods in this sector, it is inevitable that more female-headed households will be making sacrifices towards loan repayment, resulting in the outcome being realised. This observation implies that female-headed households are at risk of over-indebtedness due to their low education background and low income. The preceding has wider implications for delivering financial literacy training and business support services.

Insurance payment also has a strong positive relationship with over-indebtedness and is significant at the 1 per cent level. Paying for business insurance makes a borrower more likely to be over-indebted by 7 percentage points. Having business insurance in a precarious economic environment is positive. However, it may present challenges initially, especially for those setting up a new business or trying to improve an existing business that requires a revamp. Since these payments are expected from the outset, they could be driving up the burden for debt repayment and, therefore, increase sacrifices made. Earlier studies on over-indebtedness have not addressed the influence of insurance payments from the debt-service perspective, and this study contributes new evidence on the variable.

The results suggest that household size, assets and having undergone a literacy course that facilitates financial literacy reduce the likelihood of over-indebtedness. Age and marital status are not significant. On the regional variables controlling for underlying economic and natural shocks, their sensitivity to over-indebtedness becomes apparent in the individual analysis of the intensity of over-indebtedness. However, the risk reduces for the Volta, Brong-Ahafo and Upper West Regions in the binary estimations. These regions are statistically significant at 1 and 5 per cent, respectively. The year dummy suggests that compared to the previous survey, the economic conditions of the latest survey make a borrower more likely to be over-indebted by 23 percentage points, and the result is strongly statistically significant at the 1 per cent level.

Loan Amount, Loan Use and the Severity of Over-indebtedness

The first and second hypotheses also test for the intensity of over-indebtedness. The ordinal logit estimates the continuum of over-indebtedness, from not over-indebted to moderately over-indebted, through to full over-indebtedness and severe over-indebtedness. Khandker et al. (2013) admit that it may be impractical to determine a household's welfare from the extent of indebtedness simply because these measures may be unreliable due to the ad-hoc cut-off points employed. In this study, we derive objective cut-off points from observed data that have practical relevance for household living standards regarding borrower sacrifices. Hence, we use the cost-of-living expenses forgone to illuminate the specific practical implications of the different categories of over-indebtedness, as shown in Figure 5. For the discussion, loan sizes and loan use are not identified in the ordered cross-sectional analyses of the Bangladesh study. Hence, we focus on the key variables of interest using implications from the study context.

Table 6a shows results for the four categories of over-indebtedness.[12] Since the extent of indebtedness in Figure 1 suggests that 23 per cent of borrowers are severely over-indebted, we restrict the discussion to the determinants that influence a borrower's probability to be severely over-indebted. Where the results appear interesting, we refer to outcomes for the remaining categories of over-indebtedness to complement the explanation for severe over-indebtedness. Although the logit estimation of Table 5a Column (3) reveals that over-indebtedness increases with larger loan sizes, the ordinal logit suggests that the severity of over-indebtedness reduces with increasing categories of loan size.

Table 6a: Determinants of the Intensity of Over-indebtedness

	(1)	(2)	(3)	(4)
VARIABLES	**NOT OVI**	**MOD OVI**	**OVI**	**SEV OVI**
GH¢101-500	-0.3161***	0.350 ***	0.3784***	0.4845***
	(0.0265)	(0.0897)	(0.0557)	(0.0127)
GH¢501-1000	-0.3057***	0.3995***	0.3755***	0.4219***
	(0.0326)	(0.0099)	(0.0070)	(0.0194)
GH¢1001-5000	-0.5109***	0.564***	0.610***	0.3726***
	(0.0327)	(0.0097)	(0.0074)	(0.0205)
GH¢5001-20000	0.6720***	0.661***	0.6206***	0.2290***
	(0.0204)	(0.0095)	(0.0072)	(0.03812)
Consumption	0.0429**	-0.0440**	-0.0469**	0.1363**
	(0.0163)	(0.0016)	(0.0018)	(0.0127)

GLSS6&7, N = 2428; sample is restricted to household borrowers who made loan repayments. Models (1) to (4) present the increasing intensity of over-indebtedness from ease of payment to moderate, full and severe over-indebtedness. Marginal effects reported - discrete change from the base-level reported for factor variables.

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

[12] Results for the control variables are provided in Table 6b of the Appendix.

From Table 6a Column (4), borrowing between GH¢ 101-500 has the highest likelihood of 48 percentage points, which reduces to 23 percentage points for borrowers with GH¢ 5001 and above. Compared to the other indebtedness categories, the results suggest that borrowers of lower amounts are more likely to be severely over-indebted than those in the higher categories. From Column (2), borrowers with loans between GH¢ 1001-5000 and GH¢ 5001-20000 are more likely to be moderately over-indebted by 56 and 66 percentage points, respectively.

This outcome could be attributed to the observation that the lower loan categories are used for consumption and agricultural investments. Given that loans are scheduled to be repaid later with cost implications, those used for consumption may be associated with severe repayment difficulties if expected income is not realised, especially when loans become protracted and costs begin to mount. Even for agricultural investments, it can also be anticipated that borrowers may sell their produce and reduce the normal quantity of food intake to generate income for debt repayments.

According to the GLSS data, household heads who are farmers contribute the most to the incidence of poverty (GSS, 2018). Therefore, where income sources are insufficient to pay off their loans, they are more likely to make severe sacrifices. Evidence from this study relating to food sacrifices corroborates with Schick's (2013) finding that borrowers preferred to go hungry or eat a single meal daily and considered this unacceptable. Liv (2013) also found that borrowers sacrificed the quality or quantity of their food intake to service debts. Whether used immediately to smooth consumption or invested in agriculture, loans contracted for such purposes may require intense sacrifices to make repayments since the majority are on low incomes.

In contrast, the results suggest that borrowers of larger amounts invested mainly in assets, businesses and education have a lower tendency to make food sacrifices. These borrowers are in the formal sector with secure incomes. Therefore, they make moderate sacrifices on their health, education and utility expenditures when necessary. While we highlight the higher probability of moderate sacrifices, it is also revealing that borrowers of larger amounts can be severely over-indebted. As suggested by the GSS (2018) report, households in the highest income quintile spend 41.5 per cent of their income on food, indicating that the proportion of food expenses is high, even for high-income earners. It is, therefore, unsurprising that borrowers in this category may have to cut down on elaborate food expenses.

On loan use, the hypothesis that using a loan for consumption purposes may contribute to the intensity of indebtedness is confirmed by the study. Table 6a Column (4) suggests that loans used for consumption are associated with severe over-indebtedness by 14 percentage points, which is significant at the 5 per cent level. As implied, the efficacy of this variable is embedded in a two-way explanation – the loan and its use. Hence, its explanation becomes more apparent in the above discussion of different categories of loan sizes and how they influence the probability of severe over-indebtedness, as engendered by the underlying purpose. As a stand-alone variable, it confirms that using a loan for consumption may lead to severe over-indebtedness, no matter the size of the loan involved. Our comparative study on the intensity of indebtedness does not consider loan use, and, therefore, this study contributes new knowledge on this key variable. Other strongly statistically significant factors that increase the severity of over-indebtedness include female-headed households, low education, rural residence and informal sector employment.

Effect of Over-indebtedness on Household Living Standards

This analysis tests the third hypothesis that over-indebtedness reduces household living standards. We adopted a 2SLS instrumental variable estimation to correct for possible endogeneity.[13] First, we estimate an ordinary least squares regression to confirm attenuation or otherwise. From Table 7a, Column (1) results suggest that being over-indebted reduces household living standards by 6 per cent. The instrumental variable analysis of Column (2) suggests that being over-indebted reduces household living standards by 24 per cent, confirming that OLS is attenuated by endogeneity.[14]

To determine the validity of the results for the IV estimation, we conduct post-estimation tests for endogeneity, over-identification, underidentification and weak identification, as reported in Table 7b in the Appendix, which also provides the results for the remaining control variables. The null hypothesis for the endogeneity test states that the suspected variable is exogenous. Therefore, the small p-value suggests that the principal variable is endogenous, justifying the instrumental variable estimation. Since we use two instruments, we test for the over-identifying restriction, which suggests that the restrictions implied by additional instruments are valid. On instrument relevance, the Anderson LM statistic tests the null hypothesis that there is no correlation between the instruments and the endogenous regressor. The highly statistically significant p-value suggests that the instrument relevance requirement is satisfied. The weak identification further tests for the strength of the correlation, and the high F-statistic also indicates that the instruments are strongly correlated with the over-indebtedness predictor.

From Column (3), which uses the IV Lewbel estimation for robustness, we observe a noticeable difference in the coefficient for the over-indebtedness variable, which reports a lower value for the effect of over-indebtedness. This robustness model also

[13] We estimate three models for this analysis. Model 1 presents results for the ordinary least squares estimation, and Model (2) provides the IV 2SLS estimation results. For robustness, we adopt the Lewbel Identification by heteroscedasticity estimation, which uses internally generated instruments to compare the validity of external and internal instruments. Results for the IV Lewbel are reported in Column (3). The post-estimation results suggest that the IV 2SLS is a preferred model, and the results are reported from Column (2).

[14] Household living standards and welfare are used interchangeably.

passes all tests except the over-identification requirement. The difference in the outcome of the overidentification tests for the two IV estimations confirms the robustness of the external instruments employed in the 2SLS analysis. Therefore, the results are reported from Column (2) of Table 7a.

Table 7a: Over-indebtedness and Living Standards

	(1)	(2)	(3)
VARIABLES	OLS	IV 2SLS	IV Lewbel
OVI	-0.0551*	-0.2352***	-0.1473**
	(0.0401)	(0.0310)	(0.0142)
Loan Amount	-0.0208***	-0.1794*	-0.1220***
	(0.0177)	(0.0468)	(0.0258)
Loan use	-0.00414	-0.00145	-0.00321
	(0.00391)	(0.00423)	(0.00390)
Household Size	0.0160***	0.0144***	0.0161***
	(0.0168)	(0.0173)	(0.0167)
Female	-0.0329	0.0614	-0.0413
	(0.0488)	(0.0626)	(0.0500)
Age in years	0.0315**	0.0263*	0.0319**
	(0.0152)	(0.0158)	(0.0151)

GLSS6&7, N = 2428; sample is restricted to household borrowers who made loan repayments. Models (1) presents the OLS estimation which tests for attenuation of parameter estimates from suspected endogeneity. Model (2) presents the IV 2sls estimation and Model (3) submits estimates for the Lewbel analysis with internal instruments. Robust coefficients reported. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

The link between over-indebtedness and household living standards has been suspected within the broader concepts of poverty. The European Commission (2008) report found that over-indebted households have high repayments, which pushes them below the poverty line. Likewise, Russell et al. (2011) assert that indebtedness can affect poverty by reducing basic consumption expenditure. Recent studies have also found a negative relationship between over-indebtedness and household living standards or economic well-being (Hartfree & Collard, 2014; Mutsonziwa & Fanta, 2019; Wałęga et al., 2022). This study's outcome that over-indebtedness reduces household living standards is consistent with the literature as it has ultimate implications for poverty.

As anticipated, the negative effect observed may be caused by conditions surrounding repayment and socio-economic influences. Even though borrowing has a positive effect on household living standards, the effect is not significant. This lack of statistical relevance may be attributed to borrowing conditions that could also affect household living standards. Debt-servicing generally entails repayment conditions, encompassing loan duration, interest rates, fees, charges and repayment schedule. While interest rates have been averagely high for most borrowing, inflexible repayment schedules have been reportedly entrapping. The demands put enormous pressure on households to sacrifice available income for debt servicing (Schicks, 2013). This study's measurement of over-indebtedness from the objective-burden perspective indicates that being over-indebted entails sacrificing basic consumption. From the opportunity cost perspective, it is evident how such sacrifices would activate a reduction in household consumption levels, leading to a reduction in living standards.

In this analysis, the magnitude of a loss in household welfare is consistent with the study by D'Alessio and Iezzi (2013), which suggests that the overall debt-burden indicator, with a 30 per cent cut-off point, results in a reduced consumption of 17.8 per cent. Although this indicator uses the stock-based measure of over-indebtedness, the outcome resonates with the flow-based measure adopted in this study. Similarly, Russell et al. (2011) also found in their study of over-indebtedness in Irish households that 29 per cent of over-indebted households were at risk of poverty, where 'at risk of poverty' reflects high levels of basic deprivation, which is analogous to the loss of welfare observed in this study. Even though the study does not measure objective-burden over-indebtedness, it suffices to complement the paucous evidence on the subject in general and the specific indicator in particular. The subjective nature of the Irish household study also explains the comparatively high estimate suggested.

Our result is also consistent with the study on sub-Saharan Africa, which addresses over-indebtedness and household welfare (Mutsonziwa & Fanta, 2019). It concludes that over-indebtedness is associated with low living standards, especially for low-income households. Despite its focus, this related study also depicts the complexity of the over-indebtedness phenomenon. It used a composite over-indebtedness variable and also focused on the functions and capabilities approach to examine the effect on welfare rather than the income/consumption aspect, which is the focus of this study. Therefore, the outcome from the flow-based measure extends existing knowledge from the income/consumption approach.

We present some insights on the control variables and suggest that they are interpreted cautiously since we do not address their causal effects. Column (2) indicates that living in a rural area reduces living standards for an over-indebted household. Low education leads to a reduction in household living standards by 9.3 per cent for indebted households. Throughout the analyses, the lower education indicator has contributed significantly to the probability of over-indebtedness and its severity. It is, therefore, unsurprising that it contributes significantly to a reduction in the living standards for an over-indebted household. The study's findings on education and household size are consistent with Wałęga et al. (2022). For a rural borrower, being over-indebted can reduce living standards by 13 per cent. Unfavourable locational differences in infrastructure, services and general income levels can negatively impact business profitability. These affect income levels, which drives the need to sacrifice other consumption expenditures for debt repayment. Similar levels of strong significance are associated with the geographic and economic differences in the regions. The outcome is also consistent with D'Alessio and Iezzi (2016), who found similar outcomes for the regional variations.

In this analysis, household size and tertiary education are the variables that strongly improve living standards for indebted households. An additional working adult increases living standards by 1.4 per cent, and the effect is strongly statistically significant. In the data, household size refers to the number of working adults contributing to household income. Subsequently, an increase in total household income can lessen the debt burden. In their study on economic well-being, which employed the DSR at 30 per cent (DSTI30), the authors found that living conditions improve with education and the number of people in the household (Wałęga et al., 2022). The outcome is analogous to the consumption expenditures investigated in this study.

The study's outcome on living standards has real economic and practical implications. From a cursory point of view, a 24 per cent decrease in household living standards may be seemingly innocuous. However, further details from borrowers' welfare scores elucidate the possible threat to household living standards. Welfare scores percentile distribution highlighted that the average score for households in the 25th percentile is GH¢1,824.13. The preceding indicates that, on average, a quarter of borrowers are marginally subsisting above the national poverty line of GH¢1,760.80 by GH¢ 63.33. For these households, a 24 per cent fall reduces their household welfare scores by GH¢ 437.76 to 1,386.37, pushing them below the poverty line. The practical relevance of the effect of over-indebtedness on household living standards is crucial for efforts to eradicate extreme poverty, as the subtle influence of this phenomenon, which affects a considerable number of borrowers, would have consequences for both immediate and future poverty reduction efforts.

While the study presents crucial information on the principal determinants and the effect of over-indebtedness on living standards, it is highlighted that the analysis is borrower-centred and uses comprehensive information observed from the demand perspective. Some crucial supply-side variables are proxied by the institutions and their related practices. Additionally, it does not consider over-indebtedness from the arrears, subjective or bankruptcy perspective due to data considerations. As previously highlighted, some control variables used to analyse the effect on living standards may require future thorough investigations due to possible sources of endogeneity.

6. Conclusion and Policy Recommendations

This study investigates the measurement, determinants and effect of over-indebtedness on living standards. First, it questions whether the use of arbitrary cut-off points is meaningful for determining the over-indebtedness situation of household borrowers in a low-and-middle-income country context. From this perspective, the study contributes to determining the threshold at which a borrower is considered over-indebted. It provides contextual and relevant thresholds for the debt-service indicator through the ‘opportunity cost approach’ derived from the national living standards data. It also investigates two primary factors of indebtedness - the loan amount and loan use - to determine whether they influence the probability and intensity of over-indebtedness. Another important focus of this study is its inquiry into over-indebtedness and its effect on living standards.

The study suggests that 41 per cent of household borrowers are over-indebted. This outcome provides an objective nationwide estimate of over-indebtedness in the country. Of this total, 11 per cent are moderately over-indebted, 7 per cent are fully over-indebted, and 23 per cent are severely over-indebted. The absolute amount borrowed and various categories of loan sizes, including using a loan for unproductive purposes, increase a household’s probability of over-indebtedness. Other contributing factors include rural residence, low education, female-headed households and insurance. Severe over-indebtedness triggered by food sacrifices affects almost a quarter of borrowers and is influenced by small loan sizes, consumption loans, low education, female-headed households and informal sector employment. On the effect of over-indebtedness on living standards, we find that being over-indebted reduces household living standards by 24 per cent.

This study has crucial policy implications. Since a higher percentage of borrowers fall within the severe over-indebtedness category, it could be inferred that over-indebtedness in Ghana is severe and borrowers in this category sacrifice food intake to service debts. This outcome could translate into an intensification of extreme poverty, which suggests that those affected cannot meet their food requirements. This knowledge is vital and urgent for safeguarding borrowers, particularly the vulnerable, and for all stakeholders to take action to prevent escalation.

Given the generally low educational background of most borrowers, the study recommends that the Ministry of Finance ensures that lending institutions implement a mandatory financial literacy education programme for borrowers with low education. This policy should guarantee sufficient financial awareness that would enforce financial discipline. Financial institutions should also ensure that loan requests are stridently vetted to complement their usage and borrower's loan repayment capacity. Specifically, they should ensure that loan repayment conditions are bearable to allay the possibility of such contracts having deleterious effects on borrowers' ability to repay without the likelihood of sacrificing basic minimum consumption expenditures. Although this inevitable consequence may not be fully preventable, an initial conscious effort to reduce such occurrences might reduce the number of households affected.

Crucially, this study proves that over-indebtedness poses a risk to livelihoods. Reduction in living standards caused by food sacrifices could hamper the attainment of the eradication of extreme poverty by 2030. The government should institute policies to safeguard low-income borrowers by enforcing best practices that benefit both borrowers and institutions. Given the similarity of features aiding the categorisation of countries into low- and middle-income classifications, this study has implications for similar countries, particularly in sub-Saharan Africa.

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Appendix – Tables and Figures

Table 1: Summary Statistics

Variables	Mean	Median	Standard Deviation	Minimum	Maximum
Loan amount$^{\tau}$ *(lnloan)*	1981.06	800.00	3234.43	20.00	20000.00
Household income$^{\tau}$	7193.01	3178.59	11818.17	40.00	80755.22
Amount repaid$^{\tau}$	1050.50	400.00	1811.32	10.00	10500
Household expenditure$^{\tau}$ *(hhexp)*	11268.16	9056.50	8267.09	1121.50	45784.92
Assets$^{\tau}$ *(lnassets)*	11390.75	2500.00	28423.27	5.00	191755.00
Welfare Scores – (lnCExp) Consumption expenditure per equivalent adult$^{\tau}$	4304.78	3085.00	3821.10	449.48	21227.83
Age of household head (agey)	45	43	13	23	80
Household Size (hhsize - Number of working adults over 15 years)	5	4	2.7	1	14
Dependents (depend)	3	2	2.1	1	9
Loan Use (ln_use)	.6025535	0	.4894706	0	1
Gender (female)	.3307249	0	.4705711	0	1
Financial Institutions (mfi)	.5070016	1	.500054	0	1

Employment status (emp_stat)	.8117792	3	.3909689	0	1
Education (edu)	2.045305	2	1.282672	1	4
Insurance (insure)	.7837727	.5	.8586746	0	1
Financial literacy (lit_fin)	.4303954	0	.4952335	0	1
Location (rural)	.4089786	0	.4917466	0	1
Marital status (marstat)	.6911038	1	.4621334	0	1
Health Shock (hlth_shk)	.1124382	0	.3159699	0	1
Region	5.163921	5	2.884878	1	10
Source (GLSS6&7) N = 2428 (Borrower sub-sample) ᵗamount in Ghana cedis					

Table 2: Distribution of Categorical Variables

Variables	Categories	Percentage
Loan Amount	*GH¢ 20-100*	13.51
	GH¢ 101-500	29.86
	GH¢ 501-1000	17.63
	GH¢ 1001-5000	30.23
	GH¢ 5001 and Above	8.77
Loan Use	*Education*	15.62
	Agricultural Investments	16.80
	Assets	12.23
	Starting or expanding a business	28.54

	Consumption Purposes	26.81
Financial Literacy	*Yes*	5.38
	No	94.62
Financial Institutions	*Microfinance Institutions*	38.51
	Commercial Non-MFIs	61.49
Gender	*Male*	66.93
	Female	33.07
Employment Status	*Formal*	28.00
	Informal/Unemployed/Inactive	72.00
Location	*Urban*	40.90
	Rural	59.10
Education	*None/Primary*	42.38
	BECE/MSLC	30.79
	Senior Secondary Sch/Secondary	9.18
	Voc/ Tech/Teacher	8.30
	Tertiary	9.35
Marital Status	*Not married*	40.20
	Married	59.80
Health Shock	*Yes*	10.69
	No	89.31
Insurance	*Yes*	35.06
	No	64.94
Region	*Western*	14.39
	Central	11.94
	Greater Accra	5.48
	Volta	11.41
	Eastern	11.00
	Ashanti	8.77
	Brong Ahafo	11.49

	Northern	8.40
	Upper East	10.45
	Upper West	6.59

Source: Author (GLSS6&7)

Table 3: Variable Definition and Measurement

Variables	**Definition and Measurement**	**A-Priori**	
		Determinants	**Effect**
OVI	Over-indebtedness index – ratio of total yearly debt repayments to total yearly household income - Measures the over-indebtedness situation of household; binary (0 Not over-indebted; 1 over-indebted) Ordinal (measured on a scale of four: ease of debt-service, moderately indebted, over-indebted and severely indebted; base category: ease of debt-service)	Outcome variable	Policy Variable
lnCExp†	Welfare scores – Log of consumption expenditure per equivalent adult measures the level of household standard of living (continuous)	n/a	Outcome variable
hhexp†	Log of total household expenditure measures the influence of total household consumption expenditures (continuous)	**+/-**	**+/-**
ln_use	Purpose of loan (binary- 0 investments; 1 consumption)	**+**	**+**
lnloan†	Loan amount indicates the cumulative loan amount held (continuous)	**+/-**	**+/-**
ln_size	Distinct categories of amount borrowed to determine their specific influence on over-indebtedness - Indicator variable representing loan sizes (ordinal with five categories: below GH¢ 20-100 as base reference; GH¢ 101-1000; GH¢ 1001-5000; GH¢ 5001-10,000; GH¢10,001-20,000)	**+/-**	**+/-**
lit_fin	Borrower has undergone a literacy course to facilitate financial literacy training – proxy for	**-**	**+**

	financial literacy; binary (0 No literacy training; 1 literacy training received)		
hhsize	Number of working adults over 15 years (continuous)	-	+
depend	Number of dependents in the household (continuous)	+	-
mfi	Household borrows from Microfinance Institutions (MFIs) or non-MFIs (groups of state, private banking and other outlets: proxy for MFI institutional characteristics such as interest rates, tenor and loan size (binary, 0 non-MFI; 1 MFI)	+/-	+/-
agey	Age in years of household head (continuous)	+/-	-
agesqr	Square of age in years (continuous) measures the reducing and increasing effect of age	+/-	+/-
female	Sex -Proxy for the gender of household head: binary (0 male; 1 female)	+/-	+/-
emp_stat	Types of economic activity (binary – 0 formal sector; 1 informal sector)	+/-	-
mode_fi	Knowledge of financial institution (binary – 0 indirect; 1 direct approach from institutions)		
rural	Location of a borrower; binary (0 urban, 1 rural - indicates the underlying poverty levels)	+	-
edu	Levels of educational attainment (ordinal- measured on a scale of 1 to 4 categories – None/Primary; BECE/MSLC; SSS/ Secondary; Vocational/Technical/ Teacher; Tertiary)	+/-	+/-
marstat	Marital status of household head (binary - 0 not married; 1 married)	-	+/-
region	Region of borrower's residence is a nominal variable indicating the ten administrative regions with their specific underlying economic and seasonal variations which influence the level of profits on investments; base- Greater Accra) – Controls for macroeconomic economic and climatic shocks such as droughts and floods	+/-	+/-
survyear	Survey year controls for the economic characteristics of the two time periods for the pooled cross-sectional analysis (binary – 0 2013, 1 2017)		

lnassets†	Log of total household assets measures the level of household assets	-	+
hlth_shk	Indicator of idiosyncratic shock suggesting distress borrowing, binary (0 No; 1Yes)	+	-
insure	Household has a business insurance; binary (0 No, 1 Yes)	-	+

Source: GLSS6&7 †Figures are in Ghana cedis (GH¢).

Table 4- Threshold Derivation: The Opportunity Cost Approach Proportions of Total Annual Household Cash Expenditure by Expenditure Group

Expenditure Components (Sacrifices for debt repayment)	Groups	Total Hhd Exp (%)	Rural (%)	Aggregated Total for Components (%)	Cut-off Points (%)	Intensity of Indebted-ness
Food 62% of Ghanaian microfinance borrowers sacrifice for repayment by reducing the quality and quantity of food (Schicks, 2013)	**D**	45.8	55	45.8	**55 -100**	**Severely Over-indebted**
Health	**C**	1.1	1.1	**23.4**	**55**	**Over-indebted**
Education		10.6	10.6			
Housing Water, Electricity, Gas		11.3	11.3	25*		
Clothing and Footwear	**B**	6.8	6.8	Approx. **14**	**30**	**Moderately Over-indebted**
Transport		6.9	6.9	15*		
Total Basic Consumption Expenditure		82.5	91.7			
Average Basic Consumption Expenditure including rural factor		**87.1**				
Optimal indebtedness Cut-off point: (Residual Income) Percentage of Total Income - Average Basic Consumption Expenditure (100 – 87 = **13***)	**A**	15		15	**15**	**Ease of Debt Service (EDS)**

Source: Author (Compiled from GLSS6); *Upward revision of 1 or 2 percentage point(s)

Table 5b: Determinants of Over-indebtedness

	(1)	(2)	(3)
VARIABLES	Absolute Loan Amount	Loan-Size Full	Loan-Size Nested

Household Expenditure	2.993**	2.308*	2.521**
	(0.1279)	(0.1275)	(1.272)
Household Size	-0.0128*	-0.0124	-0.0115***
	(0.00760)	(0.00760)	(0.00385)
Female	0.0919***	0.0916***	0.0862***
	(0.0235)	(0.0238)	(0.0234)
Age in years	-0.00881**	-0.00805**	-0.00108
	(0.00419)	(0.00414)	(0.000696)
Age square	8.07e-05*	7.11e-05*	
	(4.23e-05)	(4.15e-05)	
Asset	-0.0118**	-0.00912*	-0.00930*
	(0.00492)	(0.00490)	(0.00490)
BECE/MSLC	0.0882***	0.0861***	0.0835***
	(0.0217)	(0.0220)	(0.0218)
SSS/Secondary	0.0849***	0.0899***	0.0920***
	(0.0328)	(0.0331)	(0.0330)
Voc/Tech/Teacher	0.122***	0.133***	0.134***
	(0.0380)	(0.0391)	(0.0390)
Tertiary	-0.00895	0.00537	0.00573
	(0.0376)	(0.0379)	(0.0379)
Rural	0.111***	0.112***	0.111***
	(0.0208)	(0.0208)	(0.0209)
Dependents	0.00431	0.00329	
	(0.00920)	(0.00932)	
MFIs	0.0468***	0.0485***	0.0467***
	(0.0177)	(0.0179)	(0.0178)
Health shock	-0.00953	-0.0103	
	(0.0270)	(0.0273)	
Insurance	0.0667***	0.0677***	0.0696***
	(0.0257)	(0.0257)	(0.0258)
Informal Sector	0.3750**	0.2464*	0.0289

	(0.0266)	(0.0267)	(0.0265)
Financial Literacy	-0.0711	-0.0651	-0.0645**
	(0.0301)	(0.0303)	(0.0304)
Marital Status	-0.0296	-0.0269	-0.0291
	(0.0233)	(0.0236)	(0.0236)
Western	-0.0302	-0.0303	-0.0285
	(0.0331)	(0.0332)	(0.0332)
Central	-0.0478	-0.0440	-0.0464
	(0.0430)	(0.0435)	(0.0435)
Volta	-0.0890**	-0.0945***	-0.0913***
	(0.0351)	(0.0355)	(0.0354)
Eastern	-0.0621*	-0.0513	-0.0511
	(0.0333)	(0.0337)	(0.0337)
Ashanti	-0.0474	-0.0399	-0.0382
	(0.0360)	(0.0362)	(0.0361)
Brong Ahafo	-0.105***	-0.103***	-0.100***
	(0.0353)	(0.0358)	(0.0358)
Northern	-0.0351	-0.0412	-0.0392
	(0.0419)	(0.0418)	(0.0418)
Upper East	-0.0561	-0.0700*	-0.0664
	(0.0405)	(0.0413)	(0.0413)
Upper West	-0.0989**	-0.0997**	-0.0978**
	(0.0450)	(0.0452)	(0.0451)
Survey Year	0.233***	0.251***	0.253***
	(0.0322)	(0.0319)	(0.0321)
Observations	2,428	2,428	2,428

GLSS 6&7, N = 2428; sample is restricted to household borrowers who made loan repayments. Marginal effects reported - discrete change from the base-level reported for factor variables. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Model (3) restricts age square, health shock and dependents that appear to have no effect. We conduct a likelihood ratio test which confirms the hypothesis. Lrtest: [(LR chi2(3) = 3.22; Prob > chi2 = 0.3583); (Adj R^2 = 0.213 – constrained; 0.211- full); (Full: AIC 2597.774; BIC -16055.700; Constrained - AIC: 2594.649 ; BIC -16076.209)]. From the comparison tests, parameter estimates are reported from Column (3).

Table 5c: Determinants of Over-indebtedness

VARIABLES	(1) Absolute Loan Amount	(2) Loan-Size Full	(3) Loan-Size-Nested
Loan Amount	0.127***		
	(0.00873)		
GH¢ 101-500		0.124***	0.122***
		(0.0274)	(0.0276)
GH¢ 501-1000		0.313***	0.309***
		(0.0345)	(0.0345)
GH¢ 1001-5000		0.443***	0.439***
		(0.0344)	(0.0345)
GH¢ 5001-20,000		0.575***	0.572***
		(0.0466)	(0.0469)
Consumption	0.595**	0.285**	0.415**
	(0.0183)	(0.0185)	(0.0185)
Household Expenditure	3.672***	3.021**	3.123**
	(0.1281)	(0.1274)	(0.1273)
Household Size	-0.0126*	-0.0121	-0.0143*
	(0.00762)	(0.00762)	(0.00745)
Female	0.0730***	0.0731***	0.0684***
	(0.0237)	(0.0241)	(0.0237)
Age in years	-0.00680	-0.00609	-0.000813
	(0.00425)	(0.00422)	(0.000702)
Age square	6.28e-05	5.37e-05	

	(4.29e-05)	(4.23e-05)	
Asset	-0.0136***	-0.0112**	-0.0113**
	(0.00496)	(0.00494)	(0.00493)
BECE/MSLC	0.0905***	0.0876***	0.0864***
	(0.0220)	(0.0223)	(0.0223)
SSS/Secondary	0.0982***	0.102***	0.104***
	(0.0331)	(0.0333)	(0.0332)
Voc/Tech/Teacher	0.116***	0.126***	0.128***
	(0.0375)	(0.0385)	(0.0385)
Tertiary	-0.00991	0.0243	0.0248
	(0.0396)	(0.0395)	(0.0394)
Rural	0.109***	0.110***	0.110***
	(0.0211)	(0.0212)	(0.0212)
Dependents	0.00760	0.00648	
	(0.00940)	(0.00951)	
MFIs	0.0548***	0.0563***	0.0552***
	(0.0179)	(0.0181)	(0.0180)
Health shock	-0.00312	-0.00460	
	(0.0268)	(0.0270)	
Insurance	0.0745***	0.0757***	0.0772***
	(0.0264)	(0.0264)	(0.0264)
Informal Sector	0.4051	0.2884	0.3110
	(0.0270)	(0.0270)	(0.0268)
Financial Literacy	-0.0691**	-0.0629**	-0.0627**
	(0.0300)	(0.0303)	(0.0303)
Marital Status	-0.0254	-0.0230	-0.0248
	(0.0235)	(0.0239)	(0.0238)
Western	-0.0460	-0.0462	-0.0450
	(0.0338)	(0.0340)	(0.0339)
Central	-0.0175	-0.0129	-0.0140

	(0.0454)	(0.0454)	(0.0453)
Volta	-0.101***	-0.106***	-0.104***
	(0.0358)	(0.0362)	(0.0361)
Eastern	-0.0663*	-0.0549	-0.0544
	(0.0338)	(0.0342)	(0.0342)
Ashanti	-0.0470	-0.0391	-0.0379
	(0.0368)	(0.0370)	(0.0370)
Brong Ahafo	-0.118***	-0.115***	-0.113***
	(0.0360)	(0.0365)	(0.0365)
Northern	-0.0560	-0.0609	-0.0590
	(0.0423)	(0.0420)	(0.0421)
Upper East	-0.0664	-0.0793*	-0.0761*
	(0.0411)	(0.0419)	(0.0418)
Upper West	-0.120***	-0.118**	-0.116**
	(0.0459)	(0.0459)	(0.0459)
Survey Year	0.232***	0.249***	0.251***
	(0.0321)	(0.0318)	(0.0319)
Observations	2,428	2,428	2,428

GLSS 6&7, N = 2428; Sample is restricted to household borrowers who made loan repayments; DSR = 13 per cent. Marginal effects reported - discrete change from the base-level reported for factor variables. Model (1) focuses on the continuous form of loan amount and Model (2) shows variations in loan sizes.Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 6b: Determinants of the Intensity of Over-indebtedness

VARIABLES	(1) NOT OVI	(2) MOD OVI	(3) OVI	(4) SEV OVI
Household Expenditure	-0.1461*	0.1529*	0.1672*	0.1414*
	(0.1613)	(0.0121)	(0.1335)	(0.0907)
Household Size	0.0137	-0.0014	-0.0015	-0.0107
	(0.0069)	(0.0076)	(0.0077)	(0.0525)
Female	-0.1875***	0.2683**	0.2628**	0.2938***
	(0.0206)	(0.0019)	(0.0023)	(0.0166)
Age	0.744**	-0.775***	-0.885***	-0.851***
	(0.0034)	(0.0032)	(0.0039)	(0.00275)
Age Square	-0.00641*	0.00671*	0.00734*	0.00171*
	(0.0347)	(0.0036)	(0.0039)	(0.0272)
Asset	-0.0148	-0.00154	-0.00169	-0.01156
	(0.0046)	(0.0049)	(0.0053)	(0.0036)
BECE/MSLC	-0.750***	0.522***	0.597***	0.683***
	(0.0202)	(0.0023)	(0.0023)	(0.0159)
SSS/Secondary	-0.0870	-0.570**	0.568**	0.593**
	(0.0302)	(0.0303)	(0.0342)	(0.0241)
Voc/Tech/Teacher	-0.1101	0.1070	0.128	0.1870
	(0.0324)	(0 .0028)	(0.0035)	(0.0265)
Tertiary	-0.0457	0.0609*	0.059*	0.033*
	(0.0305)	(0.0043)	(0.0042)	(0.0244)
Rural	-0.207***	0.216***	0.214***	0.385***
	(0.0181)	(0.0028)	(0.0024)	(0.0145)
Dependents	-0.0067	0.0070	0.0076	0.0052
	(0.0082)	(0.0087)	(0.0095)	(0.0065)
Non MFIs	-0.0394	-0.0422*	-0.0457*	-0.306*
	(0.0160)	(0.0017)	(0.0019)	(0.0019)

Health Shock	0.1544*	0.0168	0.0179	0.1195*
	(0.0229)	(0.0025)	(0.0027)	(0.0175)
Insurance	0.0517	0.0563*	0.0586*	0.522*
	(0.0227)	(0.0026)	(0.0025)	(0.0172)
Informal Sector	-0.3047*	0.3312**	0.3531**	0.3958**
	(0.0223)	(0.0025)	(0.0026)	(0.0214)
Financial Literacy	-0.0146	-0.0110	-0.0127	-0.0208
	(0.0281)	(0.0032)	(0.0037)	(0.0159)
Marital Status	0.0265	-0.02718*	-0.0301*	-0.0208*
	(0.0202)	(0.0020)	(0.0022)	(0.0159)
Western	0.0366	0.0328	0.0037	0.0301
	(0.0297)	.0023301	.0030231	(0.0244)
Central	0.0218	-0.00157	0.0215	0.01812
	(0.0381)	(0.0028)	(0.0038)	(0.0314)
Volta	0.0829*	0.0772*	0.0907*	0.06610
	(0.0322)	(0.0033)	(0.0036)	(0.0256)
Eastern	0.0601	-0.00513	-0.00634	0.04866
	(0.0294)	(0.0026)	(0.0031)	(0.0238)
Ashanti	-0.02845	-0.0211**	-0.0283**	-0.0234**
	(0.0400)	(0.0024)	(0.0031)	(0.0258)
Brong Ahafo	0.1039*	-0.01044	-0.01176	0.0817
	(0.0330)	(0.0037)	(0.0039	(0.0258)
Northern	0.0857	0.00807	0.00943	0.0682
	(0.0364)	(0.0038)	(0.0042)	(0.0286)
Upper East	0.0896	0.0856	0.0992	0.0718
	(0.0380)	(0.0042)	(0.0045)	(0.0296)
Upper West	0.1205**	0.1278**	0.1396**	0.0937**
	(0.0400)	(0.0051)	(0.0050)	(0.0303)
Survey Year	-0.2727***	0.2580***	0.3353***	0.2134***
	(0.0303)	(0.0035)	(0.0044)	(0.0246)

Observations	2,428	2,428	2,428	2,428
R-squared	0.902	0.899	0.899	0.901

GLSS6&7, N = 2428; sample is restricted to household borrowers who made loan repayments. Models (1) to (4) present the increasing intensity of over-indebtedness from ease of payment to moderate, full and severe over-indebtedness. Marginal effects reported - discrete change from the base-level reported for factor variables. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 7b: Over-indebtedness and Living Standards

	(1)	(2)	(3)
VARIABLES	OLS	IV 2SLS	IV Lewbel
Asset	0.0975**	0.0109*	0.0965*
	(0.0120)	(0.0116)	(0.0122)
BECE/MSLC	-0.0137***	-0.0931***	-0.0141***
	(0.0442)	(0.0525)	(0.00441)
SSS/Tertiary	0.0322***	0.0296***	0.00324***
	(0.0525)	(0.0609)	(0.0523)
Rural	-0.0038***	-0.1260***	-0.1345***
	(0.0390)	(0.0534)	(0.00413)
Dependents	0.0257	0.0291	0.0254
	(0.0213)	(0.0218)	(0.0211)
Non-MFIs	-0.0107**	-0.0155**	-0.0102**
	(0.0378)	(0.0445)	(0.0380)
Health Shock	-0.0158**	-0.0160**	-0.0157**
	(0.0616)	(0.0630)	(0.0612)
Informal Sector	-0.1354***	-0.1940***	-0.1367**
	(0.0514)	(0.0650)	(0.0518)
Marital Status	0.0156	-0.0289	0.0196
	(0.0493)	(0.00564)	(0.00493)
Western	-0.0239***	-0.0282***	-0.0813
	(0.00699)	(0.0103)	(0.0592)

Central	-0.0162**	-0.0246**	-0.0235***
	(0.0704)	(0.0108)	(0.000699)
Volta	-0.0372***	-0.0365***	-0.0137**
	(0.0786)	(0.0106)	(0.0687)
Eastern	-0.0265***	-0.0270***	-0.00288
	(0.00716)	(0.0105)	(0.00631)
Ashanti	-0.00230***	-0.00199*	-2.36e-05
	(0.00764)	(0.00109)	(0.000679)
Brong Ahafo	-0.0450***	-0.0428***	-0.0217***
	(0.0760)	(0.0105)	(0.0660)
Northern	-0.0589***	-0.0684***	-0.0345***
	(0.0964)	(0.0119)	(0.0879)
Upper East	-0.0490***	-0.0587***	-0.0246***
	(0.00943)	(0.00116)	(0.0843)
Upper West	-0.0124***	-0.0128***	-0.0100***
	(0.0115)	(0.0121)	(0.0108)
Survey Year	-0.0285***	-0.0201*	-0.0282***
	(0.0392)	(0.0178)	(0.0510)
Constant	0.136***	0.132***	0.139***
	(0.0162)	(0.0231)	(0.0163)
Observations	2,428	2,428	2,428

GLSS6&7, N = 2428; sample is restricted to household borrowers who made loan repayments. Models (1) presents the OLS which tests for attenuation of parameter estimates from suspected endogeneity. Model (2) presents the IV 2sls estimation and Model (3) submits estimates for the Lewbel analysis with internal instruments. Post estimation tests: [Endogeneity: OVI = 8.647; p= 0.0033; Over-identification test: Sargan statistic 0.300; p = 0.9921; Under-identification – Anderson canon.corr. LM statistic 53.407; p = 0.0000; Weak identification - Cragg-Donald Wald F statistic = 27.023; Stock-Yogo weak ID test critical values of 10 – 25 per cent (19.93, 11.59, 8.75, 7.25; IV Lewbel Wald F statistic = 9.2, larger critical values for the weak ID test range from 18.80 to 67.70]. Robust coefficients reported. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

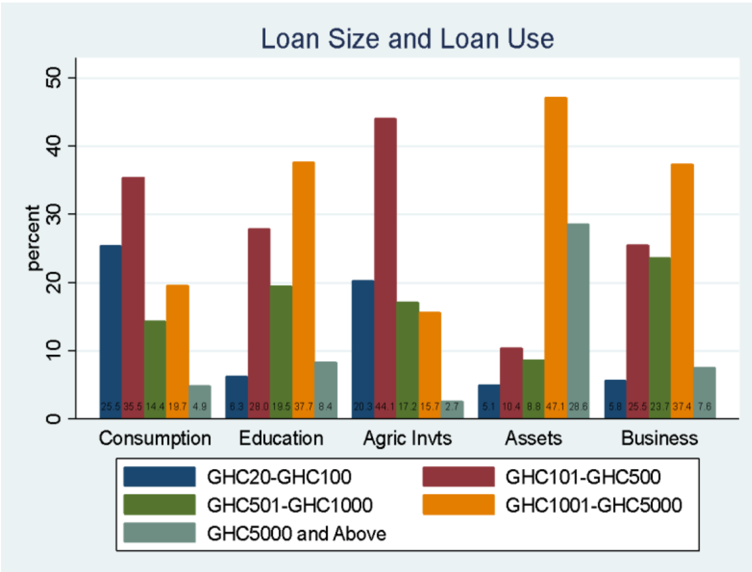
Table 8: Pairwise Correlation Matrix

	lnloan	ln_use	hhexp	hhsize	female	agey	agesqr
lnloan	1.0000						
ln_use	0.0341	1.0000					
hhexp	-0.4930	0.0074	1.0000				
hhsize	-0.0726	0.0410	-0.2593	1.0000			
female	-0.1120	0.1434	0.1404	-0.1832	1.0000		
agey	-0.0660	0.0259	0.0157	0.1624	0.1265	1.0000	
agesqr	-0.0939	0.0100	0.0535	0.1222	0.1129	0.9855	1.0000
lnasset	0.3740	-0.0684	-0.3867	0.1322	-0.2218	0.0932	0.0769
edu	0.4323	-0.0750	-0.2952	-0.2099	-0.1463	-0.1380	-0.1390
rural	0.3639	-0.0228	-0.3135	-0.1771	0.1061	-0.0337	-0.0467
depend	-0.1298	0.0172	-0.1517	0.4955	-0.1098	0.1637	0.1399
mfi	-0.1665	-0.1334	0.0385	-0.0059	-0.1206	-0.0160	0.0009
hlth_shk	0.0040	-0.0120	-0.0108	-0.0076	0.0796	0.0490	0.0527
insure	-0.0207	-0.0109	0.0121	-0.0332	-0.0236	-0.0197	-0.0179
emp_stat	-0.4075	0.1515	0.2126	0.1316	0.1235	0.1453	0.1516
lit_fin	-0.0165	-0.0351	-0.0161	-0.1186	-0.0046	-0.0183	-0.0213
marstat	0.0989	-0.0439	-0.1945	0.3276	-0.5645	-0.0762	-0.0899
region	-0.2053	0.0470	0.2255	0.1601	-0.0357	0.0087	0.0211

	ln_asset	edu	rural	depend	mfi	hlth_shk	insure
ln_asset	1.0000						
edu	0.2315	1.0000					
rural	0.1464	0.3110	1.0000				
depend	0.0655	-0.2646	-0.2066	1.0000			
mfi	-0.0372	-0.0798	-0.0864	0.0150	1.0000		
hlth_shk	0.0023	0.0078	0.0142	0.0112	0.0037	1.0000	
insure	0.0574	0.1384	0.1092	-0.0438	0.0232	-0.0189	1.0000
emp_stat	-0.2023	-0.5261	-0.2167	0.1830	0.1018	-0.0254	-0.1465
lit_fin	-0.0564	0.1366	0.1009	-0.1049	0.0779	-0.0540	0.4936
marstat	0.1925	0.0215	-0.1129	0.2608	0.0548	-0.0668	0.0043
region	0.0134	-0.0958	-0.1393	0.1432	-0.0506	0.0440	-0.0007

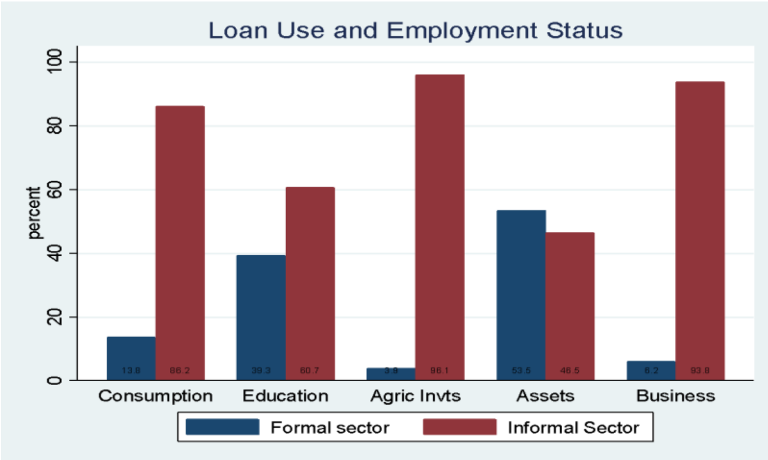
	emp_stat	lit_fin	marstat	region
emp_stat	1.0000			
lit_fin	0.0015	1.0000		
marstat	-0.0437	-0.0238	1.0000	
region	-0.0347	-0.3782	0.0602	1.0000

Figure 1: Categories of Loan Amount and Loan Use



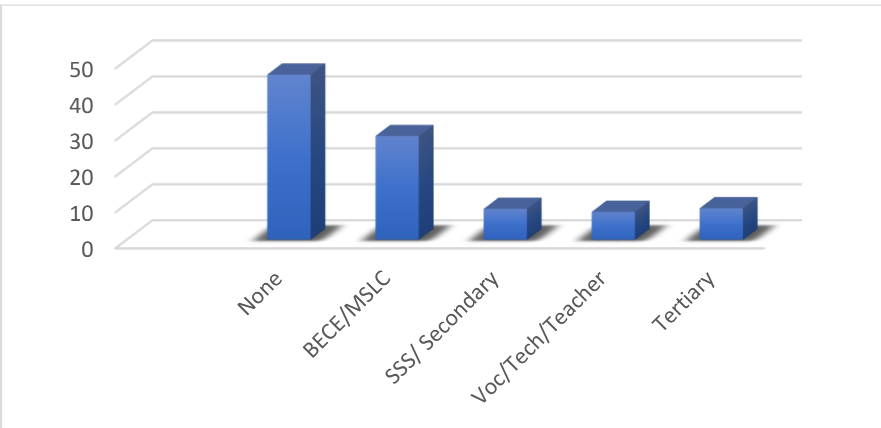
Source: Author (GLSS6&7)

Figure 2: Categories of Loan Use and Employment Status



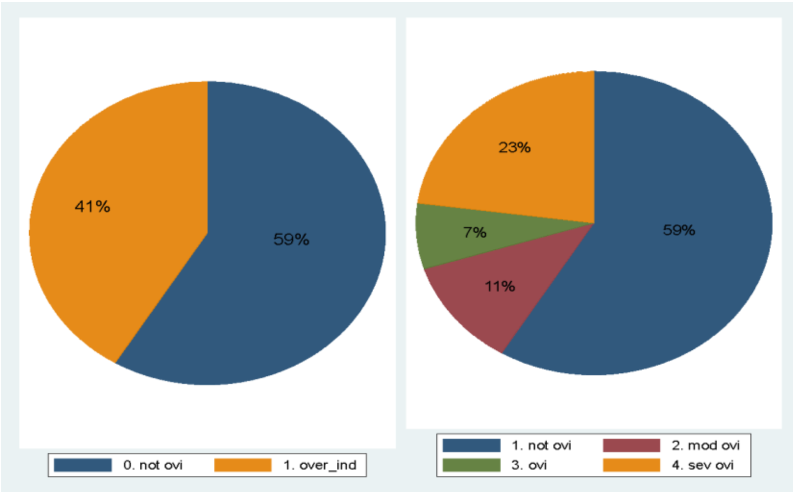
Source: Author (GLSS6&7)

Figure 3: Borrowers' Educational Background



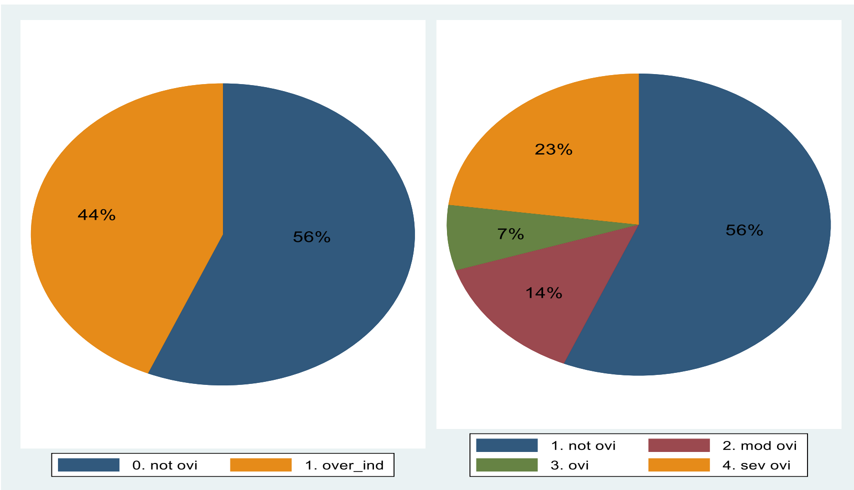
Source: Author (GLSS6&7)

Figure 4a: Prevalence and Intensity of Over-indebtedness



(Source: Author: GLSS 6&7

Figure 4b: Prevalence and Intensity of Over-Indebtedness – Residual Income Threshold



Source: Author (GLSS6&7)

Figure 5 – Threshold Derivation: The Opportunity Cost Approach

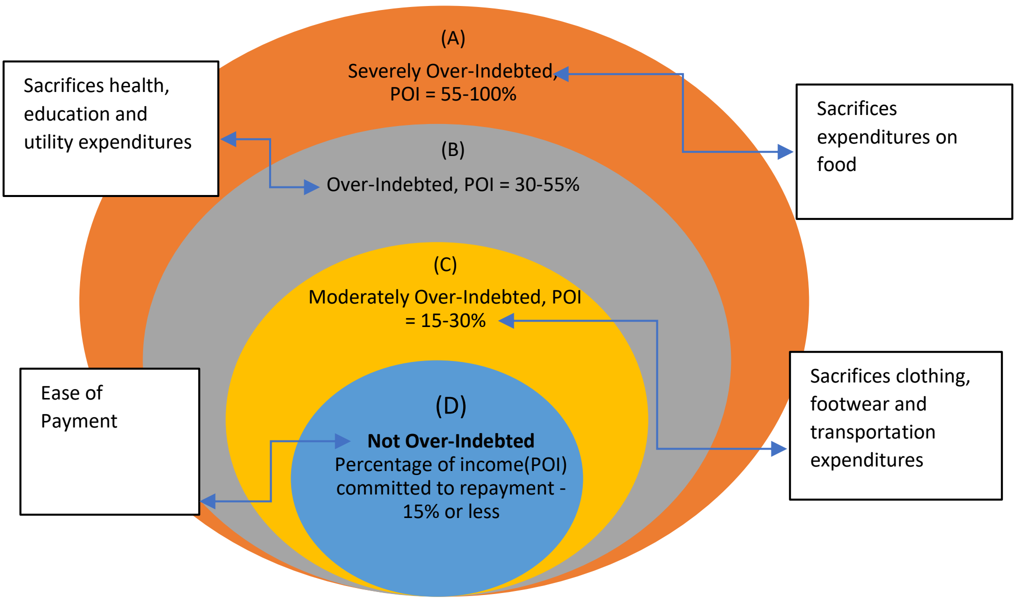


Figure 5: Objective cut-off points for the debt-service indicator

Source: Author

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