IMPACT OF MICROFINANCE ON GENDER INEQUALITY IN DEVELOPING COUNTRIES

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Abstract

This thesis studies the impact of microfinance on gender inequality by using a panel data analysis of 94 developing countries over the period 2000 to 2019. Gender Inequality Index (GII) was used as a proxy for female empowerment and gender inequality measurement. At the same time, microfinance intensity (MI) was derived by dividing the number of female active borrowers by the country's female population. A country-clustered fixed-effects model was conducted using the specific-to-general method to assess the relationship between GII and lagged value of MI. This macroeconomic analysis shows that increased access to microcredit reduces gender inequality. Microfinance takes time to impact gender equality positively, as evidenced by the negative association between GII and lagged value of microfinance intensity across all the econometric models. Analysis of the GII components shows that MI positively affects females' secondary education and political empowerment.

Keywords: Microcredit, women empowerment, cross-country analysis, and gender inequality.

JEL classification: A23, C33, J16, and O11

List of Abbreviations Used

Acronyms	Full form
ABR	Adolescent Birth Rate
AFR	Adolescent Fertility Rate
DAC	Development Assistance Committee
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
FI	Financial Institution
FISIM	Financial Intermediation Services Indirectly Measured
FSP	Female Share of Parliament
GDP	Gross Domestic Product
GII	Gender Inequality Index
ILO	International Labour Organisation
IMF	International Monetary Fund
ISCED	International Standard Classification of Education
ISIC	International Standard Industrial Classification
MFI	Microfinance Institutions
MI	Microfinance Intensity
MMR	Maternal Mortality Rate
ODA	Official Development Assistance
PFB	Proportion of Female Borrowers
PPP	Purchasing Power Parity
UNCTAD	United Nations Conference on Trade and Development
WGI	World Governance Indicators

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1. Introduction

Microcredit has been touted as the solution for the fragmented credit market in the developing world, especially for poor and marginalised people. For example, Mohammed Yunus and Grameen Bank's contribution to alleviating poverty through microcredit was deemed so significant that it won them the Nobel Peace Prize in 2006. In 2018, MFIs had a client base of 139.9 million borrowers. Of these, 80% are women, and 65% are rural borrowers ((Global Microfinance Figures: What Are the Trends? | Convergences, n.d.). The success of microcredit as a tool has popularised it among donor organisations, which then channel significant portions of their funds into different Non-Government Organisations (NGOs) with microfinance wings to combat poverty.

Initially, there was much enthusiasm for the microfinance program. Early evaluation studies showed significant promise of positive impact created by microfinance. Due to the early positive reports, Consultative Group to Assist the Poor (CGAP), an international organisation devoted to increasing financial inclusion, stated that microfinance assists in the eradication of poverty and hunger, increasing universal primary education, the promotion of gender equality and empowerment of women, and improvement of the health status of women and their children (Banerjee et al., 2015). CGAP is not alone in its optimism. Development organisations such as the World Bank and the International Labour Organisation support microfinance. Development Economist Jonathan Morduch once said, "Microfinance stands as one of the most promising and cost-effective tools in the fight against global poverty." However, in recent years, development practitioners and economists have viewed microfinance with scepticism following reports of indebtedness and suicide in India and other parts of the developing world. The scepticism was further exacerbated by the Randomised Control Trials (RCT) studies in India, Morocco, Mexico, Ethiopia and Mongolia, which showed that microfinance has a limited or adverse effect on poverty alleviation and gender equality.

As stated previously, microeconomic research from developing countries' national and societal levels suggests and refutes the claim that microfinance access reduces gender inequality. Given this ambiguous conclusion, this thesis reasoned that a macroeconomic strategy combining data

from different countries over a prolonged period might paint a clearer picture of microfinance's impact. Thus, this thesis uses panel data from 2000 to 2019 from developing countries to assess the relationship between the Gender Inequality Index (GII) and microfinance intensity (MI). Figures 1 to 5 show the relationship between GII and MI for five selected countries between 2000 to 2019 in different regions. Figure 1 to figure 5 show inverse relationships (i.e., GII has reduced over time, and MI has increased over time) between GII and MI for the given period for the selected countries. However, the results might not be extrapolated to other developing countries; hence it is important to look across countries.

Figure 1 Relationship between GII and MI in Benin
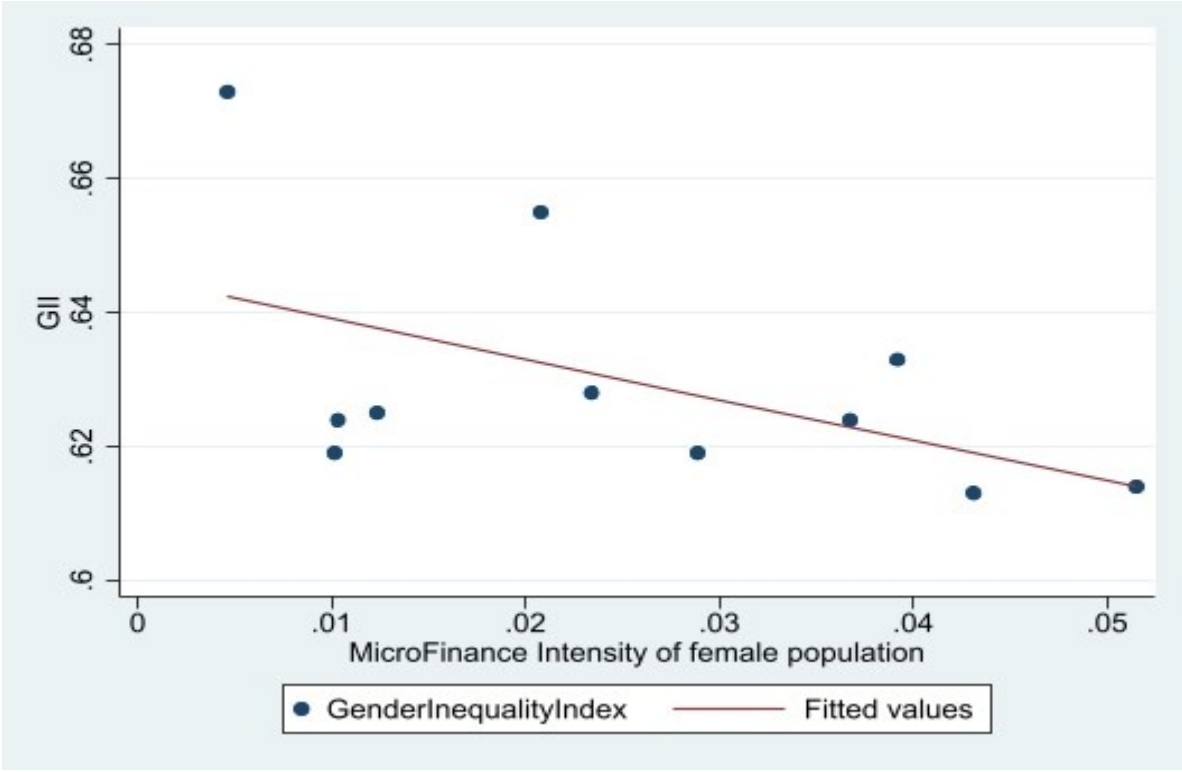
Note: GII data is collected from United Nations Development Programme Database (2022), and MI data is collected from Mix Market Database, World Bank (2022). The time period shown in the figure ranges from 2000 to 2019, with intervals because of a lack of data. Figure 1 shows that there is a negative linear association between GII and MI for Benin. The rest of the figures (figure 2-5) also indicated a negative linear association between the two variables for the selected countries.

Figure 2 Relationship between GII and MI in Armenia
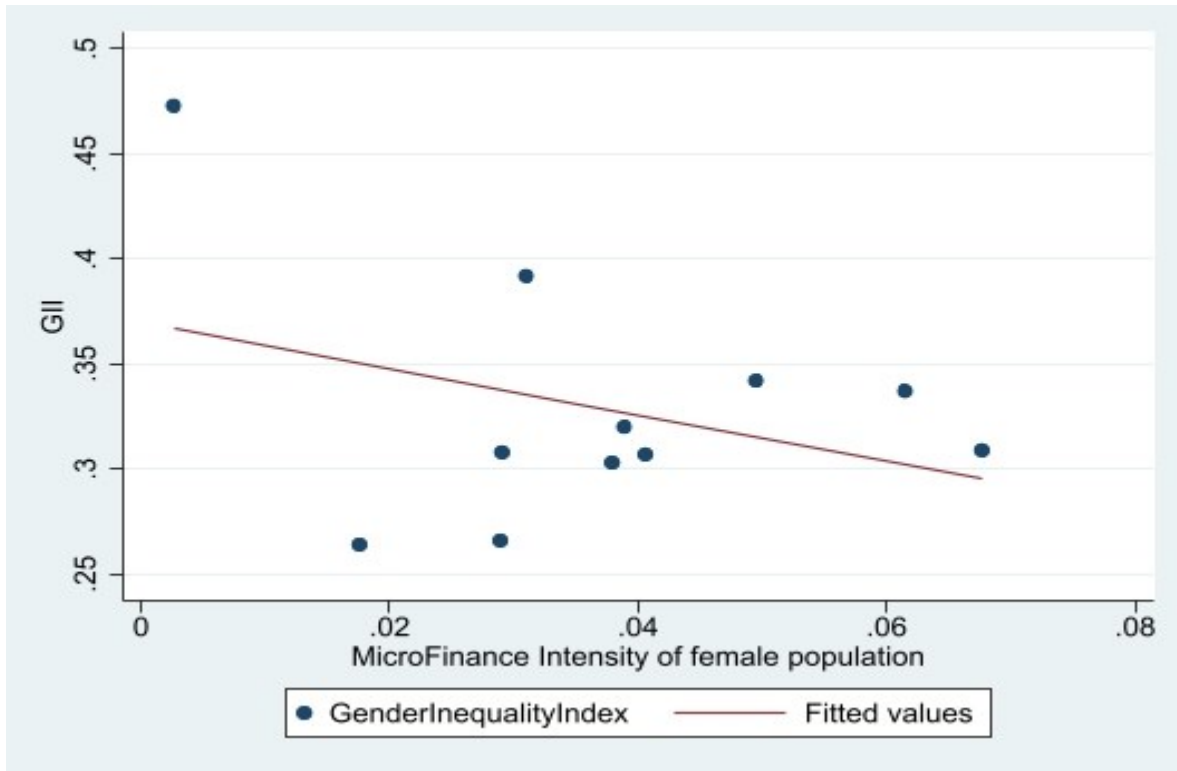
Figure 3 Relationship between GII and MI in Bolivia
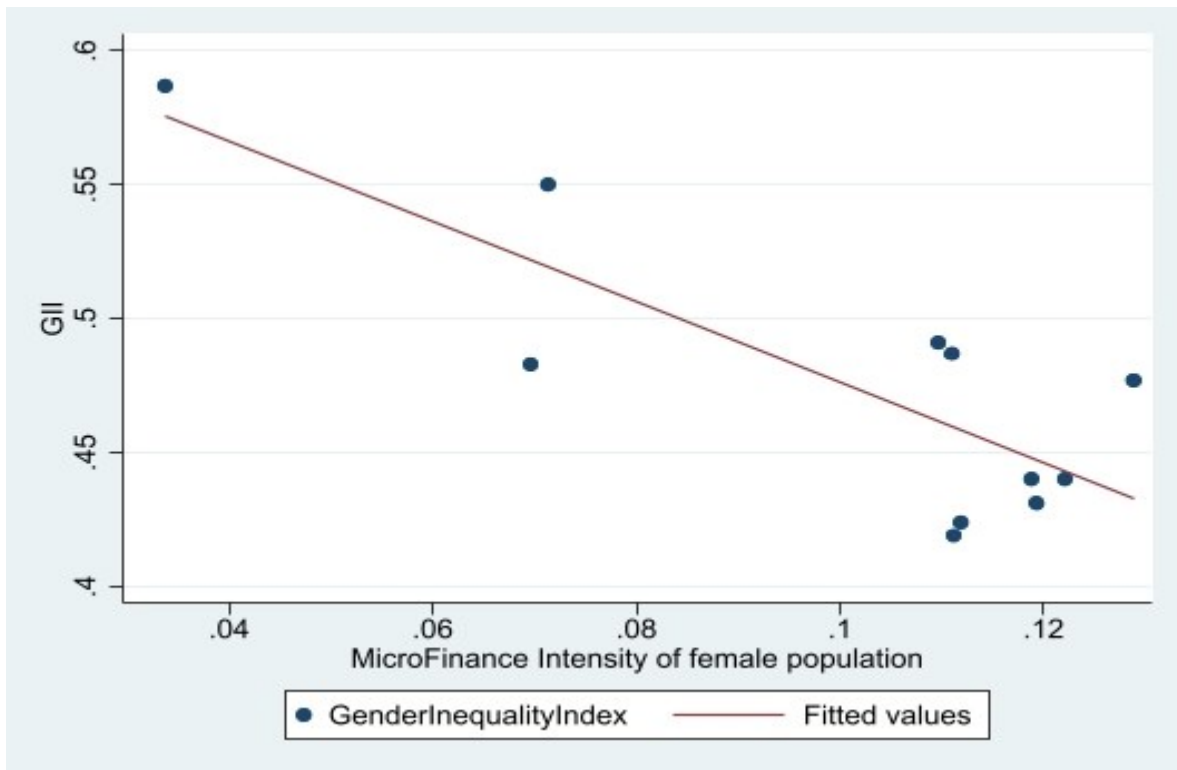
Figure 4 Relationship between GII and MI in Mexico
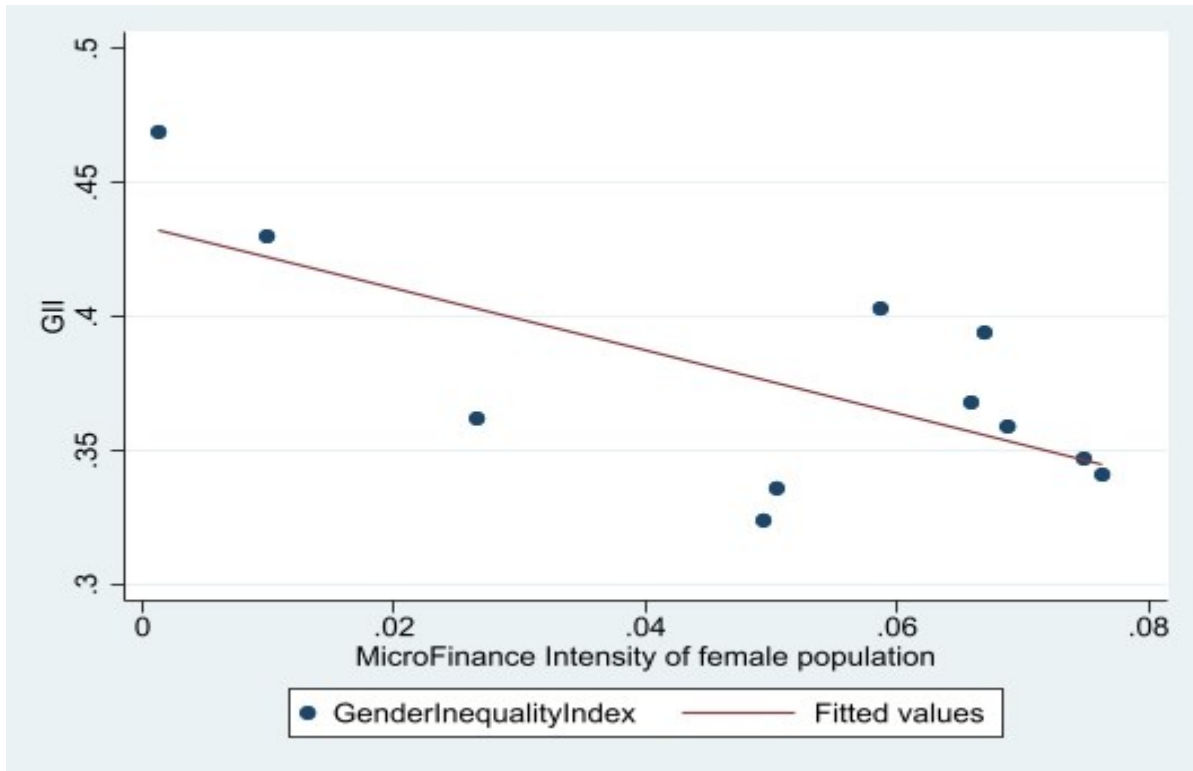
Figure 5 Relationship between GII and MI in Cambodia
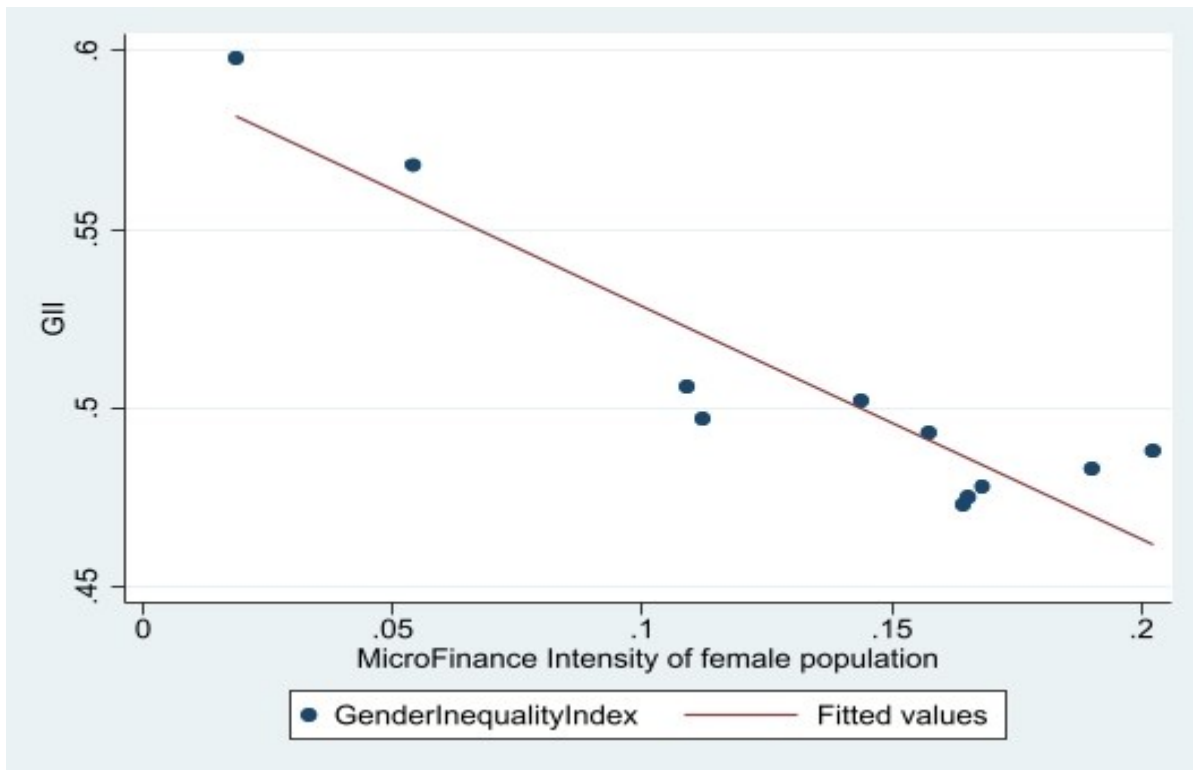
This thesis asks whether increased microfinance intensity (MI) reduces gender inequality in the selected developing countries from an aggregate perspective. As mentioned, GII is used as a proxy to capture women's empowerment and as an outcome variable. GII measures gender inequality, where a higher coefficient indicates a higher inequality and vice versa, i.e., a high coefficient indicates a significant gulf between men and females, where females are lagging. The data was analysed using panel data from 94 developing countries. The thesis uses a fixed effect approach to estimate the results while controlling for country-level standard errors. Results suggest that microfinance reduces gender inequality within a country. Microfinance, in particular, drives females' secondary education and political participation. Thus, the results indicate a long-term benefit of microfinance in increasing gender equality.

The remainder of the thesis's structure is as follows. The literature review provides a succinct summary of the key methodologies and findings of the impact evaluation of microcredit on women's empowerment in the literature. The subsequent section describes the data and methodology used in this thesis. The thesis then focuses on the results and discussion of the data analysis. Finally, the thesis concludes with the implication of the findings.

2. Literature review

There has been significant research on microfinance's impact on women's empowerment using different research methods in the past couple of decades. This section reviews some of the available literature on microfinance's impact on women's empowerment and discusses how this thesis will contribute to the existing debate regarding microfinance's impact on women's socioeconomic status. The first part of the literature review discusses the findings and methodology used in the numerous evaluation studies on microfinance and women's empowerment. Based on the literature, the latter part of the literature review discusses the motivation of this study.

2.1 A review of microcredit impact studies

The growth of microfinance has led to increased impact assessment studies of different microfinance programs. Different approaches were taken to evaluate microfinance's ability to reduce poverty or increase social welfare. These approaches are randomised control trials, quasi-experimental studies, and standard fixed-effect approaches. So far, the results of microfinance on women's empowerment or impact on women's social welfare have varied depending on the geography, indicators used, time frame and financial development of the country.

Some studies show a positive effect of microfinance on women's empowerment. Significant studies have been conducted in Bangladesh because of its microfinance presence. Bangladesh is the birthplace of Nobel prize-winning MFI, Grameen Bank. Bangladesh also has the highest number of NGOs per capita of any other developing country, making the country well-suited to analyse the impact of microfinance (Kabeer, 2010). In Bangladesh, impact assessment studies of microfinance show a positive causal relationship between microcredit and women empowerment indicators. Using observational data, Kellar et al. (2004) reported that when microfinance institutions (MFI) targeted women as the principal agents, gender roles and the household status of women changed in many households for the better. Even though the male members utilised the loans granted to women, the men acknowledged that their female partners were the principal agent in receiving the loans and thus empowered the female

borrowers in intra-household decision-making. Pitt et al. (2006) used a quasi-experimental approach to assess microfinance's impact on women's empowerment in different areas of Bangladesh. Their research reported that microcredit programs enabled female borrowers to participate more in household decision-making, have more freedom and mobility, have greater financial resources, and have more negotiating leverage with their spouses, empowering female borrowers. Debnath et al. (2019) found that microfinance moderately empowered women in Bangladesh's Jamalpur and Mymensingh districts. Another quasi-experimental study in Bangladesh covering Dinajpur, Tangail and Laksmipur districts showed that microcredit empowers women in all dimensions (Akhter and Cheng, 2020). Generally, in Bangladesh, microfinance positively affects women's empowerment outcomes, such as increasing intra-household bargaining power of women, access to economic assets and mobility.

Outside Bangladesh, other studies showed that microcredit program positively affects women's empowerment. Quasi-experimental research in five states of India, another country with a high rate of microfinance intensity, showed that microcredit programs have positively affected women's empowerment (Swain and Wallentin, 2009). Unlike prior studies, Swain and Wallentin (2009) argue that women's empowerment is an unobserved and latent variable. Authors argue that in studied areas of India, microcredit programs empower women by helping them to challenge the existing patriarchal norms and culture, thus achieving better socioeconomic status for themselves. Another study in West Bengal, India, by Debnayan and Sudipta (2010), showed that microcredit empowers long-term women borrowers (more than eight years). Compared to short-term borrowers, long-term women borrowers' attitudes and behaviours have changed, which has improved their capacity to handle issues, particularly those involving managing household assets, personal mobility, and the health of children and household members, thus empowering them. Berhane & Gardebroek (2011) used panel data from Northern Ethiopia to observe microfinance's impact on its clients. Findings in Northern Ethiopia show that microcredit has long-term benefits. Multiple-time borrowers fared better in household consumption and other welfare indicators than one-time borrowers. A microcredit program focusing on female clientele in Mongolia increased the well-being of its borrowers. Attanasio et al. (2015) used the RCT approach to assess the microcredit program's impact in

Mongolia among two different types of borrowers. The positive impact of microcredit was more profound among group loans compared to individual borrowers. The researchers found that growth in business enterprises was more in the treatment area relative to the control area, and there was increased food and total consumption among the treatment group, particularly members of the group borrowers. Dineen and Le (2015) conducted a longitudinal study in 2008 and 2012 on a sample of 50 microcredit recipients in Vietnam. Their research showed that an integrated approach, i.e., providing supportive training and microcredit, helped improve the women borrower's income and other empowerment indicators. Hence, the literature cited in this paragraph shows that microfinance positively impacts women's empowerment in the long run and when provided as a group.

Numerous other studies, mainly RCT studies, have found that microfinance has either a negative or negligible impact on women's empowerment and poverty alleviation. Banerjee et al.'s (2015) RCT evaluation of Spandana's program showed no significant impact of microfinance on women's empowerment in the short or long run. The outcome variables for social effect and most consumption indicators did not show statistical significance. Albeit, the consumption of durable goods was significant and positively affected microfinance accessibility. The study also showed that the consumption of festive goods and temptation goods was negatively related and significant to microfinance accessibility, indicating that microfinance installed greater discipline among the borrowers. The number of female-led enterprises also increased, although the profit increase was insignificant. Another RCT study in Bosnia and Herzegovina by Augsburg et al. (2015) found a positive and statistically significant but limited increase in household income, savings and consumption. Although Augsburg et al. (2015) did not consider women empowerment indicators as outcome variables, it can be stated that there was limited positive impact on women's empowerment because of the decline in consumption expenditures (except for durable goods) and savings among the households. The social effect indicators do not show any positive impact either, as the results show a decrease in teen schooling and no change in stress levels, but the results do not show statistical significance. However, Augsburg et al. (2015) also show that microfinance accessibility increased self-employment and the number of hours invested in their own firm, and the latter variable was

statistically significant. Angelucci et al. (2015) conducted a clustered RCT study in Mexico through over 16,000 household surveys where the participants were primarily female entrepreneurs. Survey findings show that access to credit has positive and significant, albeit limited, effects on a few aspects of subjective well-being, such as happiness and trust in others. The study in Mexico did not find any statistically significant increase in the treatment group's household income, weekly expenditure or labour supply compared to the control group. However, the study in Mexico finds a small but statistically significant increase in women's intrahousehold decision-making prowess and reduction in stress. Similarly, Crépon et al. (2015) found no increase in consumption or income after access to microcredit despite increased investment in self-employed businesses. Crépon el at. (2015) used the health and education status of the females in the household to capture the empowerment condition of the women. The study's results showed no statistically significant positive impact on the female empowerment indicators. An RCT-based study in Ethiopia's Amhara and Oromiya areas showed a minimal but positive and significant effect of microfinance on household income, education and gender empowerment of women based on household decision-making (Tarozzi et al., 2015). Only five show significant results out of the forty outcome variables Tarozzi et al. (2015) analysed. The positive effect of microfinance was observed through the growth of on-farm activities, increased hours in self-employment and schooling for teens. However, microfinance was positively associated with increased food insecurity, but the authors noted that the relationship could be spurious because of how the outcome variable was measured. Goldszmidt et al. (2021) conducted a large-scale microcredit impact assessment in Brazil using observational data covering 16 MFIs. In line with most RCT studies, Goldszmidt et al. (2021) did not find significant positive effects of microcredit on their borrowers, either in the short or long run. So far, RCT-based studies show that there is evidence of microfinance having a positive and significant impact on women's empowerment, but the estimates are small, and many socio-effects indicators are not affected significantly.

Apart from RCT papers, research using other econometric methods also showed a negligible effect of microfinance on women's empowerment. In a systemic review with a holistic view of evidence (considering non-trial impact studies and qualitative reports, and indicators outside

income-related variables) in the sub-Saharan Africa context, Stewart et al. (2010) stated that there is some evidence of the empowering effects of microcredit but that the evidence is inconsistent among the literature. Stewart et al. (2010) note that while microcredit can improve some female borrowers' health status, evidence also shows that the educational status of their children decreases. There is also no significant progress in household income or social cohesion. Moreover, microcredit may lead to further debt and exacerbate their already fragile economic conditions depending on external factors such as the expenditure pattern of the microcredit. Therefore, Stewart et al. (2010) deduce that microcredit does not significantly elevate women's empowerment. Vaessen et al. (2014) performed a meta-analysis of the quantitative papers on developing countries to assess the impact of microfinance on women's empowerment by assessing women's control over household spending. The researchers did not find any significant effect of microcredit on women's empowerment in the RCT studies. Regarding quasi-experimental and cross-sectional studies, the authors noted that some of these studies have a high risk of bias and showed significant heterogeneity (Vaessen et al., 2014; Banerjee et al., 2015). After addressing these issues, the researchers did not find any significant effect of microfinance on women's empowerment through increased borrower spending.

Nevertheless, most literature suggests a few positive impacts of microcredit on women's empowerment indicators. Access to microcredit has increased women's physical and social mobility. To access finance, women borrowers must attend the MFI meetings or loan group meetings. Consequently, they can communicate with more social institutions and have increased physical mobility. With increased access to economic resources and production facilities, some women also enjoyed elevated social status and bargaining power within their households and communities. Although RCT studies noted that the microfinance beneficiaries do not report increased household income or consumption, they report studies where microfinance led to business expansion and investments, particularly among women-led enterprises. With time, these entrepreneurs will likely gain more experience and network, which can cause transformative effects. Although, some of the studies did not see any transformative effect within a few years of receiving the loan (Angelucci et al., 2015; Tarozzi et al., 2015; Banerjee et al., 2015). Other studies indicate that a prolonged period of activity is

needed for a positive impact to be generated (Debnayan and Sudipta, 2010; Berhane and Gardebroek, 2011; Khandaker and Samad, 2014)

Up to now, the literature on microfinance's impact on women's empowerment has been mixed. RCT studies have been considered the gold standard trial for evaluating the effectiveness of interventions because of their unbiased estimates and strong internal validity. However, RCT studies may lack external validity (Deaton and Cartwright, 2018). The external validity issues can be because of cultural, political or other unobserved endogenous factors (Amin et al., 1998; Swain and Wallentin, 2009; Angelucci et al., 2015). For example, Amin et al. (1998) noted that Bangladesh's central and northern regions made more progress in the women empowerment index than the northeastern or southern regions, likely due to less Islamic influence in the former regions. Without accounting for endogenous factors such as religious influence, RCT's external validity is undermined. Another reason for the conflicting finding is the time frame of the studies conducted. RCT evaluation studies are often short-term evaluations (Khandaker and Samad, 2014). Some of the literature suggests that it takes time for microfinance to empower borrowers and for the positive effects to materialise (Debnayan and Sudipta, 2010; Berhane and Gardebroek, 2011; Khandaker and Samad, 2014). Therefore, differences in area coverage and time frames of the studies can cause the results of the studies to differ.

The findings in the literature are also inconsistent because of the varying definitions and metrics of empowerment used in each of the papers (Dineen and Le, 2015). Whilst some studies measured women's empowerment through changes in household consumption or income (Stewart et al., 2010; Vaessen et al., 2014, Crépon et at., 2015; Attanasio et al., 2015 and Banerjee et al., 2015), other studies considered empowerment to be multifaceted and measured empowerment across multiple dimensions(Pitt et al., 2005; Kabeer et al., 2010; Berhane & Gardebroek, 2011; Dineen and Le, 2015; Debnath et al., 2019; Akhter and Cheng, 2020). For example, Debnath et al. (2019) and Akhter and Cheng's (2020) empowerment index comprises financial assets, improved mobility, independent purchasing power, living standard, intrahousehold financial and social decision-making power, and legal awareness. Dieen and Le's (2016) empowerment questions revolved around women's autonomy and authority at home, domestic violence, and dignity. Banerjee et al. (2015) developed an empowerment index by

weighting women's expenditure on food, home durables, education, ornamentation, health, teenage girls' and teenage boys' school enrolment, and counts of female children under one year and one to two years old. Tarozzi et al. (2015) measured women's empowerment using an index based on female intra-household decision-making involvement, ranging from children's health and education to contraceptive use, savings and the woman's involvement in the labour market. Both Swain and Wallentin (2009) and Vaessen et al. (2014) used household spending on durable and non-durable goods (healthcare, education, etc.) to capture women's empowerment. Pitt et al. (2006) used ten thematic areas to understand microfinance's impact on women's empowerment. These thematic areas are purchasing power, access to economic resources, financial independence, transaction management, activism, household attitude, husband's attitude, fertility and parenting and a combination of all the variables. Berhane and Gardebroek (2011) used only household consumption and the probability of improving housing to measure the welfare of their female borrowers. The examples show how the indicators to measure women's empowerment vary across studies. Even the questions to capture the same indicator might differ across the studies. While some studies focus on household expenditure or economic power, others focus on social mobility and capital, intra-household bargaining power, economic access and means to measure empowerment. The results might differ based on the indicators used and how the index is calculated.

Another reason that contributes to external validity issues is the type of microfinance institution studied and the clients' services (Swain, & Wallentin, F. Y., 2009; Kabeer et al., 2010). For example, Kabeer et al. (2010) examined six MFIs that offered different services to their clients in Bangladesh. Their study showed that microcredit's impact was lowest among minimalist MFIs' (MFIs that offer only microfinance). Empowerment indices were higher among MFI clients who also had access to awareness, business training, and microcredit facilities. Hence, the literature indicates that the type of service provided by the MFIs could also influence the gender inequality gap.

To conclude, the results in the literature vary on women's empowerment because of the differing econometric methods, indicators, and time frames used in the impact evaluation of

MFI programs. The type of MFIs studied also affects the outcomes as the intervention strategies of the MFI vary, resulting in opportunities faced by the beneficiaries.

2.2 Motivation

Due to the stated reasons above, the findings on microfinance's impact on women's empowerment have been inconclusive. The differences in opinions from micro studies have motivated the current study to understand the impact of microfinance using aggregate cross-country data over long periods. A cross-country comparison over a more extended time period looks at the effect of microfinance from a broader spectrum to address the external validity issues cited in the literature using a randomised/micro approach. The extensive period of time studied will also validate some of the statements in the literature about microcredit programs having positive effects in the very long run (Debnayan and Sudipta, 2010; Berhane and Gardebroek, 2011; Khandaker and Samad, 2014).

Microcredit programs may operate in areas where the population is already empowered through unobserved characteristics such as better entrepreneurship skills, motivation, etc., causing simultaneity bias. Micro-evaluation studies using cross-sectional or longitudinal data can also be subject to biased estimates because of self-selection and program placement problems (Berhane and Gardebroek, 2011). Berhane and Gardebroek (2011) also noted that one of the ways the literature addressed the bias issue was by using panel data. It is possible to provide a consistent estimate and eliminate bias by differencing out unobserved and time-invariant individual and regional effects, assuming that time-invariant heterogeneity is the only cause of bias (Wooldridge (2002: 637), as cited in Berhane and Gardebroek, 2011). Therefore, this thesis utilises panel fixed effect regression to check microfinance's long-term and overall effect on women empowerment in developing countries.

Thus far, the focus in the literature review has been on micro studies to assess the causal inference between microcredit and women's empowerment, with different studies using micro indicators to capture women's empowerment status. Macroeconomic indicators have also been used to measure the impact of microcredit. Zhang and Posso (2017) estimated the relationship between women's participation in microfinance and gender inequality using panel data for 64

developing nations from 2003–2014 and found a negative association between the gender inequality index and microcredit participation. This thesis expands on Zhang and Posso's (2017) paper by introducing additional control variables that can significantly affect GII. Therefore, the model and estimates would be more precise. Zhang and Posso's (2017) model was limited to the democracy index of the countries, Gross National Income (GNI) per capita and country regions. This thesis included the government's expenditure on social welfare, the share of economic sectors, the effect of international trade, and the share of the rural population within a country. The rationale behind including these variables is elaborated in section 3.4 Control variables. Unlike Zhang and Posso (2017), this thesis takes steps to circumvent simultaneity bias. The process is explained in section 4. Endogeneity between GII and MI can lead to biased estimates.

Furthermore, the literature is limited in understanding the pathways of microfinance's impact on women's empowerment, specifically from a macroeconomic point of view. This thesis contributes to the gap by analysing the components of the gender inequality index and understanding which components are affected by microfinance and drive the GII coefficients, which can inform policymakers which areas to prioritise to improve gender inequality.

3. Data

3.1 Source and sampling

This thesis examines the effect of microfinance on the gender inequality index using panel data. The dependent variable for this research is GII, and the key independent variable of interest is the microfinance intensity of female borrowers. The data to determine microfinance intensity is collected from the MIX Market Database (World Bank, 2022). The data covers the period from 2000 to 2019. Data availability of GII starts from 1995 and is available for the years 2000, 2005 and 2010-2019. There is no MIX Market Data for 1995, but it is available from 1999 to 2019. Therefore, the period 2000 to 2019 is selected from this study.

The thesis focuses on developing countries where gender inequality differs vastly. Furthermore, relative to developed countries, there are more MFI activities in developing countries because of the commitment of the Development Assistance Committee (DAC) countries. Additionally, many developing countries were not included in this study due to data limitations or missing observations. Hence, the final model is estimated with 94 countries, 40 upper-middle-income, 34 lower-middle-income and 20 low-income countries, based on the World Bank (2022) classification.

3.2 Outcome Variables

3.2.1 Gender Inequality Index

The dependent variable for this thesis is Gender Inequality Index. GII measures gender inequalities in three important aspects of human development - reproductive health, empowerment and economic status. GII demonstrates the disparity between male and female accomplishments in stated fields. UNDP (2022) describes GII: "The scale goes from 0, when men and women perform equally, to 1, where one gender performs as poorly as possible across the board. The association-sensitive inequality measure proposed by Seth (2009) calculates GII values, which implies that the index is based on the general mean of different orders. A geometric mean across dimensions first aggregates these means, then aggregates them using a harmonic mean across genders. " Briefly, GII measures gender inequality within a country by comparing male and female achievement in the three dimensions stated above. The geometric

mean of each dimension is calculated for each gender. Afterwards, the geometric mean of each dimension comprising both genders is aggregated using a harmonic mean. The detailed methodology of GII has elaborated in Appendix: GII calculation. A score of 1 indicates significant inequality, and a score of 0 indicates no gender inequality. Based on literature and prior human history, females are often the disadvantaged gender, and high inequality suggests that the female gender lags in socioeconomic outcomes.

Gender Inequality Index comprises three-dimension indices as mentioned above, and the indicators used to measure them are the following:

i)   Female Reproductive Index

Indicators to calculate this index are: Maternal mortality ratio (deaths per 100,000 live births) and Adolescent birth rate (births per 1,000 women ages 15–19)

ii)   Empowerment Index

Indicators to calculate this index are the population with at least some secondary education (% ages 25 and older) and the share of seats in parliament by each gender

iii)   Economic Index

The indicator to calculate this index is: Labour force participation rate (% ages 15 and older) of male and female genders

 According to UNDP (2022), there are five steps in GII calculation using the above indicators. The data shows a wide range of GII distribution over the last twenty years. The distribution is centralised between 0.4 to 0.6, indicating moderating gender inequality. Tables 1 and 2 show that European and Central Asian countries have lower gender inequality than other regions. Countries with high gender inequality, i.e., over 0.7, for example, Haiti and Yemen, belong to low-income countries.

Figure 6 GII across time shows the distribution of mean values GII across time, and the graph shows a downward trend over the last two decades. In other words, the average value of GII across the countries has decreased over time, both within and between countries, indicating increased gender equality over time across the selected countries. However, exceptions exist to

this phenomenon, such as Papua New Guinea, which experienced increased GI in the late 2010s.

Table 1 GII distribution by regions and income classifications

VARIABLES	East Asia and Pacific		Europe and Central Asia		Latin America and Caribbean		Middle East and North Africa		South Asia		Sub Saharan Africa	
	N	mean	N	mean	N	mean	N	mean	N	mean	N	mean
Gender Inequality Index	150	0.415	197	0.275	234	0.450	88	0.516	84	0.510	298	0.592
	Low-Income Countries			**Lower Middle-Income Countries**			**Upper Middle-Income Countries**					
	N		mean	N		mean	N		mean			
	217		0.621	395		0.477	439		0.372			

Notes: GII = Gender Inequality Index. GII data is taken from 2000, 2005 and 2010 to 2019. Regional and income classification is adopted from World Bank's definition and data estimates. N shows the number of observations in each category.

Mean values (2000-2019)

Figure 6 GII across time
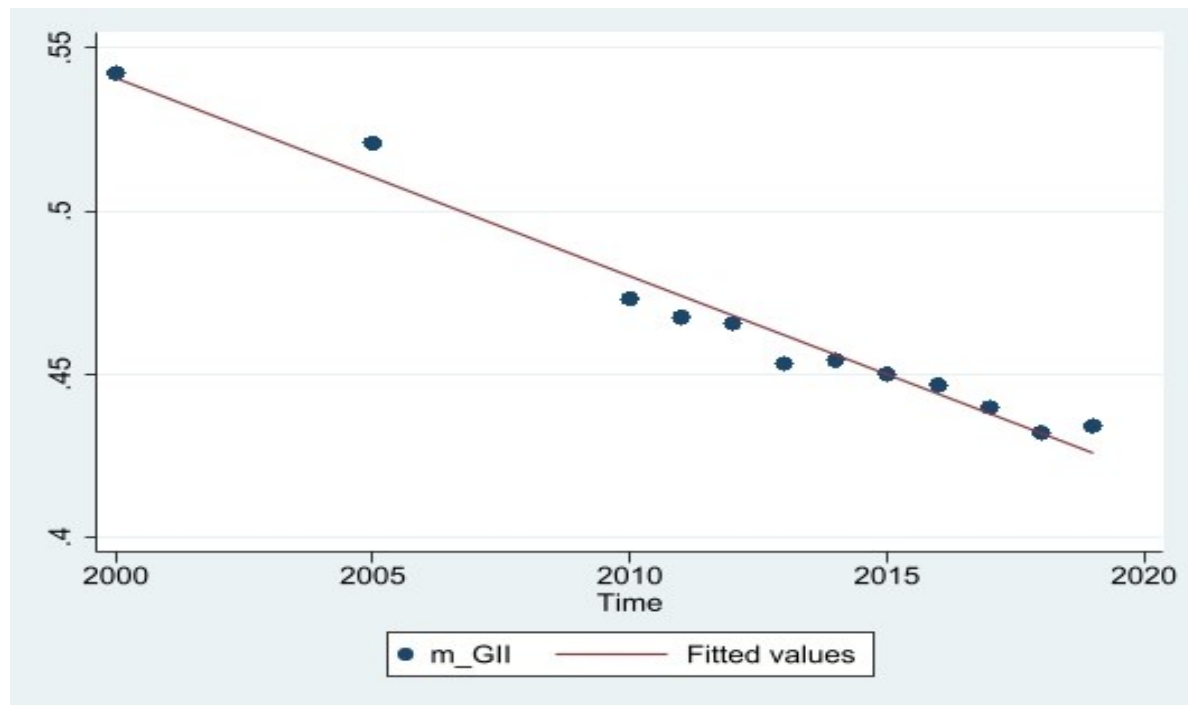
Note: The figure shows the mean value of GII of all the selected developing countries in each of the last 20 years. Overall, there is a decreasing trend of GII on an average

This thesis also analysed the components of GII to evaluate what drives the GII components in the assessed countries. The focus is on the female side of the components, as this thesis aims to assess whether microfinance positively impacts the socioeconomic status of women. Equation 1 (elaborated in the Methodology section) measures microfinance's impact on the GII components. Instead of Gender Inequality Index, GII components are used as the outcome or dependent variables. The components are:

i)   Maternal mortality ratio (MMR)

ii)   Adolescent fertility rate (AFR)

iii)   Female population with at least secondary education (FSE)

iv)   Female share of parliament (FSP)

v)   Female Labour Force Participation Rate (FLP)

3.2.2 Maternal mortality ratio

One of the many Sustainable Development Goal (SDG) goals is to ensure that the global maternal mortality ratio is less than 70 per 100,000 live births. UNDP (2022) defines MMR as "the number of maternal deaths during a given time period per 100,000 live births during the same time period." Microfinance improves health by targeting women, who are more likely to utilise any additional financial gain in medical emergencies. Furthermore, increased household income should increase financial expenses on non-durable consumptions such as medicines and doctor consultations. Finally, many MFIs have conjointly begun to supply health-related services and health education, healthcare financing, clinical care, coaching community health workers, health micro-insurance and linkages to public and personal health providers (Posso and Athukorala, 2017). Therefore, if MI does have a positive impact on MMR, then they would have an inverse relationship as decreasing MMR means better health outcomes for the women and improved health conditions.

3.2.3 Adolescent birth rate

UNDP (2022) defines the adolescent birth rate as "the annual number of births to women 15 to 19 years of age per 1,000 women in that age group. It is also referred to as the age-specific fertility rate for women aged 15-19." In other words, it determines what portion of young females out of 1000 are giving birth. If the indicator is low, it expresses a positive outcome. It is widely assumed that when women give birth later, they have more time and opportunities to develop themselves by educating themselves and increasing their social mobility. Women having children at a young age restricts their access to social institutions as they now have to devote time to their offspring. So, delaying having children should have a positive impact on women. If MI has a positive impact, then ABR, like MMR, should have a negative association with the key regressor.

3.2.4 Female population with at least secondary education

Education of girls, particularly at the higher levels, is crucial in promoting female empowerment and alleviating inequality (both gender and income). The reason is that educated girls are more likely to lead healthy lives and are less likely to marry early. They create better futures for themselves and their family, earn higher wages, take informed decisions regarding their health

and civil rights and have more intrahousehold decision-making prowess. Investing in girls' education can also spill over to male students (Hasan, 2010; Ricardo et al., 2021). When girls' enrolment increases due to educational programme incentives, it compels some parents to send their younger sons to school as well, increasing the enrolment of boys in the learning system. Furthermore, the competitiveness within the class increases, stimulating some of the male students to spend more on their education. Therefore, if MI affects positively, FSE should be positively associated, meaning that if microfinance activities increase in a country, then more female residents should attain their secondary education.

3.2.5 Female share of the parliament

Women in decision-making positions improve their position in their households and society and support the socioeconomic status of other women in their jurisdiction. Chattopadhyay and Duflo (2004), in their study of female seat reservation in the political arena in West Bengal and Rajasthan, saw that women political leaders prioritise the infrastructure developments made by female voters in their constituency. Consequently, women would have better access to social and public institutions that are of utmost importance to women, for example, better water supply.

3.2.6 Female labour force participation rate (FLP)

The primary goal of microfinance is to enhance women's empowerment by giving them financial access that formal commercial banks do not usually provide. Female borrowers can then use this finance to develop or improve their businesses, earn higher profit margins and improve their social and economic status by joining the labour force. Female entrepreneurs in developing countries also tend to hire female workers, signalling increased female labour force participation. Again, if MI positively impacts female labour market participation, it should be positively related.

3.3 Key explanatory variable

The key explanatory variable in this thesis is microfinance intensity for female borrowers (MI). Past studies have used different methods to determine microfinance's impact. Bangoura et al. (2016) measured the microfinance intensity through two channels; the number of active

borrowers divided by the country's total population and the total volume of loans divided by the GDP per capita of the country. Miled et al. (2022) used a microcredit gross loan portfolio divided by the country's total population to determine the extent of microfinance's impact in the evaluated countries. Zhang and Posso (2017) also used the proportion of women borrowers in microfinance as their key independent variable to assess the causality between gender inequality and microfinance impact.

In this thesis, the microfinance intensity is measured by taking the number of active female borrowers and dividing it by the country's female population in a year. The focus is to evaluate whether more female microfinance members lead to decreased gender inequality, assuming females are the disadvantaged gender. The following equation is a deviation of the microfinance intensity measurement used by Bangoura et al. (2016) and focuses primarily on the female citizens of a country.

MI = $\frac{N_{it}}{POPF_{it}}$, where N is the number of active female borrowers within a country (i) for a given year (t) and POPF is the total number of female populations.

A higher MI indicates that a higher proportion of the country's female population participates in MFIs. Thus, the contribution of MFI is substantial in that country. For example, in 2016, Bangladesh had a MI score of 0.28, and Cambodia had a MI of 0.17. It means that 28% of Bangladesh's female population is part of MFI programs, and thus MFIs have a higher coverage or intensity in Bangladesh than in Cambodia. Additionally, the MFI in Bangladesh increased to 0.31 in 2017, indicating a higher presence of MFI in Bangladesh. The hypothesis is that MFI positively impacts gender development; in that case, an increase in MI should reduce GII.

3.4 Control variables

In addition to the microfinance intensity, this thesis also analyses how the proportion of female borrowers (PFB) relative to male borrowers affects GII. PFB is calculated by dividing the active number of female MFI borrowers by the active number of male MFI borrowers. It is expected that a higher ratio of female to male borrowers would improve women's social mobility and cohesion. Consequently, gender inequality would reduce as more female members of society

are getting more opportunities relative to male members. The correlation matrix below shows a highly positive relationship between MI and the lag of MI, which was expected. There is almost no relationship between MI/lag of MI and PFB. Hence, both lag of MI and PFB is included in this thesis's econometric model.

Table 2 Correlation matrix between MI and PFB

	GII	MI	Lag of MI	PFB
GII	1			
MI	-0.1609	1		
Lag of MI	-0.1631	0.9186	1	
PFB	-0.0002	0.0141	0.0139	1

Note: GII = Gender Inequality Index; MI = Microfinance Intensity; PFB = Proportion of female borrowers. The data for number of female and male borrowers is taken from Mix Market Database, World Bank (2022).

Other control variables considered in the econometric model are the structure of the economy. It is assumed that when the economic structure changes, particularly from agriculture to manufacturing industries, it causes an increase in labour demand and open space for mass unskilled labour jobs in manufacturing, and this causes an increase in female employment. Foreign Direct Investment and trade openness also have a similar effect on the development of new industries and job creation. Foreign direct investment can alter individual preferences, perspectives on new forms of employment and workers' rights, and discrimination levels. Therefore, FDI net inflow is considered in this model as well. Correspondingly, the proportion of the population in rural areas can also determine women's empowerment. Traditionally, in developing countries, there are more strict social norms for women to follow, restricting their mobility and contribution to household decisions. At the same time, women in urban areas are considered to have more empowerment as they have access to more amenities and employment opportunities. Hence, change in the urban-rural dynamics is also considered in this equation.

Government investment in health and education also affects females' position through knowledge transfer and health outcomes. Access to education means that female citizens are more educated and make more informed decisions. Better healthcare facilities also result in longer life expectancy, lower pregnancy rates and mortality for females.

GDP per capita in purchasing power parity is also considered as a control l variable. As shown above, higher-income countries tend to have lower GII. Increased average income for each person indicates that they have more resources to spend on social goods such as education, healthcare and security. Additionally, relatively higher-income economies have more diverse and advanced markets that improve women's employment prospects and positions of influence.

It is widely believed that government policies could affect the social structure as they can generate the conditions for equal access to opportunities or promote equity. As stated in the literature, most prior studies on women's empowerment were assessed using microdata on a small scale. However, macroeconomic policies can also affect gender inequality, as stated by Heintz and Glyn (2015). They discussed the need to analyse the effects of public spending, tax, and monetary policy on gender equality. Hence, the government's expenditure on education, total (% of GDP) and current health expenditure (% of GDP), general government final consumption expenditure, and governance indicators are used to evaluate the macroeconomic policies.

Bangoura et al. (2016) explained the use of considering arable land, the proportion of the rural population, inflation, and government expenditure on health and education in the econometric model used to evaluate the effect of microfinance on income inequality. The same rationale can be used to assess gender inequality as well. Kim and Kim (2014) also highlighted that increased accessibility to healthcare and attainment of secondary education have a latent but positive effect on female health outcomes, thus reducing gender inequality. An increase in gross domestic product per capita, trade, and foreign direct investment substantially lowered the gender inequality index in eight ASEAN countries, according to Sangaji et al. (2018). Instead of the GDP per capita used by Bangoura et al. (2016), this thesis used the GDP per capita (PPP) as

the latter indicator that captures the purchasing power and, ultimately, the living standards more precisely. Based on the literature and rationale above, this thesis uses the regressors shown in Table 4. Table 4 shows the descriptive statistics for variables used in this study. Missing observations explain the lower number of observations in some variables. For example, there is no GII for the years between (2001-2004 and 2006-2009). Additionally, many of these missing variables are often countries from lower income levels, skewing the data towards relatively higher-income nations.

Table 3 Descriptive statistics

VARIABLES	N	mean	Sd	min	max
Gender Inequality Index	1,051	0.46	0.146	0.109	0.819
Microfinance intensity	1,448	0.02	0.04	0	0.31
Proportion of female to male borrower ratio	1,408	11.59	83.44	.0002	1,692
Size of agriculture as a share of GDP	1,855	16.72	11.87	1.927	79.04
Size of manufacturing as a share of GDP	1,757	12.64	5.97	0.233	32.45
Size of service as a share of GDP	1,827	48.65	10.07	10.86	78.90
Size of industry and construction as a share of GDP	1,851	26.67	10.36	3.243	84.80
Government expenditure on education(% of GDP)	1,271	4.042	1.56	0.622	10.65
Trade (% of GDP)	1,736	75.13	34.10	1.219	220.4
Domestic general government health expenditure (% of GDP)	1,842	2.29	1.40	0.062	7.012

VARIABLES	N	mean	Sd	min	max
Gender Inequality Index	1,051	0.46	0.146	0.109	0.819
GDP per capita (PPP)	1,838	8,045	6,156	630.7	31,440
Foreign direct investment net inflow (% of GDP)	1,853	4.214	6.524	-37.17	103.3
General government final consumption (% of GDP)	1,685	13.96	4.550	2.047	29.94
Gross domestic savings (% of GDP)	1,702	16.07	15.19	-40.81	74.62
Rural population (% of total population)	1,880	52.22	19.99	8.009	91.75

Notes: The data for these variables, except Gender Inequality Index, are taken from World Development Indicators, World Bank (2022). Gender Inequality Index data is taken from HDR, UNDP (2022) database. The source and calculation methodology for each of these variables is explained in detail in the appendix.

4. Methodology

The following equation estimates the impact of MI on GII. The data is initially analysed using a fixed effect model, i.e., controlling for time-invariant characteristics unique to a specific country.

$$GII_{it} = \beta_0 + \beta_{1it}MI_{-1it} + \beta_2 X_{2it} + \varepsilon_{it} \text{----------} 1^1$$

GII_t is the primary dependent variable, the gender inequality index described above. The "i" subscript indicates countries, and "t" represents the years. There is a possibility of endogeneity between GII and other regressors, particularly in the cases of simultaneity bias, resulting in biased and inconsistent estimators. Hence, to avoid simultaneity bias, this thesis introduces lagged value of microfinance intensity measured MI_{-1} to capture the causality between microfinance intensity and the gender inequality index. The rationale is that providing loans to women in the current period enables women to invest in different areas. Investments take time to bear fruit; for example, economic profit/income will be generated in the next period, their socioeconomic status will improve, and their political participation will increase after exposure to social mobility and awareness training. In line with the literature, the econometric model in this thesis introduces further regressors that are measured through X_{it}. The rationale behind adding each regressor is discussed in section 3. Standard errors are clustered by country to address time-correlated errors and heteroscedasticity concerns.

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[1] Ramsey RESET tests shows the model is specified as the hypothesis of specified model cannot be rejected

5. Results

5.1 Regression Estimates

The regression employs a specific-to-general method approach, i.e., the econometric model adds a relevant regressor or a set of regressors to assess the statistical significance and relationship between MI and the GII. Furthermore, this approach enables this thesis to show how each set of regressors can influence the coefficients and the direction of change. Table 4 shows the estimates of fixed effect regressions, i.e., the variation of GII and other regressors over time within the countries while controlling for time-invariant effects.

Column 1 shows the isolated effect of the lag of MI on the GII or a simple correlation between MI and GII. The coefficient of lagged MI is - 0.509, indicating a negative relationship between MI and GII. As stated earlier, MI shows the proportion of the female population that are active borrowers of microfinance. Consequently, MI can be interpreted in the following manner; when the MI in a country increases by 0.1, the GII of that country next year decreases by 0.0509 points. For example, the MI of Mongolia was 0.14 in 2018, i.e., 14% of the total female population were part of the MFI program as borrowers, and their GII was 0.318. Now, if the MI of Mongolia increases to 0.24 (or 24% of the female citizens are borrowers from MFI) in 2019, then the model predicts that the GII would decrease to 0.267.

When considering just the effect of MI on GII, the reduction in GII is relatively significant, considering that the average decrease in GII in developing countries was less than 0.1 from 2000-2010. The rate of GII was further reduced in 2010, as evident from Figure 6 GII across time. (Column 3-7 shows the effect of other regressors on the GII for a country). Despite introducing new regressors, the relationship between the lagged term of microfinance intensity and gender inequality index remains negative, robust, and statistically significant at the 5% level, albeit the coefficient of MI decreases with the addition of new regressors. Hence, it is evident that microfinance can positively impact women's socioeconomic status as it reduces gender inequality.

The econometric model in this thesis also considers the PFB, as mentioned in the previous section. The MI can decrease within a country (measured through membership/borrower

changes), but the ratio of female to male borrowers can increase, assuming more male borrowers leave. Column 2 shows the relationship between GII and the PFB. The result in column 2 shows a negative coefficient of 0.00003. The negative relationship is consistent throughout all the models, i.e., even with the addition of further regressors, indicating that an increase in female borrowers relative to male borrowers reduces gender inequality within a country. The estimates for the ratio of female to male borrowers are also statistically significant at 1% for almost all the econometric models, i.e., from columns 2 to 6, until the "proportion of the rural population" is added. Column 2 can be interpreted as a 10% increase in the female-to-male borrower ratio decreases gender inequality by 0.0003 points, which seems like a very small change. However, the change can also be significant depending on the female-to-male borrower ratio. For example, in 2018, Rwanda had a female-to-male borrower ratio of 0.04 (1 female borrower for every 2500 male borrowers) and MI of 0.0003 (0.03% of Rwandan female citizens are MFI borrowers) and a GII of 0.403. In this case, Rwanda has the scope to expand the number of female borrowers significantly. For example, If the proportion of female to male borrowers (PFB) in Rwanda went from 0 to 10 (25,000 female borrowers per 2,500 male borrowers), then GI falls by (10 *0.0003). In Azerbaijan, the PFB in 2018 was 0.165, and GII was .321; thus, increasing female borrowers relative to male borrowers can improve gender equality, but the coefficients suggest that it is not by a considerable amount unless the difference between the gender is large.

Column 3 introduces the government expenditure in the different sectors of the economy. Government expenditure on education, healthcare and consumption of different goods and services are introduced as regressors in this thesis's econometric model. The results indicate that government expenditure on education negatively affects gender inequality for all the multiple regression models. Domestic general government health expenditure seems to have a positive relationship with GII, but the results are not statistically significant for government expenditure on education and general government health expenditure. An increase in the government's final consumption expenditure tends to reduce gender inequality, according to table 5. However, the estimates are only significant at 10% in column 4 and column 5. The coefficients are relatively small as well, ranging from 0.001 to 0.003, i.e., an increase in the

government's final consumption expenditure's share in the GDP by 1% would reduce the GII by only 0.003, ceteris paribus. The maximum general government's final consumption expenditure's share in the GDP is 30%. Even if this is achieved, the GII will reduce by 0.009 (0.003*30) points. Unlike the PFB, from a pragmatic point of view, it is not viable to significantly increase the general government's final consumption expenditure's share in the GDP. PFB has a range of almost 0 to 1700. Albeit the government can increase their final consumption expenditure's share in the GDP to alleviate gender inequality, the reduction would not be significant as per the coefficient and pragmatic limitation of the government to spend.

Globalisation through international financial flow can also affect gender inequality as well. Column 4 introduces the regressors that account for the effect of global markets, such as foreign direct investment (FDI), trade and foreign aid/loans. GII is positively related to FDI and trade, indicating that if net FDI inflow as a share of GDP and trade share of GDP increases, gender inequality is likely to increase as well, but the results are statistically insignificant. On the other hand, a percentage of aid received by developing countries is negatively associated with the gender inequality index as per estimate and negative coefficient, but the result is not statistically significant.

The impact of different economic sectors as a percentage of GDP is captured through columns 5 and onwards. The service and industry sector estimates are statistically insignificant in this thesis's econometric models. The agricultural sector shows a positive relationship with GII in columns 5, 6 and 7. Estimates for the agricultural sector are also statistically significant at 10%. These estimates highlight that predominantly agricultural economies have relatively high gender inequality. The manufacturing sector also positively affects GII but is only statistically significant in column 5. The coefficients of the manufacturing sector do not differ significantly from the agricultural sector, indicating that an increase in the manufacturing sector could increase gender inequality within a country.

Comparing the coefficient of the log of GDP per capita (in terms of PPP) with other regressors, an increase in GDP per capita (PPP) can significantly reduce gender inequality, as shown by the negative association and the magnitude. According to the regression estimates, an increase in

GDP per capita (in terms of PPP) by 1% leads to a decrease in GII by .121 in column 6 and 0.086 in column 7, ceteris paribus. The estimates are statistically significant at 1%. The regression estimates further show a negative relationship between gross domestic savings as a percentage of GDP and GII but are not statistically significant. The share of the rural population as a portion of the total population also significantly affects the gender inequality index positively at 5%. The estimates in column 7 show that when the percentage of the rural population increases by 10%, it increases the GII by 0.04, ceteris paribus. Hence, more urbanisations can contribute to more equality among the genders as the female population in the urban areas get more amenities, economic opportunities, and social mobility.

Table 4 Regression Estimates

VARIABLES	(1)	(2)	(3) Government Expenditure	(4) Globalisation	(5) Economic sectors	(6) Economic Wealth	(7) Rural Population
Lagged Microfinance intensity	-0.509***		-0.526**	-0.543***	-0.408**	-0.279**	-0.304**
	[0.143]		[0.201]	[0.204]	[0.159]	[0.136]	[0.137]
Proportion of female to male borrower ratio		-0.00003**	-0.0002 ***	-0.0002***	-0.0002***	-0.0001***	-0.000005
		[0.00001]	[0.000006]	[0.000008]	[0.000004]	[0.000004]	[0.000005]
Government expenditure on education, total (% of GDP)			-0.004	-0.004	-0.002	-0.002	-0.001
			[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Domestic general government health expenditure (% of GDP)			0.0003	0.002	0.004	0.006	0.006
			[0.009]	[0.008]	[0.006]	[0.005]	[0.005]
General government final consumption expenditure (% of GDP)			-0.003*	-0.003*	-0.001	-0.001	-0.001
			[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Foreign direct investment, net inflows (% of GDP)				0.0002	0.0004	0.00002	0.00002
				[0.0002]	[0.0002]	[0.0003]	[0.0003]
Trade (% of GDP)				0.0002	0.00006	0.00003	0.00006
				[0.0003]	[0.0003]	[0.0003]	[0.0003]

VARIABLES	(1)	(2)	(3) Government Expenditure	(4) Globalisation	(5) Economic sectors	(6) Economic Wealth	(7) Rural Population
Log of net official development assistance received (constant 2018 US$)				-0.004	-0.002	-0.002	-0.001
				[0.004]	[0.003]	[0.002]	[0.002]
Agriculture, forestry, and fishing, value added (% of GDP)					0.005***	0.003*	0.003*
					[0.002]	[0.001]	[0.001]
Manufacturing, value added (% of GDP)					0.004**	0.0006	0.0005
					[0.002]	[0.002]	[0.002]
Services, value added (% of GDP)					0.0005	0.0005	0.0005
					[0.0006]	[0.0006]	[0.0006]
Industry (including construction), value added (% of GDP)					0.0008	0.001	0.001
					[0.001]	[0.001]	[0.001]
Log of GDP per capita, PPP (constant 2017 international $)						-0.121***	-0.086***
						[0.019]	[0.025]
Gross savings (% of GDP)						-0.0002	-0.00004
						[0.0004]	[0.0004]
Rural population (% of total population)							0.004***
							[0.001]
Constant	0.469***	0.462***	0.509***	0.581***	0.340***	1.470***	0.933***
	[0.004]	[0.0002]	[0.019]	[0.094]	[0.118]	[0.166]	[0.280]

VARIABLES	(1)	(2)	(3) Government Expenditure	(4) Globalisation	(5) Economic sectors	(6) Economic Wealth	(7) Rural Population
Observations	733	780	512	478	472	472	472
R-squared	0.075	0.005	0.127	0.145	0.301	0.463	0.488
Number of Countries	91	91	72	69	69	69	69

Clustered standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Note. All the estimates are obtained using ordinary least square regression with a set of dummy variables for countries. Standard errors were clustered by countries. All the variables from column 1 to column 7 jointly test for significance. The results are shown in Appendix: Joint Significance Test

5.2 Robustness Check

The first robustness check is done by performing F-statistics tests on the regressors to check the relevance of the regressors in this thesis's econometric model. The F-test shows whether the additional variables fit the econometric model compared to the restricted model. In other words, if the F-test is jointly significant, adding the explanatory variables in the unrestricted model would improve the econometric model and explain the variances better. The F-statistic results are shown in Appendix: Joint Significance Test. According to the F-statistics, the results are statistically significant at 10%. Only the regressors that are jointly statistically significant were added to the econometric model in this thesis.

The primary objective of this thesis is to identify whether MFI benefits females by providing them with financial access. Thus, this thesis explores other econometric models to check for the robustness of Equation 1. One method of robustness check includes the regressor "Borrowers from commercial banks (per 1,000 adults)" in this thesis's econometric model. Other sources of financial accessibility could influence GII, i.e., if female borrowers have accessibility from banks, it already indicates that they are empowered as they have the necessary assets or education to borrow from banks, causing potential endogeneity problems. Therefore, "Borrowers from commercial banks (per 1,000 adults)" indicator is used in two ways; first, as a robustness check and second, to control for potential endogeneity. The "Borrowers from commercial banks (per 1,000 adults)" indicator is used for robustness check by using it to create an index "Financial institution intensity (FI)". FI indicator is created by multiplying the "Borrowers from commercial banks (per 1,000 adults)" indicator by 1000 to get the total borrowers from commercial banks of a country. Then the number is divided by the country's total population to find the proportion of citizens that are borrowers of a country. The weighing is done to maintain consistency with the MI index. Concisely, FI is calculated in the following way:

$$FI = \frac{Borrowers\,commercial\,banks\,(per\ 1,000\ adults)\,value * 1000}{Total\,population\,of\,a\,country}$$

Then the lag of FI is used instead of lag of MI in equation (1) as a robustness check, as shown in column 1 of Table 5. The estimates show that the relationship between FI and GII is positive but statistically insignificant. The potential positive association is unsurprising as FI consists of males

and firms as borrowers. Males and male-dominated firms tend to have more access to financial resources, which they can use to empower themselves economically, which can translate into other forms of empowerment. For example, higher economic empowerment can increase men's political empowerment as males can invest a higher share of their wealth to get in the parliament, and males decide on health and food expenditure, among others, widen the GII. Domestic general government health expenditure (% of GDP) and general government final consumption expenditure (% of GDP) are statistically significant at 10%. Ceteris paribus, when domestic general government health expenditure's share in the GDP increases by 1% and general government final consumption expenditure's share in the GDP increases by 1%, GII reduces by 0.007 and 0.001 points, respectively.

Similar to previous regression estimates, the log of GDP per capita has a negative relationship with GII and is statistically significant at 1%. The proportion of the rural population has a positive relationship with GII and is statistically significant at 1%. Furthermore, a 1% increase in gross domestic savings' share in the GDP reduces GII by 0.0005 points, and the estimate is statistically significant at 10%. However, the coefficient decrease in gender equality is relatively small, especially compared to a decrease caused by an increase in MI or GDP per capita.

Afterwards, FI is added as an additional regressor in variable X_t in equation 1 to control for potential endogeneity. Despite the addition of FI as the control variable, lagged term of MI still has a negative association with GII and is statistically significant at 10%, albeit the coefficient of lagged MI has reduced from 0.304 (column 7, table 4) to 0.096 (column 2, table 5). In other words, if a country's proportion of female borrowers increases from 0.1 to 0.2, the GII would reduce by 0.0096 rather than 0.03, lowering the impact of MI estimates on GII after controlling for financial sector development. Nevertheless, these regression results show that lagged MI is still likely to reduce GII, as their impact is negatively associated and statistically significant, passing the robustness test. The correlation between FI and MI is almost zero, as shown in the Appendix's **Error! Reference source not found.** Thus, there is no multicollinearity problem in Table 5.

So far, this thesis has focused on microfinance's impact on female borrowers without controlling for any changes in the number of male borrowers relative to the total male population. The regression in Table 5's column 4 introduces lagged MI for male borrowers. Similar to the MI calculated in equation (1), the MI for males is calculated by dividing the number of active borrowers by the total number of male citizens within a country for the given year. Again, a correlation test was done for MI of males and females to check for multicollinearity. Results show a moderate and positive correlation of 0.59 between the two variables. It means that when female borrowers increase, the number of male borrowers also tends to increase but not at the same rate. Having all factors as constant, i.e., the number of female borrowers relative to the female borrowers would not increase, an increase in the micro intensity of male borrowers (more male members of the country are now borrowing from MFI) would increase GII, as evident through the positive coefficient, but it is not statistically significant. Given that all other factors are constant, an increase in the micro intensity of female borrowers decreases the GII, as evidenced by the negative coefficient, which is statistically significant at 5%. The results indicate that increasing female borrowers relative to the total female population does assist in gender inequality reduction, and an increase in male borrowers relative to the male population does not affect gender inequality.

Column 4 of Table 5 uses lagged value of total borrowers per capita rather than total female borrowers per female citizen as the explanatory variable. Estimates show a negative association with the gender inequality index, but it is statistically insignificant due to the presence of male borrowers in the explanatory variable. Among other control variables, the share of agriculture in the GDP and the share of the rural population in the total population positively affect GII and is statistically significant at 10%. A percentage increase in GDP per capita also reduces the GII by 0.09 and is statistically significant at 1%.

Table 5 Robustness check

VARIABLES	(1) Financial institutions	(2) Endogeneity Check	(3) Male borrowers	(4) Total borrowers

VARIABLES	(1) Financial institutions	(2) Endogeneity Check	(3) Male borrowers	(4) Total borrowers
Lagged Microfinance intensity of female borrowers		-0.096*	-0.300**	
		[0.057]	[0.085]	
Lagged Microfinance intensity of male borrowers			0.028	
			[0.093]	
Lagged Financial Institute Intensity	0.033	-0.178		
	[0.020]	[0.130]		
Lagged Microfinance intensity of total borrowers				-0.162
				[0.172]
Government expenditure on education, total (% of GDP)	0.0006	0.003	-0.001	-0.0002
	[0.002]	[0.003]	[0.005]	[0.002]
Domestic general government health expenditure (% of GDP)	-0.007*	-0.006	-0.001	0.002
	[0.004]	[0.004]	[0.001]	[0.004]
General government final consumption expenditure (% of GDP)	-0.001*	-0.002***	-0.001	-0.0007
	[0.0007]	[0.0008]	[0.001]	[0.001]
Foreign direct investment, net inflows (% of GDP)	-0.00002	0.0002	0.0003	0.0001
	[0.0002]	[0.0002]	[0.0001]	[0.003]
Trade (% of GDP)	-0.00008	0.0000003	0.00007	0.00002
	[0.0002]	[0.0002]	[0.0003]	[0.002]
Log of net official development assistance received (constant 2018 US$)	0.006	0.002	0.001	-0.002
	[0.004]	[0.002]	[0.002]	[0.002]
Agriculture, forestry, and fishing,	-0.0001	-0.001	0.003	0.003*

VARIABLES	(1) Financial institutions	(2) Endogeneity Check	(3) Male borrowers	(4) Total borrowers
value added (% of GDP)				
	[0.001]	[0.001]	[0.001]	[0.001]
Manufacturing, value added (% of GDP)	0.001	0.002*	0.0004	0.001
	[0.001]	[0.001]	[0.001]	[0.002]
Services, value added (% of GDP)	-0.000908	-0.00109	0.0005	
	[0.001]	[0.001]	[0.0004]	[0.001]
Industry (including construction), value added (% of GDP)	-0.0004	-0.0008	0.001	0.0005
	[0.001]	[0.001]	[0.0007]	[0. 0005]
Log of GDP per capita, PPP (constant 2017 international $)	-0.067***	-0.061***	-0.086***	-0.090***
	[0.021]	[0.022]	[0.024]	[0.001]
Gross savings (% of GDP)	-0.0005*	-0.0006**	-0.00003	-0.00003
	[0.0003]	[0.0003]	[0.0003]	[0.0003]
Rural population (% of total population)	0.004***	0.004**	0.004***	0.004***
	[0.002]	[0.002]	[0.001]	[0.001]
Constant	0.787**	0.852***	0.931***	0.988***
	[0.300]	[0.309]	[0.266]	[0.249]
Observations	332	280	476	552
R-squared	0.518	0.575	0.486	0.484
Number of Countries	48	40	70	73

Clustered standard errors in brackets

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note. All the estimates are obtained using ordinary least square regression with a set of dummy variables for countries.

Standard errors are clustered by countries.

This thesis further checks the size of the microfinance industry on the female by measuring the gross loan portfolio per active female borrower. As per estimates, there is a negative association between lagged microfinance intensity measured through loan disbursement and GII. However, the coefficient is very small in value, and the result is statistically insignificant. The results are indicated in Table 11. This estimate aligns with Bangoura et al. (2016), whose findings indicate that the size of the microfinance industry through the amount of gross loan portfolio does not significantly affect income inequality.

Due to its limitations, "Borrowers from commercial banks (per 1,000 adults)" indicator is not included in the initial econometric model in equation (1). The limitations are as follows: "Borrowers from commercial banks (per 1,000 adults)" indicator does not isolate female borrowers from other genders or corporations, making the financial accessibility of female citizens within a country hard to determine. Furthermore, multiple household accounts and corporate were reported due to the data's structure; therefore, the data can overestimate the number of actual borrowers, resulting in biased estimates. The literature states that in most cases, females from developing countries do not have access to formal financial institutions, and therefore the number of female borrowers from formal banks is relatively low, and MFI strives to fill this gap. Therefore, MFIs tend to significantly reduce GII as they cater to a lower socioeconomic female population.

5.3 GII Components

GII components are also analysed in the thesis to assess which components are driven by MI. The results are shown in Table 6. Out of the five components of GII, maternal mortality ratio (MMR) and adolescent birth rate (ABR) values were logarithmic because of the large between-country heterogeneity in the MMR and ABR data. Column 1 of Table 6 shows the correlation between the lagged microfinance intensity and MMR. The result indicates a negative relationship and is statistically significant at 1%.   Additional regressors were added in column 2 to check the association between lagged MI and MMR. The results show a negative association between lagged MI and MMR but are not statistically significant at 10%.

Furthermore, an increase in female to male-borrower ratio and increased government expenditure on final consumption is likely to reduce mortality based on the negative relationship between MMR and the control variables, albeit by an insignificant amount. Whereas a 1% increase in GDP per capita decreases MMR by 0.768%, ceteris paribus indicates a strong and positive effect of economic growth on health outcomes. It is expected that higher general government health expenditure (% of GDP) would reduce MMR, but the estimates surprisingly indicate that an increase in general government health expenditure (% of GDP) by 1% would increase MMR by 0.045%, ceteris paribus, i.e., a positive association. The explanation of this phenomenon is explained in the discussion section.

In theory, microfinance should reduce AFR. Rosenberg et al. (2019) noted that MFI provides sexual health education dissemination and employment opportunities to young women in developing countries. The impact of MI on AFR is shown in columns 3 and 4. As per the results, MI does not have statistically significant effects on AFR.

Columns 5 and 6 show MI's effect on females completing secondary education. A straight correlation between MI and FSE shows a positive relationship between the two variables and is statistically significant at 1%. Even after adding regressors, MI positively affects the educational attainment of females and is statistically significant at 5%. Alternatively, it means that when the activity of microfinance institutions within a country increases through increased borrowers, it is likely to increase the secondary school completion of the country. For example, in 2010, Cambodia had a MI of 0.11. It meant that 11% of the country's total female population are borrowers of MFIs. If the MI increases to 0.21, then the secondary education completion rate of females in Cambodia will increase by 1.57%. The increase would be 11.42% in the following year from 9.86%. An increase in foreign aid and GDP per capita also seem to positively and statistically affect FSE. Estimates show that 1% increase in foreign aid and GDP per capita (in PPP) is likely to raise FSE by 1% and 9.26%, respectively. The estimates of these two variables are statistically significant at 1%.

The results indicate that increased MFI activities within a country can cause political empowerment of female citizens. Like FSE, MI positively and statistically significantly affects the

female share of parliament seats at 1%. Similar to previous estimates, a percentage increase in GDP per capita (in PPP) would likely increase women's political empowerment and is statistically significant at 1%. In contrast, when a country's share of agriculture in their GDP and share of rural population increases, the percentage of women having seats in parliament is likely to decrease, as evidenced by the negative coefficient and statistically significant effect in column 8.

Columns 9 and 10 show no statistically significant relationship between MI and female labour participation. However, estimates and statistical significance imply that a high female-to-male borrower ratio would likely increase female labour participation. This is plausible as more female borrower's ratio means that female entrepreneurs developed more networks with other females through their MFI-based loans and savings group, increasing the female entrepreneurs and employee numbers among themselves. Increasing GDP per capita (in PPP) is also likely to increase female labour participation within a country over time; the estimate is statistically significant. However, an increase in trade (% of GDP) seems to reduce female labour participation in developing countries based on the coefficient's sigh and statistical significance.

Based on the regression results, it can be stated that MI plays a key role in increasing women's secondary education attainment and political empowerment. However, MI has a negligible effect on the health sector and labour participation, contrary to the general viewpoint that MFI improves health status. An increase in GDP per capita (in PPP) positively and significantly affects all the components of the gender inequality index; thus, countries should focus on increasing their income per person and economic growth. A higher share of the rural population also adversely affects women's empowerment indicators, most likely due to lower amenities and accessibility of public institutions for women in rural areas compared to urban centres. Particularly in developing countries, women must adhere more strongly to local norms and traditions in rural areas. Consequently, women are deprived of many civil rights and public institutions.

Table 6 Regression with GII components as outcome variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	MMR	MMR	AFR	AFR	FSE	FSE	FSP	FSP	FLP	FLP
Lagged Microfinance intensity	-2.773***	-0.181	0.127	0.445	62.66***	15.69**	68.37***	47.38***	4.591	3.296
	[0.589]	[0.369]	[0.405]	[0.404]	[16.85]	[7.828]	[21.67]	[16.54]	[5.018]	[8.921]
Female to male active borrower ratio		-0.0002***		0.00008***		0.0005		-0.002		0.002***
		[0.00003]		[0.00002]		[0.0008]		[0.001]		[0.0004]
Government expenditure on education, total (% of GDP)		-0.001		0.007		-0.314		-0.276		-0.348
		[0.013]		[0.008]		[0.296]		[0.459]		[0.257]
Domestic general government health expenditure (% of GDP)		0.045**		-0.007		0.219		0.150		1.129***
		[0.020]		[0.02]		[0.545]		[0.792]		[0.418]
General government final		-0.017***		0.002		0.0416		0.163		-0.206

VARIABLES	(1) MMR	(2) MMR	(3) AFR	(4) AFR	(5) FSE	(6) FSE	(7) FSP	(8) FSP	(9) FLP	(10) FLP
consumption expenditure (% of GDP)										
		[0.005]		[0.004]		[0.143]		[0.173]		[0.131]
Foreign direct investment, net inflows (% of GDP)		-0.001		-0.002**		-0.0016		-0.0008		0.027
		[0.002]		[0.001]		[0.028]		[0.052]		[0.022]
Trade (% of GDP)		0.001		-0.0003		-0.057**		-0.016		-0.030*
		[0.001]		[0.0006]		[0.023]		[0.034]		[0.016]
Log of net official development assistance received (constant 2018 US$)		-0.004		-0.016		1.021***		-0.393		-0.237
		[0.019]		[0.010]		[0.373]		[0.342]		[0.204]
Agriculture, forestry, and fishing, value added (% of GDP)		0.001		0.0009		-0.178		-0.261**		0.073

VARIABLES	(1) MMR	(2) MMR	(3) AFR	(4) AFR	(5) FSE	(6) FSE	(7) FSP	(8) FSP	(9) FLP	(10) FLP
		[0.004]		[0.004]		[0.125]		[0.121]		[0.086]
Manufacturing, value added (% of GDP)		0.003		0.006		-0.28		0.051		0.004
		[0.007]		[0.005]		[0.262]		[0.247]		[0.141]
Services, value added (% of GDP)		-0.0005		0.0004		-0.030		-0.118		0.008
		[0.002]		[0.002]		[0.101]		[0.0764]		[0.032]
Industry (including construction), value added (% of GDP)		0.006		0.002		-0.067		-0.131		-0.042
		[0.005]		[0.004]		[0.169]		[0.155]		[0.077]
Log of GDP per capita, PPP (constant 2017 international $)		-0.768***		-0.02		9.262***		7.505**		-1.152
		[0.162]		[0.132]		[3.006]		[3.311]		[2.086]
Gross savings (% of GDP)		-0.00003		-0.003		-0.081		0.041		-0.00003
		[0.001]		[0.002]		[0.0597]		[0.063]		[0.0287]

VARIABLES	(1) MMR	(2) MMR	(3) AFR	(4) AFR	(5) FSE	(6) FSE	(7) FSP	(8) FSP	(9) FLP	(10) FLP
Rural population (% of total population)		0.0109		0.022***		-0.959***		-0.718**		-0.151
		[0.008]		[0.005]		[0.221]		[0.318]		[0.147]
Constant	4.682***	10.04***	3.981***	3.283***	45.13***	17.21	17.43***	17.03	50.26***	78.32***
	[0.014]	[1.311]	[0.011]	[1.190]	[0.451]	[37.89]	[0.583]	[38.30]	[0.133]	[22.05]
Observations	686	437	770	492	757	487	752	481	770	492
R-squared	0.090	0.633	0	0.276	0.052	0.551	0.077	0.319	0.002	0.121
Number of Countries	91	69	92	70	91	69	92	70	92	70

Clustered standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Note. MMR = Maternal mortality ratio; AFR = Adolescent birth rate; FSE = Female population with at least secondary education

(in %); FSP = Female share of the parliament; FLP = Female labour force participation rate

Log values of MMR and AFR are used in this regression

6. Limitations

The results of this thesis have their own share of limitations. First, as stated, Mix Market Database has a lot of missing data. Similarly, there were missing data in some of the other indicators as well. Consequently, the missing observations would have underestimated or overestimated the effects of the major independent variable. If the missing data is due to a lack of operation by the MFI, then the model correctly specifies the estimates. If the missing data is because of a lack of records, then the estimate may not showcase the precise impact of microfinance.

Moreover, the literature shows that there are different types of MFIs. Some MFIs just provide credit facilities, other provide additional services such as business training and market linkage along with microfinance finance opportunities. The estimates do not differentiate between just microcredit access from minimalist MFI with the add-on services. Thus, the estimates could be picking up an omitted variable (add-on services), overestimating the impact of microfinance intensity. As cited in the literature and discussion section, add-on services might have contributed more significantly to promoting gender equality than just simple access to microfinance.

Furthermore, this thesis did not include a fiscal approach. Taxes rates and gender-specific transfers may have an impact on the outcomes of the regressions. For example, some countries have lower tax rates for females, or a higher portion of their income is tax-free compared to male citizens. In some instances, marginalised families receive financial incentives if they send their daughters to school. These policies may determine gender inequality within a country. Albeit, some aspects of these policies are captured by the explanatory variables used in this thesis's model. For example, government expenditure on education, total (% of GDP), general government final consumption expenditure (% of GDP) and domestic general government health expenditure (% of GDP). This thesis's model did not capture the volume of expenditure or the specific channel they were spent. Monetary policies could also have an impact, but this thesis did not account for monetary policies.

It is also important to mention that this thesis's results have only shown correlation, not causation because experimental data is difficult to capture using cross-country macro data. This can be tested, for example, by using the average MI during the previous years as a control variable.

Additionally, using GII as a proxy to understand female empowerment can underestimate the impact of microfinance intensity. For example, the impact of microfinance on political influence is likely to be more profound at the grassroots level than at the national level. Kellar et al. (2004) highlighted cases where the activities of MFIs increased female representatives in the community or union-level elections. Furthermore, GII uses labour participation to assess economic empowerment. Again, this is likely to underestimate microcredit's impact because microcredit is usually channelled into micro or cottage industries by female borrowers. Micro evaluation studies state that microfinance increases businesses and self-employment (Goldszmidt et al., 2021; Tarozzi et al., 2015; Crépon et al., 2015; Banerjee et al., 2015; Attanasio et al., 2015; Angelucci et al., 2013). However, these micro and cottage enterprises are not usually added to the national employment data because of a lack of legal documents, e.g., business permits, and the structure of their businesses, i.e., homestead based. Additionally, female borrowers who are engaged in rearing the family's domesticated animals are not considered agricultural labourers as per the social attitudes of developing countries (Rahman and Islam, 2013). Consequently, national data might underreport the economic labour participation of female borrowers, particularly in rural areas.

In the last 5 to 10 years, policymakers have focused more on gender diversity and inclusivity. One of the methods used to promote gender inclusiveness is through a quota system or other fiscal incentives. The quota or other measures can vary across countries. This factor was not included in the econometric model due to data constraints. Hence, there could be possible bias in the estimates because of the omission of this factor.

7. Discussions

7.1 General Discussions

Theoretically, microfinance enables marginalised women to access productive assets to generate their own income, empowering them to make decisions for their families and society; thus, microfinance can potentially lessen gender disparity (Posso and Zhang, 2017). Moreover, as stated earlier, add-on services provided by microfinance could have contributed to greater equality within a country over time (Kabeer et al., 2010; Dineen & Le, 2015). The long-term positive impact of microfinance on women's empowerment found in this thesis is consistent with some of the dynamic models reviewed in this literature (Debnayan and Sudipta, 2010; Berhane and Gardebroek, 2011; Khandaker and Samad, 2014).

Economic development is crucial in reducing GII as it creates more prospects for both genders, particularly women. The negative association and statistically significant coefficient in the regression result assert the phenomenon. It allows female workers to enter the labour market, increasing other social opportunities and purchasing power. The positive effect of an increase in the country's wealth causing a reduction in gender inequality is also consistent with Zhang and Posso (2017) and Sangaji et al. (2018).

Furthermore, results indicate that agriculture's share of the GDP and proportion of the rural population statistically significantly affects GII and is positively associated. Saravanakumar and Varakumari's (2019) study in Tamil Nadu on female empowerment supports the finding that there is more inequality in rural areas, with females being the disadvantaged gender. The rural labour market structure also disfavours women due to limited off-farm jobs and poor market linkage with microentrepreneurs. Consequently, rural women earn 25% less than men (FAO, IFAD, and ILO, 2010). These factors cause agriculture's share of the GDP and the proportion of the rural population to associate with GII positively, indicating worsening gender inequality.

Table 6 indicates that MI has a negative and statistically significant relationship with the maternal mortality rate. However, with the addition of further regressors, the association is no longer statistically significant. MI does not have a statistically significant association with ABR either. Kabeer et al. (2010) also noted in their study that they did not see a significant increase

in health expenditure among the female borrowers of most MFIs despite increased access to microfinance. Studies noted that the borrowers invested microcredit in durable items or the microenterprise itself, and the increase in income was not significant to improve the health status of the female borrowers (Kabeer, 2015; Crépon et al., 2015; Banerjee et al., 2015). Furthermore, Aziz et al. (2021) suggested that the possible causes for the lack of positive impact of increasing health expenditure in the sampled region were due to inadequate and meagre quality of management, substandard healthcare services, misallocation, and inefficient usage of funds, particularly in the South Asian countries. Thus, the results align with the literature.

Female share in secondary education and parliament seats is statistically significant and positively associated with microfinance intensity. Kabeer et al. (2010) argue that some MFIs target women as loan recipients, encouraging families with daughters to pursue higher education in the hope of more benefits, potentially increasing female enrolment. Furthermore, membership in MFI has increased the likelihood of women having access to government programmes, expressing their opinion in various public meetings, and giving the political and public confidence to run for elected offices (Kellar et al., 2004). Thus, these reasons, explained by literature, may have resulted in microfinance positively impacting females' share in secondary education and political offices.

Lastly, as Morduch (2005) and Kabeer (2010) suggested, women in developing countries are constrained by social norms and thus prefer their microenterprises to their households. The econometric analysis of Kabeer et al. (2010), Attanasio et al. (2015), Augsburg et al. (2015) and Banjeree et al. (2015) showed that access to microcredit has often resulted in borrowers investing more in their firms. In these studies, female employment did not increase; instead, they established micro or small enterprises. Often these micro enterprises operate within their homestead and in the informal sector as these firms do not pay taxes or go for a trade license. Furthermore, microcredit is often sufficient to start a small business or increase inventory but is not always adequate to expand enough to hire additional employees. Due to these reasons, an increase in MI does not necessarily increase the female labour participation rate, as shown in columns 9 and 10 of table 6.

To summarise, the results in this thesis align with some of the studies that microfinance can help create gender equality in the long run. Analysis of GII components indicates that microfinance intensity positively affects educational attainment and political components of GII. The robustness check in table 5 also indicates that increased financial accessibility of non-gendered borrowing does not significantly affect gender equality. Therefore, increasing microfinance intensity for female borrowers would reduce gender inequality within the country.

7.2 Policy Implications

Based on the econometric results, microfinance can be said to be an effective tool for reducing gender inequalities within a country using macro analysis. However, based on prior literature and micro evaluation studies, microfinance should be supplemented with non-financial services such as carefully designed adult literacy and business training programmes, advocacy training and social mobilisation training, as microfinance itself does not empower women (Kabeer et al., 2010; Kabeer, 2005; and Rahman, 1999, Dineen and Le, 2015; Debnath et al., 2019; Posso and Zhang, 2017). Posso and Zhang (2017) note that country-specific and cultural factors and their historical aspects can play a crucial role in determining microfinance's impact on gender equality. Hence, these factors should be considered during policy formulation.

As mentioned before, the proportion of the country's rural population and agriculture sector also affect gender inequality. Government can mandate the MFIs to target women borrowers for business training and up-skilling to improve their productivity to command higher wages in the local rural labour market. The training program could also contain workshops on civil rights and advocacy so that the borrowers know their rights and how to take appropriate action if those rights are breached. Local government institutions should increase their support at the grassroots level to promote an enabling environment for these small-scale female producers (Rahman and Islam, 2013). These steps should reduce gender inequality in rural areas.

Finally, achieving high economic growth and increasing purchasing power of its residents must be an objective for policymakers of developing countries. As discussed above, literature and econometric analysis show that increased income per capita can reduce gender inequality. As

per Solow Model, developing countries are usually far from their golden steady state and have the potential for a high economic growth rate. Countries that have drastically reduced their GII score have rapidly achieved high economic growth and increased GDP per capita. Sustainable economic growth must be achieved through the diversification of economic sectors and not on the back of one or two outputs. Otherwise, the economy would be susceptible to Dutch diseases[2]; the effect would be particularly harsh if the minor industries were dominated by female employees, for example, textiles, handicrafts, etc.

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[2] Dutch disease is an economic term that describes the unfavorable effects that can result from a sharp increase in a country's currency value. It is mostly related to the discovery or exploitation of new, lucrative natural resources and the unanticipated effects these discoveries can have on a country's overall economy.

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Appendix

GII calculation

Step 1. Treating zeros and extreme values

All component indicators have a minimum value of 0.1 per cent since a geometric mean cannot be calculated from zero values. Additionally, the maximum and minimum values for the maternal mortality ratio are truncated at 1,000 deaths per 100,000 births and 10, respectively, because higher maternal mortality reflects worse maternal health. UNDP argues that countries where maternal mortality rates is over 1,000 do not differ in their ability to provide adequate maternal health services, and countries with 10 deaths or fewer per 100,000 live births are performing about equally well and that minor variations are negligible.

Step 2. Aggregating across dimensions within each gender group, using geometric means

The indicators stated above are aggregated using the geometric mean, making the GII association sensitive. The maternal mortality rate and adolescent fertility rate are only relevant for females, while the other two dimensions are only aggregated for males. The formula is:

$$G_F = \sqrt[3]{\left\{ \sqrt{\left(\frac{\frac{10}{MMR} * 1}{ABR}\right) * \sqrt{(PR_F * SE_F)}} * LFPR_F \right\}}$$

$$G_M = \sqrt[3]{\left\{ \sqrt{(PR_M * SE_M)} * LFPR_M \right\}}$$

Where,

MMR = Maternal Mortality Rate

ABR = Adolescent fertility ratio

PR = share of seats in parliament

SE = population with at least some secondary education (% ages 25 and older)

LFPR = Labour force participation rate

F = Females

M = Males

To account for the truncation of the maternal mortality ratio at 10, the maternal mortality ratio in equation 1 was rescaled by 0.1.

Step 3. Aggregating across gender groups, using a harmonic mean

The female and male indices are aggregated by the harmonic mean of the geometric means to capture the inequality between females and males and adjust for the association between dimensions to compute the equally distributed gender index, i.e., adjusts for the overlapping inequalities in dimensions. The formula for harmonisation is as follows:

$$HARM(G_F, G_M) = \left[\frac{(G_F)^{-1} + (G_M)^{-1}}{2} \right]^{-1}$$

Step 4. Calculating the geometric mean of the arithmetic means for each indicator

The reference standard of obtaining inequality is achieved by aggregating males and females using equal weights and then aggregating indices across dimensions. This is achieved by the following method:

$$G_{F,M} = \sqrt[3]{\{\overline{Health} * \overline{Empowerment} * \overline{LFPR}}$$

Where,

$$\overline{Health} = \frac{\sqrt{\left(\frac{\frac{10}{MMR}*1}{ABR} + 1 \right)}}{2}$$

$$\overline{Empowerment} = \frac{\sqrt{(PR_F * SE_F)} + \sqrt{(PR_M * SE_M)}}{2}$$

$$\overline{LFPR} = \frac{LFPR_F + LFPR_M}{2}$$

Step 5. Comparing indices

The final step is comparing indices of the country (found in step 3) with the reference standard (step 4) using the following method:

$$1 - \frac{HARM(G_F, G_M)}{G_{\overline{F.M}}}$$

Table 7 Definition of variables

Indicator Name	Long definition	Source	Methodology
Number of active female borrowers	The number of female individuals who currently have an outstanding loan balance with the financial institution or are primarily responsible for repaying any portion of the gross loan portfolio/	MIX Market	Individuals who have multiple loans with a financial institution should be counted as single borrowers. > Segmentation based on gender. > Of the female gender
Total number of female populations	The female population is based on the de facto definition of population, which counts all female residents regardless of legal status or citizenship.	World Bank staff estimates using the World Bank's total population and age/sex distributions of the United Nations Population Division's World Population Prospects: 2019 Revision.	

Indicator Name	Long definition	Source	Methodology
Active number of male borrowers	The number of male individuals who currently have an outstanding loan balance with the financial institution or are primarily responsible for repaying any portion of the gross loan portfolio,	MIX Market	Individuals who have multiple loans with a financial institution should be counted as single borrowers. > Segmentation based on gender. > Of the male gender
Gross Loan Portfolio	All outstanding principals due for all outstanding client loans. This includes current, delinquent, and renegotiated loans, but not loans that have been written off.	MIX Market	

Indicator Name	Long definition	Source	Methodology
Government expenditure on education, total (% of GDP)	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government. General government usually refers to local, regional and central governments.	UNESCO Institute for Statistics (http://uis.unesco.org/). Data as of September 2021.	Government expenditure on education, total (% of GDP), is calculated by dividing total government expenditure for all levels of education by the GDP and multiplying by 100. Aggregate data are based on World Bank estimates.

Data on education are collected by the UNESCO Institute for Statistics from official responses to its annual education survey. All the data are mapped to the International Standard Classification of Education (ISCED) to ensure the comparability of education programs at the international level. The current version was formally adopted by the UNESCO Member States in 2011. GDP data come from the World Bank.

The reference years reflect the school year |

Indicator Name	Long definition	Source	Methodology
			for which the data are presented. In some countries, the school year spans two calendar years (for example, from September 2010 to June 2011); in these cases, the reference year refers to the year in which the school year ended (2011 in the example).

Indicator Name	Long definition	Source	Methodology
Domestic general government health expenditure (% of GDP)	Public expenditure on health from domestic sources as a share of the economy as measured by GDP.	World Health Organization Global Health Expenditure database (http://apps.who.int/nha/database). The data was retrieved on January 30, 2022.	The health expenditure estimates have been prepared by the World Health Organization under the framework of the System of Health Accounts 2011 (SHA 2011). The health SHA 2011 tracks all health spending in a given country over a defined period of time regardless of the entity or institution that financed and managed that spending. It generates consistent and comprehensive data on health spending in a country, which in turn can contribute to evidence-based policymaking.

Indicator Name	Long definition	Source	Methodology
General government final consumption expenditure (% of GDP)	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.	World Bank national accounts data, and OECD National Accounts data files.	Gross domestic product (GDP) from the expenditure side is made up of household final consumption expenditure, general government final consumption expenditure, gross capital formation (private and public investment in fixed assets, changes in inventories, and net acquisitions of valuables), and net exports (exports minus imports) of goods and services. Such expenditures are recorded in purchaser prices and include net taxes on products.

Indicator Name	Long definition	Source	Methodology
Foreign direct investment, net inflows (% of GDP)	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP.	International Monetary Fund, International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates.	Data on equity flows are based on balance of payments data reported by the International Monetary Fund (IMF). Foreign direct investment (FDI) data are supplemented by the World Bank staff estimates using data from the United Nations Conference on Trade and Development (UNCTAD) and official national sources. The internationally accepted definition of FDI (from the sixth edition of the IMF's Balance of Payments Manual [2009]), includes the following components: equity investment, including investment associated with equity that gives rise to control or influence; investment in indirectly influenced or controlled enterprises; investment in fellow enterprises; debt

Indicator Name	Long definition	Source	Methodology
			(except selected debt); and reverse investment. The Framework for Direct Investment Relationships provides criteria for determining whether cross-border ownership results in a direct investment relationship based on control and influence. Distinguished from other kinds of international investment, FDI is made to establish a lasting interest in or effective management control over an enterprise in another country. A lasting interest in an investment enterprise typically involves establishing warehouses, manufacturing facilities, and other permanent or long-term organisations abroad. Direct investments may take the form of greenfield investment, where the investor starts a new venture in a foreign country by constructing new operational facilities; joint venture, where

Indicator Name	Long definition	Source	Methodology
			the investor enters into a partnership agreement with a company abroad to establish a new enterprise; or merger and acquisition, where the investor acquires an existing enterprise abroad. The IMF suggests that investments should account for at least 10 percent of voting stock to be counted as FDI. In practice, many countries set a higher threshold. Many countries fail to report reinvested earnings, and the definition of long-term loans differs among countries. BoP refers to the Balance of Payments.

Indicator Name	Long definition	Source	Methodology
Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Bank national accounts data, and OECD National Accounts data files.	
Net official development nt assistance received (constant 2018 US$)	Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25	Development Assistance Committee of the Organisation for Economic Co-operation and Development, Geographical Distribution of Financial Flows to Developing Countries, Development Co-operation Report, and International Development Statistics database. Data are available online at: https://stats.oecd.org/.	

Indicator Name	Long definition	Source	Methodology
	percent (calculated at a rate of discount of 10 percent). Data are in constant 2018 U.S. dollars.		

Indicator Name	Long definition	Source	Methodology
Agriculture, forestry, and fishing, value added (% of GDP)	Agriculture, forestry, and fishing corresponds to ISIC divisions 1-3 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 4. Note: For VAB countries, gross value added at factor cost is used as the denominator.	World Bank national accounts data, and OECD National Accounts data files.	Gross domestic product (GDP) represents the sum of value added by all its producers. Value added is the value of the gross output of producers less the value of intermediate goods and services consumed in production before accounting for the consumption of fixed capital in production. The United Nations System of National Accounts calls for value added to be valued at either basic prices (excluding net taxes on products) or producer prices (including net taxes on products paid by producers but excluding sales or value-added taxes). Both valuations exclude transport charges that are invoiced separately by producers. Total GDP is measured at purchaser prices. Value added by industry is normally measured at basic prices.

Indicator Name	Long definition	Source	Methodology
Manufacturing, value added (% of GDP)	Manufacturing refers to industries belonging to ISIC divisions 15-37. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.	World Bank national accounts data, and OECD National Accounts data files.	Gross domestic product (GDP) represents the sum of value added by all its producers. Value added is the value of the gross output of producers less the value of intermediate goods and services consumed in production before accounting for the consumption of fixed capital in production. The United Nations System of National Accounts calls for value added to be valued at either basic prices (excluding net taxes on products) or producer prices (including net taxes on products paid by producers but excluding sales or value-added taxes). Both valuations exclude transport charges that are invoiced separately by producers. Total GDP is measured at purchaser prices. Value added by industry is normally measured at basic prices.

Indicator Name	Long definition	Source	Methodology
Services, value added (% of GDP)	Services correspond to ISIC divisions 50-99 and they include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making	World Bank national accounts data, and OECD National Accounts data files.	Gross domestic product (GDP) represents the sum of value added by all its producers. Value added is the value of the gross output of producers less the value of intermediate goods and services consumed in production, before accounting for consumption of fixed capital in production. The United Nations System of National Accounts calls for value added to be valued at either basic prices (excluding net taxes on products) or producer prices (including net taxes on products paid by producers but excluding sales or value-added taxes). Both valuations exclude transport charges that are invoiced separately by producers. Total GDP is measured at purchaser prices. Value added by industry is normally measured at basic prices. Financial intermediation services indirectly

Indicator Name	Long definition	Source	Methodology
	deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3 or 4.		measured (FISIM) is an indirect measure of the value of financial intermediation services (i.e. output) provided but for which financial institutions do not charge explicitly as compared to explicit bank charges. Although the 1993 SNA recommends that the FISIM are allocated as intermediate and final consumption to the users, many countries still make a global (negative) adjustment to the sum of gross value added.

Indicator Name	Long definition	Source	Methodology
Industry (including construction), value added (% of GDP)	Industry (including construction) corresponds to ISIC divisions 05-43 and includes manufacturing (ISIC divisions 10-33). It comprises value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water, and gas. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 4.	World Bank national accounts data, and OECD National Accounts data files.	Gross domestic product (GDP) represents the sum of value added by all its producers. Value added is the value of the gross output of producers less the value of intermediate goods and services consumed in production before accounting for the consumption of fixed capital in production. The United Nations System of National Accounts calls for value added to be valued at either basic prices (excluding net taxes on products) or producer prices (including net taxes on products paid by producers but excluding sales or value-added taxes). Both valuations exclude transport charges that are invoiced separately by producers. Total GDP is measured at purchaser prices. Value added by industry is normally measured at basic prices.

Indicator Name	Long definition	Source	Methodology
	Note: For VAB countries, gross value added at factor cost is used as the denominator.		

Indicator Name	Long definition	Source	Methodology
Control of Corruption: Estimate	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Detailed documentation of the WGI, interactive tools for exploring the data, and full access to the underlying source data available at www.govindicators.org.The WGI are produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank Development Research Group). Please cite Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430	The World Bank governance indicators are scores between -2.5 and 2.5, with a higher score indicating a positive governance

Indicator Name	Long definition	Source	Methodology
	(http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130). The WGI do not reflect the official views of the Natural Resource Governance Institute, the Brookings Institution, the World Bank, its Executive Directors, or the countries they represent.		

Indicator Name	Long definition	Source	Methodology
Government Effectiveness: Estimate	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Detailed documentation of the WGI, interactive tools for exploring the data, and full access to the underlying source data available at www.govindicators.org.The WGI are produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank Development Research Group). Please cite Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430	

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Indicator Name	Long definition	Source	Methodology
Political Stability and Absence of Violence/Terrorism: Estimate	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Detailed documentation of the WGI, interactive tools for exploring the data, and full access to the underlying source data available at www.govindicators.org.The WGI are produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank Development Research Group). Please cite Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430	

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Indicator Name	Long definition	Source	Methodology
Rule of Law: Estimate	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Detailed documentation of the WGI, interactive tools for exploring the data, and full access to the underlying source data available at www.govindicators.org.The WGI are produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank Development Research Group). Please cite Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430	

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		(http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130). The WGI do not reflect the official views of the Natural Resource Governance Institute, the Brookings Institution, the World Bank, its Executive Directors, or the countries they represent.	

Indicator Name	Long definition	Source	Methodology
Voice and Accountability: Estimate	Voice and accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Detailed documentation of the WGI, interactive tools for exploring the data, and full access to the underlying source data available at www.govindicators.org.The WGI are produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank Development Research Group). Please cite Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430	

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Indicator Name	Long definition	Source	Methodology
Rural population (% of total population)	Rural population refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population.	World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision.	Rural population is + calculated as the difference between the total population and the urban population. Rural population is approximated as the midyear nonurban population. While a practical means of identifying the rural population, it is not a precise measure. The United Nations Population Division and other agencies provide current population estimates for developing countries that lack recent census data and pre- and post-census estimates for countries with census data.

Indicator Name	Long definition	Source	Methodology
GDP per capita, PPP (constant 2017 international $)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the country plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation	International Comparison Program, World Bank | World Development Indicators database, World Bank | Eurostat-OECD PPP Programme.	For the concept and methodology of 2017 PPP, please refer to the International Comparison Program (ICP)'s website (https://www.worldbank.org/en/programs/icp).

Indicator Name	Long definition	Source	Methodology
	of natural resources. Data are in constant 2017 international dollars.		
Gross domestic savings (% of GDP)	Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption).	World Bank national accounts data, and OECD National Accounts data files.	[3]

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[3] Retrieved from World Bank Database (2022)

Indicator Name	Long definition	Source	Methodology
Borrowers from commercial banks (per 1,000 adults)	Borrowers from commercial banks are the reported number of resident customers that are nonfinancial corporations (public and private) and households who obtained loans from commercial banks and other banks functioning as commercial banks. For many countries data cover the total number of loan accounts due to lack of information on loan account holders.	International Monetary Fund, Financial Access Survey.	Borrowers from commercial banks denotes the total number of resident customers that are nonfinancial corporations (public and private) and households who obtained loans from commercial banks for every 1,000 adults in the reporting country. It is calculated as (number of borrowers)*1,000/adult population in the reporting country.
Saved any money in the past year, female (% age 15+)	The percentage of respondents who report personally saving or setting aside any money for any reason and using any mode of saving in the past 12 months., female (% age 15+).	Global Findex database	

Indicator Name	Long definition	Source	Methodology
Employment in agriculture, female (% of female employment) (modeled ILO estimate)	Employment is defined as persons of working age who were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement. The agriculture sector consists of activities in agriculture, hunting, forestry and fishing, in accordance with division 1 (ISIC 2) or categories A-B (ISIC 3) or category A (ISIC 4).	International Labour Organization, ILOSTAT database. Data retrieved on January 29, 2021.	The International Labour Organization (ILO) classifies economic activity using the International Standard Industrial Classification (ISIC) of All Economic Activities, revision 2 (1968), revision 3 (1990), and revision 4 (2008). Because this classification is based on where work is performed (industry) rather than type of work performed (occupation), all of an enterprise's employees are classified under the same industry, regardless of their trade or occupation. The categories should sum to 100 percent. Where they do not, the differences are due to workers who are not classified by economic activity. The series is part of the ILO estimates and is harmonized to ensure comparability across countries and over time by accounting for

Indicator Name	Long definition	Source	Methodology
			differences in data source, scope of coverage, methodology, and other country-specific factors. The estimates are based mainly on nationally representative labor force surveys, with other sources (population censuses and nationally reported estimates) used only when no survey data are available.
Employment in industry, female (% of female employment) (modeled ILO estimate)	Employment is defined as persons of working age who were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement. The industry sector consists of		The International Labour Organization (ILO) classifies economic activity using the International Standard Industrial Classification (ISIC) of All Economic Activities, revision 2 (1968), revision 3 (1990), and revision 4 (2008). Because this classification is based on where work is performed (industry) rather than type of work performed (occupation), all of an enterprise's employees are classified under

Indicator Name	Long definition	Source	Methodology
	mining and quarrying, manufacturing, construction, and public utilities (electricity, gas, and water), in accordance with divisions 2-5 (ISIC 2) or categories C-F (ISIC 3) or categories B-F (ISIC 4).		the same industry, regardless of their trade or occupation. The categories should sum to 100 percent. Where they do not, the differences are due to workers who are not classified by economic activity. The series is part of the ILO estimates and is harmonized to ensure comparability across countries and over time by accounting for differences in data source, scope of coverage, methodology, and other country-specific factors. The estimates are based mainly on nationally representative labor force surveys, with other sources (population censuses and nationally reported estimates) used only when no survey data are available.

Indicator Name	Long definition	Source	Methodology
Employment in services, female (% of female employment) (modeled ILO estimate)	Employment is defined as persons of working age who were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement. The services sector consists of wholesale and retail trade and restaurants and hotels; transport, storage, and communications; financing, insurance, real estate, and business services; and community, social, and personal services, in accordance with divisions 6-9 (ISIC 2) or categories G-Q (ISIC 3) or categories G-U		The International Labour Organization (ILO) classifies economic activity using the International Standard Industrial Classification (ISIC) of All Economic Activities, revision 2 (1968), revision 3 (1990), and revision 4 (2008). Because this classification is based on where work is performed (industry) rather than type of work performed (occupation), all of an enterprise's employees are classified under the same industry, regardless of their trade or occupation. The categories should sum to 100 percent. Where they do not, the differences are due to workers who are not classified by economic activity.

The series is part of the ILO estimates and is harmonized to ensure comparability across countries and over time by accounting for |

Indicator Name	Long definition	Source	Methodology
	(ISIC 4).		differences in data source, scope of coverage, methodology, and other country-specific factors. The estimates are based mainly on nationally representative labor force surveys, with other sources (population censuses and nationally reported estimates) used only when no survey data are available.
Rural population, female (% of total)	Female rural population is the percentage of females who live in rural areas to total population.	Estimates of the United Nations urban and rural population by sex is based on the 2014 revision of World Urbanization Prospects (WUP) for urban and rural population and the 2012 revision of World Population Prospects (WPP) for total population by age and sex for all countries or territories in the world.	

Indicator Name	Long definition	Source	Methodology
Borrowed from a financial institution, female (% age 15+)	The percentage of respondents who report borrowing any money from a bank or another type of financial institution in the past 12 months, female (% age 15+)	Global Findex database	

Note: The definition, source and methodology is taken from the "Series-Meta data" section of the downloaded excel files

Joint   significance test for Government expenditure on education, total (% of GDP), Domestic general government health expenditure (% of GDP), and General government final consumption expenditure (% of GDP)

$F(3, 71) = 2.45$

Prob > F =   0.071

Joint   significance test for Foreign direct investment, net inflows (% of GDP), Trade (% of GDP), and Log of net official development assistance received (constant 2018 US$)

$F(3, 68) = 2.27$

Prob > F =   0.088

Joint   significance test for Agriculture, forestry, and fishing, value added (% of GDP), Manufacturing, value added (% of GDP), Services, value added (% of GDP), and Industry (including construction), value added (% of GDP)

$F(4, 68) = 6.99$

Prob > F =   0.0001

Joint   significance test for Control of Corruption: Estimate, Government Effectiveness: Estimate, Political Stability and Absence of Violence/Terrorism: Estimate, Rule of Law: Estimate and Voice and Accountability: Estimate

$F(5, 68) = 1.68$

Prob > F =   0.151

Joint   significance test for Log GDP per capita, PPP (constant 2017 international $), and Gross domestic savings (% of GDP)

$F(2, 68) = 22.81$

Prob > F =   0.0000

Joint   significance test for Rural population (% of total population)

F (1, 68) =   7.13

Prob > F =   0.0095

Correlation Results

Table 8 Correlation between FI and MI

	Financial institution intensity	Microfinance intensity of female borrowers
Financial institution intensity	1	0.09
Microfinance intensity of female borrowers	0.09	1

Table 9 Correlation between MI using male and female borrowers

	Microfinance intensity of male borrowers	Microfinance intensity of female borrowers
Microfinance intensity of male borrowers	1	0.506
Microfinance intensity of female borrowers	0.506	1

Hypothesis testing

Table 10 shows how of microfinance intensity can affect female population's behaviour within a country over time. The indicators selected to analysis the behaviour is the female's saving habit, spatial population density i.e., whether female move to urban area from rural areas or not, employment sector of the female population. The estimates below show that lagged of microfinance intensity is not significant with any of the stated outcome variables.

Table 10 Further tests

VARIABLES	(1) % of Savings made by female	(2) % of Rural female population	(3) % of female in agricultural sector	(4) % of female in industrial sector	(5) % of female in service sector
Lagged Microfinance intensity	-156.3	1.042	-8.402	2.058	6.34
	[134.7]	[3.400]	[9.923]	[6.305]	[7.630]
Female to male active borrower ratio	-0.139	-0.0004	-0.0002	0.0007	-0.0005
	[0.084]	[0.0003]	[0.001]	[0.0006]	[0.001]
Government expenditure on education, total (% of GDP)	-0.659	0.054	-0.495	-0.093	0.589
	[1.764]	[0.093]	[0.419]	[0.141]	[0.391]
Domestic general government health expenditure (% of GDP)	0.472	0.139	1.045**	-0.519***	-0.526
	[4.554]	[0.092]	[0.508]	[0.191]	[0.480]
General government final consumption expenditure (% of GDP)	2.847**	-0.063**	0.0437	0.025	-0.069
	[1.332]	[0.031]	[0.187]	[0.062]	[0.161]
Foreign direct investment, net inflows (% of GDP)	-0.446	0.045***	-0.029	0.014	0.015
	[0.974]	[0.014]	[0.103]	[0.029]	[0.080]
Trade (% of GDP)	0.0749	-0.010*	-0.044	0.026**	0.018
	[0.166]	[0.005]	[0.030]	[0.012]	[0.025]
Log of net official development assistance	0.526	-0.280**	-0.575	-0.040	0.615

VARIABLES	(1) % of Savings made by female	(2) % of Rural female population	(3) % of female in agricultural sector	(4) % of female in industrial sector	(5) % of female in service sector
received (constant 2018 US$)					
	[1.559]	[0.111]	[0.425]	[0.121]	[0.400]
Agriculture, forestry, and fishing, value added (% of GDP)	0.438	-0.021	0.270*	-0.130***	-0.14
	[1.127]	[0.012]	[0.156]	[0.047]	[0.162]
Manufacturing, value added (% of GDP)	-0.746	-0.030	0.070	0.223**	-0.293
	[1.717]	[0.039]	[0.264]	[0.105]	[0.211]
Services, value added (% of GDP)	0.868	0.006	0.037	-0.071	0.034
	[0.723]	[0.005]	[0.076]	[0.049]	[0.108]
Industry (including construction), value added (% of GDP)	0.975	0.001	0.119	-0.090*	-0.028
	[0.907]	[0.025]	[0.108]	[0.051]	[0.117]
Log of GDP per capita, PPP (constant 2017 international $)	29.49	-0.511	-13.05***	3.319***	9.736***
	[21.93]	[0.560]	[3.849]	[1.101]	[3.461]
Gross savings (% of GDP)	0.0964	-0.021**	-0.005	0.025	-0.021
	[0.382]	[0.010]	[0.067]	[0.027]	[0.054]
Rural population (% of total population)	4.074**	0.426***	0.21	0.174*	-0.384*
	[1.720]	[0.045]	[0.283]	[0.091]	[0.221]
Constant	-497.5*	15.06*	130.8***	-17.72	-13.1
	[250.5]	[7.598]	[42.18]	[13.95]	[36.54]
Observations	91	139	748	748	748

VARIABLES	(1) % of Savings made by female	(2) % of Rural female population	(3) % of female in agricultural sector	(4) % of female in industrial sector	(5) % of female in service sector
R-squared	0.41	0.883	0.465	0.219	0.534
Number of Countries	55	64	74	74	74

Clustered standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Note. All the estimates are obtained using ordinary least square regression with a set of dummy variables for countries.

Standard errors were clustered by countries.

Microfinance industry by loan distribution

Table 11 Regression estimates with gross loan disbursement

VARIABLES	(1) Loans disbursed per borrower
Lagged Microfinance intensity through loans disbursed	-0.000
	0
Female to male active borrower ratio	000
	0
Government expenditure on education, total (% of GDP)	0.004*
	[0.002]
Domestic general government health expenditure (% of GDP)	-0.006
	[0.005]
General government final consumption expenditure (% of GDP)	-0.0005
	[0.001]
Foreign direct investment, net inflows (% of GDP)	0.0003*
	[0.0002]
Trade (% of GDP)	0.0002
	[0.0002]
Log of net official development assistance received (constant 2018 US$)	0.002
	[0.002]
Agriculture, forestry, and fishing, value added (% of GDP)	0.001
	[0.001]
Manufacturing, value added (% of GDP)	0.001
	[0.001]
Services, value added (% of GDP)	0.001*
	[0.0003]
Industry (including construction), value added (% of GDP)	0.001
	[0.001]
Log of GDP per capita, PPP (constant 2017 international $)	-0.092**

VARIABLES	(1) Loans disbursed per borrower
	[0.025]
Gross savings (% of GDP)	-0.0003
	[0.0003]
Rural population (% of total population)	0.004**
	[0.002]
Constant	0.943***
	[0.280]
Observations	432
R-squared	0.48
Number of Countries	65

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1