



How do loan officer-borrower gender-driven behavioural differences impact on the microfinance lending market?

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ABSTRACT

This paper analyses the impact of the gender of the loan officer-borrower pair on the loan-size, credit availability and time spent in managing the credit application. By using 3,020 lending transactions from Ecuador during 2016–2019, we document that the loan officer-borrower pair gender drives differences in the microcredit portfolio management. We find that female loan officers grant smaller microcredits to both male and female borrowers. However, the loan-size increases when matching the loan officer-borrower gender. We also demonstrate that female loan officers have greater loan approval rates, mainly in the segment of higher loan-sizes granted to male clients. Finally, our results show that the microcredits that have the fastest evaluation process are those that have a lower loan-size and are granted by female loan officers to female borrowers. Our findings have practical implications for the analysis of the credit availability for entrepreneurs as well as the loan portfolio management.

1. Introduction

Entrepreneurship plays a leading role in the growth, innovation and dynamism of an economy while favouring the social and regional cohesion of the population by alleviating poverty (Bams et al., 2021; Lin et al., 2020; Wainwright & Muñoz, 2020). However, entrepreneurs have been traditionally suffering a severe credit crunch that limits their access to funding and hampers the development of their venturing projects (Bams et al., 2021; Quigley & Patel, 2022). This credit constraint is enhanced (i) in developing environments due to the absence of quality accounting information and credit bureaus that synthesise the historical behaviour of the borrowers (Feigenberg et al., 2013; Ruiz et al., 2022) and, also (ii) for (vulnerable) female credit applicants since the socio-cultural prejudices have associated businesswomen with a lower ability to efficiently address entrepreneurial tasks (Ibañez & Guerrero, 2021; Wheadon & Duval-Couetil, 2019). Indeed, the socio-cultural factors that restrict funding to women entrepreneurs in developing contexts are mainly related to the obstacles from religious and cultural norms that prevent women benefitting from social capital (Al-Dajani et al., 2015; Oppedal-Berge & Garcia-Pires, 2020).

In this challenging context, microfinance emerges as an economic

paradigm to poverty alleviation through funding entrepreneurial initiatives amongst the impoverished population, mostly focused on the female population (Doering & Wry, 2022). Essentially, microfinance contributes to enhancing the (poor) women's empowerment and emancipation through funding entrepreneurship (Alawattage et al., 2019; Bousslah et al., 2018). Microfinance therefore carries out a crucial task since the literature on women entrepreneurship highlights that the limited access to capital and discrimination when applying for loans are the most frequently discussed barriers to venturing (Berglund & Johansson, 2007).

In practice, in the lending market there are two types of gender bias: the first one caused by stricter lending criteria (Quigley & Patel, 2022) and the second linked to worse lending conditions (Cozarenco & Szafarz, 2018). These inequalities are reduced by microfinance institutions (hereafter, MFIs) despite that face severe opacity of information in the assessment of credit applicants. Note that the (micro) loans are granted exclusively based on the social capital of the entrepreneurs due to the lack of creditworthy and economic guarantees (collaterals) of their target population (Lindvert et al., 2017). Accordingly, in microfinance the final lending decisions continue to lie entirely with the intuition and expertise of the loan officers (Trönnberg & Hemlin, 2014). For this, loan

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officers to spend most of the working day capturing non-quantitative (soft) information and screening the (micro) entrepreneurs (Aktaruzzaman & Farooq, 2023). As sustained by Blanco-Oliver et al. (2021), the loan officer's job is predominately relational and is grounded on the interpersonal interactions with borrowers based on limited information. In other words, MFIs implement relational banking, a lending approach based on relational contracts; that is, on the informal relationship arising between people (loan officers and borrowers) who set, interpret, enact, and enforce formal contracts (Lindvert et al., 2018).

In this framework gender arises as a transversal and intangible factor that catalyses socio-cultural variables and governs the behaviour of loan officers regarding both their loan portfolio management and the trusted relationships that develop with the borrowers. In this vein, Booth et al. (2019) suggest that the behaviour of individuals varies depending on the gender of the counterpart. Accordingly, the gender effect acquires special relevance in the microfinance where the lending transactions are extremely trust intensive (Duarte et al., 2012). Thus, it is not surprising that MFIs' loan officers incorporate their subjective preferences via gender bias in loan granting decisions.

Therefore, to provide a more complete understanding of the gender effect in entrepreneurial financing, we explore how the gender of the loan officer-credit applicant pair impact on the funding access (loan-size, credit availability and time spent by loan officer in managing the credit application) of the borrowers from a developing environment. Essentially, we test whether in loan transactions a gender affinity emerges between the loan officer and borrowers that encourages or obstructs the funding of venturing projects. Thus, we simultaneously analyse the lending transaction in its entirety, providing a more encompassing view of the impact of gender in the funding of entrepreneurial initiatives from poor populations in developing countries.

To do this, we use a dataset from a leading Ecuadorian MFI with nationwide coverage that funds to (very) small businesses in rural and marginal urban areas. A total of 3,020 lending transactions managed by 174 branches of BanEcuador BP during the period from 2016 to 2019 constitutes our sample. It is worth highlighting as one of the core strengths of the present study the use of a unique dataset with information of credit operations at an item level (loan-level data), where it is possible to match each loan officer and borrower to investigate how the gender of both counterparts impacts on the loan portfolio management.

This paper contributes to the microfinance and entrepreneurship literature highlighting the gender as a main driver of funding entrepreneurial initiatives in developing countries. In this vein, previous research calls for further research on how banks convert trust into credit decisions (Kautonen et al., 2020). The present study responds to this call by exploring how the gender affinity of the loan officer-credit applicant pair reinforces the interpersonal and true-intensive relationships based on the mutual confidence between both sides of the lending transactions in developing environments. This is definitively the foundation upon which lies the funding of poor micro entrepreneurs. That is, unlike the previous works focused on the banking sector, this research is framed within the singular institutional environment of microfinance that is dominated by the complete lack of financial information from borrowers, lower corporate governance standards and patriarchal gender patterns typical of developing countries. Furthermore, we study the gender of the both parties of the lending transactions (the loan officer-borrower pair) at the same time and not separately as is customary in the literature. Therefore, this research brings novel findings that support and update the similarity-attraction (Byrne, 1971), and self-identity and self-categorisation theories (Turner, 1982) that posit that same-sex pairs tend to better build confidence relationships based on social capital and relational contracts in comparison with opposite-sex pairs. Our findings therefore have relevant implications for the funding of the new businesses of poor entrepreneurs as well as the loan portfolio management and credit evaluation that MFI loan officers perform.

The rest of the paper is structured as follows. Section 2 describes the

study's theoretical background and hypotheses. Section 3 details the data set used for the empirical analysis and the methodology. Section 4 presents the results and discussion, and Section 5 sets out the conclusions.

2. Theoretical background and hypotheses

The risk tolerance gap leads to men and women performing different behaviours that have a special influence on business decision-makings and particularly on the economic-financial issues where women adopt strategies to minimise the variance (Hillesland, 2019). The literature sustains that there are also socio-cultural grounds that lead to gender-driven behavioural differences being considered environment-dependent; that is, there is a powerful influence of the socio-cultural context that constrains female attitudes (Friedl et al., 2020). Socio-cultural variables explain why in certain societies - those normally defined as patriarchal, i.e., with societal arrangements and costumes dominated by men - women face greater barriers in terms of equality and professional opportunities (Quigley & Patel, 2022). In these challenging environments, women have a historical, entrenched inferior standing in relation to men, which is then usually perpetuated through the socialisation process that fuels competition in the relationship between opposite genders (Andersen et al., 2013). Accordingly, Kahan et al. (2007) suggest that risk attitudes may be remarkably determined by women's relative positions in social, political, and economic hierarchies. Nevertheless, more research is needed to deeply understand how socio-cultural factors affect the relationship between gender and risk given that the results of the bulk of the previous research are mainly based on gambling studies (Nelson, 2015).

Therefore, there are robust theoretical arguments to assume that the gender of the loan officers is a relevant variable that affects loan portfolio management, especially in the microfinance sector. In fact, Beck et al. (2018) find that own-gender preferences alter the supply of and demand for credit, causing a gender bias in the behaviour of loan officers. The conservative behaviour of female loan officers is determined by factors related with the historical discrimination against women in the labour market. Accordingly, the traditional underrepresentation of women in the managerial positions of financial intermediaries explains why female executives adopt more conservative decisions with the goal of avoiding compromising their precarious labour status occupying leadership roles (Lindquist & Säve-Söderbergh, 2011). Basically, women have fewer executive employment options, and thus female loan officers would be more incentivised to screen and monitor loans and borrowers' behaviour in a more restrictive manner, which leads to attaining lower credit risk levels in their loan portfolio. The findings of Egan et al. (2017) support the existence of a gender discrimination in the labour environment that is grounded in the theory of differential punishment based on gender. They suggest that there is a double-standard policy since, after a potential misconduct, female financial advisors are more likely to lose their job than men. Conversely, as Niederle and Vesterlund (2007) sustained, male loan officers exhibit their greater power as well as superior social and labour status by competing with their peers. This results in assuming higher credit risk levels in their loan portfolio management and highlights the male overconfidence bias when screening and monitoring loans in comparison with their female counterparts.

To further study the gender effect on loan portfolio management, the institutional framework and the socio-cultural characteristics of each country should also be taken into consideration. As Bharath et al. (2009) suggested in patriarchal societies male loan officers potentially possess a stronger standing vis-à-vis borrowers, regardless of the latter's gender, and are, therefore, capable of better monitoring and disciplining borrowers. In this context, male loan officers develop a loan portfolio management based on higher overconfidence levels that result in a greater credit risk assumption. Seen from the opposite perspective, this means that female loan officers are likely to perform a more

conservative management than their male counterparts because they face country-specific societal barriers in the exercise of their monitoring duties and in the enforcement of sanctions on male borrowers. Given that these arguments are applicable to a greater extent in the microfinance industry since MFIs operate mainly in developing environments where patriarchal attitudes are more likely to occur (Duflo, 2012), we assume that female loan officers should work towards a conservative policy based on the reduction of the credit risk levels of loan portfolio management.

Based on previous argument about loan officers' gender and considering three indicators related to the credit risk management of the loan portfolio such as loan size, loan approval rate, and time spent approving loans, the following hypotheses are put forward in this research.

Firstly, we assume that female loan officers grant smaller-sized loans than their male counterparts. Note that the loan amount is directly related to the loss given default (LGD), that is the amount of money that a lending intermediary loses when a borrower defaults on a loan (Mason, 2014). For this reason, given the greater risk-aversion of women, female loan officers grant (very) small loans that enable them to decrease the LGD as well as to continuously monitor borrowers (usually each week) and offer them progressively increasing loans after timely repayments (Cecchi et al., 2021). Therefore, our first hypothesis posits.

Hypothesis 1. (H₁): Female loan officers grant smaller-sized loans than their male counterparts.

Secondly, we consider that the loan approval rate as another indicator of loan-officer performance that can be influenced by gender due to two reasons. On the one hand, the loan approval rate measures the credit risk that loan officers face. As lending industry logic sustains, a higher approval rate would lead to higher credit risk in terms of a greater LGD because there are more loans approved than denied. Indeed, greater loan approval rates are linked to laxer attitudes to risk -that is, with less risk-aversion- by loan officers (Nguyen et al., 2019). In other words, loan officers with high approval rates are more apt to grant microcredits, despite MFIs operating in an informational opacity environment where there is a total absence of credit bureaus and without financial collateral, as customary in developing countries (Ruiz et al., 2022). Accordingly, given that riskier behaviours often occur with men, it is therefore likely for female loan officers to have lower loan approval rates than their male counterparts.

On the other hand, unlike traditional banking, in microfinance institutions the loan approval rate is also a measure of a loan officer's social commitment since the granting of a microcredit has the ultimate objective of helping the borrower to get out of the situation of poverty and social exclusion in which he/she lives. One recalls, as in Kang et al. (2019), that microfinance is an economic development tool for poverty reduction, especially focused on serving women as they are the most disadvantaged population group (Brickell et al., 2020).

Accordingly, in evaluating each microcredit, the loan officer is faced with two opposing forces: (i) the assumption of the credit risk derived from the granting of the loan; and (ii) the possibility of helping the borrower to improve his/her quality of life and get out of social exclusion. In other words, in the loan evaluation process there is a trade-off between the benefits for the borrower in terms of improved welfare and the losses, in case of default, that the MFI would face. This trade-off faced by the loan officer when approving a microloan is particularly influenced by gender. Not only because risk is a gender-dependent variable, but above all because of the social factors surrounding microfinance, which are also influenced by gender. In this sense, social preference theory (Gilligan, 1982) argues that women are more sensitive to social cues and therefore adjust their behaviour more appropriately to the social factors in their environment. Indeed, previous research argues that women have higher levels of altruism (Güth et al., 2007), as well as a greater aversion to inequality (Friedl et al., 2020). Consequently, female loan officers are more likely to have higher microcredit approval

rates than their male counterparts.

Therefore, the loan approval rate is influenced by two factors that depend on the loan officer's gender with opposite effects. Given that microfinance is a lending industry based on social commitment to borrowers, we consider that social commitment will prevail in female loan officers and that therefore they will have higher loan approval rates than their male counterparts. Accordingly, our second hypothesis states that.

Hypothesis 2. (H₂): Female loan officers have higher loan approval rates than their male counterparts.

Thirdly, we also include the time spent on evaluating and approving the loans. There are several causes that support a positive relationship between female loan officers and time spent on evaluating loans. First, as previously argued, women are more risk-aversion than men. The main implication of this is that female loan officers need to carry out more checks in their lending transactions due to being prepared to assume lower risk levels. Second, the need of more time to evaluate each loan could be also related to less time dedicated to the female loan officers' jobs since women prioritise family tasks (Blanco-Oliver et al., 2021). As argued previously, the microfinance industry is a true-intensive lending activity based on the social capital of the borrower with whom the loan officers establish close interpersonal relationships that enable them to screen and discipline the credit applicants (Czura et al., 2022). However, building a relational lending system implies spending a long time visiting, collecting soft information, and developing trusted relationships with the borrowers before making a decision regarding the loan-approval, and this would disincentivise women who prioritise their responsibility for childcare and domestic work over spending time developing relational contracts with the borrowers (Van der Lippe, 2007). Third, another factor that also supports the greater time spent by female loan officers when evaluating loans is associated with following the MFIs' general rules and internal guidelines. The psychological literature sustains that women follow the rules more often than men (e. g., see Egan et al., 2017; Sarsons, 2017). This implies that female loan officers spend more time doing bureaucratic tasks and writing reports to their supervisors. Accordingly, addressing the regulatory compliance required by the MFIs and financial authorities, which is performed in a greater extent by female loan officers, leads to employing more time evaluating the loans. Fourth, there are also labour-related reasons that explain why female loan officers are more cautious and spend more time evaluating the credit applicants. As Moltalvo and Reynal-Querol (2021) suggested, women perceive a gender bias in terms of a mistake-punishment since female errors drive harsher consequences than those of men. In fact, women discern a gender bias in mistake-punishment terms since female errors spur severer consequences for them. Accordingly, female loan officers carry out a more careful screening of the loan applicants with the goal of avoiding negative professional implications in terms of worse status recognition and ability for the job-position that harm their career advancement, or even the maintaining of their position.

However, contrary to what has been said above, there is also a powerful argument that supports the existence of a negative effect of female loan officers on the time needed to approve microcredits. This negative influence revolves around the greater efficiency levels of female loan officers in comparison with their male counterpart. Unlike the traditional banking industry where the evaluation of all the loans is based on quantitative data from credit scoring systems, in microfinance the loan officers have different information in function of their capacity to capture soft information from the borrowers. Whereby, female loan officers have greater skills (that is, they are more efficient) to set and keep informal relationships and relational contracts with the borrowers through which they obtain non-quantitative information. However, this greater efficiency is not with all borrowers, but only with female borrowers due to a gender affinity arising (Blanco-Oliver et al., 2021). As Agier and Szafarz (2013) suggested, there is likely to be a gender bias in encouraging the granting of loans between female loan officers and

female borrowers. Theoretically, previous research posits that in the assessment procedures the errors are minimised whenever the evaluators have a similar cultural background to that of the people being evaluated (Gompers et al., 2016). In this vein, similarity-attraction theory states that individuals are attracted to others with whom they share similarities. Also, the relational demography theory posits that similarities among people may affect work-related outcomes (Foley et al., 2006). Similarly, social identity and social categorisation theories also support the existence of a gender affinity between loan officers and credit applicants. Both theoretical frameworks sustain that individuals tend to classify themselves and others based on social factors such as gender, age and religion. This has a relevant practical implication for the lending industry: if the loan officers wish to increase their performance in their job-position they should reduce their cultural and personnel differences with the loan applicants.

There are another two arguments that favour that in the micro-finance sector female loan officers are discouraged from granting to male borrowers: (i) the greater difficulty of monitoring them and (ii) the higher credit risk of male borrowers due to their lower repayment rates. Regarding the first point, Kosny and MacEachen (2010) find that the authority of female loan officers may be publicly challenged whenever they are regarded to be breaking unspoken femininity rules, as happens with the aggressiveness in loan collection that is an efficient strategy but is perceived as an expression of masculinity. With respect to the second aspect, d'Espallier et al. (2011) find that female borrowers have higher loan repayment rates that evidently results in a lower loan portfolio credit risk. Accordingly, female loan officers prefer to grant more loans to female borrowers since this reduces the loan portfolio credit risk managed. The increase of approval rates of female applicants implies another positive indirect effect on female loan officers: a better performance in their job-position, in terms of a lower loan portfolio risk, that will benefit them due to a greater labour prestige and status in the structure of the MFIs. Therefore, our third hypothesis states that.

Hypothesis 3. (H₃): Female loan officers spend less time on approving loans than their male counterparts when the borrower is a woman.

3. Data, variables and methodology

3.1. Context of the study

The poorest areas from Ecuador were the context that enabled us to gain insights into the aforementioned research questions. Ecuador is a Latin American middle-income country with a population of 17.888 million people -growing annually on average by 1.4% and 50.5% being women-where a third of the population lives in rural areas. 6.5% of the Ecuadorian population live under the income poverty line (at USD 2.5 a day) and the GDP per capita is USD 5,934.90 (growing annually by 4.2%). Currently, Ecuador is one of the South American economies with the lowest inflation rate (0.10% annual), in part due to this country being considered a dollarised economy with a strong institutional environment, a stable political framework and a high trust in the public administrations.¹

The Ecuadorian business fabric is mainly formed by small and medium-sized enterprises (SMEs) that have a leading role in the creation and preservation of employment, rural economic development, and social cohesion. Indeed, 99% of the 900,000 businesses of Ecuador are SMEs - 90% are microenterprises with fewer than 10 employees-that create 60% of all jobs. Nevertheless, despite this economic relevance, as happens in most countries worldwide, (very) small firms often face challenging tasks, such as a dependence on funding, a greater impact of adverse macroeconomic shocks and a lack of professionalised and

experienced management structures. Consequently, the last decade has seen a remarkable institutional support for entrepreneurship, through actions that foster an entrepreneurial culture and innovation. However, the challenge for the Ecuadorian government is to improve its positioning in the Doing Business Index since Ecuador ranks 129th out of 190 countries (57.7 points). Within Latin America, Ecuador is in twelfth place, after Brazil.

In parallel to this micro entrepreneurship boom, Ecuador has developed a microfinance industry that has a higher relevance within the lending intermediation sector. This importance has been increasing during the last two decades, in which the representation of the gross microcredit portfolio grew from 1.56% (62.22 million USD) in July 2002 to 15.31% (5,799.86 million USD) in March 2018. That is, the volume of the gross microcredit portfolio increased by 9221% in the period 2002–2018, implying an annual growth rate of 576.3% on average. Note that, in accordance with MixMarket (a global platform for microfinance data), Ecuador ranks among the top five in terms of total microcredit portfolios and number of active borrowers in Latin America and the Caribbean. As a result, the Total early-stage Entrepreneurial Activity (TEA) in Ecuador, which measures the percentage of the population between 18 and 64 years that is an owner of a new business, has remained greater than 20% during the period 2010–2019. The sectors that have concentrated the highest microcredit demand are: (i) agriculture, livestock, forestry, and fishing (25.20%), (ii) wholesale, retail trade, repair of motor vehicles and motorbikes (21.56%) and (iii) administrative and support service activities (17%).

From the socio-cultural point of view, Ecuador has a large indigenous population with centuries old traditions that still linger. In Ecuador, the majority religion is Catholicism (over 80% of the population) and the traditional Catholic family, with the male head of household, is the most prevalent structure. In fact, only 13.2% of households are headed by women. This implies that Ecuador can be considered a patriarchal society in which women remain in a subordinate role, excluded from economic activities. In practice, women's role is mostly to serve their husbands, do the household chores and look after children. For this reason, women are financially dependent on men, who occupy the key top positions in both private organisations and the public administration. In this environment, authorities, through financial programmes such as microfinance, have focused on empowering women and funding women-owned venturing businesses.

3.2. Data and variables

3.2.1. Data

We use a unique dataset from BanEcuador BP, an Ecuadorian MFI founded in 2015 as a public lending institution and centered on funding micro-enterprises and (very) small businesses. BanEcuador BP is the second most important entity in the microfinance market of Ecuador, having a market share of 24.8%, representing 99% of the public financial sector. Currently, BanEcuador BP operate through 174 agencies in all parts of the country, many of them located in rural areas since, like other MFIs, they need to achieve a high social impact on the population while performing financially self-sustainable lending activities.

We analyse 3,020 microcredit transactions offered by BanEcuador BP to both men and women who ran a business during the period from 2016 to 2019. The data come from the 24 provinces that make up Ecuador; that is, we work with national data, and thus there is not any bias with respect to the socioeconomic situation of one or several provinces that predetermines our results. We use data at the loan-level; that is, each loan officer-client pair is studied in isolation. Note that this is one of the main strong points of this research since the access to this type of information is very limited, to yet a greater extent in the microfinance context. Only a few previous studies have analysed concerning a specific lender (Beck et al., 2013, 2018; Bellucci et al., 2010; Schmit & Marrez, 2010), but most of them are referenced to commercial banking. The 3, 020 observations that constitute our sample are all the loan transactions

¹ Source of these data: World Bank Open Data. <https://data.worldbank.org/country/ecuador?view=chart>.

managed by BanEcuador during the research period whose target population is namely “Organisations of Popular and Solidarity Economy”, which are the businesses that are specifically operating in the microfinance sector.

Regarding loan allocation policy, BanEcuador BP practices ‘zonification’; that is, a random assignment, for each geographic area (branch), of each loan application to a loan officer. Note that the loan officers are placed in a sole branch with the goal of a full knowledge of the target market and social capital (personal reputation and social standing) of the borrowers. Moreover, the question related to the loan officer position is that their salary is independent of the number of approved loans since, as BanEcuador is a public institution, the salary of each job position is regulated and fixed. Accordingly, loan officers are not either biased in their decision-making or incentivised to grant more loans. Hence, potential endogeneity problems deriving from reversed causation or self-selection are here solved since the loan officer allocation is irrespective of gender.

The entire credit evaluation process of BanEcuador is described below. To access to a microcredit, the credit applicants must pass an initial socioeconomic diagnostic form that is performed by the administrative workforce of BanEcuador, in situ; that is in the business that aspires to be funded.

The initial diagnostic form is comprised of the organisational, operational, and financial data of the credit applicants. To pass to the next step of the credit evaluation it is necessary to obtain a minimum score of 70 points out of 100 in the initial diagnostic. Otherwise, the credit applicant is added to a special programme to reinforce the business areas which have had the lowest scores. Basically, this programme can be considered training and mentoring sessions that BanEcuador imparts to the credit applicants to improve their competitive position in the market, which indirectly also benefit the lender (MFI) since the more competitive the business of the borrower is, the lower the credit risk supported by BanEcuador. Once having finished this programme, the credit applicant is again evaluated with the initial diagnostic form.

When the result of the initial diagnostic is more than 70 points out of 100, the credit application is randomly assigned to a loan officer -essentially, the credit application is taken by the loan officer that is free at this moment or has a lower workload.

The first time, the loan officer meets with the credit applicant in the MFI’s offices and then the meetings are performed where the borrower develops their business activity. The main reason for carrying out this initial evaluation in situ is to collect the highest soft information (socio-professional networks and skills, ability to negotiate contracts, and proactive business and entrepreneurial attitudes) from borrowers due to the lack of hard data (credit bureaux, financial statements, tax declarations, etc.), as is customary in the microfinance environment. Consequently, the loan officers spend much time with the credit applicants and thus it is likely that gender affinity drivers arise between the two of them. The following step is the preparation of a credit evaluation report where the loan officer detailed analyses all the aspects of the loan application and makes the decision with respect to the loan approval, or not, establishing further the credit conditions and loan-size, among other matters. Finally, it is important to say that in BanEcuador, like in most financial intermediaries, there is a credit committee that supervises the labour of loan officers but does not influence their daily work.

3.2.2. Dependent variables

This highly detailed dataset is the central core to explore how the different gender combinations of the loan officer-borrower pair impact on the loan-size, credit availability and time spent by the loan officer in managing the microcredit application. Consequently, the three dependent variables used are firmly linked to the microcredit portfolio management by the loan officers who execute the MFI’s strategy but have relevant implications for the funding of the credit applicants and the survival and developing of their entrepreneur idea.

These three variables broadly capture credit risk management in the

microfinance industry. Unlike the majority of the research on credit risk (in both microfinance and traditional financial intermediary industries) that analyses the credit risk by exclusively using variables extracted from financial-accounting statements related to loan delinquency, such as non-performing loan ratio or write-off ratio, in this paper, due to that, we use data from the loan officer-borrower pair for each loan transaction, focusing on non-financial variables associated with the credit risk of loan transactions and their link to the gender. To the authors’ knowledge, this is the first paper that uses these dependent variables extracted from credit transactions where it is possible to analyse the gender of both sides of the credit transaction.

Firstly, the loan-size corresponds to the amount (in USD) of the microcredit grant by the MFI divided by the GDP per capita. From the point of view of the loan officer, this variable acts as an indicator of the risk supported in the lending transaction -as argued previously, a greater loan-size implies higher LGD for the lenders. More importantly, the loan-size also affects the borrowers because it limits the credit access -especially in the low-income groups that is the target population of microfinance, where this is enhanced by a relevant gender bias- and therefore predetermines the investment projects that can be carried out and the ability to be positioned in the market with a competitive business product/service (Kärnä et al., 2021; Kärnä & Stephan, 2022).

Secondly, the credit availability is measured by using the microcredit approval likelihood. A higher loan approval rate is linked to a lower risk-aversion by loan officers, and hence, to a greater credit risk assumption in the loan portfolio management. This is a dummy variable that takes value 1 when the microcredit is granted, and 0 otherwise. Note that the loan approval rate measures the credit facility or propensity of the lenders to grant loans. Accordingly, the loan approval rate crucially affects the risk supported by the MFIs since higher loan approval rates imply laxer attitudes to risk and more credit applications approved and thus more money at risk (Nguyen et al., 2019). Since the main objective of microfinance is to reduce poverty, MFIs try to widen their base of customers (that is, the served population, namely the breadth of outreach) by funding as many people as possible. This causes MFIs to often have higher loan approval rates than commercial banks, and therefore their analysis as a risk measurement in the microfinance sector is crucial.

Thirdly, we employ the time spent (in days) by the officer till the loan approval as another indicator of the credit risk supported by the MFI. Note that the customary policy in microfinance implies the adoption of relational lending strategies that foster an intense ‘high-touch’ field-work, visiting the customers to capture soft information and deeply know their communities and social-familiar networks. Given that this is a time-intensive process, more time spent by the loan officer collecting information to evaluate the credit application is associated with a greater lack of information and, hence, with riskier microcredit transactions.

3.2.3. Independent variables

Since the core contribution of this research is linked to analysing the impact of the gender of the loan officer-borrower pair on loan transactions, two dummy independent variables are used: (i) the female loan officer that takes value 1 when the loan officer is a woman and 0 otherwise, and (ii) the female borrower that takes value 1 when the credit applicant is a woman and 0 otherwise.

Finally, we include several control variables related to both the credit applicant as well as the sector and area where the entrepreneurship is going to develop. To do so, first, a dummy variable that indicates whether the loan was granted with financial collateral; second, a variable that indicates the years of expertise of entrepreneurs as borrowers; third, a dummy variable that takes value 0 in the case of the borrower not having previous experience; fourth, a dummy variable to control the location (rural or urban) of the business; fifth, two dummy variables that capture information on if the entrepreneurship is carried out in the agriculture or trading sector, and, finally, a categorical variable that

captures the geographical area (province) where the borrower develops their business activity.

Table A.1. of Appendix A reports the descriptive statistics of the variables used in this research. This table shows that, on average, only 28.58% of the loan applications are granted (that is, 863 microcredits granted out of 3,020 microcredit applications). Also, Table A.1. depicts that, on average, 40.92% of the microcredits are managed by female loan officers and that, on average, 55.15% of the customers of BanEcuador BP are women. Furthermore, Table A.1. reveals that, on average, 83.62% of the credit applicants have previous expertise as borrowers, 25.72% of the customers are located on rural areas and the borrower-lender relationship has existed for 3.8 years. In Table A.2., we report the correlation matrix that suggests that multicollinearity is not a concern.

3.3. Statistical approach

We use a pool linear regression analysis where we regress the loan-size and the time spent on approving the loan on the gender of the loan officers. In contrast, for the dependent variable that measures the loan approval, we use a binary probit model since the approval is a dummy variable that takes value 1 for approval loans, and 0 otherwise. Obviously, for all the models we control for loan transaction characteristics by including several key variables such as whether borrowers are from a rural area, the sector in which they develop their business, their expertise as borrowers and their gender, and personal guarantees

associated with the loan. We therefore apply the following general linear regression model:

$$y_i = \beta_0 + \beta_1 Female\ Loan\ Officer_i + \beta_i X_i + u_i$$

where i subscript denotes each specific loan transaction and the dependent variable, y_i , is the loan-size or time spent in approving the loans. $Female\ Loan\ Officer_i$ is a dummy variable that takes value 1 if the loan officer is a woman and 0 otherwise; X_i is the vector of the control variables of the loan i , and u_i is the error term. The binary probit model is specified in the same way except that the dependent variable is a dummy variable.

Additionally, to test whether in the relationship between loan officers and borrowers there is a gender driver that impacts on their performance, we carry out a second set of regressions where several interaction terms are included. This is performed for the three dependent variables considered in this paper. Therefore, our second baseline estimation is as follows:

$$y_i = \beta_0 + \beta_1 Female\ Loan\ Officer_i \times Female\ Borrower_i + \beta_2 Female\ Loan\ Officer_i \times Male\ Borrower_i + \beta_3 Male\ Loan\ Officer_i \times Female\ Borrower_i + \beta_i X_i + u_i$$

where, the peer male loan officer - male borrower is the omitted category.

Table 1
Main results.

	Linear regression (Model 1)	Linear regression (Model 2)	Probit model (Model 3)	Probit model (Model 4)	Linear regression (Model 5)	Linear regression (Model 6)
	Loan-size	Loan-size	Approval	Approval	Evaluation time	Evaluation time
Female loan officer	-0.8054** (0.3429)		1.1462** (0.5400)		-0.1643*** (0.0628)	
Female borrower	0.2770 (0.3786)		-0.2546 (0.3785)		-0.1369** (0.0659)	
Female loan officer x Female borrower		-1.2060** (0.5586)		0.4026*** (0.1472)		-0.3001*** (0.0921)
Female loan officer x Male borrower		-0.9586* (0.5575)		0.4319*** (0.1243)		-0.1811* (0.0978)
Male loan officer x Female borrower		-0.0940 (0.5044)		0.0332 (0.1115)		-0.1497* (0.0851)
Loan-size			0.0335 (0.0254)	-0.0064 (0.0076)	0.0365*** (0.0077)	0.0365*** (0.0077)
Evaluation time	1.1289*** (0.2306)	1.1943*** (0.2256)				
Borrower rural area (dummy)	-0.4477 (0.4270)	-0.5802 (0.4383)	0.1121 (0.2880)	0.0103 (0.0971)	0.2050*** (0.0718)	0.2045*** (0.0718)
Agriculture sector (dummy)	2.0454** (0.8439)	2.4792*** (0.6445)	-0.7083 (0.5161)	-0.1065 (0.1162)	0.0797 (0.1208)	0.0795 (0.1208)
Trade sector (dummy)	0.9095 (0.6388)	1.5660*** (0.6054)	0.2693 (0.3416)	0.0418 (0.1291)	0.1673 (0.1112)	0.1661 (0.1115)
Borrower expertise (dummy)	0.2276 (0.5987)	0.1107 (0.4858)	0.6173 (0.4139)	2.5346*** (0.1039)	0.0281 (0.0883)	0.0296 (0.0889)
Years expertise borrower	0.2955*** (0.0730)	0.3102*** (0.0486)	0.0065 (0.0349)	-0.0182** (0.0085)	-0.0042 (0.0103)	-0.0041 (0.0103)
Personal guarantee (dummy)	4.5988*** (0.9321)	1.7837*** (0.4715)	0.9061** (0.4167)	-0.2785** (0.1283)	2.8558*** (0.1094)	0.4344*** (0.1104)
Province	0.0745** (0.0349)	0.0860** (0.0339)	-0.0051 (0.0321)	-0.0081 (0.0082)	-0.0006 (0.0055)	-0.0006 (0.0056)
Constant	-6.0159*** (1.3055)	-1.1687 (0.9968)	7.8368*** (1.4391)	-0.9605*** (0.2173)	2.8558*** (0.1659)	2.8615*** (0.1697)
Year	yes	yes	yes	yes	yes	yes
Number of observations	863	863	3,020	3,020	863	863
R-squared (R ²)	0.3330	0.2791	0.5491	0.4965	0.2273	0.2274
Wald Test/F-Test	11.11***	25.27***	83.35***	719.94***	15.81***	14.83***

Note: Standard errors for the slope coefficients are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Table 2
Interaction effect of gender loan officer x loan-size on approval rate and evaluation time.

	Probit model (Model 7)	Linear regression (Model 8)
	Approval	Evaluation time
Female borrower	-0.4274 (0.4275)	-0.1355** (0.0658)
Female loan officer x Loan-size	0.4299*** (0.1202)	0.0346*** (0.0097)
Male loan officer x Loan-size	0.1135*** (0.0345)	0.0393*** (0.0085)
Borrower rural area (dummy)	0.1532 (0.3509)	0.2097*** (0.0720)
Agriculture sector (dummy)	-1.5450*** (0.4693)	0.0913 (0.1217)
Trade sector (dummy)	0.3771 (0.3260)	0.1936* (0.1106)
Borrower expertise (dummy)	0.3899 (0.4549)	0.0316 (0.0887)
Years expertise borrower	0.0330 (0.0294)	-0.0057 (0.0103)
Personal guarantee (dummy)	0.3884 (0.3856)	0.4370*** (0.1106)
Province	-0.0434 (0.0427)	-0.0012 (0.0056)
Constant	10.6181*** (1.8068)	2.7666*** (0.1599)
Year	yes	yes
Number of observations	3,020	863
R-squared (R ²)	0.8596	0.2199
Wald Test/F-Test	74.28***	15.15***

Note: Standard errors for the slope coefficients are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

4. Results and discussion

4.1. Main results

To test our hypotheses, we carry out a set of regressions analyses (Table 1). First, we study the gender effect that the female loan officers have on the loan-size. As shown in column 1 of Table 1, we find that the female loan officers have a negative influence on the loan size. This finding confirms Hypothesis 1 and suggests that female loan officers provide smaller microcredits than their male counterparts. This result is in line with the theoretical background that sustains the lower risk assumption of women in economic decision-making.

As argued previously, our findings can be explained by the higher risk aversion of the female loan officers in comparison with their male counterparts. However, there are also socio-cultural factors which favour the historical gender gap that precludes equality in microfinance environments. There are labour variables which justify why female loan officers avoid managing loan portfolios with a high loan-size. In this vein, the professional skills and technical expertise (professional reputation) of loan officers depend on their non-performing loans rate. That is, on the relationship between the non-performing loans and the portfolio loans granted. The job performance appraisal of a loan officer can be increased by decreasing the loan size since a lower loan-size leads to a greater diversification of the loan portfolio and an atomisation of the loss given default (LGD). Consequently, the granting of a (very) low loan-size can be used by female loan officers as a protection strategy of their job-position in a labour market dominated by men and where women have an entrenched inferior standing.

To test whether the loan-size is biased according to the gender of the borrowers, we perform another regression with interaction terms exploring whether the gender of both the loan officer and the borrower affect the loan-size. As shown in column 2 of Table 1 (and Fig. 1), we find that the loan transactions managed by female loan officers have a lower

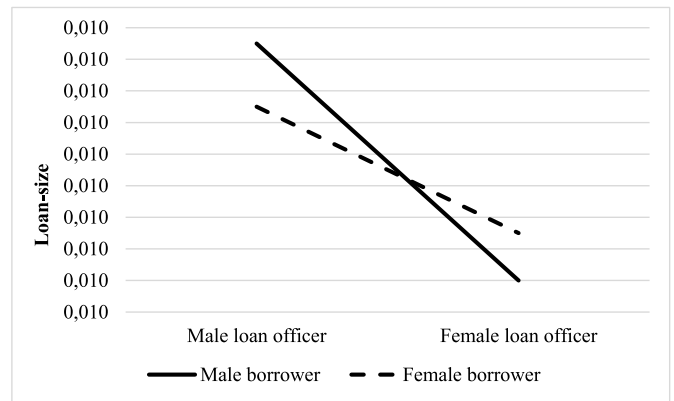


Fig. 1. Interaction effect on the loan-size of the gender of both loan officer and borrower.

loan-size, irrespective of the borrower’s gender. Therefore, there is not a gender bias with respect to the loan-size. This implies that the variable which explains that the female loan officers grant lower microcredit-sizes is their own risk-aversion level and commercial strategy to diversify their loan portfolio, but not the gender of the borrowers.

More importantly, our results suggest that the loan officers grant a larger loan-size to the credit applicants who have their same gender. In other words, the loan-size increases when matching the gender of the loan officer and the borrower. This finding supports the gender affinity hypothesis which assumes that in a lending transaction the credit risk, adverse selection problems and moral hazard are reduced when matching the gender of both loan officers and borrowers. Therefore, our findings show that the gender affinity arising in the credit market biases the larger loan-size granting towards lending transactions where the gender of the loan officer and the borrower matches.

Second, as can be seen in column 3 of Table 1, there is a positive relationship between the female loan officers and the loan approval rate. This result confirms Hypothesis 2 as it suggests that female loan officers are more social committed and more reactive to inequality than their male counterparts. That is, our findings show that female loan officers have a higher social sensitivity in the granting of microcredits which implies improving the welfare of the borrowers by granting more microcredits. However, for a deeper understanding of these results concerning the loan approval rate, we analyse whether there is an interaction effect between the gender of both the loan officer and the borrower. As shown in column 4 of Table 1, we find that, regardless of the borrower’s gender, the female loan officers present higher loan approval rates, which continues confirming Hypothesis 2 and suggests the greater determination of female loan officers to reduce the poverty

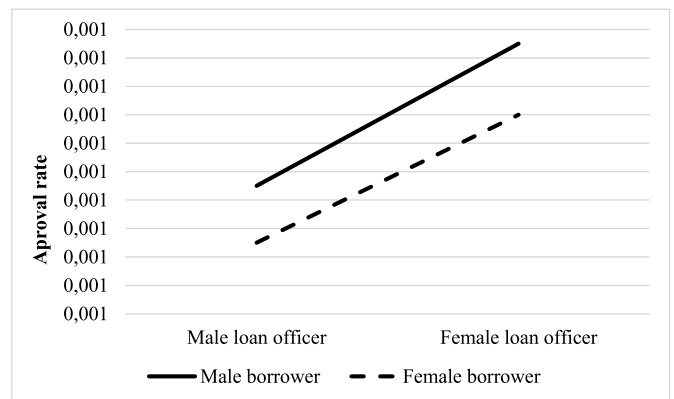


Fig. 2. Interaction effect on the approval rate of the gender of both loan officer and borrower.

of the poorest people.

To deepen the knowledge of these effects we perform Fig. 2. This Figure shows that both female and male loan officers have higher approval rates of microcredits for male borrowers. A potential explanation of this bias that the (both female and male) loan officers have towards the loan granting to male borrowers is due to men in the microfinance environment having a superior socio-cultural standing. Bharath et al. (2009) suggest that in patriarchal countries female loan officers potentially possess a weaker standing vis-à-vis male borrowers. In other words, in the microfinance sector the male credit applicants use their greater historical power and strong gender-based socio-cultural influence on female loan officers to incentivise and bias loan granting towards them. That is, our findings support the leading role, greater socio-cultural influence, and superior status of male borrowers in the developing environments.

Third, columns 5 and 6 of Table 1 show the impact of the gender of the loan officers on the evaluation time to approve a microcredit. By confirming Hypothesis 3, we find that the female loan officers take less time to evaluate and grant microcredits. A priori this finding suggests that female loan officers assume a higher level of risk than their male counterparts. Yet, by considering the interaction effect between the gender of both loan officers and borrowers (column 6 of Table 1), we find that this shorter time spent managing loans is only for loans granted to female borrowers (the only significant relationship), who have a lower credit risk (Fig. 3 displays this effect). In other words, our findings indicate that female loan officers are not supporting more risk by granting faster in all their loan portfolio, but only in those funding operations whose applicants are women, and thus present a lower risk. Therefore, our results evidence that the gender affinity among supply and demand sides in the entrepreneurial financing (that is, loan officers and female borrowers) decreases the loan granting time.

4.2. Complementary analyses

To achieve a more complete understanding of the relationships and the effects that the gender of loan officers generate on loan portfolio management, we carry out a complementary analysis by including the impact of the interaction between the gender of the loan officer and the loan-size on both the approval rate and the evaluation time of the microcredits (see Table 2).

On the one hand, we test whether the impact of the gender of the loan officers on the approval rates varies according to the loan-size (see column 1 of Table 2). Our results show that the approval rate increases as the loan amount increases. This can be explained due to larger loans funding more economically resilient business projects as there is a positive relationship between the business size and the ability to withstand environmental shocks and being able to generate higher and more

stable cash flows. In other words, although larger loans are riskier in terms of higher LGD, they really have a lower credit risk as they finance more solvent and competitive projects and are therefore more likely to survive in the medium-to long-term.

More importantly, we find that female loan officers, especially in larger loan-sizes, have greater loan approval rates (see Fig. 4). As argued previously in Section 2, this could be caused by the greater social commitment of female loan officers leading to higher loan approval rates across all types of microcredits (although to a greater extent in larger loan-sizes).

On the other hand, we explore whether the lower loan evaluation time of female loan officers evaluating microcredits remains unaltered regardless of the loan-size. As shown in column 2 of Table 2, our findings show that the time of loan approval grows along with the loan-size, irrespective of the loan officer's gender. This is a logical consequence since the greater LGD associated with a greater loan-size requires a more detailed loan evaluation. Moreover, our results propose that female loan officers are significantly more efficient (that is, take less time) than their male counterparts managing a greater loan-size (see Fig. 5). That is, we find that as the loan size increases, female loan officers are more efficient at managing, in terms of a shorter evaluation time, than their male counterparts.

These results are in line with the well-known higher social commitment and being more reactive to inequality of female loan officers, who manage their loan portfolio by granting microcredits with higher approval rates and a faster evaluation process with the ultimate objective of reducing poverty in the target population of MFIs.

Finally, we also analyse the impact that the triple interaction variable formed by gender of loan officer x gender of borrower x loan-size has on the approval rate as well as the evaluation time (see Table 3).

First, the findings reported in the column 1 of Table 3 further reinforced our assumptions, confirming that the larger loan-sizes are what have a higher approval rate and are granted by female loan officers, preferentially to male borrowers. Theoretically these results support the idea that larger microcredits have a higher approval rate since they fund more robust and competitive investment projects and are granted by female loan officers (due to their higher social commitment) to male borrowers (because of their greater socio-cultural status).

Second, we find that the microcredits that have the fastest evaluation process are those that have a lower loan-size and are granted by female loan officers to female credit applicants (see column 2 of Table 3). More importantly, our results show that the evaluation time is reduced when matching the gender of the loan officer and the borrower, this reduction being higher for the female loan officer-female borrowers pairing. These findings therefore support the previously argued gender affinity between women (or men) on the two sides of the lending process acting as a key driver of a faster access to a microcredit.

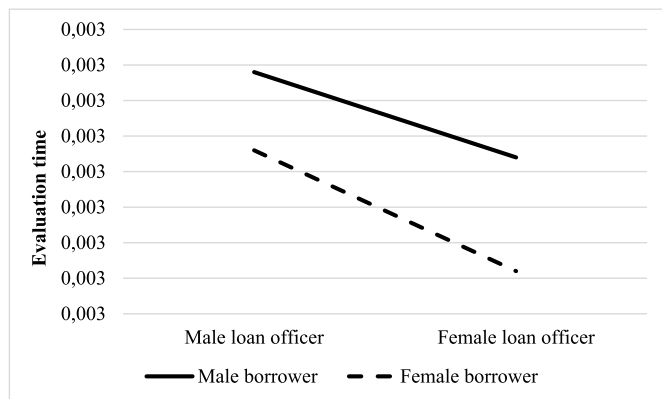


Fig. 3. Interaction effect on the evaluation time of the gender of both loan officer and borrower.

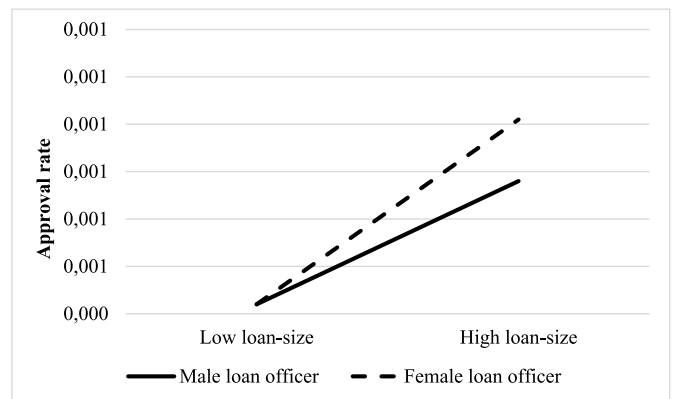


Fig. 4. Interaction effect on the approval rate of loan-size and gender of the loan officer.

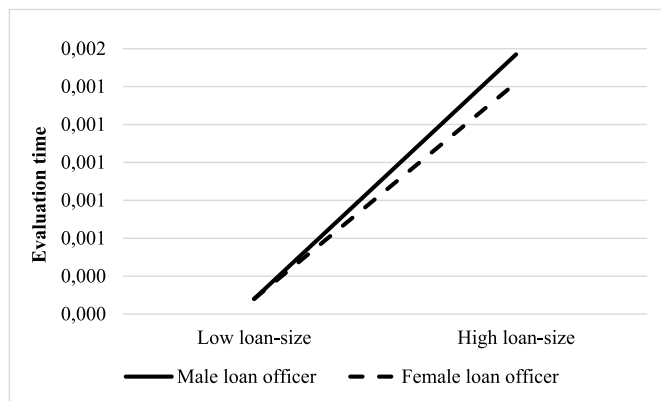


Fig. 5. Interaction effect on the evaluation time of loan-size and the gender of the loan officer.

Table 3
Interaction effect of *gender loan officer x gender borrower x loan-size* on approval rate and evaluation time.

	Probit model (Model 9)	Linear regression (Model 10)
	Approval	Evaluation time
Female loan officer x Female Borrower x Loan-size	0.3368* (0.1810)	0.0412** (0.0160)
Female loan officer x Male Borrower x Loan-size	0.4502*** (0.1295)	0.0482*** (0.0132)
Male loan officer x Female Borrower x Loan-size	0.0751*** (0.0279)	0.0430*** (0.0116)
Male loan officer x Male Borrower x Loan-size	0.1257*** (0.0441)	0.0472*** (0.0095)
Borrower rural area (dummy)	0.1537 (0.3177)	0.1887** (0.0734)
Agriculture sector (dummy)	-1.5435*** (0.4756)	0.0804 (0.1255)
Trade sector (dummy)	0.4391 (0.3357)	0.2421** (0.1090)
Borrower expertise (dummy)	0.3980 (0.4592)	0.0714 (0.0906)
Years expertise borrower	0.0264 (0.0300)	0.0225* (0.0122)
Personal guarantee (dummy)	0.3391 (0.4194)	0.4684*** (0.1156)
Province	-0.0433 (0.0433)	0.0010 (0.0059)
Constant	10.6030*** (1.8231)	2.4626*** (0.1624)
Year	yes	yes
Number of observations	3,020	863
R-squared (R ²)	0.8593	0.2517
Wald Test/F-Test	71.97***	16.57***

Note: Standard errors for the slope coefficients are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

4.3. Robustness check

To confirm our findings, we conduct a robustness test (see Tables 4 and 5). On the one hand, we re-formulate the dependent variable “evaluation time”, transforming this into a dummy variable that takes value 1 when the evaluation time of the microcredit is higher than 60 days, and 0 otherwise. These models are carried out by using the Probit estimation since the re-definition performed of the dependent variable allows this. As shown in Table 4, the results remain constant, which enhances the robustness of our findings. On the other hand, we also re-run the models that study the approval rate by using in this instance the

truncated regression as well as the Tobit estimation. As reported in Table 5, the results confirm all the previous findings. Therefore, these results re-affirmed the robustness of the previous findings and the overall implications of this study.

5. Conclusions

This paper studies how the gender affinity between the loan officer-credit applicant pair impacts on the funding of poor (micro) entrepreneurs as well as the loan portfolio management. This research aim is aligned with the Sustainable Development Goals (SDG). We frame our research into the microfinance that represents an ideal context since here the more traditional banking objectives are mixed with social goals. In accordance with Mader (2018), the financial inclusion research pinpoints the frontier of several SDG facilitators, such as poverty reduction, gender equality, zero hunger, economic growth and improvement of the infrastructure.

The main conclusion of this paper is that the gender of the loan officer matters for the loan portfolio management and for funding entrepreneurial initiatives. Our findings show that the credit management and appraisal that is carried out by female loan officers differs from that of their male counterparts. In other words, we find that there are differences in the loan portfolio management based on the gender combination of the loan officer-credit applicant pairs with relevant implications for the MFI management and its social impact on the poorest entrepreneur population, basically in terms of credit availability as well as efficiency (time spent in approving the microcredits) in loan granting.

Firstly, from the risk point of view our conclusion is that female loan officers act more cautiously with the goal of avoiding high credit risk-assumptions. On this basis, female loan officers grant lower loan-size, to both male and female borrowers, than their male counterparts. However, in this relationship a marginal effect arises given that female loan officers favour female credit applicants by granting them a higher loan-size in comparison with male borrowers. That is, we find that the loan-size increase when matching the gender of the loan officer and the borrower.

Second, we find that female loan officers have greater social commitments than their male counterparts, which is supported by their increasing the loan approval rates. More importantly, our results show that this greater loan approval rate associated with female loan officers increases for higher size microcredits, especially in the loans granted to male borrowers. Note that lending larger loans to male credit applicants is a way of favouring the social acceptance of the superior role of the male population, while reducing the credit risk of the loan portfolio since larger business projects are more economic shock-resistant and thus have a higher solvency.

Third, our findings indicate that there is a gender difference in the behaviour of loan officers based on the time spent in evaluating the microcredits. Our findings show that the microcredits that have the faster evaluation process are those that have a lower loan-size and are granted by female loan officers to female borrowers. More importantly, our results suggest that when matching the gender of the loan officer and the borrower the evaluation time is reduced, this reduction being higher for the female loan officer-female borrowers pairing. These findings therefore support the existence of a gender affinity in the microfinance lending market between women (or men) on the two sides of the lending process which acts as a key driver of faster access to microcredits.

Our results present relevant practical implications for the management of MFIs, especially in all matters relating to the loan officer’s job-position. From the point of view of the internal organisation of the human resources of MFIs, our findings suggest that female loan officers should be preferably focused on serving the female population due to two reasons. Firstly, because of that, by matching the female loan officer-borrower pair the loan-size is increased, which is a key operational strategy to improve the financial sustainability of MFIs (Blanco-Oliver et al., 2023). Secondly, because there is a gender affinity

Table 4
Evaluation time (robustness test).

	Probit model (Model 11)	Probit model (Model 12)	Probit model (Model 13)	Probit model (Model 14)
	Evaluation time (dummy)	Evaluation time (dummy)	Evaluation time (dummy)	Evaluation time (dummy)
Female loan officer	-0.3298** (0.1508)			
Female borrower	-0.2765* (0.1529)		-0.2527** (0.1141)	
Female loan officer x Female borrower		-0.5280** (0.2415)		
Female loan officer x Male borrower		-0.4282** (0.2134)		
Male loan officer x Female borrower		-0.3770** (0.1836)		
Female loan officer x Loan-size			0.0509*** (0.0191)	
Male loan officer x Loan-size			0.0559*** (0.0145)	
Female loan officer x Female Borrower x Loan-size				0.0833** (0.0329)
Female loan officer x Male Borrower x Loan-size				0.0848*** (0.0261)
Male loan officer x Female Borrower x Loan-size				0.0603*** (0.0200)
Male loan officer x Male Borrower x Loan-size				0.0820*** (0.0224)
Loan-size	0.0275** (0.0122)	0.0369** (0.0148)		
Borrower rural area (dummy)	0.2081 (0.1499)	0.1749 (0.1603)	0.2592** (0.1210)	0.2869** (0.1258)
Agriculture sector (dummy)	0.1231 (0.2153)	0.0943 (0.2347)	0.2543 (0.1866)	0.2783 (0.1923)
Trade sector (dummy)	0.1872 (0.1988)	0.2332 (0.2037)	0.3129* (0.1710)	0.4929*** (0.1747)
Borrower expertise (dummy)	-0.1575 (0.1816)	-0.0666 (0.2015)	0.0438 (0.1488)	0.1014 (0.1576)
Years expertise borrower	0.0273 (0.0169)	0.0644*** (0.0221)	-0.0116 (0.0155)	0.0114 (0.0202)
Personal guarantee (dummy)	0.6187*** (0.1889)	0.5484*** (0.2124)	0.6185*** (0.1781)	0.6147*** (0.1986)
Province	0.0199 (0.0131)	0.0278** (0.0131)	0.0058 (0.0094)	0.0087 (0.0100)
Constant	-2.0737*** (0.3576)	-2.3518*** (0.4027)	-1.1261*** (0.2866)	-1.5553*** (0.2935)
Year	yes	yes	yes	yes
Number of observations	863	863	863	863
R-squared (R ²)	0.1750	0.2048	0.1356	0.1607
Wald Test/F-Test	90.26***	107.65***	97.52***	91.18***

Note: Standard errors for the slope coefficients are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

between women located on both sides of loan transactions as loan officers (supply side) and as borrowers (demand side) that facilitates matters and speeds them up, which also increases the efficiency of MFIs, the credit operation, and its subsequent monitoring (Blanco-Oliver et al., 2021). Our results also have practical implications for MFIs' loan officer recruitment and training policy. The lending strategy followed by the MFI and their target market (micro-enterprises or bottom-of-the-pyramid) determines the size of the microcredits granted, which, in turn, influences the credit risk taken and thus whether loan officers should be women or men. Ultimately, this is strongly related to the profit orientation of MFIs that determines their management and business strategies. In this sense, as shown by Blanco-Oliver and Irimia-Dieguez (2021), profit-oriented MFIs focus on providing larger loans to established micro-enterprises, so it would be preferable for men to occupy loan officer positions as they are better able to manage larger loans more diligently and efficiently. Conversely, for non-profit-oriented MFIs the social objectives prevail over economic outcomes. Accordingly, the target market of non-profit-oriented MFIs is composed of the population from the bottom-of-the-pyramid, particularly women from rural areas who are served by being lent very small loans (Roberts, 2013). Therefore, according to our findings it would be beneficial for non-profit-oriented MFIs to increase the proportion of women in loan officer positions since female loan officers manage more efficiently (with

a higher approval rate and less time for the evaluation) smaller loans while also generating a gender affinity with the female credit applicants that favours the confidence and close interpersonal informal relationships which also increases the profitability of lenders and the quality perceived by customers (known as *relational contracts*, Lindvert et al., 2018).

Finally, our findings also have implications from the point of view of the efficiency of MFIs. The loan approval rates and the time spent on evaluating each loan measure the credit risk assumed by loan officers but are also related to the efficiency of loan officers in the development of their work. Consequently, we find that, in terms of these two variables, female loan officers are more efficient than their male counterparts, especially funding women by using (very) small loans. This is, therefore, a key finding for an industry such as that of microfinance which continues seeking a financially self-sufficient business model to guarantee its long-term survival.

For future research, it would be interesting to enhance the dataset incorporating more information such as the age and education of both the loan officers and borrowers that may be used as control and/or moderating variables to deepen the understanding of how the gender of the loan officer-credit applicant pair impact on the loan portfolio management and credit availability in the microfinance environment. Unfortunately, these data are not yet available.

Table 5
Loan approval rate (robustness test).

	Tobit model (Model 15)	Truncated regression (Model 16)	Tobit model (Model 17)	Truncated regression (Model 18)	Tobit model (Model 19)	Truncated regression (Model 20)	Tobit model (Model 21)	Truncated regression (Model 22)
	Approval	Approval	Approval	Approval	Approval	Approval	Approval	Approval
Female loan officer	0.1772*** (0.0401)	0.0772*** (0.0186)						
Female borrower	0.0106 (0.0381)	0.0028 (0.0187)			-0.0531 (0.1457)	-0.0119 (0.0109)		
Female loan officer x Female borrower			0.1829*** (0.0598)	0.0752*** (0.0272)				
Female loan officer x Male borrower			0.1845*** (0.0531)	0.0893*** (0.0256)				
Male loan officer x Female borrower			0.0151 (0.0436)	0.0110 (0.0226)				
Female loan officer x Loan-size					0.1425** (0.0555)	0.0022* (0.0012)		
Male loan officer x Loan-size					0.0352** (0.0166)	0.0008 (0.0015)		
Female loan officer x Female Borrower x Loan-size							0.1523* (0.0818)	0.0032 (0.0027)
Female loan officer x Male Borrower x Loan-size							0.1459** (0.0585)	0.0021 (0.0017)
Male loan officer x Female Borrower x Loan-size							0.0281* (0.0157)	0.0002 (0.0013)
Male loan officer x Male Borrower x Loan-size							0.0395** (0.0195)	0.0013 (0.0013)
Loan-size	-0.0025 (0.0024)	-0.0014 (0.0014)	-0.0025 (0.0024)	-0.0014 (0.0014)				
Borrower rural area (dummy)	-0.0008 (0.0375)	0.0004 (0.0192)	-0.0004 (0.0376)	0.0007 (0.0192)	-0.0629 (0.1735)	0.0099 (0.0129)	-0.0923 (0.1575)	0.0105 (0.0113)
Agriculture sector (dummy)	-0.0281 (0.0466)	-0.0219 (0.0240)	-0.0283 (0.0466)	-0.0222 (0.0241)	-0.7677** (0.3895)	0.0091 (0.0212)	-0.7613** (0.3855)	0.0131 (0.0164)
Trade sector (dummy)	0.0009 (0.0493)	0.0088 (0.0268)	0.0010 (0.0493)	0.0092 (0.0267)	0.0815 (0.1354)	0.0145 (0.0189)	0.1213 (0.1363)	0.0174 (0.0153)
Borrower expertise (dummy)	1.4201*** (0.0494)	0.7601*** (0.0188)	1.4199*** (0.0494)	0.7596*** (0.0189)	0.3733** (0.1858)	0.0614*** (0.0203)	0.3742** (0.1893)	0.0614*** (0.0134)
Years expertise borrower	-0.0064* (0.0034)	-0.0036** (0.0016)	-0.0065* (0.0034)	-0.0036** (0.0016)	0.0089 (0.0210)	0.0009 (0.0014)	0.0066 (0.0216)	0.0010 (0.0013)
Personal guarantee (dummy)	-0.1114** (0.0469)	-0.0556** (0.0250)	-0.1111** (0.0469)	-0.0549** (0.0250)	0.0438 (0.1845)	0.0260 (0.0185)	0.0155 (0.1989)	0.0267 (0.0166)
Province	-0.0030 (0.0032)	-0.0016 (0.0016)	-0.0030 (0.0032)	-0.0016 (0.0016)	-0.0252 (0.0182)	-0.0014 (0.0009)	-0.0252 (0.0185)	-0.0014 (0.0009)
Constant	0.2222*** (0.0839)	0.1869*** (0.0421)	0.2209*** (0.0842)	0.1841*** (0.0423)	5.7867*** (0.8009)	1.1733*** (0.0447)	5.8420*** (0.8085)	1.1625*** (0.0282)
Year	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	3,020	3,020	3,020	3,020	3,020	3,020	3,020	3,020
R-squared (R ²)	0.4108	-	0.4108	-	0.7478	-	0.7483	-
Wald Test/F-Test	1234.64***	2888.64***	1234.64***	2888.64***	15.15***	33.59***	12.68***	301.38***

Note: Standard errors for the slope coefficients are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

APPENDIX A

Table A.1
Descriptive statistics

Variable	N	Mean	Std. Dev.	Min.	Quartile 1	Median	Quartile 3	Max.
Panel A: Period 2016–2019								
Loan-size	3,020	5.6494	5.9235	0.1604	2.1042	3.2086	6.5799	39.5485
Approval	3,020	0.2858	0.4519	0.0000	1.0000	1.0000	1.0000	1.0000
Evaluation time	863	3.0354	0.9098	0.0000	2.4849	3.0910	3.6109	6.3456
Female loan officer	3,020	0.4092	0.4920	0.0000	0.0000	0.0000	1.0000	1.0000
Female borrower	3,020	0.5515	0.4976	0.0000	0.0000	1.0000	1.0000	1.0000
Borrower rural area	3,020	0.2572	0.4374	0.0000	0.0000	0.0000	1.0000	1.0000
Agriculture sector	3,020	0.1275	0.3337	0.0000	0.0000	0.0000	0.0000	1.0000
Trade sector	3,020	0.1663	0.3725	0.0000	0.0000	0.0000	0.0000	1.0000
Borrower expertise	3,020	0.8362	0.3702	0.0000	1.0000	1.0000	1.0000	1.0000
Years expertise borrower	3,020	3.7984	4.2302	0.0000	1.0000	2.0000	4.0000	22.0000
Personal guarantee	3,020	0.2583	0.4379	0.0000	0.0000	0.0000	1.0000	1.0000
Province	3,020	13.0114	5.7590	1	8	13	17	24
Panel B: year 2016								
Loan-size	564	6.5668	5.5431	0.2467	2.4675	4.1125	8.2249	36.1896
Approval	564	0.2589	0.4384	0.0000	0.0000	0.0000	1.0000	1.0000
Evaluation time	148	3.2750	1.0255	0.6931	2.8332	3.2958	3.6761	6.3456
Female loan officer	564	0.1854	0.3891	0.0000	0.0000	0.0000	0.0000	1.0000
Female borrower	564	0.3961	0.4895	0.0000	0.0000	0.0000	1.0000	1.0000
Borrower rural area	564	0.2606	0.4745	0.0000	0.0000	0.0000	1.0000	1.0000
Agriculture sector	564	0.1249	0.4486	0.0000	0.0000	0.0000	1.0000	1.0000
Trade sector	564	0.2500	0.4334	0.0000	0.0000	0.0000	1.0000	1.0000
Borrower expertise	564	0.1373	0.3444	0.0000	0.0000	0.0000	0.0000	1.0000
Years expertise borrower	564	4.0763	4.3058	0.0000	1.0000	2.0000	6.0000	22.0000
Personal guarantee	564	0.2900	0.4542	0.0000	0.0000	0.0000	1.0000	1.0000
Province	564	13.5000	5.8143	1	10	14	18	24
Panel C: year 2017								
Loan-size	1,080	5.4271	5.6262	0.1617	2.4014	3.2018	6.4037	39.2226
Approval	1,080	0.2854	0.4518	0.0000	0.0000	0.0000	1.0000	1.0000
Evaluation time	310	3.1202	1.1242	0.0000*	2.4849	2.9957	3.6699	6.0819
Female loan officer	1,080	0.3567	0.4795	0.0000	0.0000	0.0000	1.0000	1.0000
Female borrower	1,080	0.4352	0.4960	0.0000	0.0000	0.0000	1.0000	1.0000
Borrower rural area	1,080	0.2466	0.4840	0.0000	0.0000	0.0000	1.0000	1.0000
Agriculture sector	1,080	0.1296	0.4624	0.0000	0.0000	0.0000	1.0000	1.0000
Trade sector	1,080	0.1241	0.3298	0.0000	0.0000	0.0000	0.0000	1.0000
Borrower expertise	1,080	0.2764	0.4474	0.0000	0.0000	0.0000	1.0000	1.0000
Years expertise borrower	1,080	3.6812	4.8463	0.0000	1.0000	2.0000	5.0000	19.0000
Personal guarantee	1,080	0.1639	0.3703	0.0000	0.0000	0.0000	0.0000	1.0000
Province	1,080	13.2287	5.6819	1	10	13	19	24
Panel D: year 2018								
Loan-size	1,091	5.6017	6.0820	0.3164	1.8983	3.1639	6.3278	39.5485
Approval	1,091	0.2731	0.4458	0.0000	0.0000	0.0000	1.0000	1.0000
Evaluation time	302	2.9212	1.0255	0.4351	2.1972	2.8889	3.5624	6.1650
Female loan officer	1,091	0.3597	0.4805	0.0000	0.0000	0.0000	1.0000	1.0000
Female borrower	1,091	0.4207	0.4939	0.0000	0.0000	0.0000	1.0000	1.0000
Borrower rural area	1,091	0.2701	0.4764	0.0000	0.0000	0.0000	1.0000	1.0000
Agriculture sector	1,091	0.1277	0.4487	0.0000	0.0000	0.0000	1.0000	1.0000
Trade sector	1,091	0.1789	0.3834	0.0000	0.0000	0.0000	0.0000	1.0000
Borrower expertise	1,091	0.2860	0.4521	0.0000	0.0000	0.0000	1.0000	1.0000
Years expertise borrower	1,091	3.8641	6.4561	0.0000	1.0000	3.0000	8.0000	18.0000
Personal guarantee	1,091	0.1450	0.3522	0.0000	0.0000	0.0000	0.0000	1.0000
Province	1,091	12.8295	5.8674	1	8	13	17	24
Panel E: year 2019								
Loan-size	286	4.8649	7.1904	0.1604	1.6043	3.2086	6.4172	32.0859
Approval	286	0.3887	0.5021	0.0000	0.0000	0.0000	1.0000	1.0000
Evaluation time	103	2.7707	0.2410	1.0986	2.8904	3.3673	3.8918	6.0981
Female loan officer	286	1.2368	0.7856	0.0000	0.0000	0.0000	1.0000	1.0000
Female borrower	286	1.7955	0.5337	0.0000	0.0000	0.0000	1.0000	1.0000
Borrower rural area	286	0.2413	0.0396	0.0000	0.0000	0.0000	1.0000	1.0000
Agriculture sector	286	0.1239	0.8172	0.0000	0.0000	0.0000	0.0000	1.0000
Trade sector	286	0.1128	0.3723	0.0000	0.0000	0.0000	0.0000	1.0000
Borrower expertise	286	6.4248	0.1830	0.0000	0.0000	0.0000	1.0000	1.0000
Years expertise borrower	286	3.4433	6.7363	0.0000	3.0000	4.0000	7.5000	21.0000
Personal guarantee	286	0.9846	0.9880	0.0000	1.0000	1.0000	1.0000	1.0000
Province	286	11.9229	5.5278	1	8	12	14	24

* The minimum value is zero since there is a customer (an observation) with a pre-approved microcredit because it is a recurrent customer with previous loan transactions and positive records in its credit history. This causes the decision on the loan approval to be on the same day as the loan application (that is, evaluation time equals zero).

Table A.2
Correlation matrix

	2	3	4	5	6	7	8	9	10	11	12	VIF
(1) Loan-size	-0.0336											
(2) Approval	0.3210***											1.04
(3) Evaluation time	-0.1579***	-0.1299***										1.26
(4) Female loan officer	0.0613*	-0.1679***										1.06
(5) Female borrower			0.0471									1.23
(6) Borrower rural area				0.0471								1.11
(7) Agriculture sector					0.0471							1.36
(8) Trade sector						0.2540***						1.75
(9) Borrower expertise							0.1255***					1.07
(10) Years expertise borrower								0.1687***				1.57
(11) Personal guarantee									0.4670***			1.34
(12) Province										0.3718***		1.02

Note: VIF values are from the regression where the loan-size is the dependent variable.

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