Competition and sustainability of Ecuadorian microfinance institutions (MFIs)

Competencia y sostenibilidad de las instituciones de microfinanzas (IMFs) ecuatorianas

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Abstract

Competition is often praised for enhancing efficiency in the process of resource-allocation. However, it could also put at risk the sustainability of firms operating within certain industries such as the financial sector. This could have further managerial implications when it comes to social enterprises such as microfinance institutions (MFIs). Using data from *Superintendencia de Economía Popular y Solidaria* over the period 2016-2019, this study aims at analyzing the aspects of competition on sustainability of Ecuadorian MFIs. More specifically, the research focuses on savings and credit cooperatives (SACCOs). Relying on both the structural and non-structural approach to measure competition at a firm level, findings are in line with an important portion of the microfinance literature claiming that competition is negatively associated with the main measures of financial sustainability and portfolio quality.

Keywords:
Competition, financial sustainability, microfinance, savings-credit cooperatives, Ecuador, Latin America.
JEL Classification: G2 Financial Institutions and Services.

Resumen

A menudo se elogia la competencia por mejorar la eficiencia en el proceso de asignación de recursos. Sin embargo, también podría poner en riesgo la sostenibilidad de las empresas que operan en ciertas industrias como el sector financiero. Esto tendría implicaciones gerenciales adicionales cuando se trata de empresas sociales como las instituciones de microfinanzas (IMFs). Utilizando datos de la Superintendencia de Economía Popular y Solidaria durante el período 2016-2019, este estudio tiene como objeto analizar los aspectos de la competencia en la sostenibilidad de las IMFs ecuatorianas, específicamente en las cooperativas de ahorro y crédito (SACCOs). Con base en el enfoque estructural y en el no estructural para medir la competencia a nivel de empresa, los hallazgos están en línea con una parte importante de la literatura en microfinanzas que afirma que la competencia está negativamente asociada con las principales medidas de sostenibilidad financiera y calidad de la cartera.

Palabras Clave:
Competencia, sostenibilidad financiera, micro finanzas, cooperativas de ahorro y crédito, Ecuador, América Latina.
Clasificación JEL: G2 Instituciones Financieras y Servicios.

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Introducción

From an economic perspective, competition is commonly considered an important factor to increase efficiency in the process of resource allocation by lowering market prices and making goods and services accessible to most part of the population, as well as improving the quality in which they are delivered. In this sense, governments and policy makers often implement measures to limit the market power of agents operating under monopolistic structures, either by direct regulation or by encouraging the entry of new competitors. This is also expected to have a positive impact on the well-being of the society since economic agents can obtain the goods and services they value.

However, the hybrid nature of social enterprises such as microfinance institutions (MFIs) has raised the question whether higher levels of competition lead to better outcomes in terms of the compliance with the double bottom line: *financial and social performance*. On one hand, higher competition could lead to more efficiency due to agents' incentives to lower costs and drive innovation (Claessens, 2009); on the other, it has also been associated with lower levels of portfolio quality (Assefa et al., 2013) and multiple loan taking by borrowers (McIntosh & Wydick, 2005) which could lead to over indebtedness and default.

Over the past years, microfinance activities have increased significantly and rapidly in a wide range of developing countries in terms of providers and clients (Kar, 2016). According to Mackinnon et al. (2020) Ecuador has become one of the most attractive markets for microfinance investment funds. Yet nearly half of the adult population does not own an account at a financial institution (Demirgüç-Kunt et al., 2015) and commercial banks have more and more started to expand their services to the poorer segments. In countries with a less developed financial sector and a high level of financial exclusion like Ecuador, the impact of grants and subsidies seems to be limited and self-sufficiency emerges as the main pathway to provide financial services in a greater scale.

Using data from *Superintendencia de Economía Popular y Solidaria (SEPS*, the regulatory body of MFIs in Ecuador, over the period 2016-2019 (four years), this study aims at analyzing the aspects of competition and its effects in terms of financial sustainability. Information on MFIs is available for segments 1, 2 and 3, mostly corresponding to savings and credit cooperatives (SACCOs), and mutualists. In line with the microfinance literature, the relation between competition and sustainability is expected to be negative.

To the best of knowledge, this study represents the first attempt to specifically analyze the aspects of competition in the Ecuadorian microfinance industry. Although Ecuador has more and more attracted the eyes of academics due to its growing microfinance activity, the literature on competition remains scarce. Moreover, there is a special need to

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seriously address this topic since the seek for financial sustainability could lead MFIs to increase competition not only amongst their pairs, but also with commercial banks which could have further implications for both providers and clients.

The document is organized as follows: section 1 presents the literature review and hypothesis development, section 2 provides information about data and methodology used to build the research, section 3 shows the obtained results and the consistency of outcomes using two different measures of competition, and section 4 concludes.

Literature review

Competition and its effects

Microfinance institutions (MFIs) can be defined as hybrid organizations that seek both financial and social goals. In the literature, this is referred to as the *double bottom line*. The hybrid nature of MFIs often translates into schemes and business models that differ from those of traditional profit-maximizing structures. As analyzed by Morduch (1999) the movement has been able to demonstrate that it was possible to lend money to poor households in order to improve their living standards, and to do so in a profitable manner; however, the poverty alleviation goal through microfinance still lacks of consistent evidence.

The context where MFIs carry out their operations should be considered into the analysis of financial and social performance. Institutions that rely mainly on subsidies could be motivated to follow a more developmental logic, serving clients who have been excluded from the traditional financial sector. This might push institutions to locate themselves in rural or remote areas (Vanroose, 2016). However, in places where MFIs strive for self-sustainability MFIs may have more incentives to locate themselves in more developed areas and serve more profitable clients. Although the commercialization movement of the industry has led to innovation resulting in better products and services to serve a wider range of clients, it has also raised ethical questions such as the potential for mission drift[2].

In this regard, the question of subsidization and sustainability of microfinance providers is still at the core of academic and ethical debates. According to Armendáriz and Morduch (2010, p. 340), it is possible to achieve financial self-sufficiency while serving poor clients and ensuring an important depth of outreach; nontheless this is not always feasible when operating in rural areas, especially of Africa and Latin America where costs are higher. Therefore, subsidies seem to be justified under these circumstances. In addition, the reliance on subsidies could affect the incentives of institutions to reduce costs, preventing them from working efficiently (Armendáriz & Morduch, 2010).

Several factors may determine the

[2] For instance, see Armendáriz and Szafarz (2011) and Beisland et al. (2019).

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extent to which MFIs are able to achieve sustainability. Vanroose (2008) develops a cross-country analysis with data of 115 countries and finds that MFIs reach more clients in richer countries of the developing world, suggesting that there is a need of a certain level of development for microfinance to start reaching significant levels of clients; likewise, countries that have received more international aid present larger microfinance markets. Moreover, Ahlin et al. (2011) study the performance of MFIs according to their macroeconomic environment and find that economic growth has a positive effect on operational self-sufficiency (OSS) since it helps reducing default rates and costs per borrower.

Sustainability of MFIs may also be explained by the degree of development of the traditional financial sector and the microfinance industry itself. Vanroose and D'Espallier (2013) find that MFIs increase their outreach and profits in countries with less developed financial sectors since they capture the market underserved by banks, whereas in countries with more developed financial sectors, competition with banks pushes MFIs down the poor segments. Likewise, Cull et al. (2014) combine data on bank penetration of 99 countries and 346 MFIs from 67 countries to analyze the effect of the scope of the banking system on proftability and outreach of MFIs; the authors find that higher bank penetration pushes microbanks towards the poorer segments of the economy.

In line with Robinson (2001) regarding the debates on sustainability, Hermes and Lensink (2011, p. 878) highlight the differences between the *financial system* approach and the *poverty lending* approach of MFIs. The financial system approach stresses the idea that institutions should become financially sustainable by being able to cover lending costs with operational revenues, whereas the poverty lending approach advocates for the provision of credit to help overcome poverty by subsidizing microfinance services (i.e., interest rates). Hermes et al. (2011) analyze the cost efficiency of MFIs by using a stochastic frontier analysis (SFA) to understand the relationship between financial sustainability and outreach, and find strong evidence that outreach is negatively related to efficiency. In their study, for instance, higher efficiency leads to an increase in average loan size and a decrease in outreach to women.

The seek of sustainability may push MFIs to compete among each other or with other type of financial institutions. Tuckman (1998, p. 176) defines competition as the pursuit of the same objective by two or more firms that can create rivalry among them for capital, labor, board members, contracts, grants, customers and revenues. The author employs the term "basis of competition" to define the way organizations choose to compete, depending on the industry and customer needs. Claessens (2009) argues that competition in the financial sector leads to lower costs and more efficiency, higher levels of product innovation and diversification, and better quality of services.

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As stated by Cull et al. (2011, p. 154), competition may emerge as a result of a growing number of commercial banks downscaling their operations to offer services to poorer segments. This is also pointed out by Vanroose and D'Espallier (2013) who explain how commercial banks could start targeting poorer clients once MFIs have proven them creditworthy. Beyond the benefits of competition, however, Kono and Takahashi (2010, p. 53-54) refer to it as one of the challenges for microfinance; for instance, when there are too many MFIs operating in a region, borrowers who did not complete repayments in one institution could keep obtaining loans from other institutions which would lead to an increase in the probability of default. In order to solve this issue, McIntosh et al. (2005) state that there should be an informational system to be shared amongst MFIs.

McIntosh and Wydick (2005) develop a behavioral model to analyze the effects of the entry of new competitors within the same pool of borrowers. They find three possible adverse effects of competition: first, competition can reduce de ability of socially motivated lenders to generate rents from wealthier clients and keep serving poorer clients (cross-subsidization); second, non-profit client-mazimixzing institutions may undercut profit-maximizers to capture most pofitable clients and keep serving poorer clients which could prevent the emergence of a competitive microfinance market; third, competition may harm the information process between lenders and could increase multiple-loan taking, thus the likelihood of default.

Likewise, Navajas et al. (2003) propose a model of credit market competition considering moral hazard and adverse selection in the Bolivian microfinance industry to analyze the evolution of loan terms due to increasing competition and the impact on borrowers repayment behaviors. The study shows that althought competition has changed the type of contracts and broaden the borrowing opportunities from different segments among the poor, the overall effect on the poorest remains ambiguous since increased competition could prevent socially oriented lenders to keep cross-subsidizing poorer borrowers, but could also limit monopolistic structures and foster innovation of products and services which may translate into an increase in outreach.

Vogelgesang (2003) analyzes repayment behavior using data of *Caja Los Andes* in Bolivia within the period 1996-2000 which was charaterized by increasing levels of competition, important levels of indebteness and the beginning of an economic crisis. The author finds two opposite results: first, a higher level of competition is associated with a higher level of indebtenes (multiple-loan taking from different institutions at the same time), thus worsening the repayment behavior specially in times of crisis; second, in more competitive markets clients are more diligent and repay loans ontime. The latter might be due to better screening standards and incentive mechanisms of MFIs, but also to the

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awarness of clients about the importance of micro-loans in their daily activities.

Measuring competition

There are several ways to measure competition. Bikker and Haaf (2002) present a review of wide array of approaches to measure competition and market concentration in the banking industry; according to the authors, the Herfindahl-Hirschman Index appears to be one of the most common measures of market concentration due its simple structure and data requirement. Toh et al. (2020) argue that this procedure can be considered part of the traditional industrial organization method following the structural approach and consists of measuring competition regarding concentration levels, where higher concentration is associated with lower competition.

Assefa et al. (2013) use the Lerner Index to assess the effect of competition on financial and social performance of MFIs; using data of 362 MFIs from 73 countries, the authors find that higher competition is associated with lower levels of portfolio quality that could be explained by multiple loan taking by clients and more relaxing selection standards by MFIs. Toh et al. (2020) classify this procedure as part of the new-empirical methods that follow the non-traditional approach to measure competition and take into consideration the elasticity of the demand for the products and services offered by financial institutions.

In the same line, Chortareas et al. (2012) analyze the determinants of interest rate margins in Latin American banks from 1999 to 2006. They use both traditional and non-traditional approaches to address competition and find that traditional measures such as concentration or market share have no or little impact on interest rate spreads. Nevertheless, they observe that lower spreads are related to more efficient and competitive financial markets. Additionally, they point out a positive relationship between the level of bank capitalization and interest rate margins, as well as a negative relationship between margins and economic growth.

Hussain et al. (2020) study the effect of competition freedom on financial and social performance of MFIs in five South-East Asian countries, combining measures of regulatory efficiency and market oppeness. They find that higher competition freedom, such as business, monetary and investment freedom have positive effects on financial performance, but a negative effect on social outputs. These results suggest that less restricted economic environments may fooster efficiency in operations of MFIs, harming their incentives to keep serving the poorer segments.

Kar (2016) introduces the use of the Boone indicator as a measure of competition in the microfinance industry; it considers the impact of efficiency on performance, suggesting that more efficient firms earn larger market shares and profits. In addition, Kar and Swain (2018) use the Boone indicator to measure competition and assess its

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effects on financial and social performance of 568 MFIs of ten developing countries with significant microfinance activity; the authors find that higher levels of competition improve financial sustainability but harm social outcomes as they observe an increase in the average size of loans and a reduction of outreach to women clients. The latter study suggests that the commercialization movement of the industry could lead to mission drift with MFIs focusing on better-off clients, thus shifting away from the poorest of the poor.

Hossain et al. (2020) also use the Boone indicator to measure competition and analyze its effects on financial sustainability and social performance of MFIs for the period between 2005-2014, and find that competition negatively affects sustainability, as reflected on the estimators for operational self-sufficiency (OSS) and financial self-sufficiency (FSS) of MFIs. Regarding social performance, the study shows that competition has a negative effect on both the breadth of outreach (number of active borrowers) and the depth of oureach (average loan size). This is to say that competition can lower the breadth of outreach but increase the depth of outreach.

The Ecuadorian microfinance industry

The proliferation of microfinance institutions (MFIs) in Ecuador could be attributed to its macroeconomic environment characterized by high levels of informality and inequality, as well as a general trend of steady growth (Ahlin et al., 2011). Authors like Demirgüç-Kunt et al. (2015) already positioned Ecuador as one of the most developed microfinance markets in the world. In this context, Beisland et al. (2019, p. 123) distinguish four main types of microfinance providers in the country: *commercial banks, specialized microfinance banks, savings and credit cooperatives (SACCOs) and non-governmental organizations (NGOs).*

According to *Superintendencia de Economía Popular y Solidaria (2021)*, there exist 513 regulated microfinance institutions (MFIs) in Ecuador. This number is broadly dominated by savings and credit cooperatives (SACCOs) which account for 509 institutions; the rest includes 4 mutualists, 1 public institution (*Corporación de Finanzas Populares y Solidarias*), and 1 Caja Central (*FINANCOOP*) that gathers several SACCOs. Additionally, non-governmental organizations operate with the mission of providing access to credit, but to the best of knowledge there is currently no official information about their number, financial statements, and scope of operations.

In observation to the resolutions of *Junta de Política y Regulación Monetaria y Financiera (2015)*, one of the regulatory bodies of the financial sector in Ecuador, MFIs are classified in 5 segments considering their total assets. Table 1 presents this segmentation. The gross loan portfolio of institutions in segments 1, 2 and 3 represents 97% of the total gross loan portfolio of MFIs in Ecuador (*Superintendencia de Economía*

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Popular y Solidaria, 2021). Segments 4 and 5, on the other hand, consist of smaller and more local MFIs. The latter includes *community associations such as cajas de ahorro, bancos comunales and cajas comunales.*

Table 1.
Segmentation of Ecuadorian MFIs by total assets

Segment	Assets (USD)
1	> 80'000.000
2	20'000.000 - 80'000.000
3	5'000.000 - 20'000.000
4	1'000.000 - 5'000.000
5	< 1'000.000

Note: Adapted from Superintendencia de Economía Popular y Solidaria (2021).

From 2009, the Ecuadorian financial sector has experienced important reinforcements on the regulatory framework mainly driven by the limits on interest rates. According to the resolutions of *Banco Central del Ecuador (2009)*, the maximum interest rate for each segment of credit will be published on a monthly basis and it will be mandatory for all financial institutions, including MFIs, to fix their prices in line with those limits. The impacts of such regulations on the interaction between credit market forces cannot be overlooked. For instance, Bogan et al. (2015) argue that interest rate ceillings may lead MFIs to operate under losses thus limiting the supply of credit and harming customers whose demand is inelastic.

Despite the regulatory policies that have limited the development of the microfinance industry, Ecuador has consistently become one of the most attractive markets for microfinance investment funds (Mackinnon et al., 2020). In this regard, the industry represents an interesting context for research on competition as firms have not been able to freely choose their prices (interest rates).

Methodology

Hypothesis development

The negative effect of competition on sustainability has been stressed by authors like Assefa et al. (2013) and Hossain et al. (2020) whose studies consider measures of operational and financial sustainability, but also portfolio quality. These negative effects could be partially explained by a reduction of MFIs margins due to competition as pointed out by Chortareas (2012), but also to multiple loan-taking from borrowers that often leads to more relaxing credit policies and lower portfolio quality.

Nontheless, one could also think that institutions striving for sustainability would try to explore and capture new markets and clients which could also lead to higher profits. This is in line with the market-failure hypothesis pointed out by Vanroose & D'Espallier (2013) who argue that MFIs could target clients that were previously excluded by the traditional financial sector and also with the contributions of Kar and Swain (2018) regarding the enhancement of financial soundness and productivity of firms that face increasing competition.

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Therefore, this research will attempt to test whether greater levels of competition have a negative impact on the main financial indicators related to profitability, sustainability and portfolio quality of MFIs. Considering the above-mentioned literature, the effect is expected to be negative.

Hypothesis 1: *Higher levels of competition negatively affect MFIs' financial performance and sustainability.*

Data and methods

Data on MFIs is obtained from *Superintendencia de Economía Popular y Solidaria (SEPS)*, the regulatory body of MFIs in Ecuador. This information is open access through the institutional website and consists of balance sheets, profit and loss statements, credit granted and number of operations of MFIs in segments 1, 2, 3, including mutualists over the period 2016-2019 (four years). Despite data availability, year 2020 was excluded from the analysis to avoid distortions of estimators due to the COVID-19 pandemic. Information is presented at year level and the latter timeframe was defined due to data availability. This results in 579 observations from 163 MFIs, mostly savings and credit cooperatives (SACCOs) which represent 36% of the total number of institutions. Data at a macro-level such as gross domestic product (GDP) growth, inflation and private credit as a percentage of GDP are retrieved from Banco Central del Ecuador (BCE, 2009), *Instituto Nacional de Estadísticas y Censos* (INEC, 2021) and the World Development Indicators (The World Bank, 2021), respectively.

This research is built in three steps: first, a measure of MFI competition is calculated using a structural approach based on market concentration and regressed on different indicators of sustainability and diversification; second, an alternative measure of competition is applied using the non-structural approach considering prices and costs to check for consistency of outcomes. In both stages, competition is measured at a firm level. And third, a statistical comparative analysis is presented to determine whether MFIs compete with commercial banks in terms of markets, clients and products.

To test hypothesis 1, available information allows to build an unbalanced panel data set[3] to observe the evolution of firms over time. The process of panel balancing has not been carried out to avoid potential bias in the results and a loss of valuable information about firms. After conducting a Durbin-Wu- Hausman test to assess the efficiency of random and fixed effects estimators, Equation 1 presents the fixed effects model proposed to evaluate the relation between competition and financial sustainability:

$$Y_{i,t} = \beta C_{i,t} + \delta X_{i,t} + \tau Z_t + \alpha_i + \epsilon_{i,t} \quad (1)$$

Where $Y_{i,t}$ is a measure of sustainability of firm *i* in year *t*; $\beta C_{i,t}$ is a measure of competition of firm *i* in year *t*;

[3] Some MFIs do not report information every year, but still were considered in the study.

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$\delta X_{i,t}$ is a vector of control variables at a firm level; τZ_t is a vector of control variables at a macro level; αi represents the individual fixed effects; and $\epsilon_{i,t}$ is the error term.

To measure sustainability (dependent variable), the study uses operational self-sufficiency (OSS) and financial self-sufficiency (FSS) following Cull et al. (2007), Hossain et al. (2020) and Kar and Swain (2018). Profitability measures as conditions for sustainability such as return on assets (ROA) and return on equity (ROE) are also considered. Lastly, in line with the contributions of Assefa et al. (2013) on sustainability of MFIs in respect to their portfolio quality, portfolio at risk 30 days and 90 days (PAR 30 and PAR 90, respectively) are included.

Competition (main independent variable) can be measured either at industry or firm levels. Since this study is carried out in a single country, the most suitable approach is to measure competition at a firm level to identify patterns of behavior within firms over time. Market share is therefore used as a proxy for competition following the structural approach which associates higher market concentration with less competition (Toh et al., 2020). The indicator is calculated in respect to the total credit provided by MFIs in segments 1, 2 and 3 during each year. Thus, other financial institutions including public and private banks, as well as MFIs classified in other segments are not considered to calculate the market share.

Moreover, following Assefa et al. (2013) this study uses the Lerner Index as a more widely accepted measure of competition in the financial sector. This is done in the second part of the empirical analysis. To build the index, the price and marginal cost must be obtained. The expression can be written as shown on Equation 2.

$$Lerner\ index = \frac{P - MC}{P} \qquad (2)$$

Where P represents price and MC is the marginal cost. Since prices differ across credit products offered by MFIs, portfolio yield is used as a proxy for price. The original procedure to calculate the marginal cost consists of obtaining the first derivative of the total cost function which is often a complex procedure, and it depends on data availability. This study uses the average cost instead. Theoretically, the index should range from 0 to 1, being 0 full competition and 1 complete market power.

The use of average costs instead of marginal costs to obtain the index is justified by the assumption of constant returns to scale. “Under constant returns to scale, average cost and marginal cost are the same.” (Martin, 1984, p. 504). In the same line, Hartarska et al. (2013) argue that risk must be incorporated when estimating financial institutions’ cost function since higher risk would most likely lead to higher management costs. When risk is considered, institutions operate at minimum costs with constant returns to scale (Hughes & Mester, 1998).

In addition, a set of control variables at a firm and a macro level is included. At a firm level, regressions control for assets

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as a proxy for size (Mersland & Strøm, 2009; Assefa et al., 2013; Hossain et al., 2020), capital ratio as a measure of risk aversion and leverage (Maudos & De Guevara, 2004; Tabak et al., 2012; Hossain et al., 2020) and portfolio yield as an indicator of price (Assefa et al., 2013). Unfortunately, available data does not allow to control for age of MFIs which is often used in the literature. Following authors like Ahlin et al. (2011) and Vanroose and D'Espallier (2013), variables at macro level that are expected to have an impact on MFIs' performance and sustainability include economic growth, inflation, credit to GDP, and rural population.

It is important to acknowledge that the use of macro variables intends to increase the accuracy of the relation between competition and sustainability, but significant variations between MFIs are mostly expected to be explained at an individual level since this study focuses on a single country (Ecuador), thus the same macro environment would be affecting institutions across time. Furthermore, macroeconomic variations tend to better explain outcomes in the longer run, whereas this study considers a time framework of four years.

Data about location of the firm, such as city or province, is not available. However, institutions analyzed in this study belong to segments 1 to 3 (the largest MFIs measured by total assets) and mutualists, which mostly operate at a national level. Thus, yearly financial statements report transactions carried out across the country, making it difficult to separate results by region. Lastly, time fixed effects were considered in preliminary regressions but omitted in the final model because of collinearity.

Table 2 presents a summary of the dependent and independent variables considered in this research. As above mentioned, indicators include measures at a firm and macro levels.

Table 2.
Summary of variables

Variable	Description	Source
Market share (Share)	MFI credit as a percentage of total credit granted by the MFIs each year	Author's calculation
Lerner Index (Lerner)	Portfolio yield minus average cost divided by portfolio yield	Author's calculation
Operational self-sufficiency (OSS)	Operational income divided by operational expenses	Author's calculation
Financial self-sufficiency (FSS)	Operational income divided by operational expenses adjusted for inflation	Author's calculation
Return on assets (ROA)	Net income divided by average assets	SEPS
Return on equity (ROE)	Net income divided by average equity	SEPS
Portfolio at risk 30 days (PAR 30)	Balance in arrears over 30 days plus renegotiated portfolio divided by gross loan portfolio	Author's calculation
Portfolio at risk 90 days (PAR 90)	Balance in arrears over 90 days plus renegotiated portfolio divided by gross loan portfolio	Author's calculation
Assets (Size)	Logarithm of average assets	SEPS
Capital ratio	Average equity divided by average assets	Author's calculation
Portfolio yield (Yield)	Operational income as a percentage of gross loan portfolio	Author's calculation
GDP growth	Annual variation of GDP (percentage)	BCE
Inflation	Annual variation of consumer prices (percentage)	INEC
Credit to GDP (Credit GDP)	Private credit divided by GDP	WDI

Note: SEPS = Superintendencia de Economía Popular y Solidaria; INEC = Instituto Nacional de Estadísticas y Censos; BCE = Banco Central del Ecuador; WDI = World Development Indicators (World Bank).

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Results and analysis

Descriptive statistics

Table 3 presents descriptive statistics of the dependent and independent variables used in this study. Negative values for the Lerner Index can be explained by the use of portfolio yield as a proxy for price, since the analyzed microfinance institutions (MFIs) offer different types of credit products whose prices significantly vary across segments. Some MFIs experience costs that exceed their income resulting in a negative outcome of the Lerner Index.

Table 3.
Descriptive Statistics

	Mean	Median	S.D.	Min.	Max.
Share	0.0064	0.0022	0.0124	0.0000	0.1197
Lerner	0.2432	0.2754	0.1766	-1.5300	0.5174
OSS	1.0300	1.0310	0.1535	0.2495	1.5530
FSS	1.0240	1.0260	0.1582	0.0000	1.5570
ROA	0.0059	0.0059	0.0545	-0.4789	1.1520
ROE	0.0310	0.0381	0.1739	-0.9383	2.7310
PAR 30	0.0373	0.0253	0.0422	0.0000	0.3468
PAR 90	0.0327	0.0211	0.0389	0.0000	0.3240
Size(millions)	75.65	18.40	179.10	0.00	2170
Capital ratio	0.1743	0.1514	0.0919	-0.0488	0.5988
Yield	0.1841	0.1738	0.0410	0.0696	0.6206
GDP growth	0.0062	0.0005	0.0132	-0.0123	0.0237
Inflation	0.0027	-0.0007	0.0051	-0.0020	0.0112
Credit GDP	0.3979	0.4050	0.0327	0.3560	0.4440

Note: Author´s elaboration.

The relation between competition and sustainability

Table 4 provides the correlation coefficients of the variables used in this study and Table 5 presents the coefficients for each independent variable regressed on different measures of sustainability. As it can be seen, a greater market share (Share) is associated with higher levels of operational self-sufficiency (OSS) and financial self-sufficiency (FSS). Both coefficients are significant. More specifically, an increase of 1% in market share is linked to a 2.96% and 3.01% increase in OSS and FSS, respectively. This suggests that less competition increases financial sustainability in line with Hossain et al. (2020).

Regarding the relation between market share and profitability measured by return on assets (ROA) and return on equity (ROE), coefficients are positive and statistically significant, meaning that less competition is also related to higher

Table 4.
Correlation matrix of dependent and independent variables

	Share	Lerner	OSS	FSS	ROA	ROE	PAR 30	PAR 90	Size	Capital ratio	Yield	GDP growth	Inflation	Credit GDP
Share	1.0000													
Lerner	0.1595*	1.0000												
OSS	0.2414*	0.8507*	1.0000											
FSS	0.2134*	0.8078*	0.927*	1.0000										
ROA	0.0419	-0.0268	0.1362*	0.1297*	1.0000									
ROE	0.1284*	0.1776*	0.3725*	0.3603*	0.7907*	1.0000								
PAR 30	-0.1832*	-0.5033*	-0.5309*	-0.5168*	-0.2103*	-0.3381*	1.0000							
PAR 90	-0.1796*	-0.4891*	-0.5163*	-0.5021*	-0.2270*	-0.3481*	0.9932*	1.0000						
Size	0.9055*	0.1672*	0.1916*	0.1952*	0.0314	0.1065*	-0.1765*	-0.1724*	1.0000					
Capital Ratio	-0.1698*	0.0040	0.0665	0.0898*	0.1457*	0.1108*	0.0187	0.0203	-0.1548*	1.0000				
Yield	-0.0701	0.0191	-0.0343	-0.0095	-0.0235	-0.0293	0.0505	0.0569	-0.0512	-0.1317*	1.0000			
GDP Growth	0.0070	0.0305	0.0665	0.0280	-0.0009	0.0126	0.0889*	0.0777*	-0.0421	-0.0301	0.1579*	1.0000		
Inflation	0.0130	-0.0561	0.0067	-0.0845*	0.0656	0.0514	0.1997*	0.1830*	-0.0699	0.0029	0.1284*	0.5149*	1.0000	
Credit to GDP	-0.0187	0.0397	-0.0068	0.0683	-0.0435	-0.0269	-0.2215*	-0.2062*	0.0737*	0.0111	-0.1299*	-0.7588*	-0.8532*	1.0000

Note: * Denotes significance at the 5% level.

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profits. An increase of 1% in market share is associated with an increase of 0.57% and 2.92% in ROA and ROE, respectively. In this sense, the contributions of Mersland and Strøm (2009) stressing the decrease of portfolio yield due to competition that would lead to lower profits can be confirmed, in contrast to the ones of Kar and Swain (2018) claiming that more competition may result in higher profits. Eventhough the relationship between market share and portfolio at risk is negative, coefficients are not significant. Therefore, the ideas of Assefa et al. (2013) about the negative relationship between competition and portfolio quality remain to be tested in the following stage.

In respect to other explanatory variables, the size of MFIs seems to play a role in increasing OSS and FSS; coefficients are low, but statistically significant. Likewise, capital ratio has a positive relationship with OSS and FSS meaning that lowering the leverage of the firm would result in higher sustainability. In more detail, an increase of 1% equity in respect to total assets would lead to 0.27% and 0.24% increase in OSS and FSS respectively. Furthermore, a 1% increase in MFI's product price (yield) would result in a 0.14% increase in financial sustainability. This latter relationship is rather intuitive since higher prices allow to better cover costs and generate margins. Nonetheless, reported results do not show a significant

Table 5.
The relation between competition and sustainability – 1st stage

	OSS	FSS	ROA	ROE	PAR 30	PAR 90
Constant	0.620676***	0.637877***	0.0102771	−0.143080	0.185971***	0.164253***
	(0.0965148)	(0.0951263)	(0.0425890)	(0.141287)	(0.0199023)	(0.0180495)
Share	2.95909***	3.01452***	0.571696**	2.92318**	−0.341667	−0.330978
	(1.08624)	(1.08399)	(0.287129)	(1.34289)	(0.324673)	(0.304309)
Size [a]	0.0729 951*	0.0681521*	0.0252655	0.0667441	−0.00969996	−0.0109751
	(0.0373921)	(0.0370261)	(0.0186692)	(0.0431252)	(0.0112100)	(0.0107804)
Capital ratio	0.273335*	0.237913*	0.0309194	−0.0337838	−0.0439474	−0.0427624
	(0.142695)	(0.143277)	(0.107510)	(0.189806)	(0.0459917)	(0.0433992)
Yield	0.136898*	0.143962*	−0.0273793	−0.105246	−0.0328749	−0.0279851
	(0.0763002)	(0.0761316)	(0.0616455)	(0.147647)	(0.0263148)	(0.0253799)
GDP Growth	1.04439	1.00276	−0.271109	0.797529	−0.298102	−0.208040
	(0.717495)	(0.71989 3)	(0.354506)	(0.673159)	(0.199164)	(0.187391)
Inflation	2.45646	0.863898	−0.0511262	4.57749**	−0.548992	−0.378571
	(2.26440)	(2.27881)	(1.24193)	(2.31543)	(0.571887)	(0.543027)
Credit GDP	0.148264	0.158779	−0.228806	−0.149921	−0.243520**	−0.195293*
	(0.334533)	(0.335179)	(0.198224)	(0.269823)	(0.109189)	(0.103595)
R-squared	0.08024	0.104644	0.017201	0.017459	0.195586	0.178233
P-value	0.0000	0.0000	0.1700	0.2469	0.0000	0.0000
Observations	579	579	579	579	579	579
MFIs	163	163	163	163	163	163

Note: Standard errors are presented in parenthesis. ***, ** and * indicate significance level at 1, 5 and 10% respectively. a Includes logarithm of the variable.

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association between this indicator and profitability measures (ROA and ROE), which remains to be confirmed in the next stage of the empirical analysis.

The macro-environment also appears to impact sustainability of Ecuadorian MFIs. Inflation is positively and significantly related to ROE, meaning that 1% increase in inflation would be linked to a 4.58% in ROE. This may be explained by the use of higher prices resulting in higher profits; however, the relation needs to be confirmed in the next stage of the empirical analysis. Furthermore, an increase in credit as percentage of GDP is linked to lower portfolio at risk, which may result counterintuitive since one could think that higher levels of credit would rather lead to higher risk. This relation also remains to be confirmed in the steps that follow.

Heteroscedasticity and autocorrelation consistent (HAC) standard errors are computed in the regressions. In addition, it is noteworthy that the within r-squared reported in the six regressions could be considered weak; this means that the variations in dependent variables are not being consistently explained by the proposed model. Despite being useful to understand preliminary relations between several indicators, this empirical approach does not appear to be enough to draw conclusions at this stage and will be further tested in the following steps.

Further regressions and consistency of outcomes

Following the non-structural approach and aligned with Assefa et al. (2013), the second stage of this research uses the Lerner Index as a measure of competition. It is important to emphasize that some adaptations to the index have been made. The main adaptation consists of using the average cost instead of the marginal cost which should not be overlooked since the latter intends to measure de speed of change of the total cost throughout the production process. This procedure is justified by the assumption of constant returns to scale pointed out by Hughes and Mester (1998). Likewise, portfolio yield is used as a proxy for price since MFIs offer different credit products whose prices significantly vary between each other. Control variables applied in the first stage remain the same.

The above-mentioned preliminary relationships are tested using the same estimation technique, replacing market share (Share) as a measure of competition by the Lerner Index. Regression results are presented in Table 6. As it can be observed, the main associations stated in the previous stage of the empirical analysis are confirmed: competition appears to have a significant relation with financial sustainability. A higher Lerner Index is associated with higher operational self-sufficiency (OSS) and financial self-sufficiency (FSS), but with lower portfolio at risk 30 days (PAR 30) and portfolio at risk 90 days (PAR 90). Findings are aligned with the contributions of Assefa et al. (2013) and Hossain et al. (2020), but opposed to those of Kar and Swain (2018) who find a positive relationship between

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competition and sustainability and portfolio quality. In more detail, a unitary increase in the Lerner Index would lead to a roughly 0.58% increase in both OSS and FSS. Although coefficients of portfolio quality are consistent with the ones presented in the first stage of the empirical approach, they are not statistically significant.

A significant link between competition and profitability could not be found in this stage of the empirical approach. Nonetheless, coefficients provide a hint of the potential relation between these two variables in line with the ideas of Hermes et al. (2011), Cull et al. (2014) and Kar and Swain (2018) who refer to competition as an important factor to enhance financial soundness, productivity and efficiency of MFIs, and opposed to the contributions of Mersland and Strøm (2009) who argue that higher competition should decrease portfolio yield and lead to lower profits.

Regarding the macro environment, GDP growth appears to be positively related to OSS and FSS and negately related to PAR 30. This association is rather intuitive since economic development often enhances firms' performance and clients' repayment capacity. Inflation shows a positive association with OSS and ROE; these results confirm the ones obtained in the first stage of the analysis and suggest that higher prices may increase financial sustainability and profits. Nonetheless, evidence is not enough to draw conclusions at this point since higher inflation can also affect the cost of operations leading to less financial performance. Finally, credit as

Table 6.
Effect of competition on sustainability – 2nd stage

	OSS	FSS	ROA	ROE	PAR 30	PAR 90
Constant	0.695401***	0.712734***	0.00856249	−0.149575	0.178723***	0.15766***
	(0.0624300)	(0.0615374)	(0.0309303)	(0.126671)	(0.0183522)	(0.0166998)
Lerner	0.5 79267***	0.577571***	−0.0352050	−0.152331	−0.0517948	−0.0462005
	(0.0957565)	(0.0948755)	(0.206890)	(0.431016)	(0.0360697)	(0.0340561)
Size [a]	0.020877	0.0162716	0.0298799	0.0876856	−0.00502782	−0.00684688
	(0.0196580)	(0.0197630)	(0.0214089)	(0.0620682)	(0.00782622)	(0.00776785)
Capital ratio	0.0336538	−0.00114167	0.0452026	0.0281841	−0.0223333	−0.0234587
	(0.0600110)	(0.0591895)	(0.0603442)	(0.146909)	(0.0265799)	(0.0258222)
Yield	−0.0193327	−0.0121745	−0.0236135	−0.0929204	−0.0191016	−0.0155265
	(0.0500059)	(0.0492061)	(0.0186848)	(0.0719840)	(0.0211253)	(0.0206410)
GDP Growth	1.05064***	1.00809***	−0.248273	0.92296	−0.285657*	−0.197064
	(0.375794)	(0.373486)	(0.398590)	(0.731043)	(0.169622)	(0.160914)
Inflation	2.86225**	1.26664	−0.0199658	4.775 27**	−0.554983	−0.384291
	(1.21554)	(1.21690)	(1.30942)	(2.40528)	(0.417769)	(0.405235)
Credit GDP	0.245658	0.255597*	−0.239788	−0.200747	−0.252145***	−0.202858**
	(0.151079)	(0.150906)	(0.209169)	(0.324694)	(0.0832314)	0.0803277
R-squared	0.6 46562	0.649535	0.021118	0.027389	0.255204	0.234027
P-value	0.0000	0.0000	0.3656	0.6175	0.0000	0.0000
Observations	573	573	573	573	573	573
MFIs	161	161	161	161	161	161

Note: Standard errors are presented in parenthesis. ***, ** and * indicate significance level at 1, 5 and 10% respectively. a Includes logarithm of the variable.

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percentage of GDP is positively related to FSS and negatively related to portfolio at risk, meaning that higher levels of credit provision in the economy could enhance financial sustainability. Nevertheless, the channels through which this may happen remain to be analyzed.

Heteroscedasticity and autocorrelation consistent (HAC) standard errors are computed in the regressions. It is noteworthy that the within r-squared reported in the two first regressions could be considered moderate-high; this means that the variations in the dependent variables (OSS and FSS) can be moderate-highly explained by the proposed model. In contrast, this indicator is weak for the fifth and sixth regressions suggesting that the variations in portfolio at risk (PAR 30 and PAR 90) are weakly explained by the model. Finally, results show that the variations in profitability measures (ROA and ROE) remain far from being consistently explained by this empirical approach.

Having conducted the empirical analysis using two different measures of competition, the negative association between competition and operational self-sufficiency (OSS) and financial self-sufficiency (FSS) is confirmed, thus hypothesis 1 can be partially validated. However, the relationship between competition and the two measures of profitability used in this study (ROA and ROE) remains unclear. On one hand, competition is expected to reduce yields and margins thus negatively affecting financial sustainability in line with the contributions of Mersland and Strøm (2009), Assefa et al. (2013) and Hossain et al. (2020). On the other hand, competition could enhance financial soundness, productivity and efficiency of institutions thus leading to higher profits as claimed by Hermes et al. (2011), Cull et al. (2014), and Kar and Swain (2018). Neither the results obtained in the first stage nor the ones of the second stage provide significant evidence of the relation between competition and portfolio quality.

Conclusion

This research has analyzed the relation between competition on financial sustainability of Ecuadorian microfinance institutions (MFIs) with a special focus on savings and credit cooperatives (SACCOs). Both the structural and non-structural approaches were followed to measure competition. Outcomes suggest that competition has indeed a significant association with different indicators of sustainability. In line with an important part of the microfinance literature, findings show a negative relationship between competition and financial sustainability. This is to say that more competition is linked to less sustainability measured by operational self-sufficiency (OSS) and financial self-sufficiency (FSS).

Market share has a significant relation between return on assets (ROA) and return on equity (ROE), the profitability measures used in this study. The Lerner Index, on the other hand, does not appear to be significantly associated with these measures; therefore, this relation remains

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unclear. One could think that a larger gap between revenues and expenses due to less competition would likely lead to higher profits. At the same time, another portion of the microfinance literature highlights the positive effect of competition on profitability due to an improvement in productivity and efficiency levels. The actual channels through which this takes place still need to be identified by further research.

Neither market share nor the Lerner Index, the two measures of competition used in this study, show a significant relation with the indicators of portfolio quality. However, in the two stages of the empirical analysis these coefficients are negative suggesting that more competition could be related to higher portfolio at risk. This is also in line with an important portion of the microfinance literature stressing that competition could lead to more relaxed credit policies from financial providers and multiple loan taking by borrowers which can directly have an impact on portfolio quality. Further research is needed to address these ideas.

Several limitations were identified throughout the research process. The first one is related to data availability in the sense that it allows to focus the analysis mainly on the largest SACCOs (segments 1 to 3); it would be interesting to study the managerial logics behind smaller MFIs (segments 4 and 5) and their interactions in the market. This could also include other type of MFIs such as specialized microfinance banks and non-governmental organizations (NGOs).

Further studies may also focus on analyzing competition patterns between MFIs and commercial banks. This should include credit and savings operations, but also specific incentives of each type of institution to strive for the same goals. The question whether MFIs and banks compete is particularly important since higher levels of competition between them could affect MFIs social performance (for instance, serving clients who are better off instead of the poorest segments), thus jeopardizing the foundations of their original mission.

Another relevant limitation is linked to the use of average cost instead of the marginal cost to obtain the Lerner Index based on the strong assumption of constant returns to scale; although the gap between price and costs provides a fair proxy for competition because it includes the effect of interest rate spreads, it should be acknowledged that the estimation of the marginal cost is a fundamental step in the calculation of the index since it considers the concept of price-demand elasticity.

Contribución de autores

F.X.N.G. Revisión de literatura, metodología, análisis de datos, discusión y conclusiones, y revisión de redacción.

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