

Spillover effects of microcredit on the GDP of surrounding cantons in Ecuador

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Received 31 July 2023
Revised 6 November 2023
Accepted 20 February 2024

Abstract

Purpose – The aim of this paper is to analyse the spillover effects of microcredit on the economy of Ecuador, with a particular focus on its potential as a poverty alleviation mechanism.

Design/methodology/approach – To address our research questions, we take into account the distance between cantons (Ecuador's own administrative distribution) by adopting a spatial autoregressive (SAR) model. To this end, a database will be constructed with macroeconomic information about the country, broken down by canton (administrative division of Ecuador), and in a 2019 cross section, with a total of 1,331 microcredit operations in all 221 of Ecuador's cantons.

Findings – We find a positive effect of microcredit on these neighbouring regions in terms of wealth generation.

Research limitations/implications – We acknowledge that this study is limited to Ecuadorian cantons. Nonetheless, it is crucial to emphasize that focussing on an under-represented developing country like Ecuador adds significant value to the research.

Practical implications – Facilitating access to microcredit is one of the main solutions to address the goals proposed in the sustainable development goals (SDGs).

Social implications – Microcredit activity contributes to the creation of value and wealth in Ecuador, exerting a spillover effect in neighbouring areas that can generate positive multiplier effects and alleviate poverty. For all of the above reasons, our proposal for the country is to support and promote microcredit as one of the main solutions to address the goals proposed in the SDGs.

Originality/value – The novelty of this study lies in the use of spatial econometrics to observe the indirect effects of microcredit on the regions bordering the canton in which it was issued, thus examining the spatial effects of microcredit on wealth distribution.

Keywords Microcredit, Microfinance, Financial inclusion, Welfarism, Spatial econometrics

Paper type Research paper

1. Introduction

From the Brundtland Report to recent legislative developments, eradicating poverty has been one of the main claims and continues to be an enduring societal challenge for the global community. The objective of “eradicating extreme poverty and hunger” was initially developed at the millennium summit, held in the year 2000 by the United Nations, and

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The authors acknowledge the financial support of the research project Ref. PID 2021-128420OB-I00 funded by MCIN/AEI/10.13039/501100011033 and by “ERDF A way of making Europe”, and the research project funded by Consejería de Universidad, Investigación e Innovación (Junta de Andalucía, PAIDI 2021) Ref. “ProyExcel_00934”.



constitutes the first of the eight goals set (Millennium Development Goals (MDGs)). In January 2016, in the Paris Agreement, the MDGs were replaced by the new 2030 Agenda with 17 Sustainable Development Goals (SDGs, Sustainable Development Goal Targets, 2015). Specifically, the first of the MDGs is articulated in two SDGs: “No Poverty” and “Zero Hunger”. Among the proposed measures is financial inclusion (FI), which implies improved access to financial services.

Financial inclusion (FI) aims to ensure that all individuals, regardless of their income level or geographical location, have the opportunity to access a wide range of financial services, such as bank accounts, savings, credit, insurance and other financial products. Potentially, FI can reduce poverty and inequality (Chibba, 2009) and help low-income people to access essential services – such as health, housing and education – and to invest in their future and reduce their financial risks, as it is also an essential driver of gross domestic product (GDP) (Sethi and Acharya, 2018). One of the main tools for promoting FI is microcredit.

Microcredit enables the issuance of small amounts of unsecured credit, usually for short periods of time, to low-income individuals and disadvantaged communities (Littlefield and Rosenberg, 2004). This allows them to improve their economic conditions, generate additional income and potentially lift themselves out of poverty. Microcredit has emerged as a key tool for developing the food industry and eradicating poverty, creating opportunities for microenterprises and providing access to credit for the poorest sectors of the population (Banerjee *et al.*, 2015; Matin and Hulme, 2003). It also increases the ability to cope with risk, strengthen community ties and access informal credit (Karlan and Zinman, 2011), and introduces non-credit incentives that contribute to the success of microcredit programmes (McKernan, 2020).

The impact of microcredit on reducing poverty has been extensively studied. Some research has focused on women, revealing increased well-being and reduced poverty (Mahmud, 2003; Khandker, 2005; Hashemi *et al.*, 1996; Sanyal, 2009), along with improved immunization rates for children and decreased child mortality (Amin *et al.*, 1998).

However, there are concerns regarding microcredit programmes as a tool for alleviating poverty. Some authors question their success, attributing it to subsidies (Morduch, 1999a) and highlight the importance of considering local profiles and existing financial facilities to mitigate potential risks of poverty (Rogaly, 1996). Studies also yield mixed results: microcredit reaches the poor but not the poorest group in certain cases (Amin *et al.*, 2003), while its effectiveness in reducing extreme poverty compared to other anti-poverty measures varies (Mosley, 2001; Mosley and Hulme, 1998; Copestake *et al.*, 2001).

Although the role of microcredit in alleviating poverty has been analysed in the literature, the spillover effects of microfinance programmes remain understudied (Buera *et al.*, 2011). Some authors have found externalities in neighbouring regions (López-Bazo *et al.*, 2004; Puga and Venables, 1996), which might imply the generation of wealth for stakeholders located in regions close to the microenterprises due to trade relations and know-how transfer. Building on this, Banerjee *et al.*, 2015, suggest that microcredit can not only stimulate economic activity within the local community but also foster the development of microenterprises, generating positive effects beyond geographical boundaries. Additionally, access to microcredit can facilitate investments in education and health, potentially contributing to long-term development. By considering these potential spillover effects, valuable insights can be gained into the comprehensive impact of microcredit beyond its direct beneficiaries (Lychagin *et al.*, 2016; Morgan, 2004). As a result, we raise questions regarding the importance of geographic proximity and the potential for generating spillover effects from investments.

Ecuador is an interesting case in terms of microcredit for many reasons. The levels of poverty and extreme poverty are very worrying, at 32.4 and 14.9%, respectively. This is coupled with low levels of FI compared to nearby countries (Blanco Estévez *et al.*, 2021). In terms of microenterprises, which are often not regularized, they employ 60% of the active

population, accounting for 1.28 million people and for almost 98% of the total number of registered enterprises. Finally, there is a high level of inequality in wealth distribution, with poverty in rural areas reaching 47.2%, compared to 25.1% in urban areas; this is particularly concerning when considering extreme poverty, with 27.5% in rural areas, compared to 9% in urban areas (INEC, 2021). These social differences are reflected in the Gini index, which stands at 0.5.

For these reasons, we wonder whether microcredit is an appropriate tool for the economic growth of a geographical area within Ecuador and whether it could have significant multiplier effects on neighbouring economies. To address our research questions, we take into account the distance between cantons (Ecuador's own administrative distribution) by adopting a spatial autoregressive (SAR) model. The findings reveal the existence of spatial autocorrelation, with the productivity of one firm being related to the productivity of neighbouring firms, confirming that there is a contagion effect in the context of Ecuadorian microcredit recipient firms.

The paper fills a gap in the existing literature by examining the spatial effects of microcredit on wealth generation, a topic that has not been extensively explored in prior research. By doing so, it contributes to the advancement of knowledge on this subject matter. It should also be noted that the majority of microcredit studies (60%) focus on the Asian continent and only 12.6% of the studies deal with Latin American countries. By concentrating on this under-represented area, the research aims to expand the knowledge base and encourage further studies in these neglected regions.

This paper is organized as follows. In the second section, we establish the hypotheses by reviewing the existing literature on the correlation between income generation and microcredits granted. Subsequently, the third section outlines the methodology employed, along with the variables considered. In the fourth section, we present the results obtained. Finally, in the fifth and concluding section, we provide a summary of the main study conclusions.

2. Theoretical framework

In focussing our study on the impact of microcredit on the Ecuadorian economy, on its cantons and on neighbouring ones, we must identify the situation and determining factors of microcredit in that country, as well as a vision of its economy and the activities carried out by micro- and small enterprises (MSEs).

2.1 *Microcredit and Ecuador*

A first step will therefore be to locate microcredit in Ecuador, identifying its regulation and possible issuers, as well as providing a brief description of the current situation.

Accessing credit can be impossible for people at risk of exclusion. With little means, a low cultural level, and no economic backing, these people find it very difficult to find a minimally viable livelihood. Microcredit is seen as a financing instrument linked to financial innovation that seeks efficiency in the financial market and a reduction in disparities in the economy (Londoño-Bedoya *et al.*, 2021). Therefore, it is a strategic tool for achieving sustainable growth that, beyond contributing to the generation of wealth, fulfils a social objective.

Historically, microcredits have emerged at different times and levels of prevalence worldwide. In 1462, Europe saw the first steps in microfinance with an Italian monk establishing a pawnshop to combat usury (Patiño, 2008). Later, the Grameen Bank in Bangladesh, founded by Muhammad Yunus in 1976, popularized microcredits with low interest rates, benefiting excluded individuals.

In Latin America, microcredit began informally in rural areas in the early twentieth century, targeting agricultural modernization and reducing feudal oppression. This kind of

financial product was offered by banks in Latin America's large cities – private financial institutions which were sometimes controlled by government entities. Therefore, in these areas, microfinance institutions were not the primary issuers of microcredits, but rather, traditional financial institutions were.

In the case of Ecuador, microcredit initially emerged with private lenders offering usurious rates. Later, in the 1990s, the state took over the provision of microcredit through public institutions like the National Financial Cooperative and National Development Bank, and subsequently, private banks started offering it at subsidized rates (Granja Vásconez, 2011). The Constitution of Ecuador acknowledges the public, private and popular and solidarity sectors in its financial system, granting special treatment to the latter (Asamblea Nacional, 2008). The 2011 Law on the popular and solidarity economy and the popular and solidarity sector includes savings and credit cooperatives, associative or solidarity entities, community banks and credit unions within the popular and solidarity sector.

There are several financial entities, both private and public ones, working on enhancing the FI and the microcredit in Ecuador. As Table 1 shows with the available data in 2019, 75% of the total volume of microcredits was issued by the private bank Banco Pichincha, and the public one, BanEcuador. Banco Solidario belongs to the popular and solidarity sector, which represents 38% of the global financial sector.

While the popular and solidarity sector aims to generate economic development, previous literature questions its suitability for this purpose (Adams and Von Pischke, 1992; Biosca et al., 2014; Karlan and Zinman, 2011; Morduch, 1999a, b; Rankin, 2002; Rogaly, 1996). The sector faces challenges with credit issuance, requiring collateral and having high interest rates due to the risky nature of operations. This leads to elevated default rates across different institutions, making the intended purpose of microcredit not always achievable (BanEcuador, 2022; Rogaly, 1996; Banking High Commission, 2019; Yaron, 1992).

2.2 Ecuadorian economy and MSEs

The second area of study is a general description of the Ecuadorian economy itself, which is fundamentally based on the agricultural and oil sectors, followed by traditional products such as bananas, coffee and cocoa, with shrimp and flowers gradually gaining ground. While the agricultural sector allows entry to MSEs, oil, which is the largest export, is dominated exclusively by large companies.

But what is the importance of MSEs in Ecuador's economy? The tax regime for microenterprises, determined by the internal revenue service (IRS), establishes that the term "microenterprises" applies to those companies with a maximum of nine workers that generate a maximum income of USD300,000. According to these criteria, microenterprises employ 60% of the active population and, moreover, they often operate illegally, in breach of the regulations established by the IRS (Banegas, 2020). Of this total, 80% are sole proprietorships

Financial entity	Volume of microcredits (M USD)	Volume (%)
Banco Pichincha	941	44
BanEcuador	620	29.2
Banco Solidario	272	12.8
Juventud Ecuatoriana	141	6.6
Alianza del Valle	135	6.3
Comercio LDTA	10	0.5
TOTAL	2,119	100

Table 1.
Volume of microcredits
in Ecuador (2019)

Source(s): ASOMIF (Asociación de Microfinanzas de Ecuador, 2019)

with an average of 2.2 workers, in most cases members of the same family. These are labour-intensive companies, with little technology and disorganized production, resulting in low income and productivity, which makes savings and access to financial services difficult. The productivity is under 50% of the productivity of the companies belonging to the Organisation for Economic Co-operation and Development (OECD). Among the causes of this could be the lack of a specialized human resource force (Molina-Ycaza and Sánchez-Riofrío, 2016), the difference in innovation, or the low development of logistics, infrastructure or bureaucracy in the companies (Orueta, 2019).

Over the last decade, international cooperation, the government, private banks, non-governmental organizations (NGOs), and savings and credit cooperatives have become involved in financial services for MSEs. According to the Banking High Commission (BHC), this type of business is the recipient of 84.1% of issued microcredits (Banking High Commission, 2018). Gaining access to this source of financing is one of the solutions for the above problems.

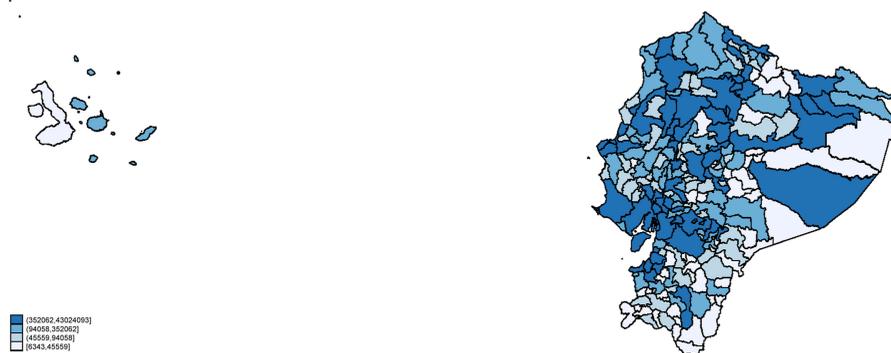
The BHC notes that, in November 2018, microfinance in Ecuador amounted to USD1.712 billion, representing 6.3% of credits issued by private banks. These are important figures, as they account for 1.9% of the country's GDP.

In terms of geographical distribution, microenterprises are primarily concentrated in urban areas, while those in the agricultural and handcraft sectors are more prevalent in rural areas, potentially leading to income disparities. The average GDP per capita in 2019 was \$6,183, but Figure 1 illustrates the varying distribution of GDP across Ecuador's cantons, with darker tones representing wealthier regions and lighter tones indicating areas with lower income. This highlights the observed unequal distribution.

2.3 Relationship between microcredit and GDP

Although microcredit emerged in the 1970s in Bangladesh and Bolivia, a rich literature on the subject did not develop until the 1990s. Our research studies the effect on GDP, as an improvement in this variable, combined with the equitable distribution of resources sought through microcredit, which can have consequences for the well-being of financially disadvantaged agents (Beck and Demirgüç-Kunt, 2008).

The value of microcredit as an instrument for microenterprises, economic growth and employment has been taken by the EU (and the UN) as a basis for some of its most recent economic policies and to fight against exclusion. However, some authors point out that this value should be taken with caution (Plasencia, 2010). In this sense, not all studies find a



Source(s): Own elaboration based on data from Central Bank of Ecuador

Figure 1. Distribution of GDP in Ecuador (2019)

positive impact on the economy. [Londoño-Bedoya et al. \(2021\)](#), found a negative relationship between microcredit and GDP in a data panel study conducted at a subnational level in Colombia from 2005 to 2018. The study revealed a higher negative impact in the short run than in the long run. Another study examined various financial indicators in 23 upper and 29 lower-middle-income countries for the period 1980 to 2008. In the short run, the relationship between these financial indicators and the growth rate of real GDP was found to be insignificant. However, in the long run, a negative influence on the growth of middle-income countries was identified ([Samargandi et al., 2015](#)). These findings suggest that microcredit may not be as effective as initially believed.

Analysing the Gini coefficient instead of GDP, [Beck et al., 2007](#), examined the long-term impact of financial development in 68 developing countries between 1980 and 2005, finding that only 40% was attributed to the reduction of income inequality, while the rest was linked to the impact on global economic growth. Similar studies were conducted in Malaysia with data from 1980 to 2000, with private sector credit and stock market capitalization in percentage of GDP as financial development. They found the financial development to be weak and statistically insignificant in reducing income inequality or obtaining a better Gini coefficient ([Hook Law and Boon Tan, 2009](#)).

Assuming that financial services stimulate a country's economic growth and drive technological and production innovations ([King and Levine, 1993](#); [Ahlin and Jiang, 2008](#)) examine the long-term effects of microcredit on employment, with self-employment influencing GDP and reducing inequality and poverty in the long run ([Ahlin and Jiang, 2008](#)).

With regard to specific works that clearly deduce a positive relationship between microcredit and GDP, the majority are focused on Asian economies, particularly in Bangladesh ([Imai and Azam, 2011](#); [Raihan et al., 2017](#); [Roodman and Morduch, 2009](#); [Sultan and Masih, 2016](#)), in South and East Asia ([Alimukhamedova, 2014](#)), in Vietnam ([Thanh et al., 2019](#)) and in India ([Negi, 2020](#)). Similar results are found in global studies involving more than 30 countries from different geographical regions ([Hook Law and Boon Tan, 2009](#); [Levine, 2004](#); [Lopatta and Tchikov, 2016](#); [Sethi and Acharya, 2018](#); [Sugiyanto and Yolanda, 2020](#)). Others focus on Africa, including 16 African countries ([Gries et al., 2009](#)), Ivory Coast ([Sanogo and Moussa, 2017](#)) and South Africa ([Saungweme and Odhiambo, 2020](#)). Lastly, there are studies focussing on Latin American countries, such as Bolivia ([Garrón Vedia and Villegas Tufiño, 2014a](#)) and Peru.

Focussing on the possibility of a causal relationship between microcredits and GDP in South East Asia, with panel data from 1995 to 2009, the authors plot the system variables vector autoregressive (VAR) model, and find a robust answer if there is an effect on a micro level, which should be reflected in aggregates already, mainly for developing countries ([Alimukhamedova, 2014](#)). Later, another study was conducted with panel data from 2012 to 2014 in Vietnam, in which microcredits created benefits for the output, such as self-employments on the micro level, but on the macro level these were shorter than expected ([Thanh et al., 2019](#)). Similar results in terms of the positive influence of microcredit on economic development and growth are found in global studies, using a multivariate approach based on cross-country data, covering all geographic areas ([Lopatta and Tchikov, 2016](#); [Hook Law and Boon Tan, 2009](#); [Levine, 2005](#); [Lopatta and Tchikov, 2016](#); [Sethi and Acharya, 2018](#); [Sugiyanto and Yolanda, 2020](#)). Finally, there are studies focussing on Latin American countries, such as in the different departments of Bolivia, with panel data from 2000 to 2013, which found a positive relationship between GDP and increasing microcredit in each department ([Garrón Vedia and Villegas Tufiño, 2014b](#)), and Peru, with panel data from 2001 to 2008, in its 24 regions ([Aguilar Andía, 2013](#)).

Extending the positive relationship between microcredit and GDP to poverty reduction with a better distribution of wealth, we found studies in Bangladesh ([Islam, 2011](#); [Khandker, 2005](#)), India ([Imai et al., 2010](#); [Kumar Panda, 2009](#); [Sehrawat and Giri, 2018](#); [Swain and Floro, 2012](#)), Indonesia ([Khan et al., 2021](#); [Majid et al., 2019](#)), Nigeria ([Awojobi and Abdurahman Bein, 2010](#)), Pakistan ([Ghalib et al., 2015](#)), Bodoland, Baksa and Udalguri ([Maity and Sarania,](#)

2017), and in a large sample of developing countries (Donou-Adonsou and Sylwester, 2016; Hartarska and Nadolnyak, 2007; Montgomery and Weiss, 2005; Mushtaq and Bruneau, 2019).

As there is no consensus in the literature on the effects of microcredit on GDP, we hypothesize the following:

H1a. Microcredit issued in a canton positively affects its own generated income.

H1b. Microcredit issued in a canton negatively affects its own generated income.

Microcredit is often regarded as a tool for promoting economic growth within an economy. However, an important question arises: does it also have an impact on neighbouring economies? Previous research has already demonstrated the existence of externalities in technological and monetary diffusion in nearby regions López-Bazo *et al.* (2004), Puga and Venables (1996a). This could potentially benefit stakeholders in strategic areas close to microenterprises, as they share labour markets, final products and knowledge. In fact, some studies have even incorporated a weighted average of neighbouring countries' GDPs as an explanatory variable for a country's own GDP, revealing significant effects (Barro and Sala-I-Martin, 1992).

Drawing on this concept, Banerjee *et al.*, 2015, propose that microcredit not only stimulates economic activity within the local community but also fosters the development of microenterprises, creating positive effects that extend beyond geographical boundaries. Furthermore, access to microcredit might facilitate investments in education and health, potentially contributing to long-term development. By exploring these potential spillover effects, valuable insights can be gained into the comprehensive impact of microcredit beyond its direct beneficiaries (Lychagin *et al.*, 2016; Morgan, 2004). A review of previous studies reveals that the spatial effects of microcredit have received limited attention, with a lack of specific research in the context of Ecuador. As a result, our second proposal aims to address this understudied aspect:

H2. Microcredit issued in one canton positively affects the GDP of neighbouring cantons.

3. Methodology, sample and data

In order to test the proposed hypotheses, a database is constructed with macroeconomic information for the country, broken down into the 221 existing cantons in Ecuador in 2019. The most commonly used study methods are multiple linear regressions for a specific year and panel data covering a whole time series. However, they refer only to the impact of the microcredit variable on the GDP components of the same region. In our study, we add the impact on neighbouring regions, making use of spatial econometrics.

As for the variables considered in previous studies, apart from the amount of microcredits granted, the overall or per capita GDP, the GDP broken down by the value added by each industry, and the Gini index, some studies consider additional variables. Some are related to the profile of the microcredit applicant, such as their socio-demographic data (Ghalib *et al.*, 2015; Islam, 2011; Khandker, 2005; Maity and Sarania, 2017; Thanh *et al.*, 2019). Others are related to the credit itself or to the institution, such as the average balance, the level of delinquency, the amount of deposits or the savings rate (Beck *et al.*, 2007; Gries *et al.*, 2009; Levine, 2005; Lopatta and Tchikov, 2016; Nwude and Anyalechi, 2018; Samargandi *et al.*, 2015; Sanogo and Moussa, 2017). Other variables describing the area are social, such as population, schools, educational level and labour market (Aguilar Andía, 2013; Garrón Vedia and Villegas Tufiño, 2014; Imai and Azam, 2011; Khandker, 2005; Raihan *et al.*, 2017), or financial, such as financial depth and stock market capitalization, among others (Alimukhamedova, 2014; Gries *et al.*, 2009; Hook Law and Boon Tan, 2009; Majid *et al.*, 2019; Negi, 2020). Lastly, we find inflation or exchange rate as control variables (Gries *et al.*, 2009; Kumar Panda, 2009; Roodman and Morduch, 2009; Sultan and Masih, 2016).

Although we take a given number of explanatory variables that determine GDP, there is the possibility that there are other unobserved factors that may vary systematically across the territory, resulting in a spatial autocorrelation of the error term. Spatial econometrics allows considering the spatial lags, which are the effects on the neighbours. For this reason, we use what [LeSage and Pace \(2009\)](#) refer to as a “spatial Durbin error model” (SDEM), which combines the spatial lags of the explanatory variables and the error term, resulting in [Eq 1](#):

$$Y = \alpha + \beta_m X_m + \beta_M X_M + \beta_Q X_Q + q_m W X_m + q_M W X_M + q_Q W X_Q + u \quad (1)$$

$$u = l W u + \varepsilon,$$

where:

- (1) X_m : Amount of microcredits issued per canton (dependent variable);
- (2) X_M : Contributions from economic activities (agriculture, fisheries, mining, manufacturing, electricity, construction, accommodation, services, communications, financial activities, public sector, trade, health and other services);
- (3) X_Q : Other qualitative variables (number of teachers, total number of students and population density).

Therefore, [Eq \(1\)](#) includes: first, the direct effects of the explanatory variables ($\beta_m X_m + \beta_M X_M + \beta_Q X_Q$); second, the spatial lags of the explanatory variables ($q_m W X_m + q_M W X_M + q_Q W X_Q$); and third, the spatial lag of the error term ($l W u$). Specifically, the SDEM enhances accuracy by correcting unaccounted spatial autocorrelation, enables the capture of non-linear and dynamic spillover effects, and enriches predictive capacity by considering the spatial influence of past errors.

The main steps of the research process are summarized in [Figure 2](#).

4. Results

The results of the initial simple linear regression ([Table 2](#)) show a positive and significant effect of issued microcredit on the GDP of the canton itself ($b = 0.0249,627$; $p < 0.05$), which confirms our [hypothesis 1a](#): microcredit generated in a region positively affects the income generated in that same region. However, in order to verify whether there are spillover effects, we must still see the effects that it generates in neighbouring areas.

We begin by performing the Moran’s I test, whose null hypothesis states that the attribute under analysis is randomly distributed among the entities in the study area; that is, the spatial processes that promote the observed pattern of values constitute a random choice. The chi-square result (10.91) is highly significant, with a p -value of 0.0010, thus corroborating the existence of spillover effects and the need for spatial econometric techniques to measure such externalities. For this purpose, we use a row-standardized contact matrix and an SDEM model.

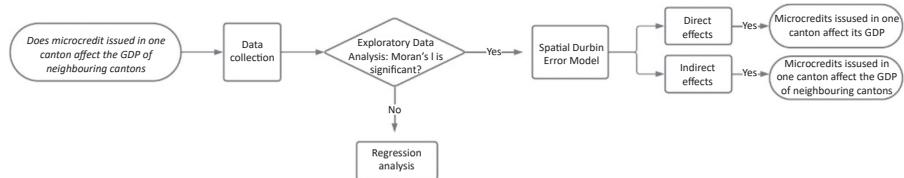


Figure 2. Flowchart of the research methodology

Source(s): Own elaboration based on Spatial Durbin Error methodology

Variables	Coefficient	<i>p</i> -value
Microcredits (millions)	0.024963**	0.027
Agriculture and fishing	0.000010***	0.000
Mining	0.000001***	0.000
Electricity	0.000015***	0.000
Construction	-0.000007***	0.001
Trade	-0.000005	0.252
Accommodation and food	0.000019	0.161
Transport and communications	0.000005	0.288
Financial activities	0.000006	0.651
Real estate	-0.000002	0.448
Administration	-0.000002	0.734
Health	-0.000065***	0.001
Other services	-0.000065***	0.020
Teachers	0.002861***	0.000
Population	-0.000010	0.172
Constant	10.362,400***	0.000
Sample size	221	
<i>R</i> ²	0.76597	

Spillover effects of microcredit on the GDP

Table 2.

Linear regression of issued microcredit on the canton's own GDP

Note(s): * Significant at 10%, ** significant at 5% and *** significant at 1%

Source(s): Authors own creation

The results are divided into two sections: direct effects (Table 3) and indirect effects (Table 4). We observe a positive and significant direct effect ($b = 0.0290,715; p < 0.01$) of microcredit on the GDP of the region, and a positive and significant indirect effect ($b = 0.030647; p < 0.1$) of microcredit on the GDP of neighbouring cantons. These results corroborate our hypothesis 2, which established a positive relationship with microcredit granted to the economies of adjacent regions.

5. Conclusions and discussion

The aim of this study is to provide original empirical evidence on the process of spatial creation and dissemination of wealth in Ecuador via microcredit issues, with a special focus on the relevance of inter-cantonal spillovers. To this end, the observed unit of analysis has focused on the cantons (second-level administrative division in Ecuador).

We provide an answer to the question of whether cantonal geographical proximity matters regarding GDP generation.

Using a sample with macroeconomic information for the country, broken down into the 221 existing cantons in Ecuador in 2019, we compiled a database with data on microcredit allocations across Ecuadorian cantons in the year 2019.

We started mapping the distribution of GDP in the cantons of Ecuador and run the Moran's I test to conclude that their GDP is not randomly distributed among the cantons, and that there exists a spatial effect to be considered. Spatial econometrics proves to be a highly effective analytical tool when empirically modelling spillover effects in the context of cross-sectional data (Moreno *et al.*, 2005). We relied on a SDEM model, which combines the spatial lags of the explanatory variables and the error term. Given that wealth distribution is a crucial variable beyond its generation, employing an SDEM model is highly appropriate. This model allows for analysing the impact of microcredits granted in a canton on the GDP of neighbouring cantons. Consequently, this methodology provides the advantage of observing the multiplicative capacity of microcredits beyond the benefits generated in the area of allocation.

The main results show a direct effect of issued microcredit on the income generated in the canton itself, which is consistent with related studies in other economies, such as those of Aguilar Andía (2013) in Perú, Garrón Vedia and Villegas Tufiño (2014b) in Bolivia, Sultan and

JSMA

Variables	Coefficient	<i>p</i> -value
Microcredits (millions)	0.0290715***	0.001
Agriculture and fishing	0.00000904***	0.000
Mining	0.00000117***	0.000
Electricity	0.0000154***	0.000
Construction	-0.00000747***	0.000
Trade	-0.00000211	0.446
Accommodation and food	0.0000206**	0.033
Transport and communications	0.00000597*	0.088
Financial activities	-7.82E-07	0.939
Real estate	-0.00000408**	0.043
Administration	9.59E-07	0.852
Health	-0.0000372***	0.000
Other services	-0.0000551***	0.000
Teachers	0.0031483***	0.000
Population	-0.0000183***	0.000
Constant	10.37828***	0.000
Sample size		221
R square		0.7959

Table 3.
Direct effects of issued microcredit on the canton's own GDP

Note(s): * Significant at 10%, ** significant at 5% and *** significant at 1%
Source(s): Authors own creation

Variables	Coefficient	<i>p</i> -value
Microcredits (millions)	0.0306407*	0.099
Agriculture and fishing	1.59E-06	0.544
Mining	2.58E-06	0.660
Electricity	-4.93E-06	0.543
Construction	2.08E-06	0.603
Trade	4.77E-06	0.47
Accommodation and food	-4.24E-06	0.863
Transport and communications	-4.15E-06	0.636
Financial activities	0.0000254	0.213
Real estate	2.15E-07	0.961
Administration	-9.69E-06	0.373
Health	-0.0000165	0.350
Other services	-0.0000393	0.233

Table 4.
Indirect effects of microcredit on the GDP of neighbouring cantons

Note(s): * Significant at 10%, ** significant at 5% and *** Significant at 1%
Source(s): Authors own creation

Masih (2016), in Bangladesh and Negi (2020) in India, who underline the increasing role that micro finance institutions are now playing in rural credit. In line with the findings of (Littlefield and Rosenberg, 2004; Dunford, 2006), the results of this study corroborate the belief that microcredit is a fundamental tool for facilitating the social and economic improvement of the most vulnerable sectors. All these studies do not consider the possibility of externalities or spillover effects of microcredit, and with this study, we come to fill this gap.

Using spatial econometrics, this study allows finding an indirect effect on the economies of neighbouring cantons. The spillover effects would benefit the lower-income population, improving basic goods such as health, housing and education and reducing their financial risks. MSEs, for their part, can increase their investment and turnover, employ more people or have a greater liquidity capacity (Demircuc-Kunt *et al.*, 2017).

This is the first study of its kind; previous studies have only shown a technological impact in neighbouring regions, as in the case of (López-Bazo *et al.*, 2004). This shows a contagion effect that makes it possible to multiply the impact of microcredits granted to other nearby regions.

Our study offers three primary contributions to the literature. Firstly, it contributes to addressing the first two sustainable development goals (SDGs). Recognizing FI as a pivotal challenge in development, our research underscores its potential to substantially contribute to the reduction of poverty and inequality (Ashraf *et al.*, 2010; Klapper *et al.*, 2016), thereby aligning with the objectives of eradicating hunger and poverty outlined in the initial two SDGs. Improved access to financial services such as microcredit is aimed especially at low-income and largely unbanked sectors of the population and constitutes an essential alternative for advancing FI in the country, directly contributing to the creation of decent work (SDG 8) and the fight against poverty and hunger (SDGs 1 and 2).

Second, this study contributes to clarify that microcredit has a positive impact on the generation of wealth in different areas of Ecuador, with the benefits and goals related to social welfare and economic development linked to the 2030 Agenda.

Finally, by demonstrating the significant effects of microcredit, we also contribute to the acknowledgement of social entrepreneurship as a potent catalyst for wealth generation, not only within the immediate region but also in neighbouring areas. This positions it as a influential driver of social change (Kamran *et al.*, 2022), aiding in the reduction of gaps and inequalities, and influencing business ecosystems to yield positive effects in the community (Bacq *et al.*, 2022; Wurth *et al.*, 2022).

This study has several implications to be considered for both, policy formulation and practitioners. The identified correlation between microcredit disbursement in a specific canton and the subsequent increase in both local and neighbouring cantons' gross domestic product (GDP) underscores the multifaceted impact of microcredit initiatives. This revelation not only emphasizes the pivotal role of microcredit in local economic development but also illuminates its spillover effects on adjacent regions. Consequently, this empirical evidence could significantly inform policy formulation and regional development strategies.

The findings advocate for a nuanced approach to economic policy, wherein microcredit accessibility is considered not only as a catalyst for localized prosperity but also as a potential driver of regional economic growth. Policymakers may find merit in implementing comprehensive strategies that prioritize the widespread availability of microcredit, recognizing its capacity to generate positive economic outcomes that extend beyond immediate geographical boundaries.

In essence, this research contributes valuable insights into the effectiveness of microcredit initiatives as a dynamic tool for fostering economic growth at both local and regional levels. For all of the above reasons, our proposal for the country is to support and promote microcredit as one of the main solutions to address the goals proposed in the SDGs.

Given the relevance of these implications, future research should consider other countries (and neighbouring countries) would be necessary, as our study is limited to Ecuador.

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