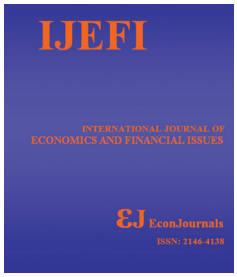

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Effects of Macroeconomic Factors in the Performance of Micro Finance Institutions in Ecuador

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ABSTRACT

Microfinance institutions (MFIs) give credit to people who do not have facilities of access to the financial system with the aim of using it to create or expand a business. However, these institutions may be affected, exogenously, by the situation of the country where they operate, influencing the full development of their activities, such as granting benefits to their applicants. The author analyzes the effect that macroeconomic factors may have on the performance of MFIs. Ecuador is taken as the reference country, using the savings and credit cooperatives organizations, non-governmental organizations and banks, which are part of this microfinance sector. A fixed effect panel data regression was used, with a multiple imputation treatment for missing values because of the quality of the information obtained. It was found that there is no statistically significant influence on the macroeconomic variables used in the study on the performance of microfinance in Ecuador.

Keywords: Micro Finance, Ecuador, Finance, Bank
JEL Classifications: G21, G23, G28

1. INTRODUCTION

Microcredit can be a very useful tool for reducing poverty in developing countries where the least favored - who usually do not have access to credit - can use it to start small businesses (Bellman, 2006). During the last decades microcredits have been growing and have played an important role in the financial markets of developing economies (Kaboski and Townsend, 2012). According to Bellman, the microfinance approach emerged in the 1970s driven by firms such as Grameen Bank in Bangladesh and has since spread all over the world. Estimates indicate that microcredit reached about 82 million households by the end of 2006 (International Finance Corporation of World Bank, 2007), and according to the World Council of Credit Unions, $ 1.2 trillion in loans worldwide.

Given the target population of microfinance, there has been an expectation that it will have a direct impact on poverty reduction. (Augsburg, et al., 2012; Khandker, 2005; Morduch, 1998), although it is not clear the extent to which its success depends on individuals alone or on other factors such as macroeconomic factors. (Imai et al., 2011) in a study of 97 countries found that institutional and macroeconomic factors (such as gross domestic product [GDP] and the proportion of domestic credit to GDP) affect financial performance (measured through profitability and the quality of the portfolio) of microfinance institutions (MFIs). In addition, (Vanroose, 2008) finds that while the level of industrialization and inflation seem not to influence the reach of microfinance, population density plays an important role, since high concentrations tend to decrease management costs of micro-financial clients. (Visconti, 2012) describes the impact of the global recession on the performance of MFIs in both developed and developing economies and finds that economic growth, especially in developed countries, is much more related to external factors caused by globalization.

Although the relationship between microfinance and macroeconomic factors is an active area of research, similar studies have not been found in Ecuador. Hence, the objective of this article is to evaluate the effect and significance of certain macroeconomic variables on the performance of MFIs in the country. To that end, a process like that proposed by Ahlin et al.

(2011) was utilized, which used a quantile regression model to explain if the financial performance variables of MFIs are being affected by macroeconomic factors. The problem with the method applied by the abovementioned author is that he does not consider the panel structure in the database, if we work with cross-sectional information. In the present paper, however, the fixed-effects methodology for panel data will be applied to capture the individual effects of MFIs and intra-temporal variations.

The article is structured as follows: The second chapter addresses the problem of microfinance in Ecuador, which outlines certain characteristics of this country. Then, the third section presents the source of the data as well as a summary of its main descriptive statistics. Likewise, the statistical model used to test the hypothesis is presented. The fourth section presents the results obtained after running the econometric model and finally in the last section the main conclusions are presented and recommendations are made for future studies.

2. MICROFINANCE IN ECUADOR

The microfinance market in Ecuador presents a diverse range of products and services such as loans, insurance, transfers, payments and collections, among others. The credits are offered to individuals and small businesses with low incomes, which do not have the real guarantees required by traditional banking. This sector is made up of banks that carry out microfinance activities, savings and credit cooperatives organizations (SACCO) and non-governmental organizations (NGOs) mainly linked to the cooperative system developed in the country.

The first records on this activity are around the year 1879, with the emergence of the first institution of this type in the city of Guayaquil called "Sociedad de Artesanos Amantes del Progreso" (Society of Progress Loving Artisans). From that moment until now, the development of the cooperative system has been quite dynamic. For the year 2000, the "red financiera rural" - rural financial network was created, which associates SACCOs that are dedicated to the activities of microfinance. Many of them started their activities in the 1970s, but the boom came mainly in the 1990s. (Jácome and Cordovéz, 2003).

According to information from the Network of Financial Institutions for Development as of March 2002, 15 NGOs and 2 banking institutions dedicated to microfinance had granted nearly USD 95 million in microcredit to serve around 193,000 borrowers. For 2008, with the approval of the new constitution, this sector was called "Economía Popular y Solidaria" (popular and solidary economy), whose purpose is to expand financial inclusion through financial services offered by SACCOs, community banks and NGOs. The regulatory framework of this sector was established in 2011 with the "Ley de Economía Popular y Solidaria - LEPS" (law for popular and solidary economy).

For the period 2014-2015, microcredits experienced growth of about 9%, from USD 184.7 to USD 202.2 million, distributed as follows: 46% in banks, 51% in cooperatives and the remaining 3% in other regulated financial institutions.

According to statistical data from the "Superintendencia de Economía Popular y Solidaria" (Superintendence of Popular and Solidary Economy), in October 2015, Ecuador registered a total of 887 credit unions with approximately 5 million members and assets amounting to USD 8.3 billion, ranking second in Latin America after Brazil. In addition, 66% of the microcredit that the country has granted belonged to the cooperative system, which makes this financial product something distinctive vis-a-vis banking.

The SACCOs are the main institutions that make up this market in Ecuador (Table 1), providing a total of USD 1.089 million in microcredit to 818 thousand borrowers as at March 2016, representing 61.93% of the total microcredit granted in the country (Network of Financial Institutions for Development RFD, 2016). Within the SACCO, the main entities that grant microcredits are "Jardín Azuayo" with 12.20% and "Mushuc Runa" with 9.86% (Table 2).

For banking entities (Table 3), the main organizations that cover this market are "Banco Solidario" with 58% and "Banco D-Miro" with about 19% of the total microcredit portfolio in the country. Among the NGOs (Table 4), ESPOIR with 28.2% and Insotec with 22.2% are the main institutions that grant microcredits in the country.

Table 1: Total microcredit portfolio as at March-2016 (USD millions)

Legal status	Total microcredit portfolio	Percent (%)
COAC	1,089.93	61.93
Banks	531.06	30.17
NGOs	138.94	7.89
Total	1,759.92	100.00

Source: Red financiera rural (Ecuador). NGOs: Non-governmental organizations

Table 2: Total of microcredit portfolio of COACs (USD millions)

Organization	Total microcredit portfolio	Percent (%)
JARDÍN AZUAYO	133.01	12.20
MUSHUC RUNA	107.46	9.86
COOPROGRESO	93.02	8.54
RIOBAMBA	88.94	8.16
CACPECO	77.19	7.08
29 DE OCTUBRE	58.86	5.40
OTRAS	531.35	48.76
TOTAL	1,089.83	100.00

Source: Red financiera rural (Ecuador)

Table 3: Total of microcredit portfolio of banks (USD millions)

Organization	Total microcredit portfolio	Percent (%)
SOLIDARIO	307.94	57.99
BANCO D-MIRO	99.44	18.73
BANCO DESARROLLO	69.04	13.00
FINCA	34.24	6.45
COOPNACIONAL	20.40	3.84
Total	531.06	100.00

Source: Red financiera rural (Ecuador)

Table 4: Total of microcredit portfolio of NGOs (USD millions)

Organization	Total microcredit portfolio	Percent (%)
ESPOIR	39.18	28.20
INSOTEC	30.89	22.23
FUNDACION ALTERNATIVA	29.11	20.95
FACES	25.49	18.34
OTROS	14.28	10.28
Total	138.94	100.00

Source: Red Financiera Rural (Ecuador). NGOs: Non-governmental organizations

Finally, it is important to point out that the use of financial services in Ecuador has advanced in a moderate but sustained way, reaching the 20th position in the ranking of the Global Microscope, prepared by The Economist Intelligence, of the best environments for the financial inclusion at the global level (CGAP Microfinance Portal, 2016).

3. METHODOLOGY

To estimate the effects of the macroeconomic environment on the performance of MFIs, the data panel structure offers a clear advantage. The data on macroeconomic indicators allow us to control the way in which several factors vary over time. For example, we will assess the dynamics in which inflation and the ratio of domestic credit to GDP can affect the financial performance (measured through operational sufficiency) of MFIs. All financial indicator data are measured at the end of the calendar year.

The operational adequacy was the dependent variable. On the other hand, the independent variables used are the macroeconomic variables GDP growth, inflation, the unemployment rate and foreign direct investment as a percentage of GDP as well as the use of microeconomic variables such as the portfolio at risk over 30 days, non-performing portfolio rate, average interest rate, mark-up rates, cost per dollar borrowed and borrower's growth.

The data of the MFIs were collected from the Mix Market website (www.mixmarket.org). The information is found annually from 2003 to 2013 in most cases, for about 60 different MFIs including banks, cooperatives and NGOs.

With respect to microfinance variables, the average interest rate is the result of dividing the financial income corresponding to the loan portfolio to the average gross portfolio. The borrower's growth rate is calculated by making a logarithmic difference between years of the number of active borrowers. Another important microeconomic indicator is the non-performing portfolio rate, which is equal to the quotient of the write-off portfolio (derecognized) among the total gross loan portfolio. This indicator is one of the most used to describe the percentage of delinquency in the portfolio.

The mark-up rate refers to the difference between the interest income on the loans granted and the average cost of those funds. Likewise, the cost of each dollar loaned is calculated as the quotient between the operating expenses related to the management and granting of the loans and the average gross portfolio. The ability of MFIs to create income that covers at least their financial/operating expenses and impairment losses is known as operational sufficiency and is another important indicator that is included in the analysis. Finally, as an additional measure of risk of default, the portfolio at risk over 30 days is included, which is calculated as the value of the loan portfolio that has a payment delay of more than 30 days divided by the total of the portfolio.

On the other hand, macroeconomic data were obtained from the World Bank's website (www.worldbank.org). The source presents annual information of Ecuador from 1960 to 2013. Unemployment, represented as a rate, indicates the percentage of people who do not have a job, of the total number of people who are part of the economically active population. Another macroeconomic variable is the foreign direct investment, which is the placement of capital in some foreign territory to the country of residence, destined for the creation or development of new industries.

Inflation is the sustained increase in the price of goods and services that exist within a market over a certain period. GDP growth reflects the aggregate and economic performance of countries. GDP is the sum of the gross value added contributed by all producers' resident in the country plus taxes and less subsidies not included in the value of the products. It is calculated without making any deductions for depreciation of manufactured assets or degradation of natural resources (Ahlin et al., 2011).

Table 5 presents the descriptive statistics for the microfinance variables used in the study. There are also the minimum and maximum variations and values between and within the same variable. In other words, it shows what are the descriptive statistics among microfinance and what was the behavior of each variable over time.

Table 6 shows the descriptive statistics of the macroeconomic variables to be used in the model as well as their overall, within and between variations. It can be observed that there is not a big deviation, neither within nor between the macroeconomic variables analyzed.

It is important to emphasize that the analyzed data present a high percentage of missing values in microfinance variables, generating in the first instance a problem to be able to estimate a model. Mechanisms for dealing with these missing values generally fall into one of the following three categories (Allison, 2001):

- Missing completely at random: If neither the variables in the dataset nor the unobserved value of the variable itself predict whether a value will be missing.
- Missing at random (MAR): If other variables (but not the variable itself) in the dataset can be used to predict missingness on a given variable.
- Missing not at random: If the value of the unobserved variable itself predicts missingness.

So, there are some alternatives to handle the missing values within a set of data. Among the most used are the following:

- Complete case analysis (listwise deletion): Involves deleting cases in a particular dataset that are missing data on any

Table 5: Descriptive statistics of microfinance variables

Variable	Abreviation	Mean	Overall deviation	Between deviation	Within deviation
Operational sufficiency	OSS	1.21	0.62	0.45	0.38
Non-perfoming porfolio rate	LLR	0.01	0.07	0.02	0.06
Portfolio at risk over 30 days	PAR30	0.04	0.07	0.05	0.05
Average interest rate	AIR	0.25	0.65	0.47	0.25
Mark-up rate	INTMARK	0.18	0.42	0.31	0.16
Cost per dollar borrowed	CPDL	0.14	0.35	0.25	0.14
Borrower's growth	BGRWTH	0.17	0.29	0.10	0.27

Source: The author

Table 6: Descriptive statistics of macroeconomic variables

Variable	Abbreviation	Mean	Overall deviation	Between deviation	Within deviation
GDP growth	GROWGDP	0.03	0.02	0.00	0.02
Unemployment	UNPLOYMENT	0.07	0.02	0.01	0.02
Inflation	INFLATION	0.08	0.16	0.05	0.15
Foreing direct investment (% of GDP)	FDI	−0.01	0.08	0.01	0.01

Source: The author. GDP: Gross domestic product

variable of interest. It is a common technique because it is easy to implement and works with any type of analysis.

- Available case analysis: Involves estimating means, variances and covariances based on all available non-missing cases.
- Mean imputation: Involves replacing the missing values for an individual variable with it's overall estimated mean from the available cases.
- Single imputation: Replaces missing values with predicted scores from a regression equation.
- Stochastic imputation: A residual term, that is randomly drawn from a normal distribution with mean zero and variance equal to the residual variance from the regression model, is added to the predicted scores from the regression imputation thus restoring some of the lost variability.
- Multiple imputation: This is a form of stochastic imputation. Instead of filling in a single value, the distribution of the observed data is used to estimate multiple values that reflect the uncertainty around the true value.

For the present investigation, the missing values are categorized as MAR and for its subsequent treatment, the multiple imputation method is used. This procedure has three steps:

- Fill in phase: Missing values are filled in with estimated values.
- Analysis phase: Each of the complete data sets is analyzed either by regression or other econometric analysis.
- Grouping phase: The estimates of the parameters obtained for each analyzed data set are combined to make the inferences.

(Rubin, 1987) in his studies on multiple imputation determined that the advantages provided by this method is that it solves the problem of underestimating uncertainty. Each missing value is replaced by a list of m>1 simulated values. With this, m alternative versions of the complete data set are produced. The results are then combined to obtain global estimates and standard errors that reflect the uncertainty of the missing data.

This multiple imputation method has attractive features. Like simple imputation, it solves problems of missing data, and does not need to be re-imputed for each new analysis. In addition, many simulations are not required to achieve more accurate estimates. Similarly, (Enders, 2010) highlights the use of multiple imputation because it easily accommodates auxiliary variables as predictors in the imputation phase. Because the imputation process provides values with the auxiliary variable information, it is not necessary to include additional information. Although multiple imputation has greater advantages over traditional methods such as simple or normal imputation, it is still criticized, since the imputation process is usually considered as data invention. However, it has many practical benefits that can solve the problems of missing values and reach better conclusions.

3.1. Econometric Analysis

After the imputation of 90 simulations, necessary to reach convergence, of the missing data, we proceeded to run the panel data model, given the information structure of the microfinance variables over time. For this, different estimation alternatives such as the fixed effects, random effects and ordinary least squares estimation were used.

Therefore, the following function will be used:

$$Fin_{it}=f(Micro_{it},Z_t) \quad (1)$$

Where Fin_{it} represents the microfinance variable "operational sufficiency" of institution i at time t, $Micro_{it}$ represents a group of microfinance variables that are explanatory of institution i at time t, and Z_t is defined as a vector of macroeconomic variables at time t.

4. RESULTS

The results are presented in Table 7. Three types of models were considered: The first one considers a linear deterministic trend, in the second all the macroeconomic and microfinancial variables are considered, whereas in the third one the best model obtained is shown after the multiple regressions were run. It can be observed that, contrary to the hypothesis initially proposed, there is no statistically significant influence on macroeconomic variables in the performance of MFIs in Ecuador. This effect is common in

Table 7: Results of the regressions using several model

Dependent variable: Operational sufficiency (OSS)			
Regressor	**1**	**2**	**3**
Unproductive portfolio rate	−0.11 (0.15)	−0.13 (0.15)	−0.14 (0.15)
Portfolio at risk over 30 days	−0.24 (0.21)		
Average interest rate	0.22 (0.21)		
Mark-up rate	0.41 (0.27)		
Cost per dollar borrowed	−0.91 (0.34)		
Borrower's growth	−0.01 (0.04)		
Inflation	−0.35 (0.23)	−0.25 (0.16)	−0.24 (0.16)
Unemployment	1.26 (2.61)	0.72 (2.43)	1.50 (1.07)
Foreing direct investment	2.09 (3.86)	2.02 (3.62)	2.71 (3.05)
GDP growth	0.92 (0.82)	0.96* (0.78)	1.09 (0.68)
Trend	−0.001 (0.26)	−0.004 (0.24)	
Constant	1.13** (0.26)	1.18** (0.24)	1.09** (0.06)
Summary			
N	334	324	334
R^2	0.02	0.06	0.02
P>F	0.428	0.17	0.32

*Significance level 5%, **Significance level 10%, Robust errors to heteroskedasticity.
Source: The author. GDP: Gross domestic product

the three estimated models, with their statistics being above the significance level of 10%. On the other hand, by including the trend as a model variable, it turns out to be non-significant.

5. CONCLUSIONS

This study analyzes the determinants of success of MFIs in a macroeconomic context, seeking to identify the impact of aggregate factors of the Ecuadorian economy on the aforementioned institutions. After the estimations were made, we can see that there is no influence of macroeconomic variables such as unemployment, GDP growth, inflation or foreign direct investment in the microfinance variables, because they are not statistically significant in any of the models presented.

On the other hand, it is important to mention that the analysis focused on the performance of MFIs, but it does not cover the impact of these institutions on the reduction of poverty. The inferences obtained seek to determine how the impact of public policies when making changes in macroeconomic indicators may affect the performance of MFIs.

In addition, it was not possible to analyze the pre-and post-crisis effects in Ecuador in the year 2000, since there are not enough data to carry out such comparative analysis and obtain further conclusions. Neither a discriminatory analysis of the urban and rural sectors was carried out, because this study was not focused on people but on microfinance as a whole. Finally, the main problem was the poor quality of the database obtained which may have affected the general conclusions. The MFI's performance data obtained over time presented many missing values, which in previous sections was treated to be able to make robust estimates and obtain the final conclusions.

REFERENCES

Ahlin, C., Lin, J., Maio, M. (2011), Where does microfinance flourish? Microfinance institution performance in macroeconomic context. Journal of Development Economics, 95(2), 105-120.

Allison, P.D. (2001), Missing Data. Quantitative Applications in the Social Sciences. UK: Sage Publications. p104.

Augsburg, B., Haas, R.D., Harmgart, H., Meghir, C. (2012), Microfinance, Poverty and Education. Available from: https://www.ifs.org.uk/wps/wp1215.pdf. [Last accessed on 2016 Jun 10].

Bellman, E. (2006), Entrepreneur Gets Big Banks to Back Very Small Loans. Wall Street Journal. Available from: http://www.wsj.com/articles/SB114765489678552599.

CGAP Microfinance Portal (2016), CGAP Microfinance Gateway. Available at: http://www.cgap.org/publications/impact-microfinance.

Enders, C. (2010), Applied Missing Data Analysis. New York: The Guilford Press.

Imai, K., Gaiha, R., Thapa, G., Annim, S.K., Gupta, A. (2011), Performance of microfinance institutions: A macroeconomic and institutional perspective. The University of Manchester Economics Discussion Paper Series, 1116, 11-22.

International Finance Corporation of World Bank. (2007), Los Siguientes 4 Mil Millones. Washington DC: International Finance Corporation of World Bank.

Jácome, H., Cordovéz, J. (2003), Microfinanzas en la economía ecuatoriana: Una alternativa para el desarrollo. Serie de Documentos de Investigación. Ecuador: FLACSO. p1-85.

Kaboski, J.P., Townsend, R.M. (2012), The impacts of credit on village economies the impacts of credit on village economies. American Economic Journal: Applied Economics, 4(2), 98-133.

Khandker, S.R. (2005), Microfinance and poverty: Evidence using panel data from Bangladesh. World Bank Economic Review, 19(2), 263-286.

Mixmarket. (2017), Available from: http://www.mixmarket.org. [Last accessed on 2017 May 15].

Morduch, J. (1998), Does Microfinance Really Help the Poor? New Evidence from Flagship Programs in Bangladesh, June 1997. p101-104.

Network of Financial Institutions for Development. (2002), Available from: http://www.rfr.org.ec.

Rubin, D. (1987), Multiple Imputation for Nonresponse in Surveys. Available from: https://www.books.google.co.il/books?hl=iw&lr=&id=bQBtw6rx_mUC&oi=fnd&pg=PR24&dq=multiple+imputations+rubin&ots=8NuI7M3ZgT&sig=2KWSC4nHl3YlnDtdT1X_WigxW_E&redir_esc=y#v=onepage&q=multiple imputationsrubin&f=false.

Superintendencia de Economía Popular y Solidaria. (2015), Available from: http://www.seps.gob.ec.

The World Bank. (2017), Available from: http://www.worldbank.org. [Last accessed on 2017 May15].

Vanroose, A. (2008), What macro factors make microfinance institutions reach out? Savings and Development, 32(3), 153-174.

Visconti, R.M. (2012), Global Recession and Microfinance in Developing Countries: Threats and Opportunities: Università cattolica del Sacro Cuore. Milano, Italy.