The final publication is available at

http://dx.doi.org/10.1016/j.mcm.2011.11.010

Additional Information

Measuring performance of social and non-profit Microfinance Institutions (MFIs): An application of multicriterion methodology

C. Bartual Sanfeliu, R. Cervelló Royo [*], I. Moya Clemente

Departamento de Economía y Ciencias Sociales, Facultad de Administración y Dirección de Empresas, Universitat Politècnica de València, Camino de Vera s/n, 46022, Valencia, Spain

ARTICLE INFO

ABSTRACT

Microfinance Institutions (MFIs) are special financial institutions of both social and non-profit nature whose performance has been traditionally measured by means of financial ratios. However, performance rankings are usually based on a single criterion, so the performance measure varies according to the criterion used. This paper proposes a multicriterion methodology based on goal programming that simultaneously considers different categories involved in the performance of Microfinance Institutions. The paper is illustrated by a sample of Latin American MFIs.

© 2011 Elsevier Ltd. All rights reserved.

1. Introduction

Most studies dealing with business performance are focused on the traditional trading bank sector: Private Capital banks [1–5, among others] and Savings banks [6]. These are institutions which in the last years have been blamed for being responsible for the credit restriction to the less-privileged classes who are not in a condition to offer loan guarantees. In order to meet this need, new financial intermediaries have arisen, so-called Microfinance Institutions (MFIs), which provide small loans (microcredits) to poor people who have promising and feasible investment ideas that can lead to profitable ventures. These new financial institutions are in touch with the local community, can obtain information about the loan taker at a low cost, and are not only interested in profit but also in economic development, the creation of jobs, women's employment, and green and ecological issues. Their best known innovation is the "peer group loan methodology", by which members accept joint liability for the individual loans made. However, these special financial institutions are also interested in financial matters like profitability, returns, and efficiency. Morduch [7] criticizes the fact that discussions on microcredit performance usually ignore important financial matters, while Yaron [8] started to analyze and study the dual concept of outreach and sustainability.

The evolution and expansion of the Microfinance Industry have led to considering all these aspects; so a set of performance indicators has been introduced, and many of them have become standardized. Thus, in 2003, a consensus group composed of microfinance rating agencies, multilateral banks, donors, and private voluntary organizations agreed to some guidelines on definitions of financial terms, ratios, and adjustment for microfinances [9]. Since then, there has been a lot of literature dealing with aspects like sustainability/profitability, asset/liability management, and/or portfolio quality [10–14], whereas there is little literature on the efficiency/productivity of these institutions [15–17].

However, the high spread of these special financial institutions all over the world (Latin America and the Caribbean, Africa, East Asia and the Pacific, Eastern Europe and Central Asia, Middle East and North Africa, etc.) has increased the available public information about them to the point that it becomes complicated to the stakeholders (international organizations and institutions, governments, rating agencies, donors, institutional investors, shareholders, traditional trading banks, etc.) to distinguish between the relevant and irrelevant information, and to eliminate the latter.

* Corresponding author. Tel.: +34 963877007.
 E-mail addresses: conbarsa@esp.upv.es (C. Bartual Sanfeliu), rocerro@esp.upv.es (R. Cervelló Royo), imoya@esp.upv.es (I. Moya Clemente).

Thus, the essential financial information about these special institutions and their global business performance is of great interest in order to rank them or to know the relative position of one MFI within a reference group (geographic area, country, or region). This performance ranking can be carried out on the basis of a single variable or economic indicator (total assets, earnings, personnel, etc.) which gives no information on the overall situation of a company within the reference group. The main aim of multicriterion business global performance ranking is to combine the institution's performance criteria into a coherent whole in order to synthesize the information contained in a series of single-criterion business performance. The definition of the weights of the variables used in the multicriterion performance ranking represents the most difficult task, trying to minimize as far as possible the subjectivity of the person who decides the weights.

To this end, one of the methods proposed in the literature is CRITIC *(Criteria Importance Through Intercriteria Correlation)* [18]. In this case, the importance of the criteria is considered to be proportional to the uniqueness of the information they provide, so the weighting of a criterion will be greater the less it overlaps the other criteria. Alternatively, the problem can be address by means of a modified version of TOPSIS *(Technique for Order Preference by Similarity to Ideal Solution)* [19] using weighted Euclidean distances together with a measure of entropy to determine the weights.

The present study proposes the multicriterion goal programming technique *(Goal Programming)* [20], and it differs from its predecessors in the method by which it obtains the multicriterion performance. Applying this methodology, weights are calculated in such a way that the similarity is maximum between the values of the different criteria and the multicriterion performance, which is the value which will later be used to rank the MFIs.

The paper is organized as follows. Section 2 describes in depth the new methodology and the data sources used to create multicriterion global business performance. Section 3 examines the application of this method on a sample of Latin American MFIs from the same geographic area (Mexico). Finally, Section 4 presents our main conclusions.

2. Methodology and data sources

2.1. Methodology

As has been mentioned before, some performance rankings refer only to the situation with reference to a single criterion and give no information on the overall performance and situation of an individual institution within a group. The aim of a multicriterion performance ranking is to synthesize the information contained in a series of single-criterion performance rankings when various explanatory variables or single-criterion performance rankings are available.

The first step will consist of how to organize the available information, in order to minimize the impact of the least important factors and emphasize the most important or most representative ones. Statistical techniques such as factor analysis can reduce the size of the original problem, but they will also need a large number of items for this purpose. Thus, other approaches must be considered. In our case of study, and considering the special features of the MFIs, the Corielli and Marcellino [21] algorithm was used in order to get the most important or most representative factors.

The second step will consist of how to weight the variables used in the multicriterion performance ranking, with the aim of minimizing the subjectivity of the decision maker who decides the weightings as far as possible. This problem can be approached from multicriterion decision-making theory, considering the different explanatory variables as criteria and the MFIs that are to be ranked as alternatives.

This study proposes the use of a multicriterion technique, goal programming, with the aim of obtaining the global business performance of the MFIs. Therefore, weights are calculated in such a way that the similarity is maximum between single-criterion variables and the multicriterion performance, which will be the variable used in order to rank the institutions. By applying different versions of the goal programming model, a collective approach is considered (giving greater weight to criteria that show similar performance over the more conflictive criteria), as well as an individual approach (greater weight to the more conflictive criteria). As a compromise solution between both approaches, a parametric version is considered in order to widen the range of decision possibilities, in such a way that the two previous approaches become particular cases of the last approach.

Goal programming is a well-known multicriterion technique introduced by Charnes et al. [20] which consists of linear or nonlinear functions and continuous or discrete variables in which all the functions have been transformed into objectives or goals [22]. Unlike the inflexibility of the optimization concept imposed on mathematical models with a single objective function, goal programming can be interpreted under a satisfying philosophy. From this point of view, the decision maker is interested in minimizing the non-achievement of their objectives since the simultaneous achievement of all goals is not feasible in practical problems [23].

Starting out from the idea of [24], who used goal programming to combine individual preferences in different social groups in a study on the planning of electricity consumption, the present study proposes to combine the different performance ranking criteria by using different goal programming models. Taking into account what norm is used, the solution obtained can be interpreted as a solution in which consensus is maximum among the measurements (penalizing those measures which are most conflictive as compared to those which follow the general trend) or as a solution in which the most conflictive measures are given preference (penalizing those measures which share most information with the rest). In the first case, the absolute difference between the multicriterion value and the standardized single-criterion value (norm L_1) is minimum. In the second, the greatest difference recorded between the multicriterion value and the standardized single-criterion value (norm L_∞) is minimum.

The goal programming model in norm L_1 appears in (1):

$$\text{Min} \sum_{i=1}^{n} \sum_{j=1}^{c} (n_{ij} + p_{ij})$$

s.a.

$$\sum_{j=1}^{c} w_j v_{ij} + n_{ij} - p_{ij} = v_{ij} \quad i = 1 \ldots n \, j = 1 \ldots c$$

$$\sum_{j=1}^{c} w_j = 1$$

$$\sum_{j=1}^{c} w_j v_{ij} = V_i \quad i = 1 \ldots n \tag{1}$$

$$\sum_{i=1}^{n} (n_{ij} + p_{ij}) = D_j \quad j = 1 \ldots c$$

$$\sum_{j=1}^{c} D_j = Z,$$

where w_j is the weight to be estimated for the jth criterion, and $n_{ij}(p_{ij})$ is the negative (positive) deviation variable, which quantifies the difference by excess (defect) between the value of the ith MFI in the jth criterion and the multicriterion value obtained by applying the weights w_j. That is, $n_{ij} - p_{ij} = v_{ij} - \sum_{j=1}^{c} w_j v_{ij}$, with $n_{ij}, p_{ij} \geq 0$. The objective function of (1) ensures that only one of the deviation variables can have a value greater than zero: $n_{ij} \times p_{ij} = 0$. D_j is the degree of disagreement between the jth criterion and the multicriterion value, and Z is the magnitude of global disagreement.

The model (1) has a total of $n \times c$ goal constraints. This means that for each criterion j ($j = 1 \ldots c$) the model implements n constraints, one for each alternative i ($i = 1 \ldots n$), and it must determine the weight associated with criterion j, w_j. This is obtained by minimizing the difference in absolute terms between the single-criterion performance of each alternative in criterion j, v_{ij}, and the multicriterion performance V_i, with $V_i = \sum_{j=1}^{c} w_j v_{ij}$. This value is the ultimate objective of the methodology, since, on assigning a single value to each alternative as the total of all single-criterion performances, the ranking of the alternatives is immediately obtained.

The value of the target function provides the degree of non-achievement of the set of goals. Weightings are restricted to sum to 1. The last constraints are used to compute the MFIs' multicriterion performance (V_i), the degree of disagreement of each single-criterion measurement in relation to the multicriterion value (D_j), and the degree of global disagreement (Z). In the literature, the model that minimizes the sum of absolute deviations is known as the *weighted goal programming* (WGP) model.

The L_∞ norm is implemented by the MINMAX goal programming model (2), in which D represents the maximum deviation between the multicriterion value and the single-criterion values. The rest of the variables keep the same meaning as in (1).

$$\text{Min} \, D$$

s.a.

$$\sum_{j=1}^{c} w_j v_{ij} + n_{ij} - p_{ij} = v_{ij} \quad i = 1 \ldots n \, j = 1 \ldots c$$

$$\sum_{i=1}^{n} (n_{ij} + p_{ij}) \leq D \quad j = 1 \ldots c$$

$$\sum_{j=1}^{c} w_j = 1 \tag{2}$$

$$\sum_{j=1}^{c} w_j v_{ij} = V_i \quad i = 1 \ldots n$$

$$\sum_{i=1}^{n} (n_{ij} + p_{ij}) = D_j \quad j = 1 \ldots c$$

$$\sum_{j=1}^{c} D_j = Z.$$

Criteria weights (v_{ij}) were normalized from the original variables (u_{ij}), so that $v_{ij} = \frac{u_{ij}-u_{*j}}{u_j^*-u_{*j}}$, with $u_j^* = \max_i(u_{ij})$ and $u_{*j} = \min_i(u_{ij})$. Normalization is needed when the original variables are given in different measures (percentage, monetary units, etc.).

The solutions provided by models (1) and (2) represent extreme cases in which conflicting strategies are opposed to each other: favoring global consensus (WGP) or favoring the criteria that generate performance rankings with a higher degree of idiosyncrasy (MINMAX GP).

An interesting option for a compromise between (1) and (2) is to employ an extended goal programming model (3) in which the λ parameter provides more balanced solutions. This widens the range of possibilities when deciding which multicriterion value is the most suitable and representative of the individual criteria. Note that if $\lambda = 1$ the same solution is obtained as in model (1), while if $\lambda = 0$ the solution coincides with model (2).

$$\text{Min } \lambda \sum_{i=1}^{n} \sum_{j=1}^{c} (n_{ij} + p_{ij}) + (1-\lambda)D$$

$$\text{s.a.}$$

$$\sum_{j=1}^{c} w_j v_{ij} + n_{ij} - p_{ij} = v_{ij} \quad i = 1 \ldots n \, j = 1 \ldots c$$

$$\sum_{i=1}^{n} (n_{ij} + p_{ij}) \leq D \quad j = 1 \ldots c$$

$$\sum_{j=1}^{c} w_j = 1$$

$$\sum_{j=1}^{c} w_j v_{ij} = V_i \quad i = 1 \ldots n$$

$$\sum_{i=1}^{n} (n_{ij} + p_{ij}) = D_j \quad j = 1 \ldots c$$

$$\sum_{j=1}^{c} D_j = Z. \tag{3}$$

2.2. Data sources

To select the variables used in the study, those used in the works cited in the first section were considered, as were all the different business performance categories (Institutional Characteristics, Financing Structure, Overall Financial Performance, Expenses, Efficiency and Productivity, and Risk and Liquidity).

Considering the special features of the MFIs, the Corielli and Marcellino [21] algorithm was used in order to get the most important or most representative factors for each one of the mentioned categories, and as is usual in studies on performance, certain areas were assigned several variables that measure different aspects. Table 1 shows these variables together with the categories they represent.

All the criteria were directly combined in the performance ranking, assuming that the higher the value of any of the criteria, the higher the perception of the performance, except for the following aspects: Financial Expense/Assets (FEA), Personnel Expense/Assets (PEA), Cost per Borrower (CPB), and Personnel Allocation Ratio (PA), which had a negative effect, so the higher the value of these four criteria, the lower perception of the performance for these four variables.

The database for the present study was compiled from the MIX Market reports published by Microfinance Information Exchange, a non-profit organization and the premier source for financial and social performance data on MFIs.

3. Results and discussion

This section describes the use of the methodology presented in Section 2 to obtain a multicriterion performance ranking of the MFIs for 2009.

The 12 criteria shown in Table 1 are used as a starting point, with the original variables being normalized.

On solving (3) for different values of $\lambda \in [0, 1]$, we obtain (1) the weighting or relative importance of each individual criterion in the overall performance ranking and (2) the multicriterion value which ranks the MFIs according to performance.

Table 2 shows the results obtained in accordance with the values assigned to the λ parameter. For each λ value, we present the weight of each criterion, the deviations between the multicriterion performance and each of the criteria ($D_j, j = 1, \ldots, 12$), the maximum deviation D between them, and the global deviation Z as the sum of all D_j.

Table 1
Variables used.

Variable	Category
O: offices (number of branches)	IC: institutional characteristics
P: personnel (number of employees)	IC: institutional characteristics
PTA: portfolio to assets (gross loan portfolio/total assets)	FS: financing structure
ROE: return on equity (net income/shareholder's equity)	OFP: overall financial performance
FEA: financial expense/total assets	E: expenses
PEA: personnel expense/ total assets	E: expenses
CPB: Cost per Borrower (operating expense/average number of active borrowers)	E&P: efficiency and productivity
LPLO: loans per loan officer (number of loans outstanding/number of loan officers)	E&P: efficiency and productivity
PA: Personnel allocation Ratio (Loan officers/Personnel)	E&P: efficiency and productivity
PR90: portfolio risk >90 days (value of loans outstanding[*]/gross loan portfolio)	R&L: Risk and Liquidity
LL: loan loss rate ((write-offs – value of loans recovered)/average gross loan portfolio)	R&L: Risk and Liquidity
RC: risk coverage (impairment loss/average assets)	R&L: Risk and Liquidity

[*] Those that have one or more installments of principal past due more than 90 days.

Table 2
Numerical results according to value of the parameter λ.

λ		1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0
Weights	O	0.1958	0.1943	0.2043	0.1905	0.1950	0.2011	0.1889	0.0000	0.0000	0.0000	0.0000
	P	0.0632	0.0657	0.0440	0.0712	0.0602	0.0460	0.0348	0.2797	0.2975	0.3348	0.2822
	PTA	0.0276	0.0253	0.0214	0.0305	0.0361	0.0544	0.0730	0.1718	0.1761	0.2123	0.2815
	ROE	0.2415	0.2440	0.2486	0.2507	0.2556	0.2563	0.2659	0.3209	0.3225	0.3419	0.3243
	FEA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	PEA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0783
	CPB	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	LPLO	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	PA	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0102	0.0110	0.0441	0.0336
	PR90	0.3045	0.3060	0.3074	0.3038	0.2979	0.2602	0.2464	0.1608	0.1461	0.0670	0.0000
	LL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	RC	0.1649	0.1648	0.1744	0.1533	0.1552	0.1821	0.1910	0.0565	0.0468	0.0000	0.0000
Distances	D	13.9313	13.8808	13.8318	13.7214	13.5233	13.0726	12.5399	10.7186	10.6732	10.5080	10.4776
	D1	7.7083	7.7490	7.8562	7.8720	8.0699	8.5020	9.0624	10.2854	10.2400	10.0854	10.0257
	D2	8.1415	8.1822	8.2894	8.3052	8.5031	8.9352	9.4956	10.7186	10.6732	10.5080	10.4776
	D3	13.9156	13.8808	13.8318	13.7214	13.5233	13.0726	12.5399	10.7186	10.6732	10.5080	10.4776
	D4	13.9313	13.8808	13.8048	13.7214	13.5233	13.0726	12.5399	10.7186	10.6732	10.5080	10.4776
	D5	10.1988	10.1787	10.1613	10.0720	9.9630	9.7341	9.4349	8.4785	8.4714	8.3738	10.4776
	D6	8.5228	8.5045	8.4627	8.4675	8.4271	8.3804	8.3071	8.5314	8.5816	8.8432	10.4776
	D7	7.3157	7.3080	7.2978	7.2886	7.2978	7.4189	7.4550	7.7678	7.8178	8.0777	10.4776
	D8	4.8830	4.9158	4.9223	5.0233	5.1195	5.2885	5.6284	7.1221	7.1515	7.2164	10.4776
	D9	13.9313	13.8808	10.2022	13.7214	13.5233	13.0726	12.5399	10.7186	10.6732	10.5080	10.4776
	D10	6.9504	6.9950	7.0656	7.1521	7.3618	7.8827	8.4310	10.2773	10.3376	10.5080	10.4776
	D11	4.6084	4.6074	4.6358	4.6373	4.7067	4.9356	5.2234	6.2333	6.2811	6.6676	7.0551
	D12	4.7849	4.8016	4.7746	4.9065	4.9717	5.0789	5.3366	7.0957	7.1589	7.3813	7.3350
	Z	104.8919	104.8846	101.3046	104.8885	104.9905	105.3738	105.9942	108.6658	108.7327	109.1855	118.7138
Categories	IC	0.2591	0.2600	0.2483	0.2617	0.2552	0.2471	0.2237	0.2797	0.2975	0.3348	0.2822
	FS	0.0276	0.0253	0.0214	0.0305	0.0361	0.0544	0.0730	0.1718	0.1761	0.2123	0.2815
	OFP	0.2415	0.2440	0.2486	0.2507	0.2556	0.2563	0.2659	0.3209	0.3225	0.3419	0.3243
	E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0783
	E&P	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0102	0.0110	0.0441	0.0336
	R&L	0.4694	0.4707	0.4818	0.4570	0.4531	0.4423	0.4375	0.2173	0.1929	0.0670	0.0000

The model for $\lambda = 1$ obtains non-null coefficients for all variables except for FEA, PEA, CPB, and LL which implies that these three variables do not contribute in the calculation of the multicriterion performance. It should be highlighted that both PR90 and ROE are noteworthy for their greater weight, as well as RC. We can thus conclude that the Overall Financial Performance (OFP) and the Risk and Liquidity (R&L) criteria are representative of the general performance tendency. Indeed, if we add together the weights obtained by the variables which represent both categories (24.15% for OFP and 46.94% for R&L), a value of 71.08% is obtained. The third most important category is Institutional Characteristics (IC) (25.91%), which represents the size of the company, and the least important and null coefficient category is Expenses (E), at 0% for its two variables, FEA and PEA.

As the value of the λ parameter diminishes, the number of variables that intervene in the calculation of multicriterion performance also diminishes. At the extreme $\lambda = 0$, only five variables appear with a non-null coefficient: P (Institutional Characteristics), PTA (Financing Structure), ROE (Overall Financial Performance), PA (Efficiency and Productivity), and a variable from the Expenses (E) category, PEA. This means that these are the five variables that differ most from the rest as to the amount of information they contribute to the performance. In fact, none of the Risk and Liquidity variables appear in the solution, although they were decisive in the model with $\lambda = 1$. If we evaluate the D_j values for each of the variables, we

Table 3
Spearman correlation between each single-criterion measurement and multicriterion performance for different λ.

λ	1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0
O	0.438	0.431	0.431	0.436	0.422	0.411	0.399	0.403	0.408	0.400	0.334
P	0.492	0.485	0.482	0.491	0.483	0.473	0.461	0.473	0.481	0.440	0.368
PTA	0.381	0.380	0.361	0.382	0.390	0.423	0.464	0.582	0.574	0.626	0.672
ROE	0.648	0.649	0.650	0.648	0.667	0.686	0.696	0.766	0.776	0.728	0.704
FEA	−0.026	−0.034	−0.036	−0.027	−0.020	−0.019	−0.031	0.115	0.137	0.173	0.165
PEA	−0.251	−0.255	−0.254	−0.259	−0.270	−0.276	−0.265	−0.326	−0.329	−0.381	−0.485
CPB	−0.115	−0.112	−0.113	−0.097	−0.117	−0.169	−0.21	−0.209	−0.206	−0.157	−0.215
LPLO	0.215	0.212	0.194	0.202	0.210	0.242	0.262	0.271	0.259	0.303	0.379
PA	−0.064	−0.056	−0.039	−0.054	−0.034	−0.040	−0.040	0.023	0.040	−0.032	−0.037
PR90	0.285	0.286	0.283	0.297	0.281	0.222	0.171	0.123	0.115	0.136	0.095
LL	0.001	−0.007	−0.011	−0.003	−0.018	−0.048	−0.077	−0.195	−0.204	−0.214	−0.278
RC	0.156	0.152	0.151	0.138	0.152	0.212	0.253	0.159	0.150	0.056	0.076

see that the biggest of these corresponds to (D_9) for most values of parameter λ. In most cases it coincides with the greatest deviation D. This means that PA is the variable most in disagreement with the rest of the single-criterion performance measurements. In other words, the Personnel Allocation ratio of the MFIs is a variable which can hardly be related to any of the other variables employed in the measurement of the performance. This fact might be of great interest for the companies' Human Resources Departments, since they will be able to take some measures in order to reallocate their staff and improve their performance.

The last rows of Table 2 are reserved for the weight of each of the categories contained in the analysis, obtained as the sum of the individual weights of each criterion. It can be clearly seen that, as the value of λ diminishes, Risk and Liquidity gives part of its weight to Overall Financial Performance and Financing Structure, while Institutional Characteristics remains around 25% or even more for the entire range of λ values analyzed.

Although the weight of each criterion, or the set calculated for the category, offers an idea of the relative importance of each measurement in calculating multicriterion performance, a Spearman correlation analysis must be carried out to analyze the correlation between each of the single-criterion measurements and the final performance Table 3. The variables with the highest correlation coefficient are ROE, with values between 0.648 (λ = 1) and 0.776 (λ = 0.2), and PTA, with values between 0.361 (λ = 0.8) and 0.672 (λ = 0). The rest of the variables have less significant coefficients for all λ values, with P and O standing out with correlation coefficients in some cases close to 0.5.

From these results it can be concluded that ROE and PTA clearly have the highest correlation with multicriterion performance and will no doubt be considered key factors in any decisions that have to be taken in the near future by the MFIs.

Bearing in mind the need not only for a business performance ranking but also the decisive role of this type of result on decision-making processes, the different MFIs' performance rankings obtained according to the models used should also be analysed (see Table 4).

The highest ranked MFIs are *ASP Financiera*, *Caja Popular Mexicana*, *COCDEP*, *Compartamos Banco*, and *Financiera Independencia*, which are always placed in the first quartile; the ones with the lowest position in the ranking are *Finacen*, *Forjadores de Negocios*, *Oportunidad Microfinanzas*, *Progresemos*, *Red de Vanguardia*, and *SolFi*, which always appear in the last quartile.

With regard to dispersion, 14 MFIs always appear in the same quartile: *ASP Financiera*, *Caja Popular Mexicana*, *COCDEP*, *Compartamos Banco*, and *Financiera Independencia* (first quartile); *Finacen*, *Forjadores de Negocios*, *Oportunidad Microfinanzas*, *Progresemos*, *Red de Vanguardia* and *Solfi*, (fourth quartile); *FINCA-MEX* (second quartile); and *GCM* and *MAS Kapital* (third quartile). It is also notable that only one MFI, *Don Apoyo*, is present in all quartiles and that only four appear in three: *ALFIN*, *CajaDepacPoblana*, *Conserva*, and *Crezkamos Kapital*.

4. Conclusions

The objective of the present study was to propose a goal programming based multicriterion methodology in order to measure the performance of Microfinance Institutions (MFIs), which have a banking side and a social side. Unlike the normally used single-criterion performance rankings, this methodology provides a global estimation of the performance of an MFI, combining the individual criteria in such a way as to include all the categories that affect its performance. The proposed methodology was then used to obtain a multicriterion performance ranking of a sample of Latin American (Mexican) MFIs for the year 2009.

The methodology proposed is characterized by the way in which it estimates the global performance. By means of the goal programming multicriterion technique, weightings are calculated considering the similarities between values of the different criteria and the multicriterion performance, which is the value which will subsequently be used to measure each MFI performance. By applying different versions of the goal programming model, a collective approach is used (giving greater weighting to those criteria with similar ranking and less to the conflictive criteria), as well as an individual approach (greater weight to the most conflictive ones). As a compromise solution between both approaches, a parametric version is developed

Table 4
Position based on the inter-quartile frequency.

Name	1st quartile	2nd quartile	3rd quartile	4th quartile
ALFIN	–	5	4	2
ALSOL	4	7	–	–
AMEXTRA	–	7	4	–
Apoyo Económico	1	10	–	–
APROS	–	–	1	10
ASP Financiera	11	–	–	–
ATEMEXPA	–	–	1	10
Caja Depac Poblana	–	2	8	1
Caja Popular Mexicana	11	–	–	–
CAME	–	9	2	–
COCDEP	11	–	–	–
CompartamosBanco	11	–	–	–
Conserva	7	2	2	–
CrediComún	–	–	10	1
Crezkamos Kapital	1	3	7	–
Don Apoyo	6	1	1	3
Finacen	–	–	–	11
FinAmigo	–	6	5	–
Financiera Independencia	11	–	–	–
FINCA – MEX	–	11	–	–
FinComún	4	7	–	–
Forjadores de Negocios	–	–	–	11
FRAC	4	7	–	–
FVP	–	–	5	6
GCM	–	–	11	–
Mas Kapital	–	–	11	–
Oportunidad Microfinanzas	–	–	–	11
Pro Mujer – MEX	–	1	10	–
Progresemos	–	–	–	11
Red de Vanguardia	–	–	–	11
SemiSol	7	4	–	–
SolFi	–	–	–	11
Solución Asea	3	8	–	–
Te Creemos	–	10	1	–
UNICREICH	–	2	9	–

to widen the range of possibilities open to the decision maker in such a way that the two previous approaches become particular cases of the last approach.

Furthermore, apart from the importance that the methodology concedes to each of the performance categories, it also allows one to carry out different multicriterion performance rankings according to the model proposed, since it provides additional information on the relative position of an MFI according to the weight the model gives to each criterion. The results show how, regardless of the value of λ chosen, there are MFIs which are always ranked among the first positions, whereas other MFIs always get a low ranking. The results obtained should encourage analysts, rating agencies, and users to go beyond simple ratio analysis in MFIs and incorporate measures of performance based on multicriterion methodology.

References

[1] J. Bonin, I. Hasan, P. Wachtel, Bank performance, efficiency and ownership in transition countries, J. Banking Finan. 29 (1) (2005) 31–53.
[2] J.M. Pastor, Credit risk and efficiency in the European banking system: a three-stage analysis, Appl. Finan. Econ. 12 (2002) 895–911.
[3] E. Tortosa-Ausina, Exploring efficiency differences over time in the Spanish banking industry, European J. Oper. Res. 13 (2002) 643–664.
[4] J.M. Pastor, F. Pérez, J. Quesada, Efficiency analysis in banking firms: an international comparison, European J. Oper. Res. 98 (2) (1997) 95–407.
[5] A. Berger, R. DeYoung, H. Genay, G. Udell, Globalization of financial institutions: evidence from cross-border banking performance, Brookings Papers on Economic Activity 2 (2000) 23–158.
[6] F. García, F. Guijarro, I. Moya, Ranking Spanish savings banks: a multicriteria approach, Math. Comput. Model. 52 (2010) 1058–1065.
[7] J. Morduch, The microfinance promise, J. Econ. Lit. 37 (1999) 1569–1614.
[8] J. Yaron, What makes rural finance institutions successful? World Bank Res. Observ. 9 (1) (1994) 49–70.
[9] CGAP, Microfinance consensus guidelines. Definitions of selected financial terms, ratios and adjustments for microfinance, 3rd ed. Washington DC, ed., USA: Consultative Group to Assist the Poorest, 2003.
[10] C. Ahlin, J. Lin, M. Maio, Where does Microfinance flourish? Microfinance institution performance in Macroeconomic context, J. Dev. Econ. 95 (2) (2011) 105–120.
[11] R. Cull, A. Demirgüç-Kunt, J. Morduch, Microfinance meets market, J. Econ. Perspect. 23 (2009) 167–192.
[12] C. McIntosh, B. Wydick, Competition and Microfinance, J. Dev. Econ. 78 (2005) 271–298.
[13] R. Mersland, The cost of ownership in microfinance organizations, World Dev. 7 (2) (2008) 469–478.
[14] T. Jansson, V. Stauffenberg, N. Kenyon, M.C. Barluenga-Badiola, Performance indicators for Microfinance Institutions: Technical Guide, MicroRate and Inter-American Development Bank, Washington DC, 2003.
[15] B. Gutiérrez-Nieto, C. Serrano-Cinca, C. Mar-Molinero, Microfinance institutions and efficiency, Omega-Int. J. Manage. Sci. 35 (2007) 131–142.
[16] B. Gutiérrez-Nieto, C. Serrano-Cinca, Factors explaining the rating of Microfinance institutions, Nonprofit Volunt. Sect. Q. 36 (3) (2007) 439–464.

[17] M.J. Garmaise, G. Natividad, Information, the cost of credit and operational efficiency: an empirical study of Microfinance, Rev. Financ. Stud. 23 (6) (2010) 2560–2590.

[18] D. Diakoulaki, G. Mavrotas, L. Papayannakis, Determining objective weights in multiple criteria problems: the CRITIC method, Comput. Oper. Res. 22 (7) (1995) 763–770.

[19] H. Deng, C-H. Yeng, R.J. Willis, Inter-company comparison using modified TOPSIS with objective weights, Comput. Oper. Res. 27 (10) (2000) 963–973.

[20] A. Charnes, W.W. Cooper, R.O. Ferguson, Optimal estimation of executive compensation by linear programming, Manag. Sci. (1) (1955) 138–150.

[21] F. Corielli, M. Marcellino, Factor based index tracking, J. Banking Finan. 30 (2006) 2215–2233.

[22] J.M. Ignizio, C. Romero, in: H. Bigdoli (Ed.), Goal Programming, in: Encyclopedia of Information Systems, vol. 2, Academic Press, London, 2003, pp. 489–500.

[23] C. Romero, Extended lexicographic goal programming: a unifying approach, Omega-Int. J. Manage. Sci. 29 (1) (2001) 63–71.

[24] P. Linares, C. Romero, Aggregation of preferences in an environmental economics context: a goal-programming approach, Omega-Int. J. Manage. Sci. 30 (2) (2002) 89–95.