The inadequacy of the dimension of assets to classify financial institutions: application to cooperative banks

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Abstract: In this research, a new approach for the classification of cooperative banks is presented by using a multi-criteria analysis in order to combine financial and economic variables with social ones. Both type of variables are indispensable and can be joined due to the unique characteristics of these financial entities with social performance. The sample is formed with the cooperative banks registered in Spain. The results show a new ranking that allows us to study the existing relation between different variables of an entity and the fulfilment of its original social purpose, as a special type of banking activity. Furthermore, the obtained ranking supports the hypothesis that the concentration in this sector, due to the financial crisis from 2009 until now, has not followed economic or social criteria. Hence, there is a lack of homogeneity in its business model as we can see in the present situation. And this leads to the failure of some of these convergence processes that, in some cases, lead to an inevitable bankruptcy.

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1 Introduction

The ratings of financial institutions are normally made taking into account economic or financial criteria extracted from their accounting documents or systems. In the case of banks, the ratings or rankings are usually based on their volume of assets, credits, deposits, or own resources (Marbella et al., 2008). Also, various ratios as: indicators of efficiency (Kumbhakar et al., 2001; Carnero et al., 2010), solvency (Alvarado et al.,

2009; García et al., 2010a), slowness in paying (Aznar et al., 2011; Cermeño et al., 2011), and productivity (Arévalo et al., 2002; Callejón and Santos, 2005) are used.

In order to classify the performance of financial entities like cooperative banks, it is necessary to consider social and economic variables simultaneously. The legal character, social purpose and non-profit essence of cooperative banks diverge from the classical criteria of value and benefit that other companies usually have.

This approach is often relegated, in practice, by the traditional classifications – purely economic –, more pragmatic but with a sense of being incomplete. In this regard, the techniques of multicriteria analysis enable working with multiple criteria simultaneously, usually in conflict among them. At the same time, each original criterion should be associated with a preference function (generalised criteria), to be able to proceed on to the calculation the multicriteria preference index matrix which will be the support to confirm this paper's hypothesis. The full development of the methodology can be seen in Fernández (2002).

The justification for this work is based on the transformation that the Spanish credit cooperative banks sector has suffered from the year 2010, primarily due to various processes of grouping, in the form of an institutional protection system (IPS), and also mergers (Palomo et al., 2011). This process has been determined by the new competitive framework established after the eruption of the financial crisis, which began between 2007 and 2008. It is therefore necessary to measure their characterisation and socio-economic performance, prior to the start of such consolidation process. This analysis can arise from the multicriteria approach that enable us to bring together the various performance aspects of the analysed institutions, and which allows to classify them and rank them to detect affinities between them.

The scientific contribution of this paper has a dual approach: on the one hand, it provides a perspective for the classification of the Spanish cooperative banks, incorporating both economic and financial variables. It also allows, among other things, to study the relation between the size of the entities, the performance and their compliance with their given social role. On the other hand, an important quantitative evaluation is obtained. Previously, it seems evident that cooperative banks do not direct their convergence process by standards of economic or social efficiency, but rather by more personal or subjective reasons.

This paper is structured in four different sections, in addition to this introduction. In the second section, a brief overview of the recent evolution of the Spanish cooperative banks is presented, specially targeting those events relevant to the restructuration process, through the operations of mergers and compositions of an IPS, held by these banks during the last years. In the third section, the methodology utilised in the study is justified. In the fourth section, the empirical study is conducted and the results obtained are analysed. Finally, in the fifth and last section, the conclusions of the study are presented.

2 The design of a new map for the cooperative banks in Spain: an overview

Spanish cooperative banks have been affected by the financial crisis that began in Spain in 2008; although to a lower extent than savings banks (EACB, 2010). Their exposure to the risk derived from the real estate sector has been less due to several reasons, like: their

smaller relative dimension, their leverage in the financial markets and their reduced use of complex financial engineering instruments.

The Spanish cooperative banking sector is experiencing a deeper process of grouping in its already centuries-old history, which clearly matches the international banking realignment caused by the financial crisis. Although, this has been a catalyst or accelerator of change in the cooperation intra sectorial model, which has apparently been needed for many years, to ensure the survival of the sector, as expressly demanded the Bank of Spain.
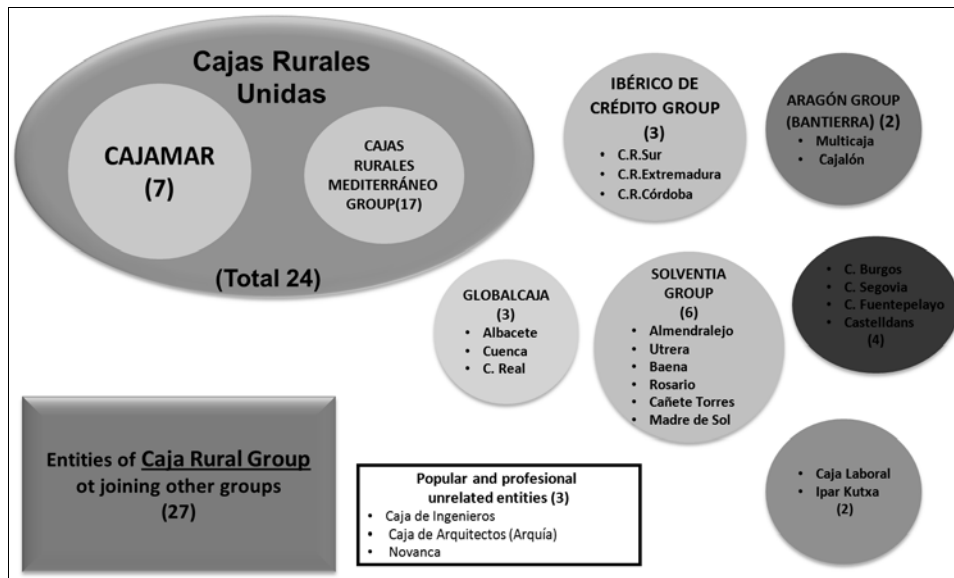
The transformation of the sector has been so impressive that from the 82 entities existing at the end of 2008 it passed to 74 in 2012; even though many of them clustered around SIPs; with the expectation that the number of entities or groups will be 40 or 45 in 2014.

The current view (February 2013) of Spanish cooperative credit banks is shown in Figure 1, and can be synthesised as follows, with four consolidated groups and other fusion processes from 2009:

1   The *CajasRuralesUnidas Group*, constituted on January 17, 2012 consisting of the union of two large groups of the sector: the Cajamar Group and the Cajas Rurales del Mediterráneo (CRM) Group, formed, in turn, as:

   - The Cajamar[1] Group, officially formed in December 2009. The Bank of Spain catalogued it as 'group of credit institutions to be consolidated' in the form of IPS.

   - The IPS CRM, approved by the Bank of Spain in the autumn of 2010 and consisting of 15CajasRurales. In December 2011, CRM Group agreed to their link to the Cajamar Group ratified by their general assemblies in mid-January of 2012. Therefore, these two IPS have been grouped by a merger into a new entity: CajasRuralesUnidas, currently the leading exponent in the dimension of the cooperative Spanish banking.

2   The *Solventia Cooperative Group*, established in July of 2011 links to other five Andalusian cooperative banks with Cajalmendralejo on the front. This group stands out at that time by its high core capital of 15.5% (almost double the required), a 17.04% solvency ratio.

3   The *Ibérico de Crédito Cooperative Group*, consisting of three cooperative banks: C.R. de Extremadura, C.R. de Córdoba and C.R. del Sur.

4   *Globalcaja*, the result of the merger of the cooperative banks of Ciudad Real, Cuenca and Albacete. In turn, C.R. Albacete absorbed in 2010 to C.R. de Roda.

5   *Bantierra* (New Caja Rural de Aragón), product of the merger of Cajalón and Multicaja. At the same time, Multicaja absorbed Caja de Abogados in 2009.

6   The *Caja Rural de Burgos, Segovia, Fuentepelayo and Castelldans, Sociedad Cooperativa de Crédito*; resulting from the merger in March 2012 of this four institutions.

7   The new entity (earring of assignment) resulting from the merger in March 2012, of CajaLaboral and IparKutxa.

As it can be seen, one of the most used formulas in current Bank realignment has been the IPSs, where members maintain their own identity, their operational capacity at commercial level, and their economic independence, but putting in common, in different level, their solvency and the results of activity (Fajardo, 2011).

Figure 1 Map of the clusters of Spanish credit cooperative banks (September 2012)

Source: Own production

3 Ranking through combination of variables: application of a multi-criteria methodology

After revealing the magnitude of the cooperative banks' restructuration, it is appropriate to examine the hypothesis under the methodology proposed in this paper, which follows the research area of various authors (Mareschal and Brans, 1991; Mareschal and Mertens, 1992; Zopounidis, 1999; Kosmidou and Zopoundis, 2008; Doumpos and Zopounidis, 2010).

3.1 PROMETHEE and GAIA methods in multicriteria decision making: transformation of variables

The outranking relations constitute one of the most important categories of multicriteria decision aid methodologies. A high number of real applications belong to this field. In this category, the preference ranking organisation methods for enrichment evaluations (PROMETHEE) methods have acquired great acceptance, mainly because they are easily understood by the decision maker and by their simple application.

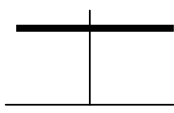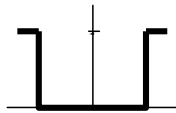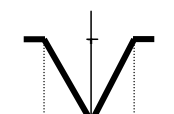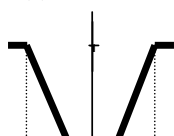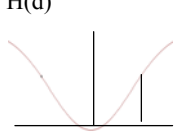The PROMETHEE is a discrete multiple criteria decision making method (Brans and Mareschal, 1994; Brans and Vincke, 1995; Goumans and Lygerou, 2000). These methods are based on preference outranking relations; different alternatives are compared by pairs.

The decision maker is supposed to compare each alternative with another when they are evaluated under different criteria, which can be expressed in different units of measure, as well as different weights. To determine a partial order (PROMETHEE I) or a complete order (PROMETHEE II) among the several alternatives, the calculation of the multicriteria preference index matrix is necessary. To be able to calculate this matrix it is necessary to know the generalised criteria under which each criterion will be evaluated.

Such methods, as they were originally proposed, offer the possibility to choose from six different types of generalised criteria to represent the preference structure that the decision maker has in mind. The generalised criteria are preference functions that are utilised in the decision process, in the preference modelisation stage. However, other extensions from the generalised criteria have been studied and defined, named 'new generalised criteria' (Fernández, 1993). The application of the new generalised criteria to real practical cases has demonstrated the possibility to include in this methodology a simple relative form so that the decision maker can express with higher 'robustness' the preference structures that he has in mind (Fernández and Escribano, 2006; Fernández and Jiménez, 2009).

The criteria are normally implemented in the decision software Decision LAB, as shown in Table 1.

Table 1   Criteria implemented in the decision software Decision LAB

I type: usual (no threshold)	*II type: U-shape (q threshold)*
H(d) $$H(d) = \begin{cases} 0 & d = 0 \\ 1 & |d| > 0 \end{cases}$$	H(d) $$H(d) = \begin{cases} 0 & |d| \leq q \\ 1 & |d| > q \end{cases}$$
III type: V-shape (p-threshold)	*IV type: level (q and p thresholds)*
H(d) $$H(d) = \begin{cases} \dfrac{|d|}{p} & |d| \leq p \\ 1 & |d| > p \end{cases}$$	H(d) $$H(d) = \begin{cases} 0 & |d| \leq q \\ \dfrac{1}{2} & q < |d| \leq p \\ 1 & |d| > p \end{cases}$$
V type: linear (q and p thresholds)	*VI type: Gaussian (σ threshold)*
H(d) $$H(d) = \begin{cases} 0 & |d| \leq q \\ \dfrac{|d| - q}{p - q} & q < |d| \leq p \\ 1 & |d| > p \end{cases}$$	H(d) $$H(d) = 1 - e^{-\frac{d^2}{2\sigma^2}}$$

Source: Own production

where q represents the threshold of indifference considered by the decision maker so that the alternatives are indifferent between them; p represents the threshold of preference between the alternatives (p has to be greater than q) and σ is the threshold utilised by the Gaussian criterion to establish the preferences between the alternatives.

To solve the problem utilising this methodology not only it is necessary that each criterion has a related generalised criteria, but that also a weight (w_i) has to be assigned to each criterion that indicates the preference that the decision maker has for the different

criteria. That is, the relative importance that the decision maker attributes to each criterion.

All the information of the problem is summarised in the decision matrix. From the decision matrix one obtains the multicriteria preference index matrix. These indexes are calculated in the following form:

$$I\left(a_i, a_j\right) = \sum_i w_i H_i(d)$$

where a_i, a_j are two different alternatives; w_i are the normalised weights of each of the criterion; and, $H_i(d)$ is the corresponding result for each generalised criterion (unicriterion preference index). For this paper, 11 matrixes of multicriteria preference indexes have been elaborated, one for each of the years included in the study (1999–2009, both years included).

From this preference index matrix one obtains the PROMETHEE I (or partial ranking between the alternatives). This preorder comes from the intersection of the positive flows ranking (ϕ^+) and the negative flows ranking (ϕ^-). On the one hand, the positive flow for one alternative indicates the preference of this alternative with relation to the rest of the alternatives when they are evaluated by the different criteria. The alternative that presents a higher positive flow than others is the better alternative (greater power of outranking, greater force).

On the other hand, the negative flows represent the weakness of an alternative, dominated by other alternatives for the criteria under they are assessed. Therefore, from this point of view the alternative that has a lower negative flow is the best (lower outranked power, lower weakness).

Both flows are utilised to establish the preference ranking between the different alternatives from best to worst. However, there could be a case in which a conflict between positive and negative flows exists, giving rise to the existence of incomparability between the different alternatives, and therefore, it would be necessary to carry out a PROMETHEE II to solve the existing conflict between the alternatives, calculating the net flows (ϕ). These net flows are calculated in the following form: $\phi = \phi^+ - \phi^-$.

Working with incomparabilities can result very useful since it shows where a rivalry among alternatives or group of alternatives exists. But it is also possible, if desired that all the alternatives were to be comparable, even at the price of losing some information, the PROMETHEE II would be applied (complete or total preorder).

Once the different preorders are obtained and conclusions of the study of alternatives ranking are expressed, the decision maker can still be aided in the alternative selection of which are considered better compromise solutions – efficient in the Paretian sense – (Fernández, 2006). At this stage of the process, it might be advisable to make a robustness analysis to prove the sensibility of the model under changes in some parameters, for instance, in the weights of the criteria. It must be noticed that we are talking about robustness in the sense of multicriteria decision aid. The best reference in this kind of analysis is Roy (1988). A detail study of robustness applications can be found in Fernández et al. (2000).

Furthermore, the geometrical analysis for interactive aid technique (GAIA) can result useful and suitable to improve the multicriteria analysis.

The use of the principal components analysis lets the dimension of the problem be reduced to pass from n-dimensional space to the bi-dimensional plan, that is to say, to

obtain the so called GAIA Plan. In the plan the alternatives are represented by a cloud of points and the criteria as axes that depart from the origin. The axis II, which is the decision axis, gives us an idea of the best alternatives. The best compromise solutions are projected in the direction of the PROMETHEE Axis.

Public data from the cooperative credit banks of the indicated time series are taken to apply the multi-criteria methodology to the entities object of study. Once the original data of each period was extracted, the number of existing entities, as of December 31 2009, rose to 80, bearing in mind that some of them are the result of fusion processes that occurred in the analysed period[2].

In such cases, it has been taken into account, in a regressive way, the resulting addition of entities merged for purposes of the period, even if this means the occasional creation of fictitious entities.

In addition, some of the data has been deflated to work with proper homogeneous series, using two deflators: of the labour costs of financial activities employed to homogenise staff costs; and the added value of financial intermediation, used to deflate the rest of variables. Both deflators have been calculated through data obtained from the National Institute of Statistics.

3.2   Selection and justification of the variables presented in the model

The multicriteria approach requires the researcher to make a selection of variables according to the purpose or the intended purpose of his decision task. This fact leads to a significant subjectivity considering the numerous indicators that can be selected. It is possible to operate with direct data, such as economic, labour, etc., in multiple perspectives, or with economic ratios or other indicators, of financial or production nature, etc. Therefore, it is necessary to carry out a detailed field analysis to make a proper selection of the elements that make up the decision matrix, i.e., alternatives and evaluation criteria, taking into account the availability of reliable and quantifiable data.

In this sense, having achieved sufficient knowledge about the entities subject to study, by its legal nature, combine the economic or bank facet as such, with the social aspect (in fact, they are financial institutions categorised within the field of the social economy and participation companies), a few indicators have been selected which can be considered adequate to pick up the social and the economic perspective using some synthetic such as HH index and the financial gap. It is important to remember that these indicators are obtained from the point of view of the multicriteria analysis, the different evaluation criteria under which shall be considered the alternatives and are characterised because of their intrinsic nature, most of them are in conflict with each other. The following is a description of the selected criteria:

3.2.1   Technical efficiency

First, the operating efficiency of the cooperative banks being studied is estimated by using an aggregate rate of efficiency. This measure is widely used to calculate the efficiency of banks by institutions like the Bank of Spain. Furthermore, it is a technique often used to make comparisons, both nationally (Sanchis and Melían, 2009) and internationally (Molyneux et al., 1996; Smail et al., 2009). To this effect, the productivity

of the cooperative banks will be measured considering the gross margin an output (after deducting the items 'other operating income' and 'other operating expenses'), being the input the expenses and depreciation.

It must be taken into account that the proposed empirical study is based on an analysis of a period of four years, so it should be made with due diligence and rigor for the entry into force of two modifications in accounting and financial information that are reflected in the Circular 6/2008 of 26 November, of the Bank of Spain to credit institutions, modification of the Circular 4/2004 of 22 December about public and private financial information norms, and financial statements models.

Thus, in order to maintain the homogeneity of the temporary information and facilitate the progressive analysis, the ratio explained above (gross margin excluding 'other operating income' and 'other operating expenses') will be applied exclusively to the years 2008 and 2009 according to the Circular to apply.

For the years 2006 to 2007, according to the Circular 4/2004, the comparable ratio shall be calculated by adding the personnel expenses, other general administration expenses, amortisation and other operating charges, and dividing this sum by the gross income.

In every case, the efficiency of the banking entities will be valued by the percentage that the net income represents obtained by their typical banking activities over the non-financial costs (Peristiani, 1997; Calvo and González, 1999).

A lower value of the described ratio implies major efficiency, i.e., a lower consumption of resources to obtain a certain margin. Therefore, the variable is included in the multiple criteria analysis under the assumption of its 'minimisation'.

3.2.2 Solvency

Since the main solvency ratios are not public information (Ratio BIS, Tier I and Tier II) it has been decided to work with the ratio of capital by the volume of total assets (Arévalo et al., 2002; García et al., 2010b). In this way, one can learn a proper approximation of the link between the solvency and the size of the bank. Consequently, this variable should be maximised, thereby giving the banks with a greater solvency a primary form.

3.3.3 Financial gap

This indicator demonstrates the relation between the credits and debits or deposits of the bank (Doumpos and Zopounidis, 2010; Palomo and Sanchis, 2008) creating a gap when its value is greater than the unit or 100%, which indicates that the volume of credits is higher than the volume of deposits. In this regard, the financial gap grew significantly with the economic boom previous to the actual crisis. In this sense, it can be argued that a certain level of the financial gap, equivalent to a greater financial leverage, favours the banks and facilitates their growth.

However, in times of economic crisis this gap tends to diminish or disappear. Since the period of the study is between 1999 and 2009, the effects of the economic crisis are only revealed in the last year of the sample. For this reason, it has been maximised for the purpose of this analysis.

3.3.4 Degree of interregional banking[3]

It was decided to take into account this indicator for its essential importance in the commercial network of retail banking that develops the cooperative banks. Precisely, during the last decade one of the most prominent phenomenon in the Spanish banking panorama has been the significant growth of branch offices, particularly, offices outside the headquarters' geographic territory, as consequence of their interest in expanding into the globalised market.

To measure this process adequately, the Herfindahl-Hirschman (HH) index has been chosen because it can be used to analyse the general concentration of the banking markets (Alegría and Schaeck, 2008; Mercieca et al., 2009), but it can also be applied to study the degree of geographic concentration of the branch offices (Berges, 2003; Palomo and Sanchis, 2008; Gutiérrez et al., 2012). This means that the degree of the onshore banking is shown for each of the banks that form the banking sector, i.e., the relative dimension of the branch offices that are outside the geographic location of the bank's headquarters[4].

The calculation of the HH index for each bank is done by adding the quotients of the square between the branch offices of each province over the total of offices of each bank. That is:

$$HH_j = \sum_{t=1}^{n} \left(\frac{N_{ij}}{N_j} \right)^2$$

Being:

N_{ij} number of the bank's offices 'j' in its province of origin 'i'

N_j total number of the bank's offices 'j'

N total number of provinces: 52 provinces.

The value of the index will be a number between 0 and 1, so that the lower its value (closer to 0) implies that the onshore banking is higher; that is, that the number of branch offices outside the province of origin is proportionally higher than the branch offices situated in the rest of the provinces.

The banks with the index equal to 1 are those that have offices in their province of origin, focusing their activity in the original territory.[5]

It has been decided to minimise this indicator, which leads us, in the classification to favour the banks that have expanded beyond their territory of origin, this contributing to a greater competition, in addition to contributing to a minor financial exclusion; even though there is discussion on it, it is considered, *a priori*, a positive factor.

3.3.5 Fund of education and promotion (assimilable to the savings banks)

This indicator is representative of the social purpose and legal personality of these banks with form of cooperative society, so its inclusion it is considered essential. For a proper measurement it has been developed a coefficient obtained from the ratio between the annual allocation of these funds and the profit for the period (Chaves and Soler, 2005). Therefore, the objective will be to maximise this indicator.

4 Results and discussion

Once the concepts that are included in the multicriteria analysis are identified, a series of individualised data is obtained, as well as a global chart (decision matrix) that gathers the results for each cooperative bank along the analysed period (2006–2009).

For each year, in which the study of the cooperative banks is based (2006–2009, both included), a multicriteria decision matrix has been elaborated in where the alternatives indicative the 80 Spanish cooperative banks are indicated, the decision criteria are the five chosen indicators, already mentioned; and the results arise from the previously explained calculations (Appendix A shows the multicriteria decision matrix for year 2006). In terms of the chosen generalised criteria, an intense task has been performed through numerous interviews to decision makers and various sensibility analyses. In this first study it has been decided that all the criteria have the same weights for the decision maker. The Decision LAB software has been applied to each of the problems individually, and for each one of them partial preorders, total preorders, matrix of weight stability intervals, GAIA decision axes, and percentage of the preserved findings by the GAIA Plan have been obtained. The software enables us to obtain other complementary analyses that will enrich the conclusions and improve the success of the decision process.

Observing the graphs of the partial preorder (Appendix B), one can notice that with 80 alternatives the representations are quiet complex to understand, mainly because of the huge amount of incomparabilities that appear. Therefore, it has been decided to analyse the results that show the total preorder. It is true that some information is lost through the process, but usually it becomes irrelevant if the decision-maker wants that all the alternatives be ranked (Brans and Mareschal, 2005).

Table 2 shows the total ordering (complete preorder of the PROMETHEE II) obtained for each of the 80 cooperative banks in each of the years in the period studied (organised according to their position in the 2009 ranking).

The analysis of these results is developed from different perspectives.

In a first perspective, a hierarchy that offers the multiple criteria method is observed for each of the years of the sample. Considering that significant variations are appreciated in the relative position of each cooperative bank in the following years, it proceeds to calculate the middle relative position for the complete temporary period. However, the standard deviation has been calculated in the variation of that relative position. Therefore, the following results can be appreciated:

- The entity with the best classification for the period studied is Caja Rural de San Jaime Alquerías; which is a mid-size bank in comparison to all the cooperative banks studied in the period analysed as second entity to many times. This entity is very local, and has one of the smaller middle sizes, by total assets, of the sample. This entity is followed by other entities also very small in comparative dimension, with the exception of Caja Rural de Navarra, an entity of large size by total assets within the sample and with leadership in the sector that has traditionally managed a good competitive position. Also the two major entities of the sector, CajaLaboral Popular and Cajamar, placed in the 11th and 12th positions respectively. Therefore, the analysis reveals how entities with good performance, regardless of their size, get good global multicriteria rakings. The size is almost irrelevant in this classification and reinforces the hypothesis widely raised in the specialised literature that the largest financial institutions are not always the best. Size can give relevant, market

    power and other attributes, but the current financial crisis is demonstrating how very small dimension entities have been much less affected by it.

- In the standard deviation function, the greatest medium dispersion in the classifications obtained each year corresponds to Caixa Popular, an entity of small relative size in the subsector of cooperative credit banks (mainly due to the sharp decline of its position in 2009). The smallest dispersion is found in Caja de Ingenieros, with a medium-sized; although the relative positions it has in the ranking are very low in the time series.

- If we look at the two major entities by average total assets (Cajamar and CajaLaboral Popular), it can be seen that the former ranked 12th among 80 entities, while the latter dimension is the 11th. This means a good relative position of both, although their greatest dimension do not leads them to the top of the classification. This result, as well as the indicated for other cooperative banks, shows the mixture or combination of economic and social aspects as stated in the third paragraph; and leads to a classification that moves away from the classical or traditional univariate, by offering a broader perspective on the performance of these entities.

A different approach could be to focus on comparing the relative classification for each year, but as it was indicated above, the continuous changes force us to work with average values and dispersion. In any case, the correlation between the dimension of the entities and their greater or lesser dispersion of their annual classification has not been obtained.

    Furthermore, another approach lets us analyse the absolute variation between the classification obtained by the entities at the beginning and by those at the end of the analysis period. In this regard, entities that advance more positions are Caja de Arquitectos, Caja de Albalat and Caja Rural de Castellón; while the entities that have lost greatest positions are Caixa Popular, Caixa Benicarló and Caixa Rural de Vinaròs (all of them are local entities and have small relative dimension).

    It should be noticed that Cajamar, the greatest entity of the sector, achieved a considerable rise in the ratings during the period; but there are 17 entities that outnumber it in absolute terms during this ascent in the classification.

    Following the previous interpretation of rankings for the cooperative banks, it is important to analyse how the process was driven in order to achieve homogeneity within the resulting entities. To this end, Table 3 contrasts the different rankings of the entities that have been found for each of the exercises under study with the results of the restructuring of cooperative banks, so those entities that have been involved in some bank reordering process, involving a total of 47 of the 80 studied entities, are incorporated into the analysis.

    The comparison carried out focuses on the year 2009, for reasons of space; it is not feasible to detail the results for the remaining three years. However, the results for the year of reference can be extrapolated to the rest of the period.

Table 2   Total rankings (total pre-rankings of PROMETHEE II) obtained for each cooperative bank for each year of the period studied

	Ranking 2009	Ranking 2008	Ranking 2007	Ranking 2006	Mean	Standard deviation
CAJA RURAL 'SAN JAIME' DE ALQUERÍAS NIÑO PERDIDO	1	1	4	2	2	1.41
CAJA R. DE NAVARRA, S.C.C.	2	10	8	5	6	3.50
CAJA RURAL DE VILLAMALEA	3	5	6	10	6	2.94
CAJA RURAL DE GUISSONA	4	2	2	16	6	6.73
CAJA RURAL DE CASAS IBAÑEZ	5	3	5	7	5	1.63
CAJAMAR CAJA RURAL, S.C.C.	6	14	12	18	13	5.00
C.R. 'LOS SANTOS DE LA PIEDRA' DE ALBALAT DELS SORELLS	7	44	52	44	37	20.19
CAJA RURAL 'NRA.SRA. DE GUADALUPE' DE BAENA	8	7	9	8	8	0.82
CAJA RURAL 'SAN JOSÉ' DE BURRIANA	9	4	24	20	14	9.32
C.R. 'NRA.SRA. DEL ROSARIO' DE NUEVA CARTEYA	10	16	15	13	14	2.65
CAJA RURAL DE LA RODA	11	17	11	9	12	3.46
CAJA RURAL 'NRA.SRA. MADRE DEL SOL' DE ADAMUZ	12	8	14	14	12	2.83
CAJA LABORAL POPULAR	13	23	10	3	12	8.30
CAJA RURAL 'SAN JOSÉ' DE ALCORA	14	18	1	12	11	7.27
CAJA RURAL 'SAN JOSÉ' DE ALMASSORA	15	25	3	4	12	10.37
CAJA RURAL CASTELLÓN – S. ISIDRO	16	62	50	51	45	19.92
CAJA RURAL 'SAN ROQUE' DE ALMENARA	17	15	21	28	20	5.74
CAIXA RURAL LA VALL 'SAN ISIDRO'	18	9	37	49	28	18.10
CAJA R. DEL SUR, S. COOP. DE CRÉDITO	19	12	25	17	18	5.38
CAJA DE CRÉDITP DE PETREL, CAJA RURAL	20	19	31	34	26	7.62

Source: Own production

Table 2   Total rankings (total pre-rankings of PROMETHEE II) obtained for each cooperative bank for each year of the period studied (continued)

	Ranking 2009	Ranking 2008	Ranking 2007	Ranking 2006	Mean	Standard deviation
CAJA RURAL 'NTRA.SRA. ESPERANZA' DE ONDA	21	6	30	33	23	12.12
CAJA RURAL DE CASINOS	22	40	40	11	28	14.29
CAJA DE ARQUITECTOS	23	22	56	63	41	21.56
CAJA RURAL DE ASTURIAS	24	26	20	26	24	2.83
CAJA R. DEL MEDITERRÁNEO, RURALCAJA, S.C.C.	25	50	42	47	41	11.17
CAJA RURAL DE ZAMORA	26	38	22	24	28	7.19
CAJA RURAL DE BETXÍ	27	24	7	6	16	11.05
CAJA RURAL DE BURGOS	28	52	58	30	42	15.23
CAJA RURAL DE CHESTE	29	34	29	58	38	13.87
CAJA RURAL 'SAN JOSÉ' DE VILLAVIEJA	30	13	38	27	27	10.42
CAJA RURAL DE TENERIFE	31	51	63	56	50	13.74
CAJA RURAL DE ALBAL	32	42	77	41	48	19.85
CAJA RURAL DE CIUDAD REAL	33	29	36	66	41	16.91
CAJA R. ARAGONES Y DE LOS PIRINEOS, S.C.C.	34	31	19	36	30	7.62
C.R. 'NRA.SRA. DEL CAMPO' DE CAÑETE DE LAS TORRES	35	30	45	45	39	7.50
CAJA RURAL DE ALGINET	36	20	16	37	27	10.81
CAJA RURAL DE UTRERA	37	33	53	67	48	15.61
CAJA RURAL DE EXTREMADURA	38	35	49	65	47	13.57
CAJA RURAL DE VILLAR	39	37	34	19	32	9.07
CAJA RURAL DE GIJÓN	40	28	26	29	31	6.29

Source: Own production

Table 2 Total rankings (total pre-rankings of PROMETHEE II) obtained for each cooperative bank for each year of the period studied (continued)

	Ranking 2009	Ranking 2008	Ranking 2007	Ranking 2006	Mean	Standard deviation
CAJA RURAL DE MOTA DEL CUERVO	41	39	18	22	30	11.69
CAJA RURAL DE ALMENDRALEJO	42	59	61	35	49	12.76
CAJA RURAL DE CUENCA	43	21	27	32	31	9.32
CAIXA RURAL ALTEA	44	47	47	55	48	4.72
CAIXA RURAL DE TURÍS	45	27	33	25	33	9.00
CAJA RURAL DE TERUEL	46	75	66	42	57	15.82
CAJA RURAL DE GRANADA	47	60	67	61	59	8.42
CAJA RURAL DE FUENTEPELAYO	48	58	64	50	55	7.39
CAJA RURAL DE SALAMANCA	49	61	65	71	62	9.29
CAJA RURAL CENTRL DE ORIHUELA	50	55	62	68	59	7.89
CAIXAR.GALEGA, S.C.C.L.G.	51	43	69	69	58	13.11
CAIXA RURAL BENICARLÓ	52	63	28	1	36	27.53
CAIXA RURAL DE L'ALCUDIA	53	32	46	43	44	8.74
CAJA RURAL DE SORIA	54	36	32	23	36	13.02
CAJA RURAL DE CÓRDOBA	55	41	43	46	46	6.18
CAJA RURAL CATÓLICO AGRARIA DE VILLARREAL	56	56	35	52	50	10.01
CAJA RURAL 'SAN ISIDRO' DE LES COVES DE VINROMÁ	57	80	70	64	68	9.74
CAIXA RURAL DE CALLOSA D'EN SARRIÁ	58	49	57	39	51	8.81
CAIXA RURAL D'ALGEMESÍ	59	68	48	59	59	8.19
CAIXA RURAL DE BALEARS	60	79	79	79	74	9.50

Source: Own production

Table 2 Total rankings (total pre-rankings of PROMETHEE II) obtained for each cooperative bank for each year of the period studied (continued)

	Ranking 2009	Ranking 2008	Ranking 2007	Ranking 2006	Mean	Standard deviation
CAJA RURAL DE TOLEDO	61	45	44	54	51	8.04
CAJA R. DE ARAGÓN, S.C.C.	62	71	71	70	69	4.36
CAJA RURAL DE ALBACETE	63	48	55	60	57	6.56
CAJA RURAL DE TORRENT	64	54	54	53	56	5.19
IPAR KUTXA RURAL, S.C.C.	65	46	41	31	46	14.27
CRÈDIT VALENCIANA CAJA RURAL	66	73	75	75	72	4.27
CAJA RURAL DE CANARIAS	67	69	72	72	70	2.45
CAJA RURAL DE JAÉN	68	67	68	77	70	4.69
CAJA CAMPO, CAJA RURAL, S.C.C.	69	57	17	48	48	22.23
CAJA RURAL 'SAN VICENTE FERRER' DE VALL DE UXÓ	70	66	23	40	50	22.25
CAJA RURAL 'LA JUNQUERA' DE CHILCHES	71	65	59	62	64	5.12
CAIXA RURAL VINARÒS	72	70	51	21	54	23.64
CAJA RURAL 'SQN ISIDRO' DE VILAFAMÉS	73	53	60	57	61	8.66
CAIXA POULAR, CAIXA RURAL	74	11	13	15	28	30.54
CAJA DE CRÉDITO DE LOS INGENIEROS	75	74	74	74	74	0.50
CAJA DE CRÉDITO COOPERATIVO, S.C.C.	76	64	73	76	72	5.68
CAJA RURAL DE SEGOVIA	77	76	76	78	77	0.96
CAJA RURAL 'SAN JOSÉ' DE NULES	78	72	39	38	57	21.22
CAIXA RURAL 'SANT FORTUNAT' DE CASTELLDANS	79	77	80	80	79	1.41
CAJA RURAL 'SAN AGUSTÍN' DE FUENTE ÁLAMO	80	78	78	73	77	2.99

Source: Own production

Table 3 Classification position or multicriteria ranking of the entities that participated in the different concentration processes of Spanish cooperative credit banks (year 2009)

Assigned named	Involved entities	Position	Standard deviation intra group
CajasRuralesUnidas	Cajamar, C.R.	6	24,75
	Caja Campo, C.R.	69	
	C.R. Casinos	22	
	CaixaAlbalat	7	
	Caixapetrer	20	
	CaixaTurís	45	
	C.R. Castellón	16	
	C.R. Balears	60	
	C.R. Canarias	67	
	Ruralcaja	25	
	C.R. Altea	44	
	C.R. S. Roque de Almenara	17	
	C.R. de Callosa dén Sarriá	58	
	C.R. S. José de Burriana	9	
	C.R. Torrent	64	
	C.R. S. Jaime Alque. Niño Perdido	1	
	C.R. Cheste	29	
	C.R. S. José de Nules	78	
	C.R. de Villar	39	
	C.R. la Junquera de Chilches	71	
	C.R. S. Josep de Vilavella	30	
	C.R. S. Isidro de Vilafamés	73	
	C.R. de Alginet	36	
	Crèdit Valencia, C.R.	66	
GrupoIbérico de Crédito	C.R. del Sur	19	18,01
	C.R. de Extremadura	38	
	C.R. de Córdoba	55	
Bantierra	Multicaja	34	19.80
	Cajalón	62	
Globalcaja	C.R. Albacete	63	21.63
	C.R. Cuenca	43	
	C.R. Ciudad Real	33	
	C.R. La Roda	11	

Source: Own production

Table 3   Classification position or multicriteria ranking of the entities that participated in the
            different concentration processes of Spanish cooperative credit banks (year 2009)
            (continued)

Assigned named	Involved entities	Position	Standard deviation intra group
Solventia	C.R. Almendralejo	42	15.56
	C.R. Utrera	37	
	C.R. Baena Ntra. Sra. De Guadalupe	8	
	C.R. Ntra. Sra. Del Rosario de nueva Carteya	10	
	C.R. de Cañete de las Torres Ntra. Sra. Del Campo	35	
	C.R. Ntra. Madre del Sol	12	
In process	C.R. Segovia	77	24.51
	C.R. Fuentepelayo	48	
	C.R. Burgos	28	
	C.R. Sant Fortunant de Castelldans	79	
In process	IparKutxa	65	36.77
	CajaLaboralPopular	13	

Source: Own production

Table 3 demonstrates that the entities that have joined or grouped, through mergers or IPS, are not sufficiently close to each other in the general classification or rankings obtained, accumulating a high intra-group dispersion in most of the cases. So, CajasRuralesUnidas Group has one of the greatest standard deviations, being of 24.75 positions. This is logical considering that it includes a total of 24 entities that are characterised by being very heterogeneous, so some are in best places in the classification, as it is the case of C.R. S. Jaime Alquerías Niño Perdido or CaixaAlbalat, and while others have much lower positions, as C.R. S. José de Nules or C.R. S. Isidro of Vilafamés.

The rest of formed groups integrate less entities (between 2 and 5), and they do not get highlight for their homogeneity, at present. In fact, the process that integrates IparKutxa and CajaLaboral Popular has a standard deviation of 36,77 posts (higher than CajasRuralesUnidas), despite joining only two entities.

Finally, it should be noted that of the total number of processes, the most homogeneous according to the classification given is the Solventia Cooperative Group, to occupy very close places in the ranking 3 of the 5 integrated entities.

5   Conclusions

The results obtained show annual rankings for the analysed period, like intended, keeping in mind that it is a multicriteria analysis, unifying the elements that can be highly differing, since economic, financial, solvency and social variables are collected. Therefore, it is considered that this type of analyses combining multicriteria techniques with financial elements, can be used as an approximate measure of the performance of

these entities that are, on one hand, financial entities that compete in a highly competitive market with high demands on margins; and on the other hand, they must be faithful to their original outset as non-profit entities, and specially oriented to the attainment of social work.

The use of multicriteria decision tools in the cooperative credit banks sector is quite innovative, at least as far as the scope of this sector is concerned and with the particularities that distinguished the financial situation in Spain at present, involved in a very strong concentration process, full of challenges due to the impact of crisis (mainly between 2010 and 2012).

The idea is that the usual classifications of financial institutions based on the dimension (mainly by total assets, but also by number of offices or corporate or labour dimension parameters), the benefits, or various profitability ratios, may not be sufficient to evaluate the performance of an entity, as it has been developed and explained in the study. Social criteria are also important and it should be taken into account since it provides or restricts the degree of economic development of the region or territory where an entity concentrates its activity – as it will be raised in subsequent studies –. In this sense, the geographic diversification has been traditionally valued as a competitive factor. Meanwhile, the financial crisis has revealed that the Spanish institutions with international diversification have escaped to the rigor of the national crisis. In fact, the strong territorial expansion developed in recent years by some financial institutions was made with an aggressive commercial policy which increased their risks with the current consequences.

The classification has allowed to empirically test the hypothesis that, the integration processes occurring in the cooperative banking sector does not respond to issues of homogeneity in the business model of the constituent entities as would have been desired and recommended by the standards and supervisors; but also other measures have been guiding the restructuration of the sector (personal issues, policies, business, valuation of the market and analysts, and even the supervisor's orientation). The above results can serve as a platform for future research of a qualitative nature to identify non-economic attributes that have motivated the direction of the processes of concentration.

The result of grouping non-homogeneous entities together can be measured in a few years and will reveal if previous homogeneity helped (– or not –) to the development and consolidation of the process. It may also be measured if a greater heterogeneity can contribute to the achievement of an improvement of those entities which were comparatively worse (in this case it could corroborate the goodness of the process so that the best positioned reinforce those that are worse, as intended in the processes of mergers and acquisitions).

Finally, it should be emphasised that, despite the deep integrator process showed in Figure 1, this has not been finished. Future work will allow a new calibration of the hypotheses and we will be able to give definitive conclusions regarding the investigation.

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Notes

1   A cooperative group of credit is in essence an IPS, consolidated for accounting purposes, but does not perform total pooling of the results of the set of entities involved.

2   In particular, the following processes have been considered: the formation of the current Cajamar after cooperative banks of Malaga, Almeria, and Grumeco have been together in the year 2000, and Caja Duero in 2007; which has been Ruralcaja by the union of C.R. Cabanes (2000), C.R. Alicante and Credicoop (2002), and C.R. Elche in 2003 to the C.R. de Valencia.; the merger of the C.R. of Huelva and Sevilla, forming the C.R del Sur.; the union of C.R. Huesca and Zaragoza in 2001 to constitute C.R. de Aragón and of the Pyrenees, which acceded in 2009 the Caja de los Abogados; the constitution of the C.R. de Aragón by C.R. Jalón in 2001, which joined the C.R. del Campo de Cariñena in 2002; and the absorption of Cobanexpo by C.R. of Navarre in 2002. In 2010, Cajamar was made up of CajamarCaja Rural, Caja Campo, Caja Rural de Casinos and CaixaAlbalat, to which were added Caja de Petrer, Caja de Turís and, in December 2011, Caja Canarias (also including the absorption of the Caja Rural de Castellón). Cajamar was the first IPS formed in Spain. Cajamar absorbed C.R. Balears in the summer of 2010; but previously, in 2008, he had absorbed to C.R. del Duero.

3   By the term interregional banking it is understood as the degree in which banking institutions operate outside their home territories.

4   This aspect is especially relevant in the banks analysed in this investigation, since the cooperative banks are entities of 'territorial scope' because its origin is linked to an autonomous community, province or region. The gradual process of the deregulation of the banking sector, initiated in the '80s, permitted the progressive expansion of the branch offices of the cooperative banks to other provinces and autonomous communities. This process has been characteristic and significant in these entities, some of them reaching national presence, like it was analysed above.

5   An important detail is that the province of origin is where the headquarters of the bank are, taking in consideration that possibly, mergers in the past have led banks to have their headquarters in the capital city of the autonomous region. The criterion of the province of origin is commonly referred by the National Union of Credit Co-operatives (UNACC in Spanish), employers' organisation of the entities that were studied.

Appendix A

Multicriteria decision matrix corresponding to year 2006 (see online version for colours)

	Índice HH	Dotac.Result.Ejercicio	Brecha	RRPP_ATM	Eficiencia Técnic
Weight	1.0000	1.0000	1.0000	1.0000	1.0000
Preference Functi	Gaussian	Gaussian	Gaussian	V-Shape	V-Shape
Indiference Thres	-	-	-	-	-
Preference Thres	-	-	-	0.0200	5.0000
Gaussian Thresho	0.2500	0.2000	0.3000	-	-
Threshold Unit	Absolute	Absolute	Absolute	Absolute	Absolute
Average Performa	0.888	0.14326980	0.811394220	0.11581581	60.80
Standard Dev.	0.213	0.05987829	0.223430398	0.13608823	12.03
Unit					
Action1	0.894	0.10812176	0.934832701	0.08294571	63.32
Action2	1.000	0.17647059	0.706049734	0.16427267	53.99
Action3	1.000	0.16775599	0.732397504	0.17561698	55.80
Action4	1.000	0.10940919	0.843458815	0.10943231	48.15
Action5	1.000	0.25015518	0.926250496	0.10952812	80.16
Action6	1.000	0.24877571	0.931677431	0.10274063	66.27
Action7	1.000	0.33291771	0.796563901	0.12063272	72.00
Action8	0.340	0.10741031	1.063612057	0.05320669	64.49
Action9	0.562	0.08891732	0.979719849	0.06594342	69.39
Action10	0.255	0.09534222	1.103968935	0.07300118	60.40
Action11	1.000	0.10076903	1.008121144	0.10376605	61.25
Action12	1.000	0.12895522	0.851129057	0.10756051	60.97
Action13	0.957	0.14568855	0.714582331	0.08423380	53.26
Action14	0.708	0.15824042	0.914446061	0.07139380	66.98
Action15	1.000	0.07902893	0.969824099	0.06438114	73.55
Action16	0.052	0.03927318	0.689920874	0.06099134	65.23
Action17	0.403	0.08415466	0.827453447	0.05134785	81.60
Action18	0.749	0.21523370	0.900739983	0.09559522	64.42
Action19	1.000	0.11214953	0.774153730	0.89969216	44.38
Action20	1.000	0.11082307	0.824509501	0.07360282	53.66
Action21	1.000	0.11097993	0.812841612	0.11039852	59.29
Action22	1.000	0.23118280	0.705434191	0.08669157	62.80
Action23	1.000	0.17647059	0.889522993	0.07247275	49.95
Action24	1.000	0.10919540	0.338750982	0.08344013	52.36
Action25	1.000	0.11094961	0.248377404	0.12092551	61.71
Action26	1.000	0.17355372	1.158386158	0.10674456	42.47
Action27	1.000	0.19029536	0.948822289	0.11966623	69.69
Action28	1.000	0.17663818	0.454575852	0.12966552	43.40

Multicriteria decision matrix corresponding to year 2006 (continued) (see online version for colours)

Action28	1.000	0.17663818	0.454575852	0.12966552	43.40
Action29	1.000	0.17672956	0.665065218	0.12980305	40.76
Action30	1.000	0.11111111	0.797557463	0.09030082	49.58
Action31	1.000	0.17574692	0.576005469	0.09168695	47.72
Action32	1.000	0.18644068	0.996651319	0.09351897	59.19
Action33	1.000	0.24222222	0.981316748	0.09660039	64.91
Action34	1.000	0.17653149	0.777033618	0.09569352	63.16
Action35	1.000	0.25000000	0.796038375	0.10188813	66.85
Action36	1.000	0.24899598	1.078630093	0.12193950	55.77
Action37	0.981	0.10427656	0.090544993	0.08903532	53.79
Action38	1.000	0.10094637	0.956582059	0.11753015	56.39
Action39	1.000	0.09859155	0.519471546	0.09606208	55.78
Action40	1.000	0.10550459	0.595060156	0.10819921	40.11
Action41	1.000	0.10440835	0.755360515	0.12500291	50.00
Action42	0.906	0.08061139	0.927179160	0.08049284	58.29
Action43	1.000	0.10910612	0.955183549	0.09571062	60.42
Action44	1.000	0.24137931	0.896474265	0.07529563	47.20
Action45	0.757	0.09871561	0.995475679	0.08365839	67.23
Action46	0.143	0.08873419	0.922564283	0.08199007	47.17
Action47	0.760	0.09384913	0.961923249	0.10863160	69.85
Action48	0.918	0.07579154	0.899937843	0.07532668	71.23
Action49	0.672	0.17638610	0.666444669	0.06405150	67.00
Action50	1.000	0.14285714	0.214994487	0.09945793	82.68
Action51	1.000	0.11101801	0.544079660	0.10547775	32.04
Action52	0.610	0.09936678	0.800259161	0.07267203	68.90
Action53	1.000	0.00000000	0.000000000	0.98943985	124.26
Action54	1.000	0.10365336	0.734529603	0.07152650	63.24
Action55	0.482	0.10957659	1.090167514	0.08983461	54.02
Action56	0.904	0.09662366	0.976279776	0.08213012	70.18
Action57	1.000	0.15384615	0.729547808	0.11222764	66.53
Action58	1.000	0.10154242	0.604505511	0.09217730	78.27
Action59	0.607	0.20384694	0.994498694	0.08065061	58.15
Action60	1.000	0.11509901	0.864636356	0.07934196	63.04
Action61	0.900	0.10899743	1.022953424	0.08842900	56.80
Action62	0.971	0.16121198	1.021092547	0.08434905	63.64
Action63	0.945	0.15741263	0.918297427	0.07329813	54.29
Action64	0.675	0.23795351	0.837732702	0.07009978	63.50
Action65	1.000	0.10829493	0.894138011	0.06198641	46.78
Action66	1.000	0.17619048	0.907144232	0.16830394	61.77
Action67	1.000	0.11142454	0.948611414	0.07942174	60.93

Multicriteria decision matrix corresponding to year 2006 (continued) (see online version for colours)

Action67	1.000	0.11142454	0.948611414	0.07942174	60.93
Action68	1.000	0.25000000	0.860661099	0.06266338	51.25
Action69	1.000	0.11111111	0.685897436	0.15251759	63.33
Action70	1.000	0.25049702	0.617910031	0.10193501	61.79
Action71	1.000	0.25186567	0.851570773	0.09513578	62.56
Action72	1.000	0.17131474	1.064028457	0.12013749	58.43
Action73	1.000	0.11162080	0.675743873	0.11028593	66.44
Action74	0.672	0.09414674	0.887212355	0.07285849	61.04
Action75	1.000	0.17738570	0.930239112	0.09331685	64.83
Action76	1.000	0.11136364	0.560062325	0.13166987	58.44
Action77	0.695	0.10517896	0.915973624	0.09975445	65.50
Action78	0.721	0.10312937	0.962267540	0.06743440	51.56
Action79	0.777	0.10525815	1.066193605	0.07055117	70.08
Action80	1.000	0.13486005	0.869685608	0.06387170	66.13

Appendix B

Graphs of total preorders (PROMETHEE II) corresponding to years the period 2006–2009 (see online version for colours)

Complete ranking 2006   Complete ranking 2007   Complete ranking 2008   Complete ranking 2009