

New Spanish Banking Conglomerates. Application of the Analytic Hierarchy Process (AHP) to their Market Value

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Abstract

The Spanish financial system is undergoing profound changes, as a consequence of the present international financial crisis and the directives laid down by the European Central Bank (ECB). One of the most important of these changes is the emergence of new financial/banking conglomerates from the mergers of various savings banks and their transformation into IPSs (Institutional Protection Systems). Therefore, determining the value of these financial conglomerates and shares in these is of great interest. This study proposes a scheme which combines the multiple criteria AHP method with the valuation ratio of the International Valuation Standards. This new methodology can be seen as a comparative method or market approach and it only requires a limited number of comparable companies, with their corresponding qualitative and quantitative variables. For this study this valuation method has been applied to the de facto mergers of savings banks. Due to the current situation of the industry, the valuation of financial institutions of this type is a task of great interest and this also serves to showcase the strengths of the proposed methodology.

Keywords: Banking Conglomerates, Valuation Ratio, Market Value, Business Valuation, Multiple Criteria Analysis, AHP

1. Introduction

Due to the economic context and the current economic situation, business valuation has taken on great importance for directors, analysts, investors and other figures in the business world. To attempt to establish the value of those companies which are preparing to float on the stock market is complex and one which is of great interest to the financial and business community. In this case, we are going to focus on the valuation of a financial conglomerate which conforms to the model of an Institutional Protection System (IPS), made up of a group of savings banks. Given that these savings banks did not previously have any shareholders, nor were they listed on any secondary market, the transformation of these into a new bank requires that the value of this conglomerate be established before it can come onto the market and be quoted on the stock exchange as a privately-owned bank.

The *International Valuation Standards* (International Valuation Standards Committee, IVSC, 2007) divide valuation methods into three groups: comparative methods or market approaches, income approaches and cost approaches. Within these, there are further distinct methods: asset valuation, discounted cash flows, methods which combine the previous two, econometric or regression models, real options valuation, or the guideline public company method.

Despite the obvious usefulness of these traditional methods, they have a number of practical limitations for valuation:

- 1) Some of these comparative methods, such as regression analysis, require a wide-ranging database of comparable assets. In numerous cases, the available database is not large enough (Moya, 1995; Miralles and Miralles, 2002; García *et al*, 2008).
- 2) For income approaches, previously estimated data must be used, as these are based on predicting the future performance of the asset to be valued. In the case of business valuation, this involves calculating future cash flows and their residual value and applying an appropriate discount rate. This leads to a high level of subjectivity being present in the valuations, which are very sensitive to changes in the future scenarios considered.
- 3) Cost methods are exclusively used for the valuation of buildings and urban land and their use can obviously not be extended to business valuation, although asset valuation is arguably similar to such methods.
- 4) In all these traditional valuation methods, it is difficult to directly introduce qualitative variables into the valuation process. This is a serious limitation, as the importance of business leadership, staff professionalism, company prestige, international standing, quality control and so on, is undeniable.

Such limitations have led to studies proposing alternative methods for valuation from the field of multiple criteria decision analysis, such as goal programming (Aznar and Guijarro, 2004, 2007a and 2007b), the analytic hierarchy process (Aznar and Estruch, 2007), the analytic network process (Aragonés *et al*, 2008, Garcia-Melón *et al*, 2008) and a combination of several of these techniques (Aznar *et al*, 2011; Aznar *et al*, 2010; Aznar *et al*, 2007, 2008; Cervelló *et al*. 2010; Guijarro and Guijarro, 2010).

This study puts forward a new valuation model composed of AHP and the valuation ratio, and which we will call AHP Ratio. This model is a comparative method, since such methods calculate the value of an asset by means of a comparison with comparable assets whose characteristics and price is known. This proposed methodology is especially appropriate for the valuation of companies in which the number of comparable variables is limited and the available accounting data is used, with it also enabling the inclusion of qualitative variables.

The rest of this paper is structured in the following manner: the next section gives an exposition of the two methods which make up AHP Ratio; the third section details the whole process of applying the method; section four presents a case study in which the new methodology is applied to the valuation of Bankia, a new Spanish bank or Institutional Protection System (ISP). Section five concerns this paper's main conclusions.

2. Methodology

The two methods which compose AHP Ratio are described below.

2.1. The Analytic Hierarchy Process (AHP)

AHP (Saaty, 1980) is a method which aids decision-making and is well-known in the business world. Given a set of alternatives, it enables these to be prioritized, by comparing elements pairwise, using a fundamental scale designed for this purpose (Table 1).

Table 1: Fundamental scale for pairwise comparisons (Saaty, 1980)

Numerical scale	Verbal scale	Explanation
1	Equal importance	Both elements contribute equally to the property or criterion.
3	One element is moderately more important than the other	Judgement and prior experience favour one element over the other.
5	One element is significantly more important than the other	Judgement and prior experience strongly favour one element over the other.
7	One element is much more important than the other	One element is favoured very strongly over the other. Its dominance is demonstrated in practice.
9	Extreme importance of one element over the other.	One element is dominant over the other to the highest possible order of magnitude.

Note: The values 2, 4, 6 and 8 can be employed to express intermediate situations

By comparing the alternatives two by two in terms of a particular criterion and using the pairwise comparison scale, square matrices are obtained $A = [a_{ij}]$ which must fulfil the properties of reciprocity, homogeneity and consistency. The eigenvector of the proposed matrix indicates the importance or weight of each alternative in terms of this criterion.

AHP enables the evaluation of inconsistency of the decision-maker when making judgements. In order to measure this, what is known as the consistency ratio (CR) is calculated. In general (Saaty, 1997), inconsistencies below 10% are accepted for matrices of the range $n \geq 5$ (5% for $n=3$ and 9% for $n=4$). Otherwise, the judgments made must be revised or the matrix discarded.

AHP possesses two important characteristics which are worth nothing. The first is that it can be applied individually or collectively, with the latter case involving consultation with experts and arriving at an ultimate solution through aggregating the opinions of everyone involved. This aggregation takes place using the geometric mean (Saaty, 1980). The second characteristic, referred to above, is that by means of the CR we can determine the consistency of the information used in the process and therefore eliminate the inconsistent information.

2.2. Valuation Ratio

The valuation ratio method (IVSC, 2007) consists of obtaining a ratio between a value and a variable related to this value. The valuation ratio is given by the expression (1), as the quotient between the summation of the prices and the summation of the value of the corresponding variable.

$$R = \frac{\sum_{i=1}^n P_i}{\sum_{i=1}^n x_i} \quad (1)$$

Where:

Pi = Prices of the assets.

xi = Value of the variable for each asset

n = Number of assets considered.

Once the ratio is known, if we wish to calculate the value of a similar asset, the expression of the calculation is (2)

$$\text{Asset value} = \text{Ratio} * \text{value of the variable} \quad (2)$$

3. Application of the Model

The process is as follows:

Step One. Selection of comparable companies

With the company to be valued already selected, the first step is to determine the comparable companies, which must logically be companies which, due to their characteristics, activity, size, etc., are similar to the target company and whose value is also known, having undergone a recent transaction or being listed on the stock market.

Step Two. Selection of a group of experts

An important property of the model is that enables a group of experts to be used in carrying out the valuation. The opinions of the different experts consulted are the ones which will make the valuation possible and so it is important to make a sound selection of these experts, who must be informed beforehand of the objective and the procedure. This group of experts can participate in every stage of the process: in the selection of comparable companies, the selection of variables and the application of the method.

Step Three. Selection of the criteria or explanatory variables (quantitative and qualitative) of the value

The value of assets is defined by their characteristics or variables. For this step, the variables which will define the value of the target assets will be selected and they are the ones which will allow us to compare the target asset with the other comparable assets. The determination of the variables that this comparison will be based on is therefore of fundamental importance. These variables may be quantitative in nature, such as, in our case, the different accounting entries or the number of employees; or they can be qualitative, such as the professionalism of the staff, quality or prestige, the distribution channels used, etc. In order to quantify the latter and be able to give consideration to them in the problem, the AHP method will be employed. In the business valuation literature, it is mainly economic and financial variables taken from accounting figures which are used. The use of variables of this kind is very common, not only in the field of business valuation, but also in fields as different as credit risk analysis (Beaver (1966,1968), Altman (1968, 1971, 1973, 1993), Ohlson (1980), Sun and Shenoy (2007), Wang and Lee (2008), Psillaki *et al* (2010), Li *et al* (2010)), business performance analysis (Yeh (1996), Halkos and Salamouris (2004), Malhotra (2009)) and the creation of company rankings (Feng and Wang (2001), Deng *et al* (2000), Garcia *et al* (2010a)), to name but a few. These studies employ methodologies as different as dichotomous classification tests, discriminate analysis, factorial analysis, logit and probit models, artificial neural networks, DEA and TOPSIS. However, as we have said, there is a series of qualitative variables which have a significant bearing on the value and these cannot be considered by most traditional methods. With our proposal, and by means of AHP, we can introduce these and take them into account in the valuation model.

Step Four. Modelling of the valuation problem as a hierarchy

Once the alternatives and criteria or variables have been established, the alternatives (companies) and the criteria (explanatory variables) are structured by building a hierarchical tree, where the top of the tree represents the objective or goal of the problem (to obtain a function of the valuation with which to estimate the value of the target company), whereas the lowest levels display the alternatives (comparable companies and the target company whose value is to be estimated), and the middle levels are reserved for the criteria and subcriteria. All the elements of the hierarchy are dependent on the level immediately above them, from the lowest level of the tree (the leaves) up to the top (the root).

Step Five. Weighting by means of AHP of the criteria, of the alternatives for each criteria and of the alternatives, in accordance with the criteria and their importance

Through the use of pairwise comparisons and the Saaty's fundamental scale, the local priorities of the alternatives and the criteria can be established. Using a process of priority aggregation, the total priorities of the assets can be established, defining the weighting of the target company and the comparable companies.

Pairwise comparisons enable the quantification of the qualitative variables. In some cases, quantitative variables can be estimated using AHP, if their utility does not have a linear form, or in situations where measuring their value is technically difficult, or when the cost involved in obtaining them is greater than the benefit that would be obtained from including them in the valuation process. In all cases, the consistency of the answers of the experts must be monitored (Saaty, 1997), so that only consistent information is used.

Step Six. Calculation of the valuation ratio

In this case, the numerator is the sum of the values of the comparable companies or another related type of parameter and the denominator is the sum of the weightings of the comparable companies obtained from the previous steps.

$$RV = \frac{\sum_{i=1}^n V_i}{\sum_{i=1}^n x_i} \quad (1)$$

Where:

RV = Valuation ratio

V_i = Value of company i

x_i = Weighting of the company obtained through AHP

The valuation ratio indicated the value of the companies per weighting unit.

Step Seven. Calculation of the value of the target company

The value of the target company is calculated by multiplying the ratio obtained in (1) by the weighting of the target company obtained by applying AHP.

4. Empirical Design: Case Study and Results

This section sees the application of the proposed methodology to the valuation of Bankia, the largest Spanish bank by volume of domestic business, formed by means of the de facto merger ("cold fusion") of a group of savings banks (*cajas de ahorros* in Spanish - Caja Madrid, Bancaja, Caja Insular de Canarias, Caixa Laietana, Caja de La Rioja, Caja Ávila and Caja Segovia) in order to comply with the legal requirements imposed by the Banco de España to resolve the financial problems faced by these savings banks. This merger is going to follow the financial model called an IPS (Institutional Protection System – SIP or *Sistema Institucional de Protección* in Spanish) and the resulting bank will then be floated on the stock market. The steps to follow to achieve a valuation of Bankia are the following:

Step One. Selection of comparable companies.

In order to undertake the valuation, comparable Spanish banks were chosen that are listed on the stock market and whose size and business figures are similar to those of the target company. The chosen banks were BBVA, CaixaBank, Banco Sabadell, and Banco Popular.

Step Two. Selection of a group of experts

7 experts from the banking and financial industry were chosen to take part in the determination and weighting of the criteria and to prioritise the alternatives for each criterion.

Step Three. Selection of the criteria or explanatory variables (quantitative and qualitative) of the value

As we have already said, the selection of economic and financial variables which will act as criteria for the comparison of companies is a key step. These variables must serve to characterise the management of these companies and the level of success or failure which this leads to. Although there is no established list of accounting ratios in the literature which could be used, there are a multitude of studies which use such information to analyse business performance, including that of savings banks. Examples of such studies are Kumbhakar *et al* (2001), Prior (2003) and García-Cestona and Surroca (2006). Other studies which also make use of economic and financial information focus on the valuation of savings banks (Moya 1996, Aznar *et al* 2010), or the creation of rankings of savings banks (Arévalo-Quijada *et al* 2002; García *et al* 2010b).

By reviewing these previous studies, it was determined that all of the ratios employed can be grouped into different categories. In other words, certain dimensions of the economic and financial structure are essential when characterising a financial institution. The following dimensions repeatedly appear: inputs (costs), outputs (profits) and management of risk; and their most representative ratios are:

Inputs dimension (costs): labour cost (personnel costs), cost of physical capital (amortization/tangible assets) and cost of deposits/capital.

Outputs dimension (profits): loan profitability (interest and similar income/loans and receivables), professionalism of staff, loyalty of clientele and trust level.

Risk management dimension: default rate, loan-loss provisions and BIS ratio (solvency ratio).

Most of the chosen variables are quantitative, although three qualitative ones were also included: professionalism of staff, loyalty of clientele and trust level, which are considered due to their importance to the business of such companies.

It should also be noted that, in accordance with the principle, “the more the better”, the inverse of the criteria included in the inputs group and of the default rate is calculated.

The data of the quantitative variables appear in Tables 2 and 3.

Table 2: Financial and economic data on 31/12/2010

	BANKIA* (thousands of €)	BBVA (thousands of €)	CAIXA BANK (thousands of €)	Sabadell (thousands of €)	Popular (thousands of €)
Staff costs	1,018,268	4,814,000	2,165,834	679,721	784,116
Staff	23,915	213,928	28,210	10,777	8,521
Amortisation	314,760	761,000	484,326	158,980	96,330
Tangible assets	4,329,180	6,701,000	5,150,130	81,352	1,890,220
Interest and similar income	4,785,224	7,814,000	3,763,512	1,081,549	1,711,093
Financial liabilities at amortised cost	245,261,934	453,164,000	224,822,918	88,710,738	119,614,237
Net income	256,644	4,995,000	1,686,393	382,922	780,291
Total assets	274,393,421	552,738,000	285,724,221	97,099,209	129,290,148
Interest and similar income	6,904,316	21,134,000	6,915,864	2,644,787	5,059,068
Loans and receivables	207,755,765	364,707,000	191,151,820	76,725,432	104,973,250
Default rate	5.68%	4.10%	3.71%	5.01%	5.27%
Loan-loss provisions	63.00%	62.00%	70.00%	56.60%	59.14%
Solvency/BIS Ratio	8%	13.70%	11.80%	11.08%	9.66%
Size (total assets)	274,393,421	552,738,000	285,724,221	97,099,209	129,290,148
Deposits (Financial liabilities at amortised cost)	245,261,934	453,164,000	224,822,918	88,710,738	119,614,237
Net equity	12,000,000	37,475,000	21,979,856	5,688,543	8,252,319

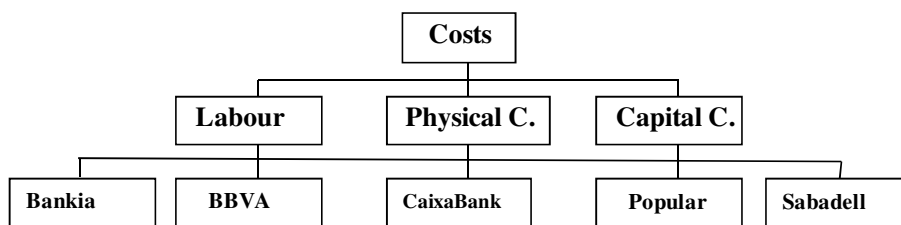
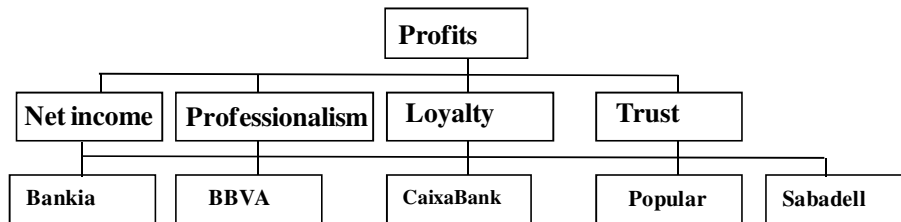
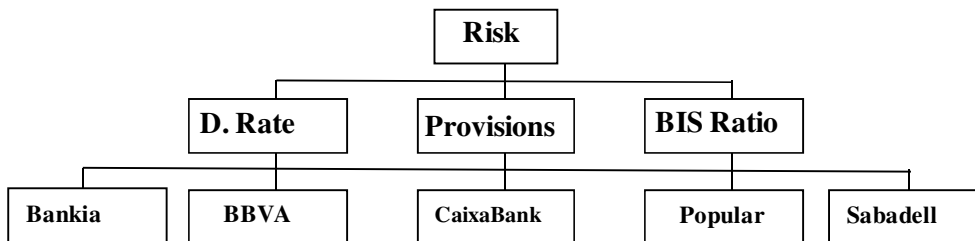
*Balance sheet data up to 31/03/2011 and the rest are weighted for that date

Table 3: Value of the financial ratios on 31/12/2010

	BANKIA (thousands of €)	BBVA (thousands of €)	CAIXA BANK (thousands of €)	Sabadell (thousands of €)	Popular (thousands of €)
INPUTS (COSTS)					
Labour	42.5786	22.5029	76.7754	63.0714	92.0216
Physical capital costs	0.0727	0.1136	0.0940	1.9542	0.0510
Cost of deposits /capital	0.0195	0.0172	0.0167	0.0122	0.0143
OUTPUTS (PROFITS)					
Loan profitability	0.0332	0.0579	0.0362	0.0345	0.0482
RISK					
Default rate	0.0568	0.0410	0.0371	0.0501	0.0527
Loan-loss provisions	0.6300	0.6200	0.7000	0.5660	0.5914
Solvency/BIS Ratio	0.0803	0.1370	0.1180	0.1108	0.0966

Step Four. Modelling the valuation problem as a hierarchy

The next step is to model the problem as a hierarchy. By following one of the fruitful ways in which AHP can be applied, three hierarchies were constructed, corresponding to each of the dimensions of the variables: inputs (costs), outputs (profit) and risk. The hierarchies are shown in Figure 1.

Figure 1: AHP hierarchy for the valuation of BANKIA. Inputs (Costs) dimension**Figure 2:** AHP hierarchy for the valuation of BANKIA. Outputs (Profits) dimension**Figure 3:** AHP hierarchy for the valuation of BANKIA. Risk dimension

Step Five. Weighting of the criteria using AHP

In the three cases, the pairwise comparisons are put to the experts in order to determine the weighting of the criteria first (Appendix). Then their answers are used to construct the pairwise

comparison matrices, their consistency is checked and the eigenvectors are calculated. For each hierarchy, the number of eigenvectors obtained will be the same as the number of experts consulted and, to arrive at a single weighting, these are aggregated using the geometric mean. The aggregated results are shown in Table 4.

Table 4: Weighting of the criteria

Weighting of the criteria					
Costs		Profits		Risk	
Labour	0.4788	Net income	0.3220	D. Rate	0.2996
Physical C.	0.1668	Professionalism	0.2082	Provisions	0.2227
Capital C.	0.3544	Loyalty	0.1731	BIS Ratio	0.4777
		Trust	0.2966		

Weighting of the alternatives for each criterion using AHP

The weighting of the comparable companies and Bankia differs according to the type of criterion involved in each case. Where the criteria are quantitative, the weighting is the normalization of the sum and, for qualitative criteria, the weighting is the aggregation of the eigenvectors of the pairwise comparison matrices, constructed using the answers made by the experts to the questionnaire (Appendix). The weightings are shown in Tables 5.1, 5.2 and 5.3.

Table 5.1: Weighting of the alternatives for each criterion using AHP

	Weighting of alternatives according to costs		
	Labour costs	Fixed Capital Costs	Deposits/Capital Costs
Bankia	0.2181	0.2579	0.1597
BBVA	0.4127	0.1651	0.1807
Caixa Bank	0.1210	0.1994	0.1861
Sabadell	0.1473	0.0096	0.2556
Popular	0.1009	0.3680	0.2178

Table 5.2: Weighting of the alternatives for each criterion using AHP

	Weighting of alternatives according to profits			
	Profitability	Professionalism	Loyalty	Trust
Bankia	0.1582	0.0576	0.1600	0.0447
BBVA	0.2759	0.3730	0.1803	0.4892
Caixa Bank	0.1723	0.2307	0.4084	0.1864
Sabadell	0.1641	0.1706	0.1275	0.1257
Popular	0.2295	0.1682	0.1238	0.1541

Table 5.3: Weighting of alternatives for each criterion using AHP

	Weighting of alternatives according to risk		
	Default Rate	Provisions	Solvency
Bankia	0.1632	0.2027	0.1480
BBVA	0.2261	0.1995	0.2524
Caixa Bank	0.2498	0.2253	0.2174
Sabadell	0.1850	0.1821	0.2042
Popular	0.1759	0.1903	0.1780

Weighting of the alternatives according to all of the criteria and their importance.

The multiplication of the weighting of the alternatives by the weighting of the corresponding criteria gives us the weighting of the former for each group of criteria. It is our opinion that each group

of criteria has the same level of importance in the determination of the value, so that the final weighting of the alternatives is the mean average of the weightings of each (Table 6).

Table 6: Weighting of the alternatives for each criterion using AHP

	Weighting of Costs	Weighting of Profits	Weighting of Risk	Final Weighting
Bankia	0.2041	0.1039	0.1647	0.1560
BBVA	0.2892	0.3428	0.2328	0.2854
Caixa Bank	0.1572	0.2295	0.2289	0.2031
Sabadell	0.1627	0.1477	0.1935	0.1663
Popular	0.1869	0.1761	0.1801	0.1792

Step Six. Calculation of the valuation ratio

Now that the weighting of the comparable companies and Bankia is known, the mean, maximum and minimum market capitalization values (for the January 2010 to July 2011 period) for each company can be taken and the valuation ratio calculated, remembering that the latter is the result of the quotient between the summation of the values of the comparable companies and the summation of the weightings of the comparable companies.

Table 7: Value/weighting ratio

	RATIO	MEAN VALUE	MAXIMUM VALUE	MINIMUM VALUE
BBVA	0.2854	41,505,431,325	59,097,654,735	31,200,583,330
Caixa Bank	0.2031	1,369,043,787	1,778,027,201	1,040,478,166
Sabadell	0.1663	4,440,490,906	5,704,409,423	3,518,075,067
Popular	0.1792	6,292,488,634	8,207,975,937	4,887,900,419
SUMA	0.8340	53,607,454,652	74,788,067,296	40,647,036,982
RATIO		64,276,079,570.28	89,671,927,079.05	48,736,359,528.49

Step Seven. Calculation of the value of the target company

The ratios obtained enable the calculation of a mean, maximum and minimum value of Bankia, by multiplying the corresponding ratio by the weighting of Bankia (Table 8).

Table 8: Values for Bankia

		Bankia Value (Billions of €)
Mean Value	$0.1560 \times 64,276,079,570.28$	10.0258
Maximum Value	$0.1560 \times 89,671,927,079.05$	13.9871
Minimum Value	$0.1560 \times 48,736,359,528.49$	7.6019

This gives the value of Bankia at 10.0258 billion euros, within a range of a maximum of 13.9871 and a minimum of 7.6019.

5. Summary and Concluding Remarks

In this study, a new methodology based on multiple criteria techniques has been proposed, and which can be classified as a comparative valuation method or market approach. It is structured in seven steps and it uses the multiple criteria AHP method and the valuation ratio of the International Valuation Standards. First, companies which are comparable to the target company are selected, along with a group of industry experts. In this way, the comparative criteria (quantitative and qualitative) are determined and, by using AHP, the importance of each criterion and those of the target and comparables companies are weighted. Next, the valuation ratio is calculated, so that, by multiplying this ratio by the weighting of the target company, the value of the latter can be obtained.

This model enables the valuation of non-listed companies which, due to the type of their activity and their size, are similar to others that are listed and for which the market capitalization represents their market value. There are many companies in this situation and whose valuation may be required in the near future, especially if they are to start being listed on a secondary market.

Thus, with the focus of our interest on the savings bank industry, especially in the current context in which the economic situation has led to a change in the relevant regulations, forcing them to become banks and be listed on the stock market, this new methodology is applied to the valuation of Bankia, an IPS or financial conglomerate.

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Appendix

Table A.1: Inputs or "Costs" dimension

CRITERION	Extremely more important	Much more important	Quite a lot more important	Modestly more important	THE SAME	Modestly more important	Quite a lot more important	Much more important	Extremely more important	CRITERION
Labour										Cost of physical capital
Labour										Cost of deposits/capital
Cost of physical capital										Cost of deposits/capital

Table A.4: Customer Loyalty Criterion. Evaluate the level of importance of each organization with the others (pairwise comparison): - continued

BBVA										Sabadell
BBVA										Popular
Caixa Bank										Sabadell
Caixa Bank										Popular
Sabadell										Popular

Table A.5: Prestige Criterion. Evaluate the level of importance of each organization with the others (pairwise comparison):

CRITERION	Extremely more important	Much more important	Quite a lot more important	Moderately more important	THE SAME	Moderately more important	Quite a lot more important	Much more important	Extremely more important	CRITERION
Bankia										BBVA
Bankia										Caixa Bank
Bankia										Sabadell
Bankia										Popular
BBVA										Caixa Bank
BBVA										Sabadell
BBVA										Popular
Caixa Bank										Sabadell
Caixa Bank										Popular
Sabadell										Popular

Table A.6: Risk

CRITERION	Extremely more important	Much more important	Quite a lot more important	Moderately more important	THE SAME	Moderately more important	Quite a lot more important	Much more important	Extremely more important	CRITERION
Default Rate										Loan Loss Provisions
Default Rate										Solvency/ BIS Ratio
Loan Loss Provisions										Solvency/ BIS Ratio