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DETERMINANTS OF PROFITABILITY IN SPANISH FINANCIAL INSTITUTIONS. COMPARING AIDED AND NON-AIDED ENTITIES

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Abstract. The last financial crisis has led to the greatest contribution of public funds ever made to Spanish banks. This paper studies why the need for support has been asymmetric, with not all of the institutions requiring aid. Based on profitability of assets (ROA), we determine using panel data econometric and logit response models the components of profit and loss accounts that generated profitability as well as the factors leading to some entities to ask for aid. The analyses show that before the beginning of the crisis there were significant differences between entities that needed aid and those that did not. The most profitable banks grounded their success in the traditional revenue components of financial institutions (such as margin on interest rates and commissions), as well as in revenues obtained from participated companies and extraordinary results. The model offers a tool to detect entities in difficulties in advance, reducing the financial and social costs of public interventions. The factors more impacting on profitability of Spanish institutions are also identified.

Keywords: Spanish financial system, public aid, ROA, profitability, crisis, panel data.

JEL Classification: G21, G28, G34.

Introduction

Spain is currently carrying out its largest financial restructuring ever made to date. This restructuring has reduced significantly the number of financial institutions and has changed the Spanish financial map. A number of banks have disappeared and out of the 46 savings banks[1] existing in 2009, only two of them, the smallest ones, remain

[1] Savings banks are special financial institutions. Compared to commercial banks, (i) their benefits cannot be distributed among their owners, they must be destined either to increase reserves or to their non-profit organizations, and (ii) their boards are chosen (in a high politicized environment) for regional and local political governments, account holders, employees and founders. Despite the above features, they can perform the same operations that commercial banks do, currently sharing the same public targets.

(see Table 1). The rest of savings banks have been transformed into banks and half of them after either receiving some financial aid, being absorbed or being nationalized. The other half has transformed their management bodies, adopting the structure of a corporation, although most of them maintaining their brands to retain their market value. In any case, savings banks have stopped providing services that were previously available and this is far from a small matter as savings banks had 50% of the Spanish financial market share in 2009.

The injection of public capital has already been substantial; more than 25,500 million euros have been directly injected by Spanish public institutions – 19,369 million euros from the Fund for Orderly Bank Restructuring (FORB) and 6,202 million by the Deposit Guarantee Fund (DGF) – and, what's more, the European Central Bank is committed to providing up to 100,000 million euros, of which 36,968 million has already been provided, to cover possible future needs (IMF 2012). In summary, a total of 62,539 million euros (~6% of Spanish GDP) has already been injected and virtually all these aids have been for savings banks.

The causes of this different behaviour between Spanish banks and savings banks have been a matter of study in the literature from different perspectives. For instance, after increasing politicization following law 44/2002, Azofra and Santamaria (2004) evaluate differences in efficiency in 2003; while for the current crisis Climent-Serrano (2012) examines profitability issues and Pérez-Ruiz (2012) focuses on corporate social responsibility. The aim of this paper is to expand the analyses studying based on profit and loss accounts the determinants of return on assets for the years immediately preceding the crisis. In this study, however, the focus will not be on the structure of governance and property since it is possible to find successes and failures inside both groups. We check if the characteristics of the entities that have needed aid are different from those not requiring it. The goal is identifying some precursors or leading indicators that can help in the future to anticipate problems, making it easier to react to the financial supervisory authority.

To guarantee the homogeneity of the period of analysis, our inquiry will focus on the profitability of the financial institutions from 2004 (when all financial institutions grew at a significant level) until 2009, when the symptoms of the current crisis in Spanish institutions started to appear. We fix the end of the period of analysis in 2009 because it was the year when most of the imbalances, gestated during the previous lustrum, began to blow up and the last year in which all the analysed entities (see Table 1) could present individual accounts. The merger and acquisition process started in 2010.

The feature of studying the profitability of Spanish institutions in the current crisis is not new and has already attracted scholars' interest. In particular, Maudos (2012) compares the development of profitability in Spanish and European banks taking as reference the period 2007–2010. Besides the period of analysis, this study presents two additional substantive differences with Maudos's work. Firstly, we focus on the factors that have determined profitability, distinguishing between entities who have received public aid and those that have not. And, secondly, although using exclusively Spanish data, our

results will be re-examined comparing data from the two groups. In this way, we will be able to identify the differences that first led some Spanish financial institutions to ask for help.

The rest of the paper is organized as follows. Section 1 briefly summarizes banking profitability literature. Section 2 relates to the process that led to the restructuring of the Spanish financial system and resumes the route followed by financial institutions. Section 3 describes data and methodology. Section 4 presents and discusses the results of panel data econometric and logit regression analyses. Section 5 studies the differences between both groups of entities, focusing on the components that determined profitability. Section 6 summarises and concludes the paper.

1. Brief review of profitability literature

Besides the already cited works, profitability and related topics have been a matter of study in a large number of papers in Spain and around the world. Salas and Saurina (2002) analysed the determinants of the loan crisis in the Spanish financial system for the period 1985–1997 and found credit expansion, bank size, core capital ratio and business cycle as the variables that provoked the problems with loans and profitability. Interestingly, they also found out that these variables differently affected banks and savings banks – as Climent-Serrano and Pavía (2014a) do for the current crisis. In the same line, Miller and Noulas (1997) also pointed to declining quality of the loan portfolio as the main factor affecting US large commercial banks profitability during the latter part of the 1980s. Hayden *et al.* (2007) claimed, after studying profitability in 983 German banks for the period 1996–2002, that diversification does not help profitability.

Liua and Wilson (2010) analysed the determinants of the profitability in Japanese banks between 2000 and 2007 using panel data and pointed out capital ratio, assumed risks and efficiency as significant determinants among internal variables, and stock market development, industry concentration and GDP as external determinants. Also using panel data and reviewing the determinants of profitability in 61 countries over the period 1992–2006, Hsieh and Lee (2010) demonstrated that the level of banking competition is ambiguous for profitability. They emphasized that among the determinants of profitability are the market structure, the level of activity, the restrictions on banks to purchase securities in the insurance business and other non-banking businesses such as the restrictions to entry to foreign banks, the investor protection, the presence of a sound financial system and the per capita GDP. Similarly, Bolt *et al.* (2012) examined profitability in a sample of 17 OECD countries for the period 1979–2007 and obtained trajectories of interest margins, insolvency provisions and economic cycle as profitability determinants. Finally, in a macro study of more than 15,000 banks in 148 countries, Shehzadab *et al.* (2013) study the interaction between size, growth and profitability and conclude that bank growth and profitability are independent of each other.

2. Restructuring process and background

Initially, Spain looked not greatly affected by the crisis triggered by US subprime mortgages and related toxic products that erupted in the United States during the summer of 2007. A crisis that, worsened by the failure of some US financial institutions (the most notorious case being the bankruptcy of investment bank Lehman Brothers in September 2008), culminated in a sovereign debt crisis in the countries of the Eurozone from early 2010 (Acharya *et al.* 2014; Acharya, Steffen 2015). In early 2009, however, the first symptoms of what would be the largest Spanish financial crisis ever began to appear with the intervention of the savings bank Caja Castilla La Mancha (CCM) in March 2009.

According to many scholars (Carbó, Maudos 2010; Foos *et al.* 2010; Berges *et al.* 2011; Maudos 2012), the main problem in Spain was the enormous amount of investment made by financial institutions and particularly savings banks in real estate and the losses caused after the bursting of the housing bubble. Additionally, other factors, both external and internal, worsened the situation of the Spanish financial system. Among the external factors can be cited unemployment rates above 20% and an intense recession with continuing negative and negligible positive rates of growth; whereas the overcapacity caused by the excessive growth of the branch network of savings banks can be quoted as an internal factor. Further impact has also come from more expensive liabilities due to losses of income from investments in capital, holding companies, strategic investment, speculative investments and the *de facto* closure of the international wholesale money markets for Spanish banks. All these circumstances have significantly reduced the profitability and solvency of the Spanish financial institutions (Climent-Serrano, Pavía 2014b).

In this context and with the aim of dealing with the situation and putting some order in the process, the Spanish government created a public body (FORB) to drive the restructuring. Through this body, two different governments of Spain have issued in eight laws, delivered in just three years, the regulations that should govern the restructuring. These regulations address three general areas: (i) amending the corporate governance of savings banks; (ii) facilitating the flow of public funds to those entities needing aid, as long as they prove to be profitable and economically viable; and (iii) cleaning up from toxic assets the bank balances by demanding strong provisions to cover the impairment of real estate assets. This new legislation coupled with the successive deterioration of the economic situation and the new solvency regulations led to a progressive loss of the minimum solvency margin in some entities and to the need of intervention by Spanish political and financial authorities.

Table 1 shows a summary of the process of restructuring experienced by the Spanish financial system. In particular, the amounts of injected funds as grants and the type of restructuring undergone (either fusion, institutional protection system or nationalization) are displayed. As can be observed, final entities are obtained after several restructuring steps and after experiencing episodes of support of different types.

3. Data and methodology

The research is based on the main Spanish financial institutions: a total of 43 savings banks (all except CCM and Cajasur which were intervened, receiving public aid, before 2010) and the 14 largest commercial banks (see Table 1). This comprises 99% of the assets of Spanish banks and savings banks. The profit and loss accounts from years 2004 to 2009 published in the annual account reports of these entities have been used as variables for the analysis. In particular, a panel database was created combining a (dummy) fictitious variable that captures if an entity has received some kind of assistance (either in the form of absorption or financial support) and all the components of profit and loss accounts of all these entities.

Table 1. Spanish bank system restructuring process up to December, 31st 2012*

	Aid	Lead	S/B	Former entity	Type according and millions of aid			Final entity
1	0	0	S	Caja Madrid	IPS 4,465	Bankia	Nationalized 17,959	1 Bankia
2	0	0	S	Bancaja				
3	0	0	S	La Caja de Canarias				
4	0	0	S	Laietana				
5	0	0	S	Avila				
6	0	0	S	Segovia				
7	0	0	S	La Rioja				
8	1	1	S	La Caixa	Merger by absorption	CaixaBank	CaixaBank (CaixaBank absorbs Banca Cívica and Banco de Valencia)	2 CaixaBank
9	1	0	S	Girona				
10	0	0	S	Navarra	IPS 977	Banca Civica starts trading on stock market		
11	0	0	S	Caja Burgos				
12	0	0	S	Caja Canarias				
13	0	0	S	Caja Sol				
14	0	0	S	Guadalajara				
15	0	0	B	Valencia	4,500	Intervened		
16	1	1	S	Cajastur + CCM	Cajastur	SIP	LiberBank	3 LiberBank
17	1	1	S	Extremadura				
18	1	1	S	Cantabria				
19	1	1	S	CAI	Caja Tres IPS	Banco Ibercaja (Fusion between Ibercaja and Caja Tres)	Banco Ibercaja	4 Banco Ibercaja
20	1	1	S	Badajoz				
21	1	1	S	Circulo Burgos				
22	1	1	S	Ibercaja	Banco Ibercaja			
23	0	0	S	Granada	SIP IPS		BMN, Banco Mare Nostrum	5 Banco Mare Nostrum
24	0	0	S	Murcia				
25	0	0	S	Penades				
26	0	0	S	Sa Nostra				

End of Table 1

	Aid	Lead	S/B	Former entity	Type according and millions of aid			Final entity
27	1	1	S	BBK + Cajasur (392)**	IPS		Banco Bilbao Bizkaia Kutxa	6 Banco Bilbao Bizkaia Kutxa
28	1	1	S	Kutxa				
29	1	1	S	Vital Kutxa				
30	1	1	S	Unicaja	Merger by absorption	Unicaja Banco	Unicaja Banco (Unicaja absorbes Caja España)	7. Unicaja Banco
31	1	0	S	Jaen				
32	0	0	S	Caja Duero	Fusion 525	Banco Ceiss		
33	0	0	S	Caja España				
34	1	1	S	Ontinyent		Savings bank		8 Ontinyent
35	1	1	S	Pollensa		Savings bank		9 Pollensa
36	1	1	B	BBVA			BBVA (Unim absorbed by BBVA)	10 BBVA
37	0	0	S	Sabadell	Fusion 953	Banco Unim		
38	0	0	S	Tarrasa				
39	0	0	S	Manlleu				
40	0	0	S	Catalunya	Fusion 2,968	Catalunya Caixa. Intervened 9,084		
41	0	0	S	Tarragona				
42	0	0	S	Manresa				
43	0	0	S	Galicia	Fusion 3,627	Novacaixagalicia. Intervened 5,425		
44	0	0	S	Caixanova				
45	0	0	B	Gallego	Intervened given it belongs to Nocaixagalicia group			
46	1	1	B	Sabadell	Sabadell (Sabadell absorbes Guipuzcoano)		Sabadell (Sabadell absorbs CAM)	11 Sabadell
47	1	0	B	Guipuzcoano				
48	0	0	S	CAM	5,249	Intervened		
49	1	1	B	Bankinter				12 Bankinter
50	0	1	B	Popular	Banco Popular absorbs Banco Pastor and increases capital by 2,500 millions			13 Popular
51	1	0	B	Banco Pastor				
52	1	1	B	Santander	Banesto, a bank already owned by Santander, is absorbed completely by its owner			14 Santander
53	1	0	B	Banesto				
54	1	1	B	Barclays				15 Barclays
55	1	1	B	Deutsche Bank				16 Deutsche Bank
56	1	1	B	March				17 Banca March
57	1	1	B	Pueyo				18 Pueyo

Notes: * 'Aid' column identifies those entities receiving financial support (0). 'Lead' column identifies the entities losing control after a merger (0). S/B column indicates if the corresponding former entity was a bank (B) or a savings bank (S). IPS refers to institutional protection system. The numbers under "Type according and Millions of aid" accounts for the millions euros of aid received; ** Cajasur receives 392 million euros from FORB before being absorbed by BBK.

In addition to return on assets (*ROA*), the list of account variables handled has been: the spread between the interest revenue on assets and interest expense on liabilities as a proportion of average assets (*Margin*, also called the banker's mark-up), the return on capital investment (*Rcapit*), the profitability on assets from participated companies (*Rpart*), the revenue net of commissions on assets (*Comis*), the gains on financial transactions on assets (*Ropfin*), the results of operations for exchange differences on assets (*Difcamb*), the net results of non-financial activities on assets (*OtResul*), the personnel and administrative expenses on assets (*EficienA*), the depreciation of assets (*Amort*), the provisions for deteriorating of credit investments made on assets (*DetInvCre*), other provisions on assets (*OProv*), the taxes paid on assets (*Impu*) and the losses due to deterioration on other assets, plus the gains (losses) on disposal of assets not classified as current for sale, plus the negative difference in business combination, plus the gains (losses) on non-current assets for sale not classified as operations interrupted, plus income from discontinued operations on assets (*ResExtr*). Finally, the dummy variable (*Type*) identifies the group to which an entity belongs to. *Type* has been constructed considering the aid events experienced up to December, 31 2012 and takes value 0 when the corresponding entity either has received financial support or has been absorbed not assuming control after a merger; whilst, otherwise, it takes value 1 if either it has not received aid or it has been leader after merging. This dummy variable is obtained multiplying the variables 'Aid' and 'Lead' of Table 1. In a regression analysis, the sign of the coefficient of *Type* will determine if there are differences in profitability between both groups of entities after controlling for the rest of variables.

The panel dataset built has been intensively analysed: a panel data econometric analysis of regression, with ROA as dependent variable, has been carried out to ascertain the possible determinants of profitability; a logit regression analysis has been done to check the power of loss and profit accounts features to predict the entities that were going to or not going to receive aid; and a mean difference analysis in which the components that determined ROA are studied is performed to highlight the main discrepancies by group.

4. Econometric analyses

As stated in the introduction, the first aim of this paper is to determine the components of profit and loss accounts that generate profitability, distinguishing between entities who have received support from those that have not. The dataset consists of a sample of 57 credit institutions for which 6 time periods have been observed, therefore a repeated cross-sectional time-series panel data is available. This provides us, compared to just cross-sectional databases, with a more informative database (with more variability, less collinearity and more degrees of freedom) that will permit us to attain more efficient estimates in an econometric linear regression model and mainly to control for individual unobserved heterogeneity. The existence of specific characteristics of the entities, α_i, that cannot be measured nor observed but that affect profitability could entail the possible inefficiency or inconsistency of OLS estimates. A possible relationship of these individual effects, α_i, with other explanatory variables could bias the estimates. With this issue in mind, the estimation techniques of panel data allows for this unobserved

heterogeneity to be controlled. Thus, along with the components of profit and loss accounts (which do not show multicollinearity problems), we have considered that there are specific characteristics of each entity, constant over time but not measurable or observable affecting the relationship, α_i. The fixed effects baseline model specified has been:

$$ROA_{it} = \alpha_i + \beta_1 Type_{it} + \beta_2 Margin_{it} + \beta_3 Rcapit_{it} + \beta_4 Rpart_{it} + \beta_5 Comis_{it} + \beta_6 Ropfin_{it} + \beta_7 Difcamb_{it} + \beta_8 OtResult_{it} + \beta_9 EficienA_{it} + \beta_{10} AmortA_{it} + \beta_{11} OProv_{it} + \beta_{12} DeinvCrd_{it} + \beta_{13} ResExtr_{it} + \beta_{14} Impu_{it} + \omega_{it},$$

where subindex *i* denotes entity, *t* represents time, the β's are the slopes of the model and ω_{it} is a disturbance error term.

This baseline model allows us to obtain the average contribution of each variable in the two groups, but does not inform about a possible different impact of ROA determinants in each group. A significant variable in one group could become insignificant in the overall sample or in the other group. Hence, two more regressions models (one for each group) have been computed to assess the marginal impacts of the variables between groups and the overall sample. The dependent variable is ROA and the input variables are all the components of profit and loss accounts. In the baseline model *Type*, which accounts for if an entity has (or not) received aid, is also included. The estimation results of the three models are shown in Table 2, where standardized coefficients are also displayed. Standardized coefficients are directly comparable among them and inform about the amount of change, in standard deviations, that a standard deviation change in an input variable would provoke in the dependent variable.

The same variables are identified as significant in the three models. Irrespective of whether an entity received (or not) aid all of them share the same sources of profitability. Their impacts, however, are not homogeneous between groups. Profitability on assets from participated companies (*Rpart*) reaches the highest standardized coefficient, with a value of 0.643 in the pooled database. The sign is positive, so the greater the results a (savings) bank gets from its investee companies, the greater its ROA. The results of financial operations (*Ropfin*) are also very important in determining profitability with a positive and high standardized coefficient, which reached a value of 0.346 in aided companies and 0.528 in unaided banks. The higher the income from financial transactions is, the greater the ROA. Further, not surprisingly, the difference between interest paid and received (*Margin*) and the commissions charged (*Comis*) also have a positive impact on ROA and some of the greater standardized coefficients. In the case of *Margin* it was 0.220 in unaided banks and 0.332 in aided ones, while in average the coefficient of *Comis* was 0.148.

A result that may appear as contradictory at first glance is the positive sign of *Impu* as it indicates that the higher the tax expenditure, the higher the ROA. However it becomes logical when taxes are viewed as a share of profits received by the state and not as an expense for the company. In this case the pooled standardized coefficient is 0.118. Another fundamental component is *OtResult* with a standardized coefficient of 0.109.

Table 2. Coefficient estimates of profitability determinants[⊥]

	Baseline model (pooled data)		Unaided entities model		Aided entities model		Comparisons[♣]		
Variables	Unstandardized coefficients[♦]	Standardized coefficients	Unstandardized coefficients[♦]	Standardized coefficients	Unstandardized coefficients[♦]	Standardized coefficients	1.*v.*2	1.*v.*3	2.*v.*3
Constant	0.132** (0.065)		0.311*** (0.115)		0.203*** (0.071)		*		
Type	0.093*** (0.028)	**0.068**							
Margin	0.409*** (0.043)	**0.273**	0.399*** (0.066)	**0.220**	0.244*** (0.061)	**0.332**		**	**
Rcapit	–0.001 (0.000)	–0.021	–0.001 (0.001)	–0.025	0.002 (0.002)	0.072			
Rpart	1.043*** (0.034)	**0.643**	0.960*** (0.038)	**0.632**	1.283*** (0.194)	**0.327**		***	***
Comis	0.497*** (0.088)	**0.148**	0.387** (0.150)	**0.092**	0.400*** (0.101)	**0.237**			
Ropfin	0.763*** (0.032)	**0.482**	0.905*** (0.040)	**0.528**	0.349*** (0.056)	**0.346**	***	***	***
Difcamb	–0.787 (0.620)	–0.031	–0.290 (0.748)	–0.013	–1.210 (1.319)	–0.053			
OtResul	0.568*** (0.110)	**0.109**	0.681*** (0.196)	**0.088**	0.353*** (0.121)	**0.159**		*	**
EficienA	–0.426*** (0.054)	**–0.230**	–0.477*** (0.098)	**–0.184**	–0.201*** (0.067)	**–0.261**		***	
AmortaA	–0.658** (0.233)	**–0.060**	–0.793** (0.381)	**–0.055**	–0.981*** (0.282)	**–0.192**			
OProv	–0.026 (0.130)	–0.004	0.198 (0.253)	0.032	–0.073 (0.131)	–0.028			
DetInvCre	-0.499*** (0.066)	**-0.158**	–0.448*** (0.112)	**–0.108**	–0.282*** (0.079)	**–0.214**		**	
ResExtr	0.277*** (0.057)	**0.095**	0.314** (0.155)	**0.038**	0.223*** (0.053)	**0.221**			
Impu	0.561*** (0.101)	**0.118**	0.366** (0.162)	**0.074**	0.727*** (0.121)	**0.369**			**
	R^2: .903 Durbin-Watson: 1.453 Adjusted R^2: .899 Observations: 342 (N = 57, T =)		R^2: .956 Durbin-Watson: 1.413 Adjusted R^2: .952 Observations: 132 (N = 22, T = 6)		R^2: .612 Durbin-Watson: 1.505 Adjusted R^2: .526 Observations: 210 (N = 35, T = 6)				

Notes: ⊥ Calculations made using IBM SPSS, Release 19. Dependent variables: ROA; ♦ Standard errors in brackets; ♣ Significant differences among the estimates coefficients of the three models; *, **, and *** denote significance at level 10%, 5% and 1%, respectively.

The last component, with a positive relative impact on ROA formation is *ResExtr* with the lower positive standardized coefficient, 0.095.

On the other hand, as expected, the relative costs of administration and personnel (*EficenA*) impact negatively, with the greater negative effect (in absolute terms) on ROA. During this period it had a standardized coefficient of –0.261 in aided banks and not surprisingly its impact was lower in unaided banks, reaching up to –0.184. Furthermore, *DetinvCre* and *AmortA* also had a significant negative impact on ROA with standardized coefficients, –0.158 and –0.060 respectively.

In light of above results, we ask ourselves if there are some configurations that characterize the elements of each group and can serve to anticipate somehow the posterior state of affairs. Thus, to complement the panel data analyses, next we study through a logit regression to what extent ROA and all the profit and loss account variables could serve to separate the sample of (savings) banks into the two groups defined by *Type*.

The results of the predictions obtained after fitting a logit regression model to the full sample thought of as a pooled dataset are displayed in Table 3. Using a binary response logit model, profit and loss account variables are able to correctly classify 84.6% of the observations, although with a somewhat imbalance probability of successes: 87.1% of the organizations that received grants are correctly classified whilst this figure only reaches 61.4% for the other group. Fortunately, the imbalance goes in the right direction given that from the point of view of the supervisor the more substantive errors come from misclassifying an observation as 1 when it should be 0. What's more, a great part of the misclassifications of aided entities (56%) could be catalogued as even as correct since 14 out of the 27 misclassifications in aided group are cases of years 2004 and 2005. A significant portion of these misclassifications correspond to observations of entities that during the first years of the sample period had good financial health but whose posterior deterioration provoked their inclusion in the aided group.

The above outcomes are, however, somewhat biased. We are predicting the same cases that are being used to fit the model. A fairer assessment of the power of loss and profit accounts to correctly classify observations would demand employing different observations in the training and prediction steps. Hence, in the spirit of Hastie *et al.* (2009), the

Table 3. Logit model predictions (full sample)♦

		Type	Predicted group membership♦		Total
			0	1	
Original	Recount	0	183	27	210
		1	51	81	132
	%	0	87.1	12.9	100.0
		1	38.6	61.4	100.0
Correctly classified 84.6% of cases					

Notes: Calculations made using R version 2.15.2; ♦ The first matrix shows the cross-classification of actual group (rows) and predicted group (columns). The second matrix displays the relative marginal distributions by row; ♣ As usual a case is predicted as 0 (1) if its estimate is minor (higher) than 0.5.

sample has been repeatedly divided into two random subsamples of sizes 250 and 62 and the approach has been assessed predicting the outcomes of the 62 observations of the second subsample using the model fitted with the larger subsample. After a hundred simulations of this strategy, we found that the level of successful classification between both groups was on average 79.45% (standard deviation, 4.92%), with this figure reaching 81.05% (standard deviation, 5.68%) on aided entities.

5. Analysing differences by group

This section focuses on mean differences between groups carrying out a descriptive and inferential analysis. The variations by group of all the components that determined ROA are examined and evaluated in aggregate terms and on average across units. Fig. 1 presents the values of the variables, handling each group of entities as if they were unique corporations. The variables with asterisks are those for which the corresponding test of difference of means between groups was significant at 10%, 5% and 1%, respectively.

The average ROA during the six year span studied is higher by more than 0.20% in the entities not needing public support than in those needing it. This finding is logical and

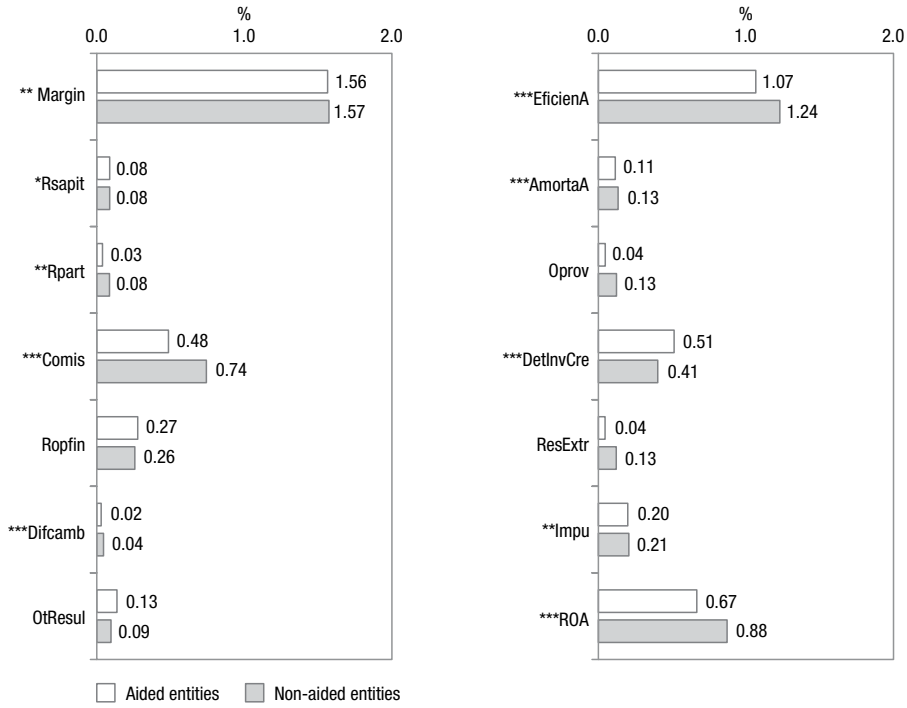

Fig. 1. A comparison of profitability components by group

Notes: The statistics in the Figure has been obtained dealing with all the banks of each group as whether they were a sole entity. Aggregating loss and accounts figures of each group by years and entities and then computing rates; *, **, and *** denote variables for which the test of difference of means by groups was significant at level 10%, 5% and 1%, respectively.

corroborates previous results: a high sustained series of ROA is a symptom of good health of an entity. Regarding ROA determinants, we find that institutions requiring public support registered on average higher figures on only two of the components identified as significant in regressions (*OtResul* and *DetInvCre*), whereas they scored lower figures for the rest of significant regression components. For the non-significant regression variables (*Rcapit*, *Difcamb* and *OProv*) non-intervened entities reach better statistics for none out of the three.

Comparing the group of variables non-significant in the regression with the group of variables for which non-significant differences of means exist between aided and unaided entities we find that only *OProv* is in both groups, although *Rcapit* shows significant differences just at 10%. Despite the obvious differences that *OtResult*, *OProv* and *ResExtr* show in their numbers when each group of entities is handled as a unique corporation, these differences almost disappear when the averages are obtained across units. Indeed, from a statistical point of view, there are no differences between the averages of aided and unaided entities in *Ropfin*, *OtResul*, *ResExtr* and *OProv*. Regardless of the non-significant mean differences across units for these variables, it is worth analysing the variable *Ropfin*, because, although financial operations are considered a marginal and occasional source of generating value when the traditional ways fail, they have been significantly (and increasingly) used by Spanish firms in recent times. The purchase of own assets at a price lower than par (e.g., buying back preferred shares) has been a practice broadly employed during the last years for Spanish (savings) banks, and mainly among aided entities. Focusing now on the significant mean-difference and non-significant regression variables (*Rcapit* and *Difcamb*), we find that the difference detected for *Rcapit* could be considered a statistical artifice. A result caused by the unusual behaviour of only five firms. Conversely, the mean differences by group in *Difcamb* seem to be genuine. The roots for this are in the dissimilar running of banks and savings banks in this variable and in the asymmetric distribution of banks and savings banks between groups.

Among the mean-significant variables with a positive impact on ROA, the greatest differences between groups are located in *Comis*, *Rpart* and *Margin*, while *DetInvCre* and *EficienA* are among the variables with a negative impact on ROA. All these variables are indeed the five variables that show the highest relative impacts on profitability (Table 2). The component with the greatest differential is *Comis*. Unaided institutions obtained as a whole 0.26% more income through commissions than aided entities. The above result moreover was reached after a process in which the gap between both groups widened. From 2004 to 2009, commissions on assets grew in the unaided group from 0.62% to 0.84%, whilst they remained quite stable, in the range 0.46-0.52%, in the other group.

The spread between interest paid and collected on assets (*Margin*) presents the second largest gap. *Margin* was on the average 0.11% (as a whole, 0.01%) higher in non-aided entities, with a growing gap during the sample period. Average *Margin* in unaided institutions advanced from 1.44% in 2004 to 2.10% in 2009, when it evolved from 1.80% to 1.58% in the aided group. Despite this, unaided institutions did not lose market share. The amount of the difference in *Rpart* depends on the statistic employed. Although

this variable shows the highest dissimilarity when differences are calculated on average across units and as a whole by group (0.15% versus 0.05%), it is clear that *Rpart* is higher in unaided institutions and that this fact has notably contributed to the better ROA figures within the unaided group.

Among the variables contributing negatively to ROA, we find that *DetinvCre* is as expected higher among aided entities. As a whole, non-aided entities dedicated 0.10% less resources to defend themselves from these deteriorations; a clear indicator of their healthier loan portfolio. Conversely, despite *EficienA* impacting negatively on ROA, the unaided entities registered on average larger figures during the sample period. As a whole, their expenses were 0.17% higher than those of aided entities. Nevertheless, the better performance of unaided entities in the rest of variables was enough to compensate their worse scores in this variable.

Conclusions

The restructuring of the Spanish financial system has been the most significant ever made and has definitely changed the Spanish financial map. This paper identifies, for the period immediately preceding the beginning of the restructuring, what components of profit and loss accounts have generated profitability and analyses the differences between the group of firms that have received public aid and the group that have not. Our analyses show that these components could be used to discriminate between entities. The study identifies some precursors or leading indicators that can help in the future to anticipate problems, making it easier to react to the financial supervisory authority.
The profitability of the entities that have not received public aid was for the period 2004–2009 on average more than 50% higher than in those entities that have had public support. This better performance was grounded in the traditional revenue components that support financial institutions (such as margin on interest rates and commissions) as well as in revenues obtained from participated companies and extraordinary results. These results, moreover, were reached despite non-aided banks having worse figures in personnel and administrative expenses. It seems that in exchange for more personalised services customers are willing to pay higher commissions. Anyway, given the trend that this variable shows, it should be controlled in the future before becoming a matter of concern.

Panel data linear regression econometric analyses have enabled to identify the components of profit and loss accounts generating profitability and also to detect that the impact of all the variables has not been homogeneous by group. All the variables identified as significant in the econometric analyses appear with the expected sign. Net interest margin, revenues from investments, commissions, net financial operation results, other results, extraordinary revenues and taxes have a significant positive impact on profitability; whereas staff and administration costs, provisions for depreciation and impairment of loans and amortizations impact negatively.

Further, a binary choice analysis has proved that there were significant differences in the configuration of determinants of ROA among aided and unaided entities. As a whole, more than 80% of the observations could be correctly predicted in a logit analysis,

growing these numbers to 87.1% among aided entities. Furthermore, through a prediction exercise we have shown the potential predictive power that loss and profit accounts have to identify aided situations. We hope that the knowledge derived from this analysis could be used in the future by supervisor authorities in different countries to identify potential circumstances of risk and, in this way, try to avoid ending up with the enormous solvency difficulties that have recently rocked the Spanish financial system or, at least, to reduce the magnitude of future challenges.

Nevertheless, given the structural differences in banking sector and financial regulation that still persists among countries in the Eurozone, our analyses should not be generalized without care to other EU countries. A detailed study of similarities and divergences with Spanish regulation and banking sector should be carried out before extrapolating our results to other country.

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