

Size and profitability in cooperative banking

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Abstract

The European cooperative banking plays an important role in promoting savings and in financing small and medium enterprises. Its distinctive characteristics have allowed it to go by the Subprime crisis with a remarkable resilience. Nevertheless, cooperative banks are inserted in a very competitive market, where they suffer a constant pressure to improve competitive position. One strategy often followed to deal with that pressure is to increase the size of local cooperative banks. Based on the data of a Portuguese cooperative banking group for 2009-11, in this paper we assess the impact of size on aggregate assets profitability, making also a disaggregated analysis of the ratios affecting aggregate profitability. After controlling for the idiosyncratic characteristics of local banks, size has a positive effect on assets return. But this effect disappears after controlling for credit risk, suggesting that the effect of size works through better credit risk management.

Keywords: banks, cooperatives, profitability, Crédito Agrícola, mergers.

JEL codes: D240, G210, M100, P130.

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1. INTRODUCTION

The cooperative model is a third model of corporate organization that educates and qualifies participants, supports and sustains the generation of wealth and creates self-sustainability for social development with less inequality and involving communities. The United Nations recognizes the cooperative business model as an important factor in economic and social development, having declared the year 2012 as the international year of cooperatives.

Credit cooperatives are especially important for promoting savings and finance small and medium enterprises, which contribute for the creation of employment and wealth. European cooperative banking is composed by 4.000 local and regional banks, more than 65.000 branches and employs more than 783.000 persons (Guider, 2009). Beyond the dimension translated by these numbers, European cooperative banks have a strong local presence and contribute to economic development (Frois, 2007). The largest European cooperative groups in terms of assets are Crédit Agricole, Rabobank, Dz Bank, RZ Bank, Caja Rural, and Op-Pohjola. In Portugal, Crédito Agrícola (CA) is the only cooperative bank and will be the focus of our study.

In general, cooperative banks have characteristics distinctive from commercial banks, as they are essentially controlled by democratic processes, customers are also members, their aim is not to maximize profit but to serve the customer/member, they have a long-term orientation with moderate risk profile, and the return of capital is modest and stable (Groeneveld and Fa, 2009). Traditionally, cooperative groups have a central body and several autonomous local banks. In the case of CA the central body is the *Caixa Central* (CC) and the local banks are the *caixas*.

Yet, cooperative banks also differ among themselves in various aspects, including the level of integration of the group, size, sophistication's level, governance, and variety of activities (Kuijpers, 2011).

Cooperative banks are in open competition with commercial banks, suffering pressure to improve their competitive position in the market. One strategy often followed to become more competitive is to increase the size of local cooperative banks. The research question raised in this paper is what is the relationship between local banks size and their profitability? *A priori*, there are arguments in favour of large banks as well as in favour of small banks, which justifies the empirical research conducted in this paper. For instance, while scale economies justify large financial institutions, a focus strategy based on a close relationship with clients validates the existence of small institutions. Moreover, in a cooperative institution, the participation of members in corporate governance is favoured by small organizations.

In cooperative banking literature this topic has been analysed with various methods, such as stochastic frontiers or frontiers obtained with Data Envelopment Analysis, used to estimate technical, allocative and total efficiency (Worthington, 2009). In this work we chose a simplified approach in

which the random error only has one component. The reason for this choice lies in the fact that we want to make a detailed analysis of the sub-elements of return, which requires a methodology easy to apply and interpret.

This paper has three features not very common in the literature, which constitute a value added to existing works. Firstly, while the majority of papers in the literature focus on cost efficiency, this paper focus on profit efficiency. Secondly, besides studying aggregate profitability, we assess the impact of size in the sub-components of profitability. Thirdly, we will answer the research question by using information at the level of the local banks composing CA group. The use of intra-firm level data is not very usual in the literature (Worthington, 2009).

In this context, our work begins with Section 2 devoted to the characterisation of CA. Section 3 reviews the arguments in the literature that link banks size with efficiency, and at the end we reflect on the specific case of the *caixas*. Section 4 makes a quantitative approach of the relationship between size and profitability in the *caixas*. Finally, in Section 5 we draw some conclusions.

2. CHARACTERIZATION OF THE CAIXA AGRÍCOLA GROUP

This point is especially dedicated to the historical evolution of CA, its characterization, and its current importance in the Portuguese banking system. CA is the only Portuguese cooperative bank and has a historical connection to agriculture, but today is an almost universal bank. CA is a modern bank with good economic and financial indicators, competing openly in the banking market and offering a wide range of products. CA is a financial group that ranks seventh in the Portuguese domestic market, with a market share in 2010 of about 3% on credit and 5% on deposits. Yet, their presence is disproportionately large in rural areas, with a market share of over 30% in some regions, but it has a weak presence in urban areas.

Like other European cooperative banks, CA has some characteristics distinctive from commercial banks (Barradas et al, 2011). The bank offers proximity banking services, is involved with local communities in promoting local development, especially in rural areas (Ferreiro et al, 2012), has an important social responsibility activity, has a conservative approach to banking, and its goal is not to maximize profit but to offer quality services to its members.

In terms of the dimensions of strategic behaviour defined by Ballarín (1985), CA has chosen universal banking (product strategy), incorporating results for capital growth (distribution of value created), and a focus on local and regional banking (geographic strategy).

Besides its central body, CA group is composed by 85 local banks (*caixas*) spread across the country. The group has 679 branches, one milion and two hundred thousand clients, 400 thousand members, and 14 thousand million euros of assets.

Among the *caixas* there is a large heterogeneity, as a consequence of differences in local markets dimension and dynamism, and differences in management. The difference between the largest and the smallest *caixa* in terms of asset is 30 times. The smaller *caixa* includes a *freguesia* (the smallest administrative area in Portugal and smaller than a county), has 6 employees and 14.2 million euros worth of assets. The larger *caixa* covers 13 *freguesias* and has 161 workers and 452.5 million in assets.

From its foundation in 1911 to 1991, the CA lived without specific regulation, which finally was created in 1991. This law created the conditions for the creation of the CA financial group. Since then many changes have been made to that regulation, namely in 1997, 1999 and 2009. These changes have successively approximated the CA to a standard commercial bank in terms of the credit operations it was authorized to realise. CA has gone from a bank allowed to grant credit only to agriculture and related activities to be able to grant all types of credit to members and non-members.

The CC was created in 1985 and its power over the *caixas* was reinforced by the 1991's law. CC's role is to manage liquidity (apply the excessive financial resources or finance the *caixas*), facilitate payments between *caixas*, and fiscalise and supervise *caixas*. The creation of the CC enabled a rapid evolution in the CA group (Santos, 2012). Namely, it allowed a significant improvement in terms of technology (with a single computer system connecting all branches and *caixas*), risk management, employees' qualifications, standardization of procedures and organization, and reduction of the number of *caixas*.

The CC and *caixas* constitute the SICAM (Integrated System of Mutual Credit to Agriculture). Since the joining to the SICAM is voluntary, there are 5 *caixas* outside this system of mutual accountability and solidarity. The CA group also includes specialised firms (CA-Non-life Insurances, CA – Life insurances, Investment funds of financial assets and real estate, and CA Management), and other central units that provide support to the group, especially the CA Computer Services and the CA Services.

The existence of the CC and other central firms allows the *caixas* (especially the small ones) to reduce costs and achieve good levels of profitability. The services offered by the central entities (marketing, information systems and technologies, and asset management) to all *caixas* avoid the duplication of costs and facilitate the integrated functioning of services.

The SICAM has its own Guarantee Fund created in 1987 and redefined in 1998 and 2008. Its main goal is to guarantee the deposits in the SICAM and perform actions deemed necessary to ensure the liquidity and solvency of the member banks. The CA has already benefited from subordinated loans from the Guarantee Fund in a total amount of 240 million euros, usually associated with mergers of *caixas* with negative equity. Presently there are still some *caixas* with subordinated loans from the Guarantee Fund to strength their capital base.

During its long existence the CA has gone through very different macroeconomic environments. In 2008 the Subprime crisis and in 2010 the Euro sovereign debt crisis has created a

deep recession in the Portuguese economy and lead the country to ask financial help from the Troika (ECB, IMF and European Commission). In this context the CA has been presenting among the best economic and financial indicators in the national banking system. Among the main banking groups, the CA was the only institution satisfying already in 2010 the criteria defined by Troika: *Core Tier 1* should be 10% in 2012 and the ratio credit to deposits should be smaller than 120% in 2014. With the outbreak of the crisis of confidence and liquidity in late 2008, the low transformation ratio proved to be an unquestioned strength of the CA group (Coelho, 2011). Moreover, among the largest banking institutions, only CA managed to increase its profit in 2011, while the others banks' results felt and some even presented negative results in the domestic activity.

It is the practice of "proximity banking" that has ensured the survival of CA and enabling it to face the financial crisis with an unmatched resilience. By proximity banking we understand a practice of banking with decision centres close to clients, a large network of branches, cooperation with local communities in the promotion of economic development, a concern with offering quality services with a long run perspective, and the development of a relationship of trust between banks and clients.

In the difficult economic environment after 2008, one of the main weaknesses of CA was its high operating costs. This weakness is offset by strong local market presence, deep knowledge of the local economic reality, brand reputation, and customer loyalty. In addition, the continuous rethinking of its strategy has also played a key role in the performance of CA, namely the use of mergers and alliances between *caixas*.

***Caixas'* mergers**

Several factors have led to the merger of *caixas* in the last years. Firstly, new regulation demanded a strengthening of compliance and risk control structures. This has created a pressure to increase the size of *caixas*, since it is necessary a relatively large minimum dimension to comply with regulatory demands, namely to have a separation between management and risk control functions. Secondly, the existence of scale economies, investment in technology and the need of qualified personnel justifies that larger units have larger competitive capacity (Cabo, 2003; Cabo and Rebelo, 2005). Thirdly, mergers were used to improve the profitability and capitalisation of some poorly run *caixas*.

The *caixas* are under the close supervision of the CC and the Banco of Portugal – BP - (the Central Bank). The legislation produced by the Central Bank has been imposing to the CA in consolidated terms the same supervision conditions and obligations than to other banks. However, regulatory obligations of individual *caixas* are differentiated according to their size.

It should also be noted that after the Subprime crisis the Portuguese supervisory institution emanated several new rules and created new supervision structures, including behavioural supervision. For example the *Aviso* no. 5 of 2008 of BP has obliged a semi-annual reporting on the several banking

risks and required the segregation of duties between those who control risk and the commercial area. This new position of the supervision entity has forced banks to large investments and increased costs.

Another risk that has been subject to greater scrutiny by the regulator and banks' management is the concentration risk in the perspective of credit, liquidity, market and operational risks (*Instrução* no. 5 of 2011 from BP). Concentration risk is linked particularly to single-name exposures, exposure to sectors of activity, concentration of revenues in specific products, and portfolio concentration in regions of the country. The merger of *caixas* constitutes a good tool to mitigate concentration and overall risks (Batista, 2010).

Given their small size, in some *caixas* the functions of risk control and internal audit are carried out by the CC. However, this relationship cannot last much longer and those *caixas* should merge in order to gain a minimum scale that supports those functions.

Another aspect that the CC has sought to change is the excessive concentration of power in the presidents of the *caixas*. This has been done through the proposition of a standard organizational chart to be adopted by the *caixas*. Regarding risk functions, this chart includes an Audit Board, Board of credit, internal audit functions, internal control functions, risk management functions, compliance functions, a credit risk department and a sub-department of accounting and reporting. In our opinion, to implement this chart, a *caixa* requires a technical staff of over 30 people in central structures. It follows from here that a *caixa* to implement that structure must have a size that permits to generate sufficient cash flow.

The several factors explained above justify the mergers' wave occurred between *caixas*. From a historical maximum of 220 *caixas*, the CC has promoted mergers between *caixas* since 1986. In recent years, the number of *caixas* fell from 120 in 2003 to 85 in 2011. Mergers between small units have diminished the asymmetries in the universe of *caixas* and increased the average size of *caixas* from 61.543 million euros of assets in 2002 to 132.375 million in 2010. Despite this, there are still some *caixas* whose size does not support the legal obligations mentioned above, having to resort to the services of the CC.

Some argue that mergers have been an important tool to reorganize and promote the growth of CA, through the creation of larger and more competitive units, with better technical structures, financially more stable, and with human and materials resources that mitigate risks and potentiate business. Batista (2009) indicates that this was the case with the *caixa* of the *Litoral Alentejano*. Nonetheless, Cabo and Rebelo (2005) did not find a positive effect of mergers in *caixas*' cost efficiency, credit management and solvency ratios. In the mutual banking literature, other papers also found an insignificant or negative effect of mergers on efficiency (Brown, Brown and O'Connor, 1999; Ralston, and Wright and Garden, 2001). But Worthington (2001) found a positive effect of mergers on technical and scale efficiencies.

3. JUSTIFICATIONS FOR LARGER CAIXAS

General arguments

In this section we start by revising the arguments on the effect of size on banks' performance. According to the neoclassical approach, firms' goal is to maximize profit, by achieving maximum efficiency in the use of resources and taking advantage of market conditions to increase revenues. Firms aim not only to produce at low costs, but above all to achieve the maximum sustainable profitability.

Larger banks may be more efficient or profitable for several reasons. Larger financial institutions may produce at lower unitary costs taking advantage of scale and scope economies and larger management efficiency. Scale economies are clearly visible in information systems, which can accommodate very different levels of production with the same fixed cost. Scale economies may also be obtained by serving large clients and practicing syndicated banking. Regarding scope economies, the most evident example occurs in the use of information systems for cross-selling of products. The increase in revenue efficiency with size may occur due to an increase in market power or because some clients prefer the services of larger institutions (Berger et al., 2000). The exercise of market power is facilitated because in banking industry there are barriers to entry, especially scale and scope economies. Larger banks may also be more diversified obtaining a larger stabilization of revenues.

Another justification to increase size in banking is the ability to better absorb risks (Jones, 1988). The larger the market of a bank, the greater is risk diversification in terms of sectors and individual clients and lower the dependence of the local economy's fluctuations.

On the other hand, as already mentioned, the prudential requirements imposed on banks and *caixas* oblige them to have a sufficient size to support a technical structure capable of responding in a competent and timely manner.

Instead of using dimension, some banks may increase profitability either by increasing product differentiation or opting for a niche strategy. Larger differentiation usually implies larger costs but globally may increase profitability. The same occurs in a niche strategy, were serving a specific clientele may prove profitable. Naturally, independently of the strategy followed and size, the quality of management is always an important determinant of profitability.

Given the diversity of strategies that can be followed, it is normal that empirical studies on mutual financial institutions did not found a clear positive relation between size and efficiency. Some works find a negative effect of size on efficiency (Field, 1990; Drake and Weyman-Jones; Esho, 2001) and others point to the importance of scale for better efficiency scores (Worthington, 1998; and McKillop, Glass and Ferguson, 2002).

The specific reality of *caixas*

In general, the factors pushing banks to become larger are also present in the *caixas* (Table 1). We can argue that some of those factors are even more important in the *caixas* than in standard banks. That is so because the *caixas* have a small dimension comparatively to a standard commercial bank, meaning that they are very distant from the minimum optimal size. For example, a *caixa* really needs to grow in size to be able to fulfil the prudential requirements imposed by the regulator.

But given their special features, *caixas* are less affected than commercial banks by shareholder pressure to increase profitability. The capital of agricultural banks is owned either by themselves as a result of incorporation of results or by their members.

Moreover, the growth of the *caixas* may lead to a reduction of the personalized relationship with clients and members that is normally present in small institutions. Firstly, the growth of the *caixas* can move away the decision centres from customers. Secondly, if the growth of *caixas* involves the closure of branches, this can lead to a reduction of the practice of proximity banking. Finally, the participation in the corporate activity of the *caixas* is also impaired when they become large units, with a reduction of the involvement of members on cooperative affairs due to the increasing of free-riding. All this leads the Dutch cooperative bank Rabobank to use the formula of considering their local banks “as large as necessary and as small as possible”.

Table 1 – Factors affecting bank size

	Commercial banks	<i>Caixas</i>
Scale economies	+	+
Scope economies	+	+
Prudential requirements	+	+
Credit risk	+	+
Reduction of competition	+	+
Proximity banking	-	-
Shareholder pressure to increase profit	+	0
Democratic control	0	-

Note: +: pressure to increase size, 0: no effect on size, -: pressure to decrease size

4. RELATION BETWEEN PROFITABILITY AND SIZE IN THE CAIXAS

4.1 Scheme of analysis

In this section we analyse if size has indeed a positive effect on the profitability of the *caixas*. For that, we need to take into account that banks are multiproduct institutions, which makes difficult the choice of measures of output and input. We chose to measure efficiency using an aggregate indicator of profitability, the return-on-assets, ROA (profit after taxes/assets).² This financial ratio shows the capacity of an institution to generate profits based on its assets. The choice of this measure was done because is a global indicator of performance that is not affected by the leverage of the bank. Against the choice of the ROA, it may be argued that the main goal of the *caixas* is not to maximize return. However, they need to achieve a sufficient rate of return to guarantee their solvability and growth.

The ROA can be disaggregated using the formula:

$$ROA = BP/A - OC/A - P/A - D/A - OR/A - T/A \quad (1)$$

, where *BP* is banking product, *OC* operating costs, *P* provisions and impairments, *D* depreciations, *OR* other results, *T* taxes, and *A* assets.

The banking product is the set of revenues generated by the bank and is the sum of net-interest income and non-interest income. The net-interest income is the difference between received and paid interests. This is the gross profit that the bank has with credit granting activities and investment in bonds after discounting financing costs. The non-interest income gives us the margin achieved with activities other than credit granting, and corresponds to the sum of revenues minus costs of commissions (from activities in and off the balance sheet, like the selling of insurances and investment funds), profits minus losses from financial operations, and other income minus both other operating costs and other taxes.

The financial margin (FM) – net interest income to assets - can be further analysed by looking at the average credit and deposit rates. Using the assets and liabilities that produce interest (financial assets – FA- and financial liabilities – FL), we have

$$FM/FA = IC/FA - (IP/FL) * (FL/FA)$$

, with *IC* as interests charged and *IP* as interests paid. The average credit rate is simple *IC/FA* and the average deposits rate is *IP/FL*. The average credit rate is determined by interest rates received from clients, investments in bonds and loans to the CC (which manages the excess liquidity of *caixas*). The average deposits rate depends on the interest rates paid to clients on their deposits and to the CC on its loans.

² Assets exclude provisions and amortizations.

Operating costs include the costs with employees and general administrative costs. Provisions and impairments include the new minus the cancellation of provisions and impairments for losses, namely in the credit portfolio. The ratio provisions and impairments to assets depends on the quality of credit risk management but also on the guarantees supporting credit and on the age of the credit portfolio.

Depreciations of physical and non-physical assets register the economic deterioration of assets. *Caixas* obtain computers through leasing and this cost enters in the general administrative costs and do not affect depreciations, which include essentially the deterioration of real estate used by banks. Other results include the remaining accounts, namely extraordinary costs and revenues. Taxes include taxes on profits. The item other results will not be analysed individually given their residual important. Also, the item taxes will not be look at in detail because we are not interest in tax management efficiency.

4.2 Empirical analysis

Our goal is to explain how a *caixa* size relates with its ROA. We will start by applying a univariate analysis were only bank's size explains ROA. After, we introduce more variables that may explain the ROA, following an approach similar to the one that Athanasoglou et al. (2008) applied to study Greek banks.

The variable of bank's size chosen in this paper was volume of assets in euros. We include in our analysis the 85 *caixas* that existed in 2011, and we will include data from the years 2009 to 2011.

Univariate analysis

Starting with a simple descriptive analysis, we chose to divide the *caixas* into three groups according to the size of their assets: less than 150 million euros, from 150 to 350 million and more than 350 million (Table 1).

Table 2 – Main ratios according with *caixas*' size

Ratios	Small size: <150 Million €	Medium size: 150 to 350 Million €	Large size > 350 Million €	Average of all <i>caixas</i>
ROA	0,493%	0,280%	0,377%	0,429%
Credit rate	4,140%	4,056%	4,017%	4,115%
Deposits rate	1,457%	1,466%	1,574%	1,467%
BP/ A	3,516%	3,329%	3,142%	3,441%
Non-interest income / A	0,811%	0,761%	0,748%	0,794%
OC/A	2,230%	2,141%	1,810%	2,179%
P/A	0,562%	0,704%	0,570%	0,600%
D/A	0,124%	0,129%	0,120%	0,125%
Market share	0,198%	0,190%	0,168%	0,193%
Clients/Members	4,670	4,78	5,243	4.74

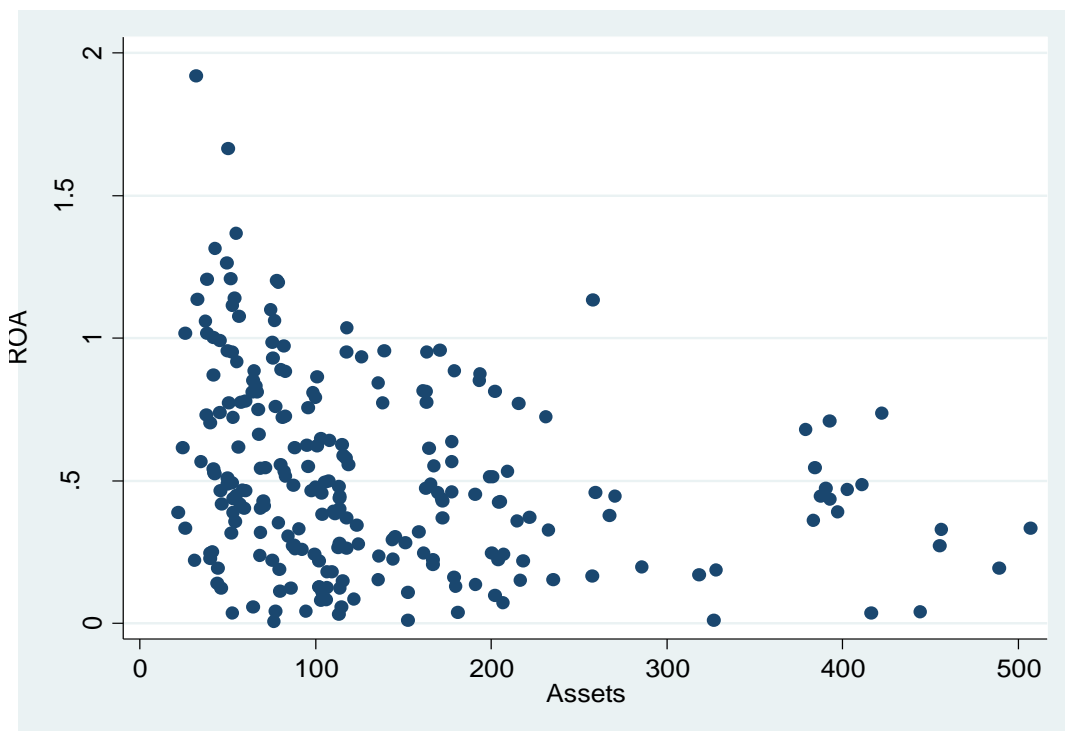
The small *caixas* perform better than medium and large *caixas* in all indicators with the exception of operating costs and depreciations (Table 2). The ROA of small *caixas* is higher than that of large *caixas* in about 0.116 p.p. This is explained by the larger financial margin of the small *caixas* comparing with large *caixas* (2.683% versus 2.443%), as well as by the larger non-interest margin (0.811% versus 0.748%). For this reason the banking product to assets in small *caixas* is greater than in larger *caixas*.

In contrast, the large *caixas* benefit from economies of scale that allow them to have lower operating costs to assets and less depreciations to assets. The medium-sized *caixas* are the worse in all indicators.

Regarding commercial efficiency, measured by market share, the smaller *caixas* have better performance. The same happens in the practice of cooperative banking, measured by the proportion of members in the total number of clients.

Next, we are going to explain the ROA using solely the variable assets. We will use a quadratic function to allow the possibility of a non-linear relation between variables. However, when the quadratic element is non-significant at 10% it will be dropped.

Figure 1 – ROA (in %) versus Assets (million euros) (2009 – 2011)



Looking at Figure 1³ we see that some small *caixas* have good levels of ROA. The graph points for a relation in U between the size and the ROA, which is confirmed by the regression (Table 3). Initially, the size of the *caixa* reduces the ROA, but from approximately 300 million euros of assets, increasing the size increases profitability. In terms of interpretation (and ignoring for simplicity the squared term), an increase of 100 million euros in assets reduces ROA by 0.28%. Note that in the years under review only 9.7% of the variability of ROA is explained by size, meaning that probably there are more factors that determine the profitability of the *caixas*. We will explore the impact of other variables below, but for now we concentrate only on the impact of size.

Table 3 – Relation between size and ROA, Banking product, and non-interest margin

ROA			
Assets	-0.002820*** (0.000721)		
Assets squared	4.5×10^{-6} *** (1.58×10^{-6})	R ²	0.0970
Constant	0.766520*** (0.059402)	F	15.57 (p-val.: 0.0000)
Banking product / Assets			
Assets	-0.001410*** (0.000435)	R ²	0.0427
Constant	3.642746*** (0.073114)	F	10.47 (p-val.:0.0014)
Non-interest Margin			
Assets	-0.000229 (0.000164)	R ²	0.0082
Constant	0.822111*** (0.027621)	F	1.95 (p-val.:0.1644)
Obs.	237		

Now, we will realise a detailed analysis of the effect of size on the ratios that affect the ROA (equation 1): net-interest margin, non-interest margin (non-interest income to assets), operating costs to assets, provisions and impairments to assets, and depreciations to assets.

Using assets to explain banking product to assets (Table 3), results indicate that the smaller *caixas* are, better they are at generating revenues. In order to better understand the impact of size on banking product, we used assets to explain the financial margin and the non-interest margin.

Firstly, we observe that smaller *caixas* have larger financial margin (Table 4). This occurs because smaller *caixas* have an average credit interest rate larger and have a smaller leverage ratio (in terms of

³ Because the *caixas* with a negative ROA are in a restructuring process we excluded them from our analysis.

financial assets to financial liabilities).⁴ However, we do not observe any relation between average deposit rate and size.

Credit interest rates are higher in smaller *caixas* possibly because their clients are more loyal and less demanding. The small *caixas* have a larger market share in local banking markets and they face less competition from commercial banks, enabling them to exercise more effectively their market power.

Table 4 – Relation between size and financial margin, average credit rate and average deposit rate

Financial margin / Assets			
Assets	-0.001031*** (0.00031)	R ²	0.0450
Constant	2.644482*** (0.052012)	F	11.07 (p-val.: 0.0010)
Average credit rate			
Assets	-0.0007438* (0.000414)	R ²	0.0135
Constant	4.227775*** (0.069454)	F	3.3 (p-val.:0.0737)
Average deposit rate			
Assets	0.000225 (0.000283)	R ²	0.0027
Constant	1.443228*** (0.047629)	F	0.63 (p-val.:0.4289)
Financial liabilities / Financial assets			
Assets	0.0003167** (0.0001212)	R ²	0.0478
Assets squared	4.96×10 ⁻⁷ * (2.65×10 ⁻⁷)	F	5.87 (p-val.:0.0033)
Constant	0.9115863*** (0.0099777)		
Obs.	237		

To verify the ability of the *caixas* in obtaining revenues apart from interest revenues, we study the relation between the non-interest margin and assets (Table 3). A high non-interest margin is an indication that a *caixa* is exploring scope economies, using its commercial network to sell other financial products besides traditional banking products. Nevertheless, empirical results show that size does not affect in a statistically significant way the non-interest margin (Table 3). There is however a slight tendency for smaller *caixas* to have a larger non-interest margin. This is probably explained by the fact that smaller *caixas* started to sell insurance contracts latter than larger *caixas*, allowing them to obtain larger revenues from a non-saturated market.

In the literature the effect of size has been studied particularly in terms of costs. Now, we observe some regressions related to costs in an attempt to test the existence of scale economies.

⁴ Financial leverage increases up to 320 million euro of assets, and decreases thereafter.

Results show that larger *caixas* have smaller operating costs, confirming the existence of scale economies (Table 5).

Depreciations are also an important cost item. Results reveal the existence of a significant relation between size and depreciations, which has the shape of an inverted U (Table 5). Initially, the size leads to larger depreciations, but approximately after 250 million euros of assets exist gains from scale. Larger *caixas* are able to dilute depreciations on their high business volumes. However, small *caixas* have a lower ratio of depreciations than medium-sized *caixas* essentially because they have rented facilities or own relatively smaller buildings.

One component of costs that is highly important for profitability of a credit institution is provisions and impairments. We observe a tendency for the local banks to have a smaller ratio, even though the effect is not statistically significant (p-value of 0.107) – Table 5. The larger *caixas* benefit from the diversification of risk that results from having a larger credit portfolio.

Besides profitability, there are the commercial and cooperative efficiencies, which we will address next. Commercial efficiency is assessed here in terms of market share. There are *caixas* that have a very large market penetration, capturing more than 50% of the market. However, we do not find a statistically significant relation between size and market share (Table 6).

Regarding cooperative efficiency, we are interest in measuring the capacity of attracting members. The *caixas* as cooperatives have the social support in their members, which are also essential for the practice of banking of proximity, a comparative advantage of CA. It is through their membership base that the *caixas* are connected to the local economy and establish a relationship of complicity with the population they serve. The preservation of cooperative principles is very important for the managers of *caixas*.

So, it is important to study whether the size has a negative effect on the preservation of cooperative principles. Therefore, we will examine the relationship between the number of customers in a *caixa* and the ratio clients to members. The regression indicates that *caixas* with more customers have higher ratios customers to members, with this relationship reverting for very large *caixas* (more than 55,000 clients) – Table 7. In other words, the more customers a *caixa* has, the smaller the percentage of members. On average the ratio clients to members is 4.7. An increase of 15,000 clients (which is equivalent to a standard deviation of this variable) implies an increase in that ratio of 1 (ignoring for now the non-linear effect). In terms of associative efficiency medium-sized *caixas* are the worst. Recall that above we saw that those *caixas* were also the worse in terms of profitability.

Table 5 – Relation between size and operating costs, provisions and depreciations

Operating costs / Assets			
Assets	-0.0008669*** (0.000264)	R ²	0.0439
Constant	2.280459*** (0.04429)	F	10.78 (p-val.: 0.0012)
Provisions / Assets			
Assets	-0.0018052 (0.0011145)	R ²	0.0110
Constant	3.174409*** (0.1869631)	F	2.62 (p-val.:0.1066)
Depreciations / Assets			
Assets	0.0002466** (0.0001091)	R ²	0.0218
Assets squared	-4.96×10 ⁻⁷ ** (2.39×10 ⁻⁷)	F	2.61 (p-val.: 0.0760)
Constant	0.1056964*** (0.0089786)		
Obs.	237		

We can thus conclude that the very large *caixas* are not harmful for the associative relationship. Probably this occurs because there are very large *caixas* that focus on membership quality and quantity, making commercial activities with the aim of capturing new members, and promoting initiatives for the massive participation of members in general meetings. It seems then that the effort put on the management of the relationship with members is a key point to guarantee high levels of membership.

Table 6 – Relation between size and market share and members

Market share			
Assets	-0.0004206 (0.0002848)	R ²	0.0110
Assets squared	4.65×10 ⁻⁷ (6.23×10 ⁻⁷)	F	1.31 (p-val.: 0.2730)
Constant	0.2309918*** (0.0234442)		
Obs.	237		
Clients / Members			
Clients	0.0000699*** (0.0000258)	R ²	0.0470
Clients squared	-7.52×10 ⁻¹⁰ * (3.86×10 ⁻¹⁰)	F	5.72 (p-val.: 0.0038)
Constant	3.790709*** (0.3228555)		
Obs.	235		

Multivariate analysis

So far we considered the size of a *caixa* as the only explanatory variable of profitability. However, to have a broader view able to explain a greater fraction of profitability's variation other determinants should be considered. The literature on cooperative banking has already studied several determinants of efficiency, which were grouped by Worthington (2009) as follows: the relevance of the mutual form versus the corporation form (public companies); regulation, organizational and legal aspects; number of branches; and mergers. In the case of *caixas* some of these variables are not relevant, since all have the cooperative form and are subject to the same regulation and legal frameworks.

Among the variables available to explain profitability, we considered market share, solvency ratio (capital/assets), average wage (staff costs/number of employees), ratio of credit provisions to assets, ratio number of branches to active, labour productivity (banking product per worker), ratio customers to members, and *município* purchasing power.⁵

Let us see next the rationality of including each of the variables mentioned. First, it is expected that the *caixas* with larger market share can exercise greater market power on their customers and therefore charge higher lending rates and pay lower deposit rates, which contribute to a higher return.

Regarding the solvency ratio, it is anticipated that the *caixas* with smaller solvency lose lucrative opportunities of credit due to insufficiency of capital. In addition, these banks have more difficulty in attracting deposits because they inspire less confidence to their customers.

The *Caixas* with higher average wages may have a higher quality of human capital to which they pay more, but on the other hand they may be less efficient in containing wage costs. Hence, it is not clear what sign to expect for this variable, leaving to the empirical analysis to decide which hypothesis best describes the data.

It was also introduced an indicator of labour productivity. Since the human factor is crucial in the banking business, it is expected that the *caixas* with higher labour productivity have also higher ROA.

We also considered the ratio of provisions for loan losses to assets, which has a direct negative impact on ROA and is an indicator of the quality of credit management of the *caixa*.

Similarly, the ratio of number of branches to assets was introduced since *caixas* with many branches maybe less profitable because of the additional costs they entail. In alternative, *caixas* with more branches are able to realise better their intermediation activity and can obtain larger return. In the literature these conflicting hypotheses have already been identified by Fried et al. (1993) for instance.

The ratio clients to members was used as a proxy of the degree of connection to cooperative principles. If a *caixa* has many associates as a percentage of the number of customers (in which case

⁵ A *Município* is as an administrative division similar to a county.

the variable used, clients to member, will be smaller), one should expect a greater control over the management and larger closeness between management and beneficiaries of the banking services. Additionally, the existence of a high percentage of members also means that customers loyalty is higher, benefiting the profitability of the *caixa*.

Finally, we introduced the average purchasing power of the *municípios* served by each *caixa* (in 2009 and obtained from INE – Portuguese Institute of Statistics) in order to capture the degree of development of the local economy, which may affect the profitability of the *caixas*.

Results confirm a relationship in U between the size of a *caixa* and profitability (Table 7). Up to a size of 317 million euros of assets the ROA decreases with size, but from that dimension onwards it increases.

Let us now consider the impact of other explanatory variables. Market share has a negative impact on profitability (with a p-value of 0.102), indicating that the *caixas* with greater market power have less incentive to be profitable because they face less competition. In turn, the average wage has a negative effect on ROA, confirming the hypothesis that the *caixas* that pay higher wages make it not to hire better workers, but because they are run less efficiently. However, workers' productivity is an important factor to explain assets' return. A further confirmation of the importance of human capital is that the *caixas* that manage less efficiently credit risk are also those that have lower ROA. Additionally, the *caixas* that have more branches to assets have also a higher ROA (with a p-value of 0.083), possibly because they practice more the banking of proximity typical of cooperative banking. The *caixas* that have proportionally more associates are also more profitable, which draws attention to the fact that these institutions should give full consideration to its cooperatives roots. Finally, it is curious that the purchasing power of the *município* does not seem to affect profitability, likewise for the solvency ratio.

Now, we estimate the regression considering the existence of fixed effects that capture bank's characteristics constant over time. Among other things, these effects may include organization and management culture, competitive position on the market, and local economy characteristics. Empirical results indicate that size is no longer important, neither the proportion of members (Table 7, FE-I).

Trying to understand why size lost its relevance for return, it is necessary to take into account bank's size may increase labour productivity and improve credit risk management. This means that a part of the effect of size is captured by those elements. Therefore, we removed those two variables in order to analyse that hypothesis. The result is that size has a *positive* effect on return (Table 7, FE-II). When we introduce labour productivity, we observe that the effect of size is still present (Table 7, FE-III). Only after the introduction of the ratio provisions to credit is that the effect of size becomes

insignificant (Table 7, FE-I).⁶ This seems to indicate that, with multiple explanatory variables, the effect of size on return operates through the improvement of credit risk management.

Table 7 – Multivariate analysis

Variables	OLS	FE- I	FE-II	FE-III
Assets	-0.002548*** (0.0006541)	0.016625* (0.008484)	0.014324* (0.0077205)	0.009063 (0.007651)
Assets squared	4.02×10 ⁻⁶ *** (1.40E-05)	-0.000015 (0.000011)	-0.000015 (0.000010)	-0.000012 (0.000010)
Market Share	-.2534207 (.1545166)	-0.004912 (0.725127)	-0.204353 (0.659857)	-0.168825 (0.639136)
Solvability	0.3276035 (0.409212)	9.92393** (4.239301)	5.963613 (3.916388)	3.392174 (3.875224)
Average wage	-9.34×10 ⁻⁶ ** (4.10e-06)	0.000019** (7.31×10 ⁻⁶)	7.89×10 ⁻⁷ (7.40×10 ⁻⁶)	-2.42×10 ⁻⁷ (7.17×10 ⁻⁶)
Branches/Assets	1782486* (1023037)	-3641243 (6245426)	-1198712 (5691706)	1895655 (5594518)
Clients/Members	-.0199526** (.0100368)	0.0106075 (0.022173)	0.0429497** (0.0209586)	0.0057997 (0.0233202)
Labour Productivity	6.13×10 ⁻⁶ *** (7.99×10 ⁻⁷)	-	8.60×10 ⁻⁶ *** (1.53×10 ⁻⁶)	9.50×10 ⁻⁶ *** (1.51×10 ⁻⁶)
Provisions/Credit	-.0333144*** (0.0109475)	-	-	-0.109350*** (0.0337984)
<i>Município</i> purchasing power ¹	-0.0015212 (0.0013067)	-	-	-
Obs	235	235	235	235
F	13.29	3.66	7.81	8.56
(p-val.)	(0.0000)	(0.0011)	(0.0000)	(0.0000)
R ²	R2 ajust: 0.3446	R2 within: 0.1511	R2 within: 0.3040	R2 within: 0.3518
F test of all FE equal to 0	-	2.25 (p-val.: 0.0000)	2.15 (p-val.: 0.0000)	2.26 (p-val.: 0.0000)

Note: 1- Because the *município* purchasing power refers to 2009, being fixed during the sample, it is dropped when we use fixed effects.

⁶ The correlation between assets and provisions to assets is -0.0924.

5. CONCLUSION

Cooperative banks and CA in particular have a banking practice close to the populations, with a large network of branches mainly in rural areas. Along the years, the CA has suffered a considerable adjustment and today is a modern bank able to compete in the market with other commercial banks, and has shown a strong resilience during the recent period of crisis. A strong strategic tendency in CA has been mergers between *caixas*, with the goal of creating stronger local banks. In this context, this paper aims to study whether larger *caixas* are more profitable.

The regression with a single explanatory variable reveals that ROA is affected by the size of the caixa, with the relationship having the form of a U: size initially decreases ROA, but above a scale of 300 million euros of assets, size affects favourably ROA. This statistical evidence shows that small and large *caixas* are those with better returns, leaving the medium-sized *caixas* "stuck in the middle". Small *caixas* follow a niche strategy that reveals profitable, while large *caixas* benefit from their dimension.

After, we went to a more detailed analysis. In terms of income variables, we found that small *caixas* generate larger financial margin because they charge larger credit rates and have smaller leverage. The non-interest margin does not seem to be related with size.

In terms of operating costs, we found that the larger *caixas* take advantage of scale economies. Regarding depreciations the relationship with size is in inverted U, with the large and small *caixas* having the best performance, while the medium-sized *caixas* having the worst performance. Indeed, it is the better performance of the large *caixas* in terms of operating costs and depreciations that justifies they have a higher ROA than the medium-sized *caixas*. Provisions and impairments are not statistically affected by the size of the *caixa*.

Concerning the associative component, the statistical evidence shows that the more customers a *caixa* has the smaller is the ratio members to customers, with the relation inverting for very large *caixas*. In turn, commercial efficiency is not affected by the size of the local bank.

Introducing other variables that affect profitability, the analysis confirms the relation in U between size and return. Further it reveals the importance that *caixas* should give to their cooperative root that ensures customer loyalty and supports business, since the *caixas* that have more members (in proportion of customers) have better returns.

Considering the time-invariant characteristics of each *caixa* (fixed effects), the effect of size becomes positive, linear and less statistically significant. But after introducing the explanatory variable credit risk, the effect of size disappears, which suggests that the effect of size on return is essentially linked to credit risk. With fixed effects, cooperative membership does not affect return anymore.

The overall conclusion of our work is that the profitability of small *caixas* is partially explained by their specific time-invariant characteristics. After controlling for those idiosyncratic characteristics, size has a positive effect on return essentially linked to a better credit risk management ability.

Our work supports the creation of larger local banks in cooperative groups, but also underlines the key importance of good human resources management for profitability. The creation of large local banks should also be made with care in order not to alienate members and undermine the cooperative principles of the institutions.

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7. ANNEX

Table A1 – Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
ROA (%)	235	0.5168	0.3365	0.0038	1.9211
Financial margin /Assets (A) (%)	235	2.5090	0.4921	0.7277	3.8850
Non-interest margin /A (%)	235	0.7922	0.2568	0.2716	1.7932
Average credit rate (%)	235	4.1202	0.6421	1.0012	6.0656
Average deposit rate (%)	235	1.4681	0.4368	0.2175	2.5444
Financial liabilities / Financial assets	235	0.9389	0.0534	0.4461	1.0507
Banking product /A (%)	235	3.4584	0.6900	1.1465	5.4721
Operating costs / A (%)	235	2.1644	0.4199	0.7501	3.6068
Total provisions / A (%)	235	0.5409	0.4193	-0.8020	1.6783
Credit Provisions / A (%)	235	2.9494	1.7334	0.3296	11.6105
Depreciations / A (%)	235	0.1242	0.0485	0.0249	0.2446
Market share	235	0.1969	0.1268	0.0103	0.5567
Solvability	235	0.1060	0.04978	-0.0820	0.2462
Average wage (euros)	235	39074.17	5809.28	12098.96	60805.88
Branches/Assets (no. Branches / assets in euros)	235	6.17×10^{-8}	2.16×10^{-8}	1.21×10^{-8}	1.42×10^{-7}
Clients/Members	235	4.7293	1.8889	1.5579	13.8838
Labour Productivity (banking product in euros / no. workers)	235	114783.1	29778.74	33325.09	289460.5
<i>Freguesia</i> purchasing power (100 is the national average)	235	76.5667	15.0587	53.5037	126.7983