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Did the Extent of Hybridization Better Enable Cooperative Banking Groups to Face the Financial Crisis?

ABSTRACT

The 2008 financial crisis affected both cooperative and joint-stock banking groups. But since these groups had adopted different forms and modes of governance, cooperative banks might have suffered less. Cooperative banking groups are seen as more risk-averse than jointstock banking groups. One possible explanation is that they are owned by their members and unlisted; another reason could be the extent of their presence in a local area, which enables them to reduce information asymmetry. Joint-stock banking groups are seen as more ready to take risks. As they are held by stockholders requiring high-returns, they are more motivated to undertake risky projects. As cooperative banking groups have evolved, some have adopted joint-stock banking group features. This evolution can have more important consequences on their management style.

To study whether cooperative banking groups faced the financial crisis better than jointstock groups, we compared their sensibility to the financial crisis and their contribution to financial stability. We built a sample composed of European cooperative and joint-stock banks and computed a z-score indicator, reflecting the probability of bankruptcy. A dummy variable set for the governance criteria distinguishes between the different types of cooperative banking groups. We used a data panel treatment to highlight the potential differences due to governance factors over the entire period studied (2002-2011); we then divided this period into three sub-periods to determine whether some banks, according to the extent of hybridization, showed on the one hand more resistance, and on the other more resilience. Our principal conclusion is that cooperative banking groups that have retained the main features of their original model while diversifying their activities have contributed most to financial stability.

KEY-WORDS

COOPERATIVE BANKS; HYBRIDIZATION; FINANCIAL STABILITY; FINANCIAL CRISIS; RESISTANCE; RESILIENCE

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1. Introduction

The financial crisis that began in mid-2007[1] with the subprime lending scandal in the United States does not seem to have spared any bank. Regardless of legal statuses, all of them suffered as the crisis unfolded. As each bank pursues different objectives, one may presume that the crisis did not have the same impact on all banks.

The banking area is mainly composed of cooperative and joint-stock banking groups. Cooperative banking groups are network constructs composed of local and/or regional banks. The owners are also customers. These banks may be affiliated to a structure that offers them logistical support, or alternatively can hold (or be held, even partially by) other unifying activities. So, if we consider the whole structure, we conceive the notion of a group. Cooperative banking groups have evolved since their creation: some have listed subsidiaries, others are partially listed, and some have retained the main features of the original cooperatives. Even within one country, cooperative banking groups can behave differently. These notable differences in organizational models enable us to report that some are now built on a hybrid model that confers the properties of both joint-stock and cooperative banking groups.

In this paper we discuss the degree of hybridization of the cooperative model and examine whether the extent of hybridization affected the ability of cooperative banking groups to face the financial crisis. We begin by conducting a theoretical analysis that explains why cooperative banking groups are expected to contribute more to financial stability than joint-stock groups. We also describe the evolution and process of hybridization that brings some cooperative banking groups closer to joint-stock groups. Then, we explore empirically whether the extent of a banking group's hybridization played a role in its contribution to financial stability. This is represented by a number of endogenous variables as the z-score characterizes the probability of bank bankruptcy, the loans to assets ratio shows a bank's capacity to maintain its lending level even in times of crisis, and the return on equity shows the evolution of financial performance during three different sub-periods. Following a descriptive statistics analysis of the endogenous variables retained, we present an econometric data panel model in order to reinforce the initial results, and, finally, we conclude.

2. Theoretical analysis

2.1. Cooperative banking groups benefit from a governance model that plays a stabilizing role in periods of crisis

Cooperative banking groups pursue low-risk goals.

Cooperative banks are held by their member-owners, who are also their customers. To preserve the continuity of their bank, they are not inclined to take risks that could lead to bankruptcy. Being a shareholder does not confer the right to a dividend, so whatever the level of profit realized by the bank, it has no effect on shareholder wealth (Gurtner *et al.*, 2006). This is an important asset compared to joint-stock banks. The latter are listed and their stockholders want to maximize their wealth, so they exercise pressure on management to ensure that the maximum profit will be realized. To achieve this, the management is motivated to undertake excessively risky projects. This difference in ownership shows that cooperative banking groups are more risk-averse than joint-stock banks.

[1] The crisis began in mid-2007 but the effects were really perceptible in the 2008 balance sheets and income statements of the banks.

Cooperative banking groups are protected from hostile takeovers.

Cooperative banks are not listed, so they cannot be easily bought by another bank (Gurtner *et al.*, 2002). Obligations to reach a minimal level of profitability do not worry cooperative banks. Even if they discover inefficiencies, they are not afraid of a hostile purchase and so can continue to focus on objectives that do not feed instability.

Members in cooperative banks are focused on intergenerational inheritance.

Members want to preserve their inheritance in order to transmit it to the next generation. Indeed, another specificity of this structure is, generally, the impossibility of members' sharing the accumulated profit (Soulage, 2000). It must remain the property of the cooperative and be transmitted to succeeding shareholders. This obligation to consolidate the profit to the banks' reserves helps reinforce cooperative banks' powerful financial stability.

Networked cooperative banks are able to reduce information asymmetry.

Cooperative banks are built as networks. They are settled throughout an entire area. This strength of deployment enables them to be close to their customers. The latter includes not only households, but also small and medium-sized firms. This proximity enables the banks to know their customers better and reduce the information asymmetry that appears before the beginning of a contractual relation (Amess, 2002). The territorial establishment of independent local banks is a substantial advantage compared to joint-stock banks. Cooperative banks are better able to determine their customers' real-risk profiles and may adjust the risk premium according to the specific ability to refund a loan.

Cooperative banks meet the economic needs of small and medium sized-firms.

Joint-stock banks are less attracted to small and medium-sized firms, which have a reputation for being more vulnerable to bankruptcy than larger firms. By contrast, thanks to their territorial distribution and closeness to customers, cooperative banks are more likely to actively contribute to the development and maintenance of smaller firms (Angelini *et al.*, 1998). They grant loans even to firms that are perceived as weak; by diversifying their lending portfolio among the activity areas of small and medium-sized firms, they minimize the risk undertaken. Cooperative banks do not grant loans to firms within a single business sector; however, they do grant loans to firms in a variety of loosely correlated business sectors. A well-diversified lending portfolio means that if one particular business sector is hit by a crisis, it will have little or no impact on the bank. Cooperative banking groups are seen as important participants in local economic development and can help limit the effects of a credit crunch in times of crisis. Their implication is also justified by the fact that the managers of the local banks are also entrepreneurs. They know how difficult it is for small firms to obtain loans, they are familiar with the environment in which small and medium-sized firms operate, and they understand their needs. In return, entrepreneurs among the shareholders will expect the bank to continue to support them in times of crisis through granting loans.

Cooperative banks aim to develop long-term valorization

Banks obviously need to realize a profit. Since this is not the main concern of cooperative banks, perceived as "resource wasters", select authors have stated that they are doomed to fail (Hansmann and Krackmann, 2001). They have stressed that the costs registered by these banks are too high (Akella and Greenbaum, 1988); and as these banks are not motivated to lower their costs in order to improve profits, they are considered as inefficient banks. However, the aim of cooperative banks is to develop long-term valorization (Allen and Gale, 2004). They do make a profit, a share of which is forwarded into reserves.

Shareholder members aim to stabilize their bank over the long term; this point increases the difference between cooperative and joint-stock banks.

Cooperative banks' compensation policy is less performance-related.

Cooperative banks practice different compensation policies compared to joint-stock banks. They do not use motivating wage tools related to market exchange value, for example, stock options. These appeared in joint-stock banks to ensure that managers would have the same interests as stockholders in the firm; to increase wealth, they must maximize firm value, and in order to achieve that goal, they undertake high-risk projects. If they are successful, the firm will do well. But this compensation policy has a devastating effect when projects fail, as they can lead to bankruptcy of both the bank and its stakeholders (Beltratti and Stulz, 2011).

All these factors seem to confer a status that cooperative banking groups have more financial stability than joint-stock banks. While they do not enable a bank to maximize its profit and achieve high performance in times of favorable growth, in times of financial crisis they enable the bank to amortize its losses. Those factors can lead us to expect that cooperative banking groups:

- will be more stable and resistant than joint-stock banking groups in times of financial crisis as they are more capitalized and own fewer risky assets (hypothesis 1, tested in the first econometrical model);
- will continue to maintain their superior level of lending to small and medium-sized firms (hypothesis 2, tested in the second econometrical model);
- will have weaker financial performance than joint-stock banking groups in crisis-free periods. However, this difference will disappear in periods of crisis as joint-stock banking groups that are focused on financial performance may realize poor or negative profits (hypothesis 3, tested in the third econometrical model).

Before we embark on the empirical study, we need to classify cooperative banking groups. Since their creation, they have evolved differently, enjoying a particularly strong growth period in the 1990s when they took advantage of the financial crisis that affected the joint-stock banks. During that period, some cooperative banks used their huge reserves to acquire joint-stock banks. Some cooperatives now have characteristics that are close to or farther from the original cooperative banking group model. Here, we use the term "hybridization degree" to describe the extent to which they have adopted the features of joint-stock banks or retained the cooperative ones.

2.2. Cooperative banking groups' diversity and hybridization degree

Some cooperative banks have adopted features that bring them closer to joint-stock banks, while retaining some features of cooperative banks. These modifications lead us to use the term "hybridization of the cooperative model". Among cooperative banking groups, we find some that can be described as banking groups under cooperative control, as regards the capital link[2]. These are networks composed of local and/or regional banks that are strongly integrated in the group, but the group also holds listed subsidiaries that can either be placed under the control of a holding, or under one of the listed apexes. The apex loses its cooperative status once it is listed. Any customer of this type of bank can access the bank's entire range of banking products, including the most sophisticated, just like in a joint-stock bank. They belong to the most hybrid category of cooperative banking groups. In this category we find the French *Crédit Agricole* and BPCE groups, the Austrian *Raiffeisen* group, the Italian *Istituto Centrale delle Banche Popolari* group,

[2] The capital link deals with the fact that cooperative local or regional banks are generally the main owners of the shares of the apex; and so, they own the majority of capital and voting rights.

and the Finnish *OP-Pohjola* group.

Among cooperative banks, we also find those that intervene in a particular area and do not truly form a group. They are composed of local banks that freely affiliate themselves with a group that provides logistical support. Those banks could not afford to finance their own IT platform; for example, as the costs of functioning would exceed the benefits for an insufficient number of operations. So, it is in their interest to share a common platform by affiliating with a group, so as to achieve economies of scale. The group does not own any listed subsidiary. This is the case for Spanish *Cajas Rurales*, UK building societies, the *Portuguese* CCCAM, Austrian *Volksbanken* and the Italian BCC. These belong to the least hybrid category in this research paper.

Finally, some cooperative banking groups form an intermediate category of hybridization degree. They are composed of numerous decentralized local banks and unlisted subsidiaries that operate in various areas (corporate and investment banking, market finance, etc.). In this category, we find the German DZ Bank group, the Dutch *Rabobank* group, and the French *Crédit Mutuel* and *Crédit Coopératif* groups. We decided to include the French *Crédit Mutuel* group in this category, even though it holds a listed subsidiary (CIC). There is a very small share of stocks that do not belong to the *Crédit Mutuel* and are in free exchange. This free float cannot have a negative effect on the stability of CIC; if all investors decided to sell their stock at the same time, neither CIC nor *Crédit Mutuel* would suffer.

As there are important differences in governance amongst cooperative banking groups on the one hand, and between cooperative and joint-stock banking groups on the other, it is important to examine and measure the impact of these differences. We approached this by first conducting a descriptive statistics analysis to see how three representative indicators of financial stability evolved during (a) the whole period studied and (b) during three discrete periods within that time span: before the crisis, the crisis year, and after the crisis. The target was to measure the relative levels of resistance and resilience between cooperative and joint-stock banking groups. In order to increase the descriptive statistics analysis robustness, we conducted an econometric analysis using the data panel method.

3. Empirical analysis

3.1. Methodology

To analyze how hybridization degree affected bank stability during the financial crisis, we began by first defining the different concepts, then leading a descriptive statistics analysis, and finally, strengthening the first observations stemming from this analysis by carrying out an econometric study.

Concept definitions.

In this analysis, we divide the whole period (2002-2011) into three periods in order to examine the behaviour of each category before the crisis (2002-2007), during the crisis (2008) and after the most important phase of the crisis (2009-2011), using the concepts of resistance and resilience. Thus, a bank is considered resistant if it was able to maintain its level of management and financial indicators during the crisis, or if it sustained a lower deterioration of its indicators compared with other banks. A bank is said to be resilient if it was able to overcome the crisis. If it suffered from a deterioration of its indicators during the crisis, it will show more resilience if, post-crisis, it manages to present indicator levels close to pre-crisis ones.

The concepts of resistance and resilience are used to describe a bank's financial stability. According to the European Central Bank, financial stability is the ability to resist shocks and absorb financial imbalances. In this paper, we classify the cooperative banking groups according to their hybridization degree but put joint-stock banking groups under a single category since they all function the same way. A cooperative banking group that belongs to a defined hybridization category will contribute more to financial stability if it shows greater resistance during the year of the crisis than the other banking groups in the period of reference (2002-2007). This will be measured in terms of its results, which will be better than those of the other banking groups in the period of reference. A banking group that has a defined hybridization degree will contribute to financial stability if it is resilient, that is to say, if it performs better in the post-crisis period than in the crisis period. To test the difference in financial contribution according to hybridization degree, we used three endogenous indicators: a computed z-score, the loans to assets ratio, and the return on equity.

Building the database.

To create our database, we retained all the cooperative banking groups within the European Union. In order to compare the contribution of cooperative banks and joint-stock banks to the financial stability, we collected the same data for the joint-stock banking groups established in the same countries with the largest total assets. This last criterion should support this study; as cooperative banking groups have rather high total assets profiles, it is important to compare them with joint-stock banks with the same profiles. Here, we consider that a group comprises the local bank's activities plus the activities of the subsidiaries held by the group. In this way, we consider the whole activities of the group. The data were obtained from the Bankscope database. For some cooperative banking groups, we had to proceed to an aggregation of data. Indeed, some groups, such as DZ Bank in Germany, do not take into account data produced by local banks. In this case, we had to aggregate group data with data from local banks to obtain data that truly reflect the group's performance. Our database is composed of 15 cooperative banking groups and 49 joint-stock banks in Austria, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain, and the United Kingdom (the countries in which cooperative banking groups are found). The number of observations for the whole period was 601.

Classification according to hybridization degree.

Once the data were collected, we classified the cooperative banking groups according to their hybridization degree. We consider that a cooperative banking group has a low level of hybridization if it is composed of independent and decentralized local banks. The latter have a free affiliation to the group, which has no listed subsidiaries. We called this category LHCoop (least hybrid cooperative banking groups). The second, intermediate category comprises local or regional banks, with no listed subsidiaries except where the public share is very low. We named this category IHCoop (intermediate hybridization cooperative banking groups). The final category refers to cooperative banking groups that have adopted some features of joint-stock banking groups. They are partly listed and hold a listed subsidiary that they have built ex-nihilo or have acquired from a commercial rival; they are also subject to stockholder pressure, unlike traditional cooperative banking groups, which have none of these features, and are likely to be penalized more heavily during a financial crisis. We named them MHCoop (most hybrid cooperative banking groups). We refer to the joint-stock banks in our sample as JSB.

3.2. Descriptive statistics analysis (Appendices 1, 2 and 3)

This analysis precedes the econometrical analysis. It enables us to see how banks in the four categories behave during each of the three periods in terms of financial stability, ability to maintain their level of lending and financial performance. The different periods are:

- 2002-2007: the period before the crisis. This is the period of reference, as presented earlier.
- 2008: the year of the financial crisis. We compare changes in the indicators before and during the crisis to see if banks, according to their hybridization degree, were more resistant to the crisis and therefore contributed more to financial stability.
- 2009-2011: the post-crisis period. We will see whether the banks show resilience by examining the improvement in their results following the crisis.

Definitions of the endogenous variables used as proxies of contributions to financial stability.

Z-score: we used a z-score indicator to determine whether cooperative banking groups, according to their hybridization degree, contribute more to financial stability. There are different definitions of the z-score in the literature. Although Altman (1968) pioneered the definition, we focus our analysis on the definition used in the IMF studies (Hesse and Cihak, 2007) and by Laeven and Levine (2008). Our preference is explained by the presence of the return on assets standard deviation as a denominator, which enables risk measurement. The z-score formula we use is: $z\text{-}score = (K+\mu)/\sigma$, where K is the capital funds to total assets ratio, μ represents the return on assets ratio and σ represents the return on assets standard deviation. The z-score indicator takes into account the size of the bank's capitalization, its assets return performance and the risk contained in the latter. It can be considered as a solvency probability estimator as it measures the number of standard deviations the return on assets must lose to reach bankruptcy; the higher this indicator is, the more the bank contributes to financial stability. The advantages of this indicator are the ease of collecting data to build it, the ease of interpretation and the ability to measure the probability of bankruptcy.

Loans to assets: we use this ratio to examine a bank's lending level. If this ratio is raised, a bank allocates an important part of its assets to financing the economy.

Return on equity: this ratio measures the financial performance realized by a bank. If it is high, it indicates a bank makes a substantial profit. It could also indicate that a bank invests in risky projects that offer high returns.

Cooperative banking groups present higher indicators before the crisis. Before the crisis, cooperative banking groups with low and intermediate degrees of hybridization present higher z-score means (Appendix 1) than joint-stock banks. The z-score mean of the most hybrid banks is inferior to that of the joint-stock banks. At this stage, cooperative banking groups that have retained the main features of the original cooperatives contribute more to financial stability than joint-stock banks. Moreover, all the cooperative banking groups have a loans to assets ratio (Appendix 2), which is on average higher than that of joint-stock banks. Cooperative banks that have the lowest hybridization are those that lend most to the economy. As regards to financial performance (Appendix 3), joint-stock banks performed best (12%). We notice that cooperative banking groups benefit from an average return indicator that is close to that of joint-stock banks. The most hybrid cooperative banking groups have an indicator of 11 per cent; the least hybrid banks have an indicator

of 9.7 percent. So, before the crisis, the situation was advantageous for cooperative banking groups, and particularly for those that had a low or intermediate hybridization degree.

The least and intermediate hybrid cooperative groups are more resistant in time of crisis. In 2008, during the crisis, we notice that the intermediate hybridization degree banks saw an improvement in the z-score mean. The least hybrid banks suffered from a deteriorating z-score mean; nonetheless, it remained higher than that of the joint-stock banks. The latter suffered from an important deterioration of their z-score mean, as did the most hybrid degree cooperative banks. But, the z-score of the joint-stock banks was higher than the most hybrid cooperative banks. Regarding the granted loans' preservation level, banks in all categories slightly improved, on average, their ratio, with the exception of banks belonging to the most hybrid degree.

The highest improvement is observed among the least hybrid banks, followed by intermediate hybrid banks and then by the joint-stock banks. Regarding financial performance evolution, we first notice that all the bank categories suffered from a drop in their indicator. But the largest declines were registered by the joint-stock banks and the most hybrid banks. On average, the least and intermediate hybrid banks presented the highest indicators. We can thus say that the cooperative banks belonging to the intermediate and least hybridization degree showed higher resistance than banks in the other categories.

The intermediate and most hybrid cooperative groups seem more resilient. During the 2009-2011 period, almost all the banks improved their z-score mean. The exception was those in the least hybrid category; their z-score mean continued to deteriorate, becoming the lowest of all categories. Intermediate hybrid cooperative banks showed the highest improvement in this indicator, followed by the most hybrid cooperative banks and lastly by the joint-stock banks. As regards to the level of lending, we note that only the banks in the intermediate and most hybrid categories improved their ratios. The joint-stock banks were the lowest but held a steady lending profile. The least hybrid banks suffered from a slight drop in their indicator. Finally, the evolution of the financial performance indicator benefited the intermediate hybrid banks, which improved their average indicator (the highest indicator in this period). They were followed by the most hybrid banks, which greatly improved their average ratio. The other bank categories realized negative performances. We conclude that cooperative banks in the intermediate and most hybrid categories show more resilience in term of contribution to financial stability.

The initial results show that the least and intermediate hybrid banks show more resistance during a financial crisis, while the intermediate and the most hybrid banks show more resilience during the post-crisis period. As these results are drawn from the descriptive statistics analysis, we attempt to reinforce them through an econometrical analysis. This will enable us to determine if there is a different contribution to financial stability during the various periods, according to the hybridization degree.

3.3. Econometric analysis

Data panel treatment choice. The purpose of this study was not to follow the evolution of financial stability over a period of time, but to examine whether, during distinct periods, cooperative and joint-stock banking groups behaved in different ways in terms of financial stability. To reach this goal, the econometric tool which meets our needs is the data panel method. The variation of the z-score, the loans to assets and the return on equity are thus not only studied over determined periods but also for a sample of individuals. The database from which we work is an unbalanced panel containing 601 observations. As we work on data panel treatment, we had to treat different points as the unitary root process presence. Our database does not contain sufficient data to use (augmented) Dickey-Fuller or Philips Perron tests. To avoid obtaining biased

results, we applied the Levin, Lin and Chu test, which is specifically adapted to small samples (Appendix 5). We found that the endogenous indicators series was stationary on level. We have also taken care to determine whether we were in the case of random or fixed effects. We supposed that there was a random effect on the coefficient associated with individuals. This was confirmed by the Hausman test (Appendix 4).

Description of the models. In the first model, we use the z-score as a proxy for financial stability. The z-score is the endogenous variable and we attempt to explain its variability with a set of dummy variables that represent the level of hybridization degree, along with other explanatory control variables. The model is:

$$\text{Z-Score}_{i,\,t,\,c} = \alpha i + \beta 1_i\, \text{LHCoop}_{i,t} + \beta 2_i\, \text{IHCoop}_{i,t} + \beta 3_i\, \text{MHCoop}_{i,t} + \beta 4_i\, \text{Loans}^2_{i,t} + \beta 5_i\, \text{Loans}_{i,t} + \beta 6_i\, \text{NIM}_{i,t} + \beta 7_i\, \text{Fees}_{i,t} + \sum \varphi_t\, \text{Crisis}_t + \beta 8_c\, \text{Rate}_{c,t} + \beta 9_i\, \text{CTIR}_{i,t} + \varepsilon_{i,t}\, \forall\, i = 1,..,64$$

In which:

- LHCoop, IHCoop, MHCoop are a set of dummy variables that describe the degree of hybridization. LHCoop includes the least hybrid cooperative banks, IHCoop contains cooperative banks that have an intermediate level of hybridization, and MHCoop represents the most hybrid cooperative banks. In this set of dummies, the omitted dummy is JSB, which represents the joint-stock banks and is the reference in our model;
- Loans^2 is the quadratic loans to assets ratio and Loans is the loans to assets ratio;
- NIM is the net interest margin;
- fees represents the amount of fees and income divided by total assets;
- crisis is a temporal dummy variable;
- rate is the long-term interest rate;
- CTIR is the cost to income ratio.

In the second model, the endogenous variable is the return on equity. We want to examine the evolution of financial performance over the entire period, as well as within separate periods, according to the degree of hybridization. As control variables, we introduce the long-term interest rate and the net interest margin. The model is:

$$\text{ROE}_{i,\,t,\,c} = \alpha i + \beta 1_i\, \text{LHCoop}_{i,t} + \beta 2_i\, \text{IHCoop}_{i,t} + \beta 3_i\, \text{MHCoop}_{i,t} + \beta 4_i\, \text{NIM}_{i,t} + \beta 5_c\, \text{Rate}_{c,t} + \sum \varphi_t\, \text{Crisis}_t + \varepsilon_{i,t}\, \forall\, i = 1,..,64$$

In the third model, we use the loans to assets ratio as an endogenous variable to see if the banks, according to their hybridization degree, have maintained their level of lending. As a control variable, we keep only the long-term interest rate. The model is:

$$\text{Loans}_{i,\,t,\,c} = \alpha i + \beta 1_i\, \text{LHCoop}_{i,t} + \beta 2_i\, \text{IHCoop}_{i,t} + \beta 3_i\, \text{MHCoop}_{i,t} + \beta 4_c\, \text{Rate}_{c,t} + \sum \varphi_t\, \text{Crisis}_t + \varepsilon_{i,t}\, \forall\, i = 1,..,64$$

3.3.1. Definition of the variables and expected signs

To differentiate the three categories, we had to create a set of dummy variables. We determined the first category as LHCoop: this dummy takes the value 1 if the cooperative banking group belongs to the least hybrid category, 0 otherwise. As the banks that belong to this category have no diversified activities, we do not expect them to contribute a great deal to financial stability. If the bank is specialized in financing a single activity, for example real estate, if a crisis arises in this sector the bank will be annihilated.

IHCoop: this dummy takes the value 1 if the cooperative banking group has an intermediate degree of hybridization, 0 otherwise. These banks have diversified activities through unlisted subsidiaries. They retain the main features of a cooperative bank and are unlisted. So, the profile they benefit from should help them to contribute the most to financial stability.

MHCoop: this dummy takes the value 1 if the cooperative banking group belongs to the most hybrid category, 0 otherwise. These banks are close to joint-stock banks, as they have listed subsidiaries or are themselves partially listed. They retain some features of the original cooperative banks but their proximity to joint-stock banks allows us to assume that there is no difference between their financial stability contributions.

Finally, in JSB, we included all the joint-stock banking groups. In our model, JSB is the reference. This enables us to compare the financial stability of each category of cooperative banks relative to the joint-stock banking groups.

To give our model more robustness, we decided to include other variables that could explain the endogenous indicators' volatility. As each country benefits from specificities that can have some impact on the endogenous indicators' variation, we also decided to introduce an indicator characterizing financial data appropriate to each country.

Net interest margin. The net interest margin represents the net interest income expressed as a percentage of earning assets. If this ratio is high, it means the bank is able to obtain funding at low prices or is able to impose high margins on its customers. If this ratio is low, it means a bank obtains extensive funding or is unable to calibrate fair and sufficient margins for its customers according to their real risk profile. We expect it to have a positive effect on the z-score. As the z-score takes into account the return on assets, if the net interest margin increases, the realized return will also increase and the z-score will be higher.

Cost to income ratio. Cost to income ratio measures the costs of running of a bank (for example staff salaries) divided by the income before provisions generated by the bank and thus represents an efficiency measure. We expect that this ratio will have a negative effect on the z-score. Indeed, costs and returns are highly and negatively correlated. If costs increase, the realized return will decrease and the z-score will drop.

Fees and commissions to total assets. We divide a bank's generated fees and commissions by its total assets. We thus try to measure the element of fees and commissions that are unrelated to lending, in order to see if the bank's income sources are diversified. We expect a positive impact on the z-score, as an increase in fees and commissions will increase the level of returns.

Loans to assets. We also want to know if the bank prioritizes granting loans or if it has other priorities besides lending. We divide the loans granted by each bank by its total assets. The higher the ratio, the greater the bank's lending. We expect a quadratic specification and convexity. As we suppose that cooperative banking groups have a greater lending profile, we expect banks that lend the most will contribute more to financial stability.

Long-term interest rates by country. This indicator measures the rate at which a country issues its 10-year bonds. If this indicator is high, it means a bank is located in a poorly rated country. If the rate is raised, the interest rate of the long-term bonds will be low, despite some exceptions, such as France. Since France lost its AAA rating, it has been borrowing money at lower rates. An increase in this rate will have negative consequences on the financial stability of banks in France. Indeed, an increase will contribute to the depreciation of bank assets. As the z-score is built on capital funds, an increase in rates will cause a decrease

in asset value and consequently a lower z-score. Finally, when a country issues long-term bonds, banks are expected to participate in this operation by subscribing to these bonds. If the country is poorly rated, the risk undertaken by the bank will reduce its asset value and thus lower its z-score value.

2008 crisis dummy variable. To appreciate the effect of the financial crisis on the z-score variation, we included a temporal dummy variable, named 2008 Crisis. It takes the value 1 if the year is 2008; otherwise, the value is 0. If it is a significant variable, then 2008 played a role in the z-score variation.

3.3.2. Results

We conducted regressions under data panel treatment over four periods: the entire period under study (2002-2011), the pre-crisis period (2002-2007), the crisis year (2008) and the post-crisis period (2009-2011). The main regression attempts to explain the z-score variability. The other regressions aim to explain financial performance and variability in lending levels. This demonstrates the level and evolution of contribution to financial stability according to the degree of hybridization throughout the different periods. In this way, we can establish whether banks of a particular hybridization degree show more resilience and/or resistance during times of financial crisis. We introduced other control variables that influenced the z-score variability. In each case, we explain whether the control variables introduced in each regression are significant and whether their coefficient has the expected sign.

Model 1: Z-score as a measure of bank solvency
Do cooperative banking groups present more robust z-scores according to their hybridization degree?

We first begin by explaining the results of the first model, which has the z-score as an endogenous variable. The model was (see Appendix 6.1):

$$\text{Z-Score}_{i,\,t,\,c} = \alpha i + \beta 1_i\, \text{LHCoop}_{i,t} + \beta 2_i\, \text{IHCoop}_{i,t} + \beta 3_i\, \text{MHCoop}_{i,t} + \beta 4_i\, \text{Loans}^2_{i,t} + \beta 5_i\, \text{Loans}_{i,t} + \beta 6_i\, \text{NIM}_{i,t} + \beta 7_i\, \text{Fees}_{i,t} + \sum \varphi_t\, \text{Crisis}_t + \beta 8_c\, \text{Rate}_{c,t} + \beta 9_i\, \text{CTIR}_{i,t} + \varepsilon_{i,t}\; \forall\; i = 1,..,64$$

In this model, regardless of the period, we see that the control variables have the expected influence on z-score variability. The sign is coherent with the hypothesis we assessed earlier. As regards to the loans to assets ratio with a quadratic specification, the curve is convex. The minimum α on the whole period is 53.3 per cent. This indicates that banks that have a ratio superior to α contribute more to financial stability. The coefficient of this quadratic ratio is also significant in the post-crisis period. The curve remains convex and the minimum α is 36.5 percent. As such we can corroborate our explanation of the results on the dummy variables that characterize the degree of hybridization.

Intermediate hybrid cooperative banks contribute more to financial stability. First of all, when we consider the whole period (2002-2011) that relies on 591 observations3, we note that the explanatory power is 21.6 percent. The variables introduced in the model explain 21.6 percent of the z-score variance, which is an interesting level in the social sciences area. Regarding the dummy variables of the hybridization degree, we note that the coefficient related to the intermediate hybrid banks is positive (53.36) and significant. This signifies that, on average, cooperative banking groups that have an intermediate hybridization degree have

[3] We used 591 observations instead of 601 because of the missing Fees data for Goldman Sachs International.

higher z-scores than the joint-stock banks that are the reference in our model. As regards the other hybridization degree categories, we cannot deduce any difference between said categories and joint-stock banks, as the coefficients related to the dummies are insignificant. So, over the whole period, intermediate hybrid cooperative banks contribute more to financial stability. Looking at the situation before the crisis period (2002-2007), we can see that once again, cooperative banking groups with an intermediate hybridization degree are affected by a positive and significant coefficient of 49.83. In 2008, the crisis year, this coefficient rises to 55.96. Finally, in the post-crisis period (2009-2011), it continues to rise, reaching a value of 58.72. In all three periods, these coefficients remain significant at a one percent level. Thus, compared to the joint-stock banks, intermediate hybrid cooperative groups contribute more to financial stability, even during the crisis period. As *Rabobank* belongs to this category, and as the joint-stock banks include Dexia, we decided to run those regressions omitting both cases[4]. The coefficient related to the intermediate hybrid banks is lower (22.43) but it remains positive and significant at a five percent level. We note that this coefficient evolves as before. It is worth more during the crisis period (23.61) than in the pre-crisis period (20.13), and it is worth more in the post-crisis period (24.70) than during the crisis. Therefore, we cannot say there is a *Rabobank* and Dexia effect (although in the case of *Rabobank* the coefficient is not as high as before). Thus we may conclude that even during a period of financial crisis, cooperative banking groups that have an intermediate hybridization degree contribute more to financial stability than the joint-stock banks. This can be explained by: their diversification, the fact that they and the subsidiaries they hold are not listed, they are well established in various countries, and they benefit from a stable structure that better enables them to face the crisis.

Regarding the banks that have lower (LHCoop) and greater (MHCoop) degrees of hybridization, even in this restricted model, we cannot observe any difference between them and the joint-stock banks since the coefficients remain insignificant. This can be explained by the fact that the least hybrid cooperative banks are often specialized in a single business area. Their lack of diversification makes them vulnerable, particularly in times of crisis; if they are specialized in mortgages, for example, a housing crisis will lead them to bankruptcy. The most hybrid cooperative banks have the features of joint-stock banks. As they are partially listed or hold listed subsidiaries, they receive pressure from stockholders. As they can act as joint-stock banks, the lack of difference between them is not surprising.

To deepen our analysis, we tested the hybridization degree effect of banks on other endogenous variables, particularly those we examined in the descriptive statistics analysis. We want to see if financial performance remains the same before, during and after the crisis. To do this, we examine the link between financial performance (represented by the return on equity ratio) and hybridization degree in the three different periods. We also attempt to see if the hybridization degree played a role in supporting the economy. To search for a possible relation, we use the loans to assets ratio as the endogenous variable.

Model 2: How does financial performance evolve throughout each period?

The model we ran to explain the variation in financial performance was (Appendix 6.2):

$$ROE_{i,t,c} = \alpha i + \beta 1_i\, LHCoop_{i,t} + \beta 2_i\, IHCoop_{i,t} + \beta 3_i\, MHCoop_{i,t} + \beta 4_i\, NIM_{i,t} + \beta 5_c\, Rate_{c,t} + \sum \varphi_t\, Crisis_t + \varepsilon_{i,t} \forall\, i = 1,..,64$$

[4] We decided to withdraw *Rabobank* as this cooperative banking group has always presented strong results and performances throughout the banking area. Until the end of 2011, it was an AAA-rated group and its results could have biased the real performances of other cooperative banking groups. As regards to Dexia, it was so affected by the debt and financial crisis that its presence in the sample could have underestimated the performances of the other joint-stock banking groups.

In this model, the control variables show different effects on financial performance. The long-term interest rate indicator has an insignificant effect on the return on equity, except in the post-crisis period (2009-2011) when we withdrew Dexia from the sample. The effect is significant and negative, as expected. Regardless of the period, the net interest margin always has a positive and significant effect on financial performance, except in 2008, where the effect is insignificant. Over the whole period, whatever the sample, the temporal dummy always has a negative and significant effect on financial performance.

The least and intermediate hybrid cooperative banking groups are less profitable in the pre-crisis period. Over the whole period (2002-2011), we note that there is no difference in the financial performance of cooperative banking groups and joint-stock banks, regardless of their hybridization degree. Indeed, all coefficients related to the hybridization degree are insignificant. If we focus on the pre-crisis period (2002-2007), we see a negative and significant coefficient related to the least and intermediate hybrid banks. So, a bank in the least hybrid degree category has on average a financial performance inferior to 3.29 points compared to that of joint-stock banks. A bank that has an intermediate degree of hybridization has on average a financial performance inferior to 3.91 points compared to that of joint-stock banks. We note that there is no difference between the financial performance of cooperative banking groups with the highest degree of hybridization and that of joint-stock banks, as the coefficient is insignificant. So in the pre-crisis period, the least and intermediate hybrid cooperative banking groups had a lower financial performance than joint-stock banks. This is not unexpected; as we described earlier, cooperative banks are not under stockholder pressure, they are not listed and do not pursue profit maximization.

In times of crisis, there is no difference in profitability between cooperative banks and joint-stock banks. In 2008, the crisis year, and during the post-crisis period (2009-2011), we cannot report any difference between the financial performance of cooperative banks, whatever their hybridization degree, and that of joint-stock banks. This signifies that cooperative banking groups that had lower and significant financial performance in the pre-crisis period showed higher resistance; there was no difference between the return realized by the different categories. We repeated the analysis omitting *Rabobank* and Dexia. The results are the same in all three sub-periods, but not over the whole period. In this latter case, the coefficient related to the least hybrid banks is negative and significant. So over the entire period, when we run the model without Dexia, the least hybrid banks have lower financial performance than joint-stock banks.

Model 3: Do cooperative banks lend more in times of crisis?

We ran some models with the loans to assets as the endogenous variable. The control variables are the long-term interest rate and the temporal dummy. The model used was (Appendix 6.3):

$$\text{Loans}_{i,t,c} = \alpha i + \beta 1_i \, \text{LHCoop}_{i,t} + \beta 2_i \, \text{IHCoop}_{i,t} + \beta 3_i \, \text{MHCoop}_{i,t} + \beta 4_c \, \text{Rate}_{c,t} + \sum \varphi_t \, \text{Crisis}_t + \varepsilon_{i,t} \quad \forall \, i = 1,..,64$$

As a rise in interest rates leads to lower asset value, we expected a positive sign related to its coefficient. Indeed, if the asset value decreases, the loans to assets ratio will increase. This hypothesis is confirmed. Nevertheless, we note that regardless of the period and sample, the temporal dummy has no effect on the lending level, as its coefficient is insignificant.

The least and intermediate hybrid banks lent more than the joint-stock banks during the period 2002-2011. In the first model, which covered the entire period, we noted that the least hybrid cooperative banking groups lent more than the joint-stock banks. The coefficient related to the least hybrid category was positive and highly significant. Their ratio was on average 11.49 points higher than that of joint-stock banks. Intermediate hybrid cooperative banks also lent more than joint-stock banks. On average, their ratio was 5.44 points higher and significant at the 10 percent level. A *Rabobank* effect was noted in this case. Indeed, if we withdraw *Rabobank*, the coefficient becomes insignificant. There is no difference in lending behaviour between the more hybrid and the joint-stock banks. These results are consistent with the earlier theoretical analysis, where we noted that cooperative banks are established throughout a territory; they are close to their customers and are willing to contribute to community and economic development.

The least and intermediate hybrid banks also lent more during the crisis and post-crisis periods. If we focus on the banks' behaviour during the different periods as regards to their lending offers, we note that during the pre-crisis period as well as in the crisis year, there is no difference between the different categories of banks, as no coefficient appears significant. Because the crisis year gives poor results, and the post-crisis period also gives insufficient results compared to the whole period, which shows that there is a difference in behaviour between the banks, we added a post-crisis period covering 2008-2011. It shows that the least hybrid cooperative banking groups lent more on average than joint-stock banks. Their coefficient is 9.34 and is significant at the 5 percent level. It remains significant and positive even if we withdraw *Rabobank* and Dexia. Intermediate hybrid cooperative banking groups also lent more on average than joint-stock banks. Their loans to assets ratio is on average 8.91 points higher and is significant at the 10 percent level. As in the previous analysis over the whole period, there seems to be a *Rabobank* effect here as well. When we withdraw this bank, the coefficient becomes insignificant.

We stated earlier that cooperative banking groups lend more even in times of crisis. As they are held by shareholders who are also customers - and as their customers include managers of small and medium-sized firms who need loans so as to enable their firm to grow - it seems normal for cooperative banks to contribute to the economic development of the area where they are settled. This hypothesis was verified in the descriptive statistics analysis and is corroborated by the econometric analysis. Since they continue to lend even during the crisis period, they show higher resistance than joint-stock banks.

4. Conclusion

In this paper, we have shown that there is a link between a cooperative banking group's hybridization degree and its financial stability. We tested levels of resistance and resilience through various indicators: a computed z-score in order to measure the probability of bankruptcy; the loans to assets ratio to measure a bank's capacity to maintain its level of lending in times of financial crisis; and the return on equity to see how financial performance evolves according to their hybridization degree over the different periods considered.

The first conclusion we draw is that intermediate hybrid cooperative banks contribute significantly to financial stability. They benefit from higher z-scores, which show that they are well-capitalized and realize steady returns. Their bankruptcy probability is lower than that of joint-stock banks, even in times of crisis. *Rabobank* plays an important role in this. Moreover, we showed that whatever the period even when we withdraw *Rabobank* and Dexia from the sample - intermediate hybrid cooperative banks continue to

provide higher z-scores than joint-stock banks. These banks have diversified activities that enable them to mitigate economic fluctuations and their firm establishment in an area (local, regional or country-wide) gives them a better understanding of their customers. As local and/or regional banks benefit from this proximity, and as group activities are diversified and unlisted, they accumulate different assets that enable them to contribute more to financial stability, as shown through their higher z-score. According to this indicator, these banks show more resistance and resilience. The results for the least and most hybrid banks do not differ from those for joint-stock banks. The least hybrid banks suffer from their lack of diversification and are more vulnerable to macroeconomic shock. The most hybrid banks have features that also characterize joint-stock banks, which explains the lack of difference in their results.

The second conclusion concerns the ability of cooperative banking groups to make a profit. During the pre-crisis period, their return is lower than that of joint-stock banks, with the exception of the most hybrid cooperative banking groups, whose level of returns is not much different than the joint-stock banking groups. But in times of crisis and during the post-crisis period, we find that there is no difference between the financial performances of cooperative and joint-stock banking groups. As the least and intermediate hybrid cooperative banks had weaker return on equity ratios before the crisis, and as there are no differences between the cooperative and joint-stock banks during the other periods, it demonstrates that they showed more resistance during the crisis. Because the least and intermediate hybrid banks are unlisted or do not hold listed subsidiaries, they do not suffer from a fall in stock market prices. Additionally, they do not undertake high-risk projects that can have negative consequences in times of crisis if they fail.

The third and final conclusion we draw is the capacity of the least and intermediate hybrid cooperative banking groups to maintain their lending level in times of crisis. As these banks are built as local and/or regional networks throughout an entire country, they are close to their customers. These banks are leading players in regards to the economic development of their area. As they are often managed by entrepreneurs of small and medium-sized firms, who themselves know the difficulties of obtaining a loan, the results we found are consistent with their willingness to develop the local economy.

While drawing conclusions in this paper, we found that, globally, cooperative banking groups with an intermediate hybridization degree have faced the financial crisis better. They contribute more to financial stability than joint-stock banking groups. They show more resistance and resilience before, during and after the crisis. Even if they do not differentiate themselves from joint-stock banking groups in terms of the z-score indicator, the least hybrid banks also showed more resistance and resilience as far as lending is concerned and they showed more resistance than joint-stock banks in regards to financial performance. They faced the financial crisis more successfully and contributed more to financial stability with respect to those indicators.

Nevertheless, these models - particularly those that use the loans to assets and the return on equity as endogenous variables - need to be enhanced, as their explanatory power is rather limited. Even if the variables' coefficients are often significant, the introduction of further control variables that influence the endogenous variable would improve the models. Collecting more data for the following years would also be useful to check if the least and intermediate cooperative banks continue to succeed in maintaining their lending levels.

Appendix 1: Z-score descriptive statistics

Z-score descriptive statistics sorted by periods, countries and hybridization degree where LHCoop is the least hybrid cooperative banks, IHCoop the cooperative banks that have an intermediate degree of hybridization, MHCoop the most hybrid cooperative banks and JSB the joint-stock banks.

Table 1-a: Z-score descriptive statistics before the crisis

2002-07	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
	Mean	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***
Austria	8.23	0.62	6				15.63	3.12	6	30.32	12.60	23
Germany				49.02	6.60	6				13.51	7.37	38
Spain	31.25	1.65	6							26.28	12.53	42
France				40.05	9.31	12	19.54	7.44	18	19.74	11.95	18
Netherlands				156.77	8.82	6				15.52	7.02	24
UK	23.95	4.13	6							22.55	31.10	59
Italy	39.48	0.56	6				22.12	1.62	6	33.71	28.72	42
Portugal	25.89	1.77	6							21.05	9.20	12
Finland							32.11	1.83	6	22.24	13.68	12
Total	***25.76***	***10.65***	***30***	***71.47***	***51.11***	***24***	***21.41***	***7.51***	***36***	***23.36***	***21.11***	***270***

Note: (1) standard-deviation (2) number of observations

Table 1-b: Z-score descriptive statistics the year of the crisis

2008	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
	Mean	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***
Austria	6.96	NA	1				13.97	NA	1	29.04	20.37	4
Germany				52.05	NA	1				9.32	6.51	8
Spain	28.57	NA	1							22.34	11.64	7
France				39.21	16.18	2	14.60	7.60	3	13.13	13.89	3
Netherlands				163.42	NA	1				10.38	6.16	4
UK	15.88	NA	1							14.28	22.41	10
Italy	37.75	NA	1				21.66	NA	1	37.40	35.05	7
Portugal	27.86	NA	1							19.44	9.93	2
Finland							21.48	NA	1	15.67	6.47	2
Total	***23.40***	***12.03***	***5***	***73.47***	***60.98***	***4***	***16.82***	***6.06***	***6***	***19.21***	***20.39***	***47***

Note: (1) standard-deviation (2) number of observations

Table 1-c: Z-score descriptive statistics after the crisis year

2009-11	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
	Mean	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***
Austria	5.12	2.85	3				18.24	2.18	3	35.82	20.90	12
Germany				56.87	0.53	3				13.70	6.02	20
Spain	27.37	1.62	3							24.10	13.89	21
France				48.37	11.87	6	24.44	1.99	6	19.30	15.23	9
Netherlands				182.22	2.29	3				13.88	7.02	12
UK	15.51	1.77	3							20.49	27.00	30
Italy	32.11	4.07	3				21.34	1.97	3	33.03	27.26	21
Portugal	24.89	1.53	3							23.09	13.09	6
Finland							24.11	1.46	3	13.94	2.61	6
Total	**21.00**	**10.17**	**15**	**83.96**	**59.91**	**12**	**22.52**	**3.05**	**15**	**22.49**	**20.34**	**137**

Note: (1) standard-deviation (2) number of observations

Table 1-d: Z-score descriptive statistics on the whole period

2002-11	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
	Mean	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***
Austria	7.17	2.04	10				16.24	2.94	10	31.88	16.07	39
Germany				51.68	6.16	10				13.06	6.93	66
Spain	29.82	2.37	10							25.23	12.76	70
France				42.46	10.81	20	20.08	7.04	27	18.95	12.84	30
Netherlands				165.07	13.73	10				14.51	6.95	40
UK	20.61	5.36	10							21.09	28.99	99
Italy	37.10	3.99	10				21.84	1.57	10	33.88	28.53	70
Portugal	25.78	1.74	10							21.50	10.03	20
Finland							28.65	4.78	10	19.09	11.32	20
Total	***24.10***	***10.64***	***50***	***75.42***	***53.58***	***40***	***21.22***	***6.59***	***57***	***22.67***	***20.80***	***454***

Note: (1) standard-deviation (2) number of observations

Appendix 2: Loans to assets descriptive statistics

Loans to assets descriptive statistics classified by periods and hybridization degree, where LHCoop is the least hybrid cooperative banks, IHCoop the cooperative banks that have an intermediate degree of hybridization, MHCoop the most hybrid cooperative banks and JSB the joint-stock banks.

Table 2-a: Loans to assets descriptive statistics on the whole period

2002-11	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***
[30, 40)							37.31	2.49	12			
[40, 50)	43.22	NA	1	47.02	3.27	10	44.71	2.50	19			
[50, 60)	55.58	2.66	13	54.21	2.15	14	50.91	0.69	3			
[60, 70)	65.78	2.33	19	64.14	3.61	9	66.71	1.70	13			
[70, 80)	74.75	2.62	17	72.31	1.90	6	75.17	2.05	9			
[80, 90)				84.35	NA	1	81.10	NA	1			
[0, 20)										11.52	5.01	41
[20, 40)										31.75	5.45	74
[40, 60)										52.47	6.00	143
[60, 80)										67.05	6.16	152
[80, 100)										85.94	3.42	44
	65.72	***8.47***	***50***	***58.12***	***10.06***	***40***	***53.95***	***14.71***	***57***	***53.52***	***20.81***	***454***

Note: (1) standard-deviation (2) number of observations

Table 2-b: Loans to assets descriptive statistics before the crisis

2002-07	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std*** (1)	***Obs*** (2)	***Mean***	***Std*** (1)	***Obs*** (2)	***Mean***	***Std*** (1)	***Obs*** (2)	***Mean***	***Std*** (1)	***Obs*** (2)
[40, 50)				45.81	3.86	6						
[50, 60)	55.81	3.29	8	54.49	2.17	10						
[60, 70)	65.73	2.83	12	62.31	2.30	5						
[70, 80)	74.22	2.82	10	73.94	2.72	2						
[80, 90)				84.35	NA	1						
[30, 40)							36.90	2.53	10			
[0, 20)							43.99	2.40	9	12.00	5.28	22
[20, 40)							51.13	0.82	2	31.92	5.44	42
[40, 60)							66.68	1.90	9	52.63	5.31	101
[60, 80)							76.32	1.76	5	66.19	5.81	75
[80, 100)							81.10	NA	1	85.64	3.34	30
	65.92	***7.75***	***30***	***56.82***	***10.25***	***24***	***53.61***	***15.72***	***36***	***53.53***	***20.04***	***270***

Note: (1) standard-deviation (2) number of observations

Table 2-c: Loans to assets descriptive statistics the year of the crisis

2008	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std***(1)	***Obs***(2)	***Mean***	***Std***(1)	***Obs***(2)	***Mean***	***Std***(1)	***Obs***(2)	***Mean***	***Std***(1)	***Obs***(2)
[45, 50)				48.55	NA	1						
[50, 55)	52.87	NA	1	50.86	NA	1						
[60, 65)				62.28	NA	1						
[65, 70)	65.85	0.65	2	69.64	NA	1						
[75, 80)	76.72	1.42	2									
[30, 40)							39.08	NA	1			
[40, 50)							45.49	0.32	3			
[60, 70)							68.27	NA	1			
[70, 80)							71.82	NA	1			
[0, 20)										10.39	3.22	5
[20, 40)										30.32	4.98	8
[40, 60)										52.87	7.33	10
[60, 80)										67.94	6.86	19
[80,100)										87.73	3.63	5
	67.60	***9.90***	***5***	***57.83***	***9.89***	***4***	***52.60***	***13.78***	***6***	***54.32***	***23.30***	***47***

Note: (1) standard-deviation (2) number of observations

Table 2-d: Loans to assets descriptive statistics after the crisis year

2009-11	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***	***Mean***	***Std(1)***	***Obs(2)***
[45,50)				48.92	0.16	3						
[50, 55)				53.61	1.44	2						
[55, 60)				55.92	NA	1						
[60, 65)				63.98	NA	1						
[65, 70)				69.87	NA	1						
[70, 75)				71.50	0.96	4						
[30, 40)							39.67	NA	1			
[40, 50)	43.22	NA	1				45.30	3.103099	7			
[50, 60)	55.79	0.61	4				50.47	NA	1			
[60, 70)	65.86	1.54	5				66.31	1.21	3			
[70, 80)	75.01	2.51	5				74.39	0.91	3			
[0, 20)										11.17	5.28	14
[20, 40)										31.94	5.75	24
[40, 60)										51.84	7.63	32
[60, 80)										67.88	6.30	58
[80,100)										85.94	3.69	9
	64.71	***9.83***	***15***	***60.81***	***10.02***	***12***	***55.29***	***13.32***	***15***	***53.23***	***21.53***	***137***

Note: (1) standard-deviation (2) number of observations

Appendix 3: Return on equity descriptive statistics

Return on equity descriptive statistics classified by periods and hybridization degree level, where LHCoop is the least hybrid cooperative banks, IHCoop the cooperative banks that have an intermediate degree of hybridization, MHCoop the most hybrid cooperative banks and JSB the joint-stock banks.

Table 3-a: Return on equity descriptive statistics before the crisis

2002-07	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std(1)***	***Obs (2)***	***Mean***	***Std (1)***	***Obs (2)***	***Mean***	***Std (1)***	***Obs (2)***	***Mean***	***Std (1)***	***Obs (2)***
[4, 6)	5.53	0.39	2									
[6, 8)	6.88	0.74	5									
[8, 10)	8.96	0.72	10									
[10, 12)	11.03	0.47	8									
[12, 14)	12.96	0.68	3									
[14, 16)	14.43	0.34	2									
[0, 5)				4.72	NA	1	2.02	NA	1			
[5, 10)				7.56	1.28	19	7.94	1.26	18			
[10, 15)				11.94	1.24	3	11.61	0.95	11			
[15, 20)				15.20	NA	1	17.63	1.72	3			
[20, 25)							22.30	0.14	2			
[25, 30)							26.04	NA	1			
[-40, -0)										-22.41	0.74	2
[-20, 0)										-10.94	5.34	7
[0, 20)										11.52	4.31	233
[20, 40)										24.30	4.57	28
	9.70	***2.49***	***30***	***8.30***	***2.49***	***24***	***11.01***	***5.09***	***36***	***12.01***	***7.56***	***270***

Note: (1) standard-deviation (2) number of observations

Table 3-b: Return on equity descriptive statistics the year of the crisis

2008	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*
[-200, -50)										-178.94	NA	1
[-100, -50)										-56.52	NA	1
[-50, 0)										-19.82	20.15	6
[0, 50)										9.90	5.76	38
[-15, -10)							-10.84	NA	1	53.17	NA	1
[-5, 0)	-1.48	NA	1				-2.09	NA	1			
[0, 5)	4.54	NA	1				4.14	0.08	3			
[5, 10)	6.84	0.79	2				5.33	NA	1			
[10, 15)	13.05	NA	1									
[0, 2)				1.36	0.47	2						
[2, 4)				2.52	NA	1						
[8, 10)				8.50	NA	1						
	5.95	***5.23***	***5***	***3.43***	***3.42***	***4***	***0.80***	***6.29***	***6***	***1.60***	***32.05***	***47***

Note: (1) standard-deviation (2) number of observations

Table 3-c: Return on equity descriptive statistics after the crisis year

2009-11	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*
[-400, -300)										-374.8100	NA	1
[-200, -100)										-100.7050	0.120208	2
[-100, 0)										-17.79913	22.46528	23
[0, 100)												
[-10, -5)							-5.23	NA	1			
[-5, 0)							-0.18	NA	1			
[0, 5)							3.34	1.27	4			
[5, 10)							6.54	0.82	8			
[10, 15)							13.79	NA	1			
[2, 4)				2.75	0.72	2						
[4, 6)				4.85	0.67	4						
[6, 8)				6.56	0.34	5						
[8, 10)				9.46	NA	1						
[-40, -30)	-36.68	NA	1									
[-30, -20)	-21.64	NA	1									
[0, 10)	3.35	1.21	13							8.18	4.99	111
	-0.98	***11.84***	***15***	***5.59***	***1.91***	***12***	***4.94***	***4.21***	***15***	***-0.56***	***37.30***	***137***

Table 3-d: Return on equity descriptive statistics on the whole period

2002-11	***LHCOOP***			***IHCOOP***			***MHCOOP***			***JSB***		
In %	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std*** *(1)*	***Obs*** *(2)*	***Mean***	***Std***$^{(1)}$	***Obs***$^{(2)}$
[-400, -300)										-374.81	NA	1
[-200, -100)										-126.78	45.16	3
[-100, 0)										-18.11	19.99	39
[0, 5)				3.23	1.43	9						
[5, 10)				7.41	1.27	27						
[10, 15)				11.94	1.24	3						
[15, 20)				15.20	NA	1						
[20, 30)												
[-40, -20)	-29.16	10.63	2									
[-20, 0)	-1.48	NA	1									
[-20, -10)							-10.84	NA	1			
[-10, 0)							-2.50	2.54	3			
[0, 10)							6.53	2.11	35			
[10, 20)							12.96	2.68	15			
[0, 20)	7.78	3.62	47							10.21	4.66	377
20, 30)							23.54	2.16	3			
[20, 40)										24.19	4.50	33
[40, 60)										53.17	NA	1
	6.12	***8.32***	***50***	***7.00***	***2.92***	***40***	***8.33***	***6.16***	***57***	***7.14***	***24.32***	***454***

Note: (1) standard-deviation (2) number of observations

Appendix 4: Hausman test results

The Hausman test is a specification test. It allows us to determine whether both estimations' (fixed and random effect) coefficients are statistically different. Under the null hypothesis H0 of orthogonality between the explanatory variables and the error term of the random effect model, both estimators within (LSDV) and generalized least squares (GLS) are unbiased estimators. In this case, there is no significant difference between the coefficients in the within and generalized least square estimations. Thus we use the generalized least square method, as ours is a random effect model.

The hypothesis test is:

H0: $\hat{a}_{LSDV} - \hat{a}_{GLS} = 0$ thus, the model is a random effect model
H1: $\hat{a}_{LSDV} - \hat{a}_{GLS} \neq 0$ thus, the model is a fixed effect model

The H statistics formula is:

$$H = (\hat{a}_{LSDV} - \hat{a}_{GLS})'[Var(\hat{a}_{LSDV}) - Var(\hat{a}_{GLS})]^{-1}(\hat{a}_{LSDV} - \hat{a}_{GLS})$$

H statistics follow a chi-square with k degree of freedom. If H> χ^2 (k) for a α fixed threshold, then we will reject H0. The within estimator is so unbiased, we can reject the random effect specification and use an individual fixed effects model.

In our model, we ran the Hausman test. The results indicate that for a degree of freedom of 7, the chi-square statistics are widely inferior to the five percent threshold (and even the 10 percent threshold). Therefore we cannot reject the H0 hypothesis that the model is a random effect model.

Correlated Random Effects – Hausman Test
Equation: EQZSCORE
Test cross-section random effects

Test summary	Chi-sq. statistic	Chi-Sq. d.f.	Prob.
Cross-section random	**2.882528**	**7**	**0.8957**

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
Loans to assets^2	0.003242	0.003037	0.000000	0.2910
Loans to assets	-0.343761	-0.320551	0.000473	0.2858
Net interest margin	3.659333	3.739466	0.003532	0.1775
Fees and commissions on assets	4.951734	4.873370	0.045381	0.7130
CRISIS 2008	-2.119291	-2.108077	0.000534	0.6274
Long-term interest rate	-0.776844	-0.776473	0.000102	0.9707
Cost to income ratio	-0.024749	-0.025341	0.000001	0.4663

Appendix 5: Research of unit root process

In order to check the unit root test presence, we use the specific Levin, Lin and Chu test adapted for the panel data unit root test search. This fits the panel that contains the least observations (few individuals and/or few periods).

Here, the test indicates that we can reject the null hypothesis that assumes a common unit root process. So, the z-score series is stationary and we can work with it on level.

Panel unit root test: summary
Series: ZSCORE
Date: 04/28/13 Time: 18:11
Sample: 2002 2011
Exogenous variables: individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: unit root (assumes common unit root process)				
Levin, Lin & Chu t*	**-4.41185**	**0.0000**	61	471

Appendix 6.1: Results from the data panel regressions where the endogenous variable is the Z-score

$$\text{Z-Score}_{i,\,t,\,c} = \alpha i + \beta 1_i\, \text{LHCoop}_{i,t} + \beta 2_i\, \text{IHCoop}_{i,t} + \beta 3_i\, \text{MHCoop}_{i,t} + \beta 4_i\, \text{Loans}^2_{i,t} + \beta 5_i\, \text{Loans}_{i,t} + \beta 6_i\, \text{NIM}_{i,t} + \beta 7_i\, \text{Fees}_{i,t} + \sum \varphi_t\, \text{Crisis}_t + \beta 8_c\, \text{Rate}_{c,t} + \beta 9_i\, \text{CTIR}_{i,t} + \varepsilon_{i,t}\ \forall\ i = 1,..,64,$$

where LHCoop is the least hybrid cooperative banks, IHCoop the cooperative banks that have an intermediate degree of hybridization, MHCoop the most hybrid cooperative banks and JSB the joint-stock banks.

Table 6.1 a: Results for the data panel regression using the full sample

Full sample	***Z-score 2002–11***	***Z-score 2002–7***	***Z-score 2008***	***Z-score 2009–11***
C	25.59 (5.388***)	28.16 (5.248***)	2.37 (0.033)	15.71 (2.160**)
LHCOOP	-0.78 (-0.071)	2.41 (0.219843)	-10.36 (-0.905)	-2.913420 (-0.252346)
IHCOOP	53.36 (4.368***)	49.83 (4.106***)	55.96 (4.649***)	58.72 (4.608***)
MHCOOP	-1.825 (-0.191)	-2.56 (-0.254)	-1.80 (-0.183)	-3.313 (-0.287)
LOANS_TOASSETS^2	0.003 (2.679***)	0.0012 (0.839)	0.004 (0.654)	0.0043 (2.019**)
LOANS_TOASSETS	-0.32 (-2.632***)	-0.225 (-1.473)	-0.477 (-0.734)	-0.314 (-1.367)
Net Interest Margin	3.73 (6.872***)	2.18 (3.318***)	14.05 (2.480***)	4.162 (2.470**)
FEES_AND_COMM_ONASSETS	4.873 (2.985***)	8.26 (3.976***)	-6.769 (-0.424)	15.76 (3.127***)
CRISE2008	-2.10 (-3.028***)		Not Included	
Long-Term Interest rate	-0.77 (-2.549***)	-0.969 (-1.761*)	3.336 (0.210)	-1.135 (-3.671***)
Cost To Income Ratio	-0.025 (-1.753*)	-0.036 (-1.379)	-0.049 (-0.498)	-0.011 (-0.552)
R^2	0.216	0.2157	0.4246	0.3126
Adjusted R^2	0.202	0.195264	0.3231	0.2751
F	15.989***	10.544***	4.182***	8.340***
Number of observations	591	355	61	175

Note: Into brackets, the Student T.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.1 b: Results for the data panel regression using the full sample except Dexia

Full sample except Dexia	***Z-score 2002-11***	***Z-score 2002-7***	***Z-score 2008***	***Z-score 2009-11***
C	25.71 (5.323***)	28.67 (5.257***)	3.096 (0.043)	16.82 (2.178**)
LHCOOP	-1.055 (-0.094)	2.189 (0.196)	-10.619 (-0.919262)	-2.947 (-0.252)
IHCOOP	53.10 (4.308***)	49.58 (4.044***)	55.49 (4.560***)	58.62 (4.558***)
MHCOOP	-2.078 (-0.2163)	-2.814 (-0.275)	-1.98 (-0.199)	-3.473551 (-0.298)
LOANS_TOASSETS^2	0.00305 (2.674***)	0.0012 (0.832)	0.0033 (0.523)	0.0042 (1.948*)
LOANS_TOASSETS	-0.3194 (-2.603***)	-0.2272 (-1.469)	-0.4033 (-0.599)	-0.3050 (-1.316)
Net Interest Margin	3.725 (6.805***)	2.18 (3.288***)	13.91 (2.432**)	3.955 (2.266**)
FEES_AND_COMM_ONASSETS	4.908 (2.987***)	8.238 (3.928***)	-8.215 (-0.502)	15.65 (3.070***)
CRISE2008	-2.034 (-2.868***)		Not Included	
Long-Term Interest rate	-0.792 (-2.574***)	-1.003 (-1.790*)	3.139 (0.196)	-1.134 (-3.651***)
Cost To Income Ratio	-0.024 (-1.487)	-0.036 (-1.381)	-0.053 (-0.531)	-0.022 (-0.612)
R^2	0.2139	0.2155	0.4178	0.3102
Adjusted R^2	0.2002	0.1947	0.3130	0.2722
F	15.545***	10.351***	3.987***	8.148***
Number of observations	582	349	60	173

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.1 c: results for the data panel regression using the full sample except rabobank

Full sample except Rabobank	***Z-score 2002-11***	***Z-score 2002-7***	***Z-score 2008***	***Z-score 2009-11***
C	24.16 (6.016***)	28.20 (5.881***)	18.98 (0.357)	15.667 (2.415**)
LHCOOP	-0.87 (-0.104)	2.15 (0.249)	-10.21 (-1.193)	-2.91 (-0.347)
IHCOOP	22.70 (2.155**)	20.39 (1.878*)	24.049 (2.343156**)	24.709 (2.338**)
MHCOOP	-1.969 (-0.274)	-2.64 (-0.334)	-3.048 (-0.413)	-3.657 (-0.436)
LOANS_TOASSETS^2	0.00239 (2.248**)	0.00078 (0.560)	0.00239 (0.518)	0.00388 (1.838*)
LOANS_TOASSETS	-0.265 (-2.323**)	-0.183 (-1.249)	-0.378 (-0.780037)	-0.312 (-1.400)
Net Interest Margin	3.79 (7.404***)	2.35 (3.714***)	14.91 (3.524***)	4.98 (3.031***)
FEES_AND_COMM_ONASSETS	4.69 (3.059***)	7.791308 (3.900***)	-5.616804 (-0.471)	16.38264 (3.435***)
CRISE2008	-2.11 (-3.196***)		Not Included	
Long-Term Interest rate	-0.66 (-2.289**)	-1.16 (-2.167**)	-0.72 (-0.061)	-1.15 (-3.719***)
Cost To Income Ratio	-0.023 (-1.693*)	-0.036 (-1.430)	-0.053 (-0.728)	-0.011 (-0.541)
R^2	0.2167	0.2072	0.3986	0.2778
Adjusted R^2	0.2029	0.1861	0.2903	0.2377
F	15.769***	9.844***	3.682***	6.925***
Number of observations	581	349	60	172

Note: the Student T is in brackets.

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.1 d: Results for the data panel regression using the full sample except Dexia and Rabobank

Full sample except Dexia and Rabobank	***Z-score 2002-11***	***Z-score 2002-7***	***Z-score 2008***	***Z-score 2009-11***
C	24.29 (5.948***)	28.74 (5.899***)	19.66 (0.368)	16.70 (2.417**)
LHCOOP	-1.14 (-0.135)	1.91 (0.219)	-10.45 (-1.213)	-2.91 (-0.343)
IHCOOP	22.43 (2.109**)	20.13 (1.834*)	23.61 (2.280**)	24.70 (2.315**)
MHCOOP	-2.22 (-0.306)	-2.89 (-0.362)	-3.21 (-0.433)	-3.77 (-0.445)
LOANS_TOASSETS^2	0.0024 (2.241**)	0.000774 (0.545)	0.001727 (0.361)	0.003755 (1.761*)
LOANS_TOASSETS	-0.263 (-2.290**)	-0.183 (-1.239)	-0.307 (-0.612)	-0.299 (-1.330)
Net Interest Margin	3.78 (7.331***)	2.35 (3.683***)	14.78 (3.465***)	4.74 (2.779***)
FEES_AND_COMM_ONASSETS	4.71 (3.051***)	7.74 (3.839***)	-7.00 (-0.574)	16.22 (3.350***)
CRISE2008	-2.041 (-3.026***)		Not Included	
Long-Term Interest rate	-0.676 (-2.316**)	-1.202 (-2.196**)	-0.913 (-0.076)	-1.152 (-3.693***)
Cost To Income Ratio	-0.0223 (-1.439)	-0.0367 (-1.441)	-0.0574 (-0.771610)	-0.0225 (-0.623)
R^2	0.2140	0.2072	0.3875	0.2736
Adjusted R^2	0.2000	0.1857	0.2750	0.2327
F	15.279***	9.670***	3.445***	6.696***
Number of observations	572	343	59	170

Note: the Student T is in brackets.

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix 6.2: Results of the data panel regressions where the endogenous variable is the return on equity

$ROE_{i,\,t,\,c} = \alpha i + \beta 1_i\, LHCoop_{i,t} + \beta 2_i\, IHCoop_{i,t} + \beta 3_i\, MHCoop_{i,t} + \beta 4_c\, Rate_{c,t} + \beta 5_i\, NIM_{i,t} + \sum \varphi_t\, Crisis_t + \varepsilon_{i,t}\ \forall\ i = 1,..,64,$ where LHCoop is the least hybrid cooperative banks, IHCoop the cooperative banks that have an intermediate degree of hybridization, MHCoop the most hybrid cooperative banks and JSB the joint-stock banks.

Table 6.2 a: Results for the data panel regression using the full sample

Full sample	***ROAE 2002-11***	***ROAE 2002-7***	***ROAE 2008***	***ROAE 2009-11***
C	-0.893 (-0.175)	13.673 (4.279***)	-74.205 (-0.919)	-8.478 (-0.830)
LHCOOP	-6.116 (-1.158)	-3.294 (-2.348**)	-1.732 (-0.122)	-5.913 (-0.456)
IHCOOP	-1.181 (-0.208)	-3.918 (-2.688***)	4.744 (0.307)	-2.127 (-0.149)
MHCOOP	0.219 (0.047)	-1.239 (-1.020)	-0.903 (-0.072)	1.948 (0.153)
Long-term interest rate	0.190 (0.165)	-0.718 (-0.956)	16.065 (0.841)	-3.318 (-1.565)
Net Interest Margin	4.982 (3.700***)	0.834 (2.008**)	3.702 (0.767)	14.503 (3.117***)
2008CRISIS	-5.364 (-2.051**)		Not included	
R^2	0.03185	0.037	0.043	0.060
Adjusted R^2	0.02207	0.023	-0.043	0.032
F	3.257***	2.720**	0.502	2.192*
Number of observations	601	360	62	179

Note: the Student T is in brackets.
*** significant at 1% level ; ** significant at 5% level ; * significant at 10% level.

Table 6.2 b: Results for the data panel regression using the full sample except dexia

Full sample except Dexia	***ROAE 2002-11***	***ROAE 2002-7***	***ROAE 2008***	***ROAE 2009-11***
C	7.509 (2.897***)	13.327 (4.104***)	-54.000 (-1.205)	7.758 (2.106**)
LHCOOP	-5.260 (-2.217***)	-3.318 (-2.349**)	-1.167 (-0.148)	-4.749 (-1.303)
IHCOOP	-2.251 (-0.992)	-3.854 (-2.625***)	0.786 (0.092)	-0.978 (-0.241)
MHCOOP	-1.078 (-0.517)	-1.182 (-0.966)	-4.141 (-0.598)	0.162 (0.045)
Long-term interest rate	-0.708 (-1.184)	-0.682 (-0.894)	13.606 (1.283)	-2.393 (-2.503**)
Net Interest Margin	2.839 (4.323***)	0.907 (2.139**)	-0.053 (-0.020)	3.504 (2.360**)
2008CRISIS	-3.347 (-2.432**)		Not included	
R^2	0.045	0.038	0.045	0.061
Adjusted R^2	0.035	0.024	-0.042	0.033
F	4.660***	2.723**	0.514	2.195*
Number of observations	591	354	61	176

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.2 c: Results for the data panel regression using the full sample except rabobank

Full sample except Rabobank	***ROAE 2002-11***	***ROAE 2002-7***	***ROAE 2008***	***ROAE 2009-11***
C	-0.891 (-0.173)	13.665 (4.208***)	-73.468 (-0.901)	-8.563 (-0.830)
LHCOOP	-6.138 (-1.152)	-3.297 (-2.330**)	-1.746 (-0.122)	-5.964 (-0.455)
IHCOOP	-1.976 (-0.301)	-3.946 (-2.347**)	3.208 (0.180)	-4.492 (-0.272)
MHCOOP	0.215 (0.046)	-1.239 (-1.012)	-0.917 (-0.073)	1.918 (0.149)
Long-term interest rate	-0.184 (-0.157)	-0.718 (-0.940)	15.885 (0.823)	-3.343 (-1.561)
Net Interest Margin	5.004 (3.686***)	0.836 (1.992**)	3.734 (0.767)	14.629 (3.105***)
2008CRISIS	-5.456 (-2.052**)		Not included	
R^2	0.032	0.033	0.043	0.060
Adjusted R^2	0.022	0.019	-0.044	0.032
F	3.232***	2.377**	0.490	2.165*
Number of observations	591	354	61	176

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5 % level; * significant at 10% level.

Table 6.2 d: Results for the data panel regression using the full sample except Dexia and Rabobank

Full sample except Dexia and Rabobank	***ROAE 2002-11***	***ROAE 2002-7***	***ROAE 2008***	***ROAE 2009-11***
C	7.556 (2.877***)	13.316 (4.034***)	-53.294 (-1.178)	7.746 (2.083**)
LHCOOP	-5.275 (-2.203***)	-3.321 (-2.331**)	-1.180 (-0.148)	-4.764 (-1.296)
IHCOOP	-3.078 (-1.049)	-3.890 (-2.297**)	-0.685 (-0.069)	-1.813 (-0.387)
MHCOOP	-1.083 (-0.515)	-1.183 (-0.958)	-4.154 (-0.595)	0.148 (0.041)
Long-term interest rate	-0.725 (-1.196)	-0.680 (-0.878)	13.434 (1.255)	-2.411 (-2.496**)
Net Interest Margin	2.859 (4.307***)	0.910 (2.122**)	-0.022 (-0.008)	3.559 (2.366**)
2008CRISIS	-3.413 (-2.440**)		Not included	
R^2	0.046	0.034	0.045	0.061
Adjusted R^2	0.036	0.020	-0.043	0.032
F	4.646***	2.391**	0.515	2.155*
Number of observations	581	348	60	173

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix 6.3: Results of the data panel regression where the endogenous variable is the loans to assets ratio

$$Loans_{i,\,t,\,c} = \alpha i + \beta 1_i\, LHCoop_{i,t} + \beta 2_i\, IHCoop_{i,t} + \beta 3_i\, MHCoop_{i,t} + \beta 4_c\, Rate_{c,t} + \sum \varphi_t\, Crisis_t + \varepsilon_{i,t} \quad \forall\ i = 1,..,64$$

where LHCoop is the least hybrid cooperative banks, IHCoop the cooperative banks that have an intermediate degree of hybridization, MHCoop the most hybrid cooperative banks and JSB the joint-stock banks.

Table 6.3 a: Results for the data panel regression using the full sample

Full sample	***Loans to assets 2002-11***	***Loans to assets 2002-7***	***Loans to assets 2008***	***Loans to assets 2008-11***	***Loans to assets 2009-11***
C	41.919 (9.566***)	56.075 (10.947***)	-16.190 (-0.291)	35.219 (6.660***)	35.299 (6.757***)
LHCOOP	11.491 (4.056***)	12.854 (1.576)	11.272 (1.111)	9.211 (1.974**)	8.090 (1.535)
IHCOOP	5.445 (1.735*)	3.615 (0.400)	6.859 (0.601)	9.011 (1.752*)	10.488 (1.809*)
MHCOOP	0.733 (0.276)	0.445 (0.059)	-1.086 (-0.117)	1.753 (0.388)	3.036 (0.585)
Long-term interest rate	2.813 (2.693***)	-0.703 (-0.668)	16.107 (1.270)	4.754 (3.602***)	4.695 (3.613***)
2008CRISIS	-0.112 (-0.043)		Not included	-2.000 (-0.673)	Not included
R^2	0.044	0.008	0.058	0.081	0.100
Adjusted R^2	0.035	-0.003	-0.008	0.062	0.079
F	5.476***	0.746	0.882	4.176***	4.809***
Number of observations	601	360	62	241	179

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.3 b: Results for the data panel regression using the full sample except Dexia

Full sample except Dexia	***Loans to assets 2002-11***	***Loans to assets 2002-7***	***Loans to assets 2008***	***Loans to assets 2008-11***	***Loans to assets 2009-11***
C	41.818 (9.426***)	56.780 (10.903***)	-18.215 (-0.324)	34.861 (6.525***)	34.949 (6.626***)
LHCOOP	11.440 (4.010***)	12.699 (1.544)	11.396 (1.114)	9.343 (1.991**)	8.224 (1.552)
IHCOOP	5.416 (1.713*)	3.435 (0.377)	7.124 (0.619)	9.199 (1.777*)	10.686 (1.833*)
MHCOOP	0.698 (0.260)	0.272 (0.036)	-0.892 (-0.096)	1.922 (0.423)	3.215 (0.615)
Long-term interest rate	2.851 (2.701***)	-0.831 (-0.778)	16.529 (1.289)	4.795 (3.614***)	4.743 (3.627***)
2008CRISIS	-0.273 (-0.105)		Not included	-2.013 (-0.669)	Not included
R^2	0.044	0.009	0.060	0.083	0.102
Adjusted R^2	0.035	-0.003	-0.007	0.063	0.081
F	5.381***	0.759	0.894	4.206***	4.852***
Number of observations	591	354	61	237	176

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.3 c: Results for the data panel regression using the full sample except Rabobank

Full sample except Rabobank	***Loans to assets 2002-11***	***Loans to assets 2002-7***	***Loans to assets 2008***	***Loans to assets 2008-11***	***Loans to assets 2009-11***
C	41.714 (9.412***)	56.133 (10.793***)	-14.906 (-0.266)	35.237 (6.611***)	35.321 (6.711***)
LHCOOP	11.477 (4.024***)	12.855 (1.563)	11.309 (1.108)	9.214 (1.962**)	8.094 (1.525)
IHCOOP	3.414 (0.946)	2.095 (0.201)	3.163 (0.242)	6.171 (1.045)	7.984 (1.199)
MHCOOP	0.739 (0.275)	0.444 (0.059)	-1.097 (-0.118)	1.751 (0.385)	3.035 (0.580)
Long-term interest rate	2.865 (2.712***)	-0.716 (-0.669)	15.814 (1.239)	4.739 (3.570***)	4.690 (3.582***)
2008CRISIS	-0.206 (-0.079)		Not included	-1.971 (-0.654)	Not included
R^2	0.042	0.008	0.057	0.078	0.095
Adjusted R^2	0.034	-0.003	-0.010	0.058	0.074
F	5.224***	0.719	0.847	3.922***	4.510***
Number of observations	591	354	61	237	176

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6.3 d: Results for the data panel regression using the full sample except Dexia and Rabobank

Full sample except Dexia and Rabobank	***Loans to assets 2002-11***	***Loans to assets 2002-7***	***Loans to assets 2008***	***Loans to assets 2008-11***	***Loans to assets 2009-11***
C	41.609 (9.272***)	56.851 (10.748***)	-16.924 (-0.299)	34.877 (6.475***)	34.970 (6.580***)
LHCOOP	11.427 (3.978***)	12.700 (1.531)	11.432 (1.111)	9.347 (1.978**)	8.228 (1.542)
IHCOOP	3.386 (0.932)	1.914 (0.182)	3.434 (0.260)	6.360 (1.070)	8.182 (1.222)
MHCOOP	0.704 (0.260)	0.270 (0.035)	-0.905 (-0.096)	1.920 (0.420)	3.214 (0.611)
Long-term interest rate	2.904 (2.719***)	-0.848 (-0.780)	16.235 (1.257)	4.789 (3.582***)	4.737 (3.595***)
2008CRISIS	-0.371 (-0.141)		Not included	-1.983 (-0.650)	Not included
R^2	0.042	0.008	0.059	0.080	0.098
Adjusted R^2	0.034	-0.003	-0.010	0.059	0.076
F	5.139***	0.734	0.857	3.950***	4.549***
Number of observations	581	348	60	233	173

Note: the Student T is in brackets.
*** significant at 1% level; ** significant at 5% LEVEL; * significant at 10% level.

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