

Original Article

# Evaluation of Cooperative Banks After the Global Financial Crisis But Before the Pandemic; Evidence from Greece

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**Abstract:** As open-end banks, cooperative banks are vulnerable in times of crisis or recession, where members may massively seek the liquidity of their shares, either out of fear or to meet other more pressing needs. The lack of a secondary market for cooperative shares also contributes to this, although with the general crisis and the stock market crisis, its existence could offer little. This paper is a comprehensive and thorough research and analysis of Greece's seven main cooperative banks with liquidity, profitability and bankruptcy ratios. The initial purpose of this work is to research and record, individually and collectively, the course of prices and indicators of each cooperative bank located in Greece. The second and most basic purpose is to compare prices and analyze the financial position of each cooperative bank in Greece so that there is an overall picture of possible insolvency to creditors and the possibility of direct or indirect bankruptcy. What are the chances of bankruptcy, and how can they be expressed in simple and comprehensible numerical results? We shall attempt to address a number of queries pertaining to the financial data of banks in the financial analysis that follows. The final goal of the research could be the calculation, summary, and presentation of the results to the scientific community, as well as the conclusions of the five-year analysis, so that there is a clear picture of the financial market. This research paper's objective is to assess Greece's seven cooperative banks following the 2010 Financial Crisis.

**Jel Classification Numbers:** G21, G34

**Keywords:** Cooperative Banks of Greece, Financial Analysis, Indicators, Banking Sector.

## I. INTRODUCTION

If we want to evaluate the sizes of a specific economic unit, the sizes of a similar company/bank or the representative sizes of the sector to which it belongs are used. To compare the balance sheets of various economic units, the "external business comparison" is used, which has to do with the study of the balance sheets of more than one company/bank (Niarchos, 2004). In the relatively short time that they have been in operation, cooperative banks have had a significant impact at the local level by getting involved in the banking system in a complementary and improving way by creating a new type of bank distinguished by its own customer-based philosophy, which supports and, in turn, is supported by local productive forces and boosts local development. The cooperatives are active in their communities and serve as the banks for many small and medium-sized businesses and the local populace. (Petropoulos D., Kyriazopoulos G., 2010)

The cooperative financial system consists of a set of institutions, organizations and markets that operate as "intermediaries", i.e. "intermediate" between deficit and surplus, mainly small and medium enterprises. The cooperative financial system facilitates the smooth execution of consumer and investment plans because it allows the postponement of transactions of small and medium enterprises. Transactions are made on credit, i.e. with 'promissory notes', which can be converted into 'cash'. The seller accepts the 'securities' (e.g. checks) because he has credit (trust) not only in the buyer but also in the financial system.

Confidence among small and medium-sized enterprises in a relatively small market served by cooperative banks is a key element in the operation of the financial system. Also, the information that is usually freely and quickly circulated in a local market and is available to small and medium-sized traders is crucial because it affects the agreement but also because traders have the ability to influence the outcome of the transaction.

Hellenic Cooperative Banks operate in one of the most competitive environments and sectors, that is, the Greek financial market, but also the global economy. The history of Greek cooperative banks counts for more than two decades, full



of offerings and a strong dynamic presence in the Greek financial market and economy, but also of many great challenges, especially in recent years.

Many of these banks have been described as highly successful efforts with a great deal of potential, though their operation is primarily local and regional. However, it was not a few who bent under the economic crisis and stranglehold they faced in recent years and were forced to suspend their operations or merge with others to survive.

One of the main advantages of these banks is the more detailed and thorough knowledge of the local markets and their needs. However, their size (usually small albeit flexible) makes them prone to major shocks in the financial system. This was clearly reflected in the recent economic crisis in our country.

Of course, many of these banks managed to remain viable and profitable as their involvement in complex brokerage products was small to nonexistent, and the risks they took were small and manageable.

Contrary to commercial banks, cooperative banks provide benefits for society as a whole as well as for economic ones. They facilitate better collaboration between small and medium-sized businesses and the better resolution of funding issues. The institution of cooperative banks is linked to the future of the small and medium economy and contributes to tackling major economic and social problems. Their ability to operate effectively and in harmony with the overall economic objectives depends to a large extent on their effective management. Their strategic planning could be said to have a common voyage line with the other banks but with an increased anthropocentric character. It, therefore, focuses on four main pillars:

1. Disbursements of funds to the real economy, with the aim of supporting Individuals and Businesses.
2. Effective use of funds to deal with Non-performing Exposures.
3. Commitment to performance and responsibility.
4. Corporate governance with efficiency and transparency.

The main objectives of cooperative banks are:

- Prevent the marginalization of the financially weak.
- Contribute to the fight against economic inequality and contribute to the achievement of social balance.
- They contribute to solving the problem of regional development.
- They contribute to strengthening economic democracy since the economy is thus contained in the hands of as many people as possible.
- To contribute to the connection of the private company with the place of its establishment.
- To contribute to the formation of a more stable economic situation in the country through companies.
- Cooperative banks, when properly managed, supervised and operated, are able to play their historic role of protecting against usury, developing the spirit of solidarity and the economy, and providing financial support to small businesses, craftsmen and traders locally and regional level ([www.este.gr](http://www.este.gr)).

In Greece, this form of banking is financially independent of the state and does not benefit from state financial grants. Their primary purpose is to adhere to the principles of efficiency, solvency, liquidity and security of cooperative capital. The purpose of these institutions is to raise local funds and savings and to channel them back into the local community in the form of business and other loans always focused on local development and prosperity.

## **II. LITERATURE REVIEW**

The primary goal of accounting statement assessment is to aid in decision-making on the effective distribution of financial resources. (Kantzios, 1997).

These decisions directly affect the financial benefits of each sector that uses a company's accounting statements, such as creditors, employees, management, shareholders, the state, customers and many more.

In recent decades, numerous financial and accounting models have been created. But ratios continue to hold onto their traditional and basic strength as benchmarks or as an additional, supportive assessment for financial analysis. Financial reporting's primary goal is to offer details on a company's financial situation and performance using the figures and information in its financial statements. Financial information is primarily used to convey details about a company's financial situation and performance, which are revealed through the figures and information presented in their financial statements. (Arkan, 2016).

A bank's capacity to fulfill all anticipated costs, such as funding deposits or making debt payments, by guaranteeing liquid assets is referred to as funding liquidity. Theoretically, a liquid asset is one that has minimal risk (like bonds issued by governments) and is less subject to interest rate fluctuations. (Garber and Weisbrod, 1992). Liquid assets are recognized as assets that convert to cash rapidly and without major issues. (Alger et al., 1990; Melese, 2015). Drehmann and Nikolaou (2010)

give their definition of "funding liquidity as the ability to raise cash at short notice either via asset sales or new borrowing." Yet, the majority of individuals think that deposit money and bank funding liquidity are closely related—Bordo et al. (2001) suggest Income is anticipated to decline during economic downturns or depressions. The loan repayment will be challenging for borrowers. As a result, banks are trapped between the illiquidity of their assets (loans) and the liquidity of their liabilities (deposits), and they run the risk of becoming bankrupt. As a result, the Committee of Basel on the Supervision of Banking (Drehmann and Nikolaou, 2010) believes that the risk of financing liquidity may be present.

Using the Z-score model for banks, Nguyen Tran Thai Ha and Phan Gia Quyen (2018) suggested that when there is no risk to their liquidity, big banks will take fewer risks than smaller entities. Karafolas Simeon (2016) said that the international financial crisis triggered an economic catastrophe in Greece, resulting in a substantial recession from 2009 to 2014. As a result, substantial issues have arisen in the financial sector. Cooperative banks were affected differently by the economic downturn. They were primarily affected by the effects of loan default. This new banking environment restricted the growth of the Greek credit cooperative sector even further. Six cooperative banks faced severe penalties after the Bank of Greece revoked their licenses, but others had less severe effects, especially when compared to commercial banking institutions.

### III. RESULTS AND DISCUSSION

The methodology of the specific work will consist of researching information, connecting knowledge and exploring new ways of the banking object and the general economic context surrounding the market sector.

Specifically, we will use tables and charts to compare bank prices across the range of financial positions. We will then place the prices of total assets, total equity and pre-tax profits as variables on bankruptcy models and try to find out whether cooperative banks are exposed to bankruptcy risks. Finally, we will make a summary report on the results of the research as well as the necessary presentation so that the readers can easily understand the results.

First of all, we examine the Liquidity Financial Ratios for Banks. These ratios are Loan total number to total deposits  
Loan total ratio to total fixed assets  
Cash and guarantee ratio to total assets

$$Liquidity1 = \frac{Total\ Loans}{Total\ Deposit} \quad (1)$$

$$Liquidity2 = \frac{Total\ Loans}{Total\ Assets} \quad (2)$$

$$Liquidity3 = \frac{cash + cash\ deposit\ account + guarantees}{Total\ Assets} \quad (3)$$

Liquidity Ratios show the ability of a Cooperative Bank to meet its overdue liabilities and to indicate the possibility of converting current assets into cash. The existence of liquidity in a business affects its profits because if its turnover is not easily converted into cash or if there is not enough cash available, then the business will not be able to pay its obligations. Thus, the non-fulfilment of its obligations will result in its defamation, the reduction of the trust of the traders with it and possibly its declaration of a state of bankruptcy (Niarchos, 2004).

Second, we examine Profitability Ratios Such as Return on Equity (ROE), Return on Assets (ROA), Net Profit Margin (NPM), and Net Interest Margin (NIM).

$$ROE = \frac{Net\ Profit}{Total\ Equity} \quad (4)$$

$$ROA = \frac{Net\ Profit}{Total\ Assets} \quad (5)$$

$$NPM = \frac{Sales}{Net\ Profit} \quad (6)$$

$$NIM = \frac{Net\ Interest\ Income}{Total\ Assets} \quad (7)$$

In this analysis, we define the profit before tax as Net Profit, so it would be compared with the profit of cooperative banks in other countries with different tax rates.

These ratios measure a company's profitability, its profit potential and its management capacity. In simple terms, profitability metrics assess a company's success or failure over a specific time period. (Gikas, 2002).

$$DuPont\ Analysis\ ROE = ROA \times EM \quad (8)$$

Where  $ROE = (EBIT / EQUITY) \times 100$

$ROA = (EBIT / ASSETS) \times 100$

$EM = ROE / ROA = Total\ Assets / Total\ Equity$

The Equity Multiplier Index shows the financial leverage and extracts from the DuPont analysis. DuPont Analysis is a framework for determining a company's strengths and shortcomings by disaggregating the fundamental ratio sections of the return on equity (ROE) statistic. Developed in the early twentieth century by Donaldson Brown at DuPont Corporation, the chemical corporation, the framework is used to examine the return on equity (ROE) as split into several separate pieces to evaluate the contribution made by every portion. (<https://www.wallstreetprep.com/knowledge/dupont-analysis-template/>).

The main utilities of DuPont Analysis are described below:

- Asset turnover gauges an organization's performance of producing revenues for every dollar/euro of assets.
- The Equity Multiplier (EM) calculates how much funding stockholders have contributed for each dollar/euro asset to determine how leveraged a bank/company is.
- DuPont Analysis is regarded as an effective tool for forecasting upcoming shifts in Return On Non-Operating Assets (RNOA).
- DuPont Analysis helps the CEO of a bank/company to identify the factors that increase profits, improving the accuracy of the bank/company.
- There are several advantages associated with DuPont analysis:
- First, investors can use DuPont analysis to assess different stock investments while comparing why the ROEs of the equities differ.
- This is accomplished by determining the effect of operational efficiency, asset utilization efficiency, and financial leverage on ROE.
- DuPont Analysis assists in analyzing the factors that lead to the varying ROEs of companies, which may be used to inform portfolio management.
- Finally, as a technique, DuPont analysis serves as a metric for investment portfolios.

Some disadvantages concern DuPont Analysis, and we write them below (<https://www.financestrategists.com/accounting/financial-statements/dupont-analysis/>):

- It is a short-term before-tax measurement;
- It has no relationship to the cost of capital, time value of money, or value in and of itself; and
- It can be hard to define a target for strong ROCE.
- The use of the gross value of assets for a metric rather than their net worth is contrary to accounting regulations and norms.

In mergers and acquisitions, DuPont Analysis measure the profitability of bidders and targets banks/companies before any mergers and acquisitions and compare it to the new profitability of the remaining banks/companies after mergers and acquisitions. If we are external financial analyst, it is too difficult to discover the EBIT of banks from their balance sheets because the IASB give them the right not to display it prominently. For this reason, we use operating profits before tax instead of EBIT to calculate ROE and ROA for DuPont Analysis.

Third, we examine the Solvency Ratios (SR)

$$\text{Capital Adequacy} = \frac{\text{Total Equity}}{\text{Total Assets}} \quad (8)$$

$$\text{Total Borrowing Capacity} = \frac{\text{Total Liabilities}}{\text{Total Assets}} \quad (9)$$

$$\text{At last, we examine any bankruptcy in Greek Cooperative Banks using the Z-score model for banks.} \\ Z = \Sigma \frac{\overline{\text{ROA}} + \overline{\text{EA}}}{\sigma_{\text{ROA}}} \quad (10)$$

The Z-score estimates the bank's profit, capitalization, and return on volatility together to determine the bank's distance from bankruptcy for a certain bank where (ROA) denotes the average return on assets, (EA) denotes the average equity ratio, and (ROA) denotes the return on assets' standard deviation. To put it another way, the Z-score calculates the number of standard deviations that a bank's earnings would have to deviate from the anticipated value before its equity turns negative, indicating the likelihood that the bank will go bankrupt. The profitability and capital ratio of the bank has a positive impact on the Z-score's value, while the bank's profits volatility has a negative impact. A higher Z-score denotes greater stability or lower risk of failure for the bank. In a nutshell, a reduced risk is indicated by a greater Z-score number.

It is typically credited to Boyd and Graham, 1986, Hannan and Hanweck, 1988, and Boyd et al. (1993), which is crucial in determining both the risk of a specific bank and the reliability of the entire financial system.

According to the above methodology, we hereby present the results of our study in Tables 1-10, with comments after each table.

**Table 1: Liquidity1 Ratio Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---------------------------------------|------|------|------|------|------|------|
| Cooperative Bank of Epirus            | 1,23 | 1,32 | 1,08 | 1,08 | 0,97 | 0,88 |
| Cooperative Bank of Thessaly          | 0,96 | 1,05 | 1,30 | 1,29 | 0,97 | 0,96 |
| Cooperative Bank of Karditsa          | 0,74 | 0,54 | 0,68 | 0,64 | 0,61 | 0,59 |
| Cooperative Bank of Central Macedonia | 0,82 | 0,83 | 1,07 | 0,93 | 0,87 | 0,83 |
| Cooperative Bank of Chania            | 0,77 | 0,67 | 0,99 | 1,01 | 0,97 | 0,81 |
| Pancretabank Cooperative Bank a       | 1,23 | 1,23 | 1,63 | 1,56 | 1,43 | 1,20 |
| Cooperative Bank of Drama             | 1,07 | 0,95 | 1,01 | 1,16 | 1,10 | 1,04 |

Source: Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From the above table 1, we can observe that the course of the Liquidity1 Ratio had several fluctuations, mainly increasing for 2013-2014 and decreasing for the remaining years. The cooperative banks of Thessaly and Pankritia were the ones with the highest values on average for the six-year analysis. As it seems there was a liquidity problem never the less for all the Greek Cooperative Banks during the examined time period. This fact means that the Greek Cooperative Bank was influenced very much by the financial crisis that started striking Greece mainly in 2010.

**Table 2: Liquidity2 Ratio Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---------------------------------------|------|------|------|------|------|------|
| Cooperative Bank of Epirus            | 0,85 | 0,95 | 0,91 | 0,90 | 0,82 | 0,71 |
| Cooperative Bank of Thessaly          | 0,84 | 0,87 | 1,18 | 1,18 | 0,89 | 0,90 |
| Cooperative Bank of Karditsa          | 0,60 | 0,47 | 0,58 | 0,54 | 0,51 | 0,51 |
| Cooperative Bank of Central Macedonia | 0,75 | 0,75 | 0,90 | 0,80 | 0,77 | 0,73 |
| Cooperative Bank of Chania            | 0,71 | 0,62 | 0,70 | 0,71 | 0,70 | 0,67 |
| Pancretabank Cooperative Bank         | 1,07 | 1,04 | 1,15 | 1,15 | 1,09 | 0,96 |
| Cooperative Bank of Drama             | 0,84 | 0,95 | 1,01 | 1,05 | 1,01 | 0,98 |

Source: Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From Table 2, we can see a growth of the Liquidity2 Ratio after the year 2014 for at least 2 years, but in 2016, we can see a downward trend. But in the years 2017-2018, we see that there is a standard course of the examined ratio. As we said during the examination of the Liquidity2 Ratio, the Greek Cooperative Banks had to make corrective moves and structural changes in their portfolio while strengthening their funds to avoid liquidity problems in the future.

**Table 3: Liquidity3 Ratio Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---------------------------------------|------|------|------|------|------|------|
| Cooperative Bank of Epirus            | 0,05 | 0,05 | 0,02 | 0,02 | 0,03 | 0,08 |
| Cooperative Bank of Thessaly          | 0,16 | 0,19 | 0,01 | 0,03 | 0,03 | 0,03 |
| Cooperative Bank of Karditsa          | 0,04 | 0,08 | 0,13 | 0,06 | 0,05 | 0,06 |
| Cooperative Bank of Central Macedonia | 0,12 | 0,13 | 0,02 | 0,05 | 0,06 | 0,11 |
| Cooperative Bank of Chania            | 0,03 | 0,03 | 0,02 | 0,02 | 0,03 | 0,04 |
| Pancretabank Cooperative Bank         | 0,05 | 0,09 | 0,02 | 0,01 | 0,06 | 0,16 |
| Cooperative Bank of Drama             | 0,05 | 0,07 | 0,07 | 0,06 | 0,10 | 0,12 |

Source: Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From Table 3, we notice that the Liquidity 3 Ratio of cooperative banks is at very low levels throughout the six-year analysis, and more specifically, it is estimated that the average value does not exceed 0.10, which is quite a low value. Again we see how much the liquidity of Greek Cooperative banks was affected by the financial crisis that started in the year 2010.

## A) Profitability Ratios

**Table 4: Return on Equity (ROE) Ratio for Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  |
|---------------------------------------|-------|-------|-------|-------|-------|-------|
| Cooperative Bank of Epirus            | 0,002 | 2,60  | -0,25 | -0,01 | 0,11  | 0,004 |
| Cooperative Bank of Thessaly          | 0,006 | 0,10  | -0,15 | 0,05  | 0,06  | 0,10  |
| Cooperative Bank of Karditsa          | 0,02  | -0,01 | 0,04  | 0,04  | 0,07  | 0,12  |
| Cooperative Bank of Central Macedonia | 0,67  | 0,49  | -0,32 | -0,03 | -0,08 | -0,07 |
| Cooperative Bank of Chania            | -2,79 | -0,05 | -0,11 | 0,08  | 0,07  | 0,17  |
| Pancretabank Cooperative Bank         | -3,84 | 0,07  | -0,05 | 0,16  | 0,12  | 0,21  |
| Cooperative Bank of Drama             | 0,01  | -0,01 | -0,65 | -0,06 | -0,04 | 0,006 |

*Source: Author's Calculations from Published Financial Statements of Greek Cooperative Banks*

From Table 4, we see that most banks seem to have problems with their equity efficiency, with the ROE ratio showing very low values and even negative values, while for the year 2018, most banks have now returned to the positive values of the ratio and a recovery in equity efficiency is visible.

**Table 5: Return on Equity (ROA) Ratio for Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013    | 2014   | 2015    | 2016    | 2017    | 2018    |
|---------------------------------------|---------|--------|---------|---------|---------|---------|
| Cooperative Bank of Epirus            | 0,0022  | 0,0002 | -0,0134 | -0,0005 | 0,0097  | 0,0003  |
| Cooperative Bank of Thessaly          | 0,0061  | 0,053  | -0,0107 | 0,0034  | 0,0043  | 0,056   |
| Cooperative Bank of Karditsa          | 0,0035  | -0,011 | 0,0057  | 0,0051  | 0,0098  | 0,0143  |
| Cooperative Bank of Central Macedonia | -0,057  | 0,0043 | -0,031  | -0,0022 | -0,0059 | -0,0051 |
| Cooperative Bank of Chania            | -0,127  | -0,002 | 0,0074  | 0,0061  | 0,0056  | 0,0156  |
| Pancretabank Cooperative Bank         | -0,096  | 0,0021 | 0,0028  | 0,0107  | 0,0101  | 0,0097  |
| Cooperative Bank of Drama             | -0,0129 | 0,0027 | -0,076  | -0,0013 | -0,0034 | -0,0003 |

*Source: Author's Calculations from Published Financial Statements of Greek Cooperative Banks*

From the above Table 5, we notice that most banks start with negative values, which reach their peak in the year 2015, but of course, along the way, these negative values are partially corrected or go through some stages of fluctuation until they stabilize.

**Table 6: Net Profit Margin Ratio (NPM) for Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013   | 2014  | 2015  | 2016  | 2017  | 2018  |
|---------------------------------------|--------|-------|-------|-------|-------|-------|
| Cooperative Bank of Epirus            | 1,00   | 0,09  | 2,59  | 0,84  | 1,40  | 0,87  |
| Cooperative Bank of Thessaly          | 0,86   | 13,24 | 2,57  | 1,23  | 1,75  | 1,50  |
| Cooperative Bank of Karditsa          | 4,564  | 1,297 | 0,854 | 1,466 | 1,565 | 1,433 |
| Cooperative Bank of Central Macedonia | -1,47  | 16,19 | 1,82  | -1,74 | 1,48  | 1,45  |
| Cooperative Bank of Chania            | 1,41   | 1,24  | -6,60 | 36,28 | 1,11  | 1,35  |
| Pancretabank Cooperative Bank         | 1,28   | 0,29  | -1,30 | 1,43  | 1,42  | 1,47  |
| Cooperative Bank of Drama             | -32,26 | -2,14 | 1,48  | 1,30  | 1,24  | -0,02 |

*Source: Author's Calculations from Published Financial Statements of Greek Cooperative Banks*

From Table 6 above, we observe that there was great volatility during the years 2013-2015. Afterwards, the course of this ratio begins to be standard and more or less the same for all banks until the year 2018. An exception is the Net Profit Margin Ratio of Cooperative Bank of Chania which had the highest value from all banks in the year 2016 and the highest value of all the examined periods.

**Table 7: Net Interest Margin (NIM) Ratio Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|----------------------------|------|------|------|------|------|------|
| Cooperative Bank of Epirus | 0,27 | 0,08 | 0,05 | 0,05 | 0,03 | 0,03 |

|                                       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|
| Cooperative Bank of Thessaly          | 0,08  | 0,06  | 0,07  | 0,06  | 0,05  | 0,05  |
| Cooperative Bank of Karditsa          | 0,030 | 0,029 | 0,029 | 0,029 | 0,026 | 0,029 |
| Cooperative Bank of Central Macedonia | 0,09  | 0,07  | 0,06  | 0,03  | 0,04  | 0,04  |
| Cooperative Bank of Chania            | 0,07  | 0,06  | 0,06  | 0,04  | 0,04  | 0,05  |
| Pancretabank Cooperativ-e Bank        | 0,04  | 0,04  | 0,05  | 0,05  | 0,04  | 0,04  |
| Cooperative Bank of Drama             | 0,03  | 0,03  | 0,01  | 0,03  | 0,03  | 0,03  |

**Source:** Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From Table 7, we see that in the year 2014, a decrease is observed in Net Interest Margin for all cooperative banks and in particular, the Cooperative Bank of Epirus shows a drop in the index up to three times. In 2015 and 2016, we had a drop again in all prices, but for the years 2017 and 2018, the percentages in the net interest margin remained stable in all seven cooperative banks.

### B) Solvency Ratio (SR)

**Table 8: CAD Ratio Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years     | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|-------------------------------|------|------|------|------|------|------|
| Cooperative Bank of Epirus    | 0,11 | 0,12 | 0,05 | 0,05 | 0,08 | 0,07 |
| Cooperative Bank of Thessaly  | 0,10 | 0,05 | 0,07 | 0,07 | 0,07 | 0,06 |
| Cooperative Bank of Karditsa  | 0,18 | 0,11 | 0,14 | 0,14 | 0,14 | 0,12 |
| Cooperative Bank of Central   | 0,09 | 0,08 | 0,10 | 0,08 | 0,08 | 0,08 |
| Cooperative Bank of Chania    | 0,05 | 0,04 | 0,07 | 0,07 | 0,08 | 0,09 |
| Pancretabank Cooperative Bank | 0,03 | 0,03 | 0,06 | 0,07 | 0,08 | 0,05 |
| Cooperative Bank of Drama     | 0,11 | 0,16 | 0,12 | 0,09 | 0,08 | 0,07 |

**Source:** Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From Table 8, we see that there are different courses for the CAD Ratio of the examined cooperative banks and different volatilities. The value of the CAD Ratio for all cooperative banks gathered with a common spot in the year 2017. Afterwards, volatility starts to change again. It is pointed out that the Cooperative Bank of Karditsa had the highest value during the examined period except the year 2014.

**Table 9: Total Borrow Capacity Ratio Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---------------------------------------|------|------|------|------|------|------|
| Cooperative Bank of Epirus            | 0,84 | 0,93 | 0,94 | 0,94 | 0,91 | 0,92 |
| Cooperative Bank of Thessaly          | 1,00 | 0,99 | 0,92 | 0,92 | 0,93 | 0,94 |
| Cooperative Bank of Karditsa          | 0,80 | 0,89 | 0,85 | 0,86 | 0,86 | 0,88 |
| Cooperative Bank of Central Macedonia | 0,91 | 0,91 | 0,90 | 0,90 | 0,91 | 0,92 |
| Cooperative Bank of Chania            | 0,95 | 0,95 | 0,92 | 0,92 | 0,91 | 0,90 |
| Pancretabank Cooperative Bank         | 0,97 | 0,85 | 0,93 | 0,93 | 0,91 | 0,95 |
| Cooperative Bank of Drama             | 0,79 | 0,84 | 0,88 | 0,91 | 0,91 | 0,94 |

**Source:** Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From Table 9, we noticed that there is no volatility at all, and all the values of the Total Borrow Capacity Ratio are approximately the same for all cooperative banks from 2015 until the end of our time period, which is 2018. During the years 2013 and 2014, there were low differences in the values of this ratio.

### C) Bankruptcy Z-Score Model

**Table 10: Z-Score Model for Greek Cooperative Banks 2013-2018**

| Cooperative Banks / Years             | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  |
|---------------------------------------|-------|-------|-------|-------|-------|-------|
| Cooperative Bank of Epirus            | 0,17  | 0,11  | -1,69 | 0,002 | 1,40  | 0,14  |
| Cooperative Bank of Thessaly          | 0,25  | 0,91  | -1,56 | 0,65  | 0,78  | 0,96  |
| Cooperative Bank of Karditsa          | 0,60  | -1,18 | 0,82  | 0,75  | 1,28  | 1,78  |
| Cooperative Bank of Central Macedonia | -2,34 | 0,21  | -1,25 | 0,12  | -0,21 | -0,18 |
| Cooperative Bank of Chania            | -2,35 | -0,03 | -0,12 | 0,12  | 0,12  | 0,30  |

|                               |       |      |       |       |       |      |
|-------------------------------|-------|------|-------|-------|-------|------|
| Pancretabank Cooperative Bank | -2,28 | 0,05 | -0,05 | 0,27  | 0,25  | 0,24 |
| Cooperative Bank of Drama     | -0,36 | 0,05 | -2,52 | -0,16 | -0,08 | 0,03 |

**Source:** Author's Calculations from Published Financial Statements of Greek Cooperative Banks

From Table 10, we observe that four of the seven cooperatives have a negative sign in the Z-score index, but the remaining three also have very low positive signs, which place them in the red area. The banks of Chania, Pancretabank and Central Macedonia show the lowest indicators, while the highest is the Bank of Karditsa.

#### IV. CONCLUSION

A key problem that cooperative banks face that affects their financial size is that they cannot invest large amounts of capital in new technologies due to economies of scale. This creates additional costs for the customer and takes away revenue that would come from them. Moreover, in times of crisis - such as the present one - it is difficult for them to deal with the reservations of depositors. This contributes to the increase in interest rates, while they are not able to do the same with the loan rate, resulting in negative balance and liquidity problems.

By investigating and evaluating the liquidity, efficiency, solvency, and eventual occurrence of the possibility of filing for bankruptcy for the Greek cooperative banks shortly after the worldwide economic downturn and prior to the start of the pandemic, we find that the economic downturn basically had a negative impact on the profitability of all cooperative banks in Greece, occasionally less and frequently even more. Therefore, to improve the financial figures of the Greek cooperative banks in the future, perhaps a good option is to increase their operating profits by reducing their operating costs and better using their existing assets to generate more profitable sales. Thus, with the help of withholding future increased profits, they may achieve a partial increase in their funds.

The negative profits of the cooperative banks are observed mainly during the years 2013-2015, when the country experienced its worst economic course forcing most banks into mergers or acquisitions to remain competitive and protect themselves from bankruptcy. A characteristic feature of these years was also the help of the banks from the financial stability fund through lending, hence the positive results that may interfere with the negative sequence between 2013 and 2015.

Unfortunately, things seem difficult for the Greek cooperative banks, where they will be called upon to operate rationally and methodically in order to avoid imminent bankruptcy, according to our pessimistic findings from the use of the bankruptcy model. It should be noted that after the period under review and after the end of the pandemic, which also contributed to the reduction of the profitability of the cooperative banks, some Greek cooperative banks have merged but have nevertheless suspended their operations, unable to cope with the high operating costs and the ongoing financial crisis that has plagued Greece for over a decade.

#### V. REFERENCES

- [1] Alger. G, Agenor. P, and Alger. G, *Liquid Assets in Banking: Theory and Practice*, Boston: Chestnut Hill, (1990).
- [2] Arkan T. "The Importance of Financial Ratios in Predicting Stock Price Trends: A Case Study in Emerging Markets," *Finanse, Rynki Finansowe, Ubezpieczenia*, 79(1) (2016) 13–26.
- [3] Bordo. M, Eichengreen. B, Klingebiel. D, and Martinez-Peri, M, "Is the Crisis Problem Growing More Severe?," *Economic Policy*, 16(32) (2001) 51-82.
- [4] Boyd. J. H, and Graham. S. L, "Risk, Regulation, and Bank Holding Company Expansion into Nonbanking," *Quarterly Review*, 10(2) (1986).
- [5] Boyd J. H, and Runkle D. E, "Size and Performance of Banking Firms: Testing the Predictions of Theory" *Journal of Monetary Economics*, 31(1) (1933) 47-67.
- [6] Drehmann. M, and Nikolaou. K, "Funding Liquidity Risk: Definition and Measurement" *BIS Working Papers: No.316 Monetary and Economic Department*, (2010).
- [7] Garber P.M, and Weisbrod S.R. "The Economics of Banking, Liquidity, and Money". Lexington, Mass: D.C. Heath, (1992).
- [8] Gikas. D, "The Analysis and Uses of Accounting Statements", Book Published by Benou, Athens, Greece, (2002).
- [9] Hannan T. H, and Hanweck G. A "Bank Insolvency Risk and the Market for Large Certificates of Deposit," *Journal of Money, Credit and Banking*, 20 203-211(1988).
- [10] Kantzos. K, "Analysis of Financial Statements", INTERBOOKS Publications, Athens, Greece, (1997).
- [11] Karafolas Simeon "The Greek Cooperative Credit System" *Book Credit Cooperative Institutions in European Countries* published by Springer, 111-126 (2016).
- [12] Melese N.L "Determinants of Banks Liquidity: Empirical Evidence on Ethiopian Commercial Banks," *Journal of Economics and Sustainable Development*, 6(15), 36-46 (2015).
- [13] Niarchos. N, "Financial Analysis of Financial Statements," Book Published by Ath. Stamoulis, Athens, Greece, (2004).
- [14] Nguyen Tran Thai Ha, and Phan Gia Quyen, "The Impact of Funding Liquidity on Risk-taking Behaviour of Vietnamese Banks: Approaching by Z-Score Measure," *International Journal of Economics and Financial Issues*, 8(3) (2018) 29-35.
- [15] Petropoulos D, and Kyriazopoulos G, "Profitability, Efficiency and Liquidity of the Cooperative Banks in Greece" *International Conference of Applied Economics ICOAE*, (2010).
- [16] [www.este.gr](http://www.este.gr)
- [17] <https://www.financestrategists.com/accounting/financial-statements/dupont-analysis/>