Scientific Research Publishing

Journal of Financial Risk Management, 2023, 12, 295-309
https://www.scirp.org/journal/jfrm
ISSN Online: 2167-9541
ISSN Print: 2167-9533

Consequences of the Financial Crisis and Capital Adequacy in Greek Banks

Simeon Karafolas[1], Vaia Stergiou[2]

[1]Department of Accounting and Finance, University of Western Macedonia, Kozani, Greece
[2]Cooperative Bank of Thessaly, Trikala, Greece
Email: skarafolas@uowm.gr, vikystergiou@gmail.com

How to cite this paper: Karafolas, S., & Stergiou, V. (2023). Consequences of the Financial Crisis and Capital Adequacy in Greek Banks. *Journal of Financial Risk Management, 12,* 295-309.
https://doi.org/10.4236/jfrm.2023.124016

Received: September 2, 2023
Accepted: October 24, 2023
Published: October 27, 2023

Copyright © 2023 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/

Open Access

Abstract

Distinct from other countries, in Greece, the global financial crisis continued during the decade 2010 and became an economic crisis resulting in a recession. It resulted from implementing measures aimed at reducing Greece's high public debt, as the country had reached an agreement with the European Union and the International Monetary Fund on public borrowing. Unlike other countries, public debt is at the core of the Greek crisis. The economic crisis has primarily affected the Greek banking system, capital banks, and specialized credit institutions such as cooperative banks. The economic depression during the decade was reflected in the banks' activities and results, while in the middle of the decade, it led to a considerable increase in non-performing loans. In addition to these consequences, most Greek banks suffered from the halving of the value of Greek bonds in 2011, as they were involved in financing the Greek government. The generalization of these phenomena distinguishes the Greek case from other banking systems while limiting the argument of poor management for the outcomes of the banking crisis in Greece. Banks' difficulty meeting the capital requirements set out in the Basel Regulations III was a vital component of the banking crisis. As a result of these difficulties, some banks were unable to meet the requirements and were forced to close or be sold by their parent banks. In the case of a particular category of banks, the so-called economically significant banks, there was substantial public support for capitalization, contrary to the other banks, which had to raise the necessary capital themselves. This article examines the impact of capital requirements on bank development, both for capital and cooperative banks, and also attempts some comparative accounts between them.

Keywords

Bank, Capital Adequacy, Cooperative Bank, Financial Crisis, Greece

1. Introduction

The decade of 2010 was characterized for the Greek economy by a deep economic crisis with severe consequences for the banking system. The high level of public debt, which the Greek government could not service in 2010, led to financing by the European Central Bank, the European Commission, and the International Monetary Fund. The financing was followed by an austerity program that triggered a severe recession in the Greek economy for much of the following decade. Greek banks suffered the consequences of this program with the slowdown of activities, the loss of deposits, and, most importantly, the sharp increase in non-performing loans (NPLs). In addition, many Greek banks suffered heavy losses due to the halving of the value of the Greek bonds in which they were engaged after the private sector involvement (PSI) program, based on which, in 2011, new bonds replaced old bonds, having half of the old value. The main argument of the Greek state for the creation of the PSI was the risk of the immediate bankruptcy of the Greek state and, consequently, the suspension of any payment from the Greek state. The PSI caused additional losses for the participating banks. As a result, Greek banks struggled to meet capital requirements. Apart from four banks classified as important for the economy, which received continuous and substantial support, the others had to raise the necessary funds for their recapitalization, mainly from the private sector. Several banks that could not complete their recapitalization were forced to close, be taken over by their parent bank, or be sold. The consequences affected commercial and cooperative banks and led to significant changes in the Greek banking system, which was characterized by a sharp decline in the number of banks and an excessive concentration of the banking system in four banks at the end of the decade.

This article aims to examine the consequences that the crisis of the 2010s had on the Greek banking system, especially in the context of the capital adequacy problem. What actions did these banks take or decide to take, and what were the consequences for the banking system? After the introduction, the second section reviews the characteristics of the banking crisis, mostly European cases, to date. Section 3 discusses some of the critical macroeconomic parameters of the Greek crisis. Section 4 addresses the issue of capital adequacy and its implications for Greek banks. Section 5 examines the changes in the Greek banking market, while the final section concludes.

2. Literature Review of Crisis Results over the Banking Systems

Banks' behavior and the crisis's impact on banks' functioning and outcomes have been the subject of several papers that have focused on a country or a panel of countries or have undertaken a comparative study between capital banks and cooperative banks.

Some studies focused on the issues of supervision and capitalization. Cihak et al. (2012) found that the crisis had a more significant impact on countries with

less stringent capital policies and lower actual capital ratios, fewer restrictions on nonbank activities, bad loans and loan losses, and supervision of banks' risks. Parrado-Martinez et al. (2014) reached the same conclusions, assuming that structural deficiencies and the lack of macro-prudential supervisory and regulatory mechanisms differentiated the global crisis across countries. The gap between financial innovation and regulatory updating could explain the banking crisis, according to Hamdaoui and Maktouf (2020). Jorda et al. (2021) concluded that a better-capitalized bank system could recover faster from the financial crisis.

Other studies have focused on banking activities. Creel et al. (2021) studied a panel of EU countries over the period 1998-2012 and found a positive effect of credit on bank fragility in the euro area but not in the periphery of the EU. They also found a negative effect of bank fragility on lending for the EU as a whole. Keffala (2018) using data from 22 Italian commercial banks from 2005-2015, concluded that derivatives should not be considered a cause of fragility in the Italian banking system. Pereira et al. (2018) used panel data from OECD countries for 21 years and found that a country's high bank leverage and slow gross domestic product (GDP) growth are the main determinants of a banking crisis.

Other studies focused on the comparative behavior of capital and cooperative banks. In several studies, cooperative banks exhibit more prudent behavior and perform better than capital banks (Bazot et al., 2019). In the case of France, cooperative banks responded better to the crisis than capital banks (Ory, 2019; Richez-Batesti & Leseul, 2016). Groeneveld (2016) came to the same conclusion for the Netherlands. Paceli et al. (2019) in a study of mutual banks in Italy, Germany, France, and Spain, concluded that European mutual banks have a higher degree of efficiency than commercial banks. Efficiency is related to the efficiency of traditional lending, the degree of prudence in provisioning for credit risks, and the level of liquidity. It appears that the structure of assets based on traditional banking operations had a higher profitability during the crisis (Groeneveld & de Vries, 2009), which is to be expected since the main problems of the crisis resulted from risky operations in which cooperative banks had little involvement, given their philosophy of supporting their members, which are usually small businesses. Similar conclusions are also reached by Migliorelli (2018), who notes that the analysis shows that cooperative banks outperformed other types of banks in lending in Germany and throughout the northeastern half of the euro area, while no significant differences were observed for the rest of the continent. The main reason for this phenomenon is likely to be found in the impact of non-performing loans on the capitalization of cooperative banks and the decision to reduce leverage by restricting lending. In the case of Finland, the two largest cooperative banking groups, the OP group and the POP group, which have a sound capital structure, were exemplary (Kalmi, 2016). These conclusions were also reached by Birchall and Ketlison (2009), who argue that customer-owned cooperative banks were more stable and efficient than large traditional banks during the crisis. In the Greek case, Hardouvelis (2021) pointed out the relation of non-

performing exposures with the financial crisis.

3. The Greek Economic Crisis

In Greece, the financial crisis 2008 turned into an economic crisis in the following decade due to the sovereign debt crisis. The Greek state, having a public debt estimated at 127% of GDP at the end of 2009 and a public deficit estimated at 15.2% of GDP, could not resort to private capital to finance its debt and, in particular, to repay the bonds that matured in 2010 (Karafolas, 2019). The recourse to the European authorities (European Commission and European Central Bank) and the International Monetary Fund was necessary to finance these needs and to meet the needs for the functioning of the state (Bank of Greece, 2014). The new indebtedness of the Greek state has led to implementation of a rigorous austerity program aimed at reducing the public deficit immediately and, in the longer term, the public debt and transforming the Greek economy. The consequences of this economic policy were significant in the following decade, leading to a recession of the Greek economy, characterized by a decrease in GDP and a very significant increase in unemployment (**Table 1**). In the second half of the 2010s, especially from 2017, the economy recovered but reversed in 2021 due to the COVID pandemic. Banks also suffered the consequences of this recession, as deposits decreased especially the first half of the decade and banks' loans. However, the most important consequence was the extraordinary growth of non-performing loans (NPLs); these increased from 10% of all loans in 2009 to 49% in 2016 before finally falling to 33% in 2020 and in 8% in 2022, due to the most strict loan policy and in particular to the purchase of NPLs by Special Purpose Vehicles (see Karafolas & Ktenidou, 2019, and Hardouvelis, 2021).

4. The Issue of Greek Banks in the Face of Crisis and Capital Adequacy

4.1. Crisis Problems and Capital Adequacy

The Greek case represents a particularity for the study of the consequences of the 2008 financial crisis since the Greek economic and financial crisis was much longer and deeper compared to the other countries due to the particular problems of the country, especially the public debt and the austerity program put in place after the global financial crisis. In the case of Greece, all banks faced severe problems, including the large traditional banks. The results of these banks could have been better, and their survival depended on public aid. So, is it managerial inadequacy, as questioned by Bancel and Boned (2014) that led to the problems of Greek banks? The answer would be yes if it affected only certain banks, and some Greek banks have withstood the crisis better than others; this could result from more appropriate management. However, it is necessary to highlight the general nature of the crisis in the Greek banking market in the decade of 2010, which affected both cooperative and capitalist banks. It is significant that, in mid-2010, NPLs accounted for around 50% of total loans in both corporate and retail lending (**Figure 1**).

Table 1. Evolution of macroeconomic parameters in Greece, annual evolution (%).

	Gross domestic product, (in current prices)	Annual unemployment	Loans	Deposits	Non-performing loans as part to total loans
2009	−1.8	9.6	0.7	4.4	10
2010	−5.6	12.7	6.1	−11.8	14
2011	−9.3	17.9	−3.3	−16.9	22
2012	−7.3	24.4	−8.1	−7.3	31
2013	−4.7	27.5	−4.5	1.1	40
2014	−1.3	26.5	−2.7	−1.8	44
2015	−0.7	24.9	−3.5	−23.0	48
2016	−1.1	23.5	−4.6	−1.6	49
2017	1.7	21.5	−5.9	4.1	47
2018	1.5	19.3	−7.7	6.4	45
2019	2.1	17.8	−9.7	6.4	40
2020	−9.6	17.6	−6.8	14.0	33
2021	9.8	12.9	−21.9	10.3	12
2022	14.7	11.6	6.1	4.9	8
Average 2009/2022	−0.8	19.1	−4.7	−0.8	32

Sources: Bank of Greece (2023a, 2023b) and Hellenic Statistical Authority (2023), (authors' calculations).

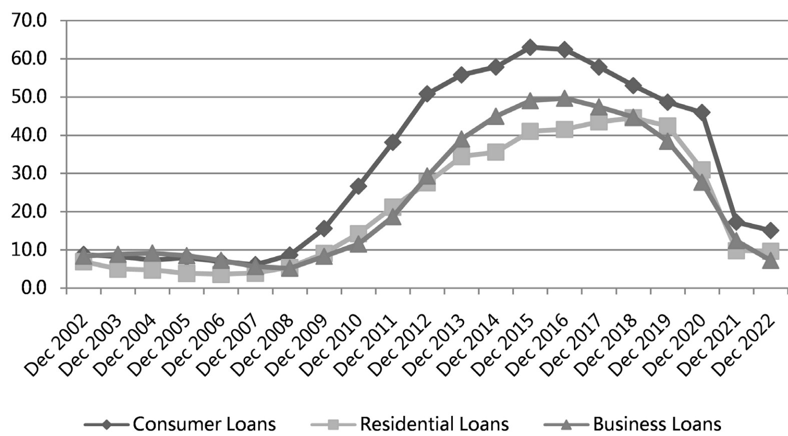

Figure 1. Non-Performing Loans ratio by loan category, (%). Source: Bank of Greece (2023a), (authors' calculations).

NPLs have been a primary consequence of the financial crisis and caused a critical problem for the banks' adequacy, see also Karafolas & Ktenidou (2019), and Hardouvelis (2021).

NPLs's issue was even more critical in the case of cooperative banks, as these banks were opened mainly with these loans rather than with public financing,

which has a risk ratio of 0%. NPLs must also be combined with the massive decline in activity in specific sectors of the economy, such as real estate construction, which has always been the locomotive of the Greek economy. As a result, there has been a sharp decline in property loans offered by banks. We find the same problem in the Italian case, particularly concerning the risk of mortgages for Banche de Credito Cooperativo (Catturani & Stefani, 2016). At the same time as this decline in activity, the fall in income and unemployment led to a decline in consumption and consumer credit. In this context, the study of Greek banks during the Greek crisis must be seen.

The Greek banks, as a whole, faced a severe problem of capital adequacy imposed by the international prudential standards, especially the "Basel III" requirements (Karafolas & Kleanthous, 2019). The issue of bank capital was raised as early as 1988 within the Bank for International Settlements by the Basel Committee, which established a solvency ratio called the "Cooke coefficient", which expresses the ratio of capital to risk-weighted assets (Bank for International Settlements, 2015; Delaite, 2012). This agreement was implemented in 1992 in the countries represented in the Basel Committee. It was followed by a second agreement ("Basel II"), which came into force in January 2008 in the European Union, and a third ("Basel III"), which came into force in 2013 in the context of the supervision of financial institutions (European Union, 2013). The focus is on common equity, the minimum level of which is raised to 4.5% of risk-weighted assets but must rise to 8% and even 12% if circumstances so require. The Greek economic crisis has hurt both banks' activity and results, leading to severe problems with bank equity. Non-performing loans, in particular, have led to significant risk provisions. These provisions are deducted from the banks' profits, resulting in lower profits and even losses for the banks. The losses for the year are transferred by deduction from the bank's equity, which leads to a reduction in the bank's equity. Consequently, the bank is forced to increase its equity as a shareholder or cooperative to meet the capital requirements set by Basel III. All Greek banks have been forced to increase their equity capital.

Among them, four banks have received financial support from the Financial Stability Fund to ensure the necessary increase in equity. Alpha Bank, Eurobank, National Bank of Greece, and Piraeus Bank are essential for the economy (European Central Bank, 2017). These banks passed under the control of the Financial Stability Fund (FSF), which became the main shareholder. The other banks had to raise the necessary capital from private funds from old or new shareholders.

4.2. Banks That Have Been Sold or Whose License Has Been Revoked

Among banks that have had their license revoked or sold, a distinction can be made between capital and cooperative banks, large banks, and small banks based on assets. Of the capital banks, two are under state control, and three others are subsidiaries of foreign banks (**Table 2**).

Table 2. Banks with license revoked or sold.

Bank concerned	Assets, €million, (end 2010)	Year of revocation of license or sold	Acquirer of the bank
Capital banks			
Banks under state control			
Agricultural Bank of Greece	31,200	2012	Piraeus Bank
Post Bank	237	2013	Eurobank
Subsidiaries of foreign banks sold			
Emporiki Bank	26,700	2012	Alpha Bank
Geniki Bank	4566	2012	Piraeus Bank
Millenium Bank	6213	2013	Piraeus Bank
Other capital banks			
Proton Bank	4255	2014	Eurobank
Pro Bank (assets, 2013)	3103	2013	NBG(*)
T Bank (**)	2700	2011	Eurobank
FBB First Business Bank (assets, 2013)	1382	2013	NBG
Pannelinia Bank (assets, 2009)	841	2015	Piraeus Bank
Cooperative banks			
Dodecanisos Cooperative Bank	311	2013	Alpha Bank
Ahaiki Cooperative Bank	300	2012	NBG
Peloponisos Cooperative Bank	137	2015	NBG
Evia Cooperative Bank	131	2013	Alpha Bank
Lamia Cooperative Bank	89	2013	NBG
West Macedonia Cooperative Bank	85	2013	Alpha Bank
Lesvos-Limnos Cooperative Bank	80	2012	NBG

(*) National Bank of Greece. (**) Acquired after revocation of license as subsidiary of the Post Bank. Source: Authors' calculations based on banks' annual reports.

4.2.1. Capital Banks

a) Banks under state control

Agricultural Bank of Greece (ABG) was a bank that specialized in agricultural activities, listed on the Athens Stock Exchange, but its main shareholder was the Greek state. The bank suffered from negative results due to NPL and primarily to ABG's participation in the Private Sector Involvement Program (in which old Greek government bonds were exchanged for new bonds at half price). PSI ABG's losses amounted to €4329 million in 2011, much higher than the banks' equity (Table 3). In March 2012, the Bank of Greece proposed the consolidation of ABG through a purchase and acquisition process. In July 2012, the FSF approved Piraeus Bank's offer, and the Bank of Greece transferred ABG's activities to Piraeus Bank. However, as the transferred assets had a lower nominal value

Table 3. Private sector involvement consequences on Greek banks, (estimations on May 2012, in €million).

Banks	Main core reference equity	Total gross losses due to PSI (December 2011)	Previsions related to PSI (June 2011)
National Bank of Greece	7287	−11,735	1646
Eurobank	3515	−5781	830
Alpha Bank	4526	−4786	673
Piraeus Bank	2615	−5911	1005
Emporiki Bank	1462	−590	71
Agriculture Bank of Greece	378	−4329	836
Post Bank	557	−3444	566
Millenium Bank	473	−137	0
Geniki Bank	374	−292	70
Attica bank	366	−142	53
Probank	281	−295	59
Neo Proton Bank	57	−216	48
FBB	145	−49	0
Panellinia Bank	82	−26	3
Total	**22,118**	**−37,733**	**5860**

Source: Bank of Greece, 2012.

than the liabilities, the FSF covered the difference with €7471 million in January 2013 by providing Piraeus Bank with EFSF bonds; in addition, an amount of €570 million was issued against ordinary shares to achieve the recapitalization. The price paid for Piraeus' acquisition of ABG was €95 million (European Commission, 2015).

Post Bank was a Greek savings bank founded in 1902 and, since 2006, listed on the stock exchange under state control. In 2010, Post Bank acquired 32.9% of the share capital of T Bank. As in the case of ABG, Post Bank faced severe losses due to its participation in the PSI program; its losses reached €3444 million, much higher than the bank's equity, **Table 3**. The losses from PSI and those due to NPL severely affected the capital adequacy and, consequently, the bank's recapitalization. In January 2013, the Bank of Greece proceeded with the dissolution and liquidation of the bank and the creation of a transitional credit institution. The share capital of the transitional credit institution was set at €500 million and was fully paid by the FSF (in the form of FSF bonds), who became the sole shareholder. The newly founded bank received an operating license from the Bank of Greece and was capitalized with €4.6 billion from the Financial Stability Fund. Eurobank acquired the new banking institution, having the best offer (European Commission, 2014). According to the offer, Eurobank had to pay

the FSF the amount of €681 million to acquire 100% of the bank's share capital in the form of new Eurobank common shares.

b) Subsidiaries of foreign banks

In the case of the three subsidiaries of foreign banks, Emporiki Bank, Geniki Bank, and Millenium Bank, the losses and difficulties they faced led the parent banks Crédit Agricole, Société Générale and Banco Comercial Portugues, respectively, to sell them.

In the case of Emporiki Bank, its parent bank, Crédit Agricole, allocated significant funds to successive share capital increases that did not have the expected consolidation results of the Greek subsidiary, burdening the results of the parent Crédit Agricole. Emporiki Bank's negative results resulted from both NPLs and the bank's losses with PSI participation. In 2012, the parent bank decided to sell Emporiki Bank by initially boosting its capital and selling it to Alpha Bank. According to the terms of the acquisition (Alpha Bank, 2012), Crédit Agricole had to pay €2.85 billion for the capital reinforcement of its subsidiary. Crédit Agricole also had to buy a €150 million bond issued by Alpha Bank convertible into shares. Alpha Bank acquired all the issued shares of Emporiki Bank for a symbolic purchase price following the terms and conditions set by the Financial Stability Fund. With this agreement, the consolidated bank is capitalized by €3 billion.

In the case of Geniki Bank, this bank faced severe adverse losses from the PSI program in addition to the NPLs problems, **Table 3**. As a result, the parent bank Société Générale decided to sell its Greek subsidiary, Geniki Bank. The resulting negotiations in October 2012 led to the purchase by Piraeus Bank. As part of the transaction, Société Générale agreed to invest a total of €460 million in the Piraeus Group. This amount consisted of a capital contribution from Société Générale to Geniki Bank for €290 million and the subscription of a bond issued by Piraeus Bank for an amount of €170 million. Piraeus Bank subsequently acquired Geniki Bank for €1 million (European Commission, 2015).

In the case of Millennium Bank in Greece, the parent bank, Banco Comercial Portugues (BCP), decided to sell its subsidiary to Piraeus Bank in April 2013. According to the agreement, BCP contributed €400 million to the recapitalization of MBG by converting existing intra-corporate financing provided by BCP to MBG of €261 million and the €139 million invested by BCP in Millennium Bank in December 2012. Piraeus Bank would then acquire a fully recapitalized MBG for €1 million. In June 2013, the acquisition of MBG was accomplished (European Commission, 2015).

c) Other capital banks

For some other small private banks, losses due to NPLs and, in some cases, essential losses from the PSI program created severe previsions that negatively affected the equity capital. Negative equities were so crucial that banks could not meet the capital requirements; therefore, the Bank of Greece ordered the revocation of the license of these banks. Proton Bank, an investment bank with an essential portfolio of Greek bonds, had significant losses due to the PSI program,

Table 3, which in conjunction with NPLs, could not meet capital requirements. So in 2014, after the operating license was revoked, FSF, owner of the bank, sold all its shares of Proton Bank to Eurobank for €1 (European Commission, 2014). Before the sale, the FSF had the obligation to cover the capital needs of Proton Bank with an amount of €395 million.

First Business Bank (FBB) could also not raise the required funds for its recapitalization. Consequently, in 2013, the Bank of Greece decided to sell the bank to the National Bank of Greece. Bank of Greece estimated the financing gap of FBB to be €457 million, which the FSF paid in the form of FSF bonds (European Commission, 2014a).

In 2013, the Bank of Greece decided, first, to revoke ProBank's operating license since the bank's equity was negative by €15.9 million, made the bank carry out its recapitalization and then the transfer of the bank's assets to the National Bank of Greece (Bank of Greece, 2013a, 2013b).

Panellinia Bank was the capital bank created by Greek cooperative banks and the participation of the German cooperative bank, DZ Bank (Karafolas, 2016). In 2015, the Bank of Greece decided to revoke Panellinia's license since the bank was not able to achieve recapitalization. The bank was sold in 2015 to the Piraeus Bank (Bank of Greece, 2015).

4.2.2. Cooperative Banks

Cooperative banks were forced to appeal to their members or new members to find the necessary capital. Seven cooperative banks failed to raise the necessary capital because they had suffered considerable operating losses, which caused the reduction of equity. Table 4 presents the necessary capital needs estimated by the Bank of Greece in order to meet the requirements of "Basel III". The problem of non-performing loans appears clearly (in the case of available data).

The non-performing loans were such that the banks under consideration needed considerable sums, given their size, to obtain the necessary capital. In this economic environment, seven cooperative banks did not succeed, and as a result, the Bank of Greece revoked its license to operate.

5. A Radical Change in the Banking Market

The acquisitions of the banks resulting from the revocation of the license and the sales of the subsidiaries created a new landscape in the Greek banking market. From a total of 66 banks of any form in 2009, only 19 banks existed in 2021, Table 5. In particular, for the cooperative banks, the capital requirements caused further changes; Pagritia Bank, the most important cooperative bank, decided in 2020 to transform into a capital bank, losing its character as a cooperative bank. Four other cooperative banks decided to merge; in 2018, the Cooperative Bank of Drama merged with the Cooperative Bank of Evros by absorbing the second, and the Cooperative Bank of Serres merged with the Cooperative Bank of Pieria, creating the Cooperative Bank of Central Macedonia. Thus, at the end of 2022, five cooperative banks with a regional character are operating.

Table 4. Revocation of License to Operate Cooperative Bank in Greece (amounts expressed in €million).

Cooperative bank concerned	Capital estimated as provision for NPLs	Capital necessary (*)	Capital achieved
Cooperative Bank Ahaiki	n.a.	8.1	n.a.
Cooperative Bank of Dodecanisos	22.5	10.6	5.3
Cooperative Bank of Evia	8.8	6.1	0.34
Cooperative Bank of Lamia	n.a.	1.1	n.a.
Cooperative Bank of Lesvos-Limnos	n.a.	9.6	n.a.
Cooperative Bank of West Macedonia	10.36	12.98	5.2
Cooperative Bank of Peloponisos	n.a.	14.3	0.46

(*) Capital required to be reached according to "Basel III", estimated by the Bank of Greece. n.a. Not available. Source: Bank of Greece, 2020, (author's calculations).

Table 5. Number of banks in Greece.

Banks	2009	2022
Banks based in Greece	20	10
Foreign banks with branches in Greece	30	3
Cooperative banks	16	5
Total banks	66	19

Source: Hellenic Bank Association, 2023; Association of Co-operative Banks of Greece, 2023.

The reduction of banks resulted in the large concentration of the banking sector in four banks, Alpha Bank, Eurobank, National Bank of Greece, and Piraeus Bank. At the end of 2022, these banks had approximately 96% of bank assets in Greece, which presents the highest banking concentration in the European Union (European Central Bank, 2023). This development allows, to a certain extent, the more significant capital strengthening of banks; conversely, the concentration reduces the possibilities of competition between banks. Most importantly, any adverse development in one or more of these banks, either on capital adequacy or banking activities, will seriously impact the banking system and, by extension, the entire Greek economy.

6. Conclusion

The Greek economic crisis of the 2010s caused a profound change in the entire Greek banking system. Banks faced serious capital adequacy problems because of the negative results they presented in the decade from 2010 to 2020. A question that arises is why the banks reach the point of problematic capital adequacy. Greek banks suffered the consequences of the financial crisis that turned into a prolonged decade-long economic recession. The euphoria in the 2000s and the remarkable growth of loans, especially consumer loans, seriously affected non-

performing loans for these same banks. Here, better banking operations management would have brought fewer negative consequences; this is true to an extent. However, the banks' management policy was significantly affected by the borrowing problems of the Greek state in two ways. The high public debt forced the Greek state to go into borrowing following a rigorous fiscal policy that also brought about the economic recession in the following decade. In addition, the Greek banks participating in the lending of the Greek state were obliged to reduce this lending by half through the PSI program. In several banks, the impairment of Greek bond debt exceeded their capital capacity, causing severe problems in their capital adequacy. In this context, the Greek case differs from other countries.

The lack of capital adequacy resulted in the end of the function of many banks; the four big banks in Greece acquired them. Due to this development, 96% of the total banking assets are held, with approximately the same participation, by just four banks at the end of 2022 (European Central Bank, 2023). This concentration is worrying, especially since the survival of these banks was possible thanks to public financial support and not the result of profitable banking operations during this period. New banking pillars that will reduce massive banking concentration are essential; however, any attempt should be based on sound banking practices and the necessary capital adequacy. Encouraging signs are emerging for the banking system. Banks now have more robust capital adequacy. Some, such as cooperatives, accept strengthening through mergers. The recent problematic period enforced the supervision policy of banking activities and led to a less aggressive lending policy.

Acknowledgements

Part of the paper refers to the results of a diploma thesis presented for the MSc "Banking-Insurance and Finance" at the University of Western Macedonia, Greece. Authors thank anonymous reviewers for their helpful comments which improved the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Alpha Bank (2012). *Alpha Bank Acquires the Entire Share Capital of Emporiki Bank S.A.* Alpha Bank Press Release. https://www.alpha.gr/-/media/alphagr/files/group/press-releases/en/deltio_typou_20121017en.pdf

Association of Co-Operative Banks of Greece (2023). *Cooperative Banks Members.*

Bancel, J.-L., & Boned, O. (2014). Après la faillite de co-op Bank, quelles perspectives pour la gouvernance des coopératives bancaires? *RECMA, 333,* 108-113. https://doi.org/10.7202/1026047ar

Bank for International Settlements (2015). *A Brief History of the Basel Committee.* https://www.bis.org/bcbs/

Bank of Greece (2012). *Report on the Recapitalization and Restructuring of the Greek Banking Sector December 2012.*

Bank of Greece (2013a). *Order for the Transfer of the Credit Institution Probank under Special Liquidation to the Credit Institution Ethniki Trapeza.*

Bank of Greece (2013b). *Revocation of the Operating License of the Credit Institution under the Name PROBANK.*

Bank of Greece (2014). *The Chronicle of the Big Crisis.* https://www.bankofgreece.gr/

Bank of Greece (2015). *Order for Transfer of Assets under Special Liquidation of a Credit Institution with the Name "Panellinia Trapeza SA" in the Credit Institution with the Name "Bank of Piraeus S.A".*

Bank of Greece (2020). *Legal Framework List.* https://www.bankofgreece.gr/en/the-bank/legal-framework/legal-framework-list

Bank of Greece (2023a). *Monetary and Banking Statistics.* https://www.bankofgreece.gr/en/statistics/monetary-and-banking-statistics/

Bank of Greece (2023b). *Governor's Annual Report 2022-2023.* (In Greek) https://www.bankofgreece.gr/

Bazot, G., Jeefers, E., & Yahia, O. (2019). Les banques coopératives sont-elles plus résistantes? Etude comparative des banques coopératives et coopératives de 2005 à 2014. *Revue d'Economie Financière, 2,* 157-175. https://doi.org/10.3917/ecofi.134.0157

Birchall, J., & Hammond Ketilson, L. (2009). *Resilience of the Cooperative Business Model in Times of Crisis.* International Labor Organization, Geneva.

Catturani, I., & Stefani, M.-L. (2016). Italian Credit Cooperative Banks. In S. Karafolas (Ed.), *Credit Cooperative Institutions in European Countries* (pp. 149-168). Springer. https://doi.org/10.1007/978-3-319-28784-3_8

Cihak, M., Demirguc-Kunt, A., Peria, M. S. M., & Mohseni-Cheraghlou, A. (2012). *Bank Regulation and Supervision around the World: A Crisis Update.* Policy Research Working Paper 6286, World Bank, Washington, DC. http://documents.worldbank.org/curated/en/279091468168248726/Bank-regulation-and-supervision-around-the-world-a-crisis-update https://doi.org/10.1596/1813-9450-6286

Creel, J., Hubert, P., & Labondance, F. (2021). The Intertwining of Credit and Banking Fragility. *International Journal of Financial Economic, 26,* 459-475. https://doi.org/10.1002/ijfe.1799

Delaite, M.-F. (2012). Les fonds propres bancaires au cœur de la crise financière. *Mondes en Développement, 4,* 117-132. https://doi.org/10.3917/med.160.0117

European Central Bank (2017). *Banking Supervision, List of Supervised Banks as 1 July 2017.* ECB. https://www.bankingsupervision.europa.eu/banking/list/who/html/index.en.html

European Central Bank—Statistical Data Warehouse (2023). *Shares of the 5 largest CIs in Total Assets (CR5), Greece, World (All Entities).* https://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=251.SSI.A.GR.122C.S10.X.A1.Z0Z.Z

European Commission (2014). Commission Decision (EU) of 29 April 2014 on the State Aid SA.34825 (2012/C), SA.34825 (2014/NN), SA.36006 (2013/NN), SA.34488 (2012/C) (ex 2012/NN), SA.31155 (2013/C) (2013/NN) (ex 2010/N) Implemented by Greece for the Eurobank Group Related to: Recapitalization and Restructuring of Eurobank Erga-

sias S.A.; Restructuring Aid to Proton Bank through Creation and Capitalization of Nea Proton and Additional Recapitalization of New Proton Bank by the Hellenic Financial Stability Fund; Resolution of Hellenic Postbank through the Creation of a Bridge Bank. *Official Journal of the European Union, L357,* 112.

European Commission (2014a). Commission Decision (EU) of 23 July 2014 on the State Aid SA.34824 (2012/C), SA.36007 (2013/NN) SA.36658 (2014/NN), SA.37156 (2014/NN), SA.34534 (2012/NN) Implemented by Greece for National Bank of Greece Group Related to Recapitalization and Restructuring of National Bank of Greece S.A., Resolution of First Business Bank S.A. through a Transfer Order to National Bank of Greece S.A., Resolution of Probank S.A. through a Transfer Order to National Bank of Greece S.A., Resolution of Cooperative Bank of Lesvos-Limnos, Cooperative Bank of Achaia, and Cooperative Bank of Lamia. *Official Journal of the European Union, L183,* 29.

European Commission (2015). Commission Decision (EU) 2015/455 of 23 July 2014 on the State aid SA.34826 (2012/C), SA.36005 (2013/NN) Implemented by Greece for Piraeus Bank Group Relating to the Recapitalization and Restructuring of Piraeus Bank SA (Notified under Document C (2014) 5217) Text with EEA Relevance. *Official Journal of the European Union, L80,* 85.

European Union (2013). Directive 2013/36/EU of the European Parliament and the Council of 26 June 2013 on Access to the Activity of Credit Institutions and the Prudential Supervision of Credit Institutions and Investment Firms, Amending Directive 2002/87/EC and Repealing Directives 2006/48/EC and 2006/49/EC. *Official Journal of the European Union, L176,* 338.
http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:2013:176:TOC

Groeneveld, H. (2016). Rabobank before, during and after the Credit Crisis: From Modesty via Complacency to Fundamental Steps. In S. Karafolas (Ed.), *Credit Cooperative Institutions in European Countries* (pp. 169-190). Springer.
https://doi.org/10.1007/978-3-319-28784-3_9

Groeneveld, H., & De Vries, B. (2009). European Cooperative Banks: First Lessons of the Subprime Crisis. *International Journal of Cooperative Management, 4,* 8-21.

Hamdaoui, M., & Maktouf, S. (2020). Financial Reforms and Banking System Vulnerability the Role of Regulatory Frameworks. *Structural Change and Economic Dynamics, 52,* 184-205. https://doi.org/10.1016/j.strueco.2019.10.007

Hardouvelis, G. (2021). *Financial Crisis and Non-Performing Exposures in Greece*. GreeSE-Papers/GreeSE, No. 159.
https://www.lse.ac.uk/Hellenic-Observatory/Assets/Documents/Publications/GreeSE-Papers/GreeSE-No159.pdf

Hellenic Bank Association (2023). *Greek Banking System Data.* https://www.hba.gr/En

Hellenic Statistical Authority (2023). *National Accounts*.
https://www.statistics.gr/en/statistics/eco

Jorda, O., Richter, B., Schularick, M., & Taylor, A. M. (2021). Bank Capital Redux: Solvency, Liquidity and Crisis. *Review of Economic Studies, 88,* 260-286.
https://doi.org/10.1093/restud/rdaa040

Kalmi, P. (2016). Cooperative Banks in Finland. In S. Karafolas (Ed.), *Credit Cooperative Institutions in European Countries* (pp. 43-54). Springer.
https://doi.org/10.1007/978-3-319-28784-3_3

Karafolas, S. (2016). The Credit Cooperative System in Greece. In S. Karafolas (Ed.), *Credit Cooperative Institutions in European Countries* (pp. 111-126). Springer.
https://doi.org/10.1007/978-3-319-28784-3_6

Karafolas, S. (2019). Crisis Consequences on the Structure of the Greek Banking System.

Financial Studies, 23, 6-20.

Karafolas, S., & Kleanthous, A. (2019). Crisis' Consequences on Recapitalization and Exposure for Cypriot and Greek Cooperative Banks. *CIRIEC España, Revista de Economía Pública, Social y Cooperativa, 96,* 5-27. https://doi.org/10.7203/CIRIEC-E.96.12974

Karafolas, S., & Ktenidou, P. (2019). Non-Performing Loans in the Greek Case: Evolution and Initiatives in the Regulatory Framework. *Journal Transition Studies Review, 26,* 29-41.

Keffala, M. R. (2018). Analyzing the Effect of Derivatives on the Financial Soundness of Commercial Banks in Italy: An Approach Based on the Camels Framework. *Review of Financial Economics, 36,* 267-283. https://doi.org/10.1002/rfe.1020

Migliorelli, M. (2018). Cooperative Banks Lending during and after the Great Crisis. In M. Migliorelli (Ed.), *New Cooperative Banking in Europe* (pp. 47-85). Palgrave. https://doi.org/10.1007/978-3-319-93578-2_3

Ory, J.-N. (2019). Les groupes bancaires coopératifs français, dix ans après la crise fnancière: Quelles leçons? Pour quel constat? *Revue d'Economie Financière, 2,* 93-116. https://doi.org/10.3917/ecofi.134.0093

Paceli, V., Pampurini, F., & Sylos Labini, S. (2019). The Peculiarity of the Cooperative and Mutual Model: Evidence from the European Banking Sector. *Journal of Financial Management, Markets and Institutions, 7,* 1-19.

Parrado-Martinez, P., Partal-Urena, A., & Aguado, P. G.-F. (2014). Impact of Financial Crisis on Soundness of European Banking Systems According to the Level of Financial Development. *Actual Problems of Economics, 161,* 314-326.

Pereira Pedro, C., Ramalho, J. J. S., & Da Silva, J. V. (2018). The Main Determinants of Banking Crisis in OECD Countries. *Review of World Economics, 154,* 203-227. https://doi.org/10.1007/s10290-017-0294-0

Richez-Batesti, N., & Leseul, G. (2016). Cooperative Banks in France: Emergence, Mutations and Issues. In S. Karafolas (Ed.), *Credit Cooperative Institutions in European Countries* (pp. 55-82). Springer. https://doi.org/10.1007/978-3-319-28784-3_4