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## MERGERS AND ACQUISITIONS IN THE GREEK BANKING SYSTEM. A PROFITABILITY EVALUATION ANALYSIS WITH DUPONT MODEL

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### ABSTRACT

The unfavorable economic situation, that prevailed in the first five years from the financial crisis that it invaded in Greece in 2010, caused very serious problems regarding the organization of the Greek banking sector. This resulted in the in-depth restructuring of the Greek banking system with acquisitions and mergers in order to create large systemic and crisis-resistant banks, in order to be able to face the looming upcoming profitability problems. The purpose of this study is to evaluate the profitability ratios of the both target and bidder banks that they took place in the wave of acquisitions during the financial crisis and to find out if there is any improvement of profitability to the remained bidder systemic Greek banks. For this reason, we examine and analyze the profitability using the DuPont method three years before the acquisition and three years after the acquisition. Essentially, we study whether the major acquisitions carried out by the Greek systemic

banks during the financial crisis had improved their profitability in the short and long term time period. So we describe a general theoretical framework of the DuPont model and the theoretical framework profitability ratios that are part of the DuPont modulus

**Keywords:** Banks, Mergers & Acquisitions, Profitability, DuPont Analysis.

**JEL Classification:** G21, G33, G3.

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## INTRODUCTION

Mergers and acquisitions are two of the most misunderstood words in the business world. Both terms often refer to the joining of two companies, but there are key differences involved in when to use them. A merger occurs when two separate entities combine forces to create a new, joint organization. Meanwhile, an acquisition refers to the takeover of one entity by another. Mergers and acquisitions may be completed to expand a company's reach or gain market share in an attempt to create shareholder value. In an acquisition, a new company does not emerge. Instead, the smaller company is often consumed and ceases to exist with its assets becoming part of the larger company. Acquisitions, sometimes called takeovers, generally carry a more negative connotation than mergers. As a result, acquiring companies may refer to an acquisition as a merger even though it's clearly a takeover. An acquisition takes place when one company takes over all of the operational management decisions of another company. Acquisitions require large amounts of cash, but the buyer's power is absolute. Companies may acquire another company to purchase their supplier and improve economies of scale—which lowers the costs per unit as production increases. Companies might look to improve their market share, reduce costs, and expand into new product lines. Companies engage in acquisitions to obtain the technologies of the target company, which can help save years of capital investment costs and research and development.<sup>1</sup>

The characteristics of the acquisitions of the financial sector are related to the meaning, categories, motivations and consequences of acquisitions are identified.

The banking sector, as is known, as a member of the international financial system, plays a very important role in achieving the goals related to the development of developed and emerging economies, such as the Greek economy.

The economic crisis that broke out in Greece essentially in 2010, started after its manifestation in the international markets. The conclusions reached through scientific studies were that the unfavorable refinancing prospects of the Greek public debt and therefore the financial distress of the Greek state, led to the lack of liquidity and a dramatic decrease in the efficiency of the Greek financial sector, although it had the strength to cope in the financial crisis.

## LITERATURE REVIEW

The DuPont model for financial analysis is a formula used to track a company's financial performance. It was developed in 1914 by F. Donaldson Brown, who worked for the Dupont Corporation and started using this formula in 1920s. DuPont ratio analysis breaks down ROA (Return on Assets) and ROE (Return on Equity) into three basic components that determine profit

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<sup>1</sup> Majaski C., (2021). "Mergers and Acquisitions: What's the Difference?". <https://www.investopedia.com/ask/answers/021815/what-difference-between-merger-and-acquisition.asp>

efficiency, asset efficiency and leverage. This is an attempt to isolate the causes of strength and weakness in the firm's performance. DuPont focuses on expense control, asset utilization and debt utilization (Bodie Z., Kane A., and Marcus J., A., 2004).

The DuPont model of financial analysis can be used to evaluate the investment programs of banks such as mergers and acquisitions. The DuPont model of financial analysis provides a mean for the banks to monitor performance through profitability in a short and long term time period. Profitability of banks is measured mainly by two ratios. First one is the Return on Equity (ROE) ratio that shows how much earning before and after taxes can produced by equity of the banks and also increase the wealth of the shareholders. Second one is the Return on Assets (ROA) ratio that shows to the stockholders and the possible investors how cable is the bank management to yield earnings and how profitably use the hole assets of the bank.

Saunders (2000) provides a model of financial analysis for financial institutions that is based on the Dupont system of financial analysis return on equity model. The return on equity model disaggregates performance into the three components that determine return on equity: net profit margin, total asset turnover, and the equity multiplier. The profit margin allows the financial analyst to evaluate the income statement and the components of the income statement. Total asset turnover allows the financial analyst to evaluate the left-hand side of the balance sheet which is composed of the asset accounts. The equity multiplier allows the financial analyst to evaluate the right-hand side of the balance sheet which is composed of liabilities and owners equity.

Return on equity analysis provides a system for planning (budgeting) in addition to analyzing the financial institution's performance. The net profit margin allows the analyst to develop a pro forma income statement. An abbreviated income statement would be composed of net income equal to revenues minus expenses. The financial planner can determine the projected revenue level needed to meet the target net income level. The total asset turnover ratio permits the analyst to determine the total asset level needed to generate the projected total revenue level. The total asset requirement can be used to project the pro forma levels of all of the asset accounts based on the target current asset to fixed asset level. The fundamental equation of accounting is that assets equal liabilities plus owners equity. The equity multiplier ratio can be used to determine the pro forma financial needs and the financial structure of the financial institution<sup>2</sup>.

DuPont multiplication components in specific industries have a more generous assessment than regular ratios, suggesting increased validity to particular industries. Banks are a particular area of study due to their work and performance (Abeer al-Khoury, Hossam Haddad, Atef al-Bawab, Mohammed Othman, Ayman Khazaleh 2022).

Baah Aye Kusi, Kwadjo Ansah-Adu, Rockson Sai (2015) find that bank deposits and branch networking were not significant determinants of bank profitability in the DuPont model. However, we found that operating profit margin, asset turnover, bank leverage and interest burden were positively and significantly related to bank profitability (ROE) in a five step DuPont model. That is, bank operational activities, bank efficiency, leverage usage and cost of leverage were found to determine bank profitability in a DuPont set-up. We further found that the total variation in bank

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<sup>2</sup> Hargrave M., (2023): "DuPont Analysis: The DuPont Formula Plus How to Calculate and Use It" <https://www.investopedia.com/terms/d/dupontanalysis.asp> (accessed: 9/10/2023).

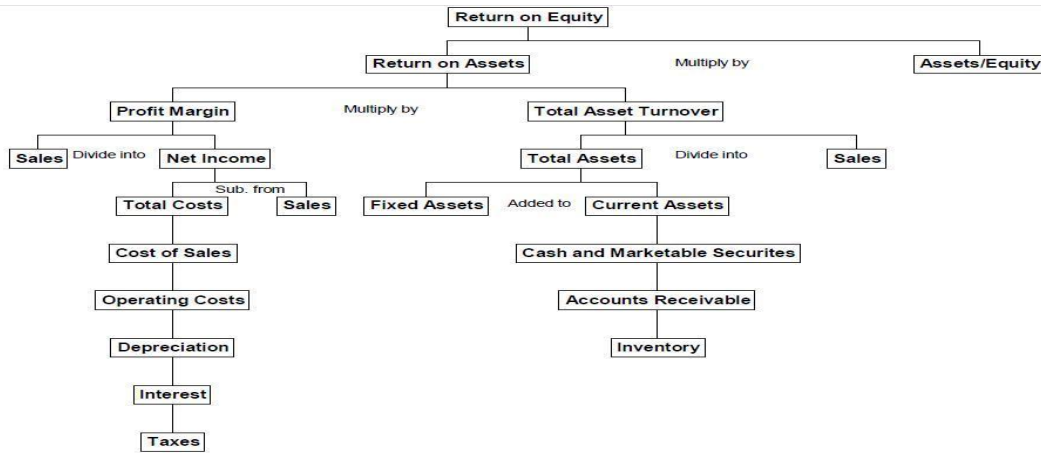
profitability was explained by these variables by 94%. This means that the five step DuPont model better explains the total variation in bank profitability measured as ROE.

Gruber M., Kavan S., (2022) used DuPont analysis in their study and find out that the Austrian banking sector's (absolute) operating income continues to depend strongly on net interest income, despite growing fees and commissions. This is one of the areas that should be watched closely as the very low interest rate environment in the euro area and in CESEE is coming to an end and RRE is becoming less and less affordable for borrowers. On the pricing side, banks' NIM is likely to rise, as higher rates directly affect the large stock of variable rate loans (especially in Austria<sup>15</sup>) as well as new business, while deposit rates may experience a slower upward adjustment.

Mahdawi, Triyono et al (2021) using the modified Du Pont financial analysis model for Syariah banks find out that Bank BNI Syariah was the top Bank from other peer banks where the Return on Assets ratio gained as much as 1.01% in the original DuPont model and the modified DuPont model with Return on Equity as much as 10.42%. It was followed by Bank Syariah Mandiri with 0.60% and 7.31% respectively in original and modified DuPont models. This research found that Bank BNI Syariah had the highest Return on Assets and Return on Equity which showed that the Bank had been running efficiently. BNI Syariah could manage their assets productively while maintaining the efficiency of the Bank. Merger blended all banks' performance. BNI Syariah was in the worse off position since the performance of merger bank was less than standalone BNI Syariah Ratios. For other banks, the merger would be favorable to leverage their financial performance.

Musaed S AlAli (2019) examined the financial performance of the Kuwaiti banks listed at the Kuwait stock exchange using the modified DuPont financial analysis model. He find out that the National bank of Kuwait came as the top bank in Kuwait by the original DuPont model standards by achieving a return on assets ratio of 1.39% followed by Ahli United bank. But when it came to modified DuPont model, return on equity, Ahli United bank had the highest return on equity (ROE) average of 11.64% for the period 2012-2017 followed by National bank of Kuwait with an average of 9.78%. The results from this study shows that while National bank of Kuwait achieved the highest return on assets, the bank came second when it came to return on equity. This would indicate that while obtaining a high return on assets is a necessary condition for obtaining a high return on equity, it is not sufficient enough to guarantee that having the highest return on assets would result in having the highest return on equity among banks. The results also showed that Warba bank came at the bottom of the list in terms of return on assets and return on equity which makes the efficiency of the bank's senior management questionable

The graph 1 below we describes the formula of DuPont Analysis with the final financial ratios that they compose DuPont model after all the gathering and calculations of the accounting elements from published financial statements.



Source: Van Voorhis, K.R. "The DuPont Model Revisited: A Simplified Application to Small Business"

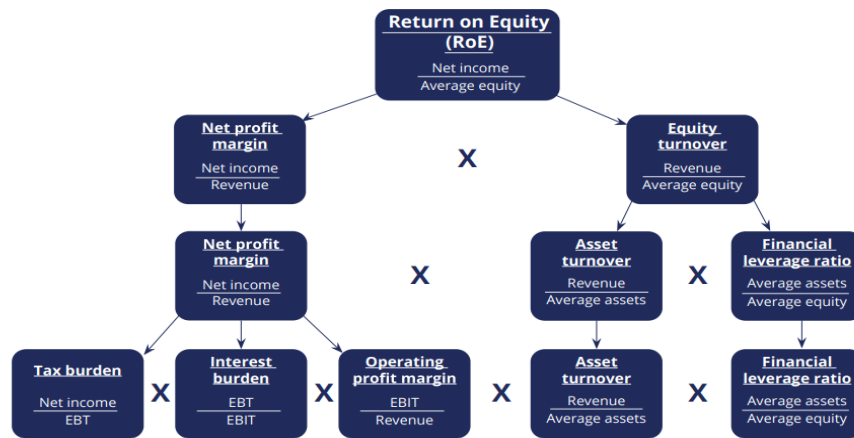
Figure 1: DuPont Formula for Financial Analysis

### METHODOLOGY

In this paper we use the DuPont Model to measure and compare the final financial ratios that compose the DuPont framework three years before and three years after the acquisitions in the Greek banking system during the financial crisis in order to find out if there is any improvement of profitability of bidder banks. For this purpose we calculate Return on Equity (ROE) ratios, Return on Asset (ROA) ratios, Equity Multiplier (EM) ratios of the target banks three year before the acquisitions, and three years before and three years after the acquisitions of the bidder banks. The graph 2 below lists the calculations of the financial ratios that they make up and conclude in the final Framework of the DuPont Analysis.

Graph 2 Framework of DuPont Analysis

## DuPont Analysis



Source: Baltova A., (2023)

<https://365financialanalyst.com/knowledge-hub/financial-analysis/dupont-analysis-a-pyramid-of-ratios/>

This framework that presented at the above graph 2 is widely [spread to this day](#) by financial analysts because, it is easy to use, it is easy to compare financial profitability between firms and banks, and more over because by decomposing three of the most important ratios of any

firms/banks such as ROE, ROA and EM, it provides a clear and comprehensive view into its financial soundness.

### Formula and Calculation of DuPont Analysis<sup>3</sup>

The DuPont analysis is an expanded return on equity formula, calculated by multiplying the net profit margin by the asset turnover by the Equity Multiplier.

$$\text{DuPont Model: ROE} = \text{NPM} \times \text{AT} \times \text{EM} \quad (1)$$

$$\text{Final DuPont Model: ROE} = \text{ROA} \times \text{EM} \quad (2)$$

where:

$$\text{NPM: Net Profit Margin} = \text{Net Income Revenue} / \text{Sales} \quad (3)$$

$$\text{AT: Asset turnover Asset Turnover} = \text{Sales Average} / \text{Total Assets} \quad (4)$$

$$\text{EM: Equity Multiplier} = \text{Total Assets Average} / \text{Shareholders' Equity} \quad (5)$$

$$\text{ROA} = \text{Net Income Revenue} / \text{Total Assets Average} \quad (6)$$

The final formula of the DuPont Analysis, as can be seen from relation (2), consists of Return on Equity, ROE, is first decomposed into Return on Asset, ROA, and the Equity Multiplier, EM. The total asset turnover ratio can be used to estimate the pro forma left-hand side of the balance sheet. The equity multiplier ratio can be used to estimate the pro forma right hand side of the balance sheet. Thus, the DuPont system of financial analysis can be used to construct a financial plan for the bank. The DuPont system of financial analysis provides a means for the firm to monitor performance through the planning period and to post-audit the planning process. DuPont analysis simplified is similar with ROE even though it uses its own formula to present the same results compiling together ROA and Equity Multiplier. This breaking down of Return on total Assets, and Return on Equity into their component parts is what DuPont analysis is.<sup>4</sup>

Analyzing the specific index of efficiency of the shareholders total equity, we can find out if the purpose of achieving a satisfactory result has succeeded. When a bank has losses ROE index is negative. When a bank has losses and negative equity then the ROE ratio is also negative. This is because in the numerator we get the absolute value of the negative earnings (ie losses) of the bank.<sup>5</sup>

## RESULTS DISCUSSION AND IMPLICATIONS

Three of the four systemic Greek banks were involved as bidders in the most significant acquisitions in the Greek banking system by acquiring four target "bad" in terms of finance banks during and soon after the global financial crisis that came to Greece. In the below tables 1-9 we examine if there were any increase of bidder's bank profitability in short and long time period after the acquisitions are completed. So we use the DuPont model for both the target and the bidder banks and we present the results of ROE, ROA and EM ratios which constitute the framework of DuPont.

<sup>3</sup> Hargrave M., (2023): "DuPont Analysis: The DuPont Formula Plus How to Calculate and Use It" <https://www.investopedia.com/terms/d/dupontanalysis.asp> (accessed: 9/10/2023).

<sup>4</sup> Collier W. H., McGowan, B. Mc., Muhammad, Jr. J., (2010) "Evaluating the impact of a rapidly changing economic environment on bank financial performance using the DuPont system of financial analysis" Asia Pacific Journal of Finance and Banking Research 4(4), 2010

<sup>5</sup> Kyriazopoulos G., et al (2013). "Dupont Analysis of the World Systemic Banks" Presented at the International Conference ABSRC 2013 Rome Italy, October 2-4.

Table 1  
*ROE ratios of the Two Involved Banks Emporiki Bank & Alpha Bank*

YEARS	ROE Emporiki Bank	ROE Alpha Bank
2008	-241.5%	16.69%
2009	-52.6%	11.89%
2010	-90.2%	10.30%
2011		-806.50%
2012		-349.70%
2013		30.44%

Source: Calculations are from published financial statements of examined banks

The above table 1 shows us that the values of the target Emporiki Bank's ROE ratios show significant negative course. Also from the same table we see that the values of the bidder Alpha Bank's ROE ratios are decreasing until the year 2010 and sink into very large negative values two years after the financial crisis, which invaded Greece in 2010. This means that not only the values of the bidder Alpha Bank's ROE ratios were affected by the acquisition of the target Emporiki Bank since it was a "bad" bank in terms of finance, but also affected by the financial crisis. With the recapitulation of the year 2013 it was a significant increase in the value of the ROE ratio and passed to a positive value.

Table 2  
*ROA Ratios of the Two Involved Banks Emporiki Bank & Alpha Bank*

YEARS	ROA Emporiki	ROA Alpha Bank
2008	-1.336%	0.593%
2009	-2.024%	0.837%
2010	-3.166%	0.072%
2011		-8.663%
2012		-2.633%
2013		3.194%

Source: Calculations are from published financial statements of examined banks

The above table 2 shows us that the values of the target Emporiki Bank's ROA ratios show very high negative course. Also from the same table we see that the values of Alpha Bank's ROA ratios are decreasing until the year 2010 and sink into negative values two years after the financial crisis, which invaded Greece in 2010. This means that not only the values of the bidder Alpha Bank's ROA ratios were affected by the acquisition of the target Emporiki Bank since it was a "bad" bank

in terms of finance but also affected by the financial crisis. With the recapitulation of the year 2013 it was a significant increase in the value of the ROA ratio and passed to a positive value.

Table 3

*EM Ratio of the Two Involved Banks Emporiki Bank & Alpha Bank*

YEARS	EM Emporiki Bank	EM Alpha Bank
2008	147.01	28.17
2009	25.25	14.21
2010	27.98	14.37
2011		93.10
2012		132.81
2013		9.53

Source: Calculations are from published financial statements of examined banks

The above table 3 shows us that the values of the Emporiki Bank's Equity Multiplier (EM) ratios had high values, with the highest in the year 2008 which it means high financial leverage. Also from the same table 3 we see that the values of Alpha Bank's Equity Multiplier (EM) ratios had lower prices than the target bank until the year 2010 and significant increase in two years after the takeover. Since Emporiki Bank was a "bad" bank in terms of finance, possibly means that the Equity Multiplier EM ratios of Alpha Bank were affected by the acquisition. Also a period of two years intervened after the financial crisis, which invaded Greece in 2010 and this fact it was very possible to affect the financial leverage of the target bank. With the recapitulation of the year 2013 the Equity Multiplier (EM) ratio had a significant decrease and turned financial leverage into reasonable prices.

Table 4

*ROE Ratios of the Two Involved Banks Agrotiki Bank and Piraeus Bank*

YEARS	ROE Agrotiki Bank	ROE Geniki Bank	ROE Piraeus Bank
2010	-6.06%	-2305.62%	0.37%
2011	-488.08%	-4896.43%	-385.46%
2012	-53.82%	-4203.90%	-50.91%
2013			20.46%
2014			-41.17%
2015			-29.24%

Source: Calculations are from published financial statements of examined banks

The above table 4 shows us that the values of the ROE ratios of both target banks Agrotiki Bank and Geniki Bank were in negative positions in the time period of three years before their



acquisitions. We can observe that Geniki Bank had the highest negative prices from the other target bank. The bidder Piraeus Bank had also negative prices of the ROE ratio two years before the acquisitions as a consequence of the global financial crisis that invaded Greece in 2010. Due to recapitalization of the Greek banking system in year 2013 the ROE ratio of Piraeus Bank turn to positive price, but in the year 2014 return to the negative price again. This negative price of ROE ratios maybe tell us that the bidder Piraeus Bank did not manage to absorb the luck of profitability of the two target banks.

Table 5

*ROA Ratios of the Two Involved Banks Agrotiki Bank and Piraeus Bank*

YEARS	ROA	ROA	ROA
	Agrotiki	Geniki Bank	Piraeus Bank
2010	-1.45%	-9.56%	0.02%
2011	-4.04%	-24.26%	-15.15%
2012	-0.47%	-5.63%	-1.68%
2013			1.90%
2014			-3.38%
2015			-3.35%

Source: Calculations are from published financial statements of examined banks

From the above table 5 we can observe that the values of the ROA ratio of both target banks Agrotiki Bank and Geniki Bank were in negative positions in the time period of three years before their acquisitions. We can also see that Geniki Bank had the highest negative prices from the other target bank. The bidder Piraeus Bank had also negative prices of the ROA ratios two years before the acquisitions as a consequence of the global financial crisis that invaded Greece in 2010. Due to recapitalization of the Greek banking system in year 2013 the ROA ratio of Piraeus Bank turn to positive price, but in the year 2014 return to the negative price again. This negative price of ROA ratios probably show us that the bidder Piraeus Bank did not absorb the negative profitability of the ROA ratios of the two target banks that had before their acquisitions.

Table 6

*EM Ratio of the Two Involved Banks Agrotiki Bank and Piraeus Bank*

YEARS	EM	EM	EM
	Agrotiki Bank	Geniki Bank	Piraeus Bank
2010	4.18	241.68	19.47
2011	120.81	201.64	25.44
2012	114.51	74.70	30.30
2013			10.77

2014	12.19
2015	8.73

Source: Calculations are from published financial statements of examined banks

The above table 6 shows us that the values of the Equity Multiplier (EM) ratios of both target banks Agrotiki Bank and Geniki Bank in the time period of three years before their acquisition were in high level. The bidder Piraeus Bank had also high prices of the Equity Multiplier (EM) ratios three years before the acquisitions maybe as a consequences due to the global financial crisis that invaded Greece in 2010. After the recapitalization of the Greek banking system in year 2013 and after the acquisitions had completed the Equity Multiplier (EM) ratios of the bidder Piraeus Bank return to more rational pointer values.

Table 7  
*ROE Ratio of the Two Involved Banks Post Bank of Greece and Eurobank*

YEARS	ROE Post Bank	ROE Eurobank
2014	-0.52	-25.34%
2015	-0.49	-17.14%
2016	-1.96	0.16%
2017		0.17%
2018		0.75%
2019		0.53%

Source: Calculations are from published financial statements of examined banks

The above table 7 shows us the negative values of the target Post Bank's ROE ratios three years before the its takeover. From the same table 7 we can see that the values of the bidder Eurobank's ROE ratios were also in negative prices two years before the acquisition and very low positive price one year before. In the short term time period that means in the first year after the acquisition took place the values of Eurobank's ROA ratio had an insignificant increase. In the long time period that means two years after the acquisition completed the values of Eurobank's ROA ratios had a little improvement, which is possible that Eurobank did not managed to absorb completely the financial consequences of the "bad" in terms of finance Post Bank, so as to have high price of equity profitability.

Table 8  
*ROA Ratio of the Two Involved Banks Post Bank of Greece and Eurobank*

YEARS	ROA Post Bank	ROA Eurobank
2014	-3.28	-1.97%
2015	-3.26	-1.64%
2016	-16.3	0.02%

2017	0.02%
2018	0.07%
2019	0.06%

Source: Calculations are from published financial statements of examined banks

The above table 8 shows us the negative values of the target Post Bank's ROA ratios three years before the acquisition took place. From the same table 8 we can see that the values of the bidder Eurobank's ROA ratios were also in negative prices two years before the acquisition and very low positive price one year before the takeover. In the short term time period that means in the first year after the acquisition took place the value of Eurobank's ROA ratio had not any difference. In the long time period that means two years after the acquisition completed the values of Eurobank's ROA ratios had an insignificant increase, which is possible that Eurobank did not managed to absorb completely the financial consequences of the "bad" in terms of finance of Post Bank, so as to have high price of assets profitability.

Table 9  
*EM Ratio of the Two Involved Banks Post Bank of Greece and Eurobank*

YEARS	EM Post Bank	EM Eurobank
2014	0.16	12.86
2015	0.15	10.45
2016	0.12	8.00
2017		8.50
2018		10.71
2019		8.83

Source: Calculations are from published financial statements of examined banks

The above table 9 shows us that the value of the Equity Multiplier (EM) ratio of the target Post Bank three years before its acquisition, were in low level. This fact were happened due to the paradox phenomenon of Post Bank that is  $ROE < ROA$ . So we can notice that the bidder Eurobank had higher prices of the Equity Multiplier (EM) ratios three years before the acquisitions than the target bank, because of the paradox phenomenon. The financial leverage the bidder Eurobank three years after the acquisition completed had insignificant better volatility. This fact might means that Eurobank did not managed to absorb completely the financial consequences of the "bad" in terms of finance of Post Bank, so as to have better prices of the financial leverage ratios.

### CONCLUSION

In this paper we studied the profitability ratios ROE, ROA and EM, of the three bidder systemic Greek banks that takeover four target "bad" banks in terms of finance. To do our research we use the DuPont Formula. So first we examined the profitability of this bidder and target banks three years before the acquisitions. Our findings were that both bidder and target banks had low profitability ratios and also had negative values of those ratios in the most of the examined cases.

Then we tried to find out if there is any increase of profitability ratios ROE, ROA and EM of the acquirer banks in a short time and long time after the acquisitions have been completed.

The implementation of DuPont formula for the financial analysis of the acquisitions in the Greek banking System, during global financial crisis pre and post the events drives us to notice that there is no increase of profitability or any improvement in the financial soundness for the bidder banks. Of course one of the reason is the global financial crisis that came to Greece in 2010 and affected both Greek public and private economy. The second reason maybe it was that all the target banks were "bad" banks according to the financial terms. The third reason possible it was the financial insolvency of the private firms and households due to the global financial crisis which made them unable to pay the loans to their banks. And the fourth reason we might think that it was because of the acquiring banks became "bad" banks in financial terms themselves. This fact was created as a consequence of the global financial crisis which led the bidder banks to exposure into Greek government bonds and due to the financial insolvency of private firms and households that they could not pay their financial obligations to the bidder banks. Thus the forth mentioned reasons lead the bidder banks to have difficulties absorbing both the insolvency of their clients and the insolvency of the acquirer banks after the event in the short and long term.

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