CORPORATE MERGERS AND ACCOUNTING PERFORMANCE DURING A PERIOD OF ECONOMIC CRISIS: EVIDENCE FROM GREECE

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Abstract. Merger deals are one of the most important business strategies which can change the company value dramatically. Mergers have been constantly a subject of debate and analysis over the past decades. Thus, it is a matter of great interest to analyze merger activities during economic crisis periods, as it was in Greece recently. This paper explores the accounting performance of Greek listed companies after mergers in 2009–2015, the economic crisis period in Greece. Thus, all mergers of listed companies during the above period are initially examined through several financial ratios from financial statements for one year before and after the merger. The analysis of Greek listed companies that comprise the final sample is performed with several regression models. The study provides positive and statistically significant results for mergers, in the sense that the period of crisis that the merger took place is positively correlated with several performance measures. Regarding the industry relatedness, the study provides evidence that conglomerate mergers have more positive impact to the improvement of the companies' profitability than non-conglomerate mergers. Last, for the merger events that take place far from the climax of the economic crisis, the profitability of merged companies is increased.

Keywords: merger, ratios, financial statements, accounting performance, Greece, economic crisis.

JEL Classification: G34, M41.

Introduction

Mergers and acquisitions (M&As) constitute an important part of corporate restructuring (Yilmaz & Tanyeri, 2016). Mergers are the act of unification of two or more companies. Unlike mergers, in acquisitions the acquired company still exists under the control of the acquiring company (Pantelidis et al., 2018). Various studies and views have been expressed

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over time by different researchers on this subject in the light of different methodological approaches (Lev & Mandelker, 1972; Meglio & Risberg, 2011; Golubov et al., 2013; Ibrahim & Raji, 2018; Grigorieva, 2020). The subject matter studied extensively in these is mainly the performance of the companies after the mergers and which exact factor has led them to positive results (Ravenscraft & Scherer, 1989; Francis & Martin, 2010; Hummel & Amiryany, 2015; Rao-Nicholson et al., 2016; Brahma et al., 2018; Fu & Wang, 2019).

There are many ways to evaluate the performance of companies after mergers, but one of the most reliable is through accounting studies by analyzing several accounting measures mainly in net earnings or return on investment (Healy et al., 1992; Ghosh, 2001; Ramaswamy & Waegelein, 2003; Edi & Rusadi, 2017; Mensah & Onumah Mensah, 2017; Berrioategortua et al., 2018). More specifically, the assessment of the accounting performance in mergers is made by analyzing the financial statements and accounting performance of companies by exporting and comparing different accounting measures from them or by using financial ratios, for some year(s) before merger and the following year(s) after merger (Pervan et al., 2015; Duggal, 2015; Strasek & Gubensek, 2016; Mohanty, 2016; Aggarwal & Garg, 2019).

In addition, the global economic crisis on 2007–2009, starting from the US, has fostered the European debt crisis. This European crisis affected afterward with catastrophic effects some small European countries in the eurozone, especially Greece (Pantelidis et al., 2018). Greece, a small, open economy inside the Eurozone was hit the hardest from the crisis, since it lost roughly 25% of its GDP in five years (2009–2015). This decline was a result of both the structural problems of the Greek economy and the austerity measures taken from the Greek government, as requirements for three bailout programs designed by the European Commission, the European Central Bank and the International Monetary Fund (IMF), which, for the first time in history, got involved in Eurozone affairs. During this period the Greek companies of every size and industry faced a multitude of complex financial problems (Pazarskis et al., 2018). Regarding the Greek market in economic crisis period, there are not many studies of post-merger performance by analyzing accounting performance or using financial ratios.

The aim of this study focuses only to the accounting performance after mergers in a period of economic crisis. For this reason, all Greek listed companies on the Athens Stock Exchange (ASE), which were involved in mergers, are examined. More specifically, initially all mergers of listed companies during the period 2009–2015 are identified, and following various constraints (such as: bankruptcy, financial activity, multiple mergers of the acquiring company), this study analyzes a final sample of thirty-three listed companies in ASE. This sample is representative of this period in Greece as the intensity of mergers has decreased in the economic crisis period.

The present paper is adopting and evolving the methodology of Healy et al. (1992) and Ramaswamy and Waegelein (2003). First, the study examines how various post-merger measures of accounting performance are correlated to their pre-merger levels and to the period of Greek sovereign crisis. Then, it tried to investigate whether the change in accounting measures, pre- and post-merger, could be explained by various business characteristics (Francis & Martin, 2010; Rao-Nicholson et al., 2016; Hu & Yang, 2016). This study finds that accounting performance after mergers is positively correlated to both pre-merger levels and to the period of crisis that the mergers took place. The same is true for the second model. The differences in examined accounting ratios of pre- and post-merger levels are positively correlated with

the studied performance measures; the improvement was increasing as merger events happen far from the beginning of the crisis. Last, non-conglomerate mergers have negative impact to the improvement of the examined financial ratios.

This study provides some important insights both in theoretical and practical level in business economics and management. First, with its findings adds to the body of a growing literature of mergers by examining the case in a period of economic crisis and providing recent experience for a small open economy in the Eurozone. Second, this study demonstrates which specific business decisions in mergers make them more successful and profitable investments for companies. Thus, this research makes particular contribution to the extant literature on this field and it could be used by managers or potential investors, on governmental policy from tax or other state authorities.

The remainder of the paper is organized as follows. Section 1 examines past literature from several aspects. The next section describes the research design of the study: sample selection and its qualitative and quantitative characteristics, along with the applied methodology. Section 3 presents the results of accounting performance after mergers. The last section concludes the paper.

1. Literature review

There are many ways to peruse business performance in M&As (Golubov et al., 2013; Triantafyllopoulos & Mpourletidis, 2014; Dargenidou et al., 2016; Hu & Yang, 2016; Tao et al., 2017; Chen et al., 2018; Tanna & Yousef, 2019; Cheng, 2019; Rodionov & Mikhalchuk, 2020). The most common through accounting studies is by calculating changes in accounting data from financial statements or ratios (extracted from the financial statements) such as net earnings, return on assets etc. (Ramaswamy & Waegelein, 2003). These changes can be further combined with several business characteristics of the merged companies, such as industry category, method payment, international orientation of the merger (as qualitative variables of a study) (Ghosh, 2001; Francis & Martin, 2010; Hu et al., 2016; Agyei-Boapeah, 2017; Fischer, 2017; Sun et al., 2017; HaiYue et al., 2021; Wilson & Vencatachellum, 2019). Although there is a plethora of past studies on mergers that employed accounting ratios, the results are ambiguous. Some find evidence of improvement in the corporate performance after the M&As action (Cosh et al., 1980; Rao-Nicholson et al., 2016), while others argued that there was a decrease in the post-merger firm performance (Meeks, 1977; Salter & Weinhold, 1979; Mueller, 1980; Kusewitt, 1985; Ravenscraft & Scherer, 1989; Dickerson et al., 1997; Sharma & Ho, 2002; Oduro & Agyei, 2013), and some others claimed for a "zero" result from the mergers (Kumar, 1984; Healy et al., 1992; Chatterjee & Meeks, 1996; Ghosh, 2001).

Using the financial statements' analysis and event study methodology simultaneously, Dargenidou et al. (2016), the examined data showed that for the research sample the abnormal returns of shares after M&As were lower and merger transactions destroyed the companies' value. On the other hand, Dargenidou et al. (2016) argued that the analysis of accounting performance measures from financial statements suggested opposite effects: that M&As generated synergies and these resulted greater value for their shareholders. In a more recent survey, Dimopoulos & Saccheto (2017) perused merger activity on business performance and productivity. In their research, they developed and rated a dynamic industrial

balance model characterized by: mergers, entry and exit of heterogeneous enterprises. They claimed that mergers directly affect productivity due to synergies, while they also observed incentives for companies to enter or leave the industry they choose to operate. Merger activity increases on average the productivity of the company totally by 4.8%. This could divided by 4.1% to synergies and 0.7% to the decisions of the entry and exit companies.

For the US market, Yanan et al. (2016) studied M&As' impact on the financial performance of firms at the United States of America. Based on the bibliographic review of the researchers, it was found that M&As helped companies to increase corporate profitability as well as broaden their market share. In their study they used company data with a six-year period before and six years after M&As in a sample size of a hundred companies. The conduct of the survey showed that there was a different economic return to the absorbing firm in the period that take place before as well as after M&As, and more specifically, on the ratios ROE, EPS and net profit margin.

For the Indian market, Gupta and Banerjee (2017) studied the effects of mergers in acquiring companies. More specifically, they tested various profitability and liquidity ratios of Indian companies for five years before merger and the following years after merger. Their sample contains seven selected different industries with mergers from 2006 to 2012, while the examined financial statements were in the period 2001–2015. Gupta and Banerjee (2017) found that there was not a general improvement in the financial performance and profitability and liquidity deteriorated after the merger for the sample companies. In another study for India, Azhagaiah and Sathishkumar (2014) found different merger effects after an M&As transactions. They surveyed a sample of thirty-nine Indian manufacturing companies with a transaction from 2006 to 2007 (with data analysis for five years before and five years later). Their investigation showed positive effect of mergers on India's acquiring manufacturing companies after its implementation.

Lebedev et al. (2015) supported that although many studies analyze M&As in developed economies, there is less research that focuses on acquisitions and mergers in developing economies. Several studies conducted on different developing countries are discussed below. One initial research carried out by Strasek and Gubensek (2016), which examined mergers for Slovenian businesses. The emphasis on their analysis was based on the average values of several financial ratios. Twenty nine companies were studied from 2005 to 2008, and comparisons were made for four years ago and four years after M&As. The conclusion of Strasek and Gubensek (2016) was that the apparent growing debt they encountered in many international M&As studies was also a typical feature of many mergers and acquisitions in Slovenia. In another study, Al-Hroot (2016) focused on economic performance of the Jordanian industry. The sample of its analysis consisted of seven companies that participated in merger agreements during the years 2000 to 2014 (with data analysis for two years before and two years later). Al-Hroot (2016) claimed that the economic performance, in terms of profits and liquidity, of the merger-involved companies slightly improved, while corporate lending increased after the merger period. Finally, he noted that the effects of the mergers differ in the Jordanian industry. Furthermore, Pervan et al. (2015) analyzed their impact on the performance of companies in Croatia. They created a sample of one hundred sixteen companies that participated in a takeover transaction from 2008 to 2011. They gathered

data from the companies' financial statements for each of these companies for a three-year period, that included the year with the M&As event, one year earlier and one year following the M&As. Pervan et al. (2015) found for the acquiring companies there were no statistically important changes in their profitability and that most of the acquisitions were made by domestic companies. For the Pakistan market, M. Ahmed and Z. Ahmed (2014) analyzed the effects of mergers in a variety of manufacturing industries. Their sample consists of twelve manufacturing companies that participated in the merger process during the period 2000–2009. They used the data for three years before and three years after the M&A event. They concluded that the overall performance of the acquiring firms in Pakistan improved slightly after mergers. More specifically, their liquidity and capital structure improved slightly, while profitability deteriorated after the merger.

Several studies for various sectors have been conducted over the last decades in many countries. For example, the pharmaceutical sector was studied by Zhang et al. (2018) who argued that the driving force behind M&As of the listed pharmaceutical companies in China during 2008–2016 was the pursue of technological innovations and that M&As are positively linked to the performance of these companies. In addition, Zhang et al. (2018) claimed that steady growth in fixed assets and in total assets also positively influences the companies' economic development. Also, Duggal (2015) examined the mergers for Indian pharmaceutical companies by looking at a number of ratios of a sample of listed Indian firms during the period 2000–2006. For the purpose of the analysis, Duggal (2015) performed a t-test and the results presented was that there is an increase of profits of the merging companies one year after $(t + 1)$, but this effect is temporary and it was not maintained in the following years from the third year and onwards $(t + 3)$, which started to turn negative.

Mergers in the textile industry at the Japanese market where examined by Braguinsky et al. (2015). They examine how ownership changes affect profitability. By analyzing the textile industry in Japan, it can be seen that the production facilities of the acquired firms were similarly productive as those of the acquiring companies (before M&As). However, several acquired units showed lower profitability, increased inventories and decreased production. Braguinsky et al. (2015) argued that after the acquisitions, the less profitable companies acquired showed a fall in inventories and gains in using their production capacity as productivity and profitability levels increased.

For the airlines industry, Aggarwal and Singh (2015) examined the merger of Air Deccan and Kingfisher Airlines for India's aviation industry. Their main objective was to study Kingfisher Airlines after the merger. Financial performance was analyzed using financial ratios related to profits, leverage and liquidity. In addition, t-tests were used for significant differences in the accounting data analysis of Kingfisher Airlines for the two years earlier and following the merger. Aggarwal and Singh (2015) found no significant benefit; no improvement in the performance of the firm's net position, the coverage of its interest and earnings per share was achieved. In another survey for the airlines industry, Daddikar Prasad and Shaikh (2014) analyzed JET Airways in India after M&As during 2007 and 2008. In particular, they wanted to analyze whether the JET Airways achieved better economic performance in the period after M&As in the areas of profits, loans, liquidity and stock market performance, with ratios. For their sample, t-tests were applied for two years ago and two years after M&As.

In general, they argued that the airlines after merger there was no improvement in the new merged entity in terms of ROE, net margin, and EPS after merger transactions.

Examining maritime transport sector, Polemis and Karlis (2016) used as research sample shipping firms after M&As, which were completed in the period 1998–2009. The methodology they used was based on the profitability and value of the company as a means of measuring the return of the absorbed-acquiring company after a takeover. Their results showed a decrease in profits and no significant statistical evidence that the buyer's business value increased after the merger. Another research for the same industry made by Alexandrou et al. (2014) also analyzed mergers in the shipping industry for the period 1984 to 2011. More specifically, Alexandrou et al. (2014) argue that M&As benefit positively the capitalization of the firms with abnormal returns in the stock price by 1.2% and 3.3% for the acquiring and acquired companies respectively. They also found that the acquiring companies are earning more when they pay with shares in international M&As and public companies.

The global economic crisis on 2007–2009 and the European debt crisis that came afterwards, with struggling effects to some European countries in the eurozone, strengthened the merger research on crisis topic. Lakstutiene et al. (2015) in their study assessed acquisitions on in Lithuania during the global economic crisis of 2007–2009. The sample of their survey included firms listed on the NASDAQ OMX in Vilnius (Lithuania) that made at least one acquisition in the period from 2008 to 2010. Their valuation of the impact of the acquisitions was based on ratios related to profits and economic value added (EVA). Lakstutiene et al. (2015) showed that profits and EVA declined shortly after the acquisition, followed by a recovery in the end of the first year after the M&A event. They also found evidence of positive results from M&As during the period of economic crisis. For the countries of the Association of Southeast Asian Nations – ASEAN (which includes the following countries: Malaysia, Thailand, Singapore, Indonesia, Vietnam, Philippines), Rao-Nicholson et al. (2016) examined M&As and showed that M&As completed during the economic crisis in ASEAN countries was profitable not in crisis, but just before and after. They also found that several peculiarities of the companies, such as size of the acquired firm, the cross-border M&As anatomy of the transactions, the buyer's cash available and the friendly negotiations (friendly M&As), are positively correlated with long-term gains after M&As. Furthermore, Rao-Nicholson et al. (2016) argued that significant correlation between the performance and some other managerial decisions of merger-involved companies doesn't exist: how the payment was dealt, associated activity of the companies involved (if they belong to the same industry or not) and if the acquiring company had already stocks before the M&As transaction or not in the acquired company.

Regarding the Greek market in the economic crisis period with accounting data analysis, there is a scarcity of studies. A study of Pantelidis et al. (2018) tested a sample of twenty-three Greek listed firms with the analysis of financial statements and twenty ratios using various statistical methods. The results of their research did not show any change in any of the tested financial ratios after M&As. Furthermore, Pantelidis et al. (2018) observed statistically significant changes in three cases: positive results for the companies that made conglomerate mergers and mergers with their subsidiaries. Also, for Greece, Pazarskis et al. (2018) examined M&As within the accounting performance of merged firms in Greece. Their study analyzes

four financial ratios related to profits of sixty listed companies in Greece, which merged as acquired companies during a ten-year period before the turmoil of the Greek economic crisis and shortly after this. They argued for negative results from mergers on profits of merged companies. In addition, Pazarskis et al. (2018) supported for more negative results on accounting performance after mergers in the Greek crisis.

2. Research design

2.1. Sample selection

The total number of listed firms in the ASE that merged between 2009 and 2015 was initially eighty-nine. However, those companies that carry out financial operations (such as banks etc.) were excluded from the sample, since financial firms, even though they follow the same accounting standards as non – financial firms, present major differences due to the nature of their businesses. These differences in operations result in special peculiarities on financial statements, which influence the accounting information and financial ratios' analysis, making any comparison extremely difficult. Thus, financial companies (in banking or insurance industries) are excluded in advance from each examined sample (Hoshino, 1982; Healy et al., 1992; Ghosh, 2001; Sharma & Ho, 2002; Alcalde & Espitia, 2003; Ramaswamy & Waegelein, 2003). Companies for which no financial data were available due to bankruptcy, de-listed, e.t.c, were also excluded from the sample. Further, the companies that made more than one merger-deal in the examined period (thus, in the previous or next year of the merger) were also removed from the examined firms. The final sample consists of thirty-three listed companies on ASE, which performed exactly one merger activity with listed or unlisted companies on the ASE for the period considered. The sample size can be considered satisfying in comparison to prior studies on corporate mergers conducted in significantly larger capital markets such as in US, UK, the Japanese or Australian market, as in: Hoshino, 1982: $n = 15$, Cornett & Tehranian, 1992: $n = 30$, Clark & Ofek, 1994: $n = 38$, Manson et al., 1995: $n = 38$, Sharma & Ho, 2002: $n = 36$, (n is the sample size). The data was collected from the annual reports for that period of the ASE. Table 1 below shows the process of selecting the listed companies according to the data mentioned above and shows the final sample as follows after the necessary companies' adjustments.

Table 1. Selection of mergers by year

Merger events	Total	2009	2010	2011	2012	2013	2014	2015
Preliminary sample: all mergers in the ASE from 2009 to 2015	89	16	9	19	10	13	9	13
Eliminated: financial companies	13	0	0	4	0	4	2	3
Eliminated: unavailability due to bankruptcy, de-listed, etc.	21	6	2	4	2	3	1	3
Eliminated: unavailability due to multiple mergers	22	2	3	6	5	3	1	2
Final sample of examined mergers	33	8	4	5	3	3	5	5

2.2. Merger characteristics (qualitative variables)

Following Healy et al. (1992) and Ramaswamy and Waegelein (2003), this study will investigate if the difference in accounting performance measures (before and after the merger) are explained by various business characteristics, as suggested by the literature for mergers (Golubov et al., 2013; Pantelidis et al., 2018; Berrioategortua et al., 2018; Grigorieva, 2020; Rodionov & Mikhalchuk, 2020). These business characteristics of the examined mergers are listed below:

The first business characteristic under consideration is *the merger place*, where it is examined if the merger is international or domestic. It is expected that companies with international orientation that operate outside of the "toxic" Greek business environment during the economic crisis might achieve better results. However, considering the huge impact in businesses worldwide, of the global economic crisis, which preceded the period of the Greek economic crisis that it is investigated, it might be more difficult to predict a precise result.

Second, the *industry relatedness* of the merged firms is categorized for conglomerate mergers and non-conglomerate mergers (thus, horizontal or vertical merger). Ramaswamy and Waegelein (2003) argued that it is not clear a positive result from the high or not industry relatedness. A non-conglomerate merger deal is expected to have higher synergy and better overlapping. While a conglomerate merger could lead to risk diversification and higher profits.

Third, the examined *period of the economic crisis* is divided in three sub-periods: the beginning of the economic crisis, between 2009 and 2010, the middle of the economic crisis, years 2011 to 2013 and the end of the economic crisis, years 2014 and 2015. It is presumed that after the turmoil of the economic crisis and till its end a severe decrease from its negative impact might take place on companies' performance.

However, several other business characteristics, that could affect accounting performance, were concentrated to depict the situation in examined mergers, as suggested by the literature for mergers (Francis & Martin, 2010; Rao-Nicholson et al., 2016; Hu & Yang, 2016; Nagasha et al., 2017; Berrioategortua et al., 2018; Grigorieva, 2020). Some of those are: (a) the willingness to merge, (b) the industry type (Pantelidis et al., 2018), (c) the method of payment (Fischer, 2017; Sun et al., 2017), (d) the size of capitalization or leverage (Tao et al., 2017) and (e) the existence of revenues from abroad. Unfortunately, in this rather small sample, those variables lack variability, therefore they were excluded from the present study, because no meaningful information could be extracted out of them.

2.3. Accounting data – financial ratios

The present study chose to examine several accounting measures from financial statements for the purpose of extracting results, in particular as regards the effectiveness of the thirty-three listed companies of the sample. Thus, relevant financial ratios are considered, related to some basic accounting measures. These variables were extracted for the study from the financial statements for one year before merger and the following year after merger of the sample companies. Accounting data analysis from financial statements provides valuable information for the merger decision, while it is widely accepted (Pervan et al., 2015; Rao-Nicholson et al.,

2016; Al-Hroot, 2016; Strasek & Gubensek, 2016; Pantelidis et al., 2018; Zhang et al., 2018). All the financial ratios that were used are presented and analyzed in the following Table 2[1].

Table 2. Examined accounting measures – financial ratios (quantitative variables)

Abbrev.	Performance measure	Variable definitions
ROTA	ROTA	Earnings before interest & taxes/Total assets
EBITM	EBIT Margin	Earnings before interest & taxes/Sales
ROABT	ROA using before-tax profit or loss	Before-tax profit or loss/Total assets
ROANI	ROA using Net income	Net Income/Total assets
TASS	Total Assets	Total Assets
TLIAB	Total Liabilities	Total Liabilities

As the target of every company is to increase its profits, all, direct and indirect stakeholders, pay great weight to its profitability over time, as well as its earnings. The profitability of the company will mainly result in its viability and its duration in time. Profitability ratios aim to calculate the effectiveness of a company, but also a business unit in general. More specifically, they estimate how well the company operated in a time-period, how profitable its sales were, and how efficient its management was for the company. Apart from the examination of total assets and total liabilities, there are used the profitability ratios of ROTA, EBITM, ROABT, ROANI. In addition, ROTA, ROABT, ROANI, the return on the total assets can be calculated in many ways and shows if there was in a whole a satisfactory operation of the management for the invested assets.

2.4. Methodology – bootstrap regression

First, in order to determine if there is any improvement to the profitability ratios after mergers have taken place and examine whether the Greek economic crisis affected that potential improvement, the study is using bootstrap regression analysis, in order to avoid the normality assumption that is clearly not supported by the data at hand. Bootstrapping is a general approach to statistics, based on building a sampling distribution for a statistic by resampling from the data at hand. In other words the study treats the sample as a population and it draws repeated samples, with replacement. Suppose someone wants to estimate a regression model with predictor y and responses $x_1, x_2, \ldots, x_p$: $y = \theta_0 + \theta_1 x_1 + \ldots \theta_p x_p + \varepsilon$. The available data is a sample that consists of n – observations $s_i = \left\{ x_{1i}, x_{2i}, \ldots, x_{pi}, y_i \right\}, i = 1, 2, \ldots, n$. In bootstrap regression someone simply draws R bootstrap samples with replacement from s_i and estimate a regression model for each sample to obtain the parameters vector $\hat{\Theta}^j = \left(\hat{\theta}_0^j, \ldots, \hat{\theta}_p^j \right), j = 1, \ldots, R$. Then the bootstrap regression coefficients, θ_i^b, their corresponding standard errors and 95% confidence intervals are easily calculated by the following formulas:

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[1] Other ratios, like ROE and Debt-equity ratio were initially included in our analysis however their results from the empirical section were not statistically significant and thus they were excluded for brevity.

$$\hat{\theta}_i^b = \frac{\sum_{j=1}^{R} \hat{\theta}_i^j}{R}, \ i = 1, \ldots, p;$$

$$SE\left(\hat{\theta}_i^b\right) = \sqrt{\frac{\sum_{j=1}^{R} \left(\hat{\theta}_i^j - \hat{\theta}_i^b\right)^2}{R-1}}, \ i = 1, \ldots, p;$$

$$\theta_i^{\left[.025R\right]} < \theta_i < \theta_i^{\left[.975R\right]}, \ i = 1, \ldots, p,$$

where $\theta_i^{\left[x\right]}$ are the ordered bootstrap coefficients in position x.

In this analysis, a modified version of the regression models that first proposed by Healy et al. (1992) and further evolved by Ramaswamy and Waegelein (2003) is used, where a variable that accounts for the sub-periods of the economic crisis is added to the model:

$$Ratio_{post} = \beta_0 + \beta_1 Ratio_{pre} + \beta_2 PEC_{(p=1)} + \beta_3 PEC_{(p=2)} + \varepsilon, \tag{1}$$

where: $Ratio_{post}$ – any of the six ratios that this study uses as performance measures, described in section 2.3, during the post-merger period; $Ratio_{pre}$ – any of the six ratios that this study uses as performance measures, described in section 2.3, during the pre-merger period; $PEC_{(p=1)}$ – binary variable with values 1, if the merger took place in 2009 or 2010 (early stage of crisis) and 0 elsewhere; $PEC_{(p=2)}$ – binary variable with values 1, if the merger took place between 2011 and 2013 (middle stage of the crisis) and 0 elsewhere.

Then, the study tried to establish whether the difference in the examined financial ratios between post- and pre-merger periods is influenced by some key categorical variables, as suggested by the literature (Lev & Mandelker, 1972; Francis & Martin, 2010; Rao-Nicholson et al., 2016; Hu & Yang, 2016; Pantelidis et al., 2018). Following Ramaswamy & Waegelein (2003), a modified version of their regression model(s) is used, adding a variable for the sub-periods of the economic crisis:

$$DR = c_0 + c_1 IR + c_2 MP + c_3 SCAP_{(h)} + c_4 SCAP_{(m)} + c_5 PEC_{(p=1)} + c_6 PEC_{(p=2)} + \varepsilon, \tag{2}$$

where: DR – the difference of each of the ratios, post and pre-merger: $DR = Ratio_{post} - Ratio_{pre}$ described in section 2; MP – Merger Place, binary variable with values 1 (domestic merger) and 2 (international merger); IR – industry relatedness, binary variable with values 1 (conglomerate merger) and 2 (non-conglomerate merger); $SCAP_{(h)}$ – the size of the merged companies, categorical variable with values 1 for high capitalization and 0 elsewhere; – the size of the merged companies, categorical variable with values 1 for medium capitalization and 0 elsewhere; $PEC_{(p=1)}$ – period of economic crisis, binary variable with values 1, if the merger took place in 2009 or 2010 and 0 elsewhere; $PEC_{(p=2)}$ – period of economic crisis, binary variable with values 1, if the merger took place between 2011 and 2013 and 0 elsewhere.

Each of the slope coefficients β_i or c_i measures the effect of the corresponding predictor to the dependent variable. For example, a statistically important and positive coefficient for the variable $PEC_{(p=1)}$ would suggest that the model's dependent variable is positively linearly

correlated with the period signaling the beginning of the crisis that the event of the merger took place.

3. Results

Descriptive statistics for the tested ratios in the pre-merger and post-merger period and the difference of each ratio from post-merger and pre-merger period are presented in Table 3. The Jarque-Bera test for normality, with null hypothesis that the data follow the normal distribution, tests statistic:

$$JB = \frac{n}{6}\left(S^2 + \frac{1}{4}\left(K - 3\right)^2 \right) \sim \chi^2, \tag{3}$$

where n is the number of observations, S is the sample skewness and K the sample kurtosis, asymptotically follows the chi square distribution with two degrees of freedom.

From this it can be concluded that the normality hypothesis for the examined ratios is not accepted for all cases, in both the pre and post crisis periods. For the differenced ratios the normality hypothesis finds weak support in five out of six cases.

The results from the models 1 and 2 are presented in Tables 4 and 5, respectively. For model 1, the pre-merger levels of the corresponding ratio are statistically significant in all six cases. The coefficients for variables $PEC_{(p=1)}$ and $PEC_{(p=2)}$ that control for the period of the crisis the merger took place, are significant and negative in sign, depicting the strong negative

Table 3. Summary statistics

Variables	mean	median	IQR	stdev	skewness	kurtosis	JB test p val
$ROTA_{pre}$	0.0266	0.0405	0.0959	0.1046	−1.2244	4.5760	0.0025
$EBITM_{pre}$	−0.0087	0.0085	0.0636	0.0700	−0.9085	3.6103	0.0741
$ROABT_{pre}$	−0.0176	0.0045	0.0643	0.0623	−1.0406	3.4829	0.0394
$ROANI_{pre}$	0.0223	0.0320	0.0608	0.0585	−0.8810	4.7028	0.0142
$TASS_{pre}$	11.8021	11.3903	1.9530	1.5865	0.9654	3.4744	0.0608
$TLIAB_{pre}$	11.3288	10.9603	2.1295	1.6830	0.7020	3.1537	0.2434
$ROTA_{post}$	0.0019	0.0230	0.1041	0.1597	−1.4593	5.6357	0.0000
$EBITM_{post}$	−0.0207	0.0025	0.0682	0.0778	−1.3716	6.9253	0.0000
$ROABT_{post}$	−0.0264	−0.0114	0.0580	0.0702	−1.6159	6.7403	0.0000
$ROANI_{post}$	0.0102	0.0156	0.0675	0.0710	−0.8340	4.5891	0.0233
$TASS_{post}$	11.7479	11.2048	1.9766	1.6616	0.9477	3.3479	0.0720
$TLIAB_{post}$	11.2728	10.7665	2.2150	1.7557	0.6859	2.9782	0.2636
$DROTA$	−0.0247	−0.0149	0.1327	0.1413	−0.3923	3.4972	0.5428
$DEBITM$	−0.0119	−0.0053	0.0893	0.0677	−0.2642	2.3267	0.5952
$DROABT$	−0.0088	0.0003	0.0855	0.0613	−0.5446	2.5900	0.3832
$DROANI$	−0.0122	−0.0076	0.0738	0.0691	−0.3889	3.4689	0.5575
$DTASS$	−0.0542	−0.0813	0.2034	0.2480	2.0190	7.9344	0.0000
$DTLIAB$	−0.0560	−0.0852	0.2567	0.2650	0.1358	4.2747	0.3002

effect of the Greek sovereign crisis to the financial ratios of the companies. However, it not surprising that in the earliest period of the crisis there is deterioration of both profits and profitability ratios, whereas in the later crisis period a negative impact on total assets (from concentration of losses per years) and total liabilities (as there is limited credit and trust in crisis periods) is observed.

These results are consistent with the results of some other past studies. Dargenidou et al. (2016) found evidence of improvement of the overall financial position of firms in the post-merger period, in terms of financial ratio analysis. Al-Hroot (2016) concluded that, in the period right after the merger, the profitability of the merging companies in the Jordanian industry improved slightly, while corporate lending increased. Azhagaiah and Sathishkumar (2014) for the Indian market showed that the merger event has had a significant (positive) effect on India's acquiring manufacturing companies after its completion.

Other studies however found evidence that profitability and overall financial performance are worsening after a merger event. For example, Pazarskis et al. (2018) found support for a negative impact on the profitability of merged companies in Greece. Examining maritime transport sector, Polemis and Karlis (2016) found a decrease in the profitability of the acquiring company and the absence of significant statistical evidence that the buyer's business value increased after the merger. Strasek and Gubensek (2016) examined mergers for Slovenian businesses where they found that growing debt was a typical feature of many mergers and acquisitions in the country.

Finally, some other studies found that mergers have no significant effects in financial ratios. Pantelidis et al. (2018) did not find any statistically significant change in any of their examined financial ratios, before and after the merger. Pervan et al. (2015) showed that for the acquiring companies in Croatia there were no statistically significant differences in their profitability. The study of Ahmed M. & Ahmed Z. (2014) in Pakistan concluded that the overall financial performance of the acquiring companies improved only slightly during the post-merger period. In their sample the liquidity and capital structure of the merged companies improved slightly, while profitability deteriorated after the merger. For the airlines industry, Aggarwal and Singh (2015) argued that there was not significant benefit achieved after the merger and no improvement in the performance of the merged company. Daddikar Prasad and Shaikh (2014) claimed that the merger of Indian airlines lead to no improvement in the new merged entity in terms of return on equity and net margin.

Table 4. Results of the bootstrap regression analysis, model (1) (based on 200 bootstrap samples)

Variables	c	pre	$PEC_{(p\,=\,1)}$	$PEC_{(p\,=\,2)}$
EBITM	0.0749**	0.6461**	−0.1481*	−0.1005*
ROABT	0.0193**	0.6417***	−0.0530***	−0.0426*
ROANI	0.0184*	0.6313***	−0.0500***	−0.0426
ROTA	0.0308**	0.5530***	−0.0579***	−0.0362*
TASS	−0.4475	1.0375***	0.0348	−0.1745***
TLIAB	−0.4817	1.0408***	0.0566	−0.1231**

Note: * significantly different from zero, at 10% level, two – tailed test; ** significantly different from zero, at 5% level, two – tailed test; *** significantly different from zero, at 1% level, two – tailed test.

In these six models, the estimated coefficients for the variables $PEC_{(p=1)}$ and $PEC_{(p=2)}$, are mostly negative and statistically significant, indicating that the period of crisis the merger took place is negatively correlated with the examined performance measures; the improvement is increasing as mergers happen away from the beginning of the crisis. In general, these results are similar with previous studies. Rao-Nicholson et al. (2016) examine M&A's performance in ASEAN countries and show that M&A's completed during the crisis is more profitable than earlier and following the crisis. Also, Lakstutiene et al. (2015) in their study assess several acquisitions regarding their profits and value-added in Lithuania in the economic crisis. The results of their survey show that profitability declines in the short term after the acquisition, but afterwards, there is a recovery, rendering acquisitions beneficial in the economic slowdown. In contrary, the results for the crisis period do not support evidence from previous studies as Pazarskis et al. (2018) that state a negative impact on performance following mergers in the duration of the Greek economic crisis.

The results from model (2), depicted in Table 5 are in line to those of model (1). For DROANI and DROTA the only statistically significant relationship is between the predictor and the capitalization of the merged company, indicating a positive impact for large and medium sized firms. For the other four models, it can be observed that the coefficient of the *industry relatedness* (IR) variable is negative, meaning that no-conglomerate mergers have negative impact to the improvement of the corresponding financial ratio. Further, the *period of economic crisis* (PEC) variable has a negative impact to the examined dependent variable, meaning that as merger events took place far from the beginning and climax of the crisis, the difference in the financial ratio, between pre-merger and post-merger period is decreasing. Regarding previous studies, Pantelidis et al. (2018) observe positive results for the companies that carry out conglomerate mergers. Rao-Nicholson et al. (2016), in a study that included firms from several southeastern Asian countries show that M&As during the economic crisis was more profitable, but found no support for correlation between performance and the industry relatedness of the involved companies.

Table 5. Results of the regression analysis, model (2)

Variables	c	IR	MP	$SCAP_{(h)}$	$SCAP_{(m)}$	$PEC_{(p=1)}$	$PEC_{(p=2)}$
DEBITM	0.208*	–0.243**	0.031	0.050	0.077	–0.167**	–0.064
DROABT	0.047	–0.123**	0.078	0.026	0.025	–0.057*	–0.053*
DROANI	0.038	–0.090	0.057*	0.011**	0.024**	–0.047	–0.045
DROTA	0.043	–0.120**	0.068*	0.033**	0.035**	–0.062**	–0.026
DTASS	1.001***	–0.821***	–0.094	–0.161	–0.108	–0.126	–0.132*
DTLIAB	0.593**	–0.557**	0.022	–0.124	–0.099	–0.031	–0.057*

Note: * significantly different from zero at 10% level, two – tailed test; ** significantly different from zero at 5% level, two – tailed test; *** significantly different from zero at 1% level, two – tailed test.

Conclusions

Corporate restructuring development affected the operation of companies and has enforced them in new competitive strategies in both domestic and international business arenas. In order for companies to evolve, they must remain competitive in their industry by increasing their profits while reducing their costs. One way to accomplish the above is to proceed to merger decisions. In this paper, mergers are analyzed extensively due to their importance, their decisive role and their long-standing interest in the business world, but also because of their importance in a company's viability in an economic crisis period.

In particular, this paper focuses on the study of the mergers of a sample of thirty-three listed companies during the Greek economic crisis period. A study of various quantitative and qualitative variables of the aforementioned companies was conducted for the previous year before merger and the following one after merger, in order to prove whether they contributed or not to the increase of their business performance and profitability. The data used to conduct the survey was derived from published available financial statements at the ASE website, as well as from the websites of the merger-involved companies for the period in question.

The research results revealed significant differences in the pre-merger and post-merger accounting performance. Further, the results support statistically significant change during the period of crisis as the merger events that taken place are positively correlated with the examined performance measures; the improvement was increasing as mergers happen away from the beginning of the crisis. Last, non-conglomerate mergers have negative impact to the improvement of the examined financial ratios.

The empirical part of this research can be a consultative and helpful tool for other companies planning to engage in a merger during the crisis. In such a period in Greece, attention is needed from companies especially when they want to move on to mergers' managerial decisions. However, there are some limitations for the present study: the sample of the study includes only listed Greek companies, which are only a small fraction of the total number of firms operating in Greece. Also, the merger transactions during the economic crisis in Greece have been evaluated with some specific quantitative and qualitative variables, as referred above, on some theoretical frameworks with a particular employed methodology. Different methodologies with different variables could lead to different results on the examined topic.

Finally, as future research proposal, one could investigate the effect of an augmented sample, consisting of both listed and non-listed companies and within different time intervals, to capture any long term effects of M&As in operating performance during crisis periods. Another approach of this study could be the introduction and examination of a control sample companies as benchmarks' criteria or in different countries. Furthermore, this study has examined short-run merger effects for one year before and after merger. The examination of financial statements of possible long-run effects for three or five years after mergers could lead on different results.

Author contributions

MP and GD conceived the study and were responsible for the design and development of the data analysis. MV and AK were responsible for data collection and analysis. MV and MP were responsible for data interpretation. MP wrote the first draft of the article.

Disclosure statement

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