The International Technology Management Review
Vol. 8(1), 2019, pp. 16–21
DOI: https://doi.org/10.2991/itmr.k.191104.001; ISSN 2213-7149; eISSN 1835-5269
https://www.atlantis-press.com/journals/itmr

Intra-industry' Effects from Mergers on Financial Statements, in and out of Technology-intensive Industries: Evidence from Greece

Michail Pazarskis[1,*], George Drogalas[2], Andreas Koutoupis[3], Grigorios Lazos[4]

[1]Department of Economics, International Hellenic University, End of Magnesias Street, Serres, GR-621 00, Greece
[2]Department of Business Administration, University of Macedonia, 156 Egnatias Street, Thessaloniki, GR-546 36, Greece
[3]Department of Accounting and Finance, University of Thessaly, University of Thessaly, Larissa, GR-411 10, Greece
[4]Program of Business Administration, Hellenic Open University, 35 26th Oktovriou Street, Thessaloniki, GR-546 27, Greece

ARTICLE INFO

Article History
Received 17 August 2019
Accepted 19 September 2019

Keywords
Mergers
financial statements
ratios
technology-intensive industrial sector
crisis
Greece

ABSTRACT

The study examines the impact of mergers on accounting performance of Greek listed firms involved in mergers. More specifically, we studied a sample of thirty-two absorbed listed firms in four sectors (primary sector, technology-intensive industrial sector, commercial and services sector, construction sector) during the period of economic crisis by using thirty-two accounting measures and ratios extracted from corresponding financial statements. The results of the study indicated that there is no statistically significant improvement or worsening for none of the examined variables in the post-merger period for the merged firms in the four examined sectors. However, as the whole economic image of the Greek economy is not very encouraging with the economic crisis, we concluded that mergers lead the involved firms to avoid any business losses in such a difficult economic period. Last, the results among four industries showed that none of the examined quantitative variables has a statistically significant change, and thus, did not reveal a different performance of one industry, as economic crisis had horizontal effects all over the Greek business.

1. INTRODUCTION

Merger is the action of unity from two or more firms under the control of one management. The merger eliminates one or more firms as independent legal entities and transfers their assets to a company that absorbs it [1]. The factors that may lead to mergers are market conditions, developments in new technologies, changes in government regulation, internationalization of markets, etc. [2–5]. Thus, there are micro and macro factors that affect the activity of mergers [6].

They are also the subject of extensive study for their success and firms' profitability, as they are important transactions, not only for the merged firms, but also for all stakeholders (shareholders, managers, employees, competitors, consumers and government), as well as the whole economy and society [7–12]. Mergers are one of the basic methods of restructuring by which each firm can acquire new resources, which they will use to increase their incomes and improve their market competitiveness.

Greece, after the global economic crisis in 2008, experienced an extended economic crisis almost for a decade (mainly from 2010 to 2018). During this period Greece was under the supervision of the 'troika' (European Union-EU, International Monetary Fund-IMF and European Central Bank) [13]. Economic crisis provided a 'toxic' environment for firms' activities in Greece, with a shrinking of their liquidity and profitability. However, financial statements' analysis provides in-depth analysis that reveals every problem in accounting performance for the examined firm and facilitates various comparisons of different samples [9,14–16].

Thus, the aim of this study is to examine the accounting performance of firms following mergers into different business industries and reveal any possible particularities, by deploying a plethora of quantitative variables from financial statements (thirty two accounting measures and ratios, extracted from them) for all listed companies at the Athens Exchange in the period of 2011–2016. During this period of economic crisis (2011–2016) in Greece, the chosen sample of 32 listed firms is examined on the basis of four main categories (according the industry type of the sample firms): primary sector (six firms), industrial sector (10 firms), commercial and services sector (eight firms), construction sector (eight firms).

The structure of the paper is as follows: Section 2 discusses the relevant literature review. Section 3 presents the research methodology and the examined data. Section 4 analyses the results of the study. Last section presents the conclusions of the study.

*Corresponding author. Email: pazarskis@gmail.com

2. LITERATURE REVIEW

Examining the impact of industry differentiation and mergers, Healy et al. [14] tested for differences a group of merged firms with a group of non-merged firms. They found better accounting performance after mergers for the merged firms, and this implies for industry differentiation's consequences in mergers. In another study, Ramaswamy and Waegelein [17] reported that firms with mergers in dissimilar industries may achieve better results in terms of efficiency and performance. For an emerging market, Al-Hroot [18] argued that each industrial sector's firms, as he had examined in his study firms after mergers in the Jordanian market, reacted differently on a merger event. Similar results were found by Rao-Nicholson et al. [19] as they also claimed for differences in every industry sector at the ASEAN countries and Ahmed and Ahmed [20] for the market of Pakistan.

For the Greek market and before the outbreak of the economic crisis, Agorastos et al. [16] claimed that the accounting performance of the acquiring firms in the post-merger period was different due to their industry type. Pantelidis et al. [21] in the beginning of the economic crisis (examined years with merger activity 2008–2009) in Greece proposed, in general, different results at the post-merger performance for their sample of examined acquiring firms of each industry. Alexandrakis et al. [22], studying Greek mergers in different business industries, argued that their results revealed for the examined firms of each industry different results per industry to profitability and operating efficiency. Finally, Pazarskis et al. [23] examined a knowledge-intensive industry in Greece, the information technology industry, using accounting variables and found a partial a worsening in their performance after mergers.

3. RESEARCH DESIGN

3.1. Sample Selection and Industry Type (Qualitative Variables)

All mergers events from listed firms in the Athens Stock Exchange (ASE) in the period from 2011 to 2016 are tracked. The reason that listed firms are studied is their size and data availability. From this preliminary sample of all mergers then are excluded:

(a) firms with banking and financial activities (due to the particularities of their financial statements),

(b) firms that their financial statements are no longer published (no available) in the ASE website,

(c) firms that presents multiple mergers (more than in one per year) that are excluded as no comparisons of financial statements from year to year can be made.

The final sample includes thirty two mergers of listed firms during the period of economic crisis in Greece.

Next, we have categorized the sample firms according their industry type in four main categories:

(i) primary sector (six firms),

(ii) technology-intensive industrial sector (10 firms),

(iii) commercial and services sector (eight firms),

(iv) construction sector (eight firms).

The merger events' participation in the sample per year and per industry is shown in Table 1.

Table 1 | Merger events by year and categorized according their industry type

Year	Mergers per year	Primary sector	Technology-intensive industrial sector	Commercial and services sector	Construction sector
2011	6	3	3	0	0
2012	3	1	1	0	1
2013	4	0	0	2	2
2014	4	0	3	0	1
2015	6	1	1	3	1
2016	9	1	2	3	3
Total	32	6	10	8	8

3.2. Accounting Measures and Ratios (Quantitative Variables)

For the sample firms their financial statements are collected from the ASE website. From them 16 accounting measures were extracted. To gain a better understanding of merger, we have calculated our 16 ratios (related to our selected accounting measures). The 32 quantitative variables of the study (accounting measures and ratios) that have been selected for the data of our sample are tabulated in Table 2.

3.3. Methodology

The sample includes mergers for 6 years (2011–2016) and is examined for 1 year before and after merger, thus our data analysis covers from the year 2010 (the beginning of the economic crisis in Greece) up to the year 2017 (the end of the economic crisis in Greece). More analytically, we explore accounting performance based on a 'change model' that compares post-merger data (1 year after merger, thus $t + 1$) and pre-merger data (1 year before merger, thus $t - 1$) and is applied as a modified methodology of Ramaswamy and Waegelein [17], Francis and Martin [24] and Pantelidis et al. [13]. In this study, we have chosen to calculate the mean from the sum of each ratio than the median for more accurate results, as many other past studies [15,25]. Furthermore, the merger year ($t = 0$) is not included in our data analysis as this the year happens many of one-time expenses related to merger event [14,17]. Next, we subtracted our sample to four sub-samples to examine the accounting performance in every of our four industries. To test our 'change model' in accounting performance, we compare year $t + 1$ to year $t - 1$ by using two independent sample mean t-tests for unequal variances. Thus, this test is applied for merged firms in every industry category: primary sector, industrial sector, commercial and services sector, construction sector.

Furthermore, to test the rate of change of accounting performance for the merged (absorbed) firms, we examine our variables in

Table 2 | Classification of accounting measures and ratios (quantitative variables)

Variables	Accounting measures and ratios	Accounting measures and ratios' definitions
AccDat01	Inventories	Inventories
AccDat02	Debtors	Debtors
AccDat03	Long term loans	Long term loans
AccDat04	Short term loans	Short term loans
AccDat05	Current liabilities	Current liabilities
AccDat06	Total liabilities	Total liabilities
AccDat07	Shareholders funds	Shareholders funds
AccDat08	Total assets	Total assets
AccDat09	Depreciations	Depreciations
AccDat10	Interest expenses	Interest expenses
AccDat11	Sales	Sales
AccDat12	Gross profit or loss	Gross profit or loss
AccDat13	EBITDA	Earnings before interest, taxes and depreciation
AccDat14	EBIT	Earnings before interest and taxes
AccDat15	Before-tax profit or loss	Before-tax profit or loss
AccDat16	Net income	Net income
Ratio01	Current ratio	Current assets/Current liabilities
Ratio02	Liquidity ratio	(Current assets – Stocks)/ Current liabilities
Ratio03	Collection period	(Debtors/Sales) × 360
Ratio04	Inventories turnover	Net sales/Inventories
Ratio05	Credit period	(Creditors/Sales) × 360
Ratio06	Debt ratio	Total liabilities/Total assets
Ratio07	Debt-equity ratio	Total liabilities/ Shareholders funds
Ratio08	Shareholder equity ratio	Shareholders funds/Total assets
Ratio09	Sales to total liabilities ratio	Sales/Total liabilities
Ratio10	Asset turnover ratio	Sales/Total assets
Ratio11	Gross margin	Gross profit/Sales
Ratio12	EBIT margin	Earnings before interest and taxes/Sales
Ratio13	EBITDA margin	Earnings before interest, taxes and depreciation/Sales
Ratio14	Net assets turnover	Sales/(Shareholders funds + Non-current liabilities)
Ratio15	Interest cover	Earnings before interest and taxes/Interest expenses
Ratio16	Gearing	Long term debt/ Shareholders funds

Note: Stocks are outstanding shares. Shareholder funds are all assets less all liabilities.

relation to the industry type of each firm by applying a modified methodology of Sharma and Ho [15], Ramaswamy and Waegelein [17] and Francis and Martin [24]. In particular, we calculate first the change in accounting performance of the absorbed firm in every quantitative variable from the post-merger value minus the pre-merger value. Then, the calculated change in every quantitative variable is divided by the pre-merger value and this is done for every firm of our sample (*dAccDat01-16, dRatio01-16*). Next, we compare the rate of change of accounting performance of merged firms regarding to the four industry categories of our sample (primary sector, industrial sector, commercial and services sector, construction sector). Because these four data sets have not a normal distribution, we use the Kruskal–Wallis test for our analysis [13].

4. RESULTS

4.1. Intra-industry Results

In our study, all mergers events from listed firms in the ASE in the period from 2011 to 2016 are tracked. After several eliminations of our preliminary sample (due to banking and financial activities' firms, data availability, etc.), the final sample includes thirty two mergers of listed firms during the period of economic crisis in Greece, which are further subtracted according their industry category. Firstly, the comparison results (*t*-tests) for accounting measures and ratios from pre- and post-merger period in the primary sector are presented in Table 3. We observe that there is no statistically significant change after mergers in accounting performance of the merged firms in the primary sector.

Table 3 | Comparison results (*t*-tests) for accounting measures and ratios from pre- and post-merger period in the primary sector

Variables	Mean pre-merger	Mean post-merger	*t*-value	*p*-value	Confidential index
AccDat01	294.942	231.302	−0.19	0.851	(−806.901; 679.621)
AccDat02	174.037	148.94	−0.13	0.903	(−477.449; 427.256)
AccDat03	210.597	93.383	−0.60	0.569	(−592.868; 358.44)
AccDat04	245.858	427.057	0.41	0.695	(−866.874; 1229.273)
AccDat05	291.583	349.658	0.14	0.890	(−868.179; 984.329)
AccDat06	832.679	916.493	0.08	0.939	(−2322.219; 2489.847)
AccDat07	445.711	443.963	−0.00	0.998	(−1326.133; 1322.639)
AccDat08	1278.39	1354.696	0.05	0.964	(−3652.222; 3804.834)
AccDat09	28.925	31.94	0.08	0.940	(−85.059; 91.089)
AccDat10	17.232	15.289	−0.13	0.903	(−36.891; 33.005)
AccDat11	1475.81	1809.809	0.15	0.884	(−4704.843; 5372.841)
AccDat12	146.88	106.373	−0.24	0.819	(−436.565; 355.551)
AccDat13	82.828	46.836	−0.37	0.720	(−259.72; 187.737)
AccDat14	58.139	15.46	−0.69	0.514	(−193.145; 107.787)
AccDat15	37.997	8.157	−0.52	0.625	(−171.545; 111.865)
AccDat16	20.475	3.834	−0.43	0.681	(−108.551; 75.267)
Ratio01	0.933	0.887	−0.17	0.868	(−0.69; 0.598)
Ratio02	0.486	0.385	−0.78	0.460	(−0.402; 0.199)
Ratio03	148	90.9	−0.87	0.426	(−225.1; 111.7)
Ratio04	9.3	5.18	−0.68	0.521	(−18.58; 10.32)
Ratio05	305	263	−0.36	0.729	(−308; 224)
Ratio06	0.724	0.778	0.51	0.624	(−0.191; 0.299)
Ratio07	3.6	−8.1	−1.02	0.354	(−41.2; 17.8)
Ratio08	0.276	0.249	−0.31	0.766	(−0.2244; 0.1707)
Ratio09	1.247	1.399	0.29	0.781	(−1.047; 1.351)
Ratio10	0.537	0.647	0.50	0.626	(−0.382; 0.602)
Ratio11	0.230	0.153	−0.64	0.541	(−0.353; 0.200)
Ratio12	0.0207	−0.082	−1.22	0.275	(−0.3194; 0.1133)
Ratio13	0.05	−0.036	−0.94	0.376	(−0.2959; 0.1247)
Ratio14	1.218	1.9	0.94	0.385	(−1.097; 2.460)
Ratio15	1.09	−0.44	−1.09	0.307	(−4.76; 1.70)
Ratio16	0.997	−0.47	−0.84	0.442	(−5.99; 3.05)

Notes: 1. The variables *AccDat01–AccDat16* are in millions euro. 2. ***, **, * indicate that the change of the mean is significantly different from zero at a significance level of 0.01. 0.05. and 0.10, respectively, as calculated by comparing the average of two independent subassemblies (two independent sample mean *t*-tests) at ratios of sample. More specifically, for the three above cases the classification levels relative to the value of the *p*-value are the following: $p < 0.01$ indicates strong evidence against H_0 (denoted by ***). $0.01 \le p < 0.05$ indicates moderate evidence against H_0 (denoted by **). $0.05 \le p < 0.10$ indicates minimum evidence against H_0 (denoted by *). $0.10 \le p$ indicates no real evidence against H_0.

Pantelidis et al. [13] argued also for similar results with no significant change after mergers per industry, as well as Pazarskis et al. [1] have been drawn same conclusions for the commercial and services sector after mergers. Finally, some other researchers concluded that there is a worsening in performance after mergers in this sector [16,22].

Next, for the firms that are in the technology-intensive industrial sector (10 firms) from comparison results (*t*-tests) for accounting data and ratios from pre- and post-merger period, we observe for the quantitative variables that none of them are statistically significant ($p > 0.1$). These results are presented in Table 4. Similar conclusions have been drawn earlier studies based on stock market or accounting performance measures that supported no significant results after mergers per industry [13,16]. On the other hand, different conclusions that there is (a) an improvement at performance in different industry than technology-intensive industrial sector were found by Pazarskis et al. [1], or (b) an improvement at performance of the technology-intensive industrial sector were found by Alexandrakis et al. [22].

Regarding the commercial and services sector (eight firms), Table 5 presents the results for years 2011–2015 based on *t*-test. There is

Table 4 | Comparison results (*t*-tests) for accounting measures and ratios from pre- and post-merger period in the technology-intensive industrial sector

Variables	Mean pre-merger	Mean post-merger	*t*-value	*p*-value	Confidential index
AccDat01	22.787	37.33	0.64	0.529	(−33.144; 62.23)
AccDat02	112.318	91.014	−0.26	0.797	(−191.824; 149.216)
AccDat03	42.576	44.225	0.03	0.973	(−99.672; 102.971)
AccDat04	35.284	47.82	0.37	0.716	(−58.204; 83.277)
AccDat05	93.381	84.393	−0.12	0.908	(−168.555; 150.579)
AccDat06	243.312	213.892	−0.16	0.878	(−423.59; 364.751)
AccDat07	141.092	162.09	0.16	0.878	(−260.218; 302.214)
AccDat08	348.74	375.982	0.08	0.934	(−646.425; 700.91)
AccDat09	7.549	7.138	−0.06	0.956	(−15.767; 14.944)
AccDat10	6.555	6.944	0.06	0.955	(−13.697; 14.477)
AccDat11	220.085	230.454	0.06	0.951	(−335319; 356058)
AccDat12	29.892	40.476	0.43	0.673	(−40.838; 62.007)
AccDat13	34.024	31.193	−0.10	0.923	(−62.708; 57.046)
AccDat14	26.406	24.025	−0.11	0.916	(−48.804; 44.043)
AccDat15	17.668	16.027	−0.10	0.919	(−34.802; 31.521)
AccDat16	13.179	12.265	−0.08	0.941	(−26.194; 24.367)
Ratio01	2.29	1.659	−0.86	0.406	(−2.229; 0.961)
Ratio02	1.89	1.215	−0.92	0.374	(−2.263; 0.917)
Ratio03	149	128	−0.49	0.629	(−110.0; 68.1)
Ratio04	9.8	5.07	−1.12	0.283	(−13.91; 4.44)
Ratio05	176	177	0.03	0.975	(−95.5; 98.5)
Ratio06	1.89	0.595	−1.39	0.192	(−3.335; 0.753)
Ratio07	7.1	3.21	−0.76	0.463	(−15.0; 7.26)
Ratio08	0.500	0.405	−0.97	0.346	(−0.3016; 0.1111)
Ratio09	2.31	2.27	−0.09	0.930	(−1.017; 0.933)
Ratio10	1.028	0.81	−0.76	0.462	(−0.839; 0.403)
Ratio11	0.289	0.308	0.22	0.826	(−0.1532; 0.19)
Ratio12	0.0779	0.0979	0.65	0.525	(−0.0443; 0.0842)
Ratio13	0.126	0.1368	0.29	0.775	(−0.067; 0.0886)
Ratio14	1.92	1.68	−0.36	0.725	(−1.648; 1.167)
Ratio15	12.5	6.76	−0.59	0.566	(−27.0; 15.5)
Ratio16	0.568	0.83	0.61	0.547	(−0.627; 1.149)

Table 5 | Comparison results (*t*-tests) for accounting measures and ratios from pre- and post-merger period in the commercial and services sector

Variables	Mean pre-merger	Mean post-merger	*t*-value	*p*-value	Confidential index
AccDat01	56.564	63.446	0.20	0.846	(−68.244; 82.009)
AccDat02	114.666	122.864	0.07	0.946	(−250.278; 266.674)
AccDat03	335.122	310.851	−0.07	0.946	(−786.801; 738.26)
AccDat04	117.566	92.205	−0.36	0.725	(−178.808; 128.085)
AccDat05	290.005	315.865	0.07	0.945	(−766.853; 818.572)
AccDat06	844.928	811.721	−0.04	0.970	(−1909.056; 1842.642)
AccDat07	436.539	463.425	0.06	0.954	(−958.201; 1011.974)
AccDat08	1281.48	1270.709	−0.01	0.994	(−2834.83; 2813.29)
AccDat09	7.524	120.017	1.03	0.336	(−144.911; 369.896)
AccDat10	7.279	22.112	0.91	0.395	(−23.844; 53.511)
AccDat11	680.456	702.985	0.03	0.973	(−1397.484; 1442.541)
AccDat12	140.617	239.584	0.59	0.571	(−277.446; 475.379)
AccDat13	203.832	193.735	−0.04	0.966	(−507.404; 487.21)
AccDat14	96.591	73.735	−0.26	0.800	(−214.865; 169.154)
AccDat15	58.212	50.155	−0.13	0.901	(−146.246; 130.133)
AccDat16	37.588	23.516	−0.34	0.742	(−106.84; 78.696)
Ratio01	1.41	1.69	0.33	0.748	(−1.577; 2.137)
Ratio02	1.005	0.787	−0.55	0.592	(−1.075; 0.638)
Ratio03	92.3	79.6	−0.39	0.704	(−83.3; 58.0)
Ratio04	10.7	7.81	−0.52	0.616	(−15.12; 9.37)
Ratio05	142.6	121.2	−0.57	0.581	(−104.4; 61.5)
Ratio06	0.755	0.805	0.32	0.752	(−0.285; 0.384)
Ratio07	123	0.52	−1.38	0.210	(−331.7; 87.2)
Ratio08	0.245	0.232	−0.08	0.934	(−0.331; 0.306)
Ratio09	2.05	3.56	0.84	0.427	(−2.72; 5.74)
Ratio10	0.665	0.690	0.29	0.773	(−0.1596; 0.21)
Ratio11	0.244	0.282	0.53	0.603	(−0.1183; 0.196)
Ratio12	0.075	0.064	−0.22	0.830	(−0.1246; 0.1019)
Ratio13	0.134	0.131	−0.06	0.956	(−0.1368; 0.1299)
Ratio14	1.68	0.86	−0.78	0.454	(−3.17; 1.53)
Ratio15	3.96	−3.2	−1.35	0.202	(−18.69; 4.4)
Ratio16	36.3	−0.18	−1.30	0.233	(−102.7; 29.7)

Notes: 1. The variables *AccDat01–AccDat16* are in millions euro. 2. ***, **, * indicate rejection of the null hypothesis at a significance level of 0.01, 0.05, 0.1, respectively.

no significant change of the examined number of the quantitative variables. Similar conclusions with no significant results after mergers per industry have been drawn earlier studies examining several accounting performance measures for the commercial and services sector after mergers [1,13]. Finally, some other researchers concluded that there is a worsening in performance [16,22].

Finally, for the construction sector (see Table 6), which includes eight firms, we observe that there is no statistically significant change after mergers in accounting performance of the merged firms ($p > 0.1$). Different conclusions have been drawn earlier studies based on accounting performance, which found a comparative better performance of the constructions sector: Pantelidis et al. [21] in the beginning of the economic crisis found that return on total assets presents a significant change due to mergers events, which it signalizes a better performance among the acquiring firms in their examined sample period for the firms of the constructions industry. Also, Pazarskis et al. [1] during the economic crisis claimed for a better performance after mergers of the constructions industry, as they found an improvement in five out of 12 examined financial ratios in their study. On the other hand, different conclusions were drawn before the outbreak of the economic crisis by Agorastos et al. [16], as

Table 6 | Comparison results (*t*-tests) for accounting measures and ratios from pre- and post-merger period in the construction sector

Variables	Mean pre-merger	Mean post-merger	*t*-value	*p*-value	Confidential index
AccDat01	160.596	202.783	0.20	0.843	(−426.485; 510.858)
AccDat02	161.391	149.571	−0.11	0.916	(−259.156; 235.515)
AccDat03	256.53	202.91	−0.29	0.775	(−465.906; 358.66)
AccDat04	172.04	260.881	0.46	0.654	(−344.471; 522.152)
AccDat05	143.475	166.276	0.23	0.823	(−201.178; 246.78)
AccDat06	650.602	706.005	0.11	0.914	(−1067.128; 1177.935)
AccDat07	505.363	514.17	0.03	0.978	(−706.181; 723.795)
AccDat08	1155.965	1220.175	0.09	0.933	(−1620.023; 1748.444)
AccDat09	34.864	29.772	−0.17	0.865	(−71.146; 60.962)
AccDat10	95.9	21.618	−1.11	0.318	(−246.689; 98.125)
AccDat11	742.357	1245.289	0.66	0.525	(−1216.647; 2222.511)
AccDat12	63.367	91.941	0.43	0.675	(−123.091; 180.238)
AccDat13	59.469	83.717	0.42	0.686	(−108.949; 157.446)
AccDat14	24.888	51.814	0.79	0.455	(−53.495; 107.345)
AccDat15	−3.333	22.534	1.21	0.262	(−23.512; 75.247)
AccDat16	−9.486	25.513	1.49	0.170	(−18.049; 88.046)
Ratio01	1.61	3.35	0.76	0.481	(−4.12; 7.59)
Ratio02	1.39	3.14	0.75	0.486	(−4.24; 7.75)
Ratio03	166	101.3	−0.98	0.354	(−216.7; 87.0)
Ratio04	8.73	37.6	0.87	0.426	(−56.8; 114.5)
Ratio05	222	−50	−1.11	0.319	(−905; 361)
Ratio06	0.583	0.606	0.19	0.854	(−0.254; 0.301)
Ratio07	1.88	2.15	0.36	0.729	(−1.425; 1.960)
Ratio08	0.417	0.394	−0.19	0.854	(−0.301; 0.254)
Ratio09	1.88	2.34	0.38	0.715	(−2.49; 3.41)
Ratio10	0.501	1.15	0.94	0.390	(−1.127; 2.427)
Ratio11	0.146	0.0516	−0.85	0.436	(−0.382; 0.193)
Ratio12	0.057	0.218	0.84	0.426	(−0.282; 0.605)
Ratio13	0.125	0.294	0.89	0.397	(−0.268; 0.607)
Ratio14	0.938	2.71	1.10	0.321	(−2.36; 5.90)
Ratio15	−0.61	2.09	1.76	0.112	(−0.76; 6.16)
Ratio16	0.632	0.465	−1.02	0.336	(−0.540; 0.205)

they claimed that there is a worsening for the acquiring firms from constructions industry at their post-merger performance.

4.2. Comparison Results from all Industries

Several studies examined impact of industry differentiation to accounting performance after mergers [1,13,16,17,19,21,22]. To test mergers of Greek listed firms in different business industries and to compare them to find which one presents better relative results among others, we test the rate of change of accounting performance for the merged (absorbed) firms. More analytically, we examine our variables in relation to the industry type of each firm by applying a modified methodology of Sharma and Ho [15], Ramaswamy and Waegelein [17] and Francis and Martin [24]. Thus, we calculate first the change in accounting performance of the absorbed firm in every quantitative variable from the post-merger value minus the pre-merger value and then, the calculated change in every quantitative variable is divided by the pre-merger value and this is done for every firm of our sample. The comparison results (Kruskal–Wallis test) for accounting data and ratios by industry is presented in Table 7. The results showed that none of the examined variables has a statistically significant change ($p > 0.1$). Our results are aligned with these of Pantelidis et al. [13] and differ from described past

Table 7 | Comparison results (Kruskal–Wallis test) for accounting measures and ratios by industry

Variables	Primary sector	Technology-intensive industrial sector	Commercial and services sector	Construction sector	*p*-value
dAccDat01	−0.1251	0.2478	0.1503	0.1999	0.678
dAccDat02	−0.164173	0.008126	−0.00402	−0.055673	0.870
dAccDat03	−0.52902	0.26471	−0.05175	−0.15389	0.333
dAccDat04	−0.12154	0.16939	−0.05738	0.45405	0.576
dAccDat05	−0.008284	0.07892	−0.128897	−0.030437	0.706
dAccDat06	−0.0509075	−0.0004085	−0.0179374	0.0956588	0.552
dAccDat07	−0.202972	0.018222	−0.148068	−0.006925	0.743
dAccDat08	−0.11795	0.02782	−0.04795	0.05105	0.279
dAccDat09	−0.11066	−0.05929	0.08495	−0.14548	0.475
dAccDat10	−0.11409	−0.07228	−0.14283	−0.17226	0.400
dAccDat11	0.084221	−0.004569	0.044256	0.241735	0.761
dAccDat12	−0.2194	0.1239	0.1845	0.1709	0.436
dAccDat13	−0.06301	−0.008016	−0.012638	0.183711	0.678
dAccDat14	0.0568	−0.06477	−0.50254	−0.30008	0.405
dAccDat15	−0.08875	−0.24337	−0.52177	−1.2521	0.645
dAccDat16	−0.11703	−0.05575	−0.65192	−1.17943	0.560
dRatio01	−0.005787	0.032259	0.024128	0.076823	0.963
dRatio02	−0.1317	0.01718	−0.46039	0.07047	0.717
dRatio03	−0.27211	−0.15347	−0.01825	−0.18839	0.455
dRatio04	0.3978	−0.1414	−0.1426	−0.1345	0.574
dRatio05	−0.05994	0.0351	−0.15673	0.14557	0.681
dRatio06	0.09596	−0.02098	0.027	0.05604	0.871
dRatio07	−0.004994	−0.08078	−0.190582	0.126071	0.275
dRatio08	−0.12319	−0.06424	−0.09227	−0.04014	0.867
dRatio09	0.31469	0.06916	0.15556	−0.244	0.576
dRatio10	0.24353	0.025495	0.02029	0.004308	0.310
dRatio11	−0.25752	0.08201	0.02603	−0.52789	0.223
dRatio12	−0.09126	−0.16732	−0.50009	−0.69947	0.465
dRatio13	−0.25386	−0.01348	−0.08836	−0.04294	0.799
dRatio14	0.39139	0.01555	−0.07601	0.28586	0.218
dRatio15	−0.08588	−0.07394	−0.84225	0.15012	0.356
dRatio16	−0.119	0.1212	−0.2288	−0.2577	0.158

Notes: 1. The variables *AccDat01–AccDat16* are in millions euro. 2. ***, **, * indicate rejection of the null hypothesis at a significance level of 0.01, 0.05, 0.1, respectively.

studies [19,20], as well as from several earlier studies for the Greek market and mergers before or during the economic crisis in Greece [1,16,21,22].

5. CONCLUSION

Greece, after the U.S. economic crisis in 2008, experienced an extended economic crisis almost for a decade (from 2010 to 2018). The present study analyse financial statements from listed firms after their mergers in Greece. However, financial statements' analysis provides in-depth analysis that reveals every problem in accounting performance for the examined firm and facilitates various comparisons of different samples.

This study compares accounting performance of Greek listed firms that are in the same industry in the ASE before and after mergers, by deploying a plethora of quantitative variables, in order to reveal any intra-industry particularities. The examined period of all merger events is from 2011 to 2016 (period of economic crisis in Greece). Furthermore, our study examined impact of industry differentiation to accounting performance after mergers. To test

mergers of Greek listed firms in different business industries and to compare them to find which one presents better relative results among others, we test the rate of change of accounting performance for the merged (absorbed) firms. Last, the study used according the relevant literature a parametric (*t*-test) and a non-parametric test (Kruskal–Wallis test).

The results indicate that there is no statistically significant improvement or worsening for none of the examined quantitative variables in the post-merger period for the merged firms in the four examined sectors (primary sector, technology-intensive industrial sector, commercial and services sector, construction sector). However, as the whole economic image of the Greek economy is not very encouraging with the economic crisis, we could concluded that mergers lead the involved firms to avoid any business losses in such a difficult economic period. Finally, the results among four industries showed that none of the examined quantitative variables has a statistically significant change, and thus, did not reveal a different performance of one industry, as economic crisis had horizontal effects over all the Greek business.

As a future research of the study is proposed an analysis of financial statements extracted from a sample of non-listed Greek with this one of listed firms. This could further be tested on the existence of differences from two different samples, entered in and were out of a period of economic crisis. Furthermore, an international comparison of different sub-samples from different countries could be helpful to understand the particularities among different business areas in every country. Finally, the present study could be examined on a different time-frame period and further could be compared with the present one's results for finding any potential differences.

REFERENCES

[1] M. Pazarskis, G. Drogalas, A. Koutoupis, Mergers taxation and accounting performance: some evidence from Greece, J account taxation 9 (2017), 119–130.

[2] R. Rao-Nicholson, J. Salaber, The motives and performance of cross-border acquirers from emerging economies: comparison between Chinese and Indian firms, Int Business Rev 22 (2013), 963–980.

[3] H.S. Bhabra, J. Huang, An empirical investigation of mergers and acquisitions by Chinese listed companies, 1997–2007, J Multinat Financial Manage 23 (2013), 186–207.

[4] S. Dutta, S. Saadi, P. Zhu, Does payment method matter in cross-border acquisitions? Int Rev Econ Finan, 25 (2013), 91–107.

[5] I.I. Rodionov, V.B. Mikhalchuk, M&A synergies in domestic M&A deals in Russia in 2006–2014, Russian Manage J 14 (2016), 3–28.

[6] A. Cosh, A. Hughes, A. Singh, The causes and effects of takeovers in the U.K.: an empirical investigation for the late 1960s at the microeconomic level, In: D. Mueller, editor. The determinants and effects of merger: an international comparison, Cambridge, UK: Gunn & Horn Publications; 1980.

[7] M.C. Jensen, R.S. Ruback, The market for corporate control: the scientific evidence, J Financial Econ 11 (1983), 5–50.

[8] S.C. Myers, N.S. Majluf, Corporate financing and investment decisions when firms have information that investors do not have, J Financial Econ 13 (1984), 187–221.

[9] S. Manson, A. Stark, H.M. Thomas, A cash flow analysis of operational gains from takeovers, Certified research report no. 35. London, UK: The Chartered Association of Certified Accountants; 1993.

[10] A. Ghosh, Does operating performance really improve following corporate acquisitions? J Corp Finan 7 (2001), 151–178.

[11] S.B. Moeller, F.P. Schlingemann, Global diversification and bidder gains: a comparison between cross-border and domestic acquisitions, J Bank Finan 29 (2005), 533–564.

[12] F. Tao, X. Liu, L. Gao, E. Xia, Do cross-border mergers and acquisitions increase short-term market performance? The case of Chinese firms, Int Business Rev 26 (2017), 189–202.

[13] P. Pantelidis, M. Pazarskis, G. Drogalas, S. Zezou, Managerial decisions and accounting performance following mergers in Greece, Invest Manage Financial Innov 15 (2018), 263–276.

[14] P.M. Healy, K.G. Palepu, R.S. Ruback, Does corporate performance improve after mergers? J Financial Econ 31 (1992), 135–175.

[15] D.S. Sharma, J. Ho, The impact of acquisitions on operating performance: Some Australian evidence, J Business Finan Account 29 (2002), 155–200.

[16] K. Agorastos, M. Pazarskis, T. Karagiorgos, The post-merger performance of acquiring listed firms among different industries in Greece, In: M. Pazarskis, editor. Mergers and acquisitions in Greece: evidence from past experience, Saarbrücken, Germany: Lambert Academic Publishing; 2013, pp. 75–123.

[17] K.P. Ramaswamy, J.F. Waegelein, Firm Financial Performance Following Mergers, Rev Quant Finan Account 20 (2003), 115–126.

[18] Y.A.K. Al-Hroot, The impact of mergers on financial performance of the Jordanian industrial sector, Int J Manage Business Stud 6 (2016), 9–13. Retrieved from: http://www.ijmbs.com/Vol6/1/1-dr-yusuf-ali-khalaf-al-hroot.pdf

[19] R. Rao-Nicholson, J. Salaber, T.H. Cao, Long-term performance of mergers and acquisitions in ASEAN countries, Res Int Business Finan 36 (2016), 373–387.

[20] M. Ahmed, Z. Ahmed, Mergers and acquisitions: effect on financial performance of manufacturing companies of Pakistan, Middle-East J Sci Res 21 (2014), 706–716.

[21] P. Pantelidis, M. Pazarskis, K. Deloudi, S. Stamatouros, Do M&As of Greek listed firms before the economic crisis improved their current liquidity and profitability? MIBES Trans 8 (2014), 100–112. Retrieved from: http://mtol.teilar.gr/vol8_2014/Pantelidis-Pazarskis-Deloudi-Stamatouros.pdf

[22] A. Alexandrakis, M. Pazarskis, P. Pantelidis, P. Chrisoula, Exploration of the impact of the industry sector at the profitability of the Greek listed firms after mergers and acquisitions, In: Proceedings of the 4th International Conference in Quantitative and Qualitative Methodologies in the Economic and Administrative Sciences (ICQQMEAS), Athens, Greece; 2013, pp. 39–45. Retrieved from: http://econferences.teiath.gr/index.php/ICQQMEAS/ICQQMEAS2015/paper/view/80

[23] M. Pazarskis, A. Alexandrakis, P. Notopoulos, D. Kydros, Are acquiring firms better off after an acquisition? Evidence from a knowledge-intensive industry in Greece, Int Res J Appl Finan 2 (2011), 844–852.

[24] J.R. Francis, X. Martin, Acquisition profitability and timely loss recognition, J Account Econ 49 (2010), 161–178.

[25] M.M. Cornett, H. Tehranian, Changes in corporate performance associated with bank acquisitions, J Financial Econ 31 (1992), 211–234.