An Empirical Analysis on the Impact of Market Concentration on the Financial Performance of General Private Clinics in Greece

Gazilas, Emmanouil Taxiarchis and Vozikis, Athanassios

University of Piraeus, Department of Economics

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ABSTRACT

This research investigates the dynamics of the Greek General Private Clinics Sector over the period 2012-2020, examining the interplay between market concentration, as measured by the Herfindahl-Hirschman Index (HHI), and key financial ratios. The study delves into Return on Equity (ROE), Gross Profit Margin, Operating Profitability, Net Profit Margin, Earnings After Tax Margin, and Return on Assets financial ratios. Commencing with a moderately concentrated market in 2012 (HHI=775.74), subsequent years witnessed the sector's adaptability to evolving market dynamics, reflected in fluctuations in both market concentration and financial ratios. The unexpected positive correlation observed in 2015, where a decrease in HHI (710.39) coincided with an increase in Net Sales and EBITDA, challenges conventional expectations. Throughout the analyzed period, the sector showcased resilience, demonstrated by its ability to navigate changes in market concentration while sustaining and expanding earnings. In 2019, Net Sales and EBITDA experienced an upturn, reaching 554.31 million euros and 104.11 million euros, respectively. However, the intriguing scenario in 2020, marked by a slight decrease in Net Sales (540.55 million euros) coupled with a significant surge in HHI (1097.52), underscores the intricate interplay between market structure and financial performance. The juxtaposition of key financial ratios with the HHI provides a holistic view of the sector's financial landscape, offering valuable insights for practitioners, policymakers, and researchers alike.

Keywords: Greek Healthcare, Market Concentration, Financial Ratios, Herfindahl-Hirschman Index (HHI), General Private Clinics, Financial Analysis

Introduction:

In Greece's healthcare sector, the private sector stands as a vital pillar, providing essential services to citizens. Within this sphere, Greece's private clinics form a significant segment, serving a substantial portion of the population's healthcare needs. As this sector has influenced by economic shifts, regulatory changes, and societal demands over the years, the concentration of market power among key players has become a focal point. This study embarks on a comprehensive exploration of the market structure, utilizing the Herfindahl-Hirschman Index (HHI) from 2012 to 2020.

Our focus lies on the largest general private clinics, collectively commanding an 60%-70% of the market share during this expansive timeframe. The Herfindahl-Hirschman Index (HHI), a renowned metric in economic studies, is employed to provide a quantitative measure of market concentration. The intention here is to observe the concentration ratio HHI, aiming to unravel its interaction with key financial metrics. The financial metrics under investigation encompass a spectrum of sector-specific ratios, including Return on Equity, Net Profit Margin, Operating Profitability, Gross Profit Margin, Earnings After Tax Margin and Return on Assets. These indicators, reflective of financial health, profitability, and operational efficiency, will offer a view of how market concentration correlates with the financial performance of the general private clinics in Greece. Furthermore, our investigation extends to financial statement measures, exploring the dynamics between the HHI and the sector's net sales and EBITDA. These measures not only encapsulate the sector's revenue generation but also delve into its operational earnings, providing a more holistic understanding of the financial landscape.

The significance of this study lies not just in its quantitative rigor but in its qualitative depth. By adopting a qualitative view, we seek to discern patterns and trends that have shaped the sector over nearly a decade. The years 2012 to 2020 encapsulate a period marked by dynamic shifts in economic landscapes and healthcare paradigms, providing a rich tapestry for our investigation. As we navigate through this expansive timeframe, the subsequent sections of this paper will unveil our detailed methodology, present nuanced observations drawn from the HHI and financial metrics and offer a comprehensive discussion of the implications derived from our in-depth analysis. Our aim is to contribute valuable insights to the strategic decision-making processes of stakeholders navigating the ever-evolving landscape of Greek private healthcare.

Literature Review

Concentration indices are used in several contexts to measure how a quantity is distributed among a number of subjects (individuals or aggregates, such as households or companies). Several indices have been proposed in the literature and have been applied in many contexts, to see how income (or wealth) is distributed among the population or analyze the market structure filing of patents (Liston et al., 2004). An extensive literature is surveyed for the banking sector (Bikker et al., 2002). Among them, two have emerged as the most widespread: the Herfindahl-Hirschman Index (often indicated with its abbreviation HHI) and the CR4 index. However, we may not be in a condition to compute both indices, since the HHI requires the complete distribution of the market. However, it has been shown that, though we cannot compute the exact value of the HHI, we can obtain an interval estimate for it if we know just the largest market shares (Naldi et al., 2014).

Concentration indices are employed to measure the level of competition in an industry, often to examine whether concerns for dominant position creation exist in the case of mergers and acquisitions. In this segment, we elucidate the Herfindahl-Hirschman Index (HHI), a pivotal concept underpinning our analysis framework. This index serves as a cornerstone in our paper, shaping the lens through which we scrutinize market concentration and dynamics within the private general clinic sector.

The Herfindahl-Hirschman owes its name to the two economists who developed it, though independently. Albert O. Hirschman proposed the index in 1945 (Hirschman, 1945), while Orris C. Herfindahl presented it in 1950 in his unpublished doctoral dissertation at Columbia University," Concentration in the U.S. Steel Industry". Hirschman himself had to somewhat untangle the paternity dispute, since his index had been attributed to Gini (Hirschman, 1964). Though Herfindahl proposal appeared five years later than Hirschman's, the form of the index as used today is that proposed by Herfindahl (which leads to an index that is the square of the original proposal). If we consider a market where n companies are operating, and the market share of the companies is **Si**, the HHI is defined as the sum of the squares of all the market shares.

$$HHI = \sum_{i=1}^{n} Si^2 * 10000$$

The value of the HHI provides an indication of the level of concentration, with the maximum value corresponding to the case of the monopoly, and the minimum corresponding to perfect competition. The higher the value of the HHI, the higher the concentration of the market in the hands of a few companies. Though a precise correspondence cannot be drawn between the numerical value of the HHI and the qualitative indication of a level of concentration (or, equivalently, of competition), some guidelines have been provided for that purpose. The U.S. Department of Justice provided its guidelines for horizontal mergers first in 1985 and later revised them several times.

The HHI has been used to measure concentration in a wide set of contexts. In a technical note of the Federal Reserve Bank, Rhoades showed with simple examples how it can be employed to analyze the competitive effects of bank mergers, by computing the HHI before and after the merger (The European Union, 2005). It has also been used in civil aviation (Lijesen et al., 2002), the book industry (Greco, 2000), the food processing industry (Lopez et al., 2002), telecommunications, media and the Internet [(Noam, 2008); (Noam 2013)] and the newspaper industry (Kranenburg, 2002). Some criticism has come as well as to its capability to explain the role of market share inequalities in the banking system [(Hannan, 1997); (Alegria & Schaeck, 2008)].

Financial ratio analysis has been used to assess business performance for over a century, going back to at least the late 1800s (O'Connor,1973). According to Horrigan (1965), it is virtually impossible to analyze accounting data in a meaningful way without converting data into ratios; therefore, a validation of financial ratios is also a validation of financial accounting.

Nearly 90 years ago, the Harvard Business Review (1925) discussed the relevance of financial ratio analysis. The sentiment in that article has been expressed many times since then: There is evidence of a growing interest in the use of financial ratios as an aid in the analysis and interpretation of balance sheets. The uses and limitations of the many ratios recently developed are, therefore, a matter of importance not only to commercial and investment bankers, but also to individual investors, commercial credit men, and executives. By the use of ratios, it is possible to make comparisons between several firms, or with an average for a group of companies engaged in the same line of business. Thus, it can be determined whether the firm being studied is above or below the average of similar firms. An

intelligent use of ratios can be made only if their limitations as well as their value are thoroughly understood.

In a major review article on financial ratio analysis, Barnes (1987) made several observations, including the following: Financial ratios can be deployed many ways, such as determining the firm's ability to cover its debts, rating business and management success, meeting statutory requirements, and reviewing industrywide averages to set norms for a firm. Ratio analysis can be deployed both to compare a firm's performance against competitors in its own industry and to estimate empirical relationships in forecasting. Predictions may relate to (presage) future success or failure across key measures, reveal possible risks, and test practical hypotheses. Using ratios in financial analysis, rather than absolute values, facilitates comparisons as firm size is normalized. Since industrywide financial ratios often become company norms, they may affect a business strategy (Lev, 1969). A debate over ratio analysis relates to deciding which among the numerous financial ratios are most valuable to use.

Belesis et al. (2023) used financial ratios to calculate the COVID-19 pandemic effects on the top 15 in market capitalization Greek Stock Exchange companies. The results of the survey revealed that the fuel production companies Hellenic Petroleum and Motor Oil as well as the vehicle rental company Autohellas were the most negatively impacted due to the significant decline in turnover. Additionally, Belesis and Gazilas (2023), used financial ratios and correlate them with macroeconomic indicators for the Greek retail market. Their findings underscored the sector's adaptability to macroeconomic shifts, with notable variations among subsectors for the years 2015 to 2021. Furthermore Gazilas (2023) used financial ratios to analyze the COVID-19 effects on the Greece's ten largest energy companies. Gazilas (2023) concluded that some companies maintained remarkable net profit margins, showcasing adaptability while others faced challenges, exemplified by negative margins.

Data and Methodology

Our study delved into the multifaceted realm of the Greek General Private Clinics Sector spanning from 2012 to 2020. We meticulously analyzed hospitals wielding the highest market share, collectively commanding 60%-70% of the market.

Table 1, presented below, provides a meticulous outline of the hospitals examined throughout these years.

Table 1

Athens Euroclinic S.A.
Athens Medical Center S.A.
Euromedica S.A.
Hygeia Diagnostic & Therapeutic Center of Athens Single Member S.A.
Iaso General S.A.
Imithea S.A.
Metropolitan General Hospital S.A.
Persefs S.A.
St. Luke's Hospital S.A.

In our examination of the Greek General Private Clinics Sector, we meticulously calculated: six critical financial ratios (presented in table 2),

Table 2

Return on Equity
Gross Profit Margin
Operating Profitability
Net Profit Margin
Earnings After Tax Margin
Return on Assets

designed to depict key aspects of profitability within the clinics over the years (2012-2020) and the Herfindahl–Hirschman Index (HHI) for the years of the analysis, which has been used to measure the concentration of the private general clinics market, taking into account the market share of the dominant players during this timeframe.

Additionally, we sourced comprehensive data on the Net Sales and EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) of the clinics sector. To ensure the integrity of our analysis, we drew data from the financial statements of each firm in our sample. This data extraction process was conducted using the ICAP (Data Prisma) database, known for its accuracy and completeness.

The six financial ratios used in our analysis are individually presented as follows. Furthermore, in Table 3, we meticulously outline the mathematical formulations of the ratios examined, offering a detailed insight into the analytical methodologies applied in our research.

Return on Equity (ROE): Return on Equity (ROE) is a financial metric that assesses a company's efficiency in generating profits from shareholders' equity. It is calculated by dividing net income by shareholders' equity and is expressed as a percentage. ROE serves as a key indicator of a company's ability to utilize equity capital effectively, reflecting the profitability of the business in relation to the equity invested by shareholders. A higher ROE suggests efficient use of equity and effective management in delivering returns to investors.

Gross Profit Margin: The Gross Profit Margin is a fundamental measure of a company's profitability, calculated by dividing gross profit (sales minus cost of goods sold) by total revenue. This metric represents the percentage of revenue retained after accounting for the direct costs of production. A higher gross profit margin indicates that a company efficiently manages production costs and has a greater proportion of revenue available to cover operating expenses and generate profits.

Operating Profitability: Operating Profitability measures a company's ability to generate profit from its core operations. Calculated by dividing operating income by total revenue and expressed as a percentage, this metric provides insight into the efficiency of a company's day-to-day operations. A higher operating profitability suggests effective cost management and operational efficiency, crucial factors for sustained business success.

Net Profit Margin: Net Profit Margin is a key profitability ratio, indicating the percentage of profit a company retains from its total revenue after all expenses, including taxes and interest. Calculated by dividing net income by total revenue, a higher net profit margin signifies effective cost control and operational efficiency. This metric provides a clear picture of how well a company converts its revenue into actual profit.

Earnings After Tax Margin: Earnings After Tax Margin measures the percentage of earnings a company retains after accounting for taxes. Calculated by dividing earnings after tax by total revenue, this metric reflects a company's ability to manage its tax obligations efficiently. A higher Earnings After Tax Margin indicates effective tax planning and management, allowing the company to preserve a greater proportion of its earnings.

Return on Assets (ROA): Return on Assets (ROA) assesses a company's efficiency in utilizing its assets to generate profit. Calculated by dividing net income by average total assets, ROA is expressed as a percentage. This metric provides insights into how well a company converts its investments in assets into earnings. A higher ROA suggests effective asset utilization, crucial for sustained financial performance and business growth.

Table 3

Return on Equity (ROE):
ROE = Net Income / Shareholders' Equity * 100
Gross Profit Margin:
Gross Profit Margin = Gross Profit / Total Revenue * 100
Operating Profitability:
Operating Profit Margin = Operating Income / Total Revenue * 100
Net Profit Margin:
Net Profit Margin = Net Income / Total Revenue * 100
Earnings After Tax Margin:
Earnings After Tax Margin = Earnings After Tax / Total Revenue * 100
Return on Assets (ROA):
ROA = Net Income / Average Total Assets * 100

Table 4

Variables' Definitions (STATA)

Herfindahl–Hirschman Index	HHI
Return on Equity	ROE
Gross Profit Margin	GPM
Operating Profitability	OP
Net Profit Margin	NPM
Earnings After Tax Margin	EAT
Return on Assets	ROA

Results

Table 5.

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
HHI	9	812.9322	132.0112	701.83	1097.52
ROE	9	-0.05644	0.141839	-0.269	0.119
OP	9	-0.004	0.077309	-0.117	0.079
EAT	9	-0.06156	0.112475	-0.247	0.071
GPM	9	0.154556	0.057598	0.03	0.209
NPM	9	-0.052	0.11221	-0.235	0.075
ROA	9	-0.02078	0.048936	-0.103	0.039

Source: Provided by Authors, Calculated in STATA 14.2

The Herfindahl-Hirschman Index (HHI), which measures market concentration, shows an average value of around 812.93, indicating a moderately concentrated market overall. However, there is notable volatility in market concentration, ranging from 701.83 to 1097.52 over the observed period. In contrast, return on equity (ROE), which shows profitability

relative to equity, shows a negative average of about -0.056. This suggests that, on average, the industry experienced negative returns on equity over the years under review. Operating Profitability, another measure of financial performance, shows a slightly negative mean value of around -0.004, reflecting challenges in generating operating profits across the industry. These findings highlight the complexities and challenges facing the Greek private clinic sector, highlighting the need for strategic management and market adaptation strategies amid evolving economic and regulatory landscapes.

Table 6

Correlation Coefficients

HHI	**ROE**	**OP**	**EAT**	**GPM**	**NPM**	**ROA**	
HHI	1						
ROE	0.7053*	1					
OP	0.6794*	0.6626	1				
EAT	0.6413	0.9791*	0.6081	1			
GPM	0.56	0.5392	0.8661*	0.578	1		
NPM	0.6722*	0.9889*	0.6215	0.9962*	0.5643	1	
ROA	0.6606	0.9939*	0.6019	0.9917*	0.521	0.9965*	1

Source: Provided by Authors, Calculated in STATA 14.2

The correlation table reveals significant relationships between the various financial metrics and market concentration in the Greek private clinic sector. First, the Herfindahl-Hirschman index (HHI) shows a strong positive correlation with return on equity (ROE) (0.7053) and a moderately strong positive correlation with operating profitability (OP) (0.6794). These findings suggest that higher market concentration tends to coincide with higher returns on equity and operating profitability. Furthermore, ROE shows a strong positive correlation with

earnings after tax (EAT) (0.9791), indicating that higher returns on equity are associated with higher earnings after tax.

Furthermore, EAT exhibits strong positive correlations with both Net Profit Margin (NPM) (0.9962) and Return on Assets (ROA) (0.9939), suggesting that higher after-tax profits coincide with higher margins net profit and returns on assets. In addition, gross profit margin (GPM) shows a moderate positive correlation with NPM (0.5643), indicating a possible relationship between higher gross profit margins and higher net profit margins.

Table 7

Return On Equity and HHI

YEAR	Herfindahl–Hirschman Index	Return on Equity
2012	775,74	-26,88%
2013	735,26	-16,67%
2014	701,83	-13,14%
2015	710,39	-20,53%
2016	717,72	-1,42%
2017	781,23	-1,69%
2018	856,59	8,31%
2019	940,11	11,89%
2020	1097,52	9,26%

In 2012, the Greek General Private Clinics Sector faced financial challenges with a negative Return on Equity (ROE) at -26.88%, indicating inefficiencies in generating profits from shareholders' equity. This coincided with a moderately concentrated market, as reflected by a Herfindahl-Hirschman Index (HHI) of 775.74. In 2016, the sector exhibited resilience, with a slightly improved ROE of -1.42%, showcasing adaptability amidst shifting market dynamics. Subsequent years demonstrated further fluctuations in both ROE and HHI. Noteworthy was 2018, a turning point marked by a positive ROE of 8.31% and an elevated HHI of 856.59, suggesting improved profitability amidst shifting market concentrations. This positive trend persisted in 2019 and 2020, with ROE reaching 11.89% and 9.26%, respectively, accompanied by HHIs of 940.11 and 1097.52.

Table 8

Gross Profit Margin and HHI

YEAR	Herfindahl–Hirschman Index	Gross Profit Margin
2012	775,74	18,63%
2013	735,26	2,98%
2014	701,83	9,55%
2015	710,39	14,34%
2016	717,72	17,02%
2017	781,23	16,95%
2018	856,59	19,27%
2019	940,11	20,92%
2020	1097,52	19,37%

In 2012, the Greek General Private Clinics Sector exhibited a Gross Profit Margin of 18.63% within a market characterized by an HHI of 775.74, indicating moderate concentration. The subsequent years witnessed fluctuations in both Gross Profit Margin and HHI, reflecting the sector's adaptability to changing market dynamics. Notably, 2016 stood out with an increased Gross Profit Margin of 17.02% and an HHI of 717.72, showcasing the sector's ability to maintain profitability amidst a moderately concentrated market. 2018 marked a turning point with further enhanced profitability, as reflected in the Gross Profit Margin of 19.27% and an elevated HHI of 856.59. This positive trend persisted in 2019 and 2020, with Gross Profit Margins reaching 20.92% and 19.37%, respectively, accompanied by HHIs of 940.11 and 1097.52.

Table 9

Operating Profitability and HHI

YEAR	Herfindahl–Hirschman Index	Operating Profitability
2012	775,74	4,38%
2013	735,26	-11,67%
2014	701,83	-7,28%
2015	710,39	-11,55%
2016	717,72	2,32%

2017	781,23	0,91%
2018	856,59	5,07%
2019	940,11	7,89%
2020	1097,52	6,44%

In 2012, the Greek General Private Clinics Sector exhibited an Operating Profitability of 4.38% within a market characterized by an HHI of 775.74, reflecting moderate concentration. The subsequent years witnessed fluctuations in both Operating Profitability and HHI, showcasing the sector's resilience in adapting to changing market dynamics. Notably, 2016 marked a departure from the negative trend with an increased Operating Profitability of 2.32% and an HHI of 717.72, suggesting improved operational efficiency in a moderately concentrated market. 2018 marked a turning point with further enhanced profitability, as reflected in the Operating Profitability of 5.07% and an elevated HHI of 856.59. This positive trend persisted in 2019 and 2020, with Operating Profitabilities reaching 7.89% and 6.44%, respectively, accompanied by HHIs of 940.11 and 1097.52.

Table 10

Net Profit Margin and HHI

YEAR	Herfindahl–Hirschman Index	Net Profit Margin
2012	775,74	-23,48%
2013	735,26	-16,27%
2014	701,83	-10,71%
2015	710,39	-13,73%
2016	717,72	-0,94%
2017	781,23	-1,06%
2018	856,59	5,07%
2019	940,11	7,52%
2020	1097,52	6,75%

In 2012, the Greek General Private Clinics Sector experienced a Net Profit Margin of -23.48%, indicative of financial challenges within a moderately concentrated market, as indicated by an HHI of 775.74. Subsequent years displayed fluctuations in Net Profit Margin and HHI, reflecting the sector's adaptability to evolving market conditions. Notably, 2016

marked a departure from negative margins with an improved Net Profit Margin of -0.94% alongside an HHI of 717.72, suggesting enhanced financial performance in a moderately concentrated market. The positive trend continued in 2018, with a Net Profit Margin of 5.07% and an elevated HHI of 856.59. This upward trajectory persisted in 2019 and 2020, with Net Profit Margins of 7.52% and 6.75%, respectively, accompanied by HHIs of 940.11 and 1097.52.

Table 11

Earnings After Tax Margin and HHI

YEAR	Herfindahl–Hirschman Index	Earnings After Tax Margin
2012	775,74	-24,74%
2013	735,26	-18,49%
2014	701,83	-10,84%
2015	710,39	-13,29%
2016	717,72	-1,31%
2017	781,23	-3,30%
2018	856,59	4,59%
2019	940,11	7,10%
2020	1097,52	4,77%

In 2012, the Earnings After Tax Margin for the Greek General Private Clinics Sector stood at -24.74%, reflecting financial challenges within a moderately concentrated market, as indicated by an HHI of 775.74. Subsequent years witnessed fluctuations in Earnings After Tax Margin and HHI, revealing the sector's adaptability to evolving market dynamics. Notably, 2016 marked a shift with an improved Earnings After Tax Margin of -1.31% alongside an HHI of 717.72, suggesting enhanced financial performance in a moderately concentrated market. The positive trend continued in 2018, with an Earnings After Tax Margin of 4.59% and an elevated HHI of 856.59. This upward trajectory persisted in 2019 and 2020, with Earnings After Tax Margins of 7.10% and 4.77%, respectively, accompanied by HHIs of 940.11 and 1097.52.

Table 12

Return On Assets and HHI

YEAR	Herfindahl–Hirschman Index	Return on Assets
2012	775,74	-10,30%
2013	735,26	-6,07%
2014	701,83	-4,49%
2015	710,39	-6,08%
2016	717,72	-0,42%
2017	781,23	-0,50%
2018	856,59	2,59%
2019	940,11	3,91%
2020	1097,52	2,71%

In 2012, the Return on Assets (ROA) for the Greek General Private Clinics Sector was -10.30%, indicating challenges in efficiently utilizing assets to generate profits. This trend persisted in 2013, 2015 (-6.08%), and 2016 (-0.42%), reflecting a period of suboptimal asset utilization despite a decrease in market concentration in 2014 (HHI=701.83). The year 2017 continued with a negative ROA of -0.50%, emphasizing ongoing challenges. The year 2018 marked a turning point with a positive ROA of 2.59%, indicative of improving asset efficiency. This positive trend continued in 2019 (3.91%) and 2020 (2.71%) despite an increase in market concentration (HHI=1097.52). The sector demonstrated an ability to enhance asset efficiency in generating profits, even in the face of heightened market concentration, showcasing resilience and adaptability.

Table 13

Sector's Net Sales Values (EUR) and HHI

YEAR	HHI	NET SALES (price eur)
2012	775.74	598,507,774.00 €
2013	735.26	450,904,383.00 €
2014	701.83	475,976,286.00 €
2015	710.39	491,969,025.00 €
2016	717.72	484,491,167.00 €
2017	781.23	483,875,308.00 €

2018	856.59	512,095,005.00 €
2019	940.11	554,305,731.00 €
2020	1097.52	540,548,088.00 €

In 2012, the market exhibited moderate concentration, registering an HHI of 775.84, while Net Sales in 2012 amounted to approximately 598.51 million euros. Subsequently, a discernible decline unfolded in both HHI and Net Sales over the following years, notably in 2013 and 2015. This trend suggested a plausible association between reduced market concentration and a temporary dip in revenue. The narrative took an unexpected turn in 2015 as the HHI decreased to 710.39, coinciding with a substantial increase in Net Sales, reaching 491.97 million euros. This intriguing positive association challenges conventional expectations, proposing that a decrease in market concentration might be linked to a surge in revenue during that specific period. The subsequent years, spanning from 2016 to 2018, portrayed fluctuations in both HHI and Net Sales, showcasing the sector's resilience in adapting to evolving market dynamics. In 2019, Net Sales experienced an upturn, reaching 554.31 million euros. The year 2020 presented an intriguing scenario where, despite a slight decrease in Net Sales to 540.55 million euros, the HHI surged to 1097.52.

Table 14

Sector's EBITDA Values (EUR) and HHI

YEAR	HHI	EBITDA (price eur)
2012	775.74	78,621,845.00 €
2013	735.26	17,704,844.00 €
2014	701.83	37,722,351.00 €
2015	710.39	41,465,208.00 €
2016	717.72	72,365,634.00 €
2017	781.23	73,285,463.00 €
2018	856.59	76,662,144.00 €
2019	940.11	104,108,804.00 €
2020	1097.52	89,120,792.00 €

In 2012, the market exhibited moderate concentration with an HHI of 775.84, setting the stage for subsequent years. The year 2012 saw EBITDA of 78.62 million euros, suggesting a substantial earnings base for the sector. However, 2013 recorded a sharp decline in EBITDA

to 17.7 million euros, indicating a challenging period with significantly reduced earnings. The unexpected positive association emerged in 2015, as the HHI decreased to 710.39, aligning with a notable increase in EBITDA to 41.47 million euros. This intriguing trend challenges conventional expectations, suggesting that a decrease in market concentration might coincide with an upswing in earnings during that specific period. The subsequent years, from 2015 to 2018, showcased a consistent growth trajectory in both HHI and EBITDA, reflecting the sector's ability to navigate changing market dynamics while sustaining and expanding its earnings. In 2019, EBITDA surged to 104.11 million euros. Furthermore, in 2020 the market concentration ratio increased into HHI=1097.52 and EBITDA was about 89.12 million euros.

5.Conclusions

Commencing with a moderately concentrated market in 2012 (HHI=775.74), subsequent years witnessed the sector's adaptability to evolving market dynamics, reflected in fluctuations in both market concentration and financial ratios. The unexpected positive association observed in 2015, where a decrease in HHI (710.39) coincided with an increase in Net Sales and EBITDA, challenges conventional expectations. This implies that periods of reduced market concentration may be linked to upswings in both revenue and earnings, offering a unique perspective on market dynamics. Throughout the analyzed period, the sector showcased resilience, demonstrated by its ability to navigate changes in market concentration while simultaneously sustaining and expanding earnings. In 2019, Net Sales and EBITDA experienced an upturn, reaching 554.31 million euros and 104.11 million euros, respectively. However, the intriguing scenario in 2020, marked by a slight decrease in Net Sales (540.55 million euros) coupled with a significant surge in HHI (1097.52), underscores the intricate interplay between market structure and financial performance. The juxtaposition of key financial ratios, including Return on Equity (ROE), Gross Profit Margin, Operating Profitability, Net Profit Margin, Earnings After Tax Margin, and Return on Assets, with the HHI over the years provides a holistic view of the sector's financial landscape.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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Data Availability

The authors do not have permission to share data.

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