



School of Social Science

Master in Business Administration

Postgraduate Course

Postgraduate Dissertation

Financial Performance and Economic Impact of the Greek  
Pharmaceutical Industry (2021-2023): A Strategic Analysis Using  
Financial Ratios, PESTLE, Porter's Five Forces and SWOT

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Patras, Greece, May 2025

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# Financial Performance and Economic Impact of the Greek Pharmaceutical Industry (2021-2023): A Strategic Analysis Using Financial Ratios, PESTLE, Porter's Five Forces and SWOT

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*“To my family for their patience and support”*

## **Abstract**

This thesis provides a strategic financial analysis of the top 10 in-revenue manufacturing pharmaceutical companies in Greece and highlights their economic impact on the Greek economy from 2021 to 2023.

Key financial ratios for activity, profitability, liquidity, capital structure, investments, operating expenses, and R&D have been identified. The analysis shows significant variability in these ratios between companies but less variability in the sector averages from 2021-2023. Gross sales also vary, but it is important to note that the industry has experienced sales growth over the years, which does not always translate into profits and most profitability ratios decline. It can be assumed that recent global and local economic conditions didn't negatively affect the sector, and there are opportunities for further growth. However, the ratios indicate areas for improvement with regard to cash ratio, R&D intensity, asset turnover and operating expense ratios, so as to mitigate the losses from clawback and rebate and the high COGS ratio.

The economic impact of the sector on the Greek economy is significant through employment, GDP contribution and export growth.

PESTLE analysis of the industry shows that medicine expenditure policies, economic decisions, the reform of the European legislation on pharmaceuticals, new environmental regulations and technological innovations are key external factors. Porter's five forces and SWOT analysis show that strong supplier power can threaten sustainability and profitability by increasing COGS but also presents investment opportunities in raw materials and primary production. High competition can be neutralised by operating in fields multinationals abandon due to low prices, and exports can defend against rivalry, with opportunities for the Greek sector to expand internationally. Scientific expertise and strict regulation are significant barriers to new entrants.

In conclusion, the strategic financial analysis of Greece's top 10 pharmaceutical manufacturing companies reveals a dynamic sector which although shows resilience, its continued growth will depend on addressing internal inefficiencies and capitalizing on external market opportunities.

## **Keywords**

Pharmaceutical Industry, Greek, financial indices, PESTLE, Porter, SWOT.

# Χρηματοοικονομικές επιδόσεις και οικονομικός αντίκτυπος της Ελληνικής Φαρμακοβιομηχανίας (2021-2023): Στρατηγική ανάλυση με χρήση αριθμοδεικτών, PESTLE, Porter's Five Forces και SWOT

Βαΐα Γ. Λαναρά

## Περίληψη

Η παρούσα διατριβή παρέχει μια στρατηγική χρηματοοικονομική ανάλυση των 10 κορυφαίων φαρμακευτικών εταιρειών παραγωγής στην Ελλάδα βάσει εσόδων και αναδεικνύει τον οικονομικό αντίκτυπό τους στην ελληνική οικονομία κατά την περίοδο 2021-2023.

Προσδιορίστηκαν οι βασικοί χρηματοοικονομικοί δείκτες που σχετίζονται με τη δραστηριότητα, την κερδοφορία, τη ρευστότητα, την κεφαλαιακή διάρθρωση, τις επενδύσεις, τα λειτουργικά έξοδα και την E&A. Η ανάλυση δείχνει σημαντική μεταβλητότητα στους δείκτες αυτούς μεταξύ των εταιρειών, αλλά μικρότερη μεταβλητότητα στους μέσους όρους του κλάδου από το 2021-2023. Οι ακαθάριστες πωλήσεις επίσης ποικίλλουν, αλλά είναι σημαντικό να σημειωθεί ότι ο κλάδος έχει παρουσιάσει αύξηση των πωλήσεων κατά τη διάρκεια των ετών, η οποία δεν μεταφράζεται πάντα σε κέρδη και οι περισσότεροι δείκτες κερδοφορίας μειώνονται. Ωστόσο, οι δείκτες υποδεικνύουν περιοχές για βελτίωση που αφορούν: τον δείκτη ρευστότητας, την ένταση E&A, τον δείκτη κυκλοφορούντων με τη χρήση των παγίων και τη διαχείριση του λειτουργικού κόστους, ώστε να μετριαστούν οι απώλειες από τις επιστροφές και τις εκπτώσεις και τον υψηλό δείκτη COGS.

Ο οικονομικός αντίκτυπος του κλάδου στην ελληνική οικονομία είναι σημαντικός μέσω της δημιουργίας θέσεων εργασίας, της συμβολής στο ΑΕΠ και της αύξησης των εξαγωγών.

Η ανάλυση PESTLE του κλάδου αποκαλύπτει ότι οι κυριότεροι εξωτερικοί παράγοντες που επηρεάζουν τον κλάδο είναι: οι εγχώριες πολιτικές αποφάσεις σχετικά με τη στρατηγική δαπανών για τα φάρμακα, οι οικονομικές αποφάσεις, όπως οι επιστροφές και οι εκπτώσεις,

η αναθεώρηση της ευρωπαϊκή νομοθεσία για τα φάρμακα, οι νέοι περιβαλλοντικοί κανονισμοί και η τεχνολογική καινοτομία.

Η ανάλυση Porter's five forces και η SWOT καταδεικνύουν ότι η ισχυρή δύναμη των προμηθευτών μπορεί να αποτελέσει απειλή για τη βιωσιμότητα και την κερδοφορία, καθώς αυξάνει το κόστος πωλήσεων, αλλά ταυτόχρονα αποτελεί ευκαιρία για επενδύσεις στην παραγωγή πρώτων υλών. Ο υψηλός ανταγωνισμός μπορεί να εξισορροπηθεί με τη δραστηριοποίηση σε τομείς που οι πολυεθνικές εταιρείες εγκαταλείπουν λόγω των χαμηλών τιμών. Οι εξαγωγές μπορούν επίσης να αποτελέσουν άμυνα απέναντι στον ανταγωνισμό του κλάδου, καθώς υπάρχουν ευκαιρίες για την ελληνική βιομηχανία να επεκταθεί διεθνώς. Το υψηλό επίπεδο επιστημονικής τεχνογνωσίας αποτελεί το κύριο πλεονέκτημα του κλάδου και επίσης εμπόδιο για την είσοδο νέων επιχειρήσεων, σε συνδυασμό με το υψηλό ρυθμιστικό και νομοθετικό πλαίσιο εντός του οποίου λειτουργεί η φαρμακοβιομηχανία.

Συμπερασματικά, η στρατηγική χρηματοοικονομική ανάλυση των 10 κορυφαίων φαρμακοβιομηχανιών της Ελλάδας αποκαλύπτει έναν δυναμικό κλάδο, ο οποίος αν και παρουσιάζει ανθεκτικότητα, η συνεχής ανάπτυξή του θα εξαρτηθεί από την αντιμετώπιση των εσωτερικών ανεπαρειών και την αξιοποίηση των ευκαιριών της εξωτερικής αγοράς.

#### **Λέξεις – Κλειδιά**

Φαρμακευτική Βιομηχανία, Ελληνική, Αριθμοδείκτες, PESTLE, Porter, SWOT.

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## List of Abbreviations & Acronyms

IOBE	FOUNDATION FOR ECONOMIC & INDUSTRIAL RESEARCH
ICAP	Is a registered Credit Rating Agency by the European Securities and Markets Authority (ESMA)
PEF	Panhellenic Association of Pharmaceutical Industry
SFEE	Hellenic Association of Pharmaceutical Companies
ΓΕ.ΜΗ	General Commercial Registration
NBG	National Bank of Greece
R&D	Research & Development
E&A	Έρευνα & Ανάπτυξη
ELSTAT	Hellenic Statistical Authority
COGS	Cost of Goods Sold
EFPIA	The European Federation of Pharmaceutical Industries and Associations
CSR	Corporate Social Responsibility
ESG	Environmental, Social And Governance
AI	Artificial Intelligence
CV	Coefficient of Variation

## **1. Introduction**

### **1.1 Background of the pharmaceutical industry in Greece**

Most Greek manufacturing pharmaceutical companies started operating in the late 1960s. Multinational companies also had manufacturing facilities in Greece, but most closed in the 1980s and 1990s. These companies provided technical knowledge and trained personnel, which the Greek industry used successfully.

The Greek pharmaceutical sector comprises the Greek manufacturing industry, multinational companies distributing medicinal products, and domestic distributing companies (ICAP financial analysis 2015-2019). This study will specifically analyse the manufacturing sector, with an emphasis on the top ten pharmaceutical manufacturing companies ranked by revenue. Except for Boehringer Ingelheim, these companies are of Greek funds.

According to an economic analysis of IOBE, “Interventions for the sustainable development of Greek industry”, published in November 2024, the pharmaceutical manufacturing sector is a value-added sector for the European manufacturing sector. From 2013 to 2023, Greece's pharmaceutical manufacturing sector experienced export growth of 1.3 billion euros. The sector was less negatively influenced by the pandemic than the average EU.

Research by IOBE and SFEE shows that the pharmaceutical sector is a leader in R&D spending, accounting for 7% of the total R&D budget in Greece, totalling €91 million. This has generated an additional €1.6 billion in value (5% of the manufacturing sector). The pharmaceutical industry directly employs 32,600 people and indirectly affects the supply chain.

### **1.2 Research objectives and questions**

The Greek pharmaceutical industry has a strong economic impact on the Greek economy, either by its contribution to GDP or to manpower employment and also to the society by providing medicines for public health. The Greek pharmaceutical sector has experienced losses during the economic crisis (Stasinopoulos D., et al., 2018) and COVID-19 pandemic had a strong impact globally (Takawira et al., 2024). So, this study is trying to provide a

comprehensive understanding of the financial performance and sustainability of this industry in the aftermath of these crises. Main objective is to evaluate the financial performance of the main Greek pharmaceutical manufacturing companies using financial ratios. So, it is discussed whether the industry:

- Operates efficiently,
- is profitable,
- can cover its short-term and long-term liabilities,
- is R&D oriented
- its operational costs give sustainability
- what its capital financial structure is
- and compare the 10 pharmaceutical firms to each other concerning their performance for these 3 years.

Additionally, this study will aim to illustrate the economic impact of the sector and apply PESTLE, Porter's five forces, and SWOT analysis to identify the major external factors affecting the sector and its financial performance, as well as their impact on the industry's internal factors and position, highlighting its strengths, weaknesses, threats, and opportunities for sustainability.

### **1.3 Importance of the study contribution to literature**

The importance of the evaluation of financial performance using financial ratios was early noticed in a study by Beaver (1966) and then implementing it in the manufacturing industry (Mavrotas, 1992).

A vital area of research is the economic evaluation of the Greek pharmaceutical industry from 2021 to 2023, as this period follows the economic crisis and the impact of COVID-19 pandemic. By conducting a comprehensive analysis of financial ratios, the study provides valuable insights. It also compares firms and assesses the sector's average trends over these three years.

It primarily reviews the top 10 pharmaceutical companies in Greece, detailing their efficiency, profitability, liquidity, and sustainability. It also assesses the sector's impact on the Greek economy, examines external PESTLE factors, and analyses their economic

implications on Porter's five forces to identify strengths, weaknesses, opportunities, and threats (SWOT) for now on.

The findings of this study will establish a foundation for future research, particularly concerning the industry's trajectory following the capital inflow that led to the creation of new production and R&D facilities.

Additionally, it enhances the existing knowledge base on financial performance and strategic management in the pharmaceutical sector. It provides valuable theoretical insights and practical implications for industry stakeholders, policymakers and researchers and establishes a framework for comparative analysis of pharmaceutical companies over time that can be replicated or adapted in other national contexts.

## **1.4 Methodology overview**

The methodology of this dissertation is designed to provide a comprehensive analysis of the financial performance and economic impact of the Greek pharmaceutical industry. A quantitative research approach was adopted, relying on secondary data collected from financial statements, industry publications, and credible databases for the years 2021-2023. The research focuses on the ten largest pharmaceutical manufacturing companies in Greece, analyzing key financial ratios such as activity, profitability, liquidity, solvency, capital structure, and R&D intensity. Comparative analysis is employed to explore differences among companies and across time, providing insights into the sector's operational strengths and areas for improvement.

In addition to the financial analysis, strategic evaluation tools are utilized, integrating PESTLE, Porter's Five Forces, and SWOT framework. The PESTLE analysis examines external factors such as political decisions, economic policies, technological advancements, social trends, environmental regulations, and legislative changes that influence the industry. Porter's Five Forces evaluates the position of the Greek industry in terms of suppliers' power, entry barriers, substitutes, rivals, and customer power. Meanwhile, the SWOT analysis assesses internal strengths and weaknesses alongside external opportunities and threats, providing a comprehensive view of the sector's position and growth potential.



## 1.5 Thesis structure

This study consists of 6 chapters:

- Chapter 1: The introduction sets out the framework, background, research objectives and questions. It highlights the study's significance and provides an overview of the methodology and thesis structure.
- Chapter 2: The literature review examines developments and influences on the global and Greek pharmaceutical sector, focusing on financial ratios and their role in analysing performance. It also reviews research on economic assessments using PESTLE, Porter's Five Forces and SWOT frameworks.
- Chapter 3: Methodology describes the research design, methods of collecting data and analytical approaches used to achieve the objectives of the study.
- Chapter 4: Financial Analysis examines the performance of the top 10 pharmaceutical companies in Greece, through an analysis of revenue trends and financial ratios over the three-year period. It covers ratios such as profitability, liquidity, capital structure and research and development intensity.
- Chapter 5: Economic Analysis examines the wider impact of the pharmaceutical sector on the Greek economy. It includes a discussion of the current market dynamics, internal and external influences, which are analysed using the PESTLE, Porter's Five Forces and SWOT analysis.
- Chapter 6: Conclusions summarise the main findings and provides strategic recommendations for stakeholders in the industry, policy makers and future researchers.

## 2. Literature review

### 2.1 Global pharmaceutical industry

The pharmaceutical industry is a key driver of the global economy. In 2022, it directly employed 7.8 million people, indirectly supported 44.7 million, and induced 22.4 million jobs. These figures demonstrate the sector's critical role in managing the supply chain operations that deliver medicines worldwide. ( IFPMA, WifOR November 2024).

Additionally, including direct and spillover effects, the pharmaceutical industry contributed \$2,295 billion to global GDP. This represents 0.7% of estimated global GDP in that year, roughly equivalent of Switzerland's GDP for 2022 ( IFPMA, WifOR November 2024).

The pharmaceutical sector's R&D activities contributed \$227 billion to global GDP in 2022, representing 30% of its direct contribution to the global economy. R&D activities directly employed 1.1 million people worldwide, an increase of 175% since 2014 ( IFPMA, WifOR November 2024).

Before the pandemic, India and China were the world's top producers and suppliers of APIs and excipients to the pharmaceutical industry. They had a big impact on industry's economy and government policies. The pandemic has made reshoring production essential (Ciriminna et al., 2024), (Zhai W et al., 2016). The supply chain interruption and the shortages in goods point out the need for politically motivated restructuring of global production networks (Butollo et al., 2022). While it is well-noticed that the pharmaceutical industry has an important role in the global economy (Juneja, Mai and Albu, 2024) a study by Granados-González, et al., (2025) show that the pandemic had a positive impact on the pharmaceutical sector in countries like Spain. This should be highlighted as important to the nation's economy and public well-being. A recent study suggests that pharmaceutical companies can enhance demand visibility, responsiveness, and supply chain resilience by implementing a comprehensive demand management strategy and utilizing data analytics along with local manufacturing (Takawira et al., 2024).

Another study by Vieira et al., (2021) concludes that the pressure of the global economy in the sector has a heavy impact, particularly on smaller economies like the Portuguese.

The pharmaceutical sector is experiencing significant changes due to the rise in biopharmaceuticals and increased R&D spending. The growth of biomedical science and

industry competition will likely drive innovation and efficiency. However, this shift may result in inefficient spending and a decline in academic performance science. R&D investments are susceptible to price controls and cost-containment measures imposed by financial constraints and contractual agreements. (Cockburn, 2004).

## 2.2 Greek pharmaceutical industry

The pharmaceutical industry in Greece is characterised by the presence of both multinational corporations and local firms. Within the manufacturing sector, only Greek firms operate, except Boehringer Ingelheim.

The Greek National Organization for Medicines (EOF) and the European Medicines Agency (EMA) regulate the pharmaceutical industry in Greece extensively. This comprehensive regulatory framework exerts a significant influence on various aspects of the pharmaceutical industry, including drug approval processes (Chantzaras *et al.*, 2024). European competition law will increase regulatory activity to promote competition, address affordability and ensure innovation is consistent with public health objectives (Hull *et al.*, 2019). Furthermore, during the Greek economic crisis, it was well stated the importance of spending less money. Eventually, these cuts led to an annual decrease in health expenditure in Greece by 6% between 2009 and 2014 (Karanikolos *et al.*, 2022).

Countries must operate efficiently to maintain strong healthcare systems and public health while ensuring continuation of these vital services. As VANDOROS *et al.*, (2013) claim, that being efficient and keeping costs down requires more than new rules; existing laws must be used to stop corruption.

The pharmaceutical sector in Greece is a major player in the national economy. Despite the ongoing economic challenges, it continues to be vital to the manufacturing sector (Voumvaki, 2022).

Pharmaceutical companies are facing an increased burden due to economic measures like clawback and rebate. However, it has been found that most clawback is allocated to a few therapeutic categories (ATCs), affecting only a few companies (Letsios *et al.*, 2023).

### **2.3 Financial ratios usability on financial performance analysis-review of previous studies**

Financial ratios directly impact pharmaceutical companies' financial performance and are vital in financial analysis. Financial performance analysis links a company's balance sheet and income statement using financial ratios to identify strengths and weaknesses (Eriotis, 2005).

A study by Gautam et al., (2024) analysing the financial statements of Indian pharmaceutical companies over five years show them to be highly liquid and solvent. However, profits are unevenly generated. To be viable in the long-term, companies must improve performance and reduce operating costs.

Choi et al. (2024) analyse the connection between inventory and firm performance and create a classification of pharmaceutical companies using the earn-turns matrix. The study examines the pharmaceutical industry's structure before COVID-19 and introduces the earn-returns matrix to validate management theory. It shows how this matrix effectively analyses strategic pharmaceutical groups.

According to Mavrotas et al., (1992) profitability is the most significant metric by which companies can differentiate themselves and establish a ranking. Labour productivity and market share are reliable indicators of business success. Long-term and short-term solvency ratios are indicators of business failure. A solid capital structure does not guarantee a company's profitability and efficiency.

A forecasting model based on comparative financial analysis shows that Greek companies occupied the intermediate grey zone between bankruptcy and healthiness from 2010 to 2016 during the Greek economic crisis (Dengleri et al., 2019).

Financial ratios are used a lot to evaluate the pharmaceutical sector. A study conducted on the pharmaceutical sector of the London stock market covering the period from 2012 to 2014 aimed to assess the impact of intellectual capital (IC) on financial performance. The study used financial ratios, including ROA, ROE, EPS, asset turnover and market-to-book ratio M/B. The findings indicate that IC and its components positively influence innovation and firms' financial performance. Innovation was measured through research and development (Amin et al., 2017).

A similar study was conducted on 24 biopharmaceutical companies during 2002-2014, (Anghel et al., 2018). The study presents a new indicator for measuring intellectual capital: ECD (Efficiency of Research and Development Expenditures). This is measured alongside the M/B ratio from existing literature. Analysing financial performance through ROA, ROE and D/E, the results show that M/B is insignificant for biotech companies, showing a negative correlation with ROA and ROE but a positive one with D/E. ECD is a more effective measure of intellectual capital in the pharmaceutical industry.

According to Gupta *et al.*, (2021) a 10-year study (2009-2018) of 48 companies proves intellectual, human, relational, process and financial capital have a significant impact on financial performance. Innovation capital, however, has no significant relationship with firms' financial performance.

A study conducted by Alshehadeh *et al.*, (2024) investigates the impact of traditional profitability measures on market value added (MVA) for pharmaceutical and chemical companies listed on the Amman Stock Exchange. It uses correlation coefficients to determine how well return on equity (ROE), gross profit margin, operating profit margin and return on assets (ROA) explain changes in MVA. The study analyses financial statements from 14 industrial companies over the period 2008–2022. The study's findings are clear: traditional profitability measures still influence market perceptions of a company's value, despite their limitations.

Another study (Gascón *et al.*, 2017) evaluates the efficiency of 37 large pharmaceutical labs from 2008-2013 with a data envelopment analysis (DEA). Financial data from DataStream was used, including R&D investment and the number of new drugs authorised, while accounting for the time effect. The analysis clearly shows the highly competitive nature of the pharmaceutical industry, with numerous firms operating near or at the efficient frontier. A recent study shows that financing policies significantly affect the financial performance of pharmaceutical companies in Europe and the United States, especially during the pandemic. The research analysed data from 466 companies over a decade (2012-2021), revealing that higher debt levels reduce profitability but improve market valuation metrics like the P/E ratio. The study's strong statistical and economic analyses support the formulated hypotheses and provide valuable insights into how financing decisions impact various aspects of financial performance. (Vintilă, 2024).

R&D expenditure in European pharmaceutical industries affects operating profit, but there is little consistent research on the time relationship between investment and firm performance (Asad et al., 2023). In addition, spending on R&D is not effective in the short term, but it does provide certain benefits in the long run (Ravšelj et al., 2020). Another study by Su et al., (2021) finds that returns to R&D investment in Chinese pharmaceutical firms appear in the second year and continue to increase. The results also suggest that firms achieve optimal performance when there is low leverage and concentration of ownership. This suggests a three-way interactive effect between R&D investment, ownership structure and leverage. A study of Koumnou et al., (2020) demonstrates that there is a positive relationship between R&D intensity and the level of competitiveness and profitability of the Greek pharmaceutical industry. Underinvestment in medicines can lead to undesirable outcomes for the healthcare systems and a burden to household (Yfantopoulos, 2024).

## **2.4 Pharmaceutical sector and PESTLE, Porter's Five Forces and SWOT analysis.**

It is well-noticed that pharmaceutical industry has an important role in the global economy (Juneja, Mai and Albu, 2024). So, its evaluation globally and locally is always of interest. PESTLE, Porter's five forces and SWOT analysis are key tools to evaluate the marketing and management strategies of a company. These tools evaluate a company's economic position in relation to external and internal factors. PESTLE analyses the macro environment, while Porter's five forces assess industry dynamics. SWOT combines both internal and external factors for strategic planning. A study by ROMAN, (2016) suggests that by combining these tools a more comprehensive approach to business operation can be achieved. It is essential for the analyst community to recognize these and try to quantify them in their financial models and risk management tools. [https://pestleanalysis.com/combining-pest-and-swot-analysis-for-business/?utm\\_source=chatgpt.com](https://pestleanalysis.com/combining-pest-and-swot-analysis-for-business/?utm_source=chatgpt.com).

Another study by Quehakia A et al., (2017) examines whether strategic tools and techniques are employed in the workplace and identifies which tools and techniques are utilized. From 1990 to 2015, SWOT analysis, PEST analysis, and Porter's Five Forces analysis emerged as some of the most commonly used.

In literature studies have been identified external factors that influence the sector globally and some of them are:

### **Political forces**

- Financial constraints are driven by policy changes, such as potential alterations in Medicare policies in the US, which could significantly impact the business models of pharmaceutical companies (Mokuolu S., et. al. 2022).
- Stringent regulatory criteria for drug approvals and regulated pricing pressures, especially in emerging markets, pose significant challenges. These factors can limit profitability and market access to new drugs (Rehmat N., 2014).
- Intellectual property rights (IPRs) and corruption in certain regions further complicate the business environment for multinational pharmaceutical companies (Rehmat N. 2014).
- The COVID-19 pandemic has significantly disrupted the pharmaceutical supply chain. Restrictions and lockdowns, particularly in China, which is a major supplier of pharmaceutical raw materials, have led to increased logistics and freight costs (Voronkova O.Yu., 2022).

### **Economic**

- The cost of drug development is rising, while fewer blockbuster drugs are reaching the market. This puts pressure on profit margins and necessitates more efficient R&D processes (Paul S.M., et al., (2010),).
- The global nature of the supply chain, involving multiple countries with different customs and regulations, adds to the complexity and potential for disruption (Muddyman,G. , 2007).
- The pharmaceutical industry is experiencing unprecedented levels of global competition. Companies are now competing not only within their traditional markets but also in emerging markets, which adds complexity to their operations. (Muddyman,G. , 2007) (Muddyman,G. , 2006).
- Another study by Vieira et al., (2021) concludes that the pressure of the global economy on the sector has a heavy impact, particularly in smaller economies like the Portuguese.



**Social**

- The industry faces volatile end-consumer demand and shorter product lifecycles, which require companies to be agile and responsive to market changes (Muddyman,G. , 2006) (Muddyman,G. , 2007).
- Customization demands from consumers add another layer of complexity, requiring tailored approaches to different markets (Muddyman,G. , 2007).
- Pandemic issues like COVID-19 strengthen the position of the industry with the example of Spain (Granados-González, López-Moreno and Moreno Adalid, 2025)

**Technological**

- New technologies like robotic systems and even AI is used in the manufacturing and other processes of the industry. The aim is to reduce cost and improve quality, lead to faster and more efficient drug development and hence lead to more sustainable future (Weaver et al., 2022).
- Industry 4.0 and digitization contribute to sustainability in manufacturing. The findings can be applied to assess how pharmaceutical firms might leverage digital technologies to enhance sustainable practices and improve financial performance(Ghobakhloo, 2020).
- New technologies are also implemented in the science of new therapeutic molecule discovery using AI. Intelligencia is an example, founded by Greek entrepreneurs Dimitrios Skaltsas and Vangelis Vergetis in 2017. Intelligencia is an AI-driven platform designed to mitigate risks in drug development (IVANOVA, 2021).

**Legislation**

- Stringent regulatory criteria for drug approvals and regulated pricing pressures, especially in emerging markets, pose significant challenges. These factors can limit the profitability and market access of new drugs. Intellectual property rights (IPRs) and corruption in certain regions further complicate the business environment for multinational pharmaceutical companies (Rehmat N. 2014).

**Environmental**



- A study by Ramanathan et al., (2017) shows that firms that adopt a dynamic approach to environmental regulations gain significant private benefits of sustainability.
- Pharmaceutical companies are focusing their investment strategies on sustainability, emphasising ESG issues. This is intended to enhance their market visibility and value. Investing in ESG is profitable and relevant for managers (López-Toro et al., 2021).

The Porter's five forces analysis is a tool that has been used to evaluate the position of a company in the market and create a business strategy (Porter M., 1979). Olatoye (2024) utilizes this model to evaluate the pharmaceutical industry 1.0, concluding that it is characterized by intense competition influenced by stringent regulations. Porter's Five forces analysis shows that all industry participants must consider five factors to maintain a competitive edge. Effective responses to these dynamics are crucial for success in this evolving market.

An article by Helms et al., (2010) suggests that SWOT remains a widely-used planning tool in academia and has applications beyond corporate contexts, including countries and industries. The study focuses on peer-reviewed business journals and suggests integrating SWOT with other strategic tools for better theory building.

While SWOT analysis is widely used according to King, et al., (2023), analysts often face issues with categorising factors, such as having too many in a category, unclear terminology and conflicts. They also don't apply SWOT analysis consistently. These findings highlight challenges and provide insights to improve SWOT analysis.

In this study combining PESTLE for external factors with Porter's five forces for both internal and external factors helps to identify the sector's SWOTs. This methodology will facilitate thorough economic analysis by integrating external factors with organisational capabilities, thus aiding strategic decision-making processes.

### 3. Methodology

The ranking of pharmaceutical companies was based on the ICAP analysis of the sector from 2015 to 2019. This ranking was subsequently verified by reviewing the income statements from 2021 to 2023. This study utilizes the financial statements of the examined firms, downloaded from the General Commercial Registration (ΓΕΜΗ), as secondary data for calculating the financial ratios. Statistical data was obtained from the National Bank of Greece (NBG) and the Foundation for Economic and Industrial Research (IOBE) for assessing the economic impact of the industry on the Greek economy. Statistical data is also sourced from ELSTAT regarding the economic contribution of pharmaceutical manufacturing companies to GDP and sales (code 21 corresponds to manufacturing pharmaceutical industries in ELSTAT Excel sheets) and articles from the internet were utilized.

The limitations of the dissertation relate to the fact that not all industry firms were considered. Nevertheless, the selection of these 10 companies provides an adequate sampling approach for sector evaluation, as it represents more than 74% of domestic sales (as concluded from ELSTATA data). The sector includes companies with different dynamics; thus, the results do not represent the entire sector but primarily the larger players. It should be noted that the findings may be skewed toward the larger firms, overlooking the dynamics of smaller companies. The financial results do not solely represent manufacturing activities, as many companies also include licensing products that cannot be differentiated from manufacturing activities. Additionally, it should be noted that the financial statements used in this analysis are based on each company's accounting assumptions and practices, which can vary significantly across firms. For instance, some companies may adopt more conservative revenue recognition policies, while others may capitalise expenses differently, leading to variations in reported profitability or asset utilisation. These discrepancies in accounting treatments could make it difficult to compare financial ratios such as profitability, capital structure, or operating expenses across companies. Furthermore, the accounting methods employed by companies, such as depreciation, inventory valuation (LIFO, FIFO) and tax reporting, can introduce inconsistencies, further complicating cross-firm comparisons. The study's reliance on these financial statements assumes a level of consistency and comparability that may not exist due to accounting differences, which

should be considered when rendering the findings, as the financial analysis may not fully reflect the operational performance of companies.

Lastly, the time frame represented by this study is narrow, as only the 2021-2023 period has been evaluated. The Greek pharmaceutical sector includes multinational companies that, despite not producing domestically, impact the sector and consequently, the Greek pharmaceutical manufacturing segment. These companies are not included in the study.

This study examines activity, profitability, liquidity, investment, solvency, operations expenses, and R&D ratios to provide a complete view of the sector's financial performance. Income statements and balance sheet data were recorded in excel spreadsheets. Financial ratios for each company, including averages, standard deviations, and coefficient of variation, were calculated using descriptive statistics. These metrics were analysed annually and over the entire period. Graphs were created to illustrate each company's ratio trends compared to peers and yearly averages.

Additionally, the annual averages of each ratio and their overall averages are plotted to illustrate industry trends. The interpretation of the ratio values trends is also included.

Economic data from the literature is presented without further calculations, except for the percentage change in sales and EBIT. Percentage changes in revenues, net profit and EBIT per year are calculated for the sector using data from the financial statements. ELSTAT data used to calculate the working cycle of the entire sector for 2021-2023 for comparison purposes and to retrieve the total number of operating companies. PESTLE, Porter's five forces and SWOT analyses have been carried out in conjunction with the interpretation of the financial ratios.

## 4. Financial analysis for the years 2021-2023 of the top 10 pharmaceutical companies

This study assesses the financial performance of Greece's top ten pharmaceutical manufacturers between 2021-2023.

It uses financial ratios to provide a comprehensive understanding of the sector's performance, strengths and weaknesses, and the existence of any diversity. The pharmaceutical companies' ranking for 2021-2023 is based on the same ICAP analysis of the sector used for 2015-2019, and the top ten companies have consistently maintained their leading position in net sales.

**Table 1.** Net sales of pharmaceutical manufacturing companies in Greece in 2015-2019. (Source ICAP )

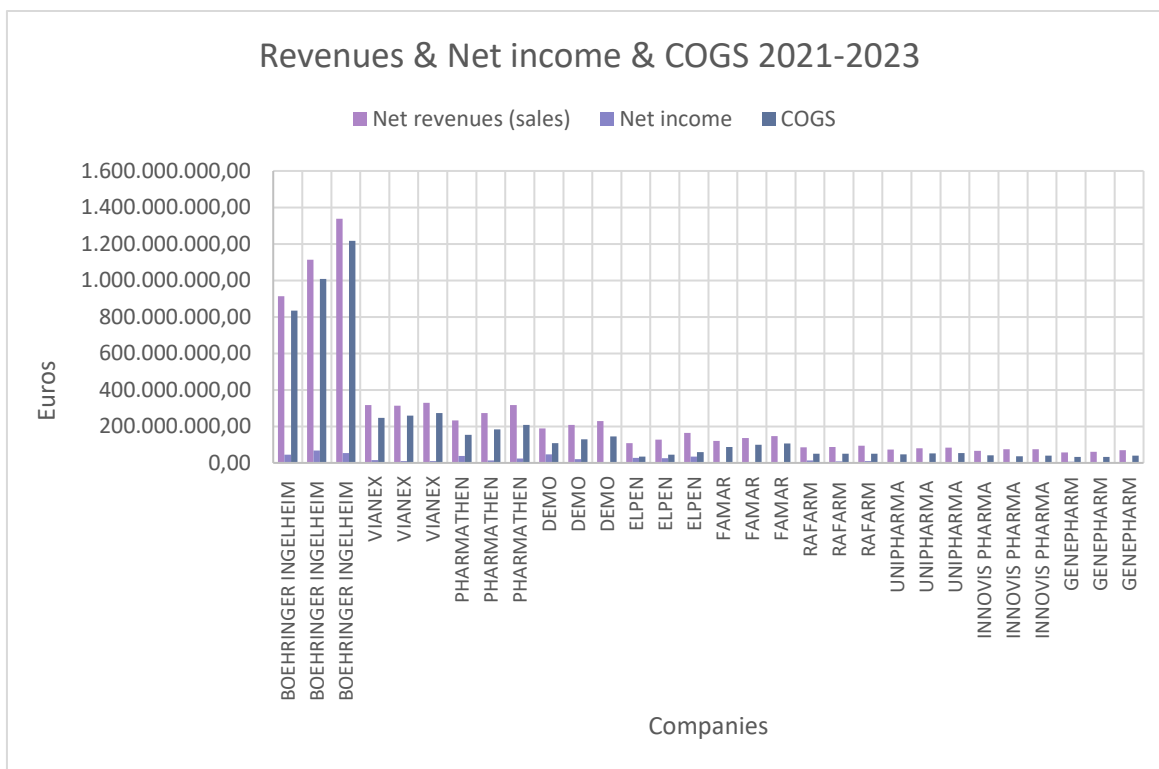
Πίνακας 1 Κύκλος εργασιών παραγωγικών φαρμακευτικών επιχειρήσεων (2015-2019)					
Επωνυμία	2015	2016	2017	2018	2019
BOEHRINGER INGELHEIM ΕΛΛΑΣ Α.Ε.	235.469.981	226.830.856	228.439.533	325.922.365	576.272.153
ΒΙΑΝΕΕ Α.Ε.	199.259.553	208.480.033	194.811.319	219.155.646	232.119.821
ΦΑΡΜΑΤΕΝ Α.Β.Ε.Ε.	150.383.892	156.460.711	176.163.599	178.809.351	205.068.100
DEMO Α.Β.Ε.Ε. ΒΙΟΜΗΧΑΝΙΑ ΦΑΡΜΑΚΩΝ	123.333.187	127.878.377	123.622.143	125.012.208	146.671.994
ΦΑΜΑΡ ΜΟΝΟΠΡΟΣΩΠΗ Α.Β.Ε. ΦΑΡΜΑΚΩΝ & ΚΑΛΥΝΤΙΚΩΝ <sup>(1)</sup>	124.606.945	120.074.013	125.629.948	131.270.565	123.732.498
ELPEN Α.Ε. ΦΑΡΜΑΚΕΥΤΙΚΗ ΒΙΟΜΗΧΑΝΙΑ	119.784.368	125.204.191	117.193.576	95.993.039	97.612.165
RAFARM Α.Ε.&Β.Ε.	-	43.941.922	60.792.489	69.549.436	69.780.491
UNI-PHARMA ΚΛΕΩΝ ΤΣΕΤΗΣ ΦΑΡΜΑΚΕΥΤΙΚΑ ΕΡΓΑΣΤΗΡΙΑ ΑΒ&ΕΕ	48.986.797	54.435.982	55.917.029	60.857.794	68.997.936
INNOVIS PHARMA Α.Ε.Β.Ε.	43.363.044	43.897.409	44.865.498	45.440.244	55.365.245
GENEPHARM Α.Ε.	34.205.580	34.160.395	37.925.600	46.675.553	50.282.566
FREZYDERM Α.Β.Ε.Ε.	33.261.829	39.806.527	41.921.800	39.687.677	42.766.732
GALENICA Α.Ε.	28.652.679	36.592.851	44.416.217	41.944.026	40.502.278
ΒΙΟΣΕΡ ΒΙΟΜΗΧΑΝΙΑ ΠΑΡΕΝΤΕΡΙΚΩΝ ΔΙΑΛΥΜΑΤΩΝ Α.Ε.	28.655.273	29.581.073	30.311.925	33.028.110	33.100.281
ΚΟΠΕΡ ΦΑΡΜΑΚΟΒΙΟΜΗΧΑΝΙΑ Α.Ε.	17.864.205	25.803.921	28.096.368	28.628.249	30.779.264
ΤΣΕΤΗ, ΙΟΥΛΙΑ & ΕΙΡΗΝΗ, Α.Β.Ε.Ε. "INTERMED"	17.626.981	20.452.338	22.848.302	24.799.504	28.382.433
ΓΚΑΠ Α.Ε.	32.905.588	30.298.860	29.462.904	32.604.778	27.828.082
ΑΝΦΑΡΜ ΕΛΛΑΣ Α.Ε.	16.664.445	16.832.999	19.254.314	24.283.696	25.887.265
LAVIPHARM Α.Ε.	28.315.000	30.525.000	20.350.000	21.084.000	20.165.000
ΠΕΤΣΙΑΒΑΣ Α.Ε.	14.985.034	15.095.466	16.006.352	15.857.193	16.496.646
BENNETT ΦΑΡΜΑΚΕΥΤΙΚΗ Α.Ε.	15.009.088	13.050.987	13.949.893	16.567.132	15.549.248
IASIS PHARMACEUTICALS HELLAS Α.Β.Ε.Ε.	10.696.044	10.697.390	11.590.657	12.683.617	14.837.749
S.J.A. PHARM Ε.Π.Ε.	9.358.865	10.971.550	12.948.698	15.097.082	11.415.475
ΚΛΕΒΑ Α.Φ.Β.Ε.Ε.	3.461.604	4.981.856	5.723.448	6.862.046	8.982.295
CANA ΦΑΡΜΑΚΕΥΤΙΚΑ ΕΡΓΑΣΤΗΡΙΑ Α.Ε.	21.135.539	18.198.336	15.610.830	11.877.581	7.724.428
ΜΕΝΤΙΠΡΙΝΑ Ε.Π.Ε.	3.708.913	5.928.776	5.266.453	4.876.646	4.789.056
ΜΙΝΕΡΒΑ ΦΑΡΜΑΚΕΥΤΙΚΗ Α.Ε.	5.989.522	5.659.478	4.858.351	5.063.573	4.328.274
SPECIFAR Α.Β.Ε.Ε.	69.652.092	64.861.658	51.780.200	46.239.452	ΜΔ
HELP Α.Β.Ε.Ε.	13.385.000	13.886.000	14.284.000	15.136.000	ΜΔ
NORMA ΕΛΛΑΣ Α.Ε.	11.966.516	9.757.250	9.366.615	8.338.169	ΜΔ
<b>Σύνολο</b>	<b>1.462.687.564</b>	<b>1.544.346.205</b>	<b>1.563.408.061</b>	<b>1.703.344.732</b>	<b>1.959.437.475</b>
Αξία σε €					
ΜΔ: Μη Διαθέσιμος					
* κατά δήλωση					
1. Οι πωλήσεις της εταιρείας προέρχονται από παραγωγή προϊόντων για λογαριασμό πελατών της στην εγχώρια αγορά και το εξωτερικό (φρασόν).					
Πηγή: ICAP (Δημοσιευμένοι Ισολογισμοί)					

## 4.1 Revenue, net income , COGS, EBIT & EBITDA Trends for 2021-2023

The results of the financial statements for each company from 2021 to 2023, including revenues after clawback and redate, net income, COGS, EBIT, and EBITDA, are tabulated below.

**Table 2.** 2021-2023 net sales/net income/COGS for top 10 pharmaceutical companies in revenues.

	Net revenues after clawback and rebate	Net Income	Cost of goods sold	Year
<b>BOEHRINGER INGELHEIM</b>	914.354.423,66 €	45.312.602,35 €	835.171.985,88 €	2021
	1.113.138.417,16 €	67.164.696,13 €	1.008.880.050,21 €	2020
	1.338.433.771,83 €	53.073.587,98 €	1.217.355.345,73 €	2023
<b>VIANEX</b>	316.507.126,85 €	14.750.702,22 €	247.716.870,33 €	2021
	313.612.582,32 €	10.542.867,06 €	258.941.643,76 €	2020
	328.781.325,82 €	9.809.977,94 €	272.503.987,80 €	2023
<b>PHARMATHEN</b>	232.462.413,00 €	38.098.202,00 €	153.881.632,00 €	2021
	272.636.077,00 €	13.402.286,00 €	182.894.444,00 €	2020
	317.150.910,00 €	23.785.012,00 €	208.302.784,00 €	2023
<b>DEMO</b>	189.387.016 €	46.103.933 €	109.064.361 €	2021
	208.729.261 €	20.708.764 €	129.676.382 €	2020
	230.118.160 €	5.417.296 €	145.537.573 €	2023
<b>ELPEN</b>	109.000.680,85 €	28.301.806,30 €	35.040.888,49 €	2021
	127.577.638,62 €	24.921.589,64 €	44.877.350,36 €	2020
	165.062.189,83 €	34.844.309,58 €	58.486.469,23 €	2023
<b>FAMAR</b>	120.700.692,00 €	1.614.243,00 €	87.731.620,00 €	2021
	136.935.489,00 €	1.685.532,00 €	99.279.918,00 €	2020
	147.272.853,00 €	2.920.699,00 €	106.668.029,00 €	2023
<b>RAFARM</b>	85.914.324,00 €	12.720.732,00 €	50.835.413,00 €	2021
	87.587.979,00 €	8.667.264,00 €	50.820.526,00 €	2020
	93.427.224,00 €	9.532.359,00 €	50.820.526,00 €	2023
<b>UNIPHARMA</b>	73.456.151,00 €	4.186.903,00 €	47.717.658,00 €	2021
	80.335.284,00 €	3.089.307,00 €	52.641.061,00 €	2020
	84.262.872 €	3.505.806 €	54.024.162 €	2023
<b>INNOVIS PHARMA</b>	65.817.278,92 €	1.983.854,66 €	41.827.621,32 €	2021
	74.270.608,62 €	2.191.832,70 €	36.296.691,00 €	2020
	74.270.608,62 €	3.640.050,53 €	40.290.817,39 €	2023
<b>GENEPHARM</b>	58.240.551,82 €	6.435.350,93 €	32.019.697,13 €	2021
	60.581.775,90 €	4.007.219,96 €	33.365.794,13 €	2020
	70.070.518,63 €	2.954.144,44 €	39.350.933,66 €	2023

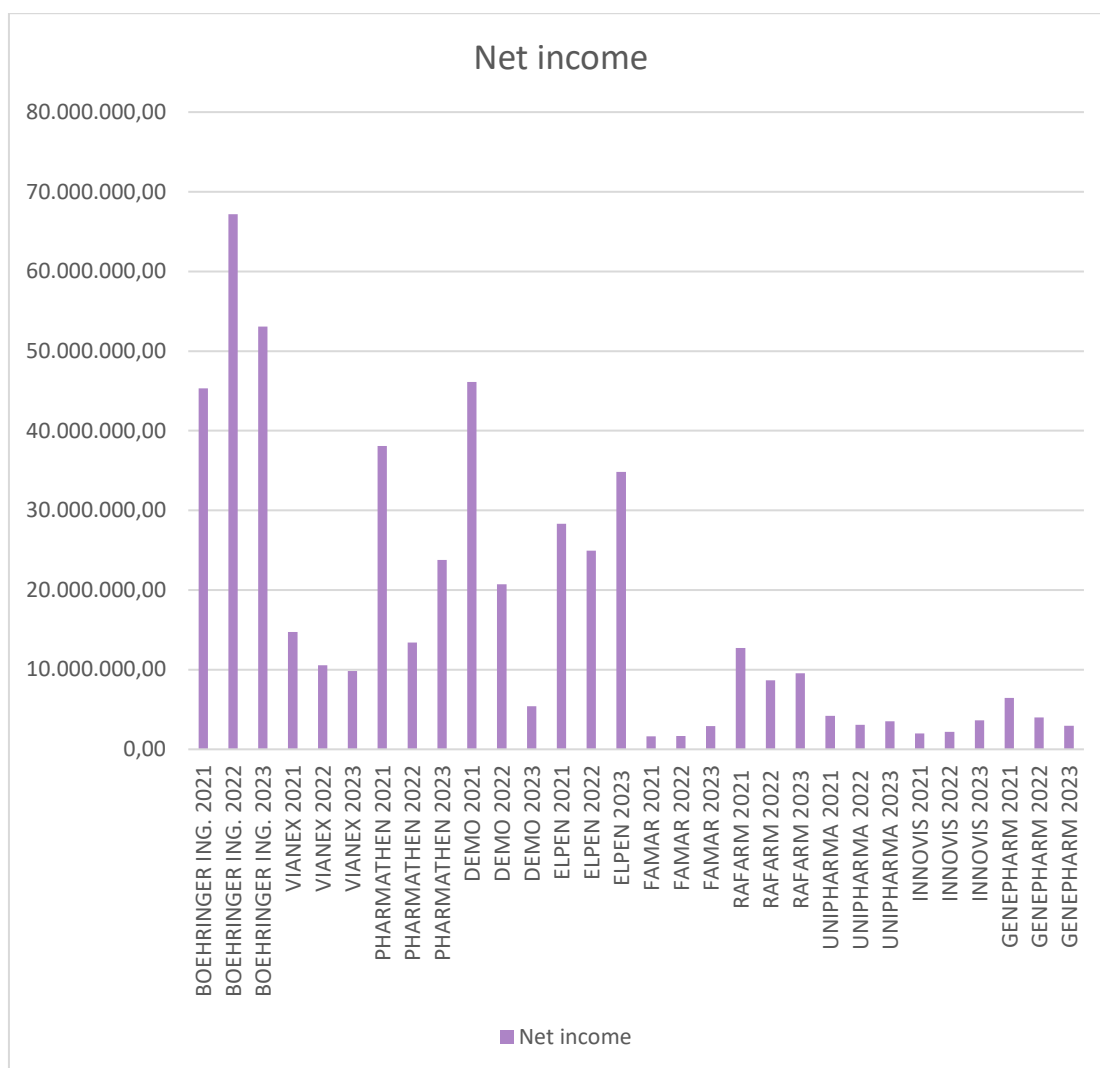


**Figure 1.** Plot of net sales, net income and COGS of 10 pharmaceutical companies in 2021-2023

The plot shows rising net sales for all companies, with BOEHRINGER leading. However, net income does not show a consistent upward trend. BOEHRINGER and VIANEX have high COGS expenses, reducing their net income despite significant revenues. ELPEN has the better sales performance considering COGS. The plot reveals four groups of companies based on their revenues. BOEHRINGER is the only company with sales over one billion. VIANEX, PHARMATHEN and DEMO are in the second group. ELPEN and FAMAR are in the third group. The remaining four companies have lower sales. There is a lot of variability in sales among the top 10 pharmaceutical companies.

**Table 3.** 2021-2023 net income/EBIT/EBIDTA for top 10 pharmaceutical companies in revenues.

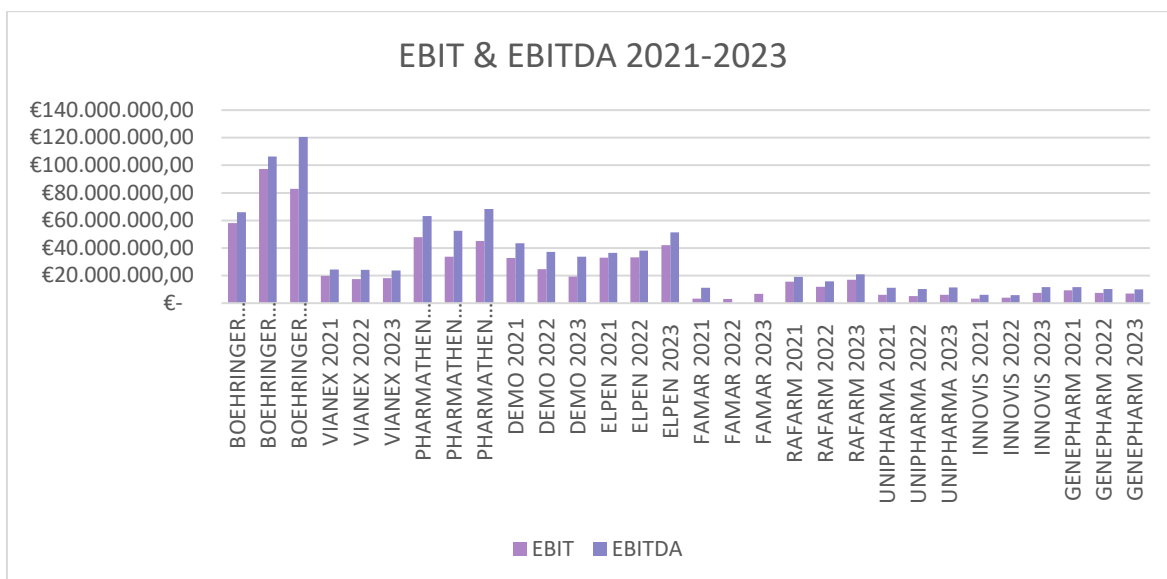
	Net income	EBIT	EBITDA	Year
<b>BOEHRINGER INGELHEIM</b>	45.312.602,35 €	58.188.647,32 €	65.965.402,81 €	2021
<b>BOEHRINGER INGELHEIM</b>	67.164.696,13 €	97.352.451,23 €	106.311.942,88 €	2020
<b>BOEHRINGER INGELHEIM</b>	53.073.587,98 €	83.015.362,56 €	120.447.444,04 €	2023
<b>VIANEX</b>	14.750.702,22 €	19.829.279,13 €	24.347.639,27 €	2021
<b>VIANEX</b>	10.542.867,06 €	17.379.995,11 €	24.090.948,98 €	2020
<b>VIANEX</b>	9.809.977,94 €	18.097.280,79 €	23.792.053,42 €	2023
<b>PHARMATHEN</b>	38.098.202,00 €	47.807.898,00 €	63.259.582,00 €	2021
<b>PHARMATHEN</b>	13.402.286,00 €	33.785.441,00 €	52.503.997,00 €	2020
<b>PHARMATHEN</b>	23.785.012,00 €	45.022.134,00 €	68.308.995,00 €	2023
<b>DEMO</b>	46.103.933 €	32.715.205,00 €	43.334.835,00 €	2021
<b>DEMO</b>	20.708.764 €	24.657.389,00 €	37.204.242,00 €	2020
<b>DEMO</b>	5.417.296 €	19.283.729,00 €	33.782.507,00 €	2023
<b>ELPEN</b>	28.301.806,30 €	32.957.814,74 €	36.480.221,97 €	2021
<b>ELPEN</b>	24.921.589,64 €	33.333.453,57 €	38.067.053,34 €	2020
<b>ELPEN</b>	34.844.309,58 €	41.950.429,85 €	51.354.892,15 €	2023
<b>FAMAR</b>	1.614.243,00 €	3.333.270,00 €	11.126.541,00 €	2021
<b>FAMAR</b>	1.685.532,00 €	3.065.436,00 €	N/A	2020
<b>FAMAR</b>	2.920.699,00 €	6.770.822,00 €	N/A	2023
<b>RAFARM</b>	12.720.732,00 €	15.597.978,00 €	18.985.103,00 €	2021
<b>RAFARM</b>	8.667.264,00 €	11.931.304,00 €	15.788.375,00 €	2020
<b>RAFARM</b>	9.532.359,00 €	16.878.320,00 €	20.915.521,00 €	2023
<b>UNIPHARMA</b>	4.186.903,00 €	6.180.242,00 €	11.148.015,00 €	2021
<b>UNIPHARMA</b>	3.089.307,00 €	5.183.053	10.320.955	2020
<b>UNIPHARMA</b>	3.505.806 €	5.972.142	11.366.158	2023
<b>INNOVIS PHARMA</b>	1.983.854,66 €	3.349.654,86 €	5.991.953,29 €	2021
<b>INNOVIS PHARMA</b>	2.191.832,70 €	4.097.669,68 €	5.813.328,58 €	2020
<b>INNOVIS PHARMA</b>	3.640.050,53 €	7.534.399,83 €	11.621.644,16 €	2023
<b>GENEPHARM</b>	6.435.350,93 €	9.223.306,08 €	11.686.047,75 €	2021
<b>GENEPHARM</b>	4.007.219,96 €	7.433.360,65 €	10.172.585,16 €	2020
<b>GENEPHARM</b>	2.954.144,44 €	6.901.056,75 €	9.973.157,43 €	2023



**Figure 2.** Net income plot for 2021-2023

Concerning the net income trends, we can distinguish two groups. In the first group BOEHRINGER is still the leading company with PHARMATHEN, DEMO and ELPEN to assembly the group. VIANEX, despite its huge sales, is experiencing low net income. Regarding the 2<sup>nd</sup> group, RAFARM distinguishes and leads.





**Figure 3.** EBIT & EBITDA plot for 2021-2023 of 10 top pharmaceutical companies.

The same trend as in the net income is illustrated in the EBIT and EBITDA for 2021-2023. So, the conclusions are the same, BOEHRINGER is still the leading company with PHARMATHEN, DEMO and ELPEN to assembly the 1<sup>st</sup> group. VIANEX despite its huge sales is experiencing low EBIT and EBITDA. RAFARM also leads the second group. The % growth of sales and EBIT will be discussed in section 5.

## 4.2 Financial Ratios of 10 Sales Leading Pharmaceutical Companies

Financial ratios related to activity, profitability, liquidity, investment, solvency, operations and R&D expenses are calculated for evaluating the financial performance over the years 2021 to 2023, identifying the key factors influencing growth or decline. The calculations of the ratios are tabulated for each ratio, and graphs are made to visualise the trends and differences between each company per year. Finally, the average of each financial ratio is calculated to provide a more comprehensive assessment of the sector's financial performance over the period 2021 to 2023.

### 4.2.1 Activity ratios

The activity ratios that were used in this study are inventories turnover ratio, receivables turnover ratio, payable turnover ratio, cash conversion cycle ratio, net working capital

turnover ratio, asset turnover ratio, equity turnover ratio, fixed asset turnover ratio. The objective of each ratio in the financial analysis and their interpretation are mentioned in the table below:

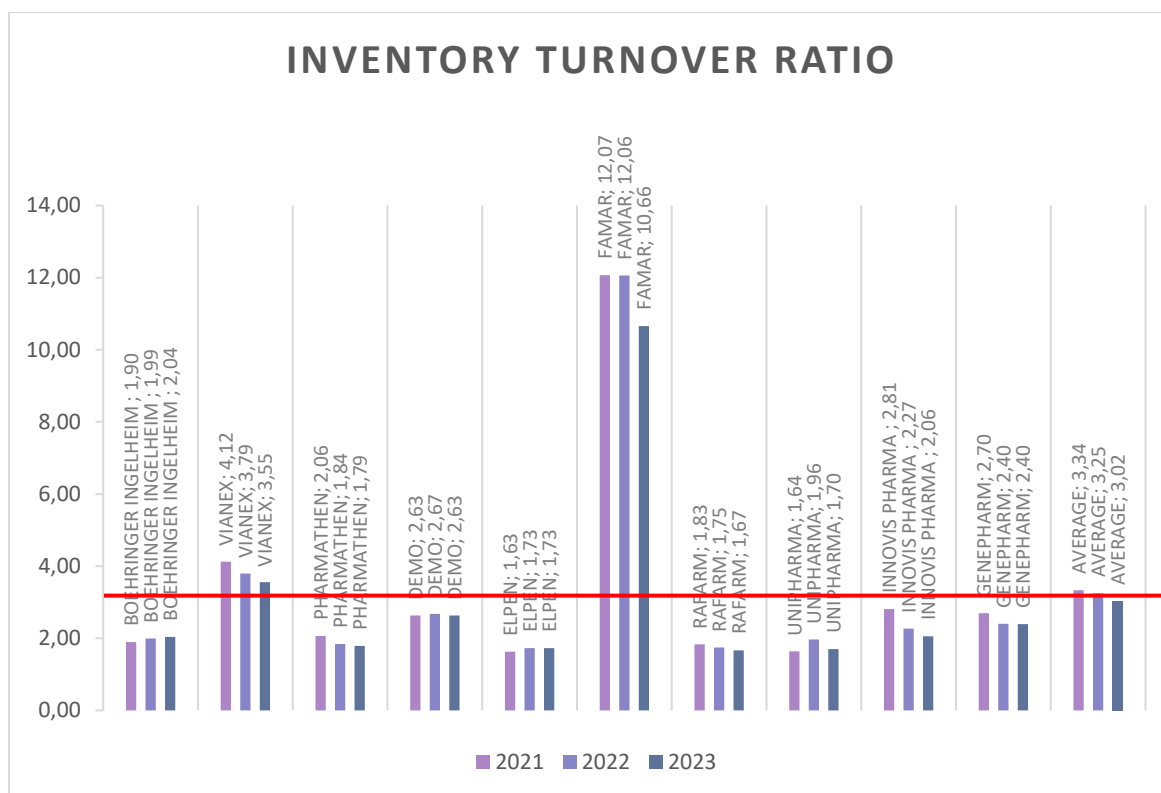
**Table 4.** Activity ratios objectives and interpretation (Eriotis, 2005)

1	Inventories turnover ratio	$\frac{\text{COGS}}{\text{Average inventory}}$	Objective: Evaluate how efficiently inventory is managed and how often it is sold and replaced over a period of time. Interpretation: A high turnover ratio = good inventory management. A low ratio = overstocking or obsolescence.
2	Receivables turnover ratio	$\frac{\text{Net Sales}}{\text{Average account receivable}}$	Objective: Assesses how efficiently a company collects its sales. Interpretation: A high ratio indicates an effective credit policy and efficient collection processes, while a low ratio could indicate difficulties in collecting payments.
3	Payable turnover ratio	$\frac{\text{COGS}}{\text{Average accounts payable}}$	Objective: Examines how quickly a company pays its suppliers. Interpretation: A high ratio may indicate prompt payments but could strain cash flow, while a low ratio may indicate delayed payments or liquidity problems.
4	Cash Conversion Cycle ratio	Average collection period for account receivable + Average holding period for inventory – average period for account payable outstanding	Objective: This is the time taken for inventory and receivables to be converted into cash, offset by the time taken to pay suppliers. Interpretation: A shorter cycle indicates better liquidity and cash flow management.
5	Net working capital turnover ratio	$\frac{\text{Net sales}}{\text{Average net working capital}}$	Objective: To highlight the efficiency with which working capital is used to generate sales. Interpretation: A low ratio may suggest that the company is not using its net working capital efficiently, or that it has excess financing on current assets or underutilises resources. This may signal inefficiencies or slower sales. A negative ratio indicates financial instability and potential liquidity problems.
6	Asset turnover ratio	$\frac{\text{Net sales}}{\text{Average total assets}}$	Objective: Measures if a company uses its assets to generate revenue efficiently. Interpretation: A higher ratio indicates efficient use of assets, while a lower ratio may indicate under-utilisation or inefficiency.
7	Owner's equity turnover ratio	$\frac{\text{Net sales}}{\text{Average equity}}$	Objective: Evaluates the return on shareholders' investment. Indicates how effectively a company turns equity into revenues.

			<p>Used to compare against industry standards or competitors.</p> <p>Interpretation:</p> <p>A higher ratio is indicative of an efficient use of equity to generate revenue. A very high ratio could indicate an overreliance on equity and potential debt dependances. A lower ratio is indicative of underutilisation of equity or inefficiencies in operations.</p>
8	Fixed assets turnover ratio	$\frac{\text{Net sales}}{\text{Average fixed assets}}$	<p>Objective:</p> <p>Cross-industry comparison of the fixed asset turnover ratio is a useful way to see how efficient companies in a sector are.</p> <p>Interpretation:</p> <p>Pharmaceutical companies often possess significant fixed assets, often due to their research and development facilities. They may exhibit lower ratios if substantial funds go to research, since this can be costly.</p> <p>A high ratio can indicate strong asset utilisation, particularly in high-output industries such as pharmaceuticals. This can indicate efficiency, but also potential asset overuse, which may need future investments.</p> <p>Don't influence the core message.</p>

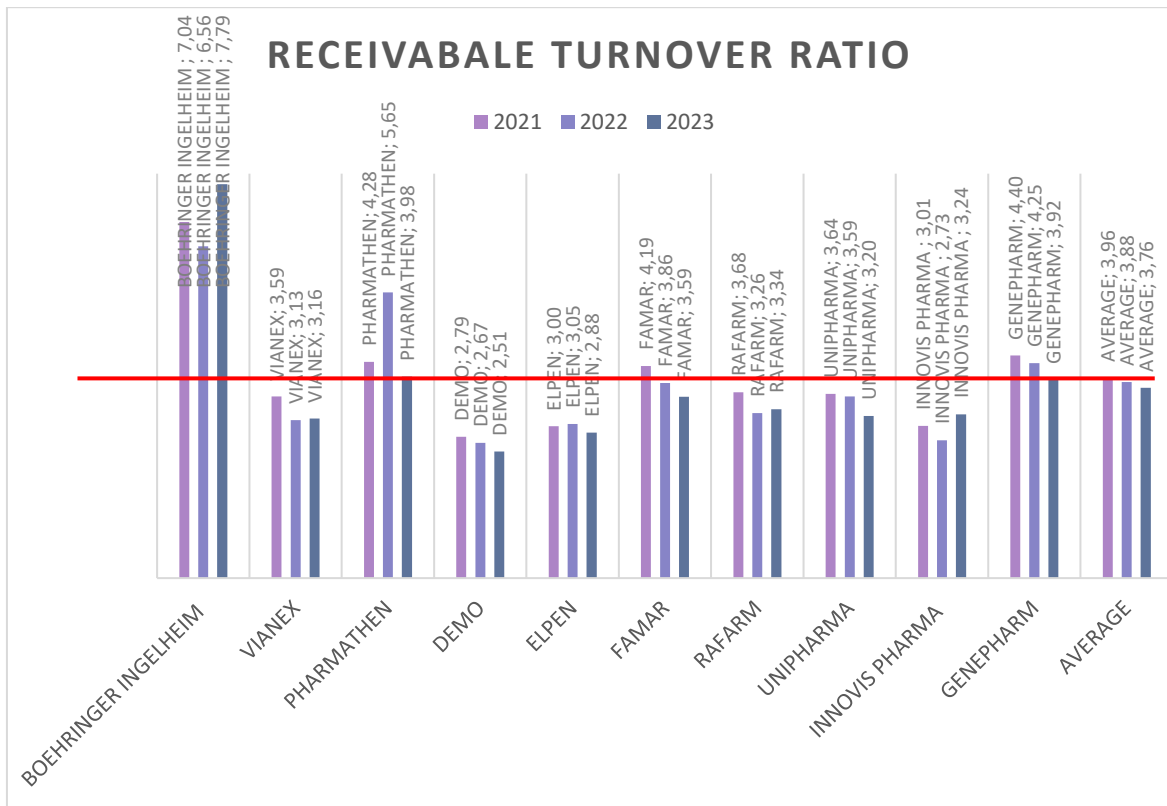
**Table 5.** Calculation results of activity ratios for 2021-2023

Company	Inventories turnover ratio	Receivables turnover ratio	Payable turnover ratio	Average collection period	Net working capital turnover ratio	Asset turnover ratio	Owner's equity turnover ratio	Fixed asset turnover ratio	YEAR
<b>BOEHRINGER INGELHEIM</b>	1,90	7,04	1,98	60,054	37,17	1,39	9,37	0,00	2021
	1,99	6,56	2,27	78,27	14,07	1,45	7,24	17,37	2022
	2,04	7,79	2,60	85,03	10,36	1,55	7,08	20,40	2023
<b>VIANEX</b>	4,12	3,59	2,64	51,80	851,17	1,30	7,51	6,03	2021
	3,79	3,13	2,82	83,53	-36,90	1,18	7,69	5,11	2022
	3,29	3,44	2,89	90,75	-73,17	1,11	8,49	5,39	2023
<b>PHARMATHEN</b>	2,06	4,28	4,08	172,96	4,29	0,69	1,64	6,14	2021
	1,84	5,65	4,11	173,80	4,40	0,96	1,62	15,44	2022
	1,79	3,98	3,55	192,88	4,15	0,75	1,58	14,94	2023
<b>DEMO</b>	2,63	2,79	2,88	142,67	2,16	0,62	1,18	1,72	2021
	2,67	2,67	3,96	180,73	1,87	0,59	1,10	1,82	2022
	2,63	2,51	2,93	159,42	2,22	0,56	1,15	1,94	2023
<b>ELPEN</b>	1,63	3,00	0,99	-23,96	4,54	0,49	1,26	2,34	2021
	1,73	3,05	1,42	74,79	-2,37	0,51	1,26	3,25	2022
	1,73	2,88	1,85	141,04	-2,93	0,56	1,41	2,71	2023
<b>FAMAR</b>	12,07	4,19	2,56	-25,35	14,21	0,97	2,35	1,80	2021
	12,06	3,86	2,46	-23,45	18,00	0,96	2,77	1,99	2022
	10,66	3,59	2,31	-22,17	25,29	0,92	3,07	2,07	2023
<b>RAFARM</b>	1,83	3,68	4,58	218,78	4,83	0,81	2,32	1,55	2021
	1,75	3,26	4,34	236,68	4,35	0,79	1,98	2,78	2022
	1,67	3,34	4,67	249,92	4,25	0,78	1,81	2,78	2023
<b>UNIPHARMA</b>	1,64	3,64	1,32	46,98	18,00	0,41	0,96	0,61	2021
	1,96	3,59	1,37	21,50	21,00	0,43	1,00	0,67	2022
	1,70	3,20	1,20	23,83	23,21	0,43	1,01	0,70	2023
<b>INNOVIS PHARMA</b>	2,81	3,01	3,01	129,79	1,70	1,16	6,23	63,83	2021
	2,27	2,73	2,28	134,80	13,11	1,04	5,85	74,46	2022
	2,06	3,24	2,67	153,22	187,90	0,93	6,72	109,24	2023
<b>GENEPHARM</b>	2,70	4,40	3,77	121,48	2,49	0,85	2,12	3,78	2021
	2,40	4,25	3,93	145,22	2,70	0,88	2,20	3,98	2022
	2,40	3,92	4,64	166,65	4,07	0,94	2,55	4,50	2023
<b>Average 2021-2023</b>	<b>3,19</b>	<b>3,88</b>	<b>2,87</b>	<b>108,06</b>	<b>38,87</b>	<b>0,87</b>	<b>3,42</b>	<b>12,64</b>	
<b>Std Deviation</b>	<b>2,92</b>	<b>1,29</b>	<b>1,09</b>	<b>78,74</b>	<b>158,19</b>	<b>0,31</b>	<b>2,73</b>	<b>25,04</b>	
<b>Cof.Var.</b>	<b>0,92</b>	<b>0,33</b>	<b>0,38</b>	<b>0,73</b>	<b>4,07</b>	<b>0,36</b>	<b>0,80</b>	<b>1,98</b>	



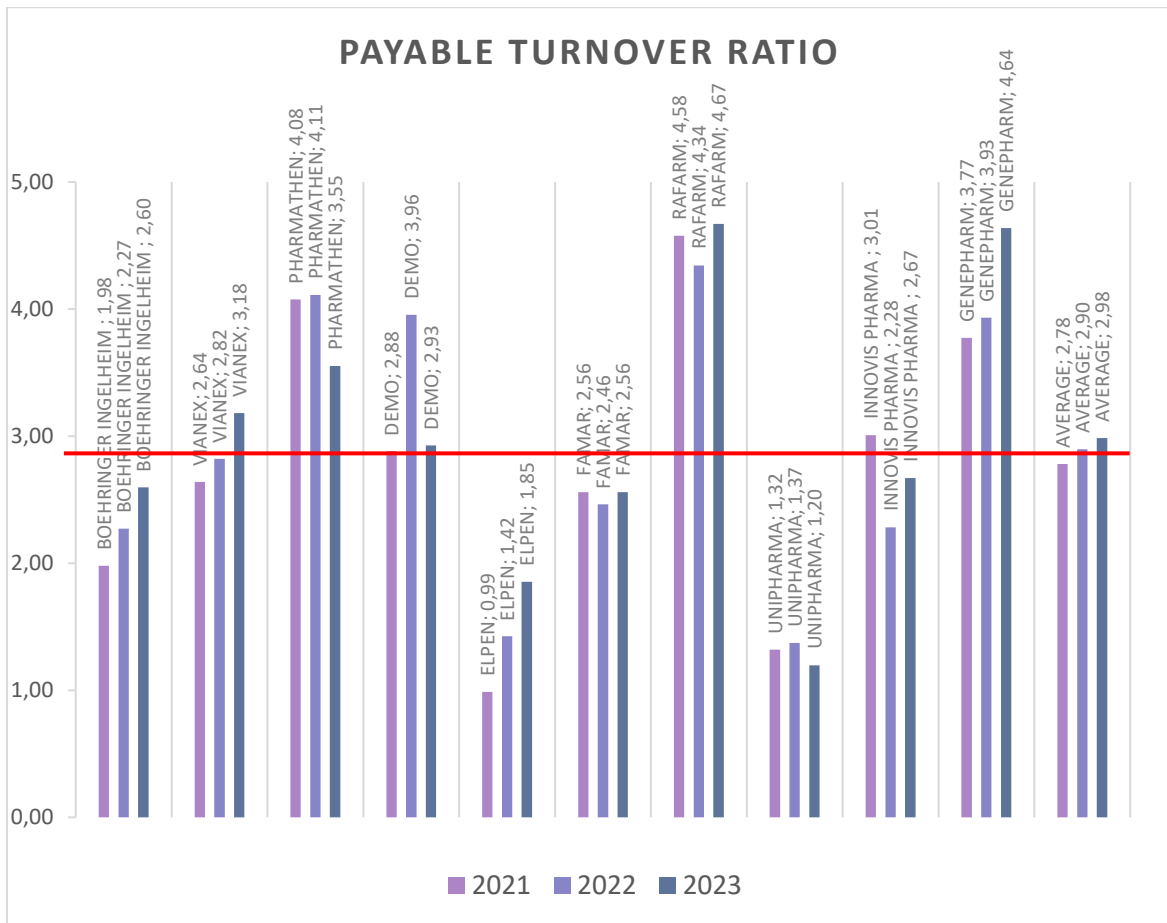
**Figure 4.** Inventory turnover ratio for 2021-2023 and average of the period

**Interpretation:** The sector's average inventory for 2021-2023 is approximately 3.2. Most companies have values below this, indicating in general overstock. However, VIANEX and FAMAR have values of 3.55 and 10.66, respectively, which exceed the average. This is expected since FAMAR and VIANEX are both contract manufacturing organizations (CMOs). ELPEN and BOEHRINGER exhibit the poorest performance, possibly due to overstocking. The pharmaceutical sector requires maintaining stocks because of delivery times, but the inventory turnover ratio is quite satisfactory.



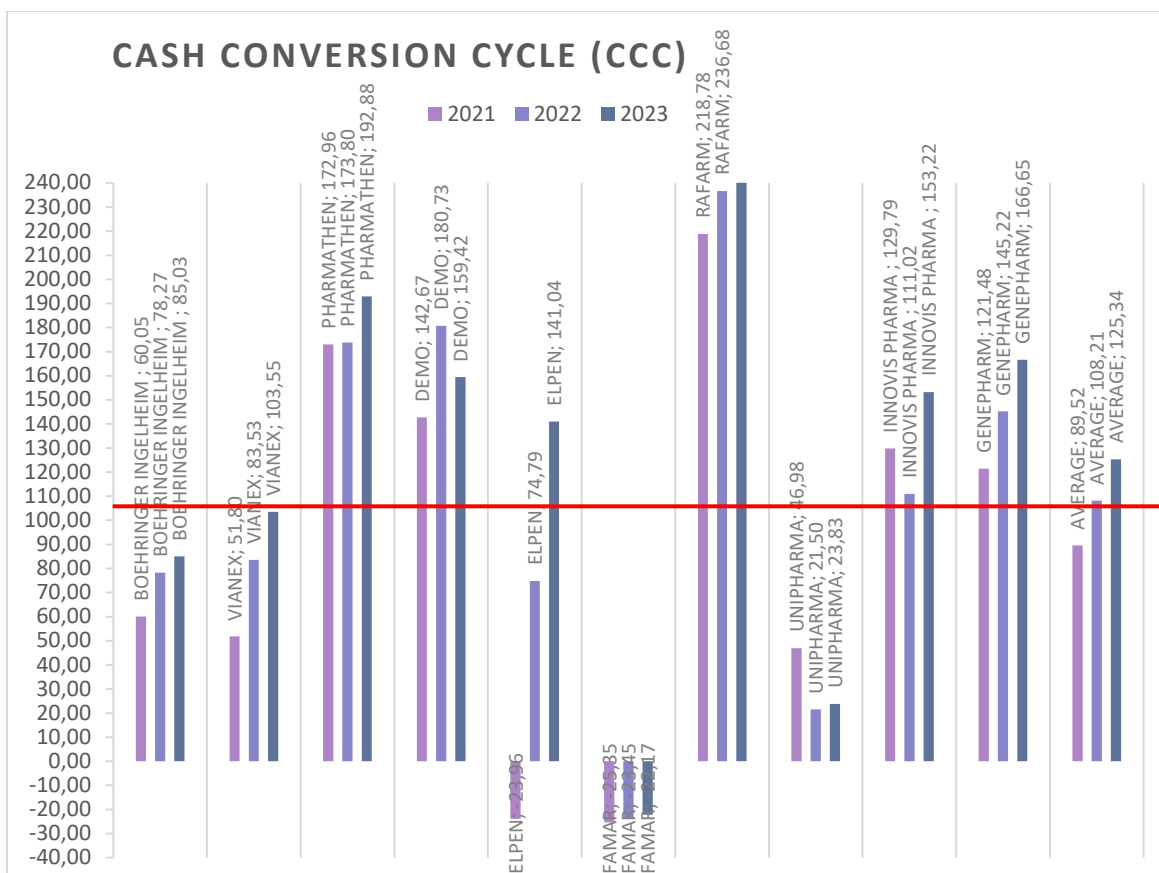
**Figure 5.** Receivables turnover ratio for 2021-2023 and average of the period

**Interpretation:** The average value of the 2021-2023 period is about 3,9 with a CV between companies of 1,29. BOEHRINGER, PHARMATHEN, FAMAR & GENEPHARM have better performances than the rest of the companies as their ratio is most of the time above average. Generally, the sector collects its credit sales more than three times annually, indicating effective collection processes and strong credit policies.



**Figure 6.** Payable turnover ratio for 2021-2023 and average of the period

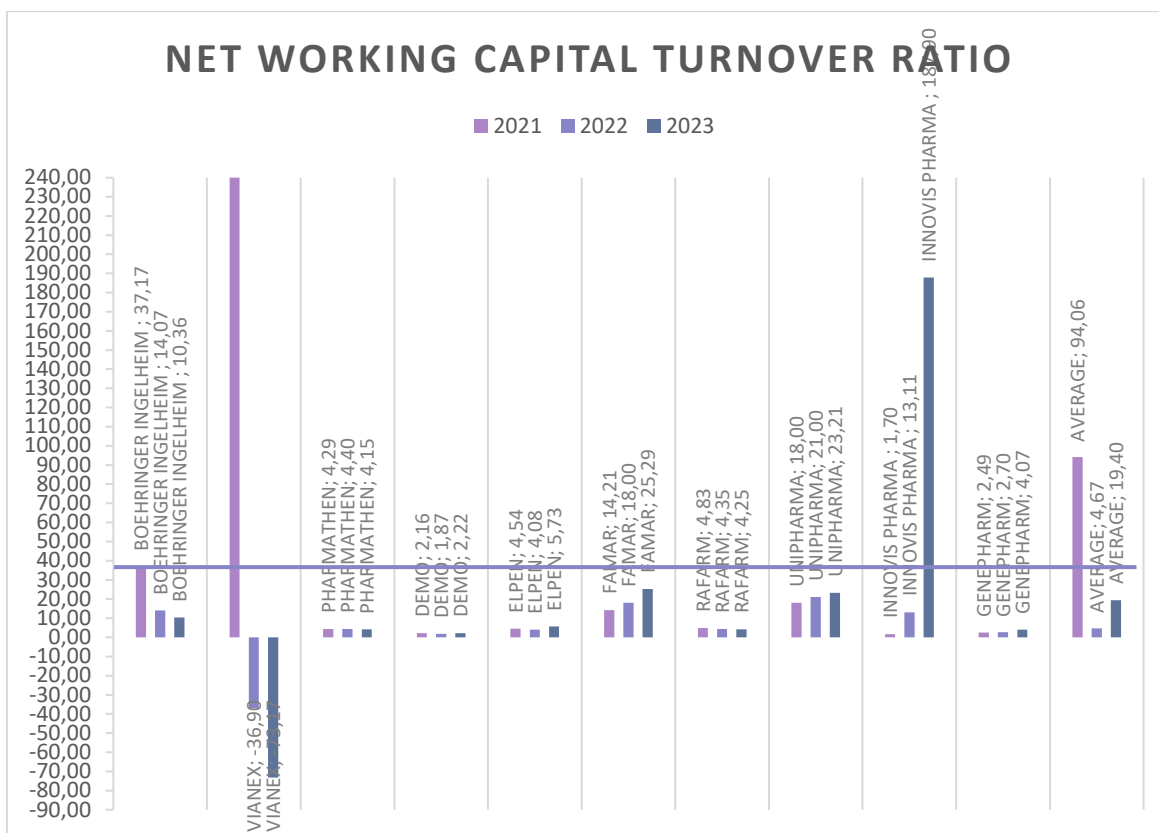
**Interpretation:** The average value of the 2021-2023 period is 2,9 with a CV of 1,09 highlighting sector-wide variability. Generally, the sector pays its obligation promptly with PHARMATHEN, RAFARM & GENEPHARM being the promptest payers. This may eventually indicate a strain on cash flow. ELPEN & UNIPHARMA are the less prompt payers that may suggest a more effective and strict payment policy. In general, the sector meets its obligations approximately three times per year, a sign of sound financial health but also a reflection of supplier bargaining power.



**Figure 7.** CCC plotting for 2021 to 2023 for the 10 pharmaceutical companies

**Interpretation:** The average Cash Conversion Cycle (CCC) for the period 2021–2023 is approximately 108 days, with a coefficient of variation (CV) of 0,73, indicating significant variability across the sector. Generally, the sector shows prompt cash collection, suggesting effective cash flow management. However, companies such as PHARMATHEN, RAFARM, and GENEFARM, have CCC above the average may potentially face pressure on cash flow or weaker negotiating power with customers or suppliers. Conversely, companies like ELPEN, FAMAR, and UNIPHARMA report the lowest CCC values, which may reflect stricter payment terms or more efficient working capital management practices. For companies with CCC values exceeding the sector average of 108 days, reassessing their payment terms, credit policies, or supplier relationships may be necessary to enhance liquidity and decrease reliance on extended working capital cycles.

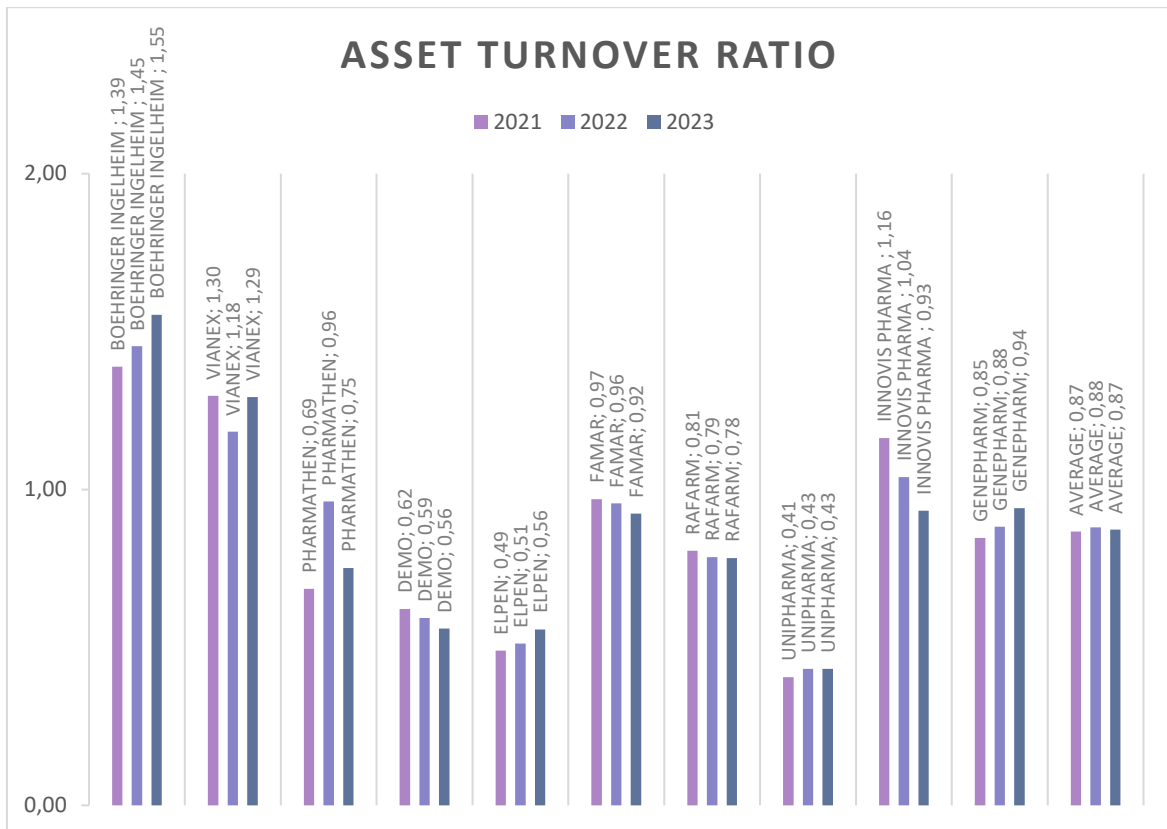




**Figure 8.** Net working capital turnover ratio in 2021-2023 of 10 pharma companies

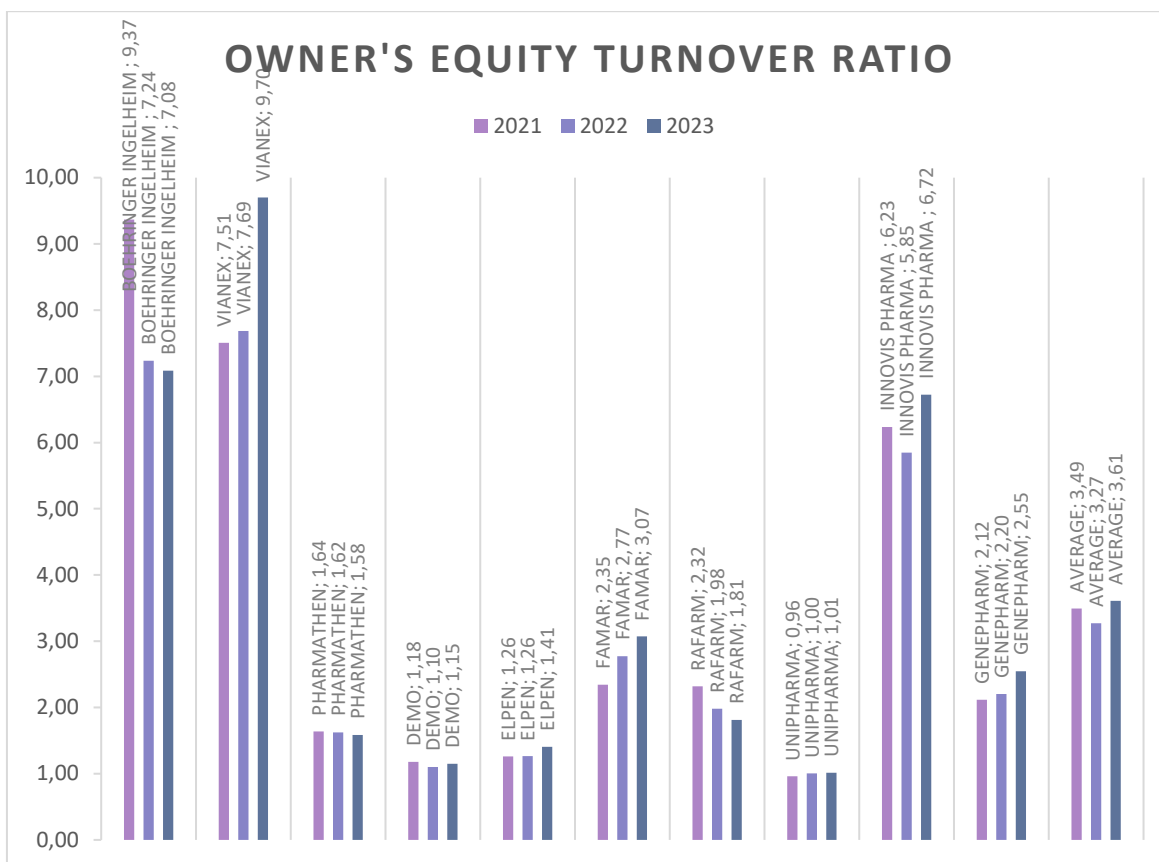
**Interpretation:** In 2021 VIANEX demonstrated a notably high ratio (851,17), while INNOVIS exhibited a negative ratio in 2021 and 2023. These figures, however, do not accurately reflect the sector's norm. A high ratio could indicate a company's reliance on its current assets, while negative values may suggest financial instability or potential liquidity concerns. These figures suggest that VIANEX and INNOVIS should review their cash flow management and liquidity strategy.

In 2023, INNOVIS also experienced a significant variation in the ratio, which was far from the 2021 value. The average value for the sector is 38,87, but this is not representative as all companies except VIANEX and INNOVIS have values below the average. If we normalise the data using the average value for VIANEX and INNOVIS, the total average is 15,8. UNIPHARMA, BOEHRINGER & FAMAR demonstrated the most stable and optimal performance.



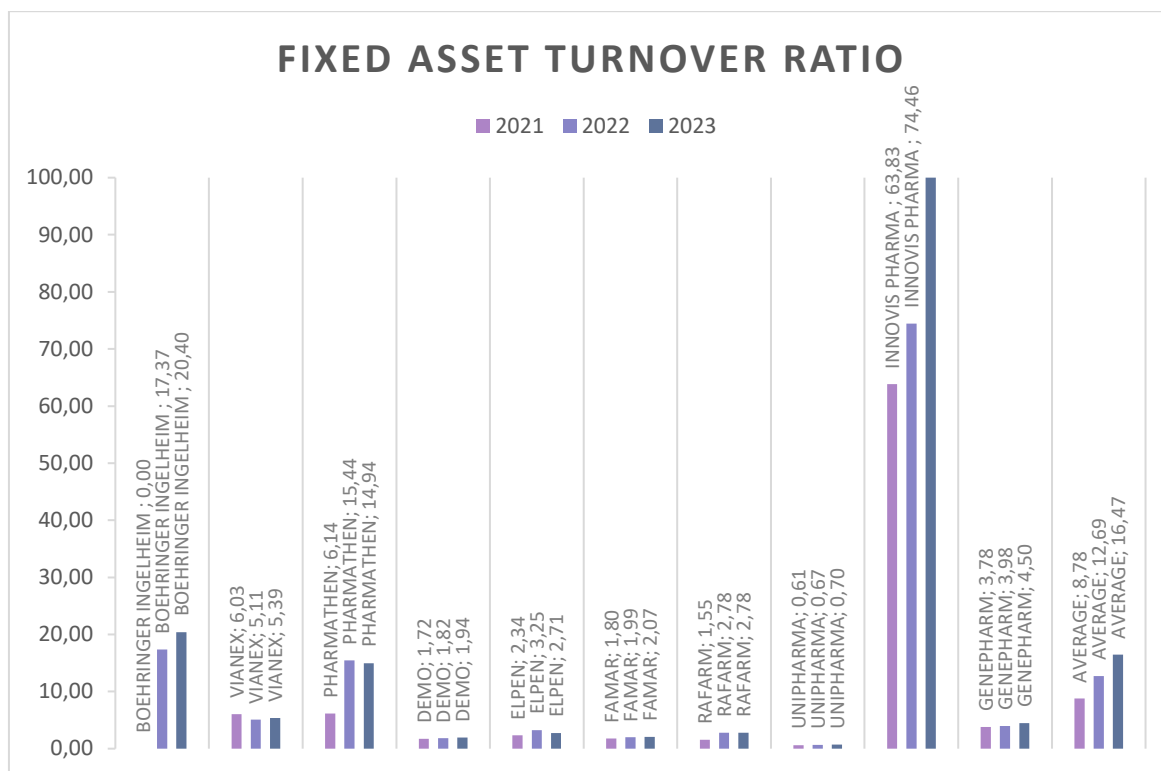
**Figure 9.** Plotting of asset turnover ratio for 2021 to 2023 and the average of the sector for each year.

**Interpretation:** The average ratio is below 1, indicating less efficient performance. Likely underutilization issues are reducing profit from asset use or possible insufficiencies in asset usage. BOERHIGER, VIANEX, and INNOVIS perform better, likely due to economies of scale. Variation is also high.



**Figure 10.** Plotting of equity turnover ratio for 2021 to 2023 and the average of the sector for each year.

**Interpretation:** The average ratio is above 3, indicating a sufficient return on shareholder's investments and sufficient performance. BOEHRINGER, VIANEX, and INNOVIS have the higher ratio values that are noticeably above the average, suggesting possible debt overreliance. Variation is also high within the sector.

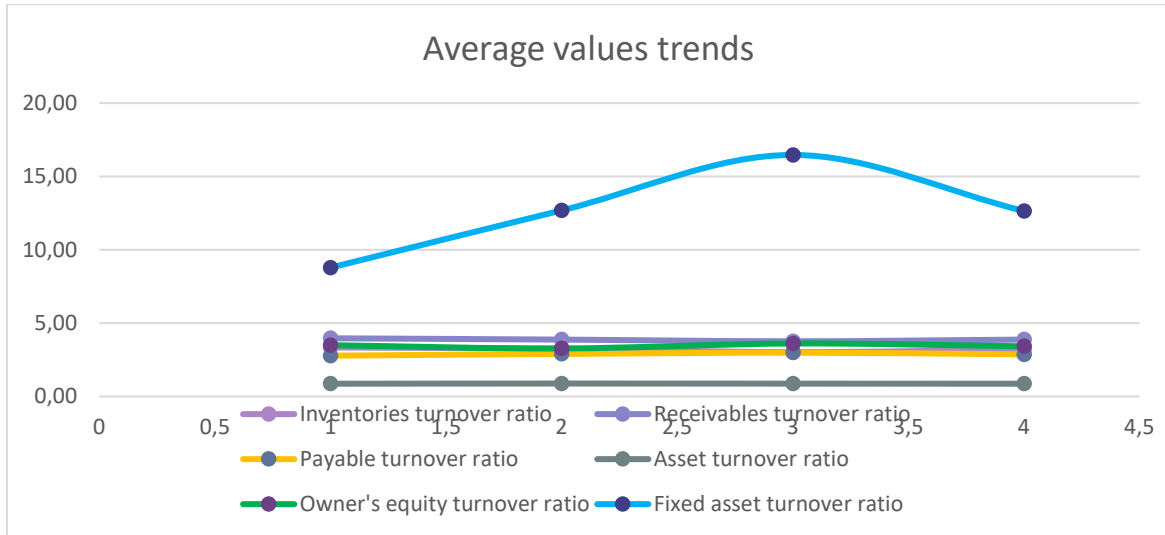


**Figure 11.** Plotting of fixed asset turnover ratio for 2021 to 2023 and the average of the sector for each year.

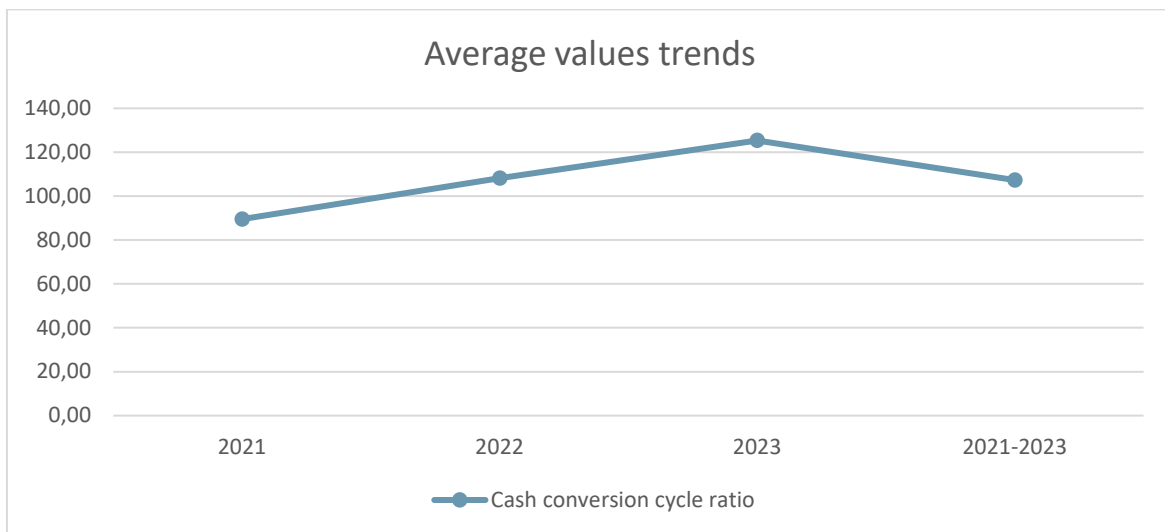
**Interpretation:** The average ratio of the period is about 12,6, indicating a sufficient usage of fixed assets. INNOVIS have the higher ratio values that are noticeably above the average, suggesting an intensive usage of fixed assets or overuse of assets, and a need for future investments. UNIPHARMA has the lower ratio suggesting over utilization or insufficient usage of the fixed assets. Thus, variation is high within the sector.

**Table 6.** Mean values of each year and the combined average of the sector.

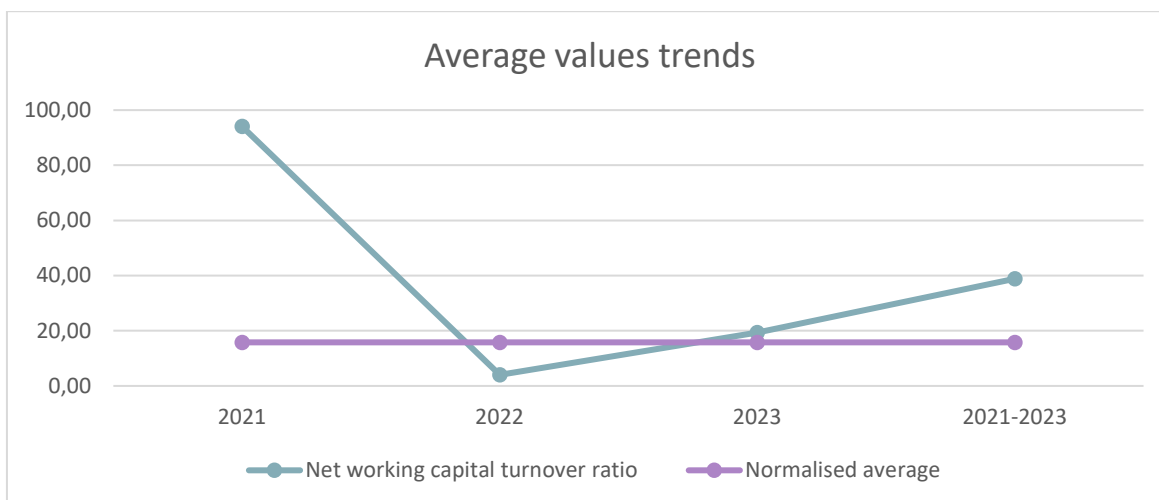
AVERAGE	Inventories turnover ratio	Receivables turnover ratio	Payable turnover ratio	Cash conversion cycle ratio	Net working capital turnover ratio	Asset turnover ratio	Owner's equity turnover ratio	Fixed asset turnover ratio	Normali zed average
2021	3,34	3,96	2,78	89,52	94,06	0,87	3,49	8,78	15,80
2022	3,25	3,88	2,90	110,59	4,02	0,88	3,27	12,69	15,80
2023	3,02	3,76	2,98	125,34	19,40	0,87	3,61	16,47	15,80
2021-2023	3,19	3,88	2,87	108,06	38,87	0,87	3,42	12,64	15,80
Std Deviation	0,16	0,10	0,10	18,00	48,16	0,01	0,17	3,84	0,00
Cof.Var.	0,05	0,03	0,04	0,17	1,24	0,01	0,05	0,30	0,00



**Figure 12.** Plotting of averages activity ratios



**Figure 13.** Plotting of averages of CCC ratio



**Figure 14.** Plotting of averages of Net Working Capital ratio

**Interpretation:** With regard to the sector's average activity ratios on an annual basis, low variability is evident with the exception of net working capital and fixed asset turnover ratio. CCC has moderate variability. The fixed asset turnover ratio and CCC exhibit an upward trend from 2021 to 2023. This indicates that the sector utilises its assets extensively and experiences delays in collections. Net working capital turnover demonstrates significant variability between years, suggesting the presence of inefficiencies or external pressures.

#### 4.2.2 Profitability ratios

The profitability ratios used in the analysis include net profit margin, return on assets (ROA) and return on equity (ROE), operating profit margin, the ratio of depreciation to fixed assets and to net sales. These ratios indicate a company's capacity to generate profit from revenue, assets, equity, or other inputs. They are vital for assessing a company's financial performance and efficiency in creating shareholder value.

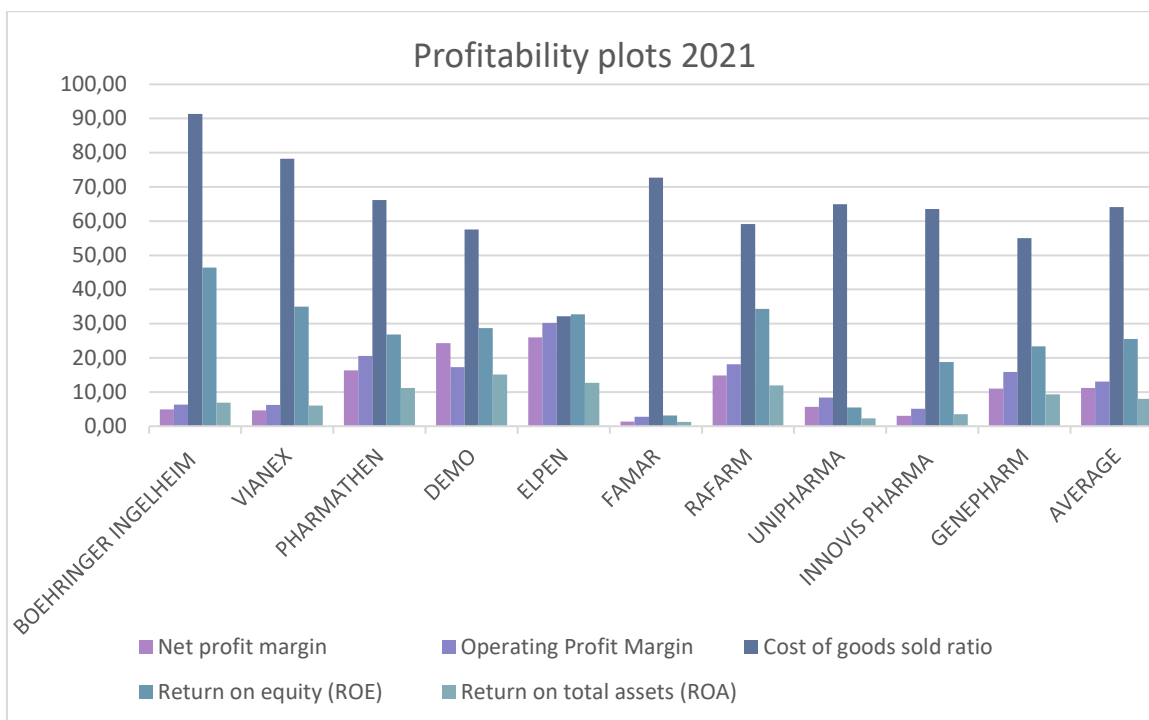
**Table 7.** Profitability ratios objectives and interpretation (Eriotis, 2005)

1	Net profit margin	$\frac{\text{Net income}}{\text{Revenues}} \times 100$	Objective: A measure of how efficiently a company converts sales into profits, costs deducted. Interpretation: Higher net profit margin is usually desirable as it shows better profitability.
2	Return on assets (ROA)	$\frac{\text{Net income}}{\text{Total assets}} \times 100$	Objective: The return on assets (ROA) measures how efficiently a company uses its assets to generate profits. Interpretation: A higher ROA is positive
3	Return on equity (ROE)	$\frac{\text{Net income}}{\text{Total equity}} \times 100$	Objective: Return on equity measures how efficiently a company uses its private capital for profit generation. Interpretation: Higher ROE is generally positive, indicating better performance
4	Operating Profit Margin	$\frac{\text{EBIT}}{\text{Revenues}} \times 100$	Objective: A measure of profitability after covering operating expenses but before interest and taxes. Shows core operational efficiency. Interpretation: It reflects how efficiently the company generates profit from its core operations. A higher operating profit margin indicates better cost control and operational efficiency. A lower margin suggests higher operational costs or pricing challenges.
5	Cost of goods sold ratio	$\frac{\text{COGS}}{\text{Revenues}} \times 100$	Objective: A financial ratio that measures the proportion of a company's sales consumed by the direct costs of producing goods or services. Interpretation: A high COGS ratio means more revenue goes to production costs, indicating lower profitability and potential inefficiencies. A low COGS ratio suggests less revenue is spent on production, reflecting higher gross profit margins and better cost management.

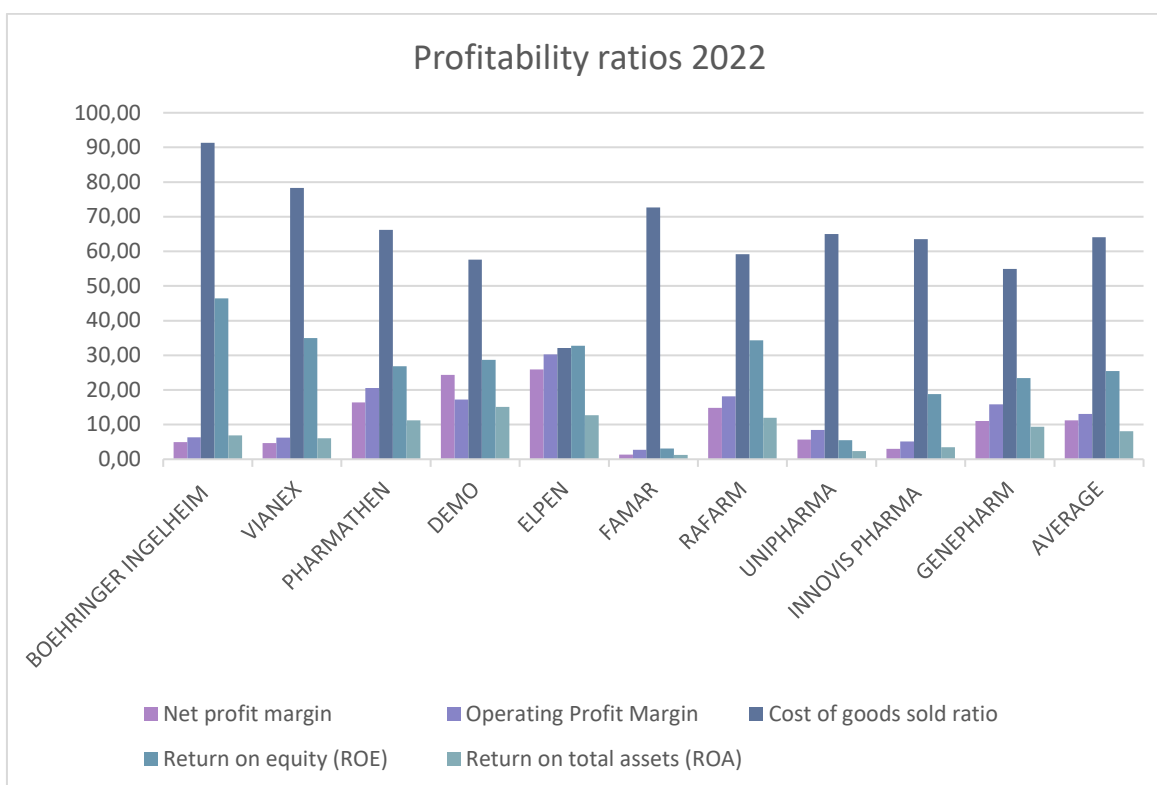
**Table 8.** Profitability ratios calculations

Company	Net profit margin	Operating Profit Margin	Cost of goods sold ratio	Return on equity (ROE)	Return on total assets (ROA)	Year
<b>BOEHRINGER INGELHEIM</b>	4,96	6,36	91,34	46,43	6,88	2021
	6,03	8,75	90,63	43,66	8,77	2022
	3,97	6,20	90,95	28,09	6,16	2023
<b>VIANEX</b>	4,66	6,27	78,27	34,99	6,04	2021
	3,36	5,54	82,57	25,84	3,98	2022
	2,98	5,50	82,88	25,34	3,30	2023
<b>PHARMATHEN</b>	16,39	20,57	66,20	26,84	11,23	2021
	4,92	12,39	67,08	7,99	4,73	2022
	7,50	14,20	65,68	11,89	5,64	2023
<b>DEMO</b>	24,34	17,27	57,59	28,72	15,14	2021
	9,92	11,81	62,13	10,93	5,89	2022
	2,35	8,38	63,24	2,70	1,32	2023
<b>ELPEN</b>	25,96	30,24	32,15	32,71	12,73	2021
	19,53	26,13	35,18	24,69	10,00	2022
	21,11	25,41	35,43	29,72	11,76	2023
<b>FAMAR</b>	1,34	2,76	72,69	3,14	1,30	2021
	1,23	2,24	72,50	3,41	1,18	2022
	1,98	4,60	72,43	6,09	1,83	2023
<b>RAFARM</b>	14,81	18,16	59,17	34,33	11,94	2021
	9,90	13,62	58,02	19,60	7,77	2022
	10,20	18,07	54,40	18,50	7,99	2023
<b>UNIPHARMA</b>	5,70	8,41	64,96	5,48	2,31	2021
	3,85	6,45	65,53	3,86	1,66	2022
	4,16	7,09	64,11	4,21	1,80	2023
<b>INNOVIS PHARMA</b>	3,01	5,09	63,55	18,79	3,51	2021
	3,59	6,71	59,44	20,98	3,73	2022
	4,90	10,14	54,25	32,95	4,57	2023
<b>GENEPHARM</b>	11,05	15,84	54,98	23,38	9,36	2021
	6,61	12,27	55,08	14,56	5,84	2022
	4,22	9,85	56,16	10,73	3,97	2023
<b>Average</b>	<b>8,15</b>	<b>11,54</b>	<b>64,29</b>	<b>20,02</b>	<b>6,08</b>	
<b>Std Deviation</b>	<b>6,94</b>	<b>7,18</b>	<b>15,00</b>	<b>12,57</b>	<b>3,86</b>	
<b>Cof.Var.</b>	<b>0,85</b>	<b>0,62</b>	<b>0,23</b>	<b>0,63</b>	<b>0,64</b>	

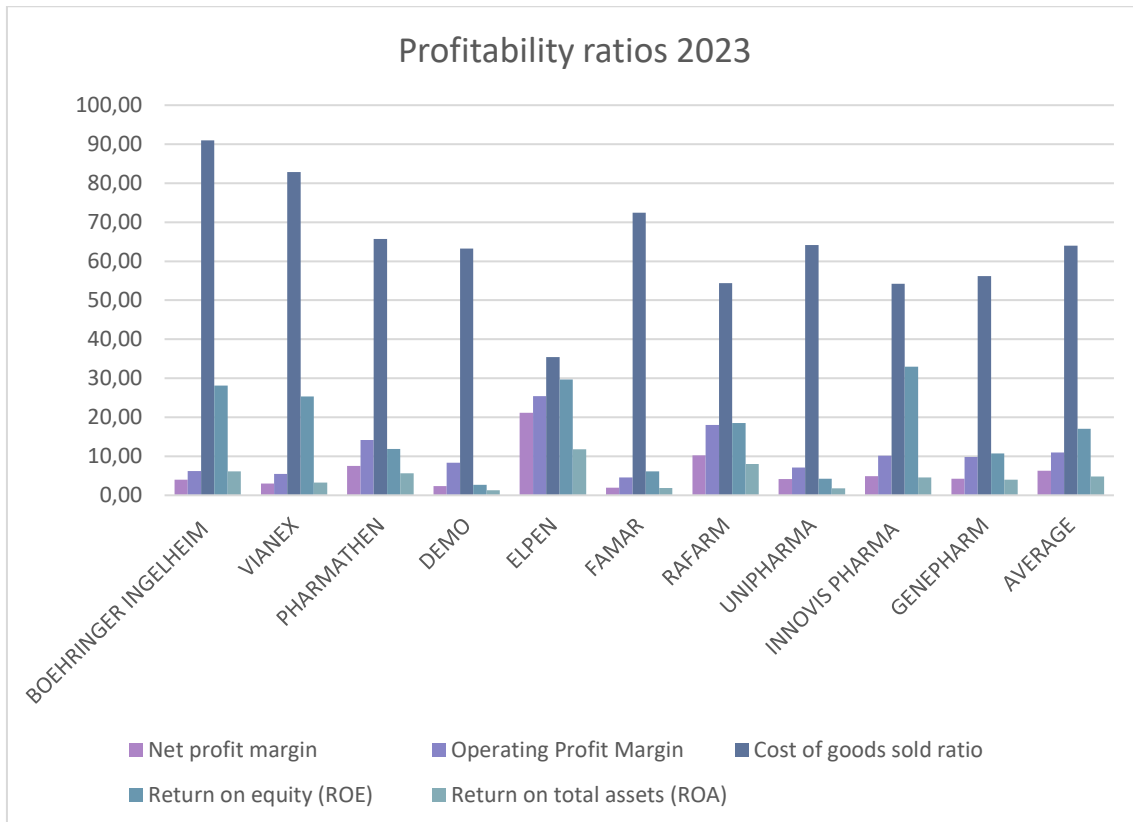




**Figure 15.** Plotting profitability ratios of each company and average of 2021



**Figure 16.** Plotting profitability ratios of each company and average of 2022

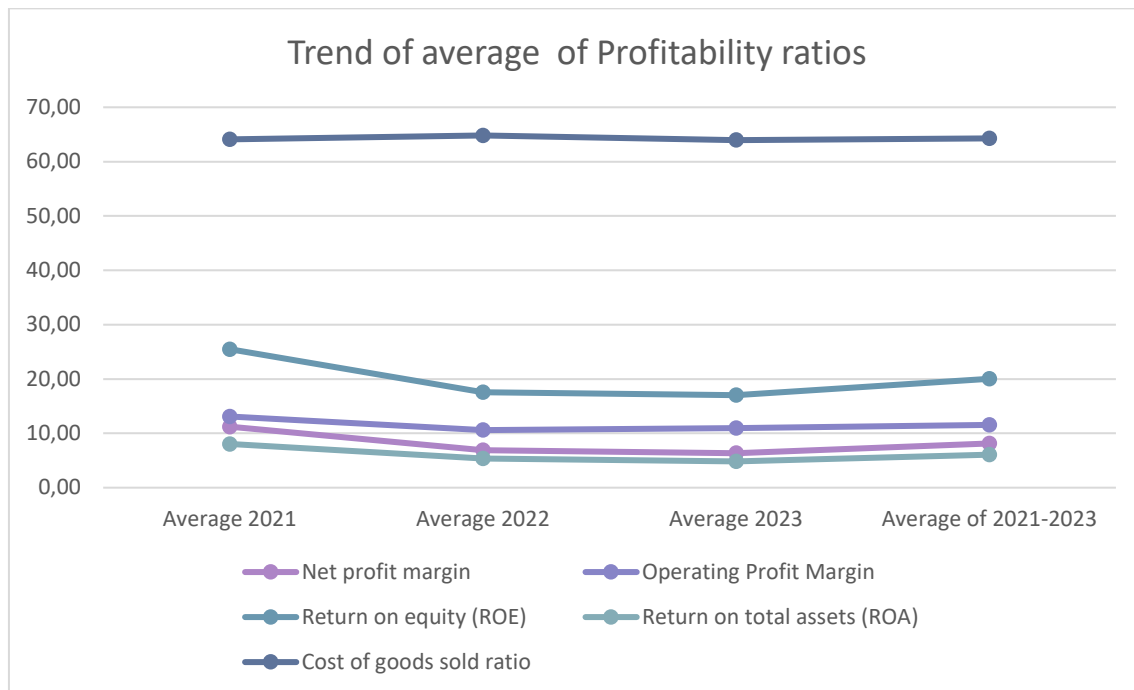


**Figure 17.** Plotting profitability ratios of each company and average of 2023

**Interpretation:** From 2021 to 2023 between companies the net profit margin has 85% variation, the operating profit margin has 63% variation, the COGS ratio has a 23% variation, ROE 63% and ROA 64% variation. So, the profitability between companies differs a lot. Variation in profitability ratio is also identified between years for the same company. DEMO ELPEN, PHARMATHEN, DEMO and RAFARM are the most profitable companies. In addition, ELPEN has a lower COGS ratio, suggesting high efficiency in cost management. ELPEN has the most balanced values among the ratios, while other firms stand out in the COGS column.

**Table 9.** Profitability ratios mean values of each year and the combined average of the sector

	Net profit margin	Operating Profit Margin	Cost of goods sold ratio	Return on equity (ROE)	Return on total assets (ROA)
Average 2021	11,22	13,10	64,09	25,48	8,04
Average 2022	6,89	10,59	64,82	17,55	5,35
Average 2023	6,34	10,94	63,95	17,02	4,83
Average of 2021-2023	8,15	11,54	64,29	20,02	6,08
Std Deviation	2,67	1,36	0,46	4,74	1,72
Cof.Var.	0,33	0,12	0,007	0,24	0,28



**Figure 18.** Plotting of the averages of profitability ratios

**Interpretation:** In the sector the net profit margin average is  $8,2 \pm 33\%$ , operating profit margin average is  $11,5 \pm 12\%$ , COGS ratio average is  $64,3 \pm 0,7\%$ , ROE average is  $20,02 \pm 24\%$  and ROA average is  $6,08 \pm 28\%$ . The Cost of Goods Sold (COGS) has remained relatively consistent between 2021, 2022, and 2023, indicating stable production costs within the sector. However, other profitability ratios have been declining during this period, suggesting a decrease in the sector's overall profitability. As it is illustrated in table 8 profitability ratios decline for the majority of the firms from 2021 to 2023.

### 4.2.3 Liquidity ratios

Liquidity ratios used for the evaluation of the sector's top 10 pharmaceutical companies are current ratio, quick ratio or acid ratio, and cash ratio. Liquidity ratios are used to assess a company's ability to meet its short-term obligations using its current assets. These ratios are important for evaluating a company's financial health and its capacity to cover liabilities if they come due.

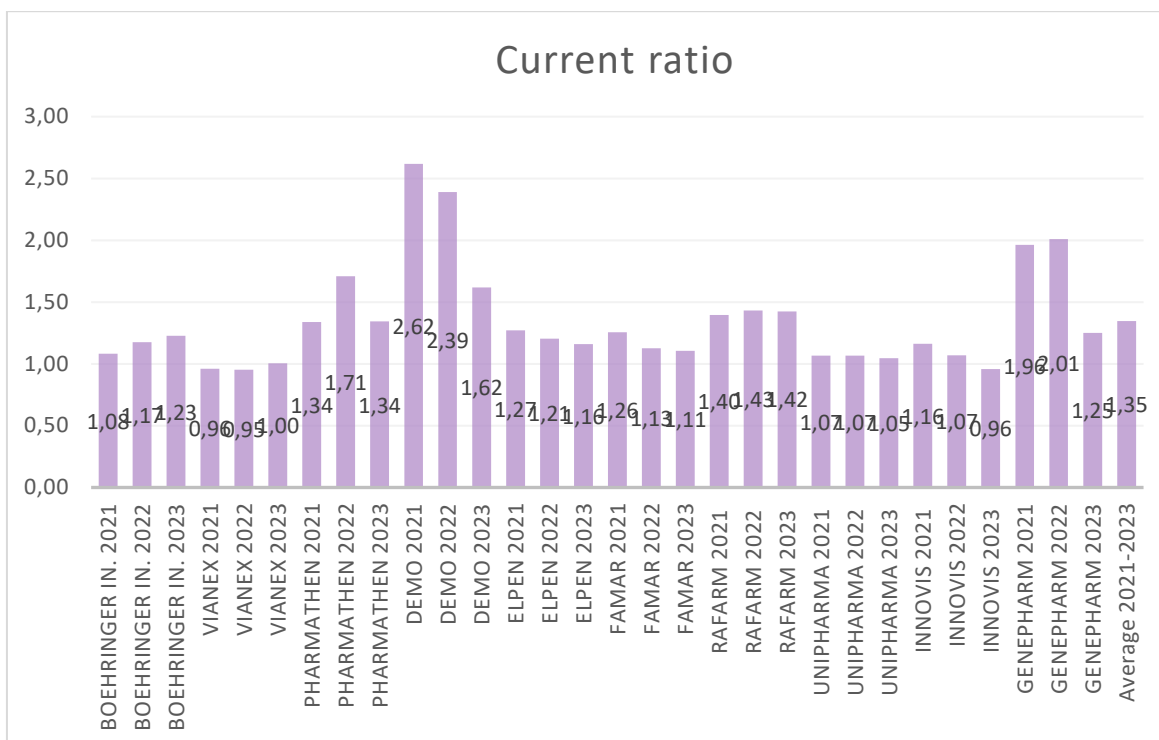
**Table 10.** Liquidity ratios objectives and interpretation (Eriotis, 2005)

1	current ratio	$\frac{\text{current assets}}{\text{current liabilities}}$	Objective: Measures the liquidity of a company and its ability to manage any unexpected situations in working capital A high ratio indicates a positive financial position regarding liquidity while a low ratio indicates possible difficulties paying current liabilities.
2	Quick ratio	$\frac{\text{Cash} + \text{cash equivalent} + \text{account receivables}}{\text{current liabilities}}$	Objective: Illustrates the assets that can be immediately converted into cash. Interpretation: A ratio above 1 indicates ability to cover immediately current liabilities. Ratio below 1 suggests that the directly liquidated assets do not cover the current liabilities.
3	cash ratio	$\frac{\text{Cash} + \text{cash equivalent}}{\text{current liabilities}}$	Objective: Measures how many times the available cash can cover the current liabilities Interpretation: A <b>high cash ratio</b> may suggest that a company is gathering cash instead of investing. A <b>low cash ratio</b> could indicate liquidity risks, especially during recessions or cash flow issues. Comparing the cash ratio with industry benchmarks is crucial, as liquidity needs differ by sector.

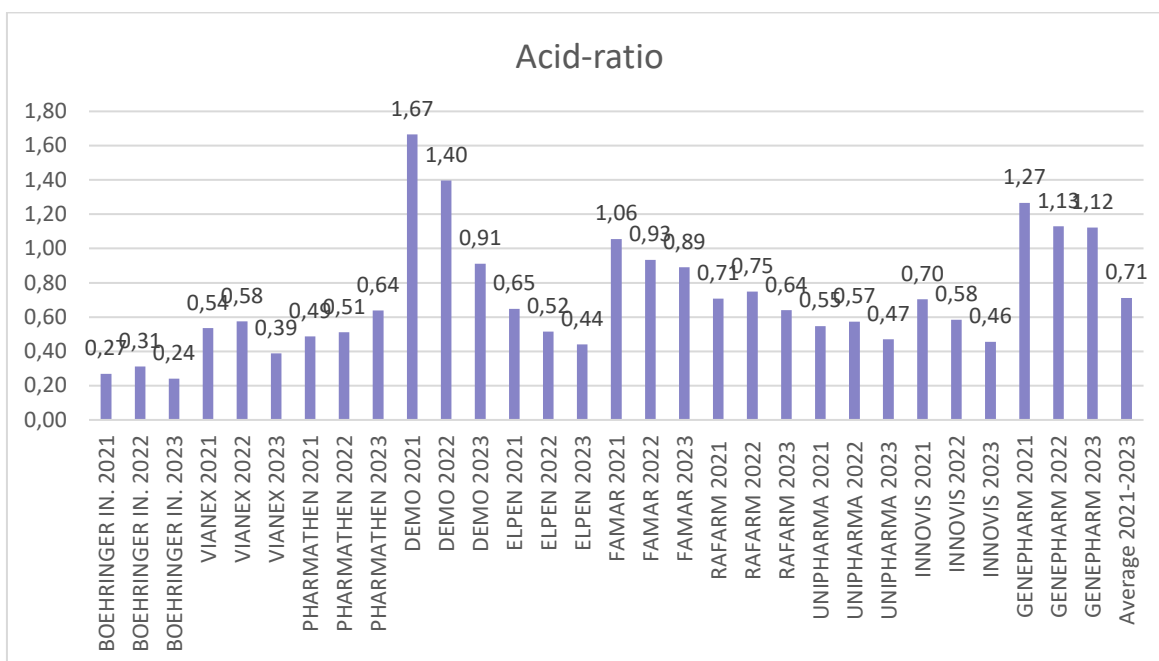
Calculation and Evaluation of the liquidity financial ratios. Conclusion for each company and comparison with the sector average.

**Table 11.** Liquidity ratios calculations

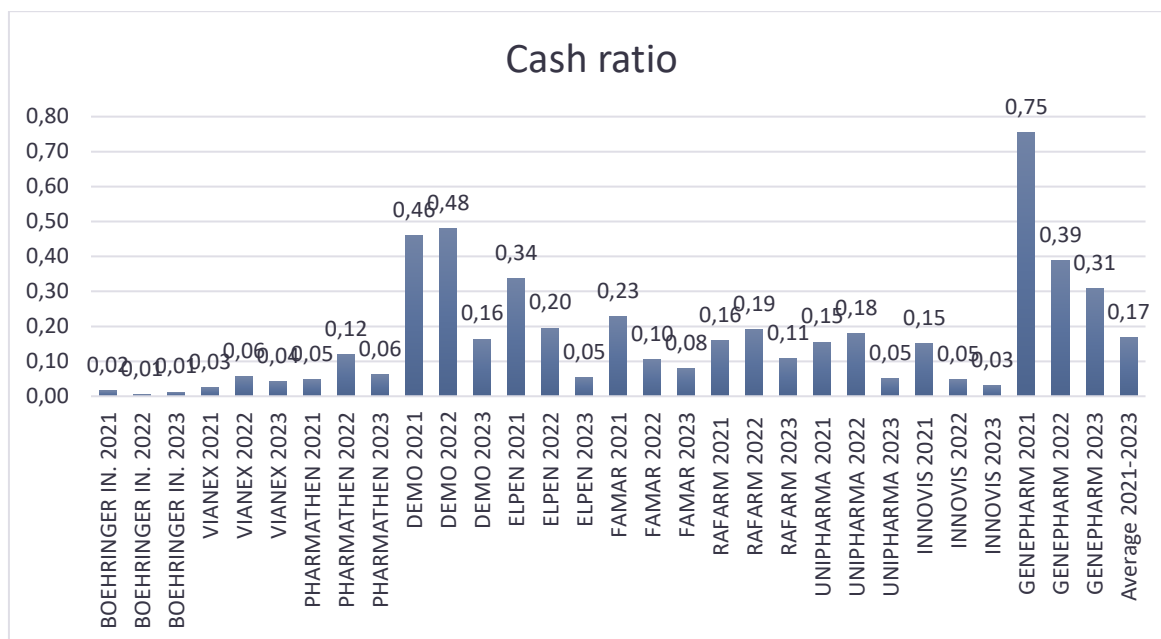
Company	Current ratio	Acid-ratio	Cash ratio
<b>BOEHRINGER IN. 2021</b>	1,08	0,27	0,02
<b>BOEHRINGER IN. 2022</b>	1,17	0,31	0,01
<b>BOEHRINGER IN. 2023</b>	1,23	0,24	0,01
<b>VIANEX 2021</b>	0,96	0,54	0,03
<b>VIANEX 2022</b>	0,95	0,58	0,06
<b>VIANEX 2023</b>	1,00	0,39	0,04
<b>PHARMATHEN 2021</b>	1,34	0,49	0,05
<b>PHARMATHEN 2022</b>	1,71	0,51	0,12
<b>PHARMATHEN 2023</b>	1,34	0,64	0,06
<b>DEMO 2021</b>	2,62	1,67	0,46
<b>DEMO 2022</b>	2,39	1,40	0,48
<b>DEMO 2023</b>	1,62	0,91	0,16
<b>ELPEN 2021</b>	1,27	0,65	0,34
<b>ELPEN 2022</b>	1,21	0,52	0,20
<b>ELPEN 2023</b>	1,16	0,44	0,05
<b>FAMAR 2021</b>	1,26	1,06	0,23
<b>FAMAR 2022</b>	1,13	0,93	0,10
<b>FAMAR 2023</b>	1,11	0,89	0,08
<b>RAFARM 2021</b>	1,40	0,71	0,16
<b>RAFARM 2022</b>	1,43	0,75	0,19
<b>RAFARM 2023</b>	1,42	0,64	0,11
<b>UNIPHARMA 2021</b>	1,07	0,55	0,15
<b>UNIPHARMA 2022</b>	1,07	0,57	0,18
<b>UNIPHARMA 2023</b>	1,05	0,47	0,05
<b>INNOVIS 2021</b>	1,16	0,70	0,15
<b>INNOVIS 2022</b>	1,07	0,58	0,05
<b>INNOVIS 2023</b>	0,96	0,46	0,03
<b>GENEPHARM 2021</b>	1,96	1,27	0,75
<b>GENEPHARM 2022</b>	2,01	1,13	0,39
<b>GENEPHARM 2023</b>	1,25	1,12	0,31
<b>Average 2021-2023</b>	<b>1,35</b>	<b>0,71</b>	<b>0,17</b>
<b>Std Deviation</b>	<b>0,41</b>	<b>0,34</b>	<b>0,17</b>
<b>Cof.Var.</b>	<b>0,31</b>	<b>0,48</b>	<b>1,03</b>



**Figure 19.** Plotting of current ratios 2021-2023 of 10 pharmaceutical companies the 3-year average.



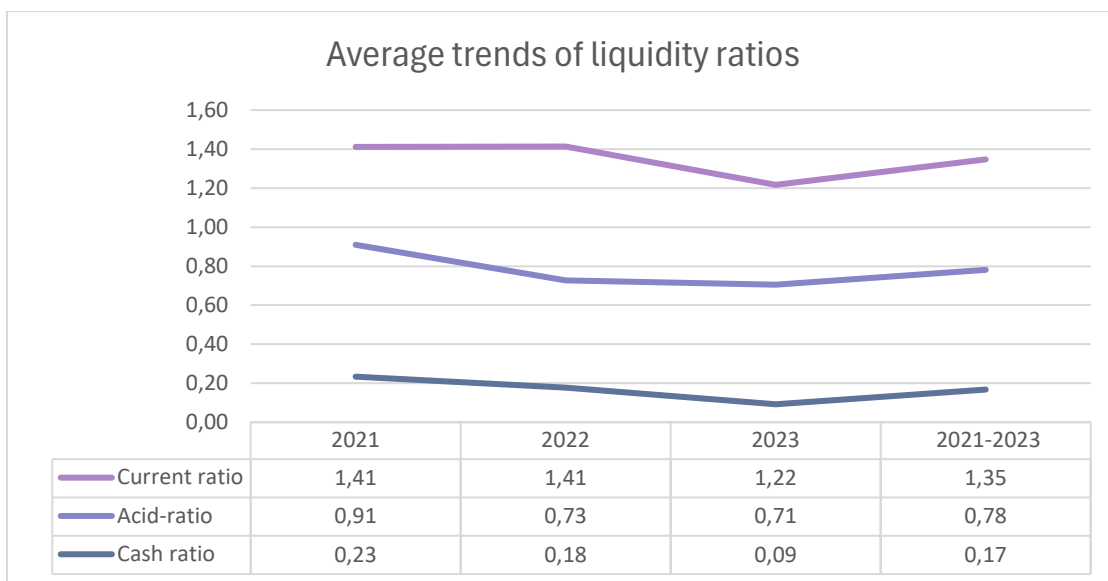
**Figure 20.** Plotting of acid-ratio ratios for 2021-2023 and the 3-year average of 10 pharmaceutical companies



**Figure 21.** Plotting of cash ratios for 2021-2023 and the 3-year average of 10 pharmaceutical companies

**Table 12.** Average values of liquidity ratios in years 2021-2023 and average of the period

Average	Current ratio	Acid-ratio	Cash ratio
<b>2021</b>	1,41	0,91	0,23
<b>2022</b>	1,41	0,73	0,18
<b>2023</b>	1,22	0,71	0,09
<b>2021-2023</b>	1,35	0,78	0,17
<b>Std Deviation</b>	0,11	0,11	0,07
<b>Cof.Var.</b>	0,08	0,14	0,43



**Figure 22.** Plotting of averages of liquidity ratios

**Interpretation:** The sector has a current ratio over 1, indicating that most companies can cover their current liabilities. The average value is declining. VIANEX has a ratio below 1 and a negative net working capital ratio, which may suggest liquidity concerns. However, high inventory turnover ratios mitigate these issues.

The sector's acid ratio is below 1, indicating that most companies rely on future sales to settle their current liabilities, suggesting liquidity problems. The acid ratio is declining. The three leading in sales companies have a lower cash ratio due to investment in new facilities. Cash ratio is also declining. CV's are 8 % for current ratio, 14% for acid ratio and 43% for cash ratio. So, liquidity ratios have low variability except cash ratio.

#### 4.2.4 Investment ratios

These ratios evaluate investment profitability relative to invested resources, compare company performance against peers and industry standards, and help investors determine share valuation. They provide critical data for investment decisions and assess how well a company uses capital to generate returns.

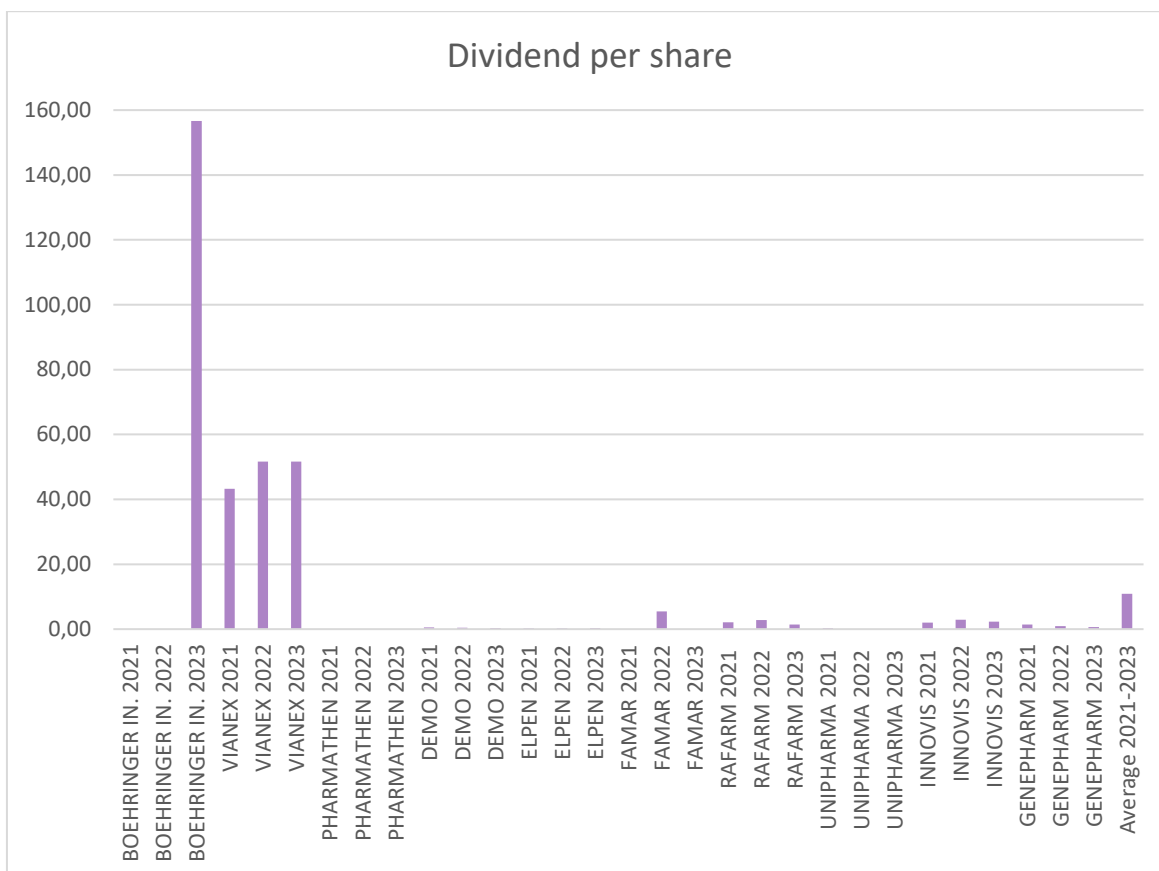


**Table 13.** Investment ratios objectives and interpretation (Eriotis, 2005)

<b>1</b>	<b>Dividend per share</b>	<b><math>\frac{\text{Dividend}}{\text{Number of outstanding shares}}</math></b>	<p>Objective: Return on Investment (ROI) Investor Attraction Signal of Financial Health Shareholder Value Maximization Corporate Policy Reflection</p> <p>Interpretation: High DPS suggests Mature Company: Limited opportunities for growth or reinvestment. Stable Profitability: The company is confident in its ability to maintain profitability. Low or no DPS if the company is reinvesting retained earnings effectively to run future growth or cash flow issues. A consistent DPS signals stability and reliability, making the company attractive for long-term investors.</p>
	Earnings per share	$\frac{\text{Net income}}{\text{Number of outstanding shares}}$	<p>Objective: It reflects the firms profitability based on its stocks.</p> <p>Interpretation: The higher the better for investors</p>
<b>3</b>	Dividend yield on equity capital	$\frac{\text{Dividend paid}}{\text{Total equity}} \times 100$	<p>Objective: This metric evaluates the dividends shareholders receive concerning the equity they have invested in the company. High values show a significant portion of earnings being paid out as dividends, which may attract income-seeking investors but indicate lower growth potential. Low values show a significant portion of earnings being kept for reinvestment or debt repayment, typical of high-growth industries or companies expanding. It may be less attractive to income investors, but better for growth investors, as the company does not pay a dividend.</p>
<b>4</b>	Percentage of distributed earnings	$\frac{\text{Dividend}}{\text{Net income}} \times 100$	<p>Objective: Measure Dividend Policy Evaluate Sustainability Investor Insights</p> <p>Interpretation: The lower this ratio is the more conservative is the dividend policy of the firm and probably the firm will reinvest its earnings.</p>

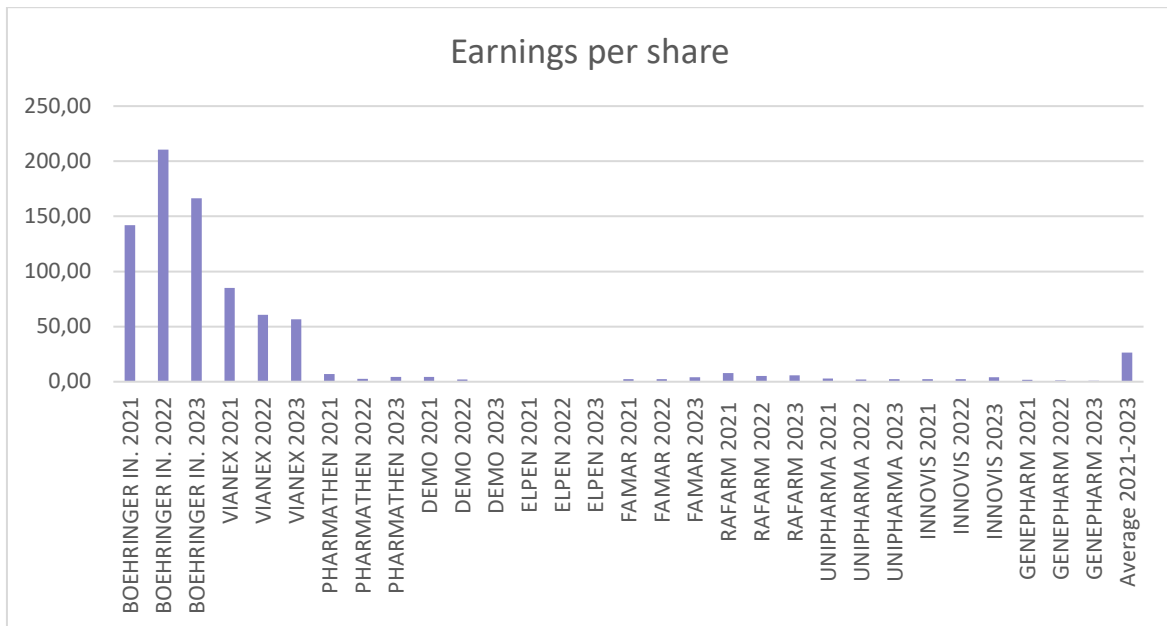
**Table 14.** Calculation outcome of investment ratios

Company	Dividend per share	Earnings per share	Dividend yield on equity capital	Percentage of distributed earnings
<b>BOEHRINGER IN. 2021</b>	0,00	141,97	0,00	0,00
<b>BOEHRINGER IN. 2022</b>	0,00	210,44	0,00	0,00
<b>BOEHRINGER IN. 2023</b>	156,66	166,29	26,25	94,21
<b>VIANEX 2021</b>	43,26	85,12	17,36	50,82
<b>VIANEX 2022</b>	51,62	60,84	23,28	84,86
<b>VIANEX 2023</b>	51,62	56,61	22,95	91,20
<b>PHARMATHEN 2021</b>	0,00	7,08	0,00	0,00
<b>PHARMATHEN 2022</b>	0,00	2,49	0,00	0,00
<b>PHARMATHEN 2023</b>	0,00	4,42	0,00	0,00
<b>DEMO 2021</b>	0,56	4,23	3,38	13,23
<b>DEMO 2022</b>	0,39	1,90	2,14	20,53
<b>DEMO 2023</b>	0,38	0,50	2,03	75,85
<b>ELPEN 2021</b>	0,23	0,52	13,09	43,81
<b>ELPEN 2022</b>	0,27	0,46	13,56	58,29
<b>ELPEN 2023</b>	0,31	0,64	13,03	47,64
<b>FAMAR 2021</b>	0,00	2,26	0,00	0,00
<b>FAMAR 2022</b>	5,46	2,36	8,39	231,38
<b>FAMAR 2023</b>	0,00	4,09	0,00	0,00
<b>RAFARM 2021</b>	2,09	7,75	8,53	26,94
<b>RAFARM 2022</b>	2,77	5,28	9,42	52,43
<b>RAFARM 2023</b>	1,40	5,81	4,21	24,19
<b>UNIPHARMA 2021</b>	0,36	2,82	0,68	12,78
<b>UNIPHARMA 2022</b>	0,00	2,08	0,00	0,00
<b>UNIPHARMA 2023</b>	0,00	2,36	0,00	0,00
<b>INNOVIS 2021</b>	2,06	2,23	17,26	92,49
<b>INNOVIS 2022</b>	2,88	2,46	25,01	117,06
<b>INNOVIS 2023</b>	2,27	4,09	17,07	55,52
<b>GENEPHARM 2021</b>	1,39	1,63	19,75	85,47
<b>GENEPHARM 2022</b>	0,89	1,02	12,87	87,34
<b>GENEPHARM 2023</b>	0,63	0,75	8,98	84,63
<b>Average 2021-2023</b>	<b>10,92</b>	<b>26,35</b>	<b>8,97</b>	<b>48,36</b>
<b>Std Deviation</b>	<b>31,20</b>	<b>54,36</b>	<b>8,88</b>	<b>51,18</b>
<b>Cof.Var.</b>	<b>2,86</b>	<b>2,06</b>	<b>0,99</b>	<b>1,06</b>



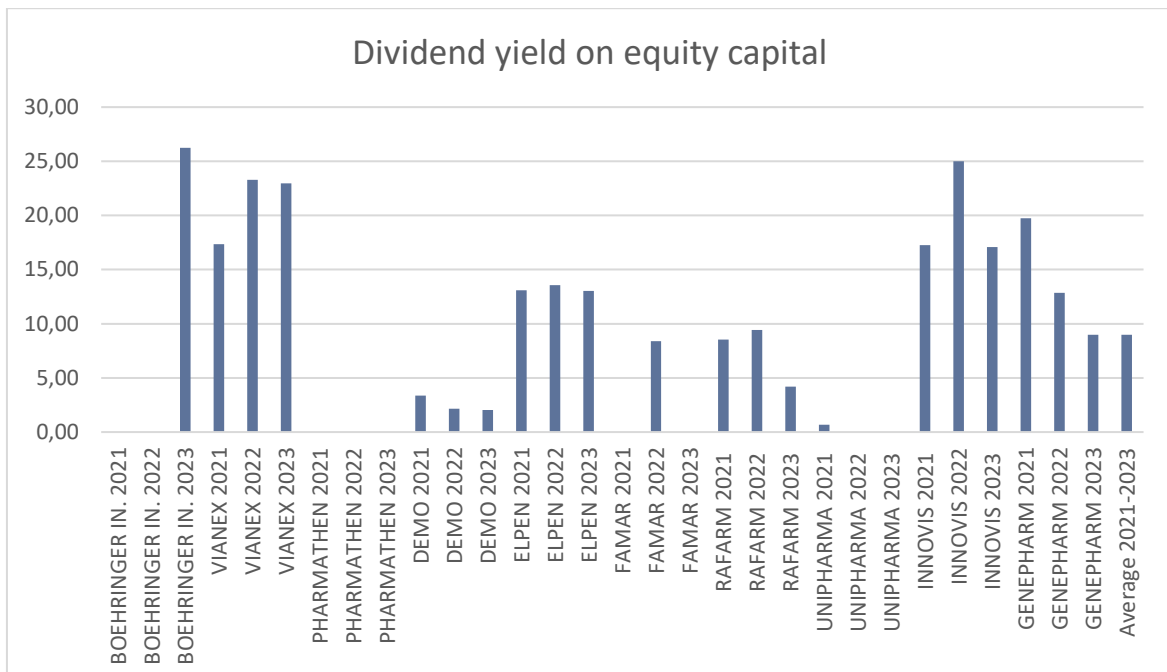
**Figure 23.** Plot of dividend per share for 2021/2022/2023 and the period average

**Interpretation:** The dividend distribution policy varies between companies and even in the same company. BOEHRINGER did not pay any dividends for 2021 and 2022 and pay a huge amount in 2023. PHARMATHEN did not pay any dividend for the whole period and UNIPHARMA did not pay for 2022 and 2023. Additionally, FAMAR paid only in 2022 and VIANEX is the firm with the higher dividend distribution per share. Probably, companies are reinvesting their earnings or cash flow issues are faced.



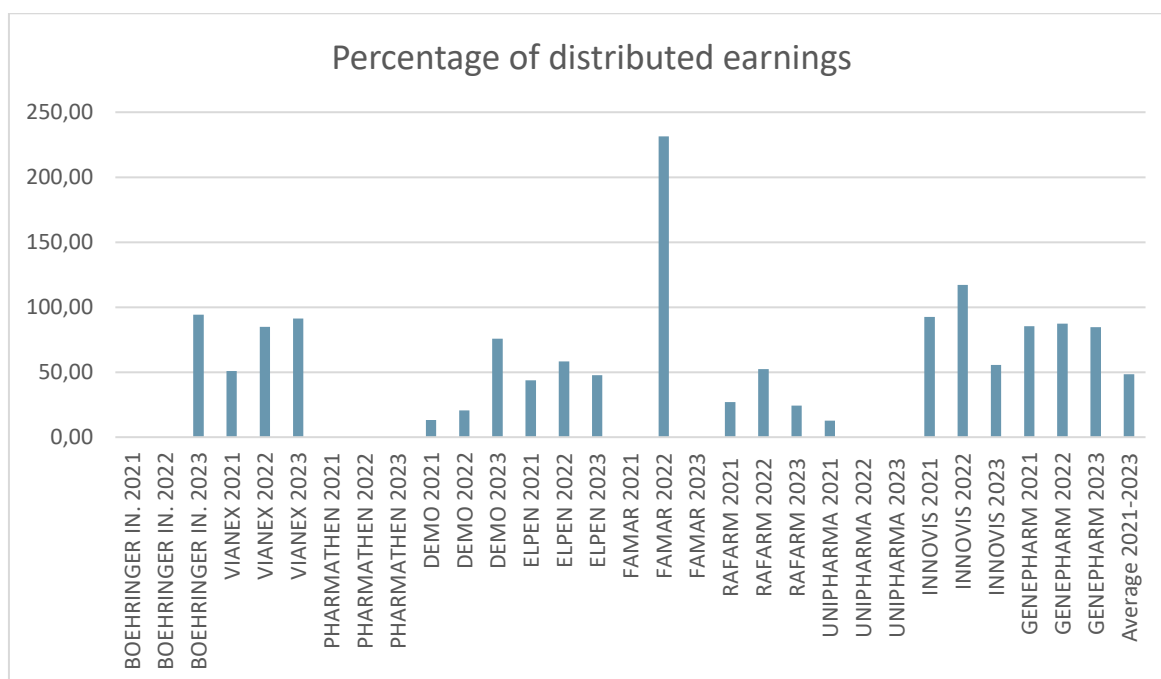
**Figure 24.** Plot of earnings per share for 2021/2022/2023 and the period average

**Interpretation:** Earnings per share are high in BOEHRINGER and VIANEX. The other companies experienced much lower earnings.



**Figure 25.** Plot of dividend yield on equity capital for 2021/2022/2023 and the period average.

**Interpretation:** The dividend yield on equity varies among companies and can differ even within the same company from year to year. As already mentioned not all companies paid dividends in the examined period. BOEHRINGER, ELPEN, INNOVIS, RAFARM, FAMAR, GENEPHARM have the highest dividend on equity ratio and are probably the most attractive for investors.



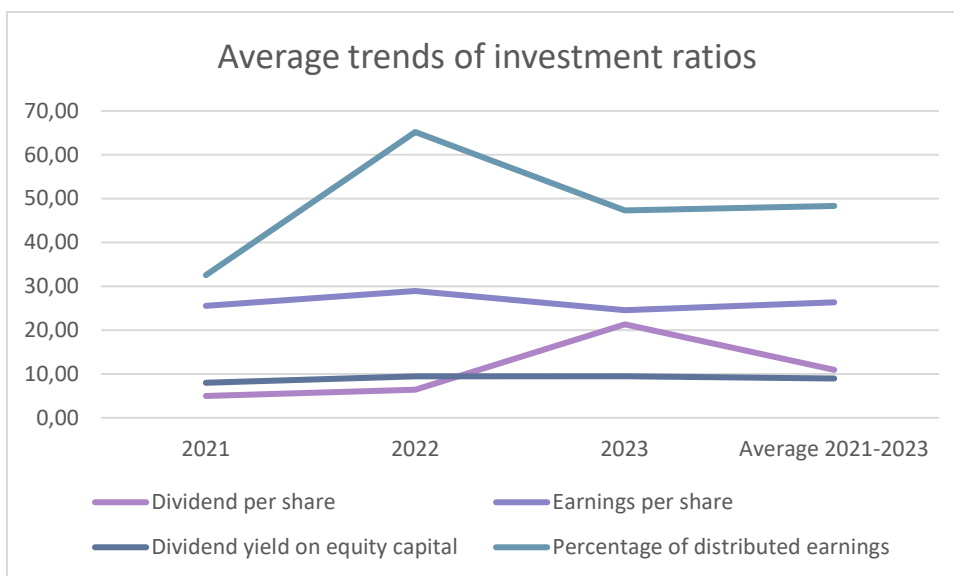
**Figure 26.** Plot of percentage of distributed earnings for 2021/2022/2023 and the period average

**Interpretation:** The percentage of distributed earnings varies between companies. GENEPHARM maintained consistent distribution, unlike other companies. FAMAR for example did not distributed any earnings in 2021 and 2023 and thus distributed more that 200% of its 2022 earnings.

In general, the sector does not have consistent policy in investment ratios. Each company has its own policy and does not distribute its earning equally in time. Nevertheless, most Greek pharmaceutical companies deliver significant profits to its stakeholders.

**Table 15.** Average values of investments ratios in years 2021 to 2023 and average of the period

Average	Dividend per share	Earnings per share	Dividend yield on equity capital	Percentage of distributed earnings
2021	4,99	25,56	8,00	32,55
2022	6,43	28,93	9,47	65,19
2023	21,33	24,55	9,45	47,32
Average 2021-2023	10,92	26,35	8,97	48,36
Std Deviation	9,04	2,29	0,84	16,34
Cof.Var.	0,83	0,09	0,09	0,34



**Figure 27.** Plot of the investment ratio averages for 2021/2022/2023 and the period average

**Interpretation:** The sector exhibits significant variation in investment ratios per year. There is an upward trend in dividends per share from 2021 to 2023. Earnings per share fluctuate slightly, and the percentage of distributed earnings fluctuates highly. The high percentage of distributed earnings and the peak in 2022 indicate aggressive distribution by some companies. Dividend yield is rather stable in the sector. The dividend yield on equity is almost 9%. It appears that the sector is prioritizing high payouts instead of reinvestment growth.

A three-year period may be insufficient to evaluate fully the trends of investment ratios.

#### 4.2.5 Capital structure -Solvency ratios

To evaluate a company's financial stability and risk profile, it's crucial to measure its ability to meet long-term obligations and analyse its capital structure. Key solvency ratios include the equity-to-fixed assets ratio, fixed assets-to-long-term liabilities ratio, times interest earned (TIE), equity multiplier, and debt-to-equity ratio. This dissertation will assess these ratios for the 10 pharmaceutical manufacturing companies and specifically, the ratio of equity-to-fixed assets, ratio of fixed assets-to-long-term liabilities, number of times of interest earned (TIE), equity multiplier and dept-to-equity ratio.

**Table 16.** Capital structure – solvency ratios objectives and interpretation (Eriotis, 2005)

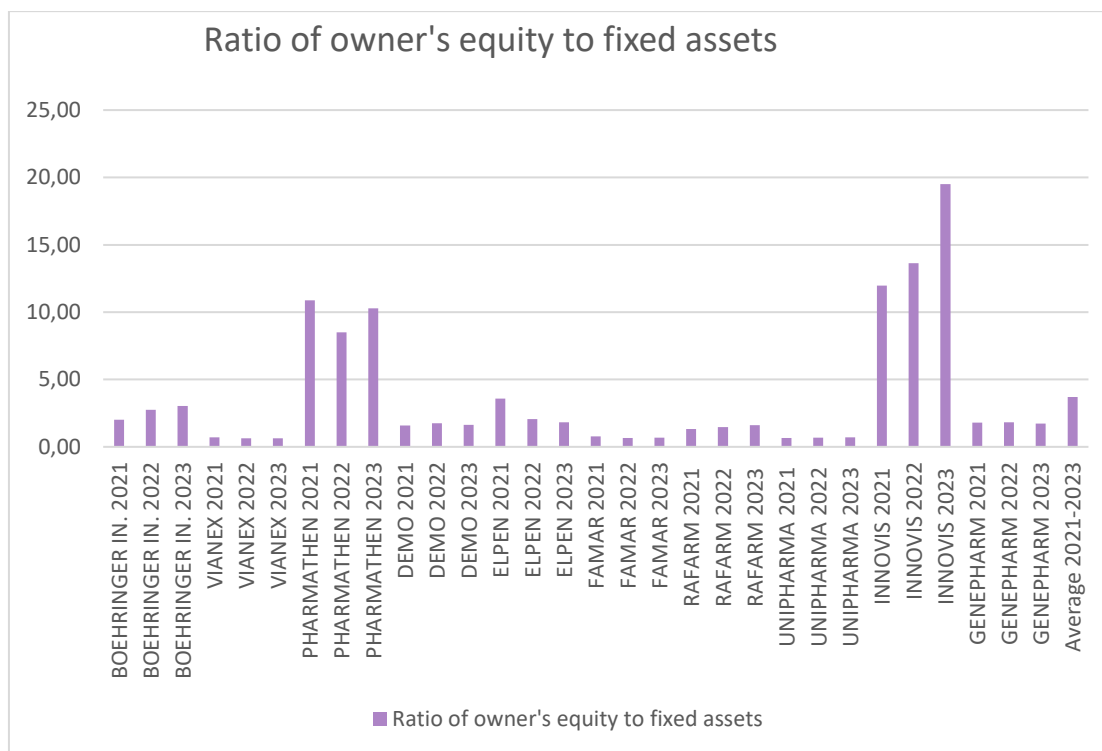
1	<b>Ratio of owner's equity to fixed assets</b>	<b><math>\frac{\text{Total equity}}{\text{Fixed assets}}</math></b>	Objective: It measures how much of the company's fixed assets are financed by owner's equity instead of liabilities or external debt. Interpretation: A higher ratio shows that more of the company's fixed assets are financed by owner's equity, indicating stability and less reliance on external funds. A lower ratio means the company depends more on external debt for its fixed assets, suggesting higher financial risk.
2	Ratio of fixed assets to long term liabilities	$\frac{\text{Fixed asset}}{\text{Long – term liabilities}}$	Objective: A financial ratio that helps evaluate the company's ability to cover its long-term debts using its fixed assets. Interpretation: A higher ratio means the company can cover its long-term liabilities with fixed assets, indicating lower financial risk. A lower ratio means the company may struggle to cover its long-term liabilities, indicating higher financial risk.
3	Number of time interest earned	$\frac{\text{EBIT}}{\text{Total interest expenses}}$	Objective: This ratio shows how many times a company can pay its interest expenses with its earnings before taxes (EBIT). It's a keyway to measure how well a company can handle its debt. Interpretation: A higher ratio indicates better financial health and a stronger ability to meet interest obligations. A ratio close to 1 or below suggests that the company may struggle to pay its interest, increasing the risk of financial distress.

4	Equity multiplier	$\frac{\text{Total assets}}{\text{Total Equity}}$	<p>Objective: It is a key indicator of financial leverage, showing how much the company relies on debt versus equity to finance its assets.</p> <p>Interpretation: A higher equity multiplier indicates greater financial leverage, while a lower one suggests less leverage and risk.</p>
5	Debt-equity ratio	$\frac{\text{Total liabilities}}{\text{Total Equity}}$	<p>Objective: A measure of how much debt a company uses to finance its operations relative to the amount of equity.</p> <p>Interpretation: A higher ratio indicates greater reliance on debt, which increases financial risk. A lower ratio suggests a greater reliance on equity, indicating lower financial risk.</p>



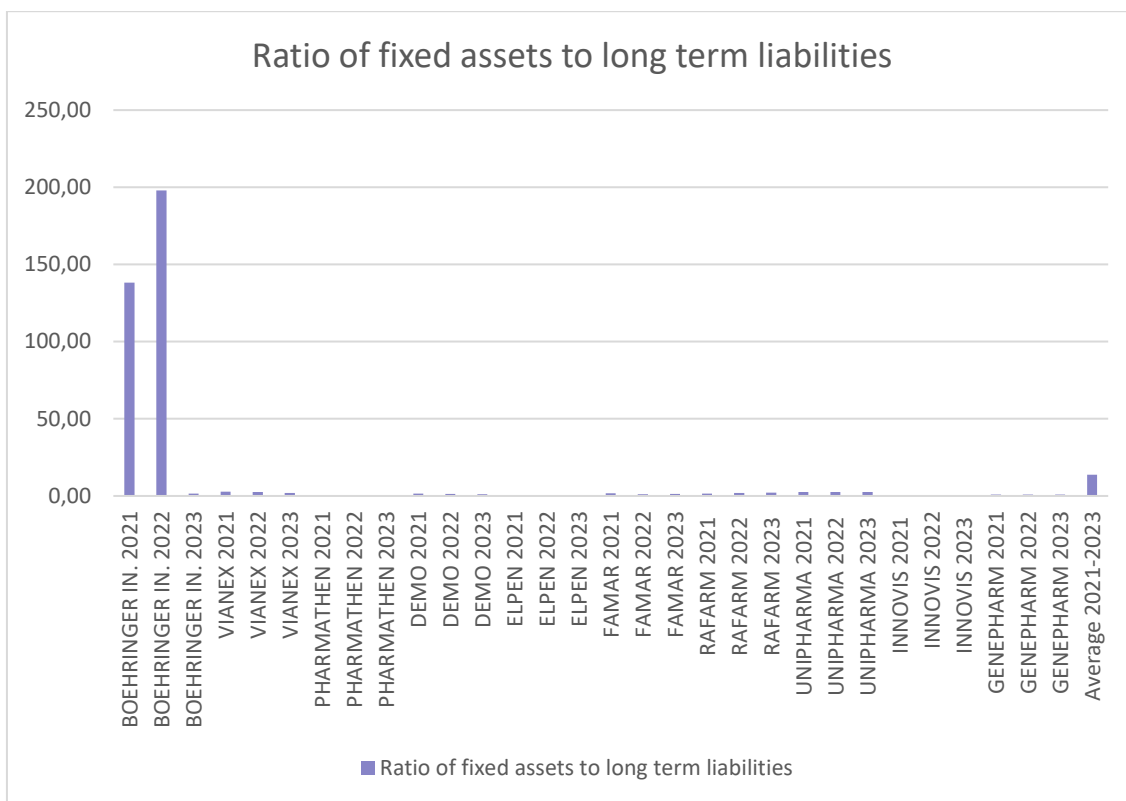
**Table 17.** Calculation of solvency ratios for 2021-2022-2023 and the period averages and variations

Company	Ratio of owner's equity to fixed assets	Ratio of fixed assets to long term liabilities	Times of time interest earned	Equity multiplier	Debt-equity ratio
<b>BOEHRINGER IN. 2021</b>	2,00	138,25	59,03	5,73	4,67
<b>BOEHRINGER IN. 2022</b>	2,75	197,87	27,91	4,50	3,45
<b>BOEHRINGER IN. 2023</b>	3,02	1,53	15,13	4,62	3,59
<b>VIANEX 2021</b>	0,70	2,76	7,70	5,86	4,72
<b>VIANEX 2022</b>	0,63	2,49	5,21	7,21	6,05
<b>VIANEX 2023</b>	0,64	1,99	3,00	8,14	6,95
<b>PHARMATHEN 2021</b>	10,88	0,17	6,68	2,22	1,22
<b>PHARMATHEN 2022</b>	8,51	0,13	1,75	1,20	1,63
<b>PHARMATHEN 2023</b>	10,29	0,10	2,58	2,81	1,81
<b>DEMO 2021</b>	1,57	1,42	12,89	1,80	0,80
<b>DEMO 2022</b>	1,74	1,22	6,93	1,91	0,91
<b>DEMO 2023</b>	1,64	1,21	2,27	2,19	1,19
<b>ELPEN 2021</b>	3,57	n/a	627,77	2,44	1,30
<b>ELPEN 2022</b>	2,06	n/a	448,44	2,49	1,32
<b>ELPEN 2023</b>	1,83	n/a	410,31	2,56	1,41
<b>FAMAR 2021</b>	0,77	1,76	2,36	2,39	1,39
<b>FAMAR 2022</b>	0,67	1,09	1,00	3,47	2,47
<b>FAMAR 2023</b>	0,68	1,22	1,53	3,19	2,19
<b>RAFARM 2021</b>	1,33	1,52	22,04	2,65	1,65
<b>RAFARM 2022</b>	1,46	1,86	17,37	2,41	1,41
<b>RAFARM 2023</b>	1,60	2,25	17,60	2,23	1,23
<b>UNIPHARMA 2021</b>	0,65	2,46	4,74	2,34	1,34
<b>UNIPHARMA 2022</b>	0,68	2,48	4,26	2,30	1,30
<b>UNIPHARMA 2023</b>	0,71	2,60	3,02	2,39	1,38
<b>INNOVIS 2021</b>	11,98	0,10	9,69	5,47	4,48
<b>INNOVIS 2022</b>	13,63	0,13	8,28	5,78	4,78
<b>INNOVIS 2023</b>	19,50	0,02	3,82	8,44	7,44
<b>GENEPHARM 2021</b>	1,80	0,93	9,38	2,45	1,43
<b>GENEPHARM 2022</b>	1,81	0,81	6,84	2,54	1,51
<b>GENEPHARM 2023</b>	1,72	0,99	3,45	2,86	1,43
<b>Average 2021-2023</b>	<b>3,69</b>	<b>13,68</b>	<b>58,43</b>	<b>3,55</b>	<b>2,55</b>
<b>Std Deviation</b>	<b>4,79</b>	<b>45,27</b>	<b>151,71</b>	<b>1,95</b>	<b>1,89</b>
<b>Cof.Var.</b>	<b>1,30</b>	<b>3,31</b>	<b>2,60</b>	<b>0,55</b>	<b>0,74</b>



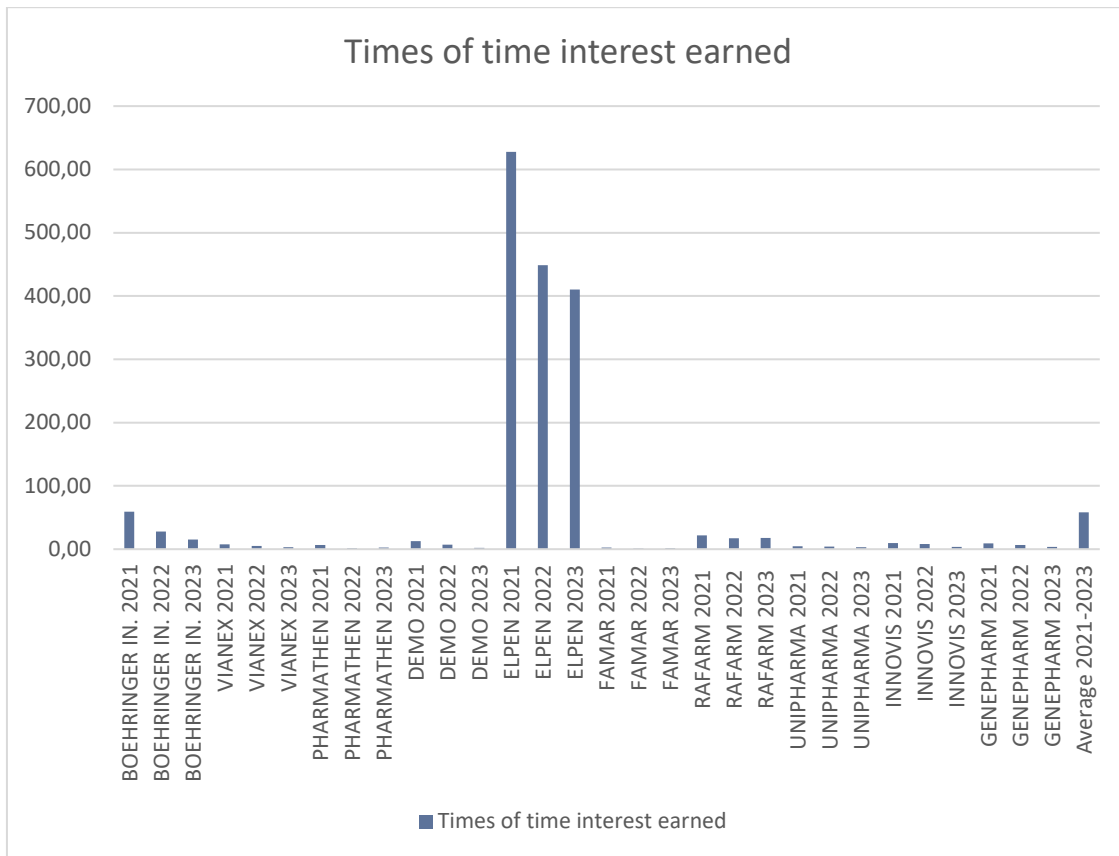
**Figure 28.** Plot of owner's ratio to fixed assets ratio for 2021/2022/2023 and the period average.

**Interpretation:** Except for VIANEX, FAMAR and UNIPHARMA the other 7 companies have a ratio above 1, suggesting that they rely more on equity than debt to finance their fixed assets. INNOVIS and PHARMATHEN have a rather high ratio. Comparing firms across years shifts in financial strategy and risk exposure are indicated. The high CV (1,3) suggests significant differences across firms.



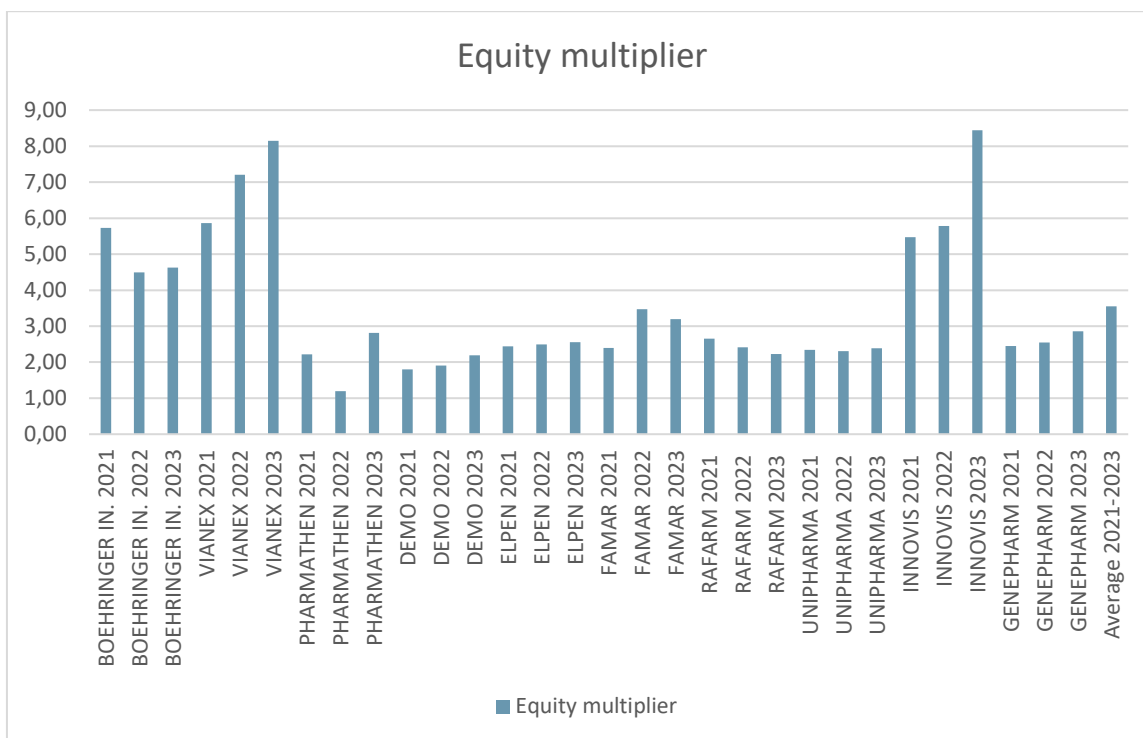
**Figure 29.** Plot of fixed assets to long-term liabilities for 2021/2022/2023 and the period average.

**Interpretation:** According to its financial statements for 2021-2023, ELPEN does not have long-term liabilities; therefore, the ratio cannot be calculated. PHARMATHEN, INNOVIS, and GENEPHARM have ratios of less than 1, indicating that their fixed assets cannot cover their long-term liabilities, which poses a higher risk. BOEHRINGER has a high ratio, indicating a lower risk profile. However, in 2023, there was a change in its borrowing strategy as long-term liabilities increased significantly to over €40,000,000 compared to 2021-2022. The ratios of the other companies indicate that their fixed assets can cover their long-term liabilities. The high CV suggests significant differences across firms.



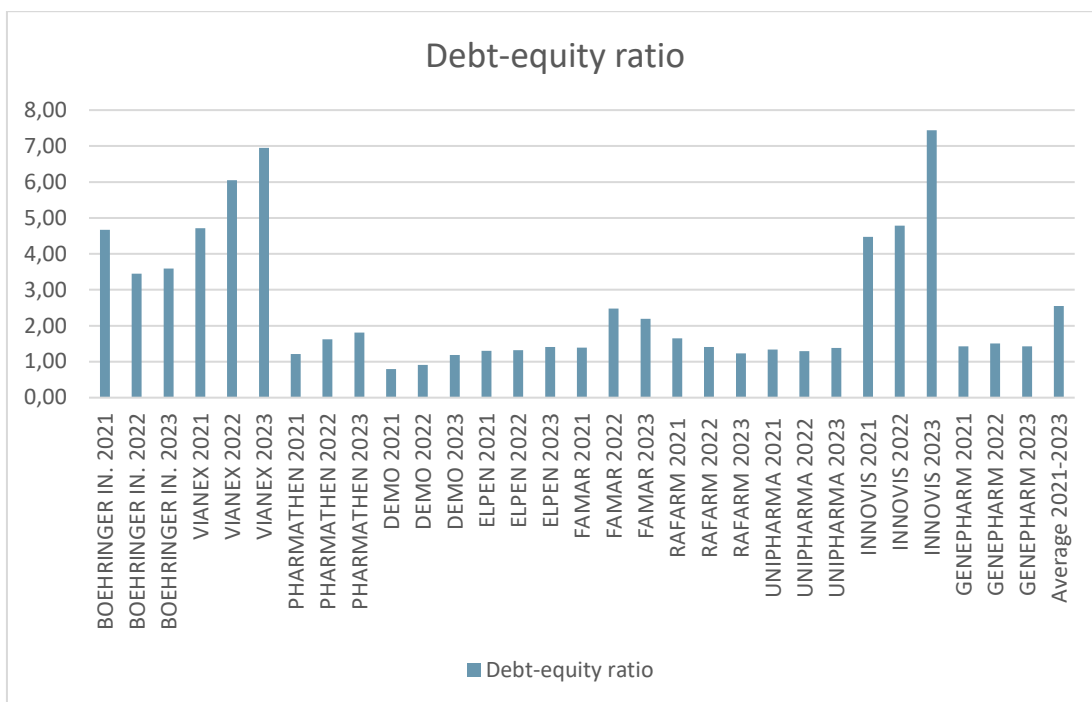
**Figure 30.** Plot of times interest earned (TIE) for 2021/2022/2023 and the period average

**Interpretation:** The majority of companies demonstrate strong financial health with high TIE ratios, notably ELPEN, BEHRINGER, and RAFARM. FAMAR's ratio of approximately 1 in 2022 indicated challenges in meeting interest payments; however, there was a slight improvement in 2023, although the ratio remains relatively low. The high coefficient of variation (CV) indicates substantial discrepancies among the firms.



**Figure 31.** Plot of equity multiplier for 2021/2022/2023 and the period average.

**Interpretation:** All firms generally, have equity multiplier values that indicate the usage of debt to finance assets, thereby increasing financial leverage. BOEHRINGER, VIANEX and INNOVIS have the highest equity multiplier among their industry peers, indicating that they rely more on debt financing for asset acquisition, which suggests a higher level of financial risk compared to their competitors.



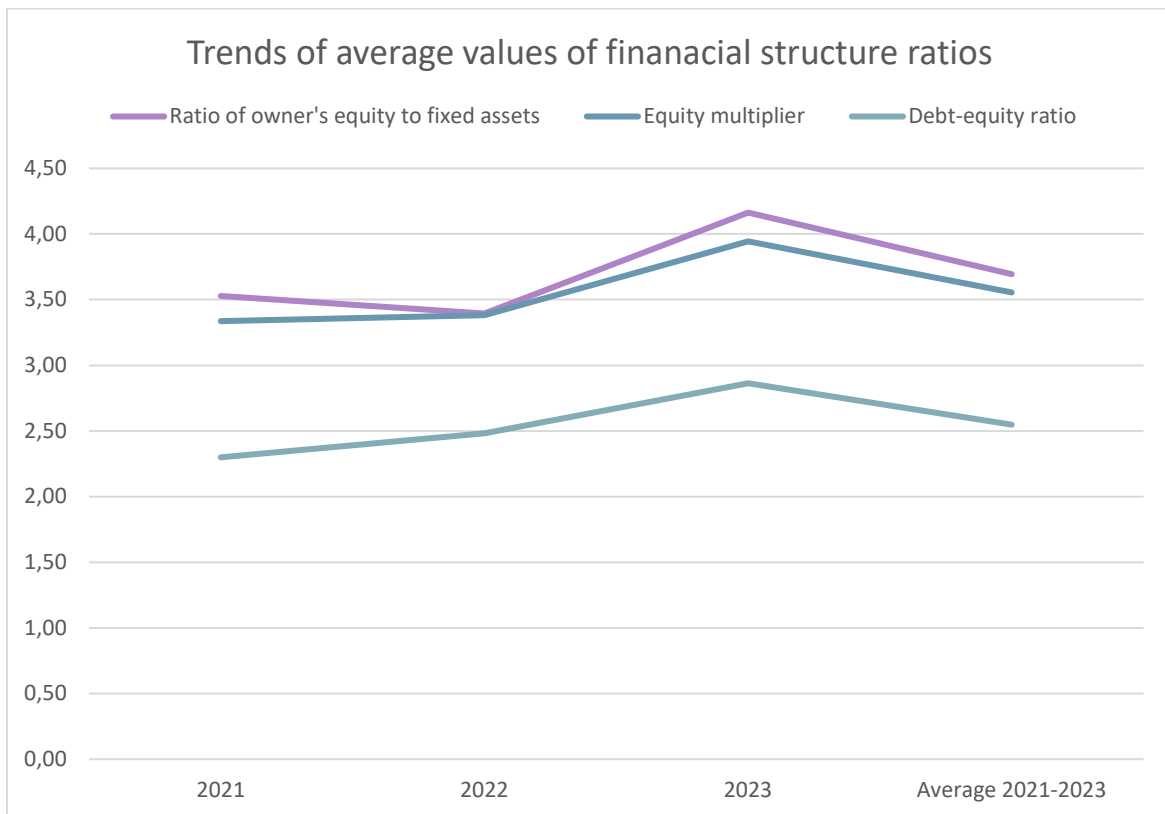
**Figure 32.** Plot of debt to equity for 2021/2022/2023 and the period average

**Interpretation:** The higher ratios of BOEHRINGER and INNOVIS indicate that the companies rely more on debt to finance their operations, which may increase financial risk. The rest have lower ratios, suggesting that are less dependent on debt, indicating lower financial risk. The high CV suggests significant differences across firms.

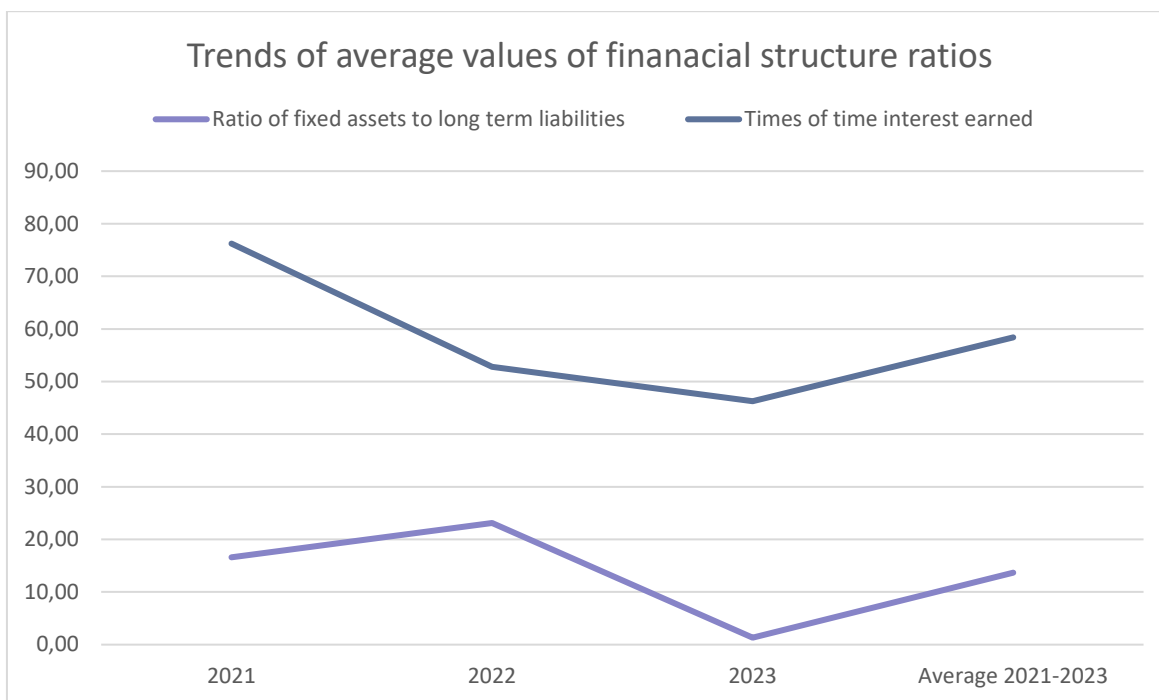
**In general, most of the 10 companies use debt to finance operations but finance fixed assets with equity. Fixed assets cover long-term liabilities and interest expenses. Some companies rely more on debt to finance their operations than others. Variability in the sector suggests different financial policies and financial management.**

**Table 18.** Solvency ratios mean values of each year and the combined average of the sector

Average	Ratio of owner's equity to fixed assets	Ratio of fixed assets to long term liabilities	Times of time interest earned	Equity multiplier	Debt-equity ratio
2021	3,53	16,60	76,23	3,34	2,30
2022	3,39	23,12	52,80	3,38	2,48
2023	4,16	1,32	46,27	3,94	2,86
Average 2021-2023	3,69	13,68	58,43	3,55	2,55
Std Deviation	0,41	11,19	15,75	0,34	0,29
Cof.Var.	0,11	0,82	0,27	0,10	0,11



**Figure 33.** Plot of equity to fixed assets, equity multiplier, debt-to-equity for 2021/2022/2023 and the period average



**Figure 34.** Plot of fixed assets to long-term liabilities and TIE for 2021/2022/2023 and the period average

**Interpretation:** The sector shows moderate to low variability between years in ratios such as equity to fixed assets, TIE, equity multiplier and debt to equity, and high variability in the ratio of fixed assets to long-term liabilities. The sector therefore has a fairly stable attitude towards relying on equity to finance fixed assets. Fixed assets can cover long-term liabilities, but the ratio is decreasing. Interest coverage is high but declining over time. Debt used to finance assets is increasing. The financing of liabilities using debt is moderate, but it is on the increase.



#### 4.2.6 Operating expense ratios

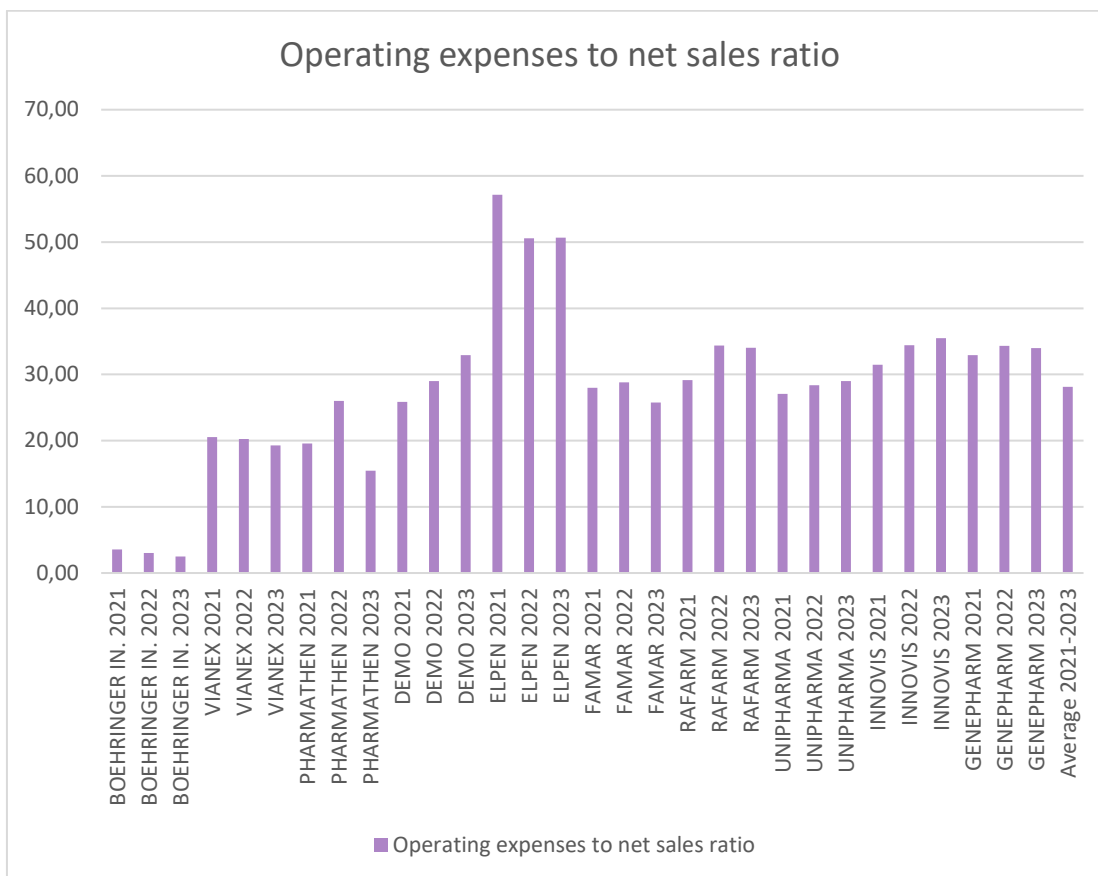
The term 'operating ratios' is a way of measuring a company's efficiency in managing its core operations. In simple terms, these ratios compare specific operational costs with revenue. They are an important way to evaluate the operational efficiency and profitability of a business, particularly in order to identify areas where cost control is required.

**Table 19.** Operating expense ratio objectives and interpretation (Eriotis, 2005)

1	Operating expenses to net sales ratio	$\frac{\text{Operating expenses}}{\text{Net sales}} \times 100$	<p>Objective: To measure how much of net sales is absorbed by operating expenses.</p> <p>Interpretation: A high ratio may suggest lower profitability and insufficiencies in cost management. A low ratio suggests that a company is managing operations cost-effectively, as it spends less on operations relative to revenue, potentially allowing for higher profit margins.</p>
2	Operating ratio	$\frac{\text{COGS} + \text{OperExpense}}{\text{Net sales}}$	<p>Objective: To measure how much net sales is absorbed by operating expenses and COGS</p> <p>Interpretation: A high ratio suggest lower profitability as the percentage of profits cannot cover financial and other expenses. A low ratio suggests that a company is managing operations cost-effectively, as it spends less on operations relative to revenue, potentially allowing for higher profit margins.</p>

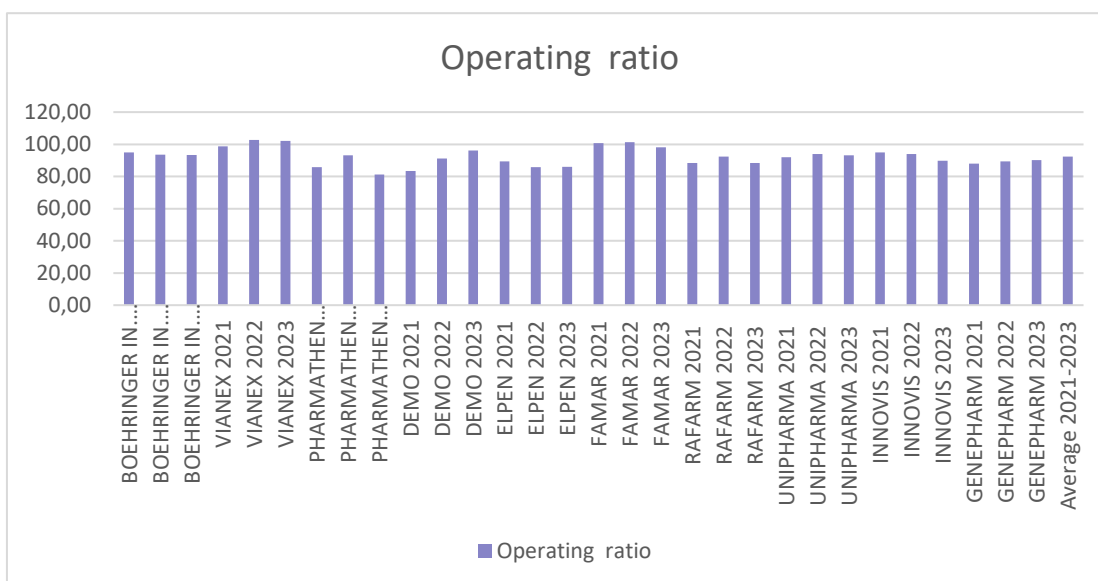
**Table 20.** Calculation of OPEX ratios for 2021-2022-2023 and the period averages and variations

Company	Operating expenses to net sales ratio	Operating ratio
<b>BOEHRINGER IN. 2021</b>	3,54	94,88
<b>BOEHRINGER IN. 2022</b>	3,02	93,65
<b>BOEHRINGER IN. 2023</b>	2,50	93,45
<b>VIANEX 2021</b>	20,53	98,79
<b>VIANEX 2022</b>	20,23	102,80
<b>VIANEX 2023</b>	19,27	102,16
<b>PHARMATHEN 2021</b>	19,55	85,74
<b>PHARMATHEN 2022</b>	26,02	93,10
<b>PHARMATHEN 2023</b>	15,44	81,12
<b>DEMO 2021</b>	25,85	83,43
<b>DEMO 2022</b>	28,99	91,11
<b>DEMO 2023</b>	32,93	96,17
<b>ELPEN 2021</b>	57,15	89,30
<b>ELPEN 2022</b>	50,57	85,74
<b>ELPEN 2023</b>	50,65	86,09
<b>FAMAR 2021</b>	27,99	100,67
<b>FAMAR 2022</b>	28,83	101,33
<b>FAMAR 2023</b>	25,78	98,21
<b>RAFARM 2021</b>	29,13	88,30
<b>RAFARM 2022</b>	34,39	92,41
<b>RAFARM 2023</b>	34,04	88,44
<b>UNIPHARMA 2021</b>	27,05	92,01
<b>UNIPHARMA 2022</b>	28,38	93,90
<b>UNIPHARMA 2023</b>	29,00	93,11
<b>INNOVIS 2021</b>	31,47	95,02
<b>INNOVIS 2022</b>	34,42	93,86
<b>INNOVIS 2023</b>	35,48	89,73
<b>GENEPHARM 2021</b>	32,91	87,89
<b>GENEPHARM 2022</b>	34,34	89,41
<b>GENEPHARM 2023</b>	34,00	90,16
<b>Average 2021-2023</b>	<b>28,11</b>	<b>92,40</b>
<b>Std Deviation</b>	<b>12,45</b>	<b>5,52</b>
<b>Cof.Var.</b>	<b>0,44</b>	<b>0,06</b>



**Figure 35.** Plot of OPEX to net sales for 2021/2022/2023 and the period average

**Interpretation:** ELPEN has the higher OpEx to sales ratio. This is probably because ELPEN spends more in R&D than the rest of its competitors. BOEHRINGER has the lower operating expense ratio probably because of economies of scale and absence R&D in Greece. In general, the sector has a three—year average of 28,11%. That suggests good operating expense management.

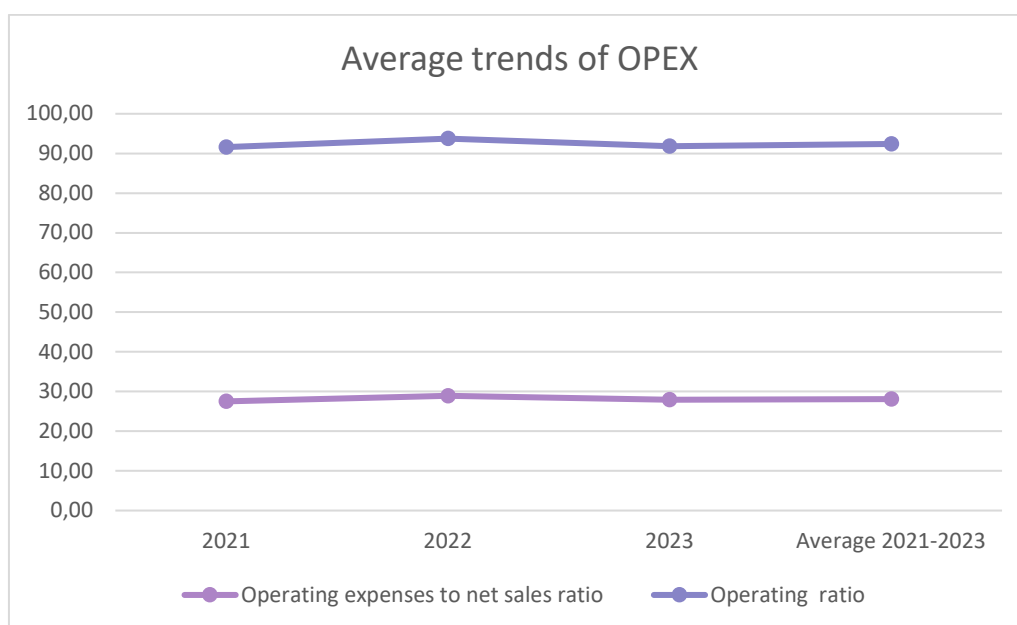


**Figure 36.** Plot of operating ratio for 2021/2022/2023 and the period average

**Interpretation:** When an operating ratio exceeds 100%, it indicates that a company's operating expenses and cost of goods sold (COGS) have surpassed its net sales, resulting in the company operating at a loss. This is evident in VIANEX & FAMAR's recent financial performance. The sector as a whole also operates with a high operating ratio, averaging over 90%. This is mainly due to COGS, as the operating expense ratio averaged at 28,11%. The sector manages expenses by controlling operating costs, given the high COGS. COGS include raw materials (active pharmaceutical ingredients - APIs, excipients), manufacturing costs (equipment, plant maintenance, utilities), and packaging and labeling (bottles, blister packs). Quality control and testing (ensuring regulatory compliance) and regulatory expenses (new drug applications, clinical trials) are significant contributors to the overall increase. These expenses cannot be controlled by the industry, indicating supplier power, which we analyse in Chapter 5.

**Table 21.** OPEX ratios mean values of each year and the combined average of the sector

Average	Operating expenses to net sales ratio	Operating ratio
<b>2021</b>	27,52	91,60
<b>2022</b>	28,92	93,73
<b>2023</b>	27,91	91,86
<b>Average 2021-2023</b>	28,11	92,40
<b>Std Deviation</b>	<b>0,72</b>	<b>1,16</b>
<b>Cof.Var.</b>	<b>0,03</b>	<b>0,01</b>



**Figure 37.** Plot of fixed assets to long-term liabilities for 2021/2022/2023 and the period average

**Interpretation:** As noted above, the sector has an average OpEx to sales ratio of 28,11% and a huge operating ratio at 92,40%. It is worth noting that the variability from year to year is very low. Thus, in the years 2021 to 2023, there is a stable huge operating expense ratio, mainly due to COGS, as previously analysed. This is a challenge for the sector to manage. In chapter 5 this will be analysed.

#### 4.2.7 R&D ratios

R&D intensity ratios show how committed a company is to innovation and how well it can compete through research and development. These ratios show how much a company

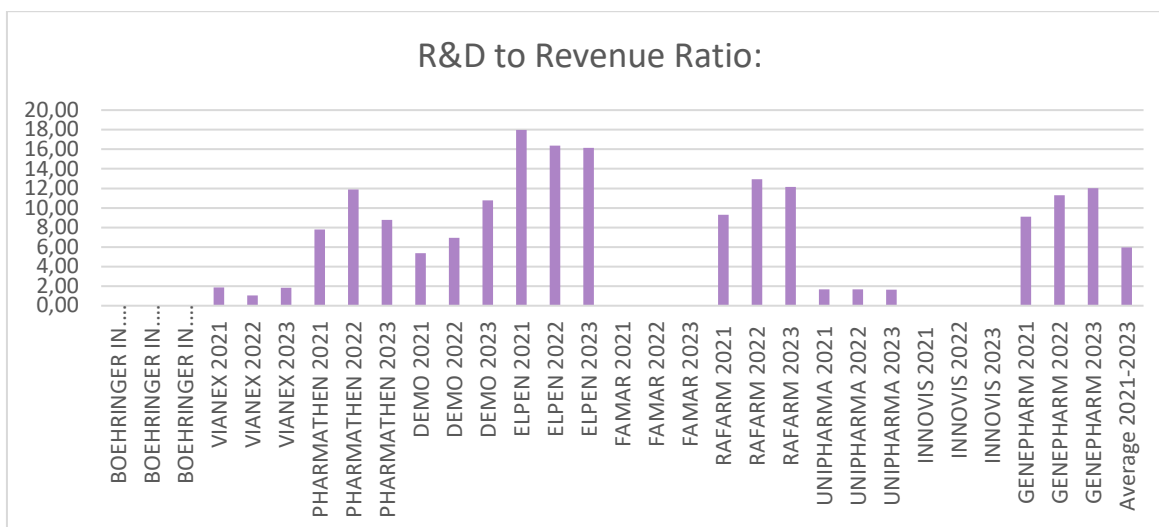
spends on R&D and give a good idea of a company's long-term strategy and how dedicated it is to develop new products, technologies, or processes. Companies with high R&D intensity ratios are often viewed as more innovative and forward-thinking, which can be pivotal for their market position. For the purpose of this study the ratios used are the R&D to Revenue Ratio (Marcin Majka, 2024) (<https://www.linkedin.com/pulse/understanding-rd-spend-percentage-sales-marcin-majka-ttlff/>), which evaluates the percentage of revenue reinvested into research and development the second ratio used is R&D expenses to Total assets (*Research & Development to Assets Meaning | Stockopedia*, no date) (<https://www.stockopedia.com/ratios/research-development-to-assets-ttm-5091/>). Also, in this paper the R&D expense to Operating Expenses Ratio is calculated to highlight how much of the total operating expenditures is the expenditure on R&D in the industry and to make comparisons between companies .

**Table 22.** R&D ratios objectives and interpretation

1	R&D to Revenue Ratio	$\frac{\text{R\&D expenses}}{\text{Net revenues}}$	Objective: A metric to evaluates the percentage of revenue reinvested into R&D. This ratio serves as an indicator of the company's emphasis on innovation and its potential for future growth. Interpretation: A higher ratio signifies a strong commitment to R&D, presenting a positive signal to investors regarding the company's future prospects. This ratio can vary widely depending on the industry. In pharmaceuticals is usually high.
2	R&D expenses to total assets	$\frac{\text{R\&D expenses}}{\text{Total assets}}$	Objective: This ratio measures the company's R&D investment as a percentage of its total asset base. Interpretation: Useful for comparing R&D commitment across companies of different sizes.
3	R&D to Operating Expenses Ratio	$\frac{\text{R\&D expenses}}{\text{Operating expenses}}$	Objective: This ratio compares the expenditure on R&D with the total operating expenses, providing a clear perspective on the importance of R&D investments relative to other costs Interpretation: A high ratio implies that the company prioritises R&D over other operational expenses, indicating a strategic focus on innovation.

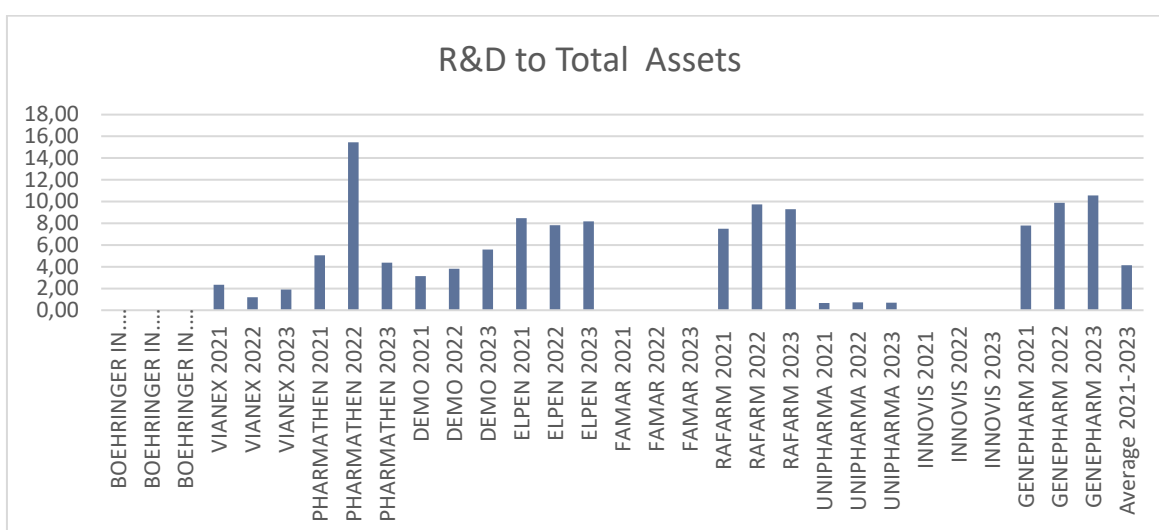
**Table 23.** Calculation of R&D expenses ratios for 2021-2022-2023 and the period averages and variations

Company	R&D to Revenue Ratio:	R&D to Operating Expenses Ratio:	R&D to Total Assets
BOEHRINGER IN. 2021	0,00	0,00	0,00
BOEHRINGER IN. 2022	0,00	0,00	0,00
BOEHRINGER IN. 2023	0,00	0,00	0,00
VIANEX 2021	1,88	9,18	2,36
VIANEX 2022	1,06	5,26	1,21
VIANEX 2023	1,84	9,53	1,90
PHARMATHEN 2021	7,78	39,81	5,07
PHARMATHEN 2022	11,88	45,66	15,46
PHARMATHEN 2023	8,78	56,85	4,39
DEMO 2021	5,38	20,82	3,14
DEMO 2022	6,95	23,97	3,83
DEMO 2023	10,77	32,69	5,58
ELPEN 2021	17,97	31,45	8,46
ELPEN 2022	16,37	32,37	7,82
ELPEN 2023	16,15	31,88	8,18
FAMAR 2021	0,00	0,00	0,00
FAMAR 2022	0,00	0,00	0,00
FAMAR 2023	0,00	0,00	0,00
RAFARM 2021	9,30	31,91	7,50
RAFARM 2022	12,94	37,62	9,73
RAFARM 2023	12,14	35,65	9,28
UNIPHARMA 2021	1,68	6,21	0,67
UNIPHARMA 2022	1,67	5,89	0,72
UNIPHARMA 2023	1,65	5,69	0,69
INNOVIS 2021	0,00	0,00	0,00
INNOVIS 2022	0,00	0,00	0,00
INNOVIS 2023	0,00	0,00	0,00
GENEPHARM 2021	9,11	27,67	7,78
GENEPHARM 2022	11,28	32,86	9,88
GENEPHARM 2023	12,01	35,31	10,55
Average 2021-2023	5,95	18,61	4,14
Std Deviation	5,97	17,37	4,33
Cof.Var.	1,00	0,93	1,05



**Figure 38.** Plot of R&D expenses to revenue ratio for 2021-2022-2023 and the period average.

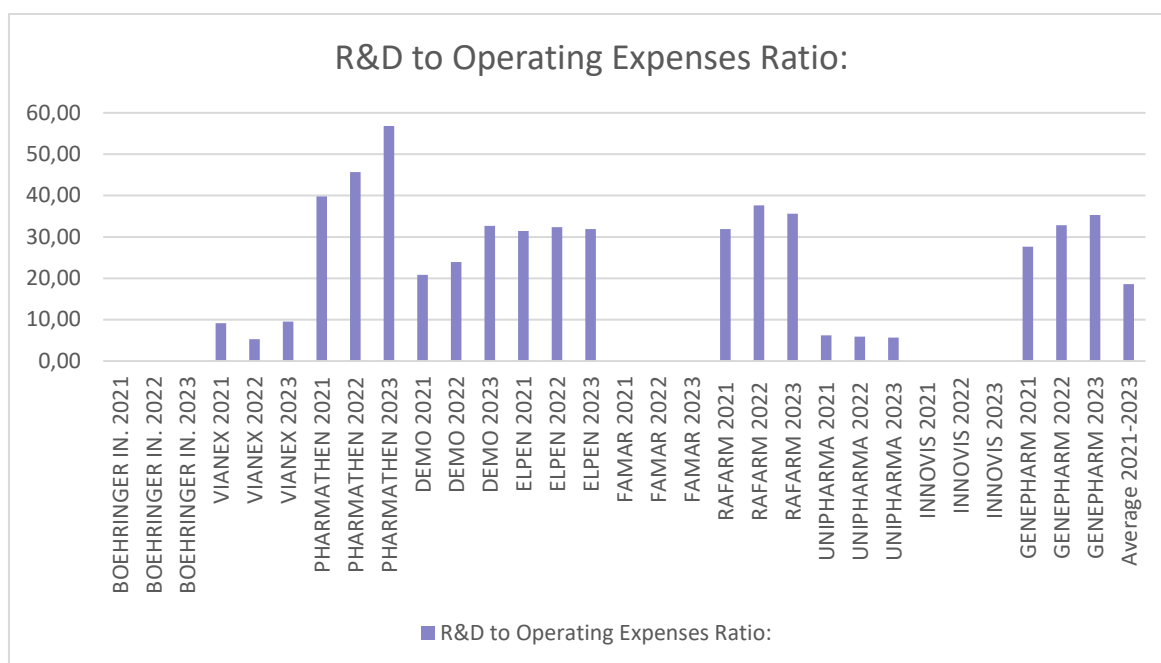
**Interpretation:** There is wide variability in how much of the revenues are returned to R&D between companies. Leaders in R&D to Revenue ratio values are ELPEN (~16,5%), RAFARM(~11%), GENEPHARM (~10,5%) and PHARMATHEN (9%) though BOEHRINGER, FAMAR and INNOVIS do not have R&D expenses at all. The rest of the sector spends much less, reducing the ratio average to 5,95%.



**Figure 39.** Plot of R&D expenses to total assets for 2021-2022-2023 and the period average.



**Interpretation:** By calculating the ratio of R&D to total assets ignoring companies that do not invest in R&D (BOEHRINGER, FAMAR and INNOVIS), we observe that the percentage of investment in R&D compared to total assets varies between companies and over time. GENEPHARM and DEMO show an increasing trend in this ratio, while ELPEN's ratio is more stable. PHARMATHEN's ratio fluctuates, which could indicate higher expenditure due to new R&D projects in 2022. RAFARM has high value ratio, while UNIPHARMA and VIANEX seem to spend much less on R&D.

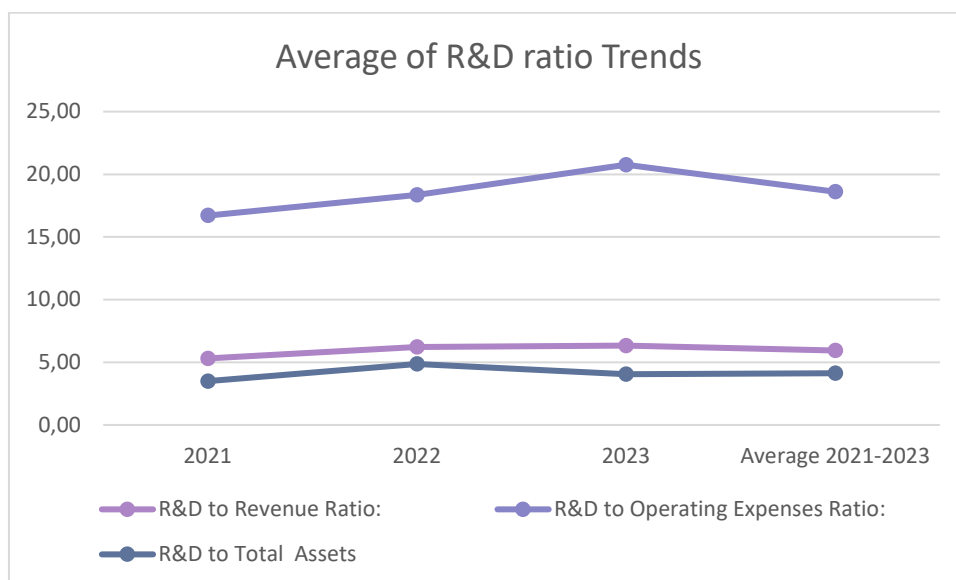


**Figure 40.** Plot of R&D expenses to OPEX for 2021-2022-2023 and the period average

**Interpretation:** PHARMATHEN expenses on R&D are in 2023 56,85% of its operation expenses which is the highest percentage in the sector for 2021-2023. ELPEN, GENERHARM and RAFARM spend almost 1/3 of its operational expenses on R&D.

**Table 24.** R&D ratios mean values of each year and the combined average of the sector

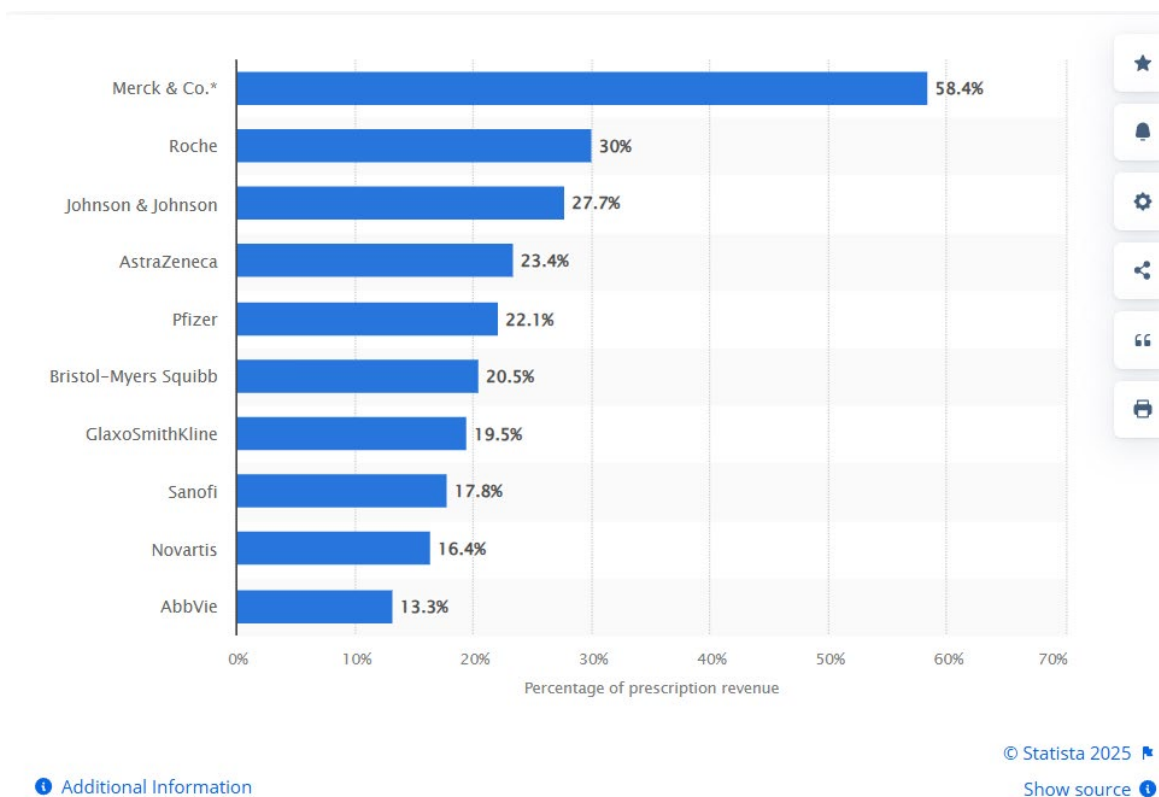
Average	R&D to Revenue Ratio:	R&D to Operating Expenses Ratio:	R&D to Total Assets
2021	5,31	16,71	3,50
2022	6,21	18,36	4,86
2023	6,33	20,76	4,06
Average 2021-2023	5,95	18,61	4,14
Std Deviation	0,56	2,04	0,69
Cof.Var.	0,09	0,11	0,17



**Figure 41.** Plot of average values of R&D ratios 2021-2022-2023 and the period average

**Interpretation:** The average values of R&D to revenue ratio and R&D to OpEx show an increasing trend, and the R&D to total asset ratio decreased in 2023. This indicates that the sector generally allocates a greater proportion of their expenditure to R&D on an annual basis. Figure 42 shows the ratio of R&D to revenues for the top 10 pharmaceutical companies worldwide for 2023. As we can see, the average ratio of Greek sector is far below the lowest recorded value (13.3%).

The average value of the R&D to revenue ratio of the world's leading pharmaceutical companies is 24.9%, while the average of the top 10 Greek companies is 6.33% for 2023. So, it is 4 times less, but considering the dynamics, the size of the companies and the field of activity, we can say that the Greek pharmaceutical sector is at least promising for innovation.



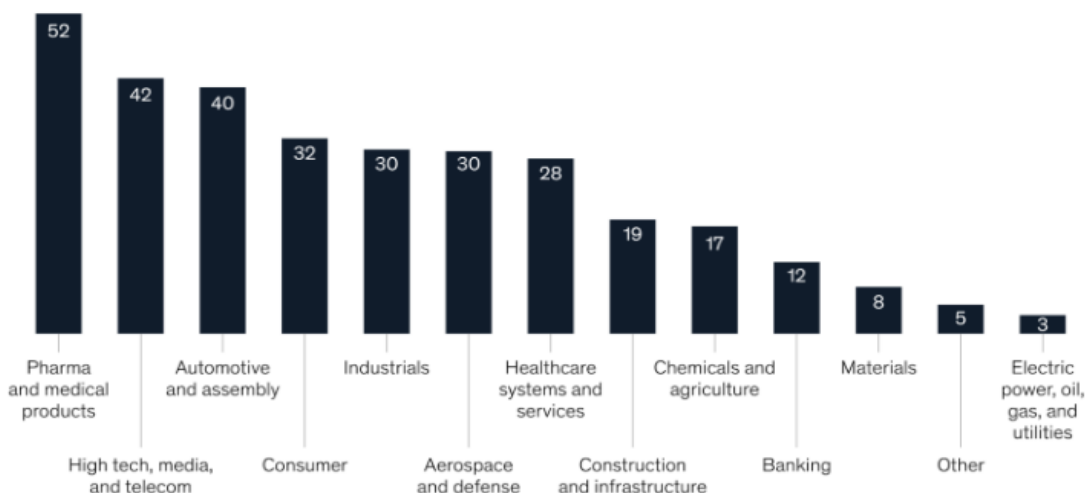
**Figure 42.** R&D spending as revenue share of leading 10 pharmaceutical companies in 2023

Source: <https://www.statista.com/statistics/309471/randd-spending-share-of-top-pharmaceutical-companies/>

According to McKinsey & Company, the pharmaceutical sector ranks second in R&D expenditure as a percentage of EBITDA, after the high-tech industry. See below for figures.

**High R&D spending is not restricted to pharma—the reinvestment of profits in R&D is substantial in many sectors.**

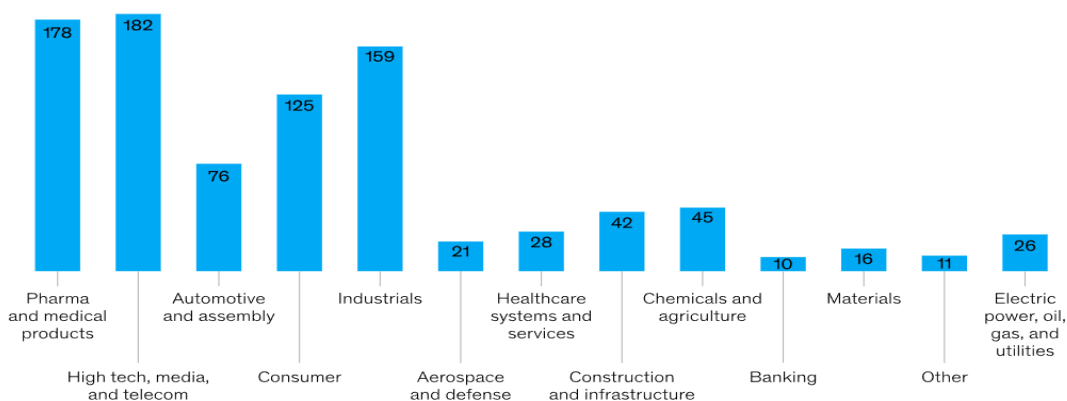
Global private-sector R&D spending as a share of EBITDA,<sup>1</sup> by industry, %



R&D Spending % EBITDA by Industry (Source: [McKinsey](#))

**Figure 43.** Total global private -sector R&D spending (Source <https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/building-an-r-and-d-strategy-for-modern-times#/>)

Total global private-sector R&D investment, by industry, \$ billion<sup>2</sup>



<sup>1</sup>Earnings before interest, taxes, depreciation, and amortization.

<sup>2</sup>Nominal US \$, 2018.

Source: S&P Capital IQ

McKinsey  
& Company

**Figure 44.** Total global private -sector R&D investment (Source:<https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/building-an-r-and-d-strategy-for-modern-times>)

## 5. Economic analysis

### 5.1 Impact of the Pharmaceutical Sector in Economy

The pharmaceutical sector is a significant contributor to the global economy. According to WifOR Institute (Juneja, et al., 2024), the pharmaceutical industry generated a total GDP contribution of \$2.295 billion globally through its business activities in 2022. The industry's direct contribution to the world's GDP amounted to \$755 billion, representing 0,7% of the global GDP, which is approximately equivalent to the GDP of Switzerland in 2022.

Additionally, the report shows that in 2022, the pharmaceutical industry assisted in the creation of approximately 74,9 million jobs, both directly and indirectly.

Specifically:

- 7,8 million people were directly employed by the industry
- 44,7 million jobs were supported indirectly
- 22,4 million jobs supported through the supply chain

The pharmaceutical sector's R&D activities alone added \$227 billion to global GDP, 30% of its direct contribution to the world economy.

In Europe, the pharmaceutical industry has a significant contribution to the economy according to EFPIA, (EFPIA, 2023) research and estimations. As it is shown in the figure 45 in 2022 the total production was estimated to be €340 billion and the number of employment units was up to 865.000.

INDUSTRY (EFPIA total)		2000	2010	2020	2021	2022
	Production	127,504	199,730	290,309	323,950	340,000 (e)
	Exports (1) (2)	90,935	276,357	509,828	567,009	670,000 (e)
	Imports	68,841	204,824	347,124	395,250	455,000 (e)
	Trade balance	22,094	71,533	162,704	171,759	215,000 (e)
	R&D expenditure	17,849	27,920	39,442	42,533	44,500 (e)
	Employment (units)	556,506	701,059	845,770	859,607	865,000 (e)
	R&D employment (units)	88,397	116,253	121,717	126,959	130,000 (e)
	Total pharmaceutical market value at ex-factory prices	89,449	153,685	236,459	254,267	275,000 (e)
	Payment for pharmaceuticals by statutory health insurance systems (ambulatory care only)	76,909	129,464	145,428	156,140	170,000 (e)

Values in € million unless otherwise stated

(1) Data relate to EU-27, Norway, Switzerland and United Kingdom since 2005 (EU-15 before 2005); Croatia and Serbia included since 2010; Turkey included since 2011; Russia included since 2013

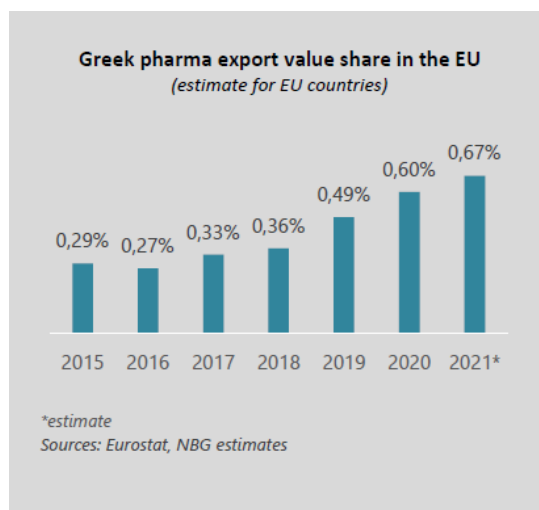
(2) Data relating to total exports and total imports include EU-27 intra-trade (double counting in some cases)

Source: EFPIA member associations (official figures) - (e): EFPIA estimate; Eurostat (EU-27 trade data 2000-2022)

**Figure 45.** (EFPIA, 2023)The Pharmaceutical Industry in Figures.

The Greek pharmaceutical industry is a highly dynamic sector of the Greek economy, playing a crucial role in health economic policies, patient care, and overall national prosperity. From 1998 to 2003, a significant number of clinical studies were conducted (4,244) encompassing various phases and stages. The pharmaceutical sector employs 32,100 people in production and wholesale trade, and according to PEF, indirect employment is estimated at 53,100 in 2020 (Tryfon Th., 2020). In 2023, the pharmaceutical sector exported €2.8 billion in products, playing a crucial role in foreign trade. This accounts for 5.5% of

total goods exports. France, Germany and UK are the primary export destinations. Imports contribute around 5.3% of total imports (IOBE, 2024).



**Figure 46.** Greek pharma export values share in EU (source: NBG Voumvaki et al., 2022)

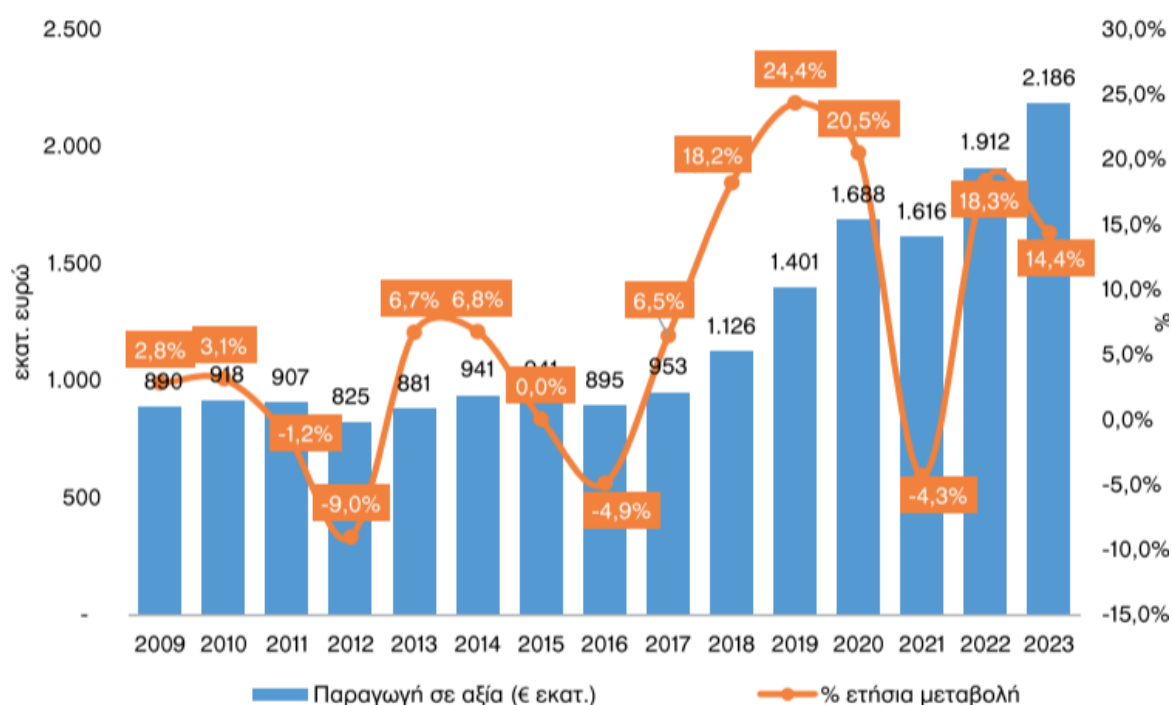
The Greek pharmaceutical industry contributes significantly to the development of the national economy. The sector's contribution to the country's GDP reaches €2.8 billion annually (according to the Prodcom survey (Eurostat), pharmaceutical production in Greece in value terms (ex-factory) approaching €2.2 billion in 2023 (*IOBE FACTS & FIGURES 2023 THE PHARMACEUTICAL MARKET IN GREECE*, 2023)). In 2022 the total revenues exceeded €3 billion and in 2023 exceeded €3,9 billion according to ELSTAT. It is estimated that for every €1.000 spent on the purchase of medicines produced in Greece, the country's GDP is boosted by €3.420 (<https://www.pef.gr/our-contribution/stin-elliniki-oikonomia/> ).

According to IOBE (*IOBE FACTS & FIGURES 2023 THE PHARMACEUTICAL MARKET IN GREECE*, 2023), the total annual tax revenues from the domestic production of pharmaceuticals amount to €147 million.

## 5.2 Current dynamics in the Greek pharmaceutical sector

Greece's pharmaceutical sector has grown rapidly over the past five years, with sales up 80%, compared to 43% in the EU and 7% for other Greek manufacturing. Exports have

driven this growth, rising to 50% of sales in 2021 from 30% in 2016. The sector's willingness for investment is gradually recovering, with the ratio of gross fixed capital formation to sales reaching around 10%, compared to 7% five years ago and around 15% in the EU.



**Figure 47.** Production of medicinal products in Greece in million (Source: Eurostat (IOBE FACTS & FIGURES 2023 THE PHARMACEUTICAL MARKET IN GREECE, 2023).

The ten leading Greek manufacturing companies have experienced a 23% increase in sales from 2021 to 2023, based on secondary data drawn from their financial statements. This rise reflects net sales after accounting for clawback and rebate, which constitute nearly 17% of the gross revenues.



**Table 25.** % Changes in sales by firm, secondary data from income statements

	2021-2022	2022-2023
<b>BOEHRINGER IN.</b>	22	20
<b>VIANEX</b>	-1	5
<b>PHARMATHEN 2021</b>	17	16
<b>DEMO 2021</b>	10	10
<b>ELPEN 2021</b>	17	29
<b>FAMAR 2021</b>	13	8
<b>RAFARM 2021</b>	2	7
<b>UNIPHARMA 2021</b>	9	5
<b>INNOVIS 2021</b>	-7	22
<b>GENEPHARM 2021</b>	4	16
<b>Average sales increase</b>	9	14

Greek pharmaceutical manufacturers have announced investment plans amounting to €1 billion for the period 2022-2026. This demonstrates their commitment to an ongoing growth strategy (Kourlibini Vichy, 2024). Based on an estimate by the NBG (Voumvaki et al., 2022), the sector can almost double sales by 2026 through higher extroversion. There is potential for synergy between increased production and R&D, driven by specialised human capital. This could transform Greece into a pharmaceutical hub.

The latest investments include 10 factories, 32 production plants, 56 production lines and 14 research facilities. These will create over 5,500 jobs. In Tripoli's Industrial Area, DEMO, Win Medica/ELPEN and FARAN will generate more than 1.000 jobs. The Panhellenic Pharmaceutical Industry Association says these investments will meet 75% of the country's medicine needs (Kourlibini Vichy, 2024).

Investment plans (ml €)				
	2022	2023	2024	Total
Greek firms (Production)	85	80	75	240
Greek firms (R&D)	70	70	70	210
Multinational firms	150	150	150	450
Total	305	300	295	900

Sources: Data from PEF members, NBG estimates

**Figure 48.** Investment plans of Greek firms (Source National Bank of Greece Voumvaki et al., 2022)

The ten leading pharmaceutical companies selected as described in chapter, have in average total sales of 2.492.297.715,30 € billion from 2021 to 2023. This represents 74% of the total production in Greece. The calculations from the ELSTAT database gave an average of €3.350.714 thousand revenues for 2021-2023.

So, considering that in the market more than 100 companies operate (source ELSTAT) it is clear that the sector's big players are a small number of the total operating companies.

The Greek pharmaceutical industry is mostly a Branded Generic Industry (<https://www.pef.gr/farmaka/asfaleia-kai-poiotita/>). With ageing populations and rising healthcare costs prompting governments around the world to rethink the sustainability of healthcare systems, the use of more affordable generic medicines is a cost-effective option in efforts to manage the cost of pharmaceutical care, giving the Greek industry a competitive edge.

### 5.3 Comparison of the Greek sector with the leading global market

While the pharmaceutical sector contributed \$2.295 billion to global GDP in 2022, the Greek pharmaceutical industry contributes €2.8 billion to national GDP annually. The figures reveal the disparity between the two but considering that the Greek population is

around 10 million and the world population is more than 8 billion, the sector's presence on the global scene is significant.

The global market is dominated by multinational giants like Pfizer, Roche and Novartis. The industry is heavily driven by patented drugs, biotech innovations and large-scale R&D investments. Generics and biosimilars are expanding but face strong competition from branded pharmaceuticals. Greek pharmaceutical sector is primarily a Branded Generic Industry, focusing on cost-effective alternatives to patented drugs, which gives it the potential to expand on the international stage by providing quality branded generic medicines. The global ageing population and the need for manageable healthcare costs indicate that generic medicines offer a competitive advantage for Greek manufacturers. Local firms compete with multinational companies in the domestic market, with some, gaining international presence. Multinational pharmaceutical companies are the main drivers of R&D investment and new drug development. Although Greek R&D investment has increased in recent years, it remains below the average of the multinational sector. As previously mentioned, Greek firms primarily invest in generic drugs rather than new drug development.

The Greek pharmaceutical sector is small compared to the global industry, but shows potential for growth, especially in exports and branded generics. Strategic investments, R&D expansion, and international market penetration could make Greece a significant player in the pharmaceutical industry. New investments in primary production and strategies to establish Greek manufacturing as a leader in branded generics in Europe, offer significant opportunities. However, challenges like pricing regulations, rebate policies, and multinational competition must be addressed to sustain long-term growth.

#### **5.4 Factors Affecting Pharmaceutical Pricing and the effect in the manufacturing sector**

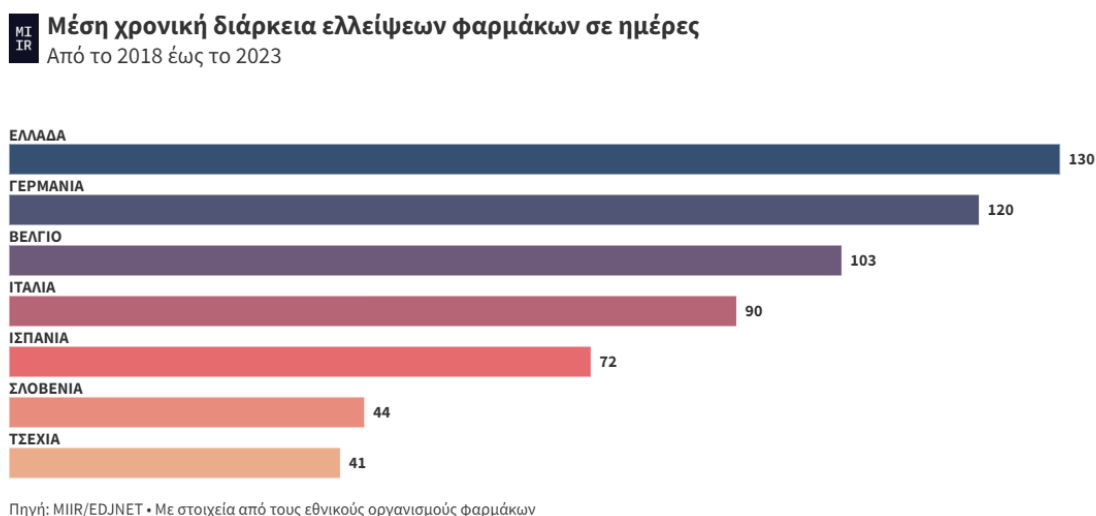
In 2022, Greece's per capita health expenditure was €1.679, down from €2.014 in 2009 due to reduced public healthcare spending. This is 46% of the EU average and 59% of Southern countries' levels. This impacts the pharmaceutical sector, as Greece is obliged to cover a portion of these cuts. Industry and patient contributions accounted for 57.3% of the total

expenditure: €1.2 billion for clawbacks and €760 million for rebates. (*IOBE FACTS & FIGURES 2023 THE PHARMACEUTICAL MARKET IN GREECE*, 2023),

Pharmaceutical pricing in Greece is set by the Ministry of Health and directly influences the profitability of the Greek pharmaceutical industry.

On 10 February 2021, the EU Commission acted against excessive pharmaceutical pricing following national competition authorities' actions. This is a significant development for political decisions regarding pharmaceutical costs in Greece and may allow the generic industry to increase pricing (Zacharodimos Georgios, 2024).

The government's pricing policies have caused a medicine shortage in Greece. Multinational companies are leaving because they can't make a profit. Greek industry must produce high-cost, low-price medicines to replace them. This puts pressure on industry and has led to parallel exports. (Zafeiropoulos K, 2023).



**Figure 49.** Shortages of medicines in Greece in days 2018-2023 (Zafeiropoulos K, 2023).

## 5.5 Integrated PESTLE -Porter's Five Forces and SWOT Analysis

The following analysis employs the PESTLE framework to explore the potential impact of external factors on the Greek pharmaceutical industry. The PESTLE framework encompasses the political, economic, social, technological, legal and environmental factors that may influence the industry.

### Political

One of the most influential political factors is government regulations on drug pricing and repayment policies as Clawback-rebate (Letsios et al., 2023). In the economic analysis it was estimated that these obligations reduce revenues in average 17%. Additionally, public healthcare system (EOPYY) plays a major role in drug purchases. (Joumard *et al.*, 2010) along with the strong EU regulatory influence (EMA guidelines) (McKee *et al.*, 2009) . Economic crisis put pressure on governments for pharmaceutical cost reductions due to national debt and fiscal policies (Karanikolos et al., 2022).

The recently introduced 'European Common Pharmaceutical Strategy' presents new opportunities for the pharmaceutical industry. Alarms about high inter-regional dependencies (for example, China will supply 23% of EU pharmaceutical raw materials in 2019, up from 12% in 2010) and product shortages due to global supply chain disruptions (related to the COVID-19 pandemic and geopolitical instability) motivated this new strategy (Voumvaki et al., 2022).

#### Impact on Porter's Forces:

**Threat of New Entrants:** Political decisions related to strict regulations and pricing pressures create high entry barriers that deter new competitors.

**Competitive Rivalry:** Political decisions can either intensify or diminish competition.

**Bargaining Power of Suppliers:** The 'European Common Pharmaceutical Strategy' is poised to transform the supply chain, favouring domestic production. However, the Greek industry will encounter higher costs if it relies on EU raw materials instead of sourcing from third countries.

**Bargaining Power of Buyers:** The government's dominant purchasing role and stringent pricing controls strengthen buyers' power and constrain profit margins.

**Threat of Substitutes:** Political decisions may influence the entrance of substitutes though the positive list of subscriptions.

#### SWOT Analysis:

**Strengths:** Greek pharmaceuticals are designed to comply with EU standards and are well-suited to pricing policies.

**Weaknesses:** Reliance on government policies renders companies vulnerable to political and economic fluctuations. The prices of medicines are not determined by the companies but are set by the minister of health. As a result, the industry cannot align elevated costs of goods sold (COGS) with selling prices.

**Opportunities:** Low domestic prices cause multinational companies to withdraw, allowing the Greek generic industry to grow. Even negative government policies present opportunities. Investing in primary production of raw materials is promising after the 'European Common Pharmaceutical Strategy'.

**Threats:** Policy changes can lead to sudden financial and operational challenges. ROA of 6% and Net profit margin of 8% suggests that economic decisions on health policies like clawback and rebate frustrate the sector.

### Economic

Growth in pharmaceutical exports (especially generics and biosimilars) occurred in the recent years. Exports of pharmaceutical products as a share of total Greek exports of goods, amounting to 5.5% in 2023 (IOBE, FACTS & FIGURES, 2023). Greece's economic recovery after the debt crisis has had an impact on healthcare spending (Vandoros et al., 2013), and combined with the high pharmaceutical spending noted in Chapter 4, COGS and operating costs are too high, but controlled pricing due to health economic policy constraints creates a hostile environment.

On the other hand, investment incentives for pharmaceutical production in Greece have been given through grants and programmes of the new multiannual financial framework (the EU budget for 2021-27). Greece has received €22.5 billion in grants and €9.4 billion in loans - a total equivalent to 1/6 of the country's GDP in 2019.

### Impact on Porter's Forces:

**Threat of New Entrants:** Economic frustration and high operational costs prevents new entrants.

**Competitive Rivalry:** Economic pressures heighten competition for financial resources and market share. Domestic and foreign pharmaceutical companies compete intensely, often marketing the same generic drugs.

**Bargaining Power of Suppliers:** Economic fluctuations can affect the cost and availability of raw materials, which enhances the effect of the supplier power dynamic.

**Bargaining Power of Buyers:** Economic fluctuations can affect buying power and press pharmaceuticals for more affordable medicines.

**Threat of Substitutes:** Economic factors can lead to the usage of new generics.

**SWOT Analysis:**

**Strengths:** Greek pharmaceuticals' export growth reduces recession impacts. The industry has high fixed assets financed by equity, a ROE of about 20%, and 11% operating margin, allowing to endure competition or policy changes.

**Weaknesses:** High operating costs, COGS and pricing controls limit profitability. The operating ratio is more than 90% and is attributed to COGS. Also, the COGS ratio is high.

**Opportunities:** Grants and loans can fund modernization and expansion. Invest in innovation to increase exports.

**Threats:** Economic recessions undoubtedly reduce both domestic and international demand. CCC is rather high, meaning that customers and/or suppliers can influence liquidity. The brain drain is causing a lack of expertise.

**Social**

Some of the social factors are:

- The demand for chronic disease treatments (e.g., cardiovascular, diabetes, Alzheimer's) is increasing as the population is aging and may change the portfolio of the industry (Börsch-Supan et al., 2013).
- Increased consumer awareness and demand for affordable medicines. Increased health and wellness awareness is driving demand for preventive care, supplements, and lifestyle-related medications. Consumers are becoming more proactive in seeking health information, prompting companies to educate and engage them. Public preference for branded drugs vs. generics, though shifting towards generics due to cost. Rise in self-medication and OTC drugs.
- Corporate Sustainability (ESG). There is increasing social demand for pharmaceutical companies to adopt sustainable practices, such as reducing environmental impact and ensuring ethical clinical trials.
- Public opinion of pharmaceutical companies affects their reputation. Scandals, high drug prices, or safety issues can harm trust, while transparency and ethical

practices can improve it. Religious and ethical beliefs also impact the acceptance of treatments like stem cell therapies and COVID-19 vaccines.

**Impact on Porter's Forces:**

**Threat of New Entrants:** This is rather not affected.

**Competitive Rivalry:** Competition is moderate influenced.

**Bargaining Power of Suppliers:** May remain stable as they also have to adapt new demands.

**Bargaining Power of Buyers:** Informed and health-conscious consumers demand higher-quality products and transparency, increasing their influence over pharmaceutical companies. The government's demand for CSR from pharma companies is increasing.

**Threat of Substitutes:** Although alternative therapies and natural remedies gain popularity as consumers seek holistic health solutions, the substitutes treat is rather weak.

**SWOT Analysis:**

**Strengths:** The industry's high level of scientific expertise gives a comparative advantage to perform in social and government demands.

**Weaknesses:** People may be reluctant to accept generics because of mistrust issues. There is a need for cheaper medicines.

**Opportunities:** Developing affordable medicines that can be preferred by the governments and the people. By engaging in CSR firms can build brand loyalty.

**Threats:** Negative public perception for generics can lead to decreased sales and increased scrutiny.

**Technological**

The pharmaceutical industry has undergone significant changes in recent years, with the emergence of new technologies playing a key role in shaping its future. Advances in biotechnology, the use of AI in drug development (IVANOVA ELENA, 2021), personalised medicine and digitisation of healthcare (e-prescriptions, telemedicine).

According to a report by Grand View Research, (<https://www.i-pharmconsulting.com/blog/the-role-of-technology-in-pharmaceuticals/>) by 2028 the pharmaceutical technology market could reach \$147.5 billion, driven by digital technology in drug discovery and development. StartUs Insights identified 10 trends and innovations for 2023:



- AI (Artificial Intelligence) (21%)
- Big Data and Analytics (15%)
- Flexible Production (13%)
- Precision Medicine (9%)
- Additive Manufacturing (9%)
- Blockchain (9%)
- Extended Reality (7%)
- Real World Data (6%)
- Digital Therapeutics (5%)
- Curative Therapies (5%)

Pfizer has installed in Greece its Centre for Digital Innovation – CDI which is the first and only digital hub of the company with target new drug development and therapies.

<https://centerfordigitalinnovation.pfizer.com/gr>

#### **Impact on Porter's Forces:**

**Threat of New Entrants:** Technological advancements can increase entry barriers as the cost to adapt new technologies is high.

**Competitive Rivalry:** Competitors leveraging advanced technologies can offer superior products or more efficient processes, intensifying rivalry.

**Bargaining Power of Suppliers:** Advanced technological expertise will enhance the power of suppliers and increase reliance on high-tech professionals.

**Bargaining Power of Buyers:** Informed patients and healthcare providers increasingly demand advanced therapeutics, but the power is rather low.

**Threat of Substitutes:** AI may increase the ability to invent new pharmaceutical molecules

#### **SWOT Analysis:**

**Strengths:** Greek pharma already invests in new facilities and in new high-tech equipment.

**Weaknesses:** High costs and a lack of enough skilled personnel may delay technological integration. Greek companies focusing on generics must innovate to stay competitive and increase R&D intensity.

**Opportunities:** Greek companies could invest in new therapeutic niches.

**Threats:** Rapid technological changes can make it difficult to track new trends.

### Legal

A reform of the EU's pharmaceutical legislation is underway to improve access to effective and affordable medicines, reduce shortages, provide more medicines for children and rare diseases, give patients a stronger voice and easier access to information, and provide more environmentally sustainable medicines (European Commission, 2023). According to ENFIA (*Pharmaceutical Legislation*, no date) the EU's new pharmaceutical legislation will have unintended consequences. They will reduce Europe's competitiveness and hinder the development of new treatments and vaccines. The laws weaken European IP rights and introduce complicated criteria for recouping IP protection. Legislative changes will obligate pharmaceutical companies to carry out Environmental Risk Assessments (ERAs) for their products and adopt measures to mitigate environmental risks (Zinken et al., 2024). Failure to comply with the updated Directive and Regulation could result in penalties and reputational damage. The reform of the EU's pharmaceutical sector will bring significant changes to product lifecycles and operating expenses.

Other legal factors that influence are the EU and Greek pharmaceutical regulations (clinical trials, patents, generics) and compliance with GDPR for patient data protection is an issue for clinical trials.

#### **Impact on Porter's Forces:**

**Competitive Rivalry:** Reducing regulatory protection periods for innovative medicines from ten to eight years may intensify competition among pharmaceutical companies, as generic manufacturers can enter the market sooner, increasing the rivalry.

**Threat of New Entrants:** The complex and stringent regulatory environment increases entry barriers for new companies. The management of complex approval processes and compliance requirements requires considerable legal expertise and resources.

**Bargaining Power of Suppliers:** Legal requirements can increase operational costs, affecting supplier dynamics.

**Bargaining Power of Buyers:** Enhanced patient involvement and access to information empower consumers, increasing their influence over pharmaceutical offerings and pricing.

**Threat of Substitutes:** Encouragement of biosimilars and generics may increase the availability of substitute products, growing competition for original drug manufacturers.

**SWOT Analysis:**

**Strengths:** Greek pharma has expertise, knowledge and available cheap and expert personnel.

**Weaknesses:** Complex and evolving legal frameworks can strain resources.

**Opportunities:** A unified EU pharmaceutical market can streamline processes and reduce administrative burdens. Opportunities for biosimilars and generics.

**Threats:** Non-compliance risks legal penalties and reputational damage. Additional costs to comply with regulations.

**Environmental**

The pharmaceutical sector has to deal with the following environmental regulations:

- Regulation (EU) 2019/1020 on market surveillance and compliance of products
- Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment
- Directive (EU) 2024/3019 of the European Parliament and of the Council of 27 November 2024 concerning urban wastewater treatment
- REGULATION (EU) 2024/573 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014
- Regulation 2025/40 - Packaging and packaging waste
- PFAS Restrictions and possible implications in the pharmaceutical sector

European PFAS restriction could threaten pharmaceutical manufacturing. Pharmaceutical manufacturing in Europe is at risk of critical drug shortages, according to the European Federation of Pharmaceutical Industries and Associations (EFPIA), if the most far-reaching chemical restriction on per- and polyfluoroalkyl substances (PFAS) is implemented. (EFPIA, Animal Health Europe, 2023).

Waste management obligations, together with environmentally friendly packaging, and EU initiatives on carbon-neutral pharmaceutical production may increase sustainability concerns in drug manufacturing and in conjunction with Corporate Sustainability Reporting Directive (ESG Reporting) will add costs.

**Impact on Porter's Forces:**

**Competitive Rivalry:** Competitors who invest in sustainability and environmental compliance may gain a competitive advantage, increasing rivalry within the industry.

**Threat of New Entrants:** Stringent environmental regulations and the associated compliance costs create high barriers to entry, deter potential entrants.

**Bargaining Power of Suppliers:** Suppliers providing eco-friendly raw materials or sustainable technologies may have increased bargaining power due to the specialized nature of their offerings.

**Bargaining Power of Buyers:** Growing consumer awareness and governments demand for environmentally responsible products enhance buyer power.

**Threat of Substitutes:** Products perceived as more environmentally friendly can increase the substitution threat, influencing market dynamics.

### SWOT Analysis

**Strengths:** Proactive compliance with environmental regulations enhances corporate reputation and ensures market access.

**Weaknesses:** The Greek sector is not ready to implement advanced environmental controls and sustainable practices, which may cause operational disruptions during the transition to greener processes.

**Opportunities:** Access to EU funding and incentives for companies adopting environmentally friendly practices and grants for investments in sustainable technologies can lead to operational efficiencies and cost savings e.g. investments in new eco-friendly facilities, manufacturing of sustainable material, decrease the dependencies and minimize the power of suppliers.

**Threats:** Evolving environmental regulations may impose additional compliance burdens and increase operational costs. Public perception and potential legal actions resulting from non-compliance.

## 6. Conclusions

### 6.1 Summary of Findings

The sector demonstrates significant variability in financial ratios among firms. The variability of the ratio's averages between years is lower. The 10 selected companies have experienced growth in revenues during 2021-2023. A significant issue is the high GOGS ratio and the operating expense ratio, which limit net profits. The operating ratio that includes COGS is extremely high (average ~92%) while the operating expense to sales is low to moderate (~28%). Even though the sector handles its operating cost effectively, the COGS boosts the expenses to extreme levels. Thus, the profitability of the sector is moderate to low, with a few exceptions and the profitability ratio values are declining from 2021 to 2023. The activity ratios indicate effective operations but highlight a need to improve the asset turnover ratio for better revenue generation. The sector liquidity is moderate as the current ratio is sufficient, but acid ratio and cash ratio are low. The debt is used more to finance assets than operations, and TIE is high, meaning that financial distress is low. The distribution of dividends varies by firm as not all pay dividends, but in general, there has been a slight upward trend in Dividend per share from 2021-2023, while the percentage of the distributed earnings and earnings per share have fluctuated. Each company has its policy on distributing its earnings. Nevertheless, most Greek pharmaceutical companies deliver significant profits to their stakeholders and the Dividend yield on equity is stable over time. Not all manufacturing companies have R&D and between those who have the R&D ratios vary (CV 1,0). The average values of the ratios indicate a comparatively low level of R&D investment compared to global trends.

Making a combined analysis using PESTLE, Porter's five forces and SWOT the following conclusions reached:

- The sector is influenced by a number of key external factors, including economic crises, health expenditure policies, the costs of new drug applications, the new environmental trends, the pharmaceutical law update and the ageing population. These factors directly impact innovation and investment in new pharmaceutical forms. Technological improvements in robotic systems, automated analytical systems in production and quality have been adopted in the pharmaceutical sector,

and the Greek industry must invest in new technologies to improve its efficiency and competitiveness. The substantial financial commitment of 1.3 billion euros allocated for the 2022-2026 period is a pivotal step in this direction, as is the reform of the pharmaceutical regulation and the obligation to comply with the environmental regulations, which will also affect the future of the sector. The impact of the external factors on Porter's five forces is mainly to increase rivalry in the sector, the bargaining power of suppliers and the bargaining power of the buyer, i.e. the Ministry of Health. The SWOT analysis shows threats of rising costs, but also opportunities for investment in areas such as primary production, becoming more extroverted and increasing exports. Sector rivalry should encourage investment in different therapeutic categories and a diversified portfolio rather than direct competition. In addition, the opportunity to operate in areas abandoned by multinationals could be a response to buyer power. The sector's strength lies in its scientific expertise, technological demands and ability to operate in a highly regulated environment.

## 6.2 Recommendations and Future Research

The study provides significant findings for industry stakeholders and policymakers to evaluate and compare the financial performance of Greek pharmaceutical companies against sector averages or specific peers. Greek pharmaceutical companies should adopt a long-term strategic vision, including a multi-year plan for sustainable growth, diversification, international expansion and innovation. Regular reviews assess progress and adjust the plan. Some recommendations toward this path are:

- To boost profitability, cut COGS (currently ~92%). Apply strategies to reduce costs in production: optimise supply chain, negotiate better terms with suppliers, invest in efficient technologies.
- Optimise operational expenses (currently ~28% manageable, more efficiency potential). This could be achieved by streamlining admin, reducing costs and adopting lean manufacturing principles. Managing energy consumption and waste in production would also contribute to a better cost-to-sales ratio. Additionally,

managing energy consumption and waste in production processes would help reduce operating costs.

- Improving asset utilisation is key to optimising asset management. This can be achieved through economies of scale, optimising inventory management and leveraging data analytics.
- Focus on International Market. Due to domestic competition and multinational companies' presence, Greek pharmaceutical companies should expand in international markets. Diversifying their export portfolios can mitigate the impact of local competition and revenue streams.
- Leverage Differentiation: To counteract the high competition in the domestic market, Greek firms should focus on product differentiation. Developing specialized pharmaceutical products or developing affordable generics.
- Strengthen Cash Position: The sector's low cash ratio indicates a liquidity risk. Companies should improve their cash position through better working capital management, such as faster receivables collection, delaying non-essential payments, or negotiating better payment terms.
- Diversify Funding Sources: A more balanced approach to financing will provide greater flexibility and security in the long term.
- Companies must adapt to regulations promptly to stay ahead of the curve and ensure compliance. Focusing on compliance can reduce legal risks and enhance reputation.
- Maintain Compliance with Health Expenditure Policies. The Greek government's policies will continue to impact the health sector. Pharmaceutical companies should align their development strategies with these priorities, ensuring their products meet public health needs.
- Collaborating with public research institutions or universities is advisable for accessing government R&D funding and reducing the financial burden of innovation.
- Collaborate with Multinational Companies with strategic partnerships in areas such as licensing and co-development can help local firms expand their capabilities and reach.

- Environmental Sustainability: Investing in cleaner technologies, reducing the carbon footprint and improving waste management meets regulations and demand.
- Corporate Social Responsibility (CSR): Engaging in CSR initiatives, such as contributing to public health programs or supporting local communities, can improve the company's image and brand loyalty.

The study highlights several key areas for further research, including:

Comparative or common size financial analysis: Assessing financial ratios to identify improvement opportunities.

Cost-reduction strategies: Investigating strategies to lower COGS and boost profitability ratios.

R&D investment and innovation: Studying the impact of low R&D investment on competitiveness and how increased funding can influence financial ratios.

€1.3 Billion Investment Evaluation: Measuring the impact of the 2022-2026 investment on financial ratios, efficiency, innovation, competitiveness.

Technological influence: The sector readiness to adopt advanced technologies, such as robotics, automated quality systems, and AI-driven drug development. Evaluating cost-benefit scenarios for implementing these technologies.

Export Strategies: Exploring global competitiveness, identifying export opportunities and evaluating government support for international trade. Evaluating opportunities for partnerships with global companies and academic institutions.

Health expenditure policies: Analysing the effects of health expenditure policies, pricing regulations, political decisions and economic crises on sector growth and profitability.

Sustainability: Investigating ESG adoption to improve environmental practices and align with global trends. Exploring the environmental impact on production processes.



**Sector Rivalry and Diversification:** Investigating how Greek pharmaceutical firms can diversify their portfolios to reduce direct competition and expand into niche therapeutic areas or neglected fields abandoned by multinationals.

This research framework has the potential to guide future investigations, to enhance the strategic direction, efficiency, and competitiveness of the Greek pharmaceutical sector. Regulators, financial analysts, and managers can use this analysis to better understand financial trends and performance metrics.

## References

1. Amin, S. and Aslam, S. (2017) 'Intellectual Capital, Innovation and Firm Performance of Pharmaceuticals: A Study of the London Stock Exchange', *Journal of Information and Knowledge Management*, 16(2). Available at: <https://doi.org/10.1142/S0219649217500174>.
2. Anghel, I. *et al.* (2018) 'Intellectual capital and financial performance of biotech companies in the pharmaceutical industry', *Amfiteatru Economic*, 20(49), pp. 631–646. Available at: <https://doi.org/10.24818/EA/2018/49/631>.
3. Asad, A.I. and Homolka, L. (2023) 'INVESTING IN INNOVATION: THE RELATIONSHIP BETWEEN R&D SPENDING AND FINANCIAL PERFORMANCE IN THE EUROPEAN PHARMACEUTICAL INDUSTRY', *Journal of Eastern European and Central Asian Research*, 10(7), pp. 1006–1026. Available at: <https://doi.org/10.15549/jeecar.v10i7.1368>.
4. Beaver, W.H. (1966) 'Financial Ratios As Predictors of Failure', *Journal of Accounting Research*, 4, p. 71. Available at: <https://doi.org/10.2307/2490171>.
5. Börsch-Supan, A. *et al.* (2013) 'Data resource profile: The survey of health, ageing and retirement in europe (share)', *International Journal of Epidemiology*, 42(4), pp. 992–1001. Available at: <https://doi.org/10.1093/IJE/DYT088>.
6. Chantzaras, A. *et al.* (2024) 'Health technology assessment of medicinal products in Greece: A 5-year (2018-2023) review of timelines and productivity', *International Journal of Technology Assessment in Health Care*, 40(1), p. e40. Available at: <https://doi.org/10.1017/S0266462324000485>.
7. Cockburn, I.M. (2004) 'The changing structure of the pharmaceutical industry', *Health Affairs*, 23(1), pp. 10–22. Available at: <https://doi.org/10.1377/HLTHAFF.23.1.10>.
8. Dengleri, K. *et al.* (2019) 'Industry Application of Assessment and Forecasting Theories Through Comparative Financial Analysis: The Case of Greek Pharmaceutical Industries Under Crisis Conditions', *Palgrave Studies of Cross-Disciplinary Business Research, in Association with EuroMed Academy of Business*, pp. 175–198. Available at: [https://doi.org/10.1007/978-3-030-17523-8\\_8](https://doi.org/10.1007/978-3-030-17523-8_8).
9. Dionysios StasinopoulosDionysios StasinopoulosCatherine KastaniotiCatherine KastaniotiSotirios SoulisSotirios SoulisDimitra Zegkou (2018) (1) *Evaluation of the Effect of the Economic Crisis on the Pharmaceutical Sector. Financial Statement Analysis Techniques: A Case Study of Greece | Request PDF, Archives of Hellenic Medicine*. Available at: [https://www.researchgate.net/publication/364921819\\_Evaluation\\_of\\_the\\_Economic\\_Crisis\\_on\\_the\\_Pharmaceutical\\_Sector\\_Financial\\_Statement\\_Analysis\\_Techniques\\_A\\_Case\\_Study\\_of\\_Greece](https://www.researchgate.net/publication/364921819_Evaluation_of_the_Economic_Crisis_on_the_Pharmaceutical_Sector_Financial_Statement_Analysis_Techniques_A_Case_Study_of_Greece) (Accessed: 25 January 2025).
10. EFPIA (2023) *The Pharmaceutical Industry in Figures*. Available at: [www.efpia.eu](http://www.efpia.eu).
11. European Commission (2023) *Reform of the EU Pharmaceutical legislation : a single market for medicines putting patients at the centre*. [Publications Office of the European Union].

12. Funmi Olatoye (2024) (11) (PDF) *Porter's Five Forces Analysis of the Pharmaceutical Industry 1.0*. Available at: [https://www.researchgate.net/publication/382105615\\_Porter's\\_Five\\_Forces\\_Analysis\\_of\\_the\\_Pharmaceutical\\_Industry\\_10](https://www.researchgate.net/publication/382105615_Porter's_Five_Forces_Analysis_of_the_Pharmaceutical_Industry_10) (Accessed: 9 February 2025).
13. Gascón, F. *et al.* (2017) 'Measuring the efficiency of large pharmaceutical companies: an industry analysis', *European Journal of Health Economics*, 18(5), pp. 587–608. Available at: <https://doi.org/10.1007/s10198-016-0812-3>.
14. Ghobakhloo, M. (2020) 'Industry 4.0, digitization, and opportunities for sustainability', *Journal of Cleaner Production*, 252. Available at: <https://doi.org/10.1016/J.JCLEPRO.2019.119869>.
15. Granados-González, P., López-Moreno, S. and Moreno Adalid, A.M. (2025) 'Economic Perspectives: An Analysis of the trajectory of the Pharmaceutical Industry in Spain[Perspectivas Económicas: Un Análisis de la Trayectoria de la Industria Farmacéutica en España]', *European Public and Social Innovation Review*, 10. Available at: <https://doi.org/10.31637/epsir-2025-337>.
16. Helms, M.M. and Nixon, J. (2010) 'Exploring SWOT analysis – where are we now?: A review of academic research from the last decade', *Journal of Strategy and Management*, 3(3), pp. 215–251. Available at: <https://doi.org/10.1108/17554251011064837>.
17. Hull, D.W. and Clancy, M.J. (no date) 'The Application of EU Competition Law in the Pharmaceutical Sector'. Available at: <http://jeclap.oxfordjournals.org/> (Accessed: 12 January 2025).
18. IOBE *FACTS & FIGURES 2023 THE PHARMACEUTICAL MARKET IN GREECE* (2023).
19. IVANOVA ELENA (2021) *Inteligencia raises \$12M to de-risk drug development*. Available at: [https://therecursive.com/the-greek-ai-platform-inteligencia-raises-12m-to-de-risk-drug-development/?utm\\_source=chatgpt.com](https://therecursive.com/the-greek-ai-platform-inteligencia-raises-12m-to-de-risk-drug-development/?utm_source=chatgpt.com) (Accessed: 9 February 2025).
20. Jessie Voumvaki, Athanasia Koutouzou and Niki Konstantopoulou (2022) *Greek pharma industry: In position to capitalize on EU shift towards more self-reliance, SECTORAL REPORT National Bank of Greece*. Available at: <https://www.nbg.gr/-/jssmedia/Files/Group/meletes-oikonomikes-analuseis/elliniki-epixeirimatikotita/kladikes-meletes/Pharma-Report-2022.pdf?rev=0794bebc5444256b7542de81c2851b3> (Accessed: 12 January 2025).
21. Joumard, I. *et al.* (2010) 'Health care systems: Efficiency and policy settings', *Health Care Systems: Efficiency and Policy Settings*, 9789264094901, pp. 1–207. Available at: <https://doi.org/10.1787/9789264094901-EN>.
22. Juneja, M., Mai, L. and Albu, N. (2024) 'THE ECONOMIC IMPACT OF THE GLOBAL PHARMACEUTICAL INDUSTRY Measurement of the economic impact relating to the pharmaceutical industry's global economic and R&D activities'.
23. Karanikolos, M. *et al.* (2022) 'The impact of austerity policies on health systems in Southern Europe', in *Social Welfare Issues in Southern Europe*. Routledge, pp. 119–139. Available at: <https://doi.org/10.4324/9780429262678-10>.
24. King, T., Freyn, S. and Morrison, J. (2023) 'SWOT analysis problems and solutions: Practitioners' feedback into the ongoing academic debate', *Journal of Intelligence Studies in Business*, 13(1), pp. 30–42. Available at: <https://doi.org/10.37380/jisib.v13i1.989>.

25. Kourlibini Vichy (2024) *Ποιες είναι οι νέες επενδύσεις 1,3 δισ. της βιομηχανίας φαρμάκων*, <https://www.capital.gr/epixeiriseis/3797139/poies-einai-oi-ependuseis-13-dis-tis-biomixanias-farmakou/>. Available at: <https://www.capital.gr/epixeiriseis/3797139/poies-einai-oi-ependuseis-13-dis-tis-biomixanias-farmakou/> (Accessed: 3 February 2025).
26. Letsios, A.N. *et al.* (2023) 'Exploring the impact of clawback on pharmaceutical expenditure: A case study of public hospitals in Greece', *International Journal of Health Planning and Management*, 38(5), pp. 1539–1554. Available at: <https://doi.org/10.1002/hpm.3679>.
27. López-Toro, A. *et al.* (2021) 'Influence of ESGC indicators on financial performance of listed pharmaceutical companies alberto', *Volume 18, Issue 9*, 18(9). Available at: <https://doi.org/10.3390/ijerph18094556>.
28. Mavrotas, G. (1992) 'A multicriteria approach for evaluating the performance of industrial firms', *Omega* [Preprint]. Available at: [https://www.academia.edu/63210250/A\\_multicriteria\\_approach\\_for\\_evaluating\\_the\\_performance\\_of\\_industrial\\_firms](https://www.academia.edu/63210250/A_multicriteria_approach_for_evaluating_the_performance_of_industrial_firms) (Accessed: 12 January 2025).
29. McKee, M. *et al.* (2009) 'Health systems, health, and wealth: a European perspective', *The Lancet*, 373(9660), pp. 349–351. Available at: [https://doi.org/10.1016/S0140-6736\(09\)60098-2](https://doi.org/10.1016/S0140-6736(09)60098-2).
30. *Pharmaceutical Legislation* (no date). Available at: <https://www.efpia.eu/pharmaceutical-legislation/> (Accessed: 14 February 2025).
31. Porter M. (1979) *How Competitive Forces Shape Strategy*. Available at: <https://hbr.org/1979/03/how-competitive-forces-shape-strategy> (Accessed: 9 February 2025).
32. *Position of the European Human Pharmaceutical and Animal Health Industry on the use of 'per-and polyfluorinated alkyl substances' (PFAS) 1 in Europe, in the light of a proposed Restriction under REACH as published 2* (2023). Available at: [https://ec.europa.eu/growth/sectors/chemicals/reach/restrictions\\_en](https://ec.europa.eu/growth/sectors/chemicals/reach/restrictions_en).
33. Qehaja, A.B., Kutllovci, E. and Pula, J.S. (2017) 'Strategic management tools and techniques usage: A qualitative review', *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 65(2), pp. 585–600. Available at: <https://doi.org/10.11118/ACTAUN201765020585>.
34. Ramanathan, R. *et al.* (2017) 'Environmental regulations, innovation and firm performance: A revisit of the Porter hypothesis', *Journal of Cleaner Production*, 155, pp. 79–92. Available at: <https://doi.org/10.1016/J.JCLEPRO.2016.08.116>.
35. Ravšelj, D. and Aristovnik, A. (2020) 'The Impact of R&D Expenditures on Corporate Performance: Evidence from Slovenian and World R&D Companies', *Sustainability* 2020, Vol. 12, Page 1943, 12(5), p. 1943. Available at: <https://doi.org/10.3390/SU12051943>.
36. ROMAN ANTON (2016) (11) (PDF) *An Integrated Strategy Framework (ISF) for Combining Porter's 5-Forces, Diamond, PESTEL, and SWOT Analysis*, OPEN SCIENCE. Available at: [https://www.researchgate.net/publication/305398596\\_An\\_Integrated\\_Strategy\\_Framework\\_ISF\\_for\\_Combining\\_Porter's\\_5-Forces\\_Diamond\\_PESTEL\\_and\\_SWOT\\_Analysis](https://www.researchgate.net/publication/305398596_An_Integrated_Strategy_Framework_ISF_for_Combining_Porter's_5-Forces_Diamond_PESTEL_and_SWOT_Analysis) (Accessed: 9 February 2025).

37. Su, C.Y. *et al.* (2021) 'R&D Investments, Debt Capital, and Ownership Concentration: A Three-Way Interaction and Lag Effects on Firm Performance in China's Pharmaceutical Industry', *Frontiers in Public Health*, 9, p. 708832. Available at: <https://doi.org/10.3389/fpubh.2021.708832>.
38. Takawira, B. and Poore, R.I.D. (2024) 'Supply chain disruptions during COVID-19 pandemic: Key lessons from the pharmaceutical industry', *South African Journal of Business Management*, 55(1). Available at: <https://doi.org/10.4102/SAJBM.V55I1.4048>.
39. Tryfon Th. (2020) *INTERVIEW: PEF first line against COVID-19*.
40. VANDOROS, S. and STARGARDT, T. (2013) 'Reforms in the Greek pharmaceutical market during the financial crisis', *Health policy (Amsterdam, Netherlands)*, 109(1), pp. 1–6. Available at: <https://doi.org/10.1016/J.HEALTHPOL.2012.08.016>.
41. Vieira, J. *et al.* (2021) 'Determinants of internationalization as levers for sustainability: A study of the portuguese pharmaceutical sector', *Sustainability (Switzerland)*, 13(17), p. 9792. Available at: <https://doi.org/10.3390/su13179792>.
42. Voumvaki, J. and Koutouzou, A. (2022) *Greek pharma industry: In position to capitalize on EU shift towards more self-reliance* *SECTORAL REPORT April 2022 NATIONAL BANK OF GREECE, Economic Analysis Department Eolou*.
43. Weaver, E., O'Hagan, C. and Lamprou, D.A. (2022) 'The sustainability of emerging technologies for use in pharmaceutical manufacturing', *Expert Opinion on Drug Delivery*, 19(7), pp. 861–872. Available at: <https://doi.org/10.1080/17425247.2022.2093857>.
44. Yfantopoulos, J. (2024) 'The impact of under-investment on health in Southern and Central Eastern European Countries', *Expert Review of Pharmacoeconomics and Outcomes Research*, 24(1), pp. 29–35. Available at: <https://doi.org/10.1080/14737167.2023.2267766>.
45. Zafeiropoulos K, M.N.L.I. (2023) *Το μάρκο κοντί των ελλείψεων φαρμάκων στην Ελλάδα - MIIR - Mediterranean Institute for Investigative Reporting*. Available at: <https://miir.gr/to-mayro-koyti-ton-elleipseon-farmakon-stin-ellada/> (Accessed: 8 February 2025).
46. Zinken, J.F. *et al.* (2024) 'Environmental risk assessment in the EU regulation of medicines for human use: an analysis of stakeholder perspectives on its current and future role', *Drug Discovery Today*, 29(12), p. 104213. Available at: <https://doi.org/10.1016/J.DRUDIS.2024.104213>.
47. IOBE (2024) *Ίδρυμα Οικονομικών & Βιομηχανικών Ερευνών 2 Παρεμβάσεις για τη βιώσιμη ανάπτυξη της ελληνικής βιομηχανίας*. Available at: [www.iobe.gr](http://www.iobe.gr).

## **Appendix A: “Secondary data”**

1. Financial statements of the 10 pharmaceutical companies 2021-2022-2023
2. Tabulated data of financial statements of the top 10 and financial ratios calculations

ELSTAT excel sheets for:

3. Κύκλος Εργασιών (σε χιλ. ευρώ), από Διοικητικές Πηγές, για το Σύνολο των Επιχειρήσεων της Ελληνικής Οικονομίας 2019-2024'
4. Συνοπτικά στοιχεία των βασικών μεταβλητών των επιχειρήσεων της βιομηχανίας, του εμπορίου και των υπηρεσιών
5. ΣΤΑΤΙΣΤΙΚΟ ΜΗΤΡΩΟ ΕΠΙΧΕΙΡΗΣΕΩΝ - ΕΤΟΣ 2022
6. ΑΚΑΘΑΡΙΣΤΗ ΠΡΟΣΤΙΘΕΜΕΝΗ ΑΞΙΑ ΚΑΤΑ ΚΛΑΔΟ (Α64)

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