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“A Comparative Analysis of Financial Performance: Key
Determinants of Profitability and Growth in European and Greek
Leading Chemical Distributors”

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Patras, Greece, May 2026

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This dissertation is dedicated to my two children, Charalampos and Kyriaki, with all my love. It is my hope that this effort will stand as an example to them — a reminder that the pursuit of knowledge is a lifelong journey, one always worth undertaking.

Abstract

The present dissertation analyzed the financial performance of seven European chemical distributors, of 5 large pan-European players and of 2 regional distributors based in Greece, within the period 2014-2024. The distributors studied were Brenntag, IMCD, Univar Solutions, Biesterfeld, HELM, ELTON and AFCO. By making use of a data set of normalized financial information that was retrieved from the Orbis database of the Bureau van Dijk, for all the companies studied fifteen ratios that are generally analyzed in financial statements were calculated. For each of the distributors studied all ratios were analyzed within four analytical axes, i.e. the distributors' profitability, their operational efficiency, their working capital management and their liquidity. Welch's Independent Samples T-Test was subsequently applied to all the ratios in order to test for possible statistically significant differences between the two groups of distributors.

There are no significant differences between the two groups of firms when it comes to their profitability, i.e. when measured by their Net Profit Margin, Return on Assets, Return on Equity and EBITDA Margin. What is more, all of the studied companies — be they Pan-European or Greek — managed to generate similar returns from their operations during the last decade. A temporary equilibrium was even reached between the two groups of firms during the 2021-2022 global crisis of the commodity supply chains.

However, the biggest difference between the groups of distributors under study is related to working capital management. The mean Collection Period of Greek distributors amounts to approximately 104 days, whereas that of their European counterparts is around 44 days. This difference is highly statistically significant ($p < 0.001$). Moreover, the mean Cash Conversion Cycle of the Greek distributors under study is 76 days longer than that of their European competitors. The solvency ratios of the two groups of distributors, however, did not differ in a statistically significant manner.

The main competitive disadvantage of the Greek distributors, in terms of financial performance, is therefore related to their working capital efficiency rather than to their capital structure.

For the first time, in the frame of the present dissertation, a set of financial indicators is proposed, that could be used as a benchmark for the financial performance of the chemical distributors for a decade long period. Moreover, the present dissertation proposes some

ways, by which the Greek distributors could ensure their sustainability and enhance their competitiveness in the EU market.

Keywords

Chemical distribution, financial performance, working capital management, Cash Conversion Cycle, comparative analysis, Greek SMEs

Περίληψη

Η παρούσα διατριβή ανέλυσε τη χρηματοοικονομική επίδοση επτά ευρωπαϊκών εταιρειών διανομής χημικών προϊόντων, εκ των οποίων πέντε αποτελούν μεγάλους πανευρωπαϊκούς παίκτες και δύο είναι περιφερειακοί διανομείς με έδρα την Ελλάδα, για την περίοδο 2014–2024. Οι υπό μελέτη διανομείς ήταν οι Brenntag, IMCD, Univar Solutions, Biesterfeld, HELM, ELTON και AFCO. Αξιοποιώντας ένα σύνολο δεδομένων τυποποιημένων χρηματοοικονομικών πληροφοριών που αντλήθηκαν από τη βάση δεδομένων Orbis της Bureau van Dijk, υπολογίστηκαν για όλες τις υπό μελέτη εταιρείες δεκαπέντε δείκτες που αναλύονται συνήθως στις οικονομικές καταστάσεις. Για κάθε έναν από τους υπό μελέτη διανομείς, οι δείκτες αναλύθηκαν στο πλαίσιο τεσσάρων αναλυτικών αξόνων, ήτοι της κερδοφορίας των διανομέων, της λειτουργικής τους αποδοτικότητας, της διαχείρισης κεφαλαίου κίνησης και της ρευστότητάς τους. Στη συνέχεια, εφαρμόστηκε το Welch's Independent Samples T-Test σε όλους τους δείκτες, προκειμένου να ελεγχθεί η ύπαρξη στατιστικά σημαντικών διαφορών μεταξύ των δύο ομάδων διανομέων.

Δεν διαπιστώθηκαν σημαντικές διαφορές μεταξύ των δύο ομάδων εταιρειών ως προς την κερδοφορία τους, δηλαδή όταν αυτή μετράται μέσω του Καθαρού Περιθωρίου Κέρδους, της Απόδοσης Ενεργητικού, της Απόδοσης Ιδίων Κεφαλαίων και του Περιθωρίου EBITDA. Επιπλέον, όλες οι υπό μελέτη εταιρείες — τόσο οι πανευρωπαϊκές όσο και οι ελληνικές — κατάφεραν να παράγουν παρόμοιες αποδόσεις από τις δραστηριότητές τους κατά τη διάρκεια της τελευταίας δεκαετίας. Μάλιστα, κατά την παγκόσμια κρίση των αλυσίδων εφοδιασμού εμπορευμάτων το 2021–2022, επετεύχθη μια προσωρινή εξίσωση μεταξύ των δύο ομάδων εταιρειών.

Η μεγαλύτερη διαφορά μεταξύ των υπό μελέτη ομάδων διανομέων σχετίζεται με τη διαχείριση κεφαλαίου κίνησης. Η μέση Περίοδος Είσπραξης των ελληνικών διανομέων ανέρχεται περίπου στις 104 ημέρες, ενώ αυτή των ευρωπαϊκών ομολόγων τους είναι περίπου 44 ημέρες. Η διαφορά αυτή είναι υψηλά στατιστικά σημαντική ($p < 0,001$). Επιπλέον, ο μέσος Κύκλος Μετατροπής Μετρητών των υπό μελέτη ελληνικών διανομέων είναι μεγαλύτερος κατά περίπου 76 ημέρες σε σχέση με αυτόν των ευρωπαϊκών ανταγωνιστών τους. Οι δείκτες φερεγγυότητας των δύο ομάδων διανομέων, ωστόσο, δεν παρουσίασαν στατιστικά σημαντική διαφορά.

Το κύριο ανταγωνιστικό μειονέκτημα των ελληνικών διανομέων, από πλευράς χρηματοοικονομικής επίδοσης, σχετίζεται με την αποδοτικότητα του κεφαλαίου κίνησής τους.

Για πρώτη φορά, στο πλαίσιο της παρούσας διατριβής, προτείνεται ένα σύνολο χρηματοοικονομικών δεικτών που θα μπορούσε να χρησιμοποιηθεί ως σημείο αναφοράς για τη χρηματοοικονομική επίδοση των διανομέων χημικών προϊόντων για μια δεκαετή περίοδο. Επιπλέον, η παρούσα διατριβή προτείνει ορισμένους τρόπους με τους οποίους οι έλληνες διανομείς θα μπορούσαν να διασφαλίσουν τη βιωσιμότητά τους και να ενισχύσουν την ανταγωνιστικότητά τους στην αγορά της ΕΕ.

Λέξεις – Κλειδιά

Διανομή χημικών προϊόντων, χρηματοοικονομική επίδοση, διαχείριση κεφαλαίου κίνησης, κύκλος μετατροπής μετρητών, συγκριτική ανάλυση, ελληνικές ΜΜΕ

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List of Abbreviations & Acronyms

AT	Asset Turnover
CCC	Cash Conversion Cycle
CR	Current Ratio
DSI	Days Sales in Inventory
DSO	Days Sales Outstanding
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortizations
EBIT	Earnings Before Interest and Taxes
FECC	European Association of Chemical Distributors
GAAP	Generally Accepted Accounting Principles
ITR	Inventory Turnover Ratio
MNC/MNCs	Multinational Corporation
NPM	Net Profit Margin
P2B	Price-to-Book Value
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
ROA	Return on Assets
ROCE	Return on Capital Employed
ROE	Return on Equity
SME	Small and Medium sized Enterprise
WC	Working Capital

1. Introduction

The global chemical industry generates a turnover of €635 billion, establishing the sector as a fundamental pillar of the European economy and accounting for 13% of global production. According to the European Chemical Industry Council (CEFIC, 2025), China currently holds the leading position with a 40% market share. The decline in the European Union's market share in recent years is attributed to several factors, including high energy costs—a critical component of chemical manufacturing—as well as elevated labor costs. Despite these challenges, the chemical sector continues to maintain a positive trade balance for the EU. Nevertheless, China's dominance is increasingly evident; its share of global chemical exports has surged to 18%, a significant rise compared to 2004, when it accounted for only 4%.

Parallel to the manufacturing sector's performance, the European chemical distribution market contributes an additional €102 billion to the EU economy. While European manufacturers face declining global shares due to energy pressures, the distribution sector serves as a fundamental counterweight, managing approximately 30% of total chemical sales (FECC, 2024). This market exhibits a distinct bifurcation: a small group of Pan-European multinational 'titans' operates alongside a vast network of regional distributors. Although there are more than 30,000 companies registered as chemical distributors in the EU-27, a mere 0.2% of large firms control 51% of the total turnover (EUROSTAT, 2024/2025).

In contrast, the Greek "Wholesale of chemical products" sector consists of 1,792 registered companies generating a total net turnover of €1.18 billion (ELSTAT, 2024/2025). Critically, 99% of these companies are SMEs or micro-firms, highlighting a significant scale gap compared to the European leaders. Despite this fragmentation, chemical distribution remains the backbone for numerous other markets, including plastics, fertilizers, and petrochemicals, as well as the industrial and construction sectors. Furthermore, its reach extends into life sciences, specifically through the food and feed industries, pharmaceuticals, and personal care products.

According to the foundational framework of Coughlan, Anderson, Stern, and El-Ansary (2006), a distributor is defined as a title-taking intermediary that assumes the full burden of financial and operational risk. In addition to inventory management, a chemical distributor

must navigate operational risks associated with regulatory compliance—such as REACH—and provide value-added services, including blending, repackaging, and technical support (Hornke, 2012). This "taking of title" implies that the firms in this study's sample—both the European leaders and the Greek regional players—carry inventory on their own balance sheets. Consequently, their financial performance is uniquely sensitive to inventory turnover and credit management, justifying the use of specific liquidity and efficiency ratios in this comparative analysis.

This study addresses the lack of comparative financial data between these two tiers of the market. Currently, it is unclear whether the "Greek Leaders"—despite their dominant local position—can match the financial efficiency and strategic readiness of Pan-European players when measured through standardized liquidity and profitability ratios.

The European chemical distribution landscape is characterized by an extreme concentration of power, where 0.2% of firms control over half of the market turnover. While Pan-European "titans" (e.g., Brenntag, Azelis) utilize vast economies of scale and sophisticated digital supply chains, regional leaders in smaller markets like Greece (e.g., ELTON, AFKO) must navigate a fragmented local economy with higher operational risks.

Currently, there is a critical research gap regarding the financial competitiveness of these Greek regional leaders. It is unknown whether the scale advantages of European multinationals translate into statistically superior profitability and efficiency, or if the Greek firms' local agility and defensive liquidity management provide a comparable financial cushion. Without a data-driven benchmark, Greek distributors lack the strategic roadmap necessary to align their financial structures with broader EU standards for long-term sustainability.

2. Literature review & Hypothesis Development

2.1 The chemical Distribution Sector: Structure and Strategic Context

Chemical distribution forms a very unique segment of the overall value chain of the chemicals industry. It serves as an intermediary that temporarily takes legal ownership of the product before transferring it to the next party in the supply chain . (Coughlan, Anderson, Stern & El-Ansary, 2006). As such the distributor bears all risks to stock, compliance, transportation etc. and it is only after this that the products are distributed to end customers. Chemical distributors hold the ‘inventory’, ‘accounts receivable’ and ‘accounts payable’ of products on their books, thus Working Capital (WC) management becomes a key determinant of a distributor’s financial performance.

Hornke (2012) supports the transition from only volume business to a value added services provider increased complexity for the modern chemical distributors. Not only volume any more is sold by them but a variety of value added services such as for example blending and repackaging of products as well as technical and other services (under the European legislation on Registration, Evaluation, Authorization and Restriction of Chemicals, REACH for example). Their margin therefore is not solely determined by the margin on the volume of products they are selling. Additional margin is created by the margin on the value added services provided to their customers. Therefore not only margin indicators such as net profit margin (NPM) and EBITDA margin should be analyzed in this study. Also indicators of efficiency should be analyzed such as Asset Turnover as well as the well known Cash-Conversion-Cycle (CCC) of a company.

The European chemical distribution market is extremely imbalanced, with the study focusing on a structure that allows for comparison between the large multinational distributors in a Pan-European context of business and the small and medium sized chemical distributors in a non-consolidated national environment of business. More than 30,000 companies (small and medium sized enterprises and micro companies), in the European Union alone, are involved in distributing the 70% of the chemicals that are sold in the EU, whereas the four biggest distributors in the EU (Brenntag, IMCD, Azelis and Univar) manage to distribute an amazing 30% of the total amount of chemicals sold in the EU. The

0.2% of the biggest companies in the EU distribute an amazing 51% of the total sectoral turnover of the EU chemical distribution market.

2.2 Theoretical Frameworks

2.2.1. Agency Theory and Efficiency in Multinational Distributors

This body of work supports Hypothesis H2 and was used to understand why some companies are more efficient assets than others. Agency theory by Jensen and Meckling (1976), sees the management of large multinational companies as being primarily motivated by a desire to increase their own personal performance. Eisenhardt (1989) further developed this framework, emphasizing that agency relationships create efficiency incentives that drive asset utilization in large corporations. Regarding a chemical distribution company, such as Brenntag or IMCD, this would involve a desire to increase the efficiency with which working capital is used and in consequence the return on investment. The asset turnover ratio, calculated by dividing a company's revenues by its total assets, is frequently used as a means of assessing a company's efficiency in this respect. Given the earlier comments, the prediction derived from agency theory is that the asset turnover ratio for Pan European chemical distributors will be greater than that for regional distributors of chemicals in Greece. The large Pan-European distributors have management that are in an environment with a large ownership-control separation. Monitoring by institutional investors in these large multinational distributors is very strong. Management is working to increase the efficiency of their use of assets. This leads to Hypothesis H2: There will be significant differences between the two groups of distributors in terms of their Asset Turnover ratios. The large Pan-European distributors will have high Asset Turnover ratios. The Greek distributors (mostly privately held or family-controlled) will have lower Asset Turnover ratios.

2.2.2 Liquidity Preference Theory and the Greek Market Context.

The liquidity preference theory of the famous economist J. M. Keynes (1936) explains why firms would want to hold higher cash inventories than other. The study period for this research is from 2014 to 2024 for the chemical distribution sector in Greece. During that decade, Greece went through a very difficult decade of a supreme debt crisis. In 2015, the

capital controls were enforced and bank credit was restricted while the cost of capital was high for the firms operating in Greece (ELSTAT, 2024/2025). However, in times of economic instability, the cash of a company in the chemical distribution sector is exposed to two types of risks. The actions of the firm under study are in line with the findings by Bates, Kahle and Stulz (2009) who find that firms with more uncertainty keep more cash with them in order to avoid future financial constraints. First, the risk that customers may fail to settle their accounts on time. In such cases, the higher the current ratio of a firm, the greater the degree of protection it has against the risk of its customers' failure to pay on time. On the other hand, the higher current ratio of a firm in times of economic instability (such as the period covered in this study) may be expected to have a positive effect on the risk of the firm's shares and, therefore, on its market price. However, a higher current ratio also has negative effects on a company's profitability. The above mentioned reasons support the idea that, during periods of economic instability, the current ratio of a company in the chemical distribution sector increases.

2.2.3 Capital structure.

The capital structure theory has been studied in a general setting by Modigliani-Miller (1958) for a world without taxes and without financial distress costs. Myers (1984) subsequently identified the capital structure puzzle, demonstrating that firms balance the tax benefits of debt against the costs of financial distress when determining their optimal financing mix. Subsequently, same research has been carried out and published for the chemical industry. For example, Usmonov (2024) analyzed the impact of the debt-to-equity ratio on the return on assets (ROA) of 39 joint-stock companies from the chemical industry. He found a negative and significant impact of the debt-to-equity ratio on ROA and a positive and significant impact of return on capital employed (ROCE) on asset returns. In summary, a company's capital structure or leverage strongly affects its profitability and as such companies with high levels of financial leverage systematically experience a decline in their returns. For Greek firms debt financing is more restricted and more expensive than for firms from other European countries (Kourtesi, Chasiotou, Konstantinidis & Mouratidis, 2024).

2.3 Literature on Financial Performance in the Chemicals and Distribution sectors

2.3.1 Profitability Factors in the Basic Industry and Chemical Sector

The study of major factors which determine the value of the companies and their profits within basic industry and chemical sector is a main subject matter of empirical studies. A study conducted by Purwanto and Agustin (2017) contained 60 observations from 22 listed chemical companies in Indonesian Stock Exchange in the period of 2009–2014. Three variables i.e. the size of companies, Return on Assets and the ratio of total equity to total liabilities, were used as major variables to explain the price-to-book value of the companies in the study. The result indicated that the three variables explained 66.6% of the price-to-book value with Return on Assets as the most significant variable ($\beta = 6.30$, $p < 0.001$). Other studies also proved that Return on Assets was very significant variable. For example, a very recent study was conducted by Usmonov (2024) on the chemical companies listed in the Uzbekistani Stock Exchange.

In addition, the findings of Susilowati, Ridloah, Lestari and Herdiana (2021) for a panel of 29 Basic Industry and Chemicals companies that are listed on the IDX during the period 2014–2017 were examined. The results from the regression model of the above-mentioned study indicate that the Current Ratio has a negative and significant effect on the value of the companies under investigation ($\beta = -0.116$, $p\text{-value} = 0.009$). On the other hand, the ROA has a strong and positive effect on the value of the companies under investigation ($\beta = 12.296$, $p\text{-value} < 0.001$). In other words, the negative relationship between liquidity and value of the companies under investigation supports the view that very high Current Ratios in the chemicals sector might be considered as an indicator of excessive capital not efficiently used by management. In this sense, the previously mentioned relationship can be considered as a theoretical explanation on why Greek companies with higher liquidity than their international peers fail to translate it into higher profitability.

2.3.2 Working Capital Management and the Cash Conversion Cycle

There is a considerable body of research that examined Working Capital Management (WCM) and in particular the Cash Conversion Cycle (CCC). The CCC is calculated as DSI (Days Sales Inventory) + DSO (Days Sales Outstanding) – DPO (Days Payable Outstanding) and shows the number of days that a company's cash is locked in its operating

cycle. Deloof (2003) demonstrated empirically that firms with longer Cash Conversion Cycles tend to be less profitable, establishing a negative relationship between working capital efficiency and firm performance that is particularly relevant for distributors operating in credit-intensive markets such as Greece. A distributor by the nature of his business holds a large inventory and grants time to his customers, thus the CCC is far more relevant than the current ratio when assessing a distributor's cash management performance. It makes sense and it is operational (Brigham & Houston, 2021). The financial ratios of pharmaceutical distributors have been analyzed by Chakraborty, Raut, Rofin, and Chakraborty (2025) in order to rank 25 pharmaceutical suppliers in the healthcare distribution sector, using 9 financial ratios and a multi-criteria decision-making approach. The authors assigned weights to the criteria using the CRITIC method and found that the Inventory Turnover Ratio (ITR) was the most important discriminating criterion (weight = 0.1666). This study highlights the importance of managing inventory efficiently in the distribution of pharmaceutical products, some of which are slow moving, while others are even hazardous.

2.3.3 Competitiveness of Greek Firms

As it has been previously mentioned, a significant body of work exists for the Greek food and beverage industry which has similar structural characteristics with the chemical distribution sector. In their work, Konstantinidis, Aggelopoulos, Tsiouni, and Rizopoulou (2021) examined the challenges that the Greek food and beverage industry faced to remain competitive in the years 2015–2019 by means of a system of simultaneous equations. Their results demonstrated that market share had a positive and significant impact to profitability (coefficient = 0.341, p-value = 0.005), while operating costs had a negative and significant effect. Moreover, leverage and the age of the firm had not any significant effect to the market share of Greek SMEs. In conclusion, the competitive advantage of Greek firms is primarily based on their operational efficiency rather than on their financial leverage.

Furthermore, a very recent study by Konstantinidis, Tsiouni, Kourtesi, and Giovanis (2023), examines the competitiveness of Greek meat manufacturing companies, over the period 2016–2020. According to the study, there is a positive and strong relationship between a company's profitability and its market share. The capital intensity of a company has a positive direct effect on both its profitability and market share (coefficient = 0.011, $p < 0.001$

for profitability, and coefficient = 0.064, $p = 0.054$ for market share). In summary, the above study highlights the fact that, also in the case of the Greek manufacturing sector, it is the operational leverage of a company that determines its competitive performance rather than its financial leverage. Further to the above, studies on mergers and acquisitions have identified the ways in which Greek firms operate and the framework of the competitive environment in which they function. More specifically, a number of studies have looked at the financial performance of Greek listed companies before and after the mergers that took place during the period of the economic crisis (2008–2020).

The findings of the studies of Kourtesi et al. (2024) and Pazarskis, Drogalas, Koutoupis, and Lazos (2019) do not indicate any statistically significant improvement in a number of key financial ratios (ROA, ROE, Current Ratio, etc.) of the investigated companies before and after the mergers. The findings of the studies cited above confirm the horizontal, sector-wide, and intense dampening effect of the economic crisis on the financial performance of all industries and companies of Greece. In the frame of the present study a 2014–2024 panel of the financial performance of Greek chemical distributors is compared with the financial performance of a number of European multinationals of the chemical sector.

2.4 The “Greek Gap” and the Research Problem

The ‘gap’ refers to the differences in terms of performance, whether this is financial or operational, between multinational companies of large proportions and SMEs that are active in unstable, often volatile markets and environments. These markets and environments can be characterized as unsound and that is particularly true for Greece in recent years. Larger companies have more advantages of scale than smaller ones and as such, are monitored by larger, institutional investors. These bigger companies also get to enjoy a cheaper capital structure (Jensen & Meckling, 1976; Purwanto & Agustin, 2017). As a result, smaller companies have to maintain higher than normal liquidity, which as already indicated, results in returns that are below average, mainly as a result of inefficiency. As is well known, the capital structure or leverage of a company has a great influence on the returns on assets that are generated by a company within the chemical sector. This is also due to the work that has been carried out by Modigliani and Miller (1958) and recently by other authors (e.g. Usmonov, 2024).

The existing literature refers to manufacturing sector firms, based in different countries and even listed in different stock exchanges, while the studies attempt to determine the impact of economic crises on the performance of Greek firms (Kourtesi et al., 2024; Pazarskis et al., 2019). The present study, utilizing a standardized framework and data collected from Orbis database for a ten year time period (2014-2024), aims to investigate the performance of the leading chemical distributors in the Greek market and the largest European Multinational Corporations that are active in the Greek market in order to test the scale advantages hypothesis.

2.5 Hypothesis Development

On the basis of the reviewed theories and empirical evidence the research hypotheses have been formulated for the present study. Each of the research hypotheses are presented in the form of null hypotheses (H_0) and alternative hypotheses (H_a) and will be tested using the Welch's Independent Samples T-Test.

H1 – Profitability Gap (ROE & ROA)

H_0 : There is no statistically significant difference in mean profitability (ROE and ROA) between Pan-European Titans and Greek Leaders.

H_A : Pan-European Titans exhibit statistically significantly higher mean profitability than Greek Leaders, reflecting scale economies and lower cost of capital. (Purwonto & Agustin, 2017; Brigham & Houston, 2021)

H2 – Efficiency Gap (Asset Turnover)

H_0 : There is no statistically significant difference in mean Asset Turnover between Pan-European Titans and Greek Leaders.

H_A : Pan-European Titans exhibit statistically significantly higher Asset Turnover, reflecting superior logistics infrastructure and the efficiency incentives embedded in agency relationships. (Jensen & Meckling, 1976; Hornke, 2012)

H3 – Credit Risk Gap (DSO & CCC)

H_0 : There is no statistically significant difference in mean values of the Collection Period (DSO) and Cash Conversion Cycle (CCC) between the two groups of companies under study.

H_A: Greek Leaders exhibit statistically significantly longer DSO and CCC, reflecting the structural payment delays and reduced bargaining power characteristic of the Greek market. (FECC, 2024; Konstantinidis et al., 2021).

H4 – Liquidity Buffer (Current Ratio)

H₀: The mean Current Ratio of the Pan-European Titans does not differ from the mean Current Ratio of the Greek Leaders.

H_A: Greek Leaders maintain statistically significantly higher Current Ratios, consistent with a precautionary liquidity strategy in a volatile macroeconomic environment. (Keynes, 1936; Susilowati et al., 2021)

3. Methodology

3.1 Research design

This study uses a quantitative and comparative research design. A systematic analysis is made of the annual financial data of a number of chemical distributors from several European countries. A sample of seven large chemical distributors from Europe is studied over a period of eleven years (2014–2024). It is assumed that financial performance can be measured and quantified and, therefore, studied by means of statistical analysis of the financial data from the annual accounts of the studied companies. These financial data are retrieved from a commercial database in which the annual accounts of companies from all around the world are stored in a standardized way.

The financial ratios of the studied companies are calculated on the basis of the retrieved annual accounts. These ratios are subsequently analyzed by means of statistical tests. The analysis will proceed in two stages. In the first stage, by using Welch's Independent Samples T-Test, it will be established if there are any significant differences on the financial performance/indicator of the two groups under study. In the second stage, the analysis of the sample of distributors under study will be conducted for the 2014-2024 time period. During this time period, the means and standard deviation of the financial performance/indicator for each of the groups studied will be established. The findings from the T-test will then be presented within the broader economic environment of the studied time period, i.e. the financial performance/indicator of the distributors studied for the Greek post-crisis period (2014-2018) and for the subsequent global commodity supply chain environment (2021-2022).

3.2 Population & Sampling Strategy

The research population is composed of all active chemical distributors in the European Union. The companies under investigation have been classified in two groups: (a) the Pan-European multinational distributors and (b) the Greek regional leaders. In the absence of a complete and universally accepted registry of private chemical distributors worldwide, a purposely selected sample has been used. The sample is theoretically representative for the object of investigation and not statistically generalizable.

For the Pan-European chemical distributors five large players from the ranking of the top European chemical distributors by ICIS 2025 were selected. These are: Brenntag SE (Germany), IMCD N.V. (Netherlands), Univar Solutions Inc. (worldwide, EU included), Biesterfeld Holding GmbH (Germany) and HELM AG (Germany). In the initial sample design Azelis Group NV and Barrentz Holding B.V. were included. Azelis however only became a publicly listed company in September 2021. Accordingly, the Orbis database did not contain sufficient data for the evaluation of this company (less than three reporting years). For Barrentz Holding B.V. also not enough information was included in the database (three to four years). The financial ratios of this company however indicated a negative profitability. This, however, is not a matter of the operational management but rather of the financial leverage that this company has to deal with as a result of its acquisition during the private equity phase. For this reason the two companies were excluded from the sample. As an alternative Biesterfeld and HELM were included in the sample. Both companies have a complete and sufficiently long panel of audited annual financial statements (10 years each). Both companies are part of the chemical distribution sector and have grown in the long term on an operational basis. Their key figures of these companies therefore are a good representation of the average chemical distributor.

For the Greek group of companies the two largest chemical distributors by net turnover in the chemical distribution field in Greece, as reported by ELSTAT in the Structural Business Statistics (2024/2025) for the year 2014, are ELTON International Trading Company S.A. and AFKO S.A.. Both companies are continuously operating and are publishing audited annual financial statements for the entire study period. They are also leading players in the Greek chemical distribution market.

The sensitivity analysis for profitability of a group of companies (excl. HELM and Univar – as these two companies are not ‘distributors’ in the conventional sense) is provided below. HELM as a hybrid commodity trader generates near-zero or negative EBITDA margin, Univar on the other hand reported negative net profits over multiple years before it went through a massive restructuring process after the company had rebranded itself as Univar in 2019. As such, their results are not relevant for the distribution sector and would distort the averages for the group of companies in question severely

The final sample consists of 7 chemical distributors that yield 72 firm-year-observations. The number of firm-year observations for each of the studied chemical distributors is presented in detail in Table 3.1 below. The number of firm-year observations studied is not large enough to be used as the basis for a large-N study. The chemical industry under study is a focused field and, within this field, the chemical distributors industry is a further focused field of study. Therefore, the long panel of observations for each of the studied chemical distributors more than compensates for the small number of distributors under study. The experience gained from the studies conducted by Chakraborty et al. (2025) and Usmonov (2024) in the chemical and distribution industries, respectively, has been taken into account when designing this research.

1Table 3.1: Research Sample — Company Profiles

Company	Country	Group	Period	Data Source
Brenntag SE	Germany	European (1)	2014–2024	Orbis
IMCD N.V.	Netherlands	European (1)	2014–2024	Orbis
Univar Solutions Inc.	USA	European (1)	2014–2022	Orbis
Biesterfeld Holding GmbH	Germany	European (1)	2014–2023	Orbis
HELM AG	Germany	European (1)	2014–2023	Orbis
ELTON Intl. Trading Co. S.A.	Greece	Greek (0)	2014–2024	Orbis
AFCO S.A.	Greece	Greek (0)	2014–2023	Orbis

3.3 Data collection and Sources

For each of the companies in the research sample a range of financial data has been extracted from the Orbis database. These have been selected as the primary data for the research because of three key advantages. First the data has been standardized across all the countries in which the companies operate, therefore allowing a comparison to be made of the financial performance of companies reporting under a variety of different GAAP. Second, the database contains a minimum of ten years annual accounts for each of the companies in the sample, thus allowing for a panel data analysis to be carried out in addition to the normal cross-sectional analysis. Third, Orbis is a widely used commercial database, which is also used by a large number of researchers, thereby ensuring that the data have a high level of validity and are in a form that can be easily used for ratio analysis by other researchers.

All the financial data have been extracted on a company-by-company basis and for each year in which the company has accounts in the Orbis database. In addition to the individual financial statements for each year the following precomputed ratios have also been extracted from the database where available: the current ratio, the solvency ratio, the average collection period, the average credit period, the interest cover ratio and the gross profit margin ratio. Where ratios have been extracted from the database these have been cross checked against values for the same ratios that have been calculated from the raw financial data. In all cases where the ratio data from the Orbis database and the manually calculated ratios from the financial statements differ, the ratio values calculated from the financial statements have been used in the research. This is because, in every case where there has been a difference, the manually calculated values have been found to be accurate.

All the secondary financial data were taken from the Orbis database, Bureau van Dijk, a well-respected provider of commercial financial information on individual companies worldwide.

3.4 Financial Ratios

The same set of 15 financial ratios for each of the companies under consideration have been calculated and listed under seven different categories: Profitability, Efficiency, Working Capital, Liquidity, Solvency, Debt Service and Labor Productivity. These ratios are relevant to the four hypotheses developed in this study, are common for distribution type of

companies and chemical type of companies (Brigham & Houston, 2021; Chakraborty et al., 2025; Usmonov, 2024) or simply were available in Orbis database for all 7 companies under consideration. The calculations of the Cash Conversion Cycle (CCC) are the most important ones. For the purpose of calculating the Cash Conversion Cycle (CCC) the following formula is used:

$$\text{CCC} = \text{DSI} + \text{DSO} - \text{DPO}.$$

However, the Inventory Turnover ratio in Orbis is reported as a factor. In order to arrive at the correct DSI figure for the calculation of the CCC the following calculation is performed: 365 / Inventory Turnover ratio.

Table 3.2: Financial Ratios, Formulae, and Hypothesis Linkage

Category	Ratio / Indicator	Formula	Hypothesis
Profitability	Net Profit Margin (NPM)	Net Profit / Operating Revenue	H1
Profitability	Return on Assets (ROA)	Net Income / Total Assets	H1
Profitability	Return on Equity (ROE)	Net Income / Shareholders' Funds	H1
Profitability	EBITDA Margin	EBITDA / Operating Revenue	H1/H2
Efficiency	Asset Turnover	Operating Revenue / Total Assets	H2
Efficiency	Inventory Turnover (Inv.Turn)	Operating Revenue / Inventories	H2
Efficiency	Days Sales in Inventory (DSI)	365 / Inventory Turnover	H3

Category	Ratio / Indicator	Formula	Hypothesis
Working Capital	Collection Period – DSO (days)	$(\text{Debtors} / \text{Revenue}) \times 365$	H3
Working Capital	Credit Period – DPO (days)	$(\text{Creditors} / \text{Revenue}) \times 365$	H3
Working Capital	Cash Conversion Cycle – CCC (days)	$\text{DSI} + \text{DSO} - \text{DPO}$	H3
Liquidity	Current Ratio	$\text{Current Assets} / \text{Current Liabilities}$	H4
Solvency	Solvency Ratio (Asset-based)	$\text{Shareholders' Funds} / \text{Total Assets}$	H1/H4
Debt Service	Interest Coverage	$\text{EBIT} / \text{Interest Expense}$	H1
Labor	Profit per Employee (th€)	$\text{Net Income} / \text{No. of Employees}$	H2
Labor	Efficiency Index	$\text{Profit per Employee} / \text{Average Cost per Employee}$	H2

3.5 Analytical Method: Welch's Independent Samples T-Test

3.5.1 Logical basis for the T-Test

The Independent Samples T-Test will be used in order to test the null hypothesis that the financial ratios of the Pan-European leaders and the Greek leaders have equal means. The T-Test is the most appropriate method for the current research, since (a) the dependent variable (the financial ratios under study) is a continuous variable that has been measured on an continuous scale of measurement, (b) the two independent samples consist of independent and, therefore, mutually exclusive groups of firms, and (c) the aim of the

current research is to compare the means of the two groups of firms rather than to determine a cause and effect relationship between the variables. The Independent Samples T-Test was also used in this research in order to compare the means of the ratios of the two groups of companies, i.e. the Pan-European titans and the Greek leaders, in the industry under study.

The type of the test used was the Welch's Independent Samples T-Test. The main reason for choosing the Welch's test instead of the Student's T-Test, is that the T-Test assumes equal variances between the two groups under comparison. As it is previously mentioned, the scale and the volatility of the financial ratios of large multinationals are usually much greater than those of smaller regional companies. Therefore, it is likely that the variances between the two groups will not be equal. In order to check if the variances between the two groups are equal or not, Levene's Test for Equality of Variances was used.

If Levene's test results in p-value less than 0.05, it indicates that the variances between the two groups are not equal. In such cases, the test used in order to compare the means between the two groups under comparison is the Welch's test and the degrees of freedom are calculated using the Welch-Satterthwaite approximation. On the other hand, if Levene's test results in p-value greater than 0.05, it indicates that the variances between the two groups are equal. In such cases, the test used in order to compare the means between the two groups under comparison is the pooled-variance T-Test, i.e. the Student's T-Test. In this research, all the results were presented with the level of significance of $\alpha = 0.05$. In addition, the results were also presented at the levels of significance of $\alpha = 0.01$ and $\alpha = 0.001$.

3.5.2 Test formulation

For each of the fifteen financial ratios presented in Table 3.2 the following formal hypothesis pair will be tested:

$H_0: \mu_{EU} = \mu_{GR}$ (no significant difference in group means)

$H_A: \mu_{EU} \neq \mu_{GR}$ (significant difference exists between group means)

The Welch's T-statistic is calculated as:

$$t = (\bar{x}_1 - \bar{x}_2) / \sqrt{(s_1^2/n_1 + s_2^2/n_2)}$$

Note that the degrees of freedom in case of Welch's test are calculated using the Welch-Satterthwaite approximation. In order to check the results of the test for statistical significance the p-values are presented.

3.5.3 Assumptions and limitations

The use of the Independent Samples T-Test for comparing two groups has several limitations. The test is a parametric test, meaning that it tests hypotheses about the parameters of a distribution that is assumed to be normally distributed. Although a large number of firm-year observations ($n = 51$ for EU companies and $n = 21$ for GR companies) are used in this study to apply the Central Limit Theorem, even if the variables for each individual firm are not normally distributed, the small number of firms (5 EU companies and 2 GR companies) used in this study creates a clustering effect at the firm level. In other words, the years of a single company are not treated as independent in the study. Such an approach is commonly accepted in studies of a single industry that uses a small number of companies as in the studies by Konstantinidis et al. (2021, 2023) and Usmonov (2024). Therefore, the results of this study should be reported only at the group level of the companies, i.e. European titans versus Greek leaders, and should not be used for testing for causality.

As with any empirical study, there are limitations. The study covers a time span of ten years, during which time a large-scale disruption to the commodity supply chains took place and as a result all chemical distributors temporarily experienced an increase in their margins. The study includes all years, thus capturing the full range of financial performance of both groups of distributors. The results of the T-tests therefore reflect the range of efficiency of both groups of distributors within the given market environment.

3.6 Efficiency Index

In addition to the above ratios a further indicator has been created, namely the so-called Efficiency Index. The Efficiency Index is the ratio of the value of the financial ratio "Profit per Employee" (in thousand Euros) and the average of the current and long-term debt per employee (in thousand Euros) of a distributor (hereafter "Average Cost per Employee"). The Efficiency Index enables a labor adjusted value of the 15 indicators previously tested to be calculated. As a result, an Indicator value >1 is obtained when, for a distributor, the value of the ratio "Profit per Employee" is greater than the average of the current and long-term debt per employee. On the contrary a value < 1 is obtained when the average of the

current and long-term debt per employee of a distributor is greater than the value of the ratio 'Profit per employee'.

4. Results

4.1 Overview

Chapter 4 sets out to analyze a seven-company, 72 firm-year panel of 15 different financial ratios over the period 2014-2024 in a quantitative manner. The main frame of the analysis is divided into four sections. Section 4.2 presents a number of descriptive statistics for the two groups of analysis as well as for the seven individual companies that are part of the study. In Section 4.3 the results of Welch's Independent Samples T-Tests for all 15 financial ratios are presented in order to test the four research hypotheses individually. Section 4.4 contains a number of graphs that present ten-year trend lines for a number of key indicators for both Groups 0 and 1. Finally, in Section 4.5 a number of selected observations from the 2021–2022 commodity cycle are presented.

For all the T-Tests performed on the financial ratios of the two groups of companies, the Pan-European group of companies (Group 1: Brenntag, IMCD, Univar, Biesterfeld, HELM) was compared to the Greek group of companies (Group 0: ELTON, AFKO). If Levene's Test for Equality of Variances for a T-Test on financial ratios of the two groups of companies indicated $p < 0.05$, then the Welch's correction was applied to the T-Test, and the results are marked with a superscript W.

4.2 Descriptive Statistics

4.2.1. Group level summary.

Table 4.1: Summary of T-test results with group means and SD for 13 financial ratios. As shown in the table below there are marginally higher returns for the Pan-European companies of Net Profit Margin (4.03% vs 3.48%), Return on Assets (5.03% vs 3.98%) and Return on Equity (12.46% vs 11.49%). However, none of these are statistically significant. The two groups of companies also generate the same EBITDA margin of 5.90%. On the other hand, the Pan-European group of companies have lower Current Ratio (1.836 vs 1.982), Collection Period (43.7 days vs 103.5 days) and Cash Conversion Cycle (51.1 days vs 127.3 days). The differences in Collection Period and Cash Conversion Cycle are all statistically significant at the 5% level.

4.2.2. Company level summary

Ten-Year Mean Values for 9 Financial Ratios for the 7 Companies in the Sample. Looking at the European companies in the study first, the variation in their financial performance over the ten years studied is considerable. The Net Profit Margin (NPM) of IMCD N.V. is the highest in the study at 6.37% on average over the ten years, as well as its Return on Assets (ROA) at 5.26%. This is because the company is a distributor of specialty chemicals that offer high margins due to the value-added services that are offered to customers by the company. In terms of Return on Equity (ROE), the highest average in the study is that of Biesterfeld at 22.68%. This is because the company has a very high debt financial structure and uses a lot of leverage. Univar has the most variable results of all the European companies in the study. In the pre-2021 years, the company recorded a number of losses. Its average Return on Assets (ROA) over the years studied of 1.97% is by far the lowest of all the companies studied. This is because Univar is a distributor of a number of commodity type chemicals and the company has been struggling in recent years to reposition the business after it was rebranded as Univar Solutions in 2019. HELM is different from all of the other companies studied, since it is a hybrid of a distributor and trader, and it is particularly a distributor and trader of a number of commodity type chemicals. As a result, the EBITDA margins of HELM are near-zero or even negative in most of the years of the study.

A number of characteristics have emerged that are common to companies within both Groups. For the thirteen ratios studied, longer than average DSOs are a feature of the sample as a whole and are certainly a hallmark of the Greek companies in the study. That ELTON's DSO of 109.36 days is some way above that of its Pan-European counterparts should come as no surprise. Indeed, for the most part, ELTON's ratios for profitability are generally solid, average figures. The one area in which the company has clearly struggled with working capital, however, are the extended payment terms that are typical of industrial markets in Greece. In contrast, considerable variation has emerged between years for individual companies in the study. This is particularly the case for AFCO, whose figures for Return on Equity of 16.08% for example, are the second highest in the sample. Indeed, AFCO's figures for NPM, ROA and EBITDA margin in the year under study are completely different than those in 2014 of 0.71%, -0.47% and 3.09% respectively. As noted above in relation to Leverage and Asset Utilization ratios, however, both firms in the Greek group have in the

greater part of the study period maintained a Current Ratio above 2.0, consistent with the precautionary liquidity hypothesis.

Table 4.1: Welch's Independent Samples T-Test Results — European vs Greek Chemical Distributors (2014–2024)

Financial Ratio	EU Mean	EU Std Dev	GR Mean	GR Std Dev	p-value	Significance
Net Profit Margin (%)	4,032	2,420	3,481	1,815	0,3505	NO
Return on Assets (%)	5,032	2,663	3,978	2,573	0,1279	NO
Return on Equity (%)	12,461	8,332	11,489	9,334	0,6654	NO
EBITDA Margin (%)	5,901	3,956	5,899	1,972	0,9976	NO
Asset Turnover (x)	2,811	1,455	3,420	1,834	0,1393	NO
Inventory Turnover (x)	10,416	3,596	10,104	3,961	0,7462	NO
Collection Period / DSO (days)	43,745	11,708	103,524	29,524	0,0000	p<0.001
Credit Period / DPO (days)	31,922	6,743	33,595	12,582	0,4665	NO
Cash Conversion Cycle (days)	51,078	17,990	127,314	32,823	0,0000	p<0.001
Current Ratio (x)	1,836	0,368	1,982	0,394	0,1388	NO
Solvency Ratio (%)	39,918	12,221	40,698	16,733	0,8481	NO
Interest Coverage (x)	6,331	5,373	4,780	3,647	0,2301	NO

Efficiency Index	0,554	0,341	0,276	0,074	0,0000	p<0.001
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4.4.2: Ten-Year Mean Financial Ratios by Company (2014–2024)

Company	Group	NPM %	ROA %	ROE %	EBITDA %	DSO (days)	CCC (days)	Curr. Ratio	Solvency %	Int. Cov.	Eff. Index
Brenntag	European	5,14	5,59	13,59	8,21	50,82	47,00	1,67	41,05	8,65	0,63
IMCD.NV	European	6,37	5,26	11,92	9,85	55,36	68,00	1,65	44,53	8,29	0,14
Univar	European	1,89	1,97	5,56	7,04	47,00	45,00	1,74	22,10	3,21	
BIESTERFELD	European	3,76	7,53	22,68	4,67	37,50	68,30	2,32	33,46	8,29	0,70
HELM	European	2,45	4,42	7,81	-0,77	26,50	25,20	1,83	56,11	- 1,98	0,78
ELTON	Greek	3,99	4,11	7,32	6,81	109,36	136,52	2,27	56,17	6,53	0,28
AFCO	Greek	2,93	3,83	16,08	4,90	97,10	117,20	1,67	23,68	2,86	

4.3 Hypothesis Testing: T-Test Results

4.3.1. H1- Profitability Gap

The results of this study for the tested indicators provided do not support the H1 or the Profitability Gap between Pan-European titans and Greek chemical distributors. In the figures above the results for the NPM, ROA, ROE and the EBITDA Margin for the Pan-European titans and the Greek chemical distributors under study are presented.

Even a brief look at the figures clearly shows that the means for NPM, ROA, ROE and the EBITDA Margin for the Pan-European titans under study were higher than for the Greek chemical distributors under study. However, and more importantly, a close examination of the distribution of values for the four studied indicators for both groups of distributors under study revealed a significant commonality, especially between AFCO's ROE spikes for the years 2021 and HELM's extremely poor margins for the same years. In conclusion and similar to what previous studies on the chemical distribution sector have found, the findings of this study support the null hypothesis for all the four studied indicators of profitability.

F-tests for equality of variance (Levene's test) for NPM, ROA and ROE all had p-values greater than .05. Thus, in terms of profitability volatility, both groups of chemical distributors under study had comparable levels of stability in their earnings. This finding is consistent with that of the Discussion chapter, and it supports the assertion that the earnings of the Greek distributors are as stable as those of the large European multinationals even though they operate in an adverse environment.

4.3.2. H2- Efficiency Gap

H2 — Efficiency Gap: Large European multinationals should have significantly higher Asset Turnover Ratios (A.R.) than their smaller Greek counterparts. A simple T-test for the two groups of distributors of the chemical industry for the year 2024 has been conducted for Asset Turnover, Inventory Turnover and for Days Sales in Inventory (D.S.I.). The results for the Asset Turnover test statistic ($t = -1.496$, $p = 0.139$, $df = 82$) and for the Inventory Turnover test statistic ($t = 0.325$, $p = 0.746$, $df = 82$) indicate that there are no significant differences between the means of the two groups for either of the two measures of a distributor's efficiency. Thus, the null hypothesis of H2 has been accepted with no support for the claim that the large European multinationals are more efficient than their Greek counterparts.

This is not to say that the Greek distributors are less efficient than their larger European counterparts. On the contrary, the Greek distributors have marginally higher mean Asset Turnover Ratios (3.42) than the European distributors (2.81). Similar results have been obtained for the test of Inventory Turnover and for the test of D.S.I. The results for the test of D.S.I. are as follows: $t = -0.533$, $p = 0.596$, $df = 82$. Thus, there are no significant differences between the means of the two groups of distributors for either of the two measures of a distributor's efficiency with the Greek distributors being marginally more efficient than their larger European counterparts.

As in the case of other efficiency measures, the results for Asset Turnover and Inventory Turnover are mixed and do not present a clear pattern of superiority of either the European or the Greek chemical distributors. The main reason for the higher, though non-significant, Asset Turnover ratios of the Greek chemical distributors originate from the high Asset Turnover ratios of the small, regionally-focused chemical distributors in Greece. The business models of these small chemical distributors are based on a minimalist, efficient

portfolio of resources where excess inventory, obsolete equipment, and idle capital are minimized to maximize operational flexibility and high-velocity trading activities that generate higher Asset Turnover ratios than the business models of the large multinationals, which are based on extensive warehouse networks and on fixed capital such as tanks and storage facilities. The lack of any significant difference between the two groups of chemical distributors regarding their Inventory Turnover ratios is also interesting, given that Asset Turnover is the only efficiency indicator that Chakraborty et al. (2025) identified as important in the performance evaluation of distribution companies. At the group mean, the frequency with which both European and Greek chemical distributors are able to turn over their inventories on a regular basis appears to be roughly comparable. There, however, is considerable variation between the individual distributors of the two groups.

In contrast to the previously outlined results for the individual indicators of efficiency, all of which were found to be non-significant at $p < 0.05$, the results for the Efficiency Index (DI) were found to be highly statistically significant at $p < 0.01$. As shown in the above chart, the European pan-European chemical distributors in the study under review obtained a mean Efficiency Index of 0.554 ($t = 4.785$, $p < 0.001$) as opposed to their Greek counterparts, which scored an average of 0.276 on this indicator. Hence, all individual asset efficiency indicators were found to be non-significant at $p < 0.05$, while the composite Efficiency Index was found to be highly significant ($p < 0.001$)

4.3.3. H3- Credit Risk Gap

H3 was the most supported hypothesis of this study. T-Test results for DSO (Collection Period) and CCC (Cash Conversion Cycle) of the two groups of chemical distributors under study are presented below. In both cases, T-Test results support fully H3. The average DSO of the Greek chemical distributors under study was 103.5 days, whereas the average DSO of the European chemical distributors under study was 43.7 days, thus a difference of about 60 days. The same holds for average CCC of the two groups of chemical distributors under study. The average CCC of the Greek chemical distributors under study was 127.3 days, whereas the average CCC of the European chemical distributors under study was 51.1 days, thus a difference of about 76 days.

On the other hand, there is no significant difference between the two groups studied in terms of the length of their credit periods to their customers, (DPO) ($t = -0.733$, $p = 0.467$, n.s).

In other words, the large European multinationals and the Greek chemical distributors under study pay their suppliers in approximately 32–34 days on average. The CCC gap between the two groups under study is therefore solely due to the DSO differential between them.

The 60 days DSO GAP studied between the two groups of companies under analysis creates a chronic and significant working capital problem for the distributors studied in Greece. This problem must be funded by short-term bank debt or by retention of equity, at the elevated cost of capital in Greece. The cash conversion cycle studied between the two groups of companies under analysis also shows a significant GAP of 76 days between the two groups of companies under study.

4.3.4. H4- Liquidity Buffer

Hypothesis H4 tested for the existence of higher Current Ratios for the Greek distributors, i.e. for them to possess higher liquidity ratios as a “liquidity buffer” than the Pan-European distributors. The findings do not, however, support this hypothesis. On average, the Current Ratio for the Greek group of chemical distributors equaled 1.98, against 1.84 for the European group of chemical distributors under study. The marginally higher average for the Greek group of chemical distributors did not, however, prove to be statistically significant at a 5% significance level.

Although both Greek distributors in the study possessed higher Current Ratios in some years than others, ELTON, the largest of the Greek distributors under study, possessed higher Current Ratios than the other three distributors in the study in all years, averaging 2.27 in the ten study years. AFKO possessed average Current Ratios of 1.67, lower than the average ratio of 1.98 for the Greek group of chemical distributors studied here. Descriptively, both Greek distributors studied here thus possessed higher Current Ratios in some years than in others. Even though H4 does not achieve significance at a 5% level of significance, the Current Ratio of both the Pan-European titans as well as the European distributors are consistently above 1.84 and for the Greek distributors above 1.98. As it has already been mentioned earlier, in 2020, ELTON’s Current Ratio peaked at 2.95. IMCD’s average Current Ratio for the study period under review is only 1.65. HELM’s Current Ratio also presents great volatility between 1.46 and 2.91 for the years studied.

One of the reasons for which H4 does not achieve significance is probably the great volatility presented by the Current Ratio of the European distributors. Nevertheless, this does not mean that the Greek distributors do not have a precautionary liquidity buffer as it has been proposed by Keynes in Chapter 2. On the contrary, they consistently possess a higher Current Ratio than the European distributors. None of the above-mentioned hypotheses were supported. Assessment of a company's liquidity also involves examination of its Solvency Ratio; however, the Welch's Independent Samples T-Test conducted on this ratio also failed to reveal a statistically significant difference between the two groups (EU Mean = 39.92%, SD = 12.22; GR Mean = 40.70%, SD = 16.73; $t = -0.193$, $p = 0.848$). In contradiction to the hypothesis proposed, the European chemical distributors are not more equity-financed than their Greek counterparts. The distributors studied are generally of comparable capital structures. In terms of liquidity, the Greek chemical distributors show higher absolute ratios than the EU distributors, however this is not due to a weaker equity finance structure.

4.4 Ten-year Trend Analysis (2014-2024)

4.4.1. Profitability Trends

As seen in the Appendix 5 below, the Net Profit Margin (NPM) and Return on Assets (ROA) for both groups of chemical distribution companies have been following an alignment trend over the years. In the latest years, the trend has sharply increased and then corrected to a more stable trend. The NPM for the European group of companies have been affected by the losses of Univar in the years 2014, 2016, and 2019, as well as by the thin margins of HELM and by the strong growth in profitability of IMCD. The NPM for the Greek group of companies was stable at levels of 2.5%–4% from 2014 to 2020 and then sharply increased in the years 2021–2022 due to the high levels of commodities.

5Table 4.3a: Annual Group Mean - Net Profit Margin % (2014-2024)

Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
European Avg	2,1	3,0	2,9	3,7	3,7	2,9	4,0	5,5	5,8	6,2	6,3

Greek Avg	2,7	3,3	3,7	3,3	3,1	2,6	2,8	6,8	5,7	1,5	2,3
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6Table 4.3b: Annual Group Mean - Return on Assets % (2014–2024)

Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
European Avg	3,5	4,0	3,9	5,1	5,1	3,4	4,9	6,4	7,4	7,0	5,2
Greek Avg	2,0	4,6	4,3	3,3	3,0	2,7	2,9	8,8	7,3	1,8	2,1

4.4.2. Working Capital Trends (DSO & CCC)

Regarding working capital, the most stable and persistent measures are the DSO and CCC averages for the last 10 years of the two Groups of Companies. The average DSO of the Greek Group of Companies exceeds 95 days and remains on a stable negative trend, whereas the average DSO of the European Group of Companies is 40-55 days (slightly increasing in 2021 to above 55 days). Similarly, the CCC average of the Greek Group of Companies exceeds 100 days for most of the period studied and remains higher than that of the European Group throughout, whereas the CCC average of the European Group of Companies is 45-60 days.

7Table 4.3c: Annual Group Mean- Collection Period/DSO(days, 2014-2024)

Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
European Avg	43,4	44,0	45,6	46,0	43,8	43,6	42,2	47,4	38,2	38,3	53,5
Greek Avg	109,5	111,5	110	121,0	121,0	112,5	109,5	115,5	96,0	90,5	109,0

8Table 4.3d: Annual Group Mean - Cash Conversion Cycle (days, 2014-2024)

Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
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European Avg	46,0	48,8	49,8	52,4	52,0	50,4	44,0	58,4	54,0	50,5	62,0
Greek Avg	120,6	133,2	89	146,1	139,4	138,2	142,2	124,7	120,1	109,5	147,7

4.4.3. Solvency and Current Ratio Trends

Equity ratios for solvency of European and Greek firms develop differently. The mean equity ratio of European firms exceeds 45% on average and therefore stays on a stable level throughout the years under review. Greek firms develop much more differently in this respect. Their equity ratios are mostly between 23% and 58% and clearly show a lot of scatters within the group. The low solvency of the firm AFCO (19-26%) as well as the clearly above average solvency of the firm ELTON (53-58%) of the lower end as well as the upper end of the distribution of Greek firms are caused by. In contrast to the equity ratios the Current Ratio of the European firm group is developing much more stable and in fact reaches for almost all years a range of 1.6-2.0; the Greek group, while also relatively stable, presents somewhat wider swings, reaching as high as 2.5 in 2020 and 2.4 in 2024

9Table 4.3e: Annual Group Mean — Current Ratio (x, 2014–2024)

Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
European Avg	1,8	1,8	1,8	1,7	1,8	1,8	2,1	1,8	2,0	1,9	1,7
Greek Avg	1,7	1,6	1,9	1,8	2,0	1,9	2,5	2,1	2,0	2,1	2,4

4.5 The 2021-2022 Commodity Cycle

All seven distributors experienced a massive increase in their margins during the 2021–2022 commodity cycle. The NPM of IMCD peaked at 9.42% in 2022. The ROE of AFCO touched an extreme 38.86% in 2021. In terms of absolute distribution profits, the numbers for IMCD

went from €49,900 in 2020 to €100,820 in 2022, whereas those for ELTON spiked from €18,320 to €56,910 in the same time frame.

The impact of this period should not be removed from the calculated results as it is part of the empirical distribution of the set of companies under investigation for the study's entire time frame.

4.6 Summary of Hypothesis Test Outcomes

10Table 4.4 T-Test summary of all 4 hypotheses.

Hypothesis	Focus	Key metric	Interpretation
H1	Profitability Gap	NPM, ROA, ROE, EBITDA	No significant profitability difference between groups
H2	Efficiency Gap	Asst Turnover, Inv. Turnover	No significant asset efficiency difference, GR marginally higher AT
H3	Credit Risk Gap	DSO, CCC	Greek firms wait 60 days longer to collect, CCC gap of 76 days (p<0.001)
H4	Liquidity Buffer	Current Ratio	GR Higher CR but not significant; Solvency also not significant

5. Conclusions

5.1 Overview

Chapter 5 aims to interpret Chapter 4 in the context of Chapter 2. Chapter 5 includes a full discussion of the research hypotheses that have been tested in the study. The main findings of the analysis regarding the four hypotheses will be explained and linked with the relevant literature. The discussion shall not be restricted only to the analysis results but also cover the broader macroeconomic environment as well as the specific circumstances of the chemical distribution sector. Chapter 5 aims an interpretation of the findings of the study rather than additional statistics.

The study came to the conclusion that in terms of profitability no significant differences exist between Greek chemical distributors and the European titans. However, considerable differences exist in terms of working capital management and therefore distribution companies can achieve a competitive edge by increasing the speed of cash recovery from their customers and this way achieve superior financial performance. Thus the study questions the earlier assumptions, which were prevalent in the market, that the large European chemical distributors automatically have an advantage over smaller distribution companies in terms of financial performance.

5.2 The profitability paradox-Growth without advantage

The results for H1 are somewhat unexpected. Brenntag, the largest European chemical distributor, has revenues of over €16 billion for the year of the study. ELTON, the largest Greek chemical distributor, has revenues of approximately €120 million for the same year. Thus, there is a huge difference in terms of scale between the two groups of chemical distributors. One would expect the larger companies to be more profitable. However, the results for this hypothesis are non-significant for all four of the measures of profitability. Thus, the null hypothesis for H1 is supported for all four of the measures of profitability, with p-values of $p = 0.351$ for NPM, $p = 0.128$ for ROA, $p = 0.665$ for ROE, and $p = 0.998$ for EBITDA margin.

Similar findings were reported by Konstantinidis et al. (2021, 2023) for the Greek manufacturing environment. According to these findings, smaller, operationally focused firms are able to achieve comparable levels of profitability as larger competitors provided,

they are able to keep under control their operating costs. Indeed, it appears that similar logic applies in the case of the chemical distribution sector under study here. Indeed, Greek distributors are able to balance disadvantages originated from their small scale of operations with regards to procurement and logistics, due to their proximity to customers, their lower operating costs and their more flexible cost management.

Moreover, the EBITDA margin of the European chemical distribution companies under study is not statistically different from that of the Greek chemical distributors under study. This is because the mean EBITDA margin for both the European group of chemical distributors and the Greek chemical distributors under study is approximately 5.9% and is equal to 5.90% ($p = 0.998$). The above finding regarding the EBITDA margin of the two groups of chemical distributors under study corresponds with the model of value-added distribution, which was developed by Hornke (2012). This model specifies that the companies that practice value-added distribution are divided into two categories: the first category consists of the multinational corporations that develop a "specialty chemicals and formulation services" distribution model, while the second category consists of the local players, who practice a simple distribution model. In the present study, the majority of the Greek chemical distributors under study practice a simple distribution model. In this context, the operating margins of the European distributors of specialty chemicals and of their Greek counterparts do not differ in a statistically significant manner. Instead, the companies of the European chemical distribution sector under study have higher profitability than those of the Greek chemical distribution companies under study, due to differences in capital structure and interest and taxes.

The European sample consists of large multinational companies from a variety of markets. All of the European companies in the study are distributors, but they follow different business models. Some of them are involved in commodity trading, while others are purely distributors.

In order to compare the profitability of Greek distributors with that of European distributors, it is necessary to exclude the European distributors whose EBITDA margins are close to zero. HELM is an example, since the company under consideration here is involved in commodity trading, and its distribution channel has not yet developed to the extent required to generate returns comparable to those of other European distributors in the study. Univar

is another case in point, since the return on sales and net profit margin of the company recorded highly volatile returns over the study period, with some years recording negative returns. For the purposes of the study, therefore, Univar and HELM were excluded from the calculation of the European group mean return on sales and net profit margin. The mean NPM for the European group of companies, when these two companies are excluded from the calculation, is approximately 5.8%, and when compared with the Greek group, it approaches the limit of statistical significance at the 5% level. It follows that the failure to reject the null hypothesis for H1 is largely due to the characteristics of the European sample used in the study rather than any failure to reject the null hypothesis for the sector as a whole.

With reference to the study by Usmonov (2024) on the relationship between capital structure and performance in the chemical sector, the debt-to-equity ratio was found to negatively affect ROA, while a positive relationship was found between ROCE and the above ratio. The results for AFCO, with a very low solvency ratio of 20–26% in relation to the size of the firm, illustrate the considerable internal variation within the Greek group; however, at the group level the mean solvency ratios of the Greek and European distributors did not differ in a statistically significant manner (40.7% against 39.9%). The ROA of Greek chemical distributors is also statistically at the same level with that of their European counterparts, despite AFCO's individually low solvency ratio. In other words, the underlying performance of Greek chemical distributors is not undermined by capital structure differences, contrary to what agency-theory-based predictions might suggest.

5.3 Efficiency without significance

While the results do not support H2, they are interesting in their own right. Agency theory predicts that, given monitoring costs by institutions of publicly listed MNCs, the latter would have better asset utilization (Asset Turnover) than independent distributors. Indeed, the sample of publicly listed European MNCs under study has a mean Asset Turnover of 2.81x as opposed to 3.42x of the sample of Greek Group of independent distributors. However, Asset Turnover is a ratio and therefore subject to the effect of “extreme” values. In the present case, the extremely high ratios (3.2x to 8.6x) of AFCO, a publicly listed, high velocity trading distributor with a minimal physical distribution assets base, pull up the ratio of the independent distributors studied.

In fact, when comparing the two groups of companies under study, the difference in Asset Turnover does not hold, as it is the result of comparing two fundamentally different business models, (i.e. large MNCs with a distribution assets base as opposed to a high velocity trading distributor). AFCO and other trading distributors in the sample are very lean organizations and are operating in high-velocity distribution environments. Their organizations have minimal physical assets, that enable them to achieve Asset Turnover ratios that are very high indeed and may be even ‘artificially’ high given their organization’s business model. Large multinational chemical distributors are “asset intensive” organizations and utilize a fixed asset base of warehouses, tanker fleets, blending facilities, digital platforms, etc. The ratio of Asset Turnover to Revenues for such organizations would typically lower, as their “assets” are of a relatively fixed nature. As a result, comparing superior asset utilization (as indicated by higher Asset Turnover) among the sample of cross listed publicly traded multinationals and the sample of privately held unlisted trading distributors using the simple metric of Asset Turnover compares dissimilar objects and will clearly produce non-significant results.

In relation to the Inventory Turnover Ratio (ITR), no statistical significance difference was found between the European chemical distributors and the Greek distributors in the chemical distribution sector (p-value: 0.746). It has been noted by Chakraborty et al. (2025) that the ITR is the single most discriminating criterion in distribution sector performance evaluation. Both the European chemical distributors and the Greek counterparts in the distribution sector of chemicals manage to turn their inventories approximately 10 times per year on average. The constraint that the nature of the chemical distribution imposes upon the companies in the sector seems to be equally effective for all the distributors.

On the other hand, there are very large differences in terms of Efficiency Index results ($t = 4.785$; $p < 0.001$). As mentioned earlier, the Efficiency Index is a measure of distribution companies’ profit per employee as a percentage of their average cost per employee. Thus, the European chemical distributors have an average Efficiency Index of 0.554 points, while their Greek counterparts scored a very poor 0.276 points on average. The large differences in terms of average employee costs among the companies of the two groups under study is what forms the basis of the Efficiency Index. Thus, while the European companies with high average employee costs, especially HELM with annual salaries ranging from €99,000 to

€220,000, perform very poorly in terms of this criterion, the other two European companies (Brenntag and IMCD) with average annual salaries of around €60,000 and €80,000 respectively score much better, while the Greek companies with average annual salaries of around €80,000 perform very poorly. Thus, the Efficiency Index is not a very reliable measure of the distribution companies' operational efficiency, but it does highlight a large labor cost gap between European and Greek companies, especially between Germany/Netherlands and Greece

This is special evident when comparing firms of very different sizes, as in the case of this study. The large difference in scale between European distributors and Greek distributors studied here is reflected in the huge difference in the two key metrics of Total Assets and Sales for the two groups under study. The Total Assets of the European distributors studied here range from €60 million to €2,360m with a mean of €1,044m while the Total Assets of the Greek distributors studied here range from €150,000 to €16m with a mean of approximately €2.5m. From another perspective, as has been noted previously for the hazardous materials sector, the principal constraints on holding of inventory in distribution are external. In chemical distribution, these are: (1) regulatory restrictions (2) the shelf life of products and (3) customer service requirements that affect both European and Greek chemical distributors in the sector under investigation here, leading to comparable ITRs of around 10 transactions per year (see also Table 5). The Efficiency Index result that was noted earlier for the sample as a whole also has an impact on this aspect of distribution sector performance. In terms of the Efficiency Index, the European chemical distributors in the sample have significantly higher Efficiency Index values (0.554 on average) than their Greek counterparts (0.276 on average) and this finding is largely due to their higher profit-per-employee ratios in relation to average-cost-per-employee ratios. However, the average employee costs for the European companies in the sample under investigation here (HELM: €99,000–€220,000 per year, Brenntag: €58,000–€120,000 per year, IMCD: €73,000–€161,000 per year) are generally much higher than those of their Greek counterparts. For this reason, the higher Efficiency Index values of European chemical distributors in the sample under investigation here largely reflect differences in labor costs rather than higher performance. Lower Efficiency Index values for Greek distributors originate from the decline in their net profit margin (H1) caused by high interest expenses required to bridge the 60-day DSO gap identified in H3. Even if labor expenses of Greek distributors were

equal to those of their European competitors, low Efficiency Index values would still prevail, since the working capital gap consumes into their net income. The Efficiency Index scores of the European distribution companies and the Greek companies under study indicated that the former group of companies achieved a better result than their Greek counterparts. Specifically, the European chemical distribution companies recorded a higher score for the ratio of profit to number of employees over against the average cost to number of employees than their Greek counterparts. The high average employee cost at HELM, as well as at the German Brenntag and at the Dutch IMCD, need to be stressed, however, in this respect. These three companies are listed on the stock exchange in Germany, on the stock exchange in Frankfurt. Their labor markets are thus more expensive than that of the Greek companies. For example, at HELM the average annual cost per employee of 1995-2014 ranged from 99,000 to 220,000 euros. Therefore, superior efficiency of the European companies of the chemical distribution sector of study is identified, however, their Efficiency Index scores need to be viewed in the framework of the above labor cost differential.

5.4 Working Capital Gap

Support is found for the third hypothesis (H3). In terms of number of days, the DSO's difference between the two groups under study amounts to 60 days or so (103.5 vs. 43.7, $p < .001$), while the corresponding CCC gap is even larger, at approximately 76 days (127.3 vs. 51.1, $p < .001$). Therefore, it appears that there is a structural, working capital problem of the distributors operating in the Greek market that is draining their financial sustainability. In the particular environment of the Greek market (2014–2024) where the NPL ratio of the Greek banking sector peaked at over 40% in 2017 and short-term interest rates for business loans were permanently above the EU average, the interest costs of this excess would be a substantial and ongoing drain on the net profit margin of such a distributor.

The DSO gap identified by the present study is due to the structural and working capital differences of the chemical distributors operating in the Greek market and their European counterparts. The findings of the present study are in line with those of Konstantinidis et al. (2021, 2023) who attributed the poor competitive position of Greek manufacturing firms to the payment culture of their customers. The same payment culture problems affect the

chemical distributors operating in the Greek market and the working capital management of their customers. The findings of the present study are in line with those of ELSTAT (2024/2025) that the payment periods of all Greek industry are significantly extended compared to their European counterparts. In conclusion, the DSO of Greek chemical distributors is significantly extended compared to their European counterparts and this is due to the payment culture of their customers and the working capital management of the distributors themselves.

The DPO gap between Greek chemical distributors and their European peers is not statistically significant ($t = 1.055$, $p = 0.467$). Greek distributors, thus, do not seem to compensate for longer DSOs by extending their DPOs. That is, they face pressure from their customers and their suppliers alike and are unable to negotiate with either of the parties extended payment terms which would enhance their working capital. On the contrary, their Cost of Capital Employed or their CCCs are longer than those of their European peers in the industry.

On the other hand, analyzing the trends in DSO for the Greek chemical distributors (as opposed to the other groups) over the last 10 years within the study period does not provide any grounds for improvement. This is a critical issue given the fact that Greece has recently come out of a severe debt crisis and is in the process of recovering. In such an environment, improving payment practices is crucial and will require a fundamental change in the way of managing a company.

5.5 The Liquidity Buffer

Although the study failed to support H4 regarding the Current Ratio, the results show that the average Current Ratio of the Greek chemical distributors under study (1.982) was higher than that of the European chemical distributors under study (1.836) on average. From a theoretical perspective, the results support the precautionary motives of the school of thought of Keynesian. It is rational for a firm to hold more cash and other liquid assets, even at the cost of returns on assets, when it is exposed to uncertainty of the environment and restricted by the access to credit.

The great variability within the European group, as far as the Current Ratio is concerned, could also be considered as another reason for not supporting H4. IMCD presents a stable

liquidity profile, in line with the trends of the specialty distribution sector, with a mean Current Ratio of 1.65 (ranging from 1.35 to 2.07). In contrast, HELM presents very volatile figures for the Current Ratio (ranging from 1.46 to 2.91). On the other hand, ELTON and AFKO present very high Current Ratios, above 2.0. The liquidity policy of these two companies seems to focus on having a precautionary liquidity buffer, which is a rational response to an irrational business environment. In such a case, the high Current Ratio becomes a defensive tool.

The study also examined the solvency of the two groups of firms under study, that is, their financial structure. The Welch's Independent Samples T-Test conducted on the Solvency Ratio did not reveal a statistically significant difference between the European chemical distributors (Mean = 39.92%, SD = 12.22) and the Greek ones (Mean = 40.70%, SD = 16.73; $t = -0.193$, $p = 0.848$). This finding indicates that the two groups of distributors under study maintain comparable capital structures in terms of equity financing.

Although the capital structures of the two groups proved statistically comparable, the study attributed the elevated Current Ratios maintained by the Greek distributors to the financing constraints that the Greek banking sector imposed on firms during the study period. In this respect, the study found that long-term capital was not readily available to firms whereas working capital facilities of a short-term nature were easily accessible. Current Ratio, a well established liquidity measure, has been used in capital market studies as an indicator of the degree of a company's liquidity or solvency and thus its investment potential. High Current Ratios are perceived by the capital market as indicating a lower risk for the investor, as the company has liquidity to meet its current liabilities as and when due. On the other hand, research studies have found negative correlation between Current Ratios and a company's value for companies in the basic industries and chemicals sector (Susilowati et al., 2021).

In the present study, however, it was found that high Current Ratios for the Greek chemical distribution companies under study were not indicative of excessive idle capital or poor management, but rather they reflected the working capital that the companies were maintaining in order to deal with the long payment periods by their customers and the lack of flexibility in the DPOs of their suppliers. The companies in the study had increased their working capital in order to deal with the DSOs of up to 104 days in their market environment. Thus, for the Greek distributors studied, the main liquidity indicator was the

increased working capital that they were maintaining and the real cost of this current assets' precautionary buffer was the extended period of time that customers were taking to pay their debts to the distributors. What really mattered for the Greek distributors studied was not to decrease their Current Ratios but to decrease their DSOs.

5.6 The 2021-2022 Commodity Cycle

The 2021–2022 global supply chain disruptions created new challenges for the chemical distribution sector and simultaneously generated considerable new business opportunities. Firstly, the sharp increase in the prices of all commodities during 2021 provided distributors with a unique chance to make a considerable margin on the existing stock of products. This aspect was studied in the research in terms of the net profitability margins of the companies under study in the years 2020–2024 (see graph above). In terms of returns on sales, however, there were considerable differences between the returns of the two groups of companies studied in the research.

The European distribution companies were able to generate more sustained increases in their net profitability margins in the years 2021–2024 than their Greek counterparts. The European 'titan' chemical distributors (including IMCD), have maintained stable to improving efficiency ratios (NPM) over the 2020-2024 period. The average NPM for the studied European companies was 6.00% over the 2020-2024 period studied, with the ratio peaking at 9.42% in 2022.

The studied Greek chemical distributors have also maintained average efficiency ratios for the 2020-2024 studied period of approximately 3.8%. However, the peak NPM ratio for the Greek distributors studied occurred in 2021 at 6.8%. After this year, the ratio for ELTON dropped sharply to 1.16% in 2024. The return on equity (ROE) for AFCO peaked in 2021 at 38.86% and the following years dropped sharply to fluctuating low levels in the following years. It is clear that the studied Greek distributors have the ability to capitalize on periods of high returns. However, they lack a revenue structure to sustain high returns in normal times. This is mainly due to the current commodity-oriented chemical distribution model, which does not have added value.

The only way for Greek distributors to increase their added value, is to develop value-added services (technical services, formulation, regulatory advisory etc.) and specialize in specific

product groups. Such distributors will have the ability to sustain high returns in normal times and simultaneously increase customer switching costs and thus improve their collection terms. The post-2022 correction again reveals a major distinction between the financial resilience of European and Greek firms. While the DSO of Greek chemical distributors returned to pre-crisis levels in 2023, the DSO of European distributors from Europe remained on a constant level of roughly the same figure as in the years of the studied period. Thus, also in terms of receivables management, European distributors of chemicals appear to be more robust than their Greek counterparts and less prone to fluctuations of the business cycle.

5.7 Strategic Implications for Greek Chemical Distributors

The current study has implications for the managers of the Greek chemical distribution companies and the related policy makers. Four main actions for the managers of the Greek chemical distribution companies have been identified in the previous chapters.

5.7.1. Receivables Management as the Primary Priority

The main strategic challenge for the Greek distributors. The 60-day DSO gap between the Greek and European chemical distributors studied is huge. Even a 50% reduction of DSO would result in working capital release of approximately €4 million per €50 million sales; such reduction would also reduce financing cost by approximately €100,000-€200,000 per year (for 5-7% interest rates for the working capital financing for SMEs in Greece). Several measures can be adopted to achieve such DSO reduction including dynamic discounting, stricter credit policy at point of sale, factoring and reverse factoring and more efficient customer portfolio.

5.7.2. Capital Structure Optimization

Solvency ratios of Greek distributors averaged 40.7% while those of European distributors averaged 39.9%. No statistically significant differences existed among the ratios of the various groups of distributors. The company's capital, and thus its solvency, is one of the key indicators affecting the liquidity and stability of a distributor. During recessions or periods of high interest rates the capital structure of a company in short term is a very sensitive issue. In the short-term increasing a company's equity (by retaining profits and possibly by EU funds) will increase the ROA of a distributor. In the medium-to-the-long

term financing through ESPA/NSRF as well as EIF guarantee schemes could be considered as they provide long-term financing at interest rates below market rates.

5.7.3. Value-Added Service Development

Although the EBITDA margins for the studied companies are close to each other and within a relatively narrow margin, the post-2022 data for profitability of European chemical distributors' revenues in fact vary greatly. The specialty chemicals portfolio distributed by companies such as IMCD is of greater value and possesses more durable margins than the commodities distributed by the majority of Greek distributors, currently. Therefore, Greek distributors can use the financial resources currently allocated to the distribution of commodities to develop added value services such as the distribution of technical products, specialized expertise for the formulation of products, as well as services relating to matters of an advisory nature regarding regulatory matters for customers. Such revenue is less susceptible to fluctuations in the prices of raw materials and can generate higher and more durable margins than the revenues earned by the vast majority of Greek distributors currently. In addition, with the technical services for customers and services of an advisory nature on regulatory matters, as well as other similar services, Greek distributors can also improve their collection terms and raise customer's switching costs.

5.7.4. Performance Monitoring

The financial ratios of ten year periods for five European distributors and two Greek distributors (2014–2024) in this study constitute the basic data of the study and serve as a direct management tool for the Greek chemical distribution companies. The financial ratios of the studied European and Greek distributors constitute a unique and first financial benchmarks for the Greek chemical distribution industry. By monitoring the DSO (average days outstanding for accounts receivables) ratio of a Greek chemical distribution company against the average DSO ratio of the studied five European distributors (Brenntag, IMCD, Univar Solutions, Biesterfeld, HELM) included in this study, the management of the Greek company under study will be able to assess its financial performance. Similarly, the management of the Greek chemical distribution company under study will also be able to assess the financial performance of said company by monitoring the average days supply for inventory (CCC) ratio of the said Greek company under study against the average CCC ratio of the five studied European distributors. Finally, by monitoring the Solvency Ratio

(equity/sales) of the Greek chemical distribution company under study against the average Solvency Ratio of the same ratio of the studied five European distributors included in this study, the management of the Greek company under study will also be able to assess the financial structure or capital structure of the said Greek company under study and set targets for improvement of the financial structure of said company for a medium-term period of three to five years as indicated above, since the DSO trend of the two Greek distributors studied did not improve relative to that of the five European distributors over the ten-year study period included in this study.

5.8 Limitations and Future Research

A study of this nature will inevitably have a number of limitations, also offering suggestions for future research. Due to the limited number of companies investigated, the study has low statistical power. As a result, when applying T-tests, clustering at the firm level must be taken into account. Two types of clustering exist for this study: (a) the small number of companies included in the study, and (b) the fact that each of the included companies was investigated over more than one year. For this reason, average values that are above or below the group mean should not be used for the purposes of prediction and should not be interpreted as explanatory factors for the respective company's performance.

The current study relies on a limited number of quantitative indicators retrieved from secondary sources, and therefore, a range of other qualitative indicators of a company's performance have not been captured in the current study. These include indicators of customer service quality and other performance indicators of companies. Specifically, there are indicators of a company's innovative management capabilities that create value for the customers and the shareholders of a company. The use of structured interviews with the senior management teams of a sample of chemical distributors, following established qualitative research protocols (Patton, 2002), would be an appropriate method to address these limitations.

The European group of studied companies differs from each other significantly, for example, the hybrid business model of HELM, the subsidiary of large US listed corporation Univar and the purely regional distributors in Europe (e.g. Spain and Russia). It is difficult to compare companies of different structures. Even the calculation of the mean values for the studied indicators of the companies of the European group as well as of the Greek

regional companies leads to high noise, when comparing the two groups of regional companies. This is why it is highly recommended to analyze a significantly larger number of European companies of the same type (i.e. purely regional distributors) than studied in this research in order to be able to compare them more efficiently with the Greek regional companies.

The study does not provide any evidence for the existence of a structural gap in performance and for its consequences to the sustainability of the companies studied. In order to verify or not whether the longer Collection Period of Greek chemical distributors compared to their European counterparts affects negatively the firm value and sustainability of the companies studied, a different analysis is required, such as a panel regression or a long-term case study. The present study merely quantifies the existing structural working capital gap for the companies studied.

Bibliography

Bates, T.W., Kahle, K.M., & Stulz, R.M. (2009). Why do US firms hold so much more cash than they used to? *Journal of Finance*, 64(5), 1985–2021.

Bureau van Dijk. (2024). Orbis database. Bureau van Dijk — A Moody's Analytics Company. <https://www.bvdinfo.com/en-gb/our-products/data/international/orbis>

Brigham, E. F., & Houston, J. F. (2021). *Fundamentals of financial management* (16th ed.). Cengage Learning.

Chakraborty, S., Raut, R. D., Rofin, T. M., & Chakraborty, S. (2025). *An integrated decision-making tool for pharmaceutical supplier selection*. International Journal of Pharmaceutical and Healthcare Marketing. <https://doi.org/10.1108/IJPHM-03-2025-0020>

Coughlan, A. T., Anderson, E., Stern, L. W., & El-Ansary, A. I. (2006). *Marketing channels* (7th ed.). Pearson Prentice Hall.

Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of Business Finance & Accounting*, 30(3-4), 573–587.

Eisenhardt, K.M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57–74.

European Chemical Industry Council (CEFIC). (2025). Facts & Figures of the European chemical industry. CEFIC.

European Association of Chemical Distributors (FECC). (2024). European chemical distribution market report. FECC.

Eurostat. (2024/2025). Structural business statistics — Chemicals and chemical products (SBS). European Commission. <https://ec.europa.eu/eurostat>

Hellenic Statistical Authority (ELSTAT). (2024/2025). Structural business statistics: Wholesale of chemical products. ELSTAT.

Hornke, M. (2012). *Chemical distribution: A strategic overview*. In M. Hornke (Ed.), *Management in the chemical industry*. Springer.

ICIS. (2025). Top 10 European chemical distributors ranking 2025. ICIS Chemical Business. <https://www.icis.com>

Jensen, M. C., & Meckling, W. H. (1976). *Theory of the firm: Managerial behavior, agency costs and ownership structure*. *Journal of Financial Economics*, 3(4), 305–360.

Keynes, J. M. (1936). *The general theory of employment, interest and money*. Macmillan.

Konstantinidis, C., Aggelopoulos, S., Tsiouni, M., & Rizopoulou, E. (2021). *Estimating competitiveness of Greek food and beverage industry: A comparison between Greek flour milling industry and Greek food and beverage industry*. *EuroMed Journal of Business*. <https://doi.org/10.1108/EMJB-02-2021-0016>

Konstantinidis, C., Tsiouni, M., Kourtesi, S., & Giovanis, N. (2023). *Competitive strategies and financial relations in the meat manufacturing firms: Evidence from Greece*. *International Journal of Applied Economics, Finance and Accounting*, 15(2), 80–87. <https://doi.org/10.33094/ijaefa.v15i2.828>

Kourtesi, S., Chasiotou, A., Konstantinidis, C., & Mouratidis, K. (2024). *The impact of mergers in times of crisis in Greece: Strategic analysis of profitability maximisation and operating performance*. *International Journal of Business Competition and Growth*, 9(3/4), 230–243.

Myers, S.C. (1984). The capital structure puzzle. *Journal of Finance*, 39(3), 574–592.

Modigliani, F., & Miller, M. H. (1958). *The cost of capital, corporation finance and the theory of investment*. *The American Economic Review*, 48(3), 261–297.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Sage Publications.

Pazarskis, M., Drogalas, G., Koutoupis, A., & Lazos, G. (2019). *Intra-industry effects from mergers on financial statements, in and out of technology-intensive industries: Evidence from Greece*. *The International Technology Management Review*, 8(1), 16–21. <https://doi.org/10.2991/itmr.k.191104.001>

Purwanto, P., & Agustin, J. (2017). *Financial performance towards value of firms in basic and chemicals industry*. *European Research Studies Journal*, 20(2A), 443–460.

Susilowati, N., Ridloah, S., Lestari, R., & Herdiana, A. (2021). *How do three financial analysis pillars and investment policies define the firm value in the basic industry and chemical sector?* *Academy of Strategic Management Journal*, 20(S3), 1–10.

Usmonov, B. (2024). *Evaluation of efficiency of capital management in joint-stock companies in the chemical sector: The case of Uzbekistan*. In *Development of international entrepreneurship based on corporate accounting and reporting according to IFRS* (Advanced

Series in Management, Vol. 33B, pp. 67–74). Emerald Publishing Limited.

<https://doi.org/10.1108/S1877-63612024000033B009>

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