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Analysing the Financial Ratios of the Companies in the Maritime Industry with Multivariate Statistical Techniques

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ABSTRACT

This study aims to glance at the shipping sector in terms of financial ratios. To this end, 23 financial ratios were collected from each of the 223 companies worldwide and examined by factor analysis. Seven factors were spotted explaining 85% of the total variance. Subsequently, multidimensional scaling was conducted to analyse the sector on these seven factors. The findings demonstrate profitability ratios as the biggest source of variability and as the reason for the differences among companies. The findings also show that the profitability ratios can be used for monitoring, early warning or decision making purposes for the shipping sector.

1 Introduction

Water transport has long proved itself as an important economic activity throughout the history of mankind and even played one of the leading roles in constructing globalization due to its influence in international trade and international mobility of commodities. The geographical difference between the supply and demand of the resources, commodities and labor required for economic activities makes it possible for waterways to propose an economic value. In this context, it can be said that water transport is an integral part of the global economy (Corbett & Winebrake, 2008).

Plenty of economic activities taking the advantage of the seas have great potential to boost economic growth, employment and innovation. Marine industries together play a key role in the world economy. According to UNCTAD-United Nations Conference on Trade and Development calculations, over 80% of the world trade is carried out via maritime transport (UNCTAD, 2021). The report compiled by Goodwin (Goodwin, 2016) on the request of European Community Shipowners' Associations (ECSA) from Oxford Economics revealed that the total economic impact of the European Union (EU) maritime industry has three dimensions: Direct impact, indirect impact and induced impact. The total economic impact is measured with the GVA contribution to GDP, employment and tax revenues metrics.

The direct impact includes: Freight and passenger transportation, towing and screening services, maintenance-repair and offshore support activities, and leasing and leasing transactions; Indirect impactincludes: Shipbuilding and maintenance, port services, insurance operations and shipping relatedfinancial and legal services; Induced impact includes: Food and similar commodities and other consumer products, restaurants and recreation services.

As a consequence of the interaction between maritime transportation with economic growth and trade, the amount of raw materials, semi-finished products, finished goods and commodities transported by sea and the carrying capacity of vessels used in transportation

have increased as deadweight tonnage (dwt) and twenty-foot equivalent unit (TEU) over the years, and this has had a positive effect on the profitability of maritime businesses owing to their economies of scale. The profitability of the companies in particular, and their financial conditions in general, are important for the relevant parties that make decisions regarding the companies in question based on these financial conditions, i.e the stakeholders. The related parties monitor the financial status of the company / companies as shareholders through financial statements (balance sheet, income statement, cost of sales, etc.) prepared at regular intervals in accordance with the legislation and financial ratios calculated on the basis of these financial statements, afterwards by using this financial status information they make their decisions as to invest, loan granting, credit rating, tax assessment, etc.

The study is based on the fundamental analysis approach, which is an important dimension of financial analysis. In this context, the financial statements (income statement, balance sheet and cash flow statement) of the companies within the scope of the study were examined according to the basic analysis approach to be used for purposes such as evaluating economic trends, developing financial policies, creating long-term commercial plans and identifying projects or companies for investment. Ratio analysis, which is a quantitative method of obtaining an idea about the liquidity, operational efficiency and profitability of companies by examining financial statements such as balance sheets and income statements within the scope of fundamental analysis, also constitutes the basis of the study.

Financial ratios under various categories are calculated based on the financial statements of companies. These categories include: Profitability, liquidity, financial structure ratios, activity ratios (Akgün & Temür, 2016) (Selimoğlu & Orhan, 2015), (Cengiz, Turanlı, Kalkan, & Köse, 2015), (Çelik, 2010), (İç, Tekin, Pamukoğlu, & Yıldırım, 2015).

There are various financial ratios that can be calculated based on the financial statements of companies. Therefore, it is important to obtain fewer unrelated variables that represent these ratios with the least possible information loss in order to classify the financial ratios and to determine the relationship between them. Since the financial ratios examined in studies are generally highly correlated with each other (Chen & Shimerda, 1981), factor analysis, which is used as a dimension reduction method in this study, has proved itself as a useful method.

The literature reviewed in the second section demonstrates that similar studies have been carried out in different industries or sectors. Notwithstandingly, by the time that this study had been executed, no similar study was identified focusing on the global water transport and shipping sector in particular. It is seen that the studies on the maritime sector cover the local or the regional level. The importance of this study is that it brings a more compherensive perspective to the industry as it covers 223 companies operating in the water transport and shipping sectors in 37 different countries in 5 continents of the world. Taking into consideration that most of the world trade is carried out by maritime transportation, it is important to evaluate the financial structures of the companies operating in this sector. The aim of this study is to examine the relationship of the financial ratios of the companies operating in the water transport and shipping sector and to glance at the sector in this context.

The study is structured in five sections. Following the Introduction section, in section two literature is reviewed. In section three the research material and methodology used is explained in detail. In section four, the findings and results of the research are evaluated. Finally section five includes the conclusion of the study.

2 Literature Review

There are many studies in the literature that examine financial ratios with factor analysis. Of these studies, Pinches, Mingo, and Caruthers' (1973) work on U.S. industrial firms has been a pioneer. In their study, factor analysis was used for an empirical-based classification of financial ratios. As a result, they found that financial ratios are gathered under 7 factors (Pinches, Mingo, & Caruthers, 1973). Chen and Shemerda demonstrated that it is possible to represent and classify a large number of financial ratios with fewer factors that are not correlated with each other (Chen & Shimerda, 1981). Ali and Charbaji (1994) stated in their study that since the study of Pinches, Mingo and Caruthers (1973), the studies for dimension reduction and classification of financial ratios are generally executed in the manufacturing and retail sectors. Therefore, Ali and Charbaji dealt distinctly with the international commercial airline industry in their studies. The study supports the conclusion that factor analysis provides a useful tool for developing and testing the theoretical structure and grouping of financial ratios (Charbaji, 1994).There are also more recent studies examining financial ratios with factor analysis. Öcal et al. analyzed the relationship between 25 financial ratios by factor analysis which are deemed important for the construction industry, and obtained a 5-factor structure. Öcal et al. showed that the 5 factors they obtained explained 84.1% of the total variance (Öcal, Oral, Erdis, & Vural, 2007). De et al., in their study on the cement industry, represented 25 financial rates under 8 factors with a variance explanation rate of 89% (De, Bandyopadhyay, & Chakraborty, 2011). Erdogan examined the relationship between the 10 different financial ratios for the largest 500 industrial enterprises in Turkey by factor analysis (Erdogan, 2013).

In addition to studies examining financial ratios with factor analysis, there are also studies examining the financial performance of the maritime transportation sector. Among these studies, Andreou, Louca and Panayides (2014) examined the relationship between corporate governance and financial management decisions such as earnings management and suboptimal investment, and firm performance in maritime firms, and revealed that various corporate governance elements are associated with financial management decisions and firm performance. Kang, Wang, Bang and Woo (2016), who studied 64 Shipping firms in the Bloomberg Shipping Indices, used panel regression to examine the impact of financial strategies on performance in three different market segments. This analysis has defined performance indicators such as profitability and leverage ratios, providing maritime companies with managerial and strategic information on how financial options affect economic performance. Lee, Lin and Shin (2012), dealing with shipping companies in Taiwan and Korea, applied the entropy method to find the relative weights of the companies' financial ratios, ranked the companies with the gray relational analysis method, and suggested business policy implications to reduce the effects of the financial crisis. In another study on Taiwan and Korea, Lee, Lin and Chung (2014) weighted the financial ratios determined based on expert opinion and financial statements of large companies. Lin and Cheng-Wei (2013) compared cognitive maps of financial ratios by country and group of financial experts by finding the interrelationship of financial ratios determined by financial experts and executives of shipping companies in Taiwan and Korea. By comparing the financial efficiency of 18 port authorities in Europe with and without ISO 9000 certification with data envelopment analysis, Pantouvakis and Dimas (2010) determined that ports with ISO 9000 certification are more financially efficient. Syriopoulos and Tsatsaronis (2011) comparatively evaluated the impact of key corporate governance mechanisms on the financial performance of Greek and Scandinavian shipping firms. Akdamar and Gögebakan (2021) developed a financial index for the waterway transportation and shipping industry and determined the importance weights of financial ratios in the index by factor analysis. Doğan (2020) conducted a financial performance analysis of the maritime freight transport sector based on the balance sheet data of the Central Bank of the Republic of Turkey. Ceyhan and Demirci (2022) carried out a similar performance analysis with multi-criteria decision making methods. Dikmen (2021), using ratio analysis, examined the financial performance of enterprises operating in the maritime freight transport sector. Kara and Gezen (2022) carried out data envelopment analysis and efficiency measurement for the transportation and storage sector.

3 Research Material and Methodology

In the study, factor analysis was used to define the relationship between financial rates and to evaluate the financial structure of the water transport and shipping sector. Multidimensional Scaling Analysis was used to evaluate the companies operating in the sector in terms of the determined factors. The data used in the study were collected from the Wall Street Journal (WSJ) for the 2018 fiscal year. There are 2 main reasons for conducting the study with 2018 data. First of all, this study does not aim to analyze a time series, it aims to determine the situation for a certain year with cross-sectional data. As it is known, studies carried out with cross-sectional data focus on the examination of a certain period taken from the flowing time period. Thus, this study for 2018 can be repeated for any year. The second reason for examining the year 2018 as a cross section from the flowing time period is; It is the year in which mergers and acquisitions started as a result of switching to capacity management approach under the leadership of Evergreen, one of the important actors of the sector, instead of the price fixing approach that was widely used in the maritime industry before 2018. Since such mergers and acquisitions have the potential to affect the financial performance of companies, it can be said that 2018 financial data are important for the sector. Due to the privacy conditions content of the dataset of 23 financial ratios of 223 companies' financial statements can only be accessed from the link under the water transport / shipping category in WSJ (https://www.wsj.com/market-data/quotes/company-list/sector/water-transport shipping). Although there were more than 500 companies at the database only 223 of them provide the solid and suitable data. These companies operate in the following maritime sectors: Ship management, port management, fisheries and aquaculture, marina management, ship building and shipyard operations, offshore oil and gas operations, supply ship management and logistics.

When the structural status of the 223 companies discussed in the study is examined, these companies consist of companies whose shares are traded in 42 different stock exchanges in 37 different countries and whose financial statements have been independently audited. In Figure 1 and Figure 2, the distribution of companies by country and in Figure 3 the distribution of companies according to stock exchanges are given.

When the figures are examined, it is seen that the 37 countries in question are distributed over 5 continents and the companies subject to the study are companies whose stocks are traded in organized markets. For this reason, it is thought that the global representation capability of the analyzed data set is sufficient. Since the WSJ data was used in the study, the financial ratios in question were classified accordingly under the titles Valuation (V), Liquidity (L), Profitability (P) and Capital Structure (CS). The financial ratios compiled for use in the study

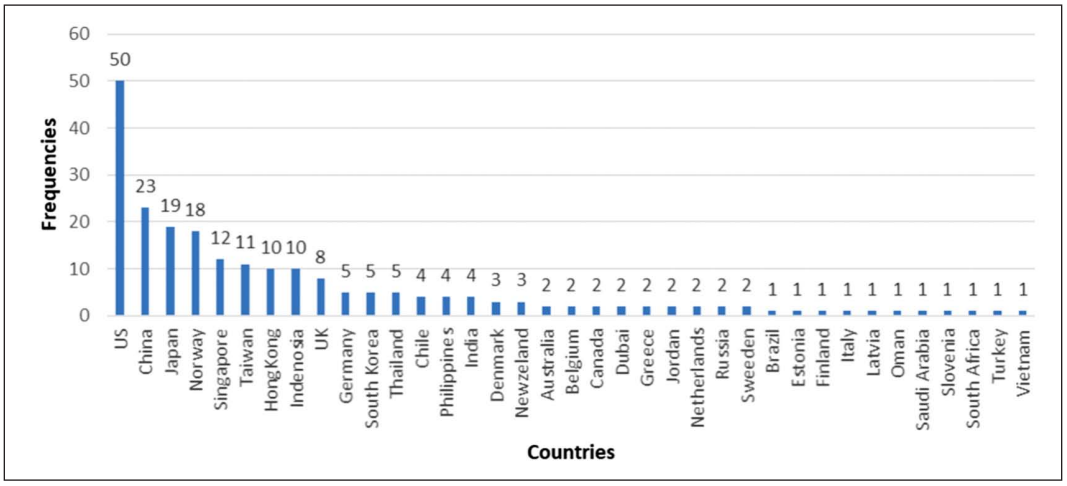


Figure 1 Distribution of Firms According to the Countries

Source: Authors

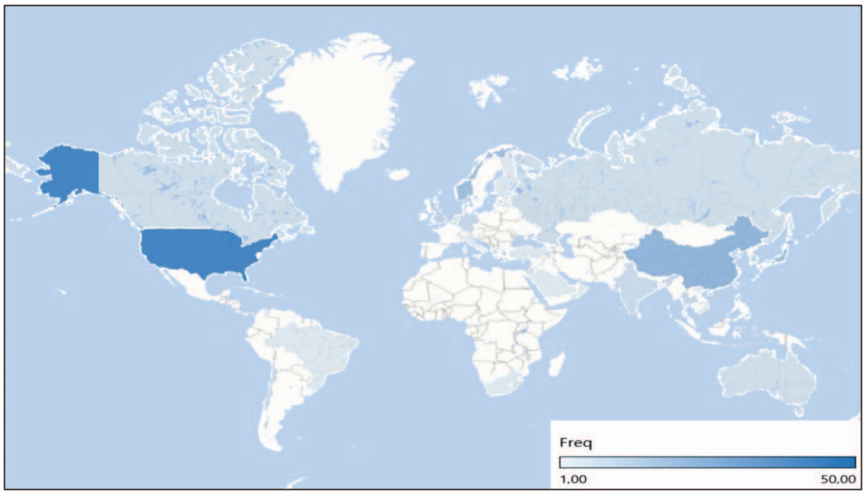


Figure 2 Distribution Map of Firms According to the Countries

Source: Authors

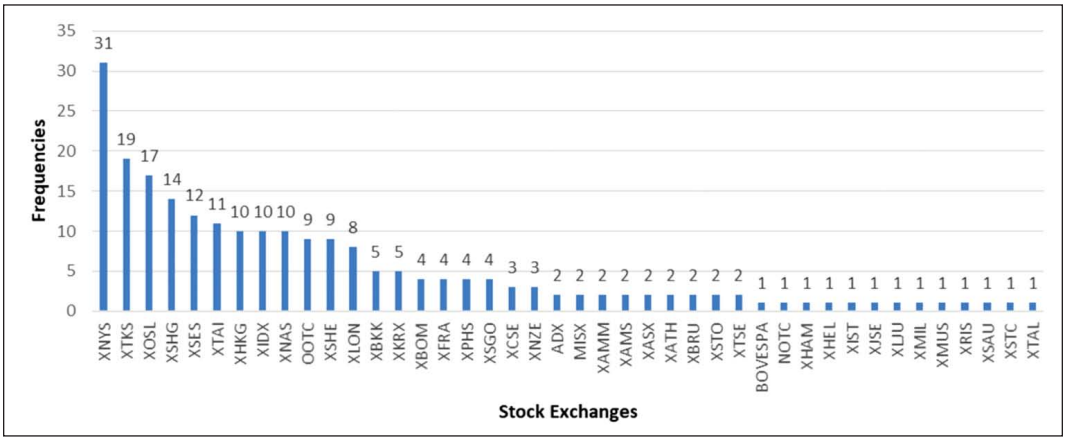


Figure 3 Distribution of Firms According to the Stock Exchanges

Source: Authors

are shown in Table 1, and descriptive statistics on financial ratios are given in Table 2 below:

Table 1 Financial Ratios Used in the Study

Category	Financial Ratios
Valuation (V)	1. Price to Sales Ratio (V1) 2. Price to Book Ratio (V2) 3. Enterprise Value to EBITDA (V3) 4. Enterprise Value to Sales (V4) 5. Total Debt to Enterprise Value (V5)
Liquidty (L)	1. Current Ratio (L1) 2. Quick Ratio (L2) 3. Cash Ratio (L3)
Profitability (P)	1. Gross Margin (P1) 2. Operating Margin (P2) 3. Pretax Margin (P3) 4. Net Margin (P4) 5. Return on Assets (P5) 6. Return on Equity (P6) 7. Return on Total Capital (P7) 8. Return on Invested Capital (P8)
Capital Structure (CS)	1. Total Debt to Total Equity (CS1) 2. Total Debt to Total Capital (CS2) 3. Total Debt to Total Assets (CS3) 4. Interest Coverage (CS4) 5. Long-Term Debt to Equity (CS5) 6. Long-Term Debt to Total Capital (CS6) 7. Long-Term Debt to Assets (CS7)

Source: Authors

The numerical values of the financial ratios used in the study were also taken from the link under the water transport / shipping category in WSJ (https://www.wsj.com/market-data/quotes/company-list/sector/water-transport shipping) and these numerical values of the financial ratios were confirmed through a randomly selected sample by the authors via the formulas taken from Kaygusuz (2018), and they were found to be consistent.

3.1 Factor Analysis

Factor analysis is used to collect a large number of interrelated variable groups under fewer and unrelated factors. While creating the factors, variables that are related to each other are classified under the same factors. On the other hand, since many variables are represented with less number of factors, dimension reduction is also performed (Öcal, Oral, Erdis, & Vural, 2007). While many variables are represented by fewer factors, it is sought to have as little information loss as possible. There are two types of factor analysis: Exploratory and confirmatory. In the exploratory factor analysis, it is aimed to group and summarize the variables that are related to each other. In the confirmatory factor analysis, an existing theory about the relationship between variables is tried to be confirmed (Tabachnick & Fidell, 2006). In this context, exploratory factor analysis was

Table 2 Descriptive Statistics for Financial Ratios

Ratio	Minimum	Maximum	Range	Mean	Standard Deviation	Variance
Price to Sales Ratio (V1)	0,01	61,72	61,71	2,01	5,62	31,59
Price to Book Ratio (V2)	-0,34	85,60	85,94	1,39	5,82	33,92
Enterprise Value to EBITDA (V3)	-918,16	388,82	1306,98	10,52	77,94	6075,11
Enterprise Value to Sales (V4)	-1,79	83,82	85,61	3,80	8,44	71,24
Total Debt to Enterprise Value (V5)	-1,63	54,60	56,23	0,84	3,63	13,20
Current Ratio (L1)	0,06	6,50	6,44	1,34	0,88	0,77
Quick Ratio (L2)	0,05	6,47	6,42	1,22	0,84	0,70
Cash Ratio (L3)	0,01	5,63	5,62	0,69	0,67	0,45
Gross Margin (P1)	-141,54	77,95	219,49	19,04	22,22	493,89
Operating Margin (P2)	-311,33	62,57	373,90	8,81	28,30	801,01
Pretax Margin (P3)	-168,75	720,76	889,51	9,11	69,77	4867,78
Net Margin (P4)	-168,75	720,37	889,12	9,00	70,93	5031,63
Return on Assets (P5)	-25,82	132,56	158,38	1,78	11,26	126,70
Return on Equity (P6)	-200,83	109,82	310,65	-0,33	26,00	675,92
Return on Total Capital (P7)	-23,43	37,42	60,85	3,56	6,98	48,78
Return on Invested Capital (P8)	-98,94	89,68	188,62	0,60	13,31	177,24
Total Debt to Total Equity (CS1)	0,14	52164,52	52164,38	381,87	3489,05	12173468,01
Total Debt to Total Capital (CS2)	0,14	99,81	99,67	47,89	21,14	446,69
Total Debt to Total Assets (CS3)	0,12	84,58	84,46	39,40	18,69	349,16
Interest Coverage (CS4)	-1306,00	134,29	1440,29	-1,83	89,06	7932,31
Long-Term Debt to Equity (CS5)	0,04	5393,55	5393,51	137,09	384,42	147777,35
Long-Term Debt to Total Capital (CS6)	0,04	664,06	664,02	37,82	46,44	2156,25
Long-Term Debt to Assets (CS7)	0,00	0,78	0,78	0,29	0,18	0,03

Source: Authors

used in this study to identify the relationship between the financial ratios of companies operating in the shipping industry.

In factor analysis, factor rotation is used to obtain an optimal structure that can represent the variables on the least number of factors and with high factor loadings. Rotation of factors is a process by which the solution is made more interpretable without changing the basic mathematical properties (Tabachnick & Fidell, 2006). Various rotation methods are used in factor analysis. In this study, the Direct Oblimin Rotation Method, which is used when a relationship is expected between factors, was used (Yong & Pearce, 2013). It should be noted that in addition to the widespread use of factor analysis, different dimension reduction methods are also used, especially for multivariate data (Gogebakan, 2020; Gögebakan, 2021).

3.2 Multidimensional Scaling Analysis

Multidimensional scaling is the problem of geometric representation of n number of objects with n number of points. The distance between points represents the differences between objects. The aim is to find the positioning that best reflects the differences between objects in the statistical sense (Kruskal, 1964). This compliance is determined by a measure called stress. This measure shows how compatible any positioning is with the data. Smaller stress value indicates better coherence. Table 3 below shows the relationship between stress values and goodness of fit (Kruskal, 1964):

Table 3 The Relationship Between Stress Values and Goodness of Fit

Stress Value	%20	%10	%5	%2,5	%0
Goodness of Fit	Bad	Middle	Good	Excellent	Perfect

Source: Authors

Multidimensional Scaling Analysis is executed through two different methods depending on the data type: Metric and non-metric scaling methods. In the metric method, the data must have at least equally spaced scale features. In the non-metric method, it is possible to work with data with sequential scale properties (MacKay & Zinnes, 1986).The non-metric method proposed by Shepard (1962) and developed by Kruskal (1964) has attracted considerable attention in practice as it eliminates the linearity assumption of metric methods (Kenkel & Orloci, 1986). In this study, the non-metric method of multidimensional scaling analysis was used to evaluate companies operating in the water transport and shipping industry in terms of financial factors.

4 Findings and Results

In this section, findings of the factor analysis and multidimensional scaling analysis are put forth and results are interpreted.

4.1 Findings

Basically, 23 financial ratios under four main categories; Valuation (V), Liquidty (L), Profitability (P) and Capital Structure (CS) of 223 maritime companies were examined by factor analysis. The aim here was to represent 23 financial ratios with fewer variables and to determine which ones fall under similar factors.

The Direct Oblimin rotation algorithm was used in the factor analysis performed by the principal components method. KaiserMeyer-Olkin (KMO) and Bartlett suitability tests were examined to determine whether the data used in the analysis were suitable for factor analysis. Findings given in Table 4 below demonstrate that the data were suitable for factor analysis.

Table 4 Kaiser–Meyer–Olkin and Bartlett'in test results

KMO	0,658
χ^2	5972,34
Significance	0,000

Source: Authors

According to the findings obtained by the direct oblimin rotation method, 23 financial ratios are gathered under 7 factors. The rotated factor matrix obtained is shown in Table 5.

When the rotated factor matrix was examined, it was seen that the ratios of P6, P8 and V5 were loaded on several factors. Therefore, these ratios were omitted from the analysis and the analysis was then conducted again. With the three financial ratios extracted, the factor analysis was executed again with 20 financial ratios and the rotated factor matrix in Table 6 was obtained.

When the rotated factor matrix is examined, it is seen that the ratios of P3, P4 and P5 under the heading Profitability (P) is gathered in the first factor and the ratios of P1, P7 and P2 in the second factor. The third factor is formed by CS1 and CS5 of the Capital Structure (CS) ratios and V2 of the Valuation (V) ratios. The fourth factor consists of four ratios in the Capital Structure heading: CS7, CS3, CS2 and CS6. The three ratios examined under the Liquidty (L) heading constitute the fifth factor. The sixth factor is formed by Valuation (V) ratios V1 and V4; The seventh factor is formed by V3 and CS4. In Table 7 the factors names are given.

Table 5 Rotated Factor Matrix

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor5	Factor 6	Factor 7
P3	,964						
P4	,946						
P5	,930						
P1		,872					
P7		,844					
P2		,773				-,400	
CS1			1,002				
V2			1,000				
CS5			,951				
P6	,370	,310	-,536				
P8	,437	,337	-,481				
CS7				,945			
CS3				,888			
CS2				,790	,233		
CS6				,677			
L2					-,974		
L1					-,953		
L3					-,935		
V1						,874	
V4						,868	
V3							,787
CS4		,251					-,556
V5						-,273	-,315

Source: Authors

Table 6 Rotated Factor Matrix with 20 Financial Ratios

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
P3	,971						
P4	,947						
P5	,947						
P1		-,904					
P7		-,822					
P2		-,777					
CS1			,997				
V2			,997				
CS5			,946				
CS7				,936			
CS3				,876			
CS2				,783			
CS6				,683			
L2					-,977		
L1					-,954		
L3					-,934		
V1						,923	
V4						,885	
V3							,853
CS4							-,558

Source: Authors

Table 7 Naming the Factors

Factor	Financial Ratio	Factor Name
Factor 1	Pretax Margin (P3)	Assets and profitability factor
	Net Margin (P4)	
	Return on Assets (P5)	
Factor 2	Gross Margin (P1)	Capital and profitability factor
	Operating Margin (P2)	
	Return on Total Capital (P7)	
Factor 3	Price to Book Ratio (V2)	Equity and debts factor
	Total Debt to Total Equity (CS1)	
	Long-Term Debt to Equity (CS5)	
Factor 4	Total Debt to Total Capital (CS2)	Assets and capital factor
	Total Debt to Total Assets (CS3)	
	Long-Term Debt to Total Capital (CS6)	
	Long-Term Debt to Assets (CS7)	
Factor 5	Current Ratio (L1)	Operating capital factor
	Quick Ratio (L2)	
	Cash Ratio (L3)	
Factor 6	Price to Sales Ratio (V1)	Sales income factor
	Enterprise Value to Sales (V4)	
Factor 7	Interest Coverage (CS4)	Expenses factor
	Enterprise Value to EBITDA (V3)	

Source: Authors

Table 8 Total Variance Explanation Percentages of the Components-Rotated Values

Compenent (factor)	Eigenvalues	Variance %	Cumulative variance %
1	5,157	25,787	25,787
2	3,082	15,411	41,199
3	2,513	12,567	53,766
4	2,149	10,746	64,511
5	1,836	9,179	73,691
6	1,216	6,080	79,771
7	1,059	5,297	**85,068**

Source: Authors

In Table 8, the eigenvalues and variance explanation rates of the 7 determined factors are given. According to this; Approximately 85% of the variance was explained by 7 factors.

Multidimensional Scaling Analysis was conducted in order to evaluate the water transport and shipping sector in terms of financial factors determined by factor analysis. Squared Euclidean Distance was used in Multidimensional Scaling Analysis, which was attained by creating a similarity matrix from the original data.

In multidimensional scaling analysis, it is an important problem how many dimensions the units will be represented. In this analysis, a small stress value is indicative of a stronger goodness of fit. The Figure 4 shows the stress values calculated for different dimensions in the Multidimensional Scaling Analysis. Although the smallest value in stress values is obtained in three dimensions, there is no significant difference between choosing three dimensions and choosing two dimensions in terms of the relationship between stress values and goodness of fit given in Table 3. Therefore, companies are represented in 2D space for ease of interpretation. Findings of the analysis are given below in Table 9 and Figure 5 respectively.

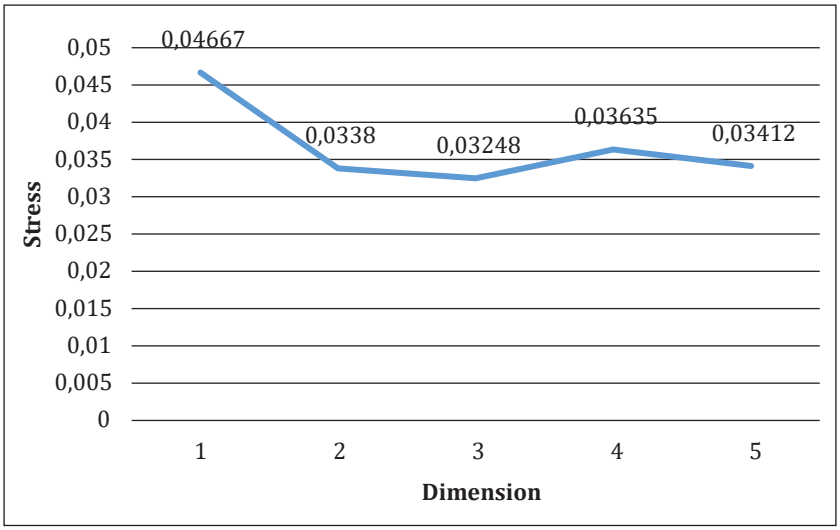


Figure 4 Stress Values Obtained for Different Dimensions

Source: Authors

Table 9 Multidimensional Scaling Analysis Findings of Goodness of Fit

Stress	0,0338
Dispersion Accounted for (D.A.F.)	0,9860
Tucker's Coefficient of Congruence	0,9929

Source: Authors

The statistics obtained as a result of the Multidimensional Scaling Analysis and given in Table 8 demonstrate that the findings have a good and perfect harmony with the real situation. This situation is visualized as in Figure 5 below:

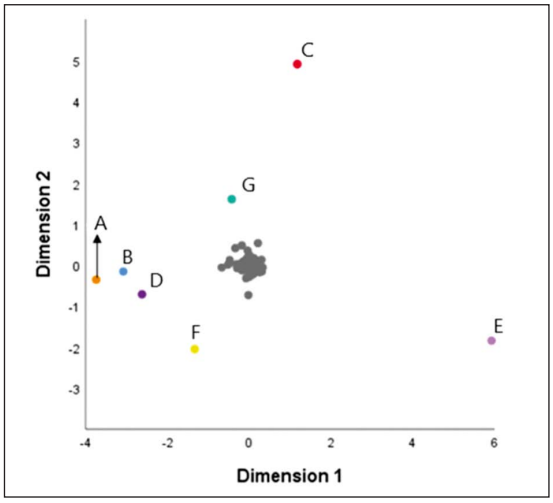


Figure 5 Representation of Water Transport and Shipping Companies in Two Dimensional Space in Terms of Financial Factors

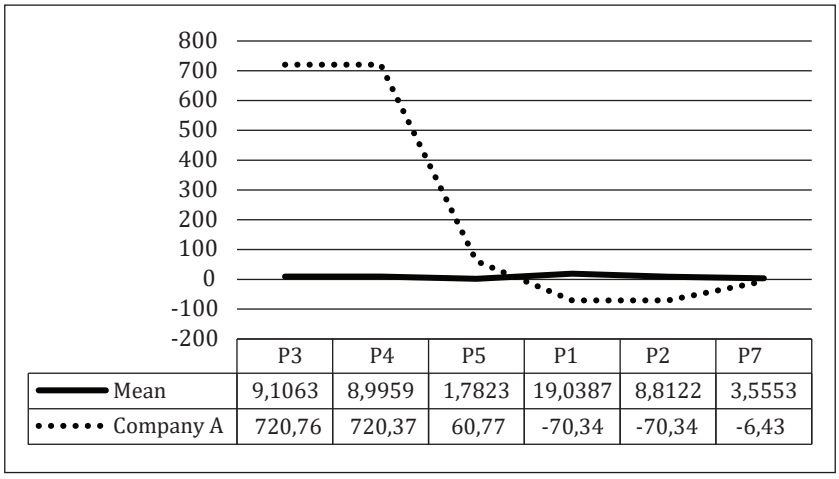
Source: Authors

It is seen that 216 of 223 companies shown in two-dimensional space in the context of seven financial factors determined as a result of factor analysis are located very close to each other. On the other hand, 7 companies named as A, B, C, D, E, F and G for the sake of privacy given in Figure 5 differ from the other 216 companies. The fact that companies are close to each other in two-dimensional space shows that they are more similar to each other in terms of the factors in question. Therefore, it can be said that the financial ratios of these 7 companies differ from other companies. The sectors in which 7 companies operate are given in the Table 10. The most important reasons for this difference are the financial ratios those formed Factor 1 and Factor 2, which have the highest variance explanation rate in Table 7. All of these financial ratios are related to profitability. Therefore, the 7 companies in question have been examined in the following ways in the context of the financial ratios that formed Factor 1 and Factor 2.

Table 10 Sectors of the Differentiating Seven Companies

Firm	Sector
Company A	Supply ship management
Company B	Ship chartering and shipyard operations
Company C	Ship management
Company D	Tanker ship management
Company E	Offshore oil and gas marine services
Company F	Shipyard management
Company G	Port and marina management

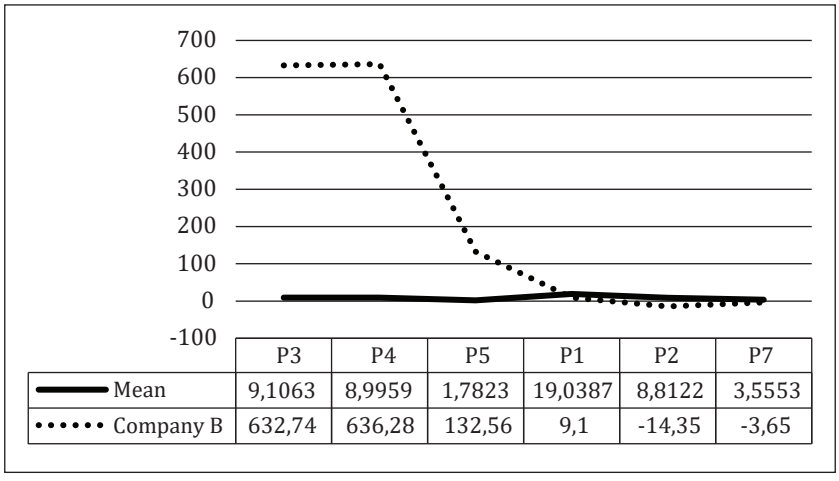
Source: Authors



	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company A	720,76	720,37	60,77	-70,34	-70,34	-6,43

Figure 6 Comparison of Company A Profitability Ratios with the Sector Average

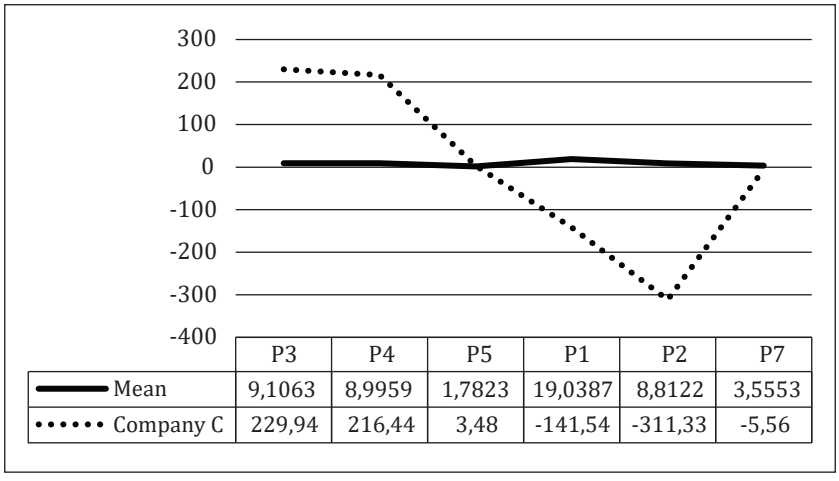
Source: Authors



	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company B	632,74	636,28	132,56	9,1	-14,35	-3,65

Figure 7 Comparison of Company B Profitability Ratios with the Sector Average

Source: Authors



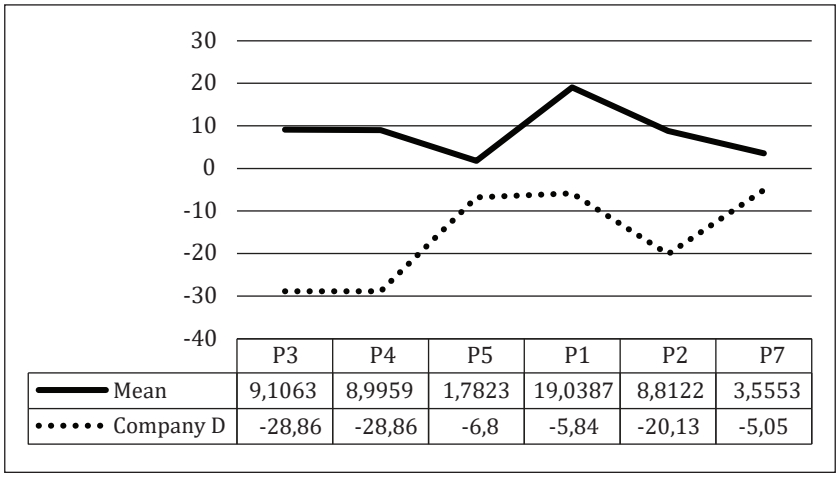
	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company C	229,94	216,44	3,48	-141,54	-311,33	-5,56

Figure 8 Comparison of Company C Profitability Ratios with the Sector Average

Source: Authors

It is seen in Figure 6 the P3 (Pretax Margin), P4 (Net Margin) and P5 (Return on Assests) ratios, which constitute the assets and profitability factor of Company A, were well above the industry average. On the other hand, the rates of P1 (Gross Margin), P2 (Operating Margin) and P7 (Return on Total), which constitute the capital and profitability factor, remained below the industry average. In Figure 7, Company B and in Figure 8 Company C is similar to Company A in terms of profitability ratios.

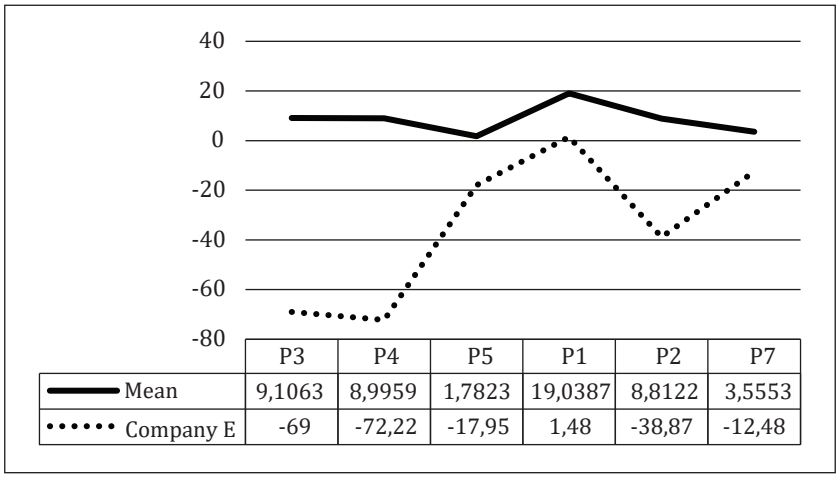
It is seen that the profitability ratio of the Company D in Figure 9, Company E in Figure 10 and Company F in Figure 11 are well below the sector average in terms of the profitability ratios forming the assets and profitability and the capital and profitability factors. In Figure 12, it is clear that the P4 (Net Margin) and P1 (Gross Margin) ratios of the Company G differ from the industry average.



	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company D	-28,86	-28,86	-6,8	-5,84	-20,13	-5,05

Figure 9 Comparison of Company D Profitability Ratios with the Sector Average

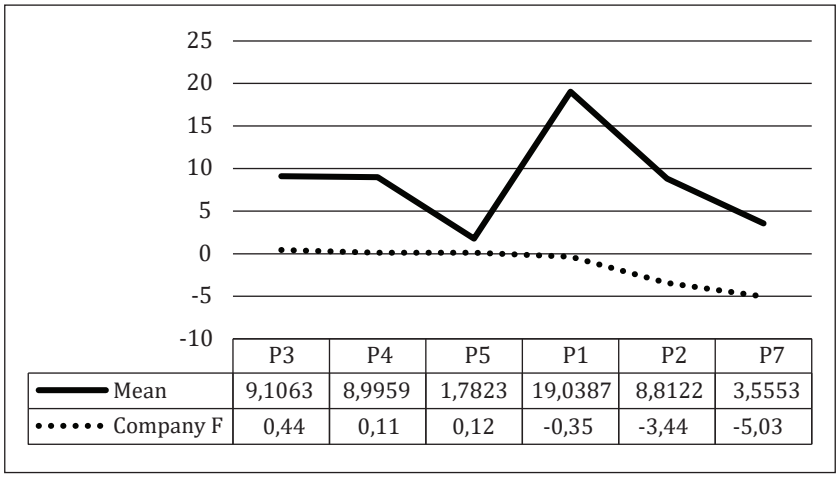
Source: Authors



	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company E	-69	-72,22	-17,95	1,48	-38,87	-12,48

Figure 10 Comparison of Company E Profitability Ratios with the Sector Average

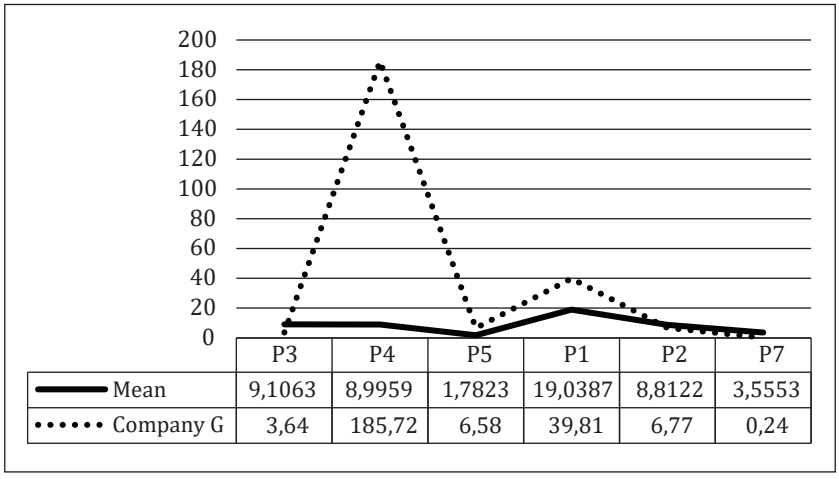
Source: Authors



	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company F	0,44	0,11	0,12	-0,35	-3,44	-5,03

Figure 11 Comparison of Company F Profitability Ratios with the Sector Average

Source: Authors



	P3	P4	P5	P1	P2	P7
Mean	9,1063	8,9959	1,7823	19,0387	8,8122	3,5553
Company G	3,64	185,72	6,58	39,81	6,77	0,24

Figure 12 Comparison of Company G Profitability Ratios with the Sector Average

Source: Authors

4.2 Results

In this study, the relationship among the financial ratios of 223 global companies operating in the water transport and shipping sector was examined by Factor Analysis, and the sector was glanced over through 7 factors representing 23 financial ratios via Multidimensional Scaling Analysis. The variance explanation rate of 7 factors obtained in the study is 85%. This ratio is in line with the size reduction studies carried out with financial ratios in different sectors.

There were some differences between the groups of financial ratios used at the beginning of the study and the groups formed as a result of factor analysis. While profitability ratios were gathered under two separate factors, liquidity ratios were gathered under a single factor. It has been determined that the capital structure ratios are distributed over two different factors, and the Valuation ratios are distributed over three different factors.

The findings demonstrate that the variability among companies in the relevant sector is mostly due to profitability rates. However, it can be said that the sector has a homogeneous structure in terms of financial ratios. As a matter of fact, only 7 companies out of 223 companies are observed to differ significantly from the others. When the profitability rates of these 7 companies are examined, it is seen that they are far from the sector average in a either positive or negative direction. In such a case, for example, an investor interested in the water transport and shipping sectors will need much more in-depth analysis to choose among the 216 companies in question. Correspondingly, in terms of 7 companies that differentiated from the other 216 companies, both cur-

rent/potential investors and senior managers such as chief risk officer (CRO), chief financial officer (CFO), and chief audit executive (CAE) could focus on factors that distinguish them from other companies for quick decision making or monitoring purposes. For example; Company A's being above the industry average in terms of assets and profitability factor while being below the industry average in terms of capital and profitability factor can be a valuable indicator for a current/potential investor. Company A's CRO can focus on the risks posed by factors below the industry average, the CFO can work on what can be done to improve these factor indicators, and the CAE can use factors below the industry average as an early warning indicator.

When the 7 companies that differed positively and/or negatively from the sector in terms of profitability ratios were analyzed in the context of the countries and sectors in which they operate and the stock exchanges they are listed, no relationship was found to explain the divergence. In other words, the difference in profitability ratios does not depend on the countries, stock markets or sectors of the companies. On the other hand, the reasons why some companies' profitability rates differ from the industry average are beyond the scope of this study.

5 Conclusion

According to the findings and results of the research, it can be said that profitability rates are important parameters of the sector, and relevant stakeholders can take into account the profitability rates in their critical decisions as to risk management as key risk indicators (KRIs) and performance evaluation as key performance indicators (KPIs). In the matter of risk management, profitability rates might be used either as a means of risk assessment and risk quantifying or as a measure of risk exposure, and profitability rates in respect to performance evaluation can provide effective metrics in terms of financial perspective due to balanced scorecard, strategy mapping or internal control purposes.

The literature regarding to the financial ratio analysis for the water transport and shipping sector was mostly compiled in specific countries (Kang, Wang, Bang, & Woo, 2016; Lee, Lin, & Shin, 2012; Lee, Lin, & Chung, 2014; Lin & Cheng-Wei, 2013; Pantouvakis & Dimas, 2010), in this study the subject matter is discussed via 223 firms operating in 37 countries, quoted in 42 stock exchanges in 5 continents through a global scale for the first time. Considering the literature gap in this scope, it is recommended that future studies on financial ratio analysis should be on a global scale, focusing on the reasons for the differences that arise at the end of the analyzes, and develop industry-specific indices.

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