The Financial Performance Measurement of the Companies Listed In The BIST Holding and Investment Index by the MCDM Methods∗

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ABSTRACT

The financial performance measurement is essential for all businesses from small one to large scale enterprises. This significance is more remarkable for the companies trading on financial markets in particular. Based on this, the 18-year financial performances of 43 holdings and investment companies listed in the BIST Holding and Investment Index trading on BIST Istanbul were calculated by taking their annual data between 2000 and 2017. Total 5 stock market performance indicators including price earnings ratio, market to book value ratio, earnings per share, dividend yield ratio and dividend payout ratio were used.

The entropy technique was used to determine the weight of the criteria used in the study. The financial performances of the companies were measured in analyses through Additive Ratio Assessment (ARAS) and Weighted Aggregated Sum Product Assessment (WASPAS) that are among the Multiple criteria decision making (MCDM) methods. Spearman correlation analysis was conducted to determine the relation between the results of the methods used in the analysis. A positive and strong relation was found between the methods of ARAS and WASPAS as a result of the Spearman correlation analysis.

Keywords: Stock Market Performance, MCDM, Entropy, ARAS and WASPAS
Jel Classification: G11, G23, G34.

BİST Holding ve Yatırım Endeksinde Yer Alan Şirketlerin Finansal Performanslarının MCDM Yöntemleri İle Ölçümü

ÖZET

Finansal performansların ölçülmesi küçük ölçekli işletmelerden büyük ölçekli işletmelere kadar her işletme için önem arz etmektedir. Özellikle finansal piyasalarda işlem gören şirketler için bu önemin çok daha fazla olduğu söylenebilir. Buradan hareketle çalışmada Borsa İstanbul'da işlem gören BİST Holding ve Yatırım Endeksinde yer alan 43 holding ve yatırım şirketinin 2000-2017 yıllık verileri dikkate alınarak 18 yıllık finansal performansları hesaplanmıştır. Şirketlerin performans göstergesi olarak fiyat kazanç oranı, piyasa değeri / defter değeri oranı, hisse senedi başına kar payı oranı, kar payı verim oranı ve kar payı dağıtım oranı olmak üzere toplam 5 borsa performans göstergesi kullanılmıştır.

Çalışmada kullanılan kriterlerin ağırlıklarını belirlemek için Entropi tekniğinden yararlanılmıştır. Multiple Criteria Decision Making (MCDM) yöntemlerinden Additive Ratio Assesment (ARAS) ve Weighted Aggregated Sum Product Assessment (WASPAS) yöntemleri ile yapılan analizlerde şirketlerin finansal performansları ölçülmüştür. Analizlerin sonuçlarının başarısını ve sonuçlar arasındaki ilişkiyi belirlemek için Spearman korelasyon analizi yapılmıştır. Spearman korelasyon analizi sonucunda ARAS ve WASPAS yöntemi arasında pozitif yönlü ve güçlü bir ilişkinin olduğu saptanmıştır.

Anahtar Kelimeler: Borsa Performansı, Çok Kriterli Karar Verme Tekniği, Entropi, Aras ve Waspas Yöntemleri
JEL Sınıflandırması: G11, G23, G34.

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1. INTRODUCTION

Together with globalization, businesses have had to realize their basic goals in international markets such as getting profits, providing sustainability and growing. It has become unavoidable for the businesses operating in the global arena to grow and to develop operation areas in order to compete with each other. In markets with intensive competition, businesses prefer to apply different types of merger including cartel, concern, trust and holding in order to combine their strength and increase their market shares.

A holding is another version of company growth and it is defined to be a group of companies that is formed by the gathering of two or more companies in order to make profit. The purpose in conglomeration is to merge into and to take control of a company whose stocks are purchased. Therefore, conglomeration in Turkey is considered to be a show of force and a safe investment area for the investors (Okka, 2009: 895-896; Şimşek and Çelik, 2011:78-79). Holdings have several advantages including the achievement of international dimension, effective management, managing big capital with small capital, specialism, investment, production, R&D, financing, profitability, competition, risk distribution and benefitting from tax incentives (Ece, 2019: 64; Otlu, 1999: 103; Kuloğlu, 2019: 5-7). These advantages are very important for the survival, growth and economic contribution of businesses in a financial system. As known, businesses provide contribution to the economy of a country from various aspects including the provision of employment, tax payment and commercial cycle. In this context, holdings play key role especially for the developing countries such as Turkey.

Starting in 1960s, conglomeration process in Turkey has gained speed in recent years. It is known that the annual revenues of many publicly-traded holdings worldwide are greater than the gross domestic products of some countries and that the said holdings are essential for the economies of their countries. Looking at the data of Borsa İstanbul, we can say that the holdings are financially successful with regards to both market value and profitability despite the fluctuations in the last twenty years. When we review the literature, we noticed few studies on holdings. Therefore, when creating the population, we aimed to calculate the 18-year financial performances of 43 companies traded in the BIST Holding and Investment Index between 2000 and 2017. The reason of keeping the period so long is to differentiate the study from the other studies and to provide sharper interpretations by reaching more reliabile results. Comparing the financial performances of holdings contains informative, guiding, decisive and predictive qualities not only for companies and interest groups but also for investors.

Financial performance analysis is used for different purposes among various interest groups including company owners, managers, investors, competitors and creditors. Financial performance analysis contains decisive functions including the evaluation of the capital structure of companies, measurement of current profitabilities, estimation of future profitabilities, liquidity, internal control, evaluation of momentary financial situations and opportunities, effectiveness and efficiency of fund resources, ensuring the measurement of present and future yields of stocks and carrying out the financial plans of companies. Taking these functions into consideration, financial performance analysis is becoming more important for holdings that are also called to be a group of companies.

The term "holding" reminds of very strong financial structures in Turkey. These strong structures become a distinct sector after growing in number and being listed in the stock exchange. It is expected that reaching greater dimensions by large holdings worldwide with respect to capital management would have a huge impact. Therefore, it is necessary to use multiple indicators when making decisions among the holding companies which are particularly planned to invest in (Kuloğlu, 2019: 117).

Financial ratios are the criteria indicating the financial position of a company within the period that is examined. However, financial ratio analysis is an insufficient method to compare the financial performance achievements of companies. Therefore, companies and interest groups calculate financial performance through statistical and econometric models including regression, correlation, panel data, time series and MCDM methods by using their financial ratios as data. The present study uses the ARAS and WASPAS methods among the MCDM methods based on the stock exchange performance ratios to calculate the 18-year financial performances of 43 companies traded in the BIST Holding and Investment Index. The Spearman correlation analysis was conducted to test the relation between the ARAS and WASPAS methods used in the financial performance analysis after which the direction and strength of the relation between the methods were determined.

2. STOCK MARKET PERFORMANCE RATIOS

Stock market performance ratios for the investors wishing to invest in stock market are divided into five basic headings: price/earnings ratio, market value/book value ratio, dividend ratio per share, dividend yield ratio and payout ratio.

Price/Earnings Ratio; the price/earnings ratio is calculated by the ratio of the stock market price to the profit per share and it is generally published on a daily basis for publicly-traded companies. Stock market price refers to the daily closing price while profit per share is the ratio of the net profit to the number of shares (Pearson, 1998: 49). Price/earnings ratio is a performance indicator that constantly varies depending on the growth expectation of the company, the changes in the risk profile and the sectors which the companies belong to. The price/earnings ratio is a tool widely used by investors for analyzing the status of companies, sectors and markets (Zarei, 2018: 582). While ratio increase means that the shares of the business gain value, that is they are purchased; ratio decrease means an increase in the tendency of being purchased (Haftacı, 2005: 227).

Price/Earnings Ratio (PER) = Market price of the share/Earnings per share

Ratio of Market Value/Book Value; market value is obtained by multiplying the stock price of a share by the total number of shares. Book value can be defined as the accounting value of the net assets of a company (Li et al., 2015: 27). It is defined as the total market value of a company divided by total equity (McNichols, 2014: 1394). It shows how many times is the stock value of the company bigger than its equities. While the increase in the ratio of market value/book value means that the company's shares gain value and therefore are sold, the decrease in the ratio means that the shares of the company lost value and thus its purchase tendency is supported. For the healthy interpretation of the ratio, sector averages need to be taken into consideration (Haftacı, 2005: 1639, Çabuk & Lazol, 2009: 201). The market value/book value ratio provides the relationship between the stock price of the stocks

and the book value and assists the investors in their decisions to buy, sell and hold shares (Akdoğan and Tenker, 2003: 645; Çabuk and Lazol, 2009: 201).

Market Value/Book Value (MVBV)=Total Market Value/Total Equity (capital stock)

Earnings per share ratio is calculated by dividing company's net profit after tax to the number of shares. The high ratio of earnings per share causes an increase in dividends per share and thus increases the market prices of stocks (Okka, 2009: 112). Earnings per share can provide different returns in different markets considering the microeconomic factors such as price/earnings ratio, market value/book value ratio and enterprise size and the macroeconomic factors including market liquidity, market stability and inflation (Oloidi and Adeyeye, 2014: 498). The ratio of earnings per share is based on the distribution of the company's net profit among its shareholders in proportion to their owning. In countries where the stock market is developed, investors give great importance on this ratio and prefer to invest in companies that distribute high amounts of dividends (Berk, 2003: 49).

Earnings Per Share (EPS) = Net Profit/Number of Stocks

Dividend Yield Ratio is one of the most important financial ratios and it measures dividend payout of the current earnings per share (Gibson, 2009: 340). For investors who invest in stocks, dividend yield ratio is very important in terms of maintaining the company's financial performance and the market price of the stock (Gill et al., 2010: 8). Dividend Yield Ratio is calculated by dividing the ratio of earnings per share to the market price of the share. Dividend yield ratio is a financial ratio that measures the amount of cash dividends paid according to the market price per share of the shareholders. It is very important in terms of increasing the current income of investors and establishing a sustainable source of income (Auxilia and Krithika, 2018: 67). The companies have the right to not distribute some or all of the profits according to their dividend policies of their profits. Companies generally use their undistributed profits for capital increases or new investments.

Dividend Yield Ratio (DYR) = Earnings Per Share/Market Price of Stocks

Dividend Payout Ratio is calculated by dividing the total dividend amount by net profit and it generally refers to the percentage of net profit paid to shareholders (Sead, 2014: 44). It is very important for the publicly trading companies to determine the policy and time of dividend payout. Factors including changing economic conditions, growth rate of the companies and their future values affect the dividend payout policies of companies (Jiang and Pistorius, 2012: 450). Companies can pay the dividends of the shareholders in cash or in stock. When companies carry out dividend payout, this can be considered successful by the investor's perspective (Fu, 2019: 1). However, dividend payout ratios are generally low, as companies with high growth potential re-invest a large part of their profits. Companies with low growth potential can have high dividend payout ratios as they can distribute a large portion of the profits to the shareholders (Dağ, 2007: 88).

Dividend Payout ratio (DPR) = Total Dividend/Net Profit for the Period

3. LITERATURE STUDY

MCDM methods are a multi-criteria analysis method that evaluates alternatives by reducing the effect of different dimensions to a single dimension, taking numerous criteria and alternatives into account. As summarized below, many researchers, at home and abroad, conducted MCDM analysis using different methods, countries and sectors and interpreted the results.

Voulgaris et al. (2000) intended to develop evaluation methods to predict the performance of 143 SMEs in the Greek industry between 1988-1996 by using the financial ratio analysis and UTilities Additives DIScriminantes (UTADIS) method among the MCDM methods. As a result of the study; they determined the performances of SMEs by means of cluster analysis of three pre-defined homogeneous groups: strong, medium and weak.

Baourakis et al. (2002) listed companies according to their financial performances by taking into consideration the strengths and weaknesses of 10 agricultural cooperatives operating in the field of agricultural food production and marketing in Greece covering the years between 1993 and 1998 by using the Preference Ranking Method for Enrichment Evaluation (PROMETHEE) among the MCDM methods.

Yurdakul and İç (2003) analyzed the financial performances of five large-scale publicly traded automotive companies between 1998 and 2001 by the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). By converting the general performance of the companies into a single score with the TOPSIS method, they tested the success of the method by comparing the performance scores of each year to the value of the stocks of that year. As a result of the analysis, it was concluded that the results of the TOPSIS method and the stock values were compatible with each other and the method was successful taking certain conditions into account.

Kayalıdere and Kargın (2004) evaluated the activities of publicly traded businesses in textile and cement sectors with Data Envelopment Analysis (DEA). Using the data of 2002, they carried out 4 different analyzes including 15 cement plants and 27 textile companies. It was concluded upon the analysis that 3 companies were effective in the analysis I, 4 companies were effective in the analysis II, 5 companies were effective in the analysis III and 5 companies were effective in the analysis IV.

Kalogeras et al. (2005) aimed to evaluate the financial performance of the companies of Greece operating in the sectors of agriculture and food between 1993-1998 by using their financial ratios with PROMETHEE, one of the MCDM methods. The financial performances of the companies were evaluated per years by applying 7 different weight combinations to the data.

Eleren and Karakul (2008) intended to carry out a performance evaluation of the Turkish economy covering a period of 21 between 1986 to 2006. They attempted to determine the years with the best performance in economy according to the success score of each year by using 7 different macro variables with the TOPSIS method, one of the MCDM methods. According to the success scores calculated as a result of the analysis, the best year was 1986, followed by 1990, 1987 and 1993, respectively.

Bülbül and Köse (2011) calculated the financial ratios selected to be the financial performance indicator of 19 businesses operating in Food, Beverage and Tobacco Industry between 2005-2008. The financial performances of the companies were calculated separately for the years 2005, 2006, 2007 and 2008 by using TOPSIS and Elimination and Choice Expressing Reality (ELECTRE) methods among the MCDM methods and the companies were listed according to their performance for each year.

Hemmati et al. (2013) used DEA and TOPSIS techniques to measure the relative performance of 16 private and state banks operating in Iran. They used the Entropy method to determine the weight of the criteria used in the study. As a result of the study, it was determined that 9 out of the 16 banks were effective, the relative performance ratio for private banks was 82% and 75% for state banks.

Rezaie et al. (2014) used fuzzy Analytic Hierarchy Process (AHP) and Vise Kriterijumska Optimizacija I Kompromisno Resenje (VIKOR) analysis to evaluate the performances of 27 cement companies traded on the Tehran Stock market between 2008 and 2009. The study was conducted using financial ratios and financial performance was calculated separately for 2008 and 2009. They applied the fuzzy AHP method in order to determine the weights of the 13 criteria used in the stud and they ranked the companies by their performance through the VIKOR analysis to carry out financial performance evaluation.

Shaverdi et al. (2016) aimed to perform financial performance analysis of 7 petrochemical companies traded on Tehran Stock market. They used fuzzy AHP and fuzzy TOPSIS analysis among the MCDM methods for performance evaluation using the financial ratios of the companies for the period of 2003-2013. Fuzzy AHP analysis was used to determine the weight of the criteria and fuzzy TOPSIS analysis was used to determine the success rank of the financial performances. As a result of the study; it was determined that the results of the analysis conform to the averages of the sector which the companies belong to.

Ceyhan and Demirci (2017) aimed to evaluate the financial performance of 6 financial leasing companies operating in the financial leasing sector of Borsa İstanbul in 2015 by using their financial ratios. MULTIMOORA method, one of the MCDM techniques, was used in the study. As a result of the study, the performance results of the companies are listed by using the reference point approach and full product form methods.

Sharma (2018) evaluated the financial performance of 7 companies traded in the banking sector in the National Stock market (NSE) between 2014 and 2017. AHP analysis was used to calculate the weights of the criteria used in the study. PROMETHEE and TOPSIS methods among the MCDM methods were used to evaluate the financial performance of companies and to determine the company with the best financial performance for a period of four years. The results of the methods used in the study were compared with the Spearman Rank Correlation Coefficient.

4. RESEARCH SAMPLE

In the study, publicly held holdings and investment companies registered to Borsa İstanbul were examined. The data of 43 companies operating as a publicly held holding and investment company were acquired through the Finnet program. Data set consists of the

annual data of 18 years between 2000 and 2017. The stock-performance indicators of 43 firms used as sample were examined. Stock-performance indicators are price-to-profit ratio, Dividend Payout ratio, Dividend Yield Ratio, share of profit per share and market value/book value, price earnings ratio, dividend payout ratio, dividend yield ratio, earnings per share and market to book value ratio.

5. METHOD OF THE STUDY

Three MCDM techniques were used in this study. The first technique, Entropy technique, was used to calculate the weights of the variables used in the study.

5.1. The Entropy Method

The first method used in the study is the Entropy method. Entropy is a measure of uncertainty and it was used for the first time by Rudolph Clausius in 1865. The method was transformed into its current use by Wang and Lee in 2009 and it includes 5 steps (Wang and Lee, 2009: 8982):

1st Step:

$$X = \begin{bmatrix} x_{11} & x_{12} \dots & x_{1n} \\ x_{21} & x_{22} \dots & x_{2n} \\ \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & x_{mn} \end{bmatrix} \tag{1}$$

2nd Step:

$$P_{ij} = \frac{a_{ij}}{\sum_{i=1}^{m} a_{ij}}; \forall_j \tag{2}$$

3rd Step:

$$E_j = -k \sum_{i=1}^{m} \left[P_{ij} \, ln P_{ij} \right]; \forall_j \tag{3}$$

4th Step:

$$d_j = 1 - E_j \tag{4}$$

5th Step:

$$W_j = \frac{d_j}{\sum_{j=1}^{n} d_j}; \forall_j \tag{5}$$

The total weight equalling to 1 should be checked to confirm and determine the correctness of the entropy method. If this cannot be met, steps need to be checked and performed again.

5.2. The ARAS Method

The ARAS method, the second one, was used to rank the holding and investment companies according to their stock market performances.

The ARAS method was introduced to the literature by Zavadskas & Turskis (2010). The most important difference of this method compared to the other MCDM techniques is that it compares optimal data to alternative data and that optimal data is included in the analysis as a different alternative.

The ARAS method consists of 4 steps (Zavadskas et al., 2010: 128):

1st Step:

$$X = \begin{bmatrix} x_{01} & x_{02} \dots & x_{0n} \\ x_{11} & x_{12} \dots & x_{1n} \\ \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & x_{mn} \end{bmatrix} \tag{6}$$

2nd Step:

$$\bar{x}_{ij} = \frac{x_{ij}}{\sum_{i=0}^{m} x_{ij}} \tag{7}$$

$$\bar{x}_{ij} = \frac{1 / x_{ij}}{\sum_{i=0}^{m} 1 / x_{ij}} \tag{8}$$

The formula number 7 is a calculation based on the benefit of the variable while formula number 8 indicates the calculation based on cost. The only difference between them is that the cost data is calculated as 1/cost before taking the share of the cost data within the total.

3rd Step:

$$\sum_{j=1}^{n} w_j = 1 \tag{9}$$

According to the level of significance:

$$x_{ij} = \bar{x}_{ij} w_i \tag{10}$$

New matrix is created by the formula no 10.

4th Step:

$$S_i = \sum_{j=1}^{n} x_{ij} \tag{11}$$

It is done by the above formula. It is necessary to determine the benefit levels of the alternatives by using this formula. Benefit levels are found with the following formula: $K_i = S_i / S_0$.

The calculated K_i values show the effectiveness of the benefit function of the alternatives. It shows the K_i values from big to small and the alternatives from good to bad.

5.3. The WASPAS Method

The WASPAS method was one of the MCDM techniques developed by Zavadskas et al. in 2012. The word WASPAS is the abbreviation of "weighted aggregated sum product assessment". The WASPAS method consists of the combination of the WSM model (Weighted sum model) and WPM model (Weighted product model). The WASPAS method is a technique that uses the weights and performance values of criteria, provides a ranking of alternatives and aims to reach high consistency in estimation (Lashgari et al., 2014: 738-740).

The WASPAS method consists of 5 steps (Zavadskas et al., 2012: 3; Chakraborty and Zavadskas, 2014: 2-3):

1st Step: A decision matrix has to be created from the data set that is used. The decision matrix is shown in the formula no 12.

$$X = \begin{bmatrix} x_{11} & x_{12} \cdots & x_{1n} \\ x_{21} & x_{22} \ldots & x_{2n} \\ \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} \cdots & x_{mn} \end{bmatrix} \tag{12}$$

2nd Step: It includes the standardization of the data in the decision matrix. This is shown by the Formula 13 and 14.

$$X_{ij}^* = \frac{X_{ij}}{\max_{ij}(X_{ij})} \qquad i = 1,2,..,m \text{ ve } j = 1,2,\ldots,n \tag{13}$$

$$X_{ij}^* = \frac{X_{ij}}{\min_{ij}(X_{ij})} \qquad i = 1,2,..,m \text{ ve } j = 1,2,\ldots,n \tag{14}$$

The Formula 13 is used in the standardization of the income resources with positive quality including profitability and earning while the Formula 14 is used in the standardization of the resources that are an expense such as cost.

3rd Step: WSM (weighted sum model), which is in the combination of the WASPAS method, is calculated. This model is calculated by the formula 15.

$$Q_i^{(1)} \sum_{j=1}^{n} r_{ij} w_j \qquad (15)$$

The weighted sum model is found by multiplying and adding the standardized data in formula 15 by the calculated weight of every variable.

4th Step: WPM (Weighted product model) is calculated. This model is calculated by using the formula no 16.

$$Q_i^{(2)} = \prod_{j=1}^{n} r_{ij}^{w_j} \qquad (16)$$

The data standardized in the Formula 16 are used and powers of every variable as much as their own weight are taken and added to find the weighted production model.

5th Step: The WSM and WPM models calculated in the Formulas 15 and 16 were multiplied and added with the lambda (λ) values as shown in the Formula 17.

$$Q_i = \lambda Q_i^{(1)} + (1-\lambda) Q_i^{(2)} \qquad (17)$$

The WASPAS score of the alternatives in the Formula no 17 was found to determine which alternative is superior. The lambda value used when conducting this finding varies between 0 and 1 depending on the choice of the decision maker. However, it is preferred to be used as 0,5 to make sure the balance is not disrupted by adding more weight to one side.

6. FINDINGS

The first method used in the study is the Entropy method. The levels of significance of the ratios used in the study were determined by the Entropy method. The Entropy scores are shown in Table 1.

Table 1. The Entropy Scores Between the Years 2000 and 2018

Years / Ratios	PER	MVBV	EPS	DYR	DPR
2000	0,191	0,175	0,159	0,247	0,228
2001	0,200	0,171	0,168	0,233	0,228
2002	0,180	0,164	0,181	0,247	0,228
2003	0,212	0,221	0,182	0,188	0,197
2004	0,197	0,175	0,207	0,200	0,222
2005	0,192	0,177	0,195	0,217	0,219
2006	0,196	0,174	0,192	0,226	0,212
2007	0,195	0,182	0,195	0,216	0,212
2008	0,215	0,185	0,137	0,244	0,219
2009	0,243	0,170	0,173	0,211	0,203
2010	0,187	0,259	0,168	0,192	0,194
2011	0,208	0,180	0,178	0,208	0,226

2012	0,178	0,276	0,167	0,194	0,185
2013	0,192	0,156	0,230	0,244	0,179
2014	0,175	0,169	0,221	0,244	0,191
2015	0,181	0,147	0,233	0,231	0,209
2016	0,188	0,184	0,235	0,195	0,198
2017	0,189	0,208	0,207	0,194	0,201

Table 1 includes the Entropy scores of the stock market performance ratios according to which:

➤ In 2000, the most important ratio among the stock market indicators was the dividend payout ratio with 24% and the least important ratio was the earnings per share ratio with 15%.

➤ In 2001, the most important ratio among the stock market indicators was the dividend payout ratio with 23% and the least important ratio was the earnings per share ratio with 16%.

➤ In 2002, the most important ratio among the stock market indicators was the dividend payout ratio with 24% and the least important ratio was the market value to book value ratio with 16%.

➤ In 2003, the most important ratio among the stock market indicators was the market value to book value ratio with 22% and the least important ratio was the earnings per share ratio with 18,2%.

➤ In 2004, the most important ratio among the stock market indicators was the dividend yield ratio with 27% and the least important ratio was the market value to book value ratio with 17%.

➤ In 2005, the most important ratio among the stock market indicators was the dividend yield ratio with 21,8% and the least important ratio was the market value to book value ratio with 17%.

➤ In 2006, the most important ratio among the stock market indicators was the dividend payout ratio with 22% and the least important ratio was the market value to book value ratio with 17%.

➤ In 2007, the most important ratio among the stock market indicators was the dividend payout ratio with 21,5% and the least important ratio was the market value to book value ratio with 18%.

➤ In 2008, the most important ratio among the stock market indicators was the dividend payout ratio with 24% and the least important ratio was the earnings per share ratio with 13%.

➤ In 2009, the most important ratio among the stock market indicators was the price/earnings ratio with 24% and the least important ratio was the market value to book value ratio with 16%.

➤ In 2010, the most important ratio among the stock market indicators was the market value to book value ratio with 25% and the least important ratio was the earnings per share ratio with 16%.

➤ In 2011, the most important ratio among the stock market indicators was the dividend yield ratio with 22% and the least important ratio was the earnings per share ratio with 17,7%.

➤ In 2012, the most important ratio among the stock market indicators was the market value to book value ratio with 27% and the least important ratio was the earnings per share ratio with 16%.

➤ In 2013, the most important ratio among the stock market indicators was the dividend payout ratio with 24% and the least important ratio was the market value to book value ratio with 15%.

➤ In 2014, the most important ratio among the stock market indicators was the dividend payout ratio with 24% and the least important ratio was the market value to book value ratio with 16%.

➢   In 2015, the most important ratio among the stock market indicators was the earnings per share ratio with 23,2% and the least important ratio was the market value to book value ratio with 14%.

➢   In 2016, the most important ratio among the stock market indicators was the earnings per share ratio with 23% and the least important ratio was the market value to book value ratio with 18,4%.

➢   In 2017, the most important ratio among the stock market indicators was the market value to book value ratio with 20,7% and the least important ratio was the price/earnings ratio with 18%.

Tables 2 and 3 show the results of the ARAS method which is the 2nd method used by the help of the Entropy scores.

Table 2. ARAS Scores of the Holding and Investment Companies
(between 2000 and 2008)

Companies / Years	2000	2001	2002	2003	2004	2005	2006	2007	2008
Alarko Holding	0,152	0,192	0,437	0,064	-0,341	0,298	0,042	0,111	-0,003
Anadolu Grubu Holding	0,152	0,283	0,089	0,206	0,365	0,362	0,249	0,255	-0,066
Artı Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,003	0,028	0,042
Atlantis Yatırım Holding	-0,072	0,095	-0,055	0,139	0,238	0,072	0,003	0,200	0,113
Avrupa Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Bera Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	-0,037
Borusan Yat. Paz.	0,094	0,050	0,082	0,050	0,153	0,172	0,065	0,143	0,060
Boyner Perakende Yat.	0,449	-0,784	0,125	0,007	0,123	0,050	0,009	0,141	0,020
Cosmos Yat. Holding	-0,164	0,540	0,050	0,007	0,016	0,148	0,127	0,339	-0,531
Dagi Yatırım Holding	0,573	0,392	1,913	0,322	0,601	0,589	0,036	0,403	-0,062
Denge Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Doğan Holding	0,057	0,009	0,056	0,014	0,045	0,182	0,084	0,149	-1,116
Eczacıbaşı Yatırım	0,052	0,075	0,112	0,137	0,095	0,104	0,055	0,142	0,209
Egeli&Co Enerji Yatırım	0,027	0,073	-0,037	0,025	0,069	0,077	0,621	0,372	-0,199
Egeli&Co Yatırım Holding	-0,029	0,072	0,084	0,006	0,014	0,066	0,147	0,143	-0,051
Euro Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,013
Gedik Yatırım Holding	-0,068	0,108	-0,014	0,009	0,082	0,180	0,100	0,249	-0,130
Global Yat. Holding	0,048	-0,002	0,016	-0,002	0,014	0,080	0,027	0,082	0,040
GSD Holding	0,186	0,058	0,090	0,532	0,070	0,085	0,029	0,057	-0,005
Güler Yat. Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,142	0,045	0,009
Işıklar Enerji Yapı Hol.	0,154	-0,068	0,037	-0,001	0,010	0,034	0,008	0,028	0,027
İhlas Holding	0,039	-0,164	-0,021	0,007	0,054	0,104	0,002	0,022	0,030
İhlas Yayın Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	-0,001	-0,015
İşbir Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
İttifak Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,128	0,169	-0,072

Kapital Yat. Holding	0,000	0,000	0,000	0,000	0,000	0,375	0,057	0,523	0,015
Kervansaray Yat. Holding	0,041	0,121	0,127	-0,007	0,143	0,123	0,078	0,275	0,264
Koç Holding	0,167	0,157	0,298	0,049	0,131	0,099	0,049	0,195	-0,126
Marka Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,351	-0,261	0,273	1,124
Mazhar Zorlu Holding	0,021	0,021	-0,010	0,002	-0,055	-0,093	-0,046	-0,016	0,197
Metro Holding	0,071	0,175	-0,027	0,006	0,031	0,192	0,093	0,237	0,015
MMC San. and Tic. Yat.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001
Net Holding	0,020	0,027	-0,010	0,005	0,114	0,076	0,087	0,124	0,015
Ostim Endüstriyel Yat	0,000	0,000	0,000	0,000	0,000	0,004	0,005	0,009	-0,009
Polisan Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Ral Yatırım Holding	-0,105	0,054	0,082	0,006	-0,028	-0,092	-0,057	0,115	-0,004
Sabancı Holding	0,077	0,079	0,108	0,047	0,115	0,144	0,085	0,178	-0,101
Salix Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,125	0,026
Tekfen Holding	0,000	0,000	0,000	0,000	0,011	0,023	0,037	0,141	-0,019
Ufuk Yatırım	0,000	0,000	0,000	0,000	0,000	0,000	0,157	0,141	-0,160
Umpaş Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,046
Verusa Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Yeşil Yatırım Holding	0,000	0,000	0,000	0,000	0,013	0,075	-0,001	0,061	0,032

Table 3. ARAS Scores of the Holding and Investment Companies

(between 2009 and 2017)

Companies / Years	2009	2010	2011	2012	2013	2014	2015	2016	2017
Alarko Holding	0,047	0,053	1,311	0,049	0,037	0,038	0,019	-0,018	0,086
Anadolu Grubu Holding	0,134	0,176	1,758	0,418	0,050	0,007	-0,003	-1,168	0,045
Artı Yatırım Holding	0,031	-0,022	0,965	-0,041	0,036	0,006	0,002	-0,323	-0,003
Atlantis Yatırım Holding	0,131	0,013	4,739	0,002	0,016	0,001	0,007	-0,089	0,062
Avrupa Yatırım Holding	-0,010	0,003	3,736	0,063	0,087	0,020	0,075	-0,273	0,151
Bera Holding	0,012	0,046	2,417	0,138	0,030	0,001	0,089	-0,010	0,054
Borusan Yat. Paz.	0,059	0,108	1,828	0,165	0,066	0,058	0,086	0,283	0,098
Boyner Perakende Yat.	0,059	0,266	1,294	2,352	0,106	0,035	0,041	-4,231	0,274
Cosmos Yat. Holding	0,162	0,233	1,559	0,500	0,013	0,092	-0,097	-0,002	-0,010
Dagi Yatırım Holding	0,175	0,522	5,304	0,300	0,011	0,015	0,010	-0,021	0,002
Denge Holding	0,000	0,009	1,798	0,019	0,014	0,014	0,016	0,349	0,023
Doğan Holding	-0,002	0,210	1,288	0,017	0,006	0,002	0,006	-0,050	0,001
Eczacıbaşı Yatırım	0,076	0,096	3,988	0,113	0,025	0,033	0,448	0,055	0,140
Egeli&Co Enerji Yatırım	0,220	0,567	5,555	0,408	0,017	0,013	0,008	-0,172	0,007
Egeli&Co Yatırım Holding	0,064	-0,019	1,461	0,171	0,120	0,073	-0,001	-0,198	0,033
Euro Yatırım Holding	0,001	0,013	4,614	-0,030	0,016	0,010	0,000	-0,008	0,002
Gedik Yatırım Holding	0,115	0,010	1,220	0,077	0,058	0,035	0,025	-0,007	0,013

Global Yat. Holding	0,028	0,072	1,486	0,088	0,070	0,039	0,011	-0,353	-0,002
GSD Holding	0,020	0,017	1,373	0,014	0,011	0,607	0,207	-0,572	0,322
Güler Yat. Holding	0,027	0,161	4,398	-0,016	0,009	0,009	0,013	0,087	0,002
Işıklar Enerji Yapı Hol.	0,045	-0,071	0,621	0,031	0,022	0,019	0,002	-0,113	0,007
İhlas Holding	0,014	0,015	4,914	-0,022	0,006	0,002	0,004	0,018	0,009
İhlas Yayın Holding	0,004	0,318	1,069	-0,017	0,006	0,005	0,003	-0,033	0,002
İşbir Holding	0,000	0,111	2,842	-0,309	0,526	0,315	0,365	-7,418	0,121
İttifak Holding	0,689	0,094	5,350	-0,032	1,317	0,013	0,014	0,221	0,017
Kapital Yat. Holding	0,016	-0,035	6,151	0,029	0,018	0,013	0,036	-0,213	0,086
Kervansaray Yat. Holding	0,100	2,231	0,000	-0,013	0,009	0,006	0,004	-0,127	0,001
Koç Holding	0,100	0,173	1,336	0,118	0,050	0,041	0,069	0,813	0,070
Marka Yatırım Holding	0,197	-0,018	3,285	-0,034	0,061	0,020	0,009	0,079	0,000
Mazhar Zorlu Holding	0,028	0,000	3,795	-0,009	0,003	0,014	0,008	0,489	0,017
Metro Holding	0,045	0,077	0,000	-0,008	0,006	0,006	0,000	0,000	0,006
MMC San. and Tic. Yat.	-0,001	0,003	2,200	-0,075	0,419	0,019	0,010	-0,335	0,003
Net Holding	0,020	0,013	0,000	0,160	0,121	0,106	0,039	-0,018	0,008
Ostim Endüstriyel Yat	0,006	0,005	5,628	0,021	0,008	0,019	0,016	0,112	-0,001
Polisan Holding	0,004	0,008	2,407	0,037	0,044	0,033	0,091	0,534	0,064
Ral Yatırım Holding	-0,093	0,053	4,954	-0,071	0,050	0,044	-0,031	0,351	0,020
Sabancı Holding	0,113	0,168	3,953	0,129	0,042	0,036	0,053	1,157	0,073
Salix Yatırım Holding	0,032	0,109	0,000	0,049	0,030	0,022	0,042	-0,296	0,020
Tekfen Holding	0,067	0,115	1,250	0,128	0,196	0,051	0,079	0,171	0,102
Ufuk Yatırım	0,015	0,024	1,199	0,013	0,012	0,012	0,017	0,043	-0,002
Umpaş Holding	0,012	0,014	-0,003	-0,002	0,000	0,001	0,009	-0,051	0,150
Verusa Holding	0,000	-0,001	0,000	0,113	0,054	0,061	0,133	0,030	0,105
Yeşil Yatırım Holding	0,026	-0,013	1,294	-0,041	0,018	0,004	0,038	2,522	0,254

Tables 2 and 3 determine the stock market performances of holding and investment companies with the ARAS method according to which:

➢ In 2000, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Cosmos Yatırım Holding.

➢ In 2001, the company with the best performance in stock market was Cosmos Yatırım Holding, while the company with the lowest performance was Boyner Perakende Yatırım business.

➢ In 2002, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Atlantis Yatırım Holding.

➢ In 2003, the company with the best performance in stock market was GSD Holding, while the company with the lowest performance was Kervansaray Yatırım Holding.

➢ In 2004, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Alarko Holding.

➢ In 2005, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Mazhar Zorlu Holding.

➢ In 2006, the company with the best performance in stock market was Egeli & Co Enerji Yatırım, while the company with the lowest performance was Marka Yatırım Holding.

> ➢   In 2007, the company with the best performance in stock market was Kapital Yatırım Holding, while the company with the lowest performance was Mazhar Zorlu Holding.
> ➢   In 2008, the company with the best performance in stock market was Marka Yatırım Holding, while the company with the lowest performance was Doğan Holding.
> ➢   In 2009, the company with the best performance in stock market was İttifak Holding, while the company with the lowest performance was Ral Yatırım Holding.
> ➢   In 2010, the company with the best performance in stock market was Kervansaray Yatırım Holding, while the company with the lowest performance was Işıklar Enerji Yapı Holding.
> ➢   In 2011, the company with the best performance in stock market was Kapital Yatırım Holding, while the company with the lowest performance was Umpaş Holding.
> ➢   In 2012, the company with the best performance in stock market was Boyner Perakende Yatırım, while the company with the lowest performance was İşbir Holding.
> ➢   In 2013, the company with the best performance in stock market was İttifak Holding, while the company with the lowest performance was Umpaş Holding.
> ➢   In 2014, the company with the best performance in stock market was GSD Holding, while the company with the lowest performance was Umpaş Holding.
> ➢   In 2015, the company with the best performance in stock market was Eczacıbaşı Yatırım, while the company with the lowest performance was Cosmos Yatırım Holding.
> ➢   In 2016, the company with the best performance in stock market was Yeşil Yatırım Holding, while the company with the lowest performance was İşbir Holding.
> ➢   In 2017, the company with the best performance in stock market was GSD Holding, while the company with the lowest performance was Cosmos Yatırım Holding.

The WASPAS method is the second ranking technique after the ARAS method. It is essential to determine the relation, approximity and reliability of the results of the ARAS method and the WASPAS method. Tables 4 and 5 show the WASPAS scores.

Table 4. WASPAS Scores (between 2000 and 2008)

Companies / Years	2000	2001	2002	2003	2004	2005	2006	2007	2008
Alarko Holding	1,376	1,686	1,819	1,430	0,547	1,822	1,353	1,580	1,581
Anadolu Grubu Holding	1,709	1,657	2,181	1,555	1,980	2,049	1,788	1,974	1,843
Artı Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,374	0,425	0,466
Atlantis Yatırım Holding	0,568	0,854	0,314	0,776	1,157	0,747	0,346	1,141	0,844
Avrupa Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Bera Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,423
Borusan Yat. Paz.	1,179	1,048	1,083	1,312	1,771	1,881	1,540	1,783	1,770
Boyner Perakende Yat.	1,967	0,138	1,147	0,563	1,091	1,014	0,377	1,251	0,364
Cosmos Yat. Holding	0,805	1,324	0,700	0,353	0,405	1,169	1,117	1,298	0,808
Dagi Yatırım Holding	2,101	1,864	-0,508	1,820	2,250	2,385	0,992	2,140	0,834
Denge Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Doğan Holding	1,107	0,396	1,034	0,609	1,021	1,889	1,563	1,795	1,239
Eczacıbaşı Yatırım	1,083	1,046	1,761	1,516	1,610	1,660	1,460	1,589	1,842
Egeli&Co Enerji Yatırım	0,953	0,934	0,312	0,621	1,026	1,080	2,150	2,050	0,885
Egeli&Co Yatırım Holding	0,300	0,576	0,830	0,304	0,411	0,828	1,470	1,451	0,693
Euro Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,215	-0,005
Gedik Yatırım Holding	0,554	0,582	0,393	0,285	0,913	1,211	1,052	1,228	0,793

Global Yat. Holding	1,078	0,428	0,382	0,158	0,406	1,122	0,943	1,103	0,304
GSD Holding	1,263	0,997	0,971	1,310	1,468	1,566	1,297	1,040	1,025
Güler Yat. Holding	0,000	0,000	0,000	0,000	0,000	0,000	1,102	0,977	0,351
Işıklar Enerji Yapı Hol.	1,152	0,400	0,949	0,136	0,365	0,483	0,448	0,435	0,380
İhlas Holding	1,048	0,303	0,369	0,560	1,406	1,521	0,541	0,392	0,296
İhlas Yayın Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,366
İşbir Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
İttifak Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,516	0,598	0,476
Kapital Yat. Holding	0,000	0,000	0,000	0,000	0,000	2,122	0,873	2,174	0,363
Kervansaray Yat. Holding	0,991	1,287	1,191	0,153	1,225	1,225	1,165	1,412	0,491
Koç Holding	1,755	1,389	1,496	1,319	1,760	1,203	1,057	1,304	1,226
Marka Yatırım Holding	0,000	0,000	0,000	0,000	0,063	2,072	0,760	1,925	2,234
Mazhar Zorlu Holding	0,929	0,884	0,350	0,173	-0,031	-0,062	-0,027	-0,012	-0,085
Metro Holding	1,166	1,161	0,326	0,550	0,934	1,220	1,116	1,305	0,417
MMC San. and Tic. Yat.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Net Holding	0,919	0,895	0,302	0,512	1,157	0,588	1,123	1,186	0,362
Ostim Endüstriyel Yat	0,000	0,000	0,000	0,000	0,000	0,221	0,250	0,290	0,337
Polisan Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Ral Yatırım Holding	-0,063	0,244	0,295	0,166	0,004	-0,020	0,003	0,089	0,368
Sabancı Holding	1,499	1,486	1,821	1,313	1,694	1,810	1,625	1,826	1,757
Salix Yatırım Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,375	1,068	0,335
Tekfen Holding	0,000	0,000	0,000	0,000	0,262	0,322	0,572	1,725	1,248
Ufuk Yatırım	0,000	0,000	0,000	0,000	0,000	0,000	1,371	1,272	1,253
Umpaş Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	-0,019
Verusa Holding	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Yeşil Yatırım Holding	0,000	0,000	0,000	0,162	0,412	1,111	0,364	1,011	0,339

Table 5. WASPAS Scores (between 2009 and 2017)

Companies / Years	2009	2010	2011	2012	2013	2014	2015	2016	2017
Alarko Holding	1,381	1,562	1,579	1,607	1,383	1,291	0,783	1,803	1,502
Anadolu Grubu Holding	1,672	1,842	1,900	1,714	1,302	0,613	0,573	0,515	1,057
Artı Yatırım Holding	0,429	0,389	0,369	0,466	0,801	0,685	0,414	0,211	0,179
Atlantis Yatırım Holding	1,002	0,553	0,334	0,782	0,382	0,315	0,360	0,311	0,667
Avrupa Yatırım Holding	-0,009	0,255	0,256	1,212	0,858	0,415	1,092	0,279	0,893
Bera Holding	0,362	0,439	0,398	1,236	0,740	0,262	1,032	0,201	0,799
Borusan Yat. Paz.	1,492	1,736	1,960	1,834	1,717	1,432	1,621	1,758	1,579
Boyner Perakende Yat.	0,986	2,031	2,291	-4,732	1,005	0,552	0,560	0,417	0,600

Cosmos Yat. Holding	1,048	1,144	0,640	1,427	0,368	0,883	-0,086	-0,014	0,294
Dagi Yatırım Holding	1,802	2,093	0,728	1,983	0,358	0,791	0,374	0,800	0,187
Denge Holding	0,000	0,319	0,329	1,121	0,694	0,785	0,830	0,801	0,744
Doğan Holding	0,766	1,771	0,286	0,921	0,323	0,292	0,350	0,241	0,182
Eczacıbaşı Yatırım	1,429	1,597	1,866	1,663	1,765	1,251	2,093	2,015	1,612
Egeli&Co Enerji Yatırım	1,882	2,106	0,750	2,117	0,385	0,394	0,373	0,224	0,565
Egeli&Co Yatırım Holding	1,163	0,380	0,357	1,571	1,455	1,009	0,370	0,303	0,332
Euro Yatırım Holding	0,243	1,042	1,140	0,401	0,383	0,703	0,353	0,737	0,179
Gedik Yatırım Holding	0,983	0,590	1,116	1,089	0,697	0,733	0,752	0,612	0,493
Global Yat. Holding	0,839	0,947	0,304	1,548	1,596	0,703	0,687	0,566	0,462
GSD Holding	0,822	0,882	0,897	0,815	0,641	2,147	1,645	1,844	1,762
Güler Yat. Holding	0,860	1,001	0,370	0,292	0,628	0,724	0,807	0,749	0,182
Işıklar Enerji Yapı Hol.	0,468	0,626	0,316	0,832	0,624	0,713	0,304	0,210	0,237
İhlas Holding	0,755	0,997	0,333	0,382	0,327	0,272	0,330	0,675	0,589
İhlas Yayın Holding	0,286	1,272	0,995	0,356	0,322	0,660	0,320	0,211	0,177
İşbir Holding	0,000	0,544	0,502	0,579	1,584	1,205	1,645	0,146	1,543
İttifak Holding	2,144	1,616	1,993	0,643	-2,565	0,754	0,806	0,784	0,671
Kapital Yat. Holding	0,388	0,430	0,403	0,980	0,696	0,733	0,866	1,569	1,436
Kervansaray Yat. Holding	0,572	-4,483	1,361	0,486	0,348	0,328	0,332	0,243	0,166
Koç Holding	1,631	1,893	1,836	1,746	1,495	1,338	1,560	1,744	1,472
Marka Yatırım Holding	1,753	0,377	1,639	0,706	0,800	0,416	0,388	0,789	0,172
Mazhar Zorlu Holding	0,562	-0,009	-0,048	-0,014	0,345	0,501	0,491	0,600	0,528
Metro Holding	0,904	0,975	0,346	0,267	0,594	0,635	0,301	0,723	0,564
MMC San. and Tic. Yat.	-0,001	0,256	1,288	0,605	1,238	0,409	0,753	0,943	0,219
Net Holding	0,387	1,034	1,267	2,084	1,754	1,564	0,953	0,256	0,614
Ostim Endüstriyel Yat	0,315	0,290	-0,006	0,966	0,345	0,818	0,837	0,824	0,180
Polisan Holding	0,293	0,311	0,204	1,632	1,580	1,264	1,564	1,489	1,418
Ral Yatırım Holding	-0,076	-0,169	-0,062	0,137	0,317	0,045	-0,026	0,200	0,328
Sabancı Holding	1,612	1,803	1,790	1,659	1,412	1,270	1,469	1,669	1,440
Salix Yatırım Holding	0,877	1,632	0,636	1,544	0,715	1,164	0,931	1,045	0,296
Tekfen Holding	1,510	1,799	1,884	1,825	0,696	1,370	1,551	1,748	1,584
Ufuk Yatırım	0,368	1,034	1,028	0,923	0,656	0,755	0,830	0,746	0,160
Umpaş Holding	0,358	0,347	-0,018	0,000	0,062	0,129	0,749	0,186	1,495

Verusa Holding	0,000	0,000	0,337	0,427	1,579	1,457	1,726	1,761	1,418
Yeşil Yatırım Holding	0,846	0,347	0,373	0,399	0,389	0,306	0,918	0,938	0,921

Tables 4 and 5 determine the stock market performances of holding and investment companies with the WASPAS method according to which:

➢ In 2000, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Ral Yatırım Holding.
➢ In 2001, the company with the best performance in stock market was Dagi Yatırım Holding, while there were several businesses with the lowest performance.
➢ In 2002, the company with the best performance in stock market was Anadolu Grubu Holding, while the company with the lowest performance was Dagi Yatırım Holding.
➢ In 2003, the company with the best performance in stock market was Dagi Yatırım Holding, while there were several businesses with the lowest performance.
➢ In 2004, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Mazhar Zorlu Holding.
➢ In 2005, the company with the best performance in stock market was Dagi Yatırım Holding, while the company with the lowest performance was Mazhar Zorlu Holding.
➢ In 2006, the company with the best performance in stock market was Egeli & Co Enerji Yatırım, while the company with the lowest performance was Mazhar Zorlu Holding.
➢ In 2007, the company with the best performance in stock market was Kapital Yatırım Holding, while the company with the lowest performance was Mazhar Zorlu Holding.
➢ In 2008, the company with the best performance in stock market was Marka Yatırım Holding, while the company with the lowest performance was Mazhar Zorlu Holding.
➢ In 2009, the company with the best performance in stock market was İttifak Holding, while the company with the lowest performance was Ral Yatırım Holding.
➢ In 2010, the company with the best performance in stock market was Egeli & Co Enerji Yatırım, while the company with the lowest performance was Kervansaray Yatırım Holding.
➢ In 2011, the company with the best performance in stock market was Boyner Perakende Yatırım, while the company with the lowest performance was Ral Yatırım Holding.
➢ In 2012, the company with the best performance in stock market was Egeli & Co Enerji Yatırım, while the company with the lowest performance was Boyner Perakende Yatırım business.
➢ In 2013, the company with the best performance in stock market was Eczacıbaşı Yatırım, while the company with the lowest performance was İttifak Holding.
➢ In 2014, the company with the best performance in stock market was GSD Holding, while the company with the lowest performance was Ral Yatırım Holding.
➢ In 2015, the company with the best performance in stock market was Eczacıbaşı Yatırım, while the company with the lowest performance was Cosmos Yatırım Holding.
➢ In 2016, the company with the best performance in stock market was Eczacıbaşı Yatırım, while the company with the lowest performance was Cosmos Yatırım Holding.
➢ In 2017, the company with the best performance in stock market was GSD Holding, while the company with the lowest performance was Ufuk Yatırım company.

The Spearman correlation analysis was conducted to determine the relation between the results of these 3 methods and results were given in Table 6.

Table 6. Spearman Correlation Analysis

Spearman Correlation Analysis			ARAS scores	WASPAS scores
Spearman's rho	ARAS scores	Correlation Coefficient	1,000	,661**
		Sig. (2-tailed)	.	,000
	WASPAS scores	Correlation Coefficient	,661**	1,000
		Sig. (2-tailed)	,000	.

According to the results in Table 6, the data ranking was conducted with the ARAS and WASPAS methods. The Spearman correlation test was performed to determine the relations between the methods and a significant relation (Sig. < 0,05) was found between the 2 methods. The correlation coefficient between the WASPAS and ARAS methods is 0,661. This value shows a strong positive correlation between the WASPAS and GIA methods. The Spearman correlation test showed that the results from the WASPAS and ARAS methods were consistent with each other.

6. DISCUSSION

The increasing competitive conditions of the markets today put a strain on companies that attempted to survive through various practices to continue their existence. One of these practices is conglomeration or in other words, incorporating a holding. Holdings are joint-stock companies that consist of several companies with control of their shares. Holdings have control over the share of the biggest partner in the business established by a person or another. Holdings also combine the investment, finance and management of several companies under one company. All these qualities of holdings protect and control businesses and reduce their risks. However, finding out about the financial position of holdings is among the leading topics wondered by the subsidiaries of holdings. Therefore, the present study used multi-criteria decision making methods in order to calculate the financial performances of companies and rank their performance achievements.

The study used the ARAS and WASPAS methods to examine the 18-year stock exchange performances of 43 holdings and investment companies trading in Borsa Istanbul between 2000-2017. The entropy analysis was conducted to determine the weight of price/earnings, market value/book value, earning per share, dividend distribution and dividend return ratio which is used as stock exchange performance indicators. The entropy method was chosen as it doesn't include any subjective judgment and is an objective method. When we look at the weights of the ratios that will guide the stock performance ranking of holdings, the dividend distribution ratio is the most important stock performance ratio for holdings despite variations from year to year. The facts that the holding structures consist of the combination of several businesses, that there is no holding directly trading in Turkey, that the purpose of the activity is to incorporate other businesses and that they only have the shares of other companies highlighted the dividend distribution ratio in the stock exchange performances of holdings.

According to the determined weights; achievement ranking is determined according to the stock exchange performances of holdings and investment companies with the methods of ARAS and WASPAS. Since the stock exchange performances vary from year to year, there are also changes in the methods used for the financial performances and achievement rankings

of companies. Therefore, the Spearman correlation analysis was conducted to measure the consistency between the methods and to be able to see which methods have healthier results in the examination of the stock exchange performances. According to the results of the Spearman correlation analysis, a positive and strong correlation was found between the ARAS and WASPAS methods. As a result of this finding, the business will have an idea about which methods would be more suitable to use for finding out about the financial position of the holdings which they are a subsidiary of and reveal the shortcomings by determining their stock exchange performances through these methods. In addition, investors will be able to analyze the most successful holding in the stock exchange by means of these methods.

When we review the literature, we found very few studies that use among the financial ratios the stock exchange performance ratios as data set and also use the companies trading in the BIST Holding and Investment Index in contrary to the studies with analyses using MCDM methods with the assumption that the criterion weights are equal. There are again very few studies covering a period of more than 10 years and including more than 30 companies. The present study is differentiated from the other studies since the weights are determined by the entropy method, the study uses BIST Holding and Investment Index and stock exchange performance ratios, it covers a long period of time as 18 years and uses 43 companies. In addition, holdings comprise other companies and are different than the other companies in the stock exchange since they effectively manage the companies they possess, distribute risk, increase investment power, distribute profit within the same group as seen in the analysis results, increase financing possibilities, have high competitive power, provide tax advantages and have international dimension.

This study is limited to the 18-year stock exchange performance data of 43 holdings and investment companies listed in the BIST Holding and Investment Index trading in Borsa Istanbul between 2000 and 2017. Therefore, the results have to be evaluated within this limitation. Studies covering different sectors and countries through different methods need to be conducted to achieve more general results. Therefore, the result of this study is believed to contribute to future studies.

REFERENCES

Akdoğan, Nalan - Tenker, Nejat (2003), Finansal Tablolar ve Mali Analiz Teknikleri, 8. Baskı, Gazi Kitabevi, Ankara.

Baourakis, George - Doumpos, Michael - Kalogeras, Nikos - Zopounidis, Constantin (2002), "Multicriteria Analysis and Assessment of Financial Viability of Agribusinesses: The Case of Marketing Co-Operatives and Juice-Producing Companies", Agribusiness, Vol. 18, No. 4, pp. 543-558.

Berk, Niyazi (2003), Finansal Yönetim, 7. Baskı, Türkmen Kitabevi, İstanbul.

Bülbül, Serpil - Köse, Ali (2011), "Türk Gıda Şirketlerinin Finansal Performansının Çok Amaçlı Karar Verme Yöntemleriyle Değerlendirilmesi", Atatürk Üniversitesi İİBF Dergisi, 10. Ekonometri ve İstatistik Sempozyumu Özel Sayısı, ss. 71-92.

Ceyhan, İsmail Fatih - Demirci, Ferhat (2017), "Multimoora Yöntemiyle Finansal Performans Ölçümü: Leasing Şirketlerinde Bir Uygulama", Bartın Üniversitesi İ.İ.B.F. Dergisi, Cilt. 8, Sayı. 15, ss. 277-296.

Chakraborty, Shankar - Zavadskas, Edmundas Kazimieras (2014), "Applications of Waspas Method In Manufacturing Decision Making", Informatica, Vol. 25, No. 1, pp. 1–20.

Çabuk, Adem - Lazol, İbrahim (2009), Mali Tablolar Analizi, 7. Baskı, Nobel Yayınevi, Ankara.

Deng, Ju-Long (1982), "Control Problem of Grey System", System And Control Letters, Vol. 5, pp. 288-294.

Deng, Ju-Long (1989), "Introduction to Grey System Theory", The Journal of Grey System, Vol. 1, pp. 1-24.

Ece, Nalan (2019), "Holding Şirketlerinin Finansal Performans Sıralamasının Entropi Tabanlı Topsis Yöntemleri ile İncelenmesi", Finans Ekonomi ve Sosyal Araştırmalar Dergisi, Cilt. 4, Sayı. 1, ss. 63-73.

Fu, Daihong (2019), "The Mechanism of Dividend Distribution and Management Equity Ratio Interaction Based On Wireless Network Mode", EURASIP Journal On Wireless Communications and Networking, Vol. 29, pp. 1-9.

Gibson, Charles H. (2009), Financial Reporting and Analysis: Using Financial Accounting Information, 11th Edition, South Western Cengage Learning, USA.

Gill, Amarjit - Biger, Nahum - Tibrewala, Rajendra (2010) "Determinants Of Dividend Payout Ratios: Evidence From United States", The Open Business Journal, Vol. 3, pp. 8-14.

Haftacı, Vasfi (2005), İşletme Bütçeleri, 5. Baskı, Beta Yayınevi, İstanbul.

Hemmati, Mohammad - Dalghandi, Seyed Abolfazl - Nazari, Hossein (2013), "Measuring Relative Performance of Banking Industry Using a DEA and TOPSIS", Management Science Letters, Vol. 3, pp. 499-504.

Jiang, Zhengjun - Pistorius, Martijn (2012), "Optimal Dividend Distribution Under Markov Regime Switching", Finance and Stochastics, Vol. 16, Iss. 3, pp. 449-476.

Kalogeras, Nikos - Baourakis, George - Zopounidis, Constantin - Dijk, Gert Van (2005), "Evaluating The Financial Performance of Agri-Food Firms: A Multicriteria Decision-Aid Approach", Journal of Food Engineering, Vol. 70, pp. 365-371.

Kayalıdere Koray - Kargın, Sibel (2004), "Çimento ve Tekstil Sektörlerinde Etkinlik Çalışması ve Veri Zarflama Analizi", Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, Cilt. 6, Sayı. 1, ss. 196-219.

Kuloğlu, Eşref (2019), "Holding Firmalarının Değer Tespiti ve Borsa İstanbul (BİST) Uygulaması", Unpublished pHd Dissertation, Gazi Üniversitesi Sosyal Bilimler Enstitüsü İşletme Anabilim Dalı, Ankara.

Lashgari, Shima - Antuchevičienė, Jurgita - Delavari, Alireza - Kheirkhah, Omid (2014), "Using QSPM And WASPAS Methods For Determining Outsourcing Strategies", Journal Of Business Economics and Management, Vol. 15, No. 4, pp. 729-743.

Li, Bob - Lajbcygier, Paul - Chen, Cindy (2015), "Book-To-Market Ration, Default Risk and Return Implications: From A Negative Perspective", JASSA The Finsia Journal of Applied Finance, Vol. 3, pp. 26-32.

Lin, Yi - Chen, Mian-yun - Liu, Sifeng (2004), "Theory of Grey Systems: Capturing Uncertainties of Grey Information, Grey Systems Theory and Applications", Kybernetes, The International Journal Of Systems And Cybernetics, Vol. 33, No. 2, pp. 196-218.

Liu, Sifeng - Lin, Yi (2006), Grey Information: Theory And Pratical Applications With 60 Figures, Springer-Verlag London Limited, Springer Science+Business Media, United States Of America.

Mary Auxilia, P. A. - Krithika, J. (2018), "A Study On The Investment Performance of High Dividend Yield Stocks With Reference to Nifty", IOSR Journal Of Economics and Finance, Vol. 9, No. 1, pp. 67-74.

Mcnichols, Maureen - Rajan, Madhav V. - Reichelstein, Stefan (2014), "Conservatism Correction For The Market-To-Book Ratio and Tobin's Q", Review Of Accounting Studies, Vol. 19, No. 4, pp. 1393-1435.

Okka, Osman (2009), Analitik Finansal Yönetim, 1. Baskı, Nobel Yayınevi, Ankara.

Oloidi, Adebayo G. - Adeyeye, Patrick Olufemi (2014), "Determinants of Dividend Per Share: Evidence From The Nigerian Stock Exchange", International Journal Of Economics And Empirical Research, Vol. 2, No. 12, pp. 496-501.

Otlu, Fikret (1999), "Holding Şirketlerde Mali Tabloların Konsolidasyonu", Atatürk İktisadi ve İdari Bilimler Dergisi, Cilt. 13, Sayı. 1, ss. 101-115.

Pearson, Barrie (1998), Stockmarket Ratio Analysis. In: Boost Your Company's Profits, Thorogood Publishing Ltd.

Rezaie, Kamran - Ramiyani, Sara Saeidi - Shirkouhi, Salman Nazari - Badizadeh, Ali (2014), "Evaluating Performance of Iranian Cement Firms Using An Integrated Fuzzy AHP-VIKOR Method", Applied Mathematical Modelling, Vol. 38, pp. 5033-5046.

Sead, Omerhodzic (2014), "Identification and Evaluation of Factors of Dividend Policy", Economic Analysis, Vol. 47, No. 1, pp. 42-58.

Sharma, Aditi - Kaur, Gurjeet - Bansal, Jatin (2018), A Comparative Analysis of Promethee, AHP and Topsis Aiding in Financial Analysis of Firm Performance, Proceedings of The First International Conference On Information Technology and Knowledge Management, Vol. 14: pp. 145-150.

Shaverdi, Meysam - Ramezani, Iman - Tahmasebi, Reza - Rostamy, Ali Asghar Anvary (2016), "Combining Fuzzy AHP and Fuzzy Topsis with Financial Ratios to Design A Novel Performance Evaluation Model", International Journal Of Fuzzy Systems, Vol. 18, No. 2, pp. 248-262.

Voulgaris, Fotini - Doumpos, Michael - Zopounidis, Constantin (2000), "On The Evaluation of Greek Industrial Smes' Performance Via Multicriteria Analysis of Financial Ratios", Small Business Economics, Vol.15, pp. 127-136.

Wang, Tien-Chin - Lee, Hsien-Da (2009), "Developing A Fuzzy Topsis Approach Based On Subjective Weights and Objective Weights", Expert Systems With Applications, Vol. 36, No. 5, pp. 8980-8985.

Yurdakul, Mustafa - İç, Yusuf Tansel (2003), "Türk Otomotiv Firmalarının Performans Ölçümü ve Analizine Yönelik Topsis Yöntemini Kullanan Bir Örnek Çalışma", Gazi Üniversitesi Mühendislik Mimarlık Fakültesi Dergisi, Cilt. 18, Sayı. 1, ss. 1-18.

Zarei, Taleb (2018), "Role of Institutional Ownership Mechanism Under The Effect Of Price-To-Earnings Ratio On The Performance and Efficiency of Companies Listed In Tehran Stock Exchange, International Journal Of Management, Accounting & Economics, Vol. 5, No. 7, pp. 566-618.

Zavadskas, Edmundas Kazimieras - Turskis, Zenonas (2010), "A New Additive Ratio Assessment (ARAS) Method in Multicriteria Decision-Making", Technological and Economic Development of Economy, Vol. 16, No. 2, pp. 159-172.

Zavadskas, Edmundas Kazimieras - Turskis, Zenonas - Vilutiene, Tatjana (2010), "Multiple Criteria Analysis of Foundation Installment Alternatives By Applying Additive Ratio Assessment (ARAS) Method", Archives of Civil and Mechanical Engineering, Vol. 10, No. 3, pp. 123–141.

Zavadskas, Edmundas Kazimieras - Turskis, Zenonas - Antucheviviene, Jurgita - Zakarevicius, Algimantas (2012), "Optimization of Weighted Aggregated Sum Product Assessment", Electronics and Electrical Engineering, Vol. 122, No. 6, pp. 3-6.

Zhai, Lian-Yin - Khoo, Li-Pheng - Zhong, Zhao-Wei (2009), "Design Concept Evaluation In Product Development Using Rough Sets and Grey Relation Analysis", Expert System With Applications, Vol. 36, pp. 7072-7079.

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