



TAPPING INTO LONG TERM VALUE: A COMPREHENSIVE OVERVIEW OF BIST 30 INDEX COMPANIES' FUTURE POTENTIAL

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Zekeriya Bildik¹, Kaya Tokmakcioglu²

¹Istanbul Technical University, Faculty of Management, Istanbul, Turkiye.

bildik18@itu.edu.tr, ORCID: 0000-0003-4117-566X

²Istanbul Technical University, Faculty of Management, Istanbul, Turkiye.

tokmakcioglu@itu.edu.tr, ORCID: 0000-0002-5981-299X

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ABSTRACT

Purpose - This article aims to establish a correlation between the valuation potential of companies listed on the Borsa Istanbul 30 index and their enduring competitive advantage, focusing on microeconomic Key Performance Indicators (KPIs) and corporate governance dimensions.

Methodology - The study conducted an extensive analysis of the financial statements of BIST 30 companies spanning three years. Employing a unique approach utilizing Triangular Spherical Fuzzy Sets, it assessed the significance of these KPIs and corporate dimensions, chosen for their capacity to handle imprecise data. Three experts were consulted over three years to assign importance scores to each indicator, which were then used to calculate cumulative scores for individual stocks.

Findings - The application of the Triangular Spherical Fuzzy Sets method provided a comprehensive understanding of these indicators, enabling a nuanced evaluation of the cumulative score for each stock. Notably, a clear distinction emerged between service and manufacturing companies, suggesting a potential glass ceiling effect that favors production-oriented enterprises. The observed patterns in certain stocks aligned with the framework developed in this study.

Conclusion - This study illustrates the use of fuzzy logic in evaluating stock valuation potential, revealing insights into their sustained growth prospects. Aligned with Warren Buffett's value investing principles, it advances modeling approaches within the Turkish public stock exchange. Offering a unique perspective on BIST 30 stocks' long-term valuation potential, it provides valuable insights for investors, stakeholders, and analysts in the dynamic finance landscape. Emphasizing the understanding of companies' enduring competitive strength in an evolving market is pivotal.

Keywords: Value investing, triangular spherical fuzzy sets, long term competitive advantage, corporate governance.

JEL Codes: D46; C58; C81

1. INTRODUCTION

Forecasting stock returns and long-term growth has remained a persistent focus within finance (Bernstein, 2016). Advances in information dissemination have accelerated data flow, elevating market transparency and efficiency (Ariely, 2016). An influential paradigm shift, led by Benjamin Graham, emphasizes the selection of undervalued stocks based on intrinsic worth, advocating comprehensive analysis of financial statements and market position. Graham's value investing strategy prioritizes tangible factors—earnings, assets, and liabilities—over market sentiments, aiming to identify stocks undervalued in the market. Investors following this philosophy scrutinize a company's financial health, earnings potential, and asset value, seeking opportunities for long-term growth (Zhang, 2022). Warren Buffett, a disciple of Graham, further refined value investing, stressing the significance of qualitative aspects like competitive advantages and management quality alongside quantitative metrics (Rajaratnam et al., 2014).

In the vast array of investment options within stock markets, discerning the specifications that yield long-term value remains a quest. Is there a miracle formula amidst this complexity? Our research aims to address this by scrutinizing the long-term valuation prospects of companies within the Borsa Istanbul 30 index. Delving into the intricacies of company valuation, our study introduces a novel perspective by integrating key financial KPIs—such as gross profit margin, cash flow ratios, working capital metrics, market value to book value—alongside critical corporate governance dimensions. Through the application of an innovative methodology, the Triangular Spherical Fuzzy Sets, we amalgamate robust KPI values with expert evaluations to derive a composite score. This score serves as a yardstick to assess companies' long-term competitive advantage, enabling the ranking of BIST 30 index companies based on their valuation potential.

Employing this unique methodology, our study provides a strategic framework combining microeconomic indicators to gauge the long-term valuation potential of stocks. This framework offers insights into expected stock price trajectories under typical market conditions, elucidating the principles of Warren Buffett's value investing strategy within the Turkish public stock exchange context.

2. LITERATURE REVIEW

In the fiercely competitive market landscape, establishing a long-term competitive advantage stands as the cornerstone of success. The means to achieve this advantage are multi-faceted, and the degree of a company's long-term competitive strength varies accordingly. Some research suggests that nurturing long-term competitive power is intricately linked to Corporate Social Responsibility (CSR). These studies explore ESG metrics, seeking meaningful correlations between ESG scores and key financial performance indicators such as ROA, ROE, and stock returns (Wang et al., 2015; Saeidi et al., 2015; Blasi et al., 2018). The underlying premise is that corporate management guided by solid principles, values, and societal considerations can outperform even ostensibly more rational management styles. This perspective underpins the contemporary approach to sustainability adopted by organizations, emphasizing not only profitability but also environmental and societal sensitivity. Alshehhi et al. (2018) analyzed 132 papers from top journals, revealing that 78% of them indicate a positive relationship between corporate governance metrics and financial performance.

On the other hand, some research focuses on microeconomic KPIs as a predictor and result of long-term competitive power and thereby valuation potential of stocks. Ibrahim and Meghour (2019) examines value creation relationship between some microeconomic KPIs like turnover, operating cost, working capital and explores positive relationship between valuation and these KPIs in larger companies. Hristov et al. (2022) defines five sustainable key performance indicators for long term success of the company as environmental, economic, social, cultural and organizational dimensions and managed interviews with 110 managers to determine sustainable key performance drivers.

3. THE DATA AND METHODOLOGY

The Fuzzy Theory, introduced Zadeh introduced the Fuzzy Theory to tackle the challenges posed by an increasingly uncertain world inundated with information (Zadeh, 1965). The development of Spherical Fuzzy sets by Kahraman and Gundogdu (2018) presented a more comprehensive approach by integrating membership, non-membership, and hesitancy degrees, ranging from zero to one. However, in finance, expert opinions are often presented in intervals denoting key expectations and ranges, commonly displayed as medians, maximums, and minimums. To align this interval representation with spherical fuzzy sets, we created triangular spherical fuzzy sets. Here, expert evaluations correspond to the midpoint, while the minimum and maximum points signify the lower and upper limits for membership, non-membership, and hesitancy values.

$SFS = \{u, ([\mu_{SFS}(x), \nu_{SFS}(x), \pi_{SFS}(x)]) \mid u \in U\}$ where $\mu_{SFS} : FS \rightarrow [0,1]$, $\nu_{SFS} : FS \rightarrow [0,1]$, $\pi_{SFS} : FS \rightarrow [0,1]$

$$0 \leq (\mu_{SFS}^2(x) + \nu_{SFS}^2(x) + \pi_{SFS}^2(x)) \leq 1 \quad \forall x \in FS \quad (1)$$

$\mu_{SFS}(x)$, $\nu_{SFS}(x)$ and $\pi_{SFS}(x)$ represent degrees of membership, non-membership and hesitancy of x to FS , respectively. Triangular Spherical Fuzzy Sets (SFS) A_{TFS} spherical fuzzy set of the universe of discourse U is given by

$$A_{TFS} = \{u, ([\mu(u), \mu_m(u), \mu_h(u)], [\nu(u), \nu_m(u), \nu_h(u)], [(\pi(u), \pi_m(u), \pi_h(u))]) \mid u \in U\} \quad (2)$$

where $\mu_{A_{TFS}} : U \rightarrow [0,1]$, $\nu_{A_{TFS}} : U \rightarrow [0,1]$, $\pi_{A_{TFS}} : U \rightarrow [0,1]$

μ : membership degree, ν : non-membership degree, π : hesitancy degree

Triangular Spherical Weighted Arithmetic Mean (TRSWAM) has been created to be applied for expert evaluations. TRSWAM is defined as

$$w = (w_1, w_2, w_3, \dots, w_n) ; w_i \in [0,1] ; \sum_{i=1}^n w_i = 1,$$

$$TRSWAM_w(TRSFS_1, \dots, TRSFS_n) = w_1 TRSFS_1 + w_2 TRSFS_2 + \dots + w_n TRSFS_n$$

$$= \left\{ \left[\left(1 - \prod_{i=1}^n (1 - \mu_{TRSFS_i}^2)^{w_i} \right)^{1/2}, \prod_{i=1}^n \nu_{TRSFS_i}^{w_i}, \left[\prod_{i=1}^n (1 - \mu_{TRSFS_i}^2)^{w_i} - \prod_{i=1}^n (1 - \mu_{TRSFS_i}^2 - \pi_{TRSFS_i}^2)^{w_i} \right]^{1/2} \right\} \quad (3)$$

Step 1: Expert Selection: It is selected a panel of three experts to assess the relative importance of five Key Performance Indicators (KPIs) and five dimension of company concerning long-term competitive advantages year by year. Three experts have been chosen based on fuzzy logic background, trade experience, and being well informed about economic trends spanning from 2000-2022.

Step 2: Selection of Key Performance Indicators for BIST 30 Valuation Potential: Evaluating a company's value holds significant importance for investors, stakeholders, and potential buyers as it shapes their assessment criteria. Strengthening a company's valuation is intricately tied to establishing a sustainable competitive advantage, fostering improved profitability, and bolstering financial robustness. To delve deeper into this aspect, a set of six Key Performance Indicators (KPIs) has been identified as reliable metrics for assessing long-term competitive advantage: gross profit margin, cash flow from investments / net sales, cash flow from operations / total liabilities, net working capital / net sales, total liability / shareholder equity, market value / book value. These chosen KPIs, emphasizing profitability, investment effectiveness, financial stability, play a crucial role in evaluating a company's potential for sustainable competitive advantage and, as a result, its appeal to investors and stakeholders.

Step 3: Selection of dimensions for BIST 30 stocks Valuation Potential: The valuation prospects of stocks are deeply intertwined with a comprehensive understanding of a company's management, financial strategies, market position, and growth trajectory. Evaluating these pivotal factors empowers investors and stakeholders to make informed decisions about the company's potential for sustained success and

its attractiveness as an investment. Corporate governance metrics play a pivotal role in determining long-term competitive advantage and, consequently, the valuation potential of companies. Expert evaluations, involving meticulous analyses of the company's corporate governance and growth metrics, required nearly 250 hours per expert. Evaluation criteria of each dimension is given at Table 1.

Table 1: Dimension Evaluation Criteria

Shareholder perspective	Transparency and Public Relations	Stakeholders' Perspective	Board of Directors	Business and Growth Strategy
Shareholder Rights and Equitable Treatment	Communication Strategies and Stakeholder Engagement	Stakeholder Engagement and Collaboration	Board Composition and Diversity	Strategic Planning and Execution
Dividend Policies and Shareholder Returns	Disclosure Policies and Reporting Practices	Corporate Social Responsibility (CSR) Initiatives	Leadership Structure and Independence	Long-Term Vision and Goals Alignment
Transparency in Financial Reporting to Shareholders	Investor Relations and Shareholder Communications	Ethical Practices and Stakeholder Rights	Governance Oversight and Risk Management	Market Expansion and Diversification Strategies
Governance Structure and Board Accountability	Ethics and Integrity in Public Communications	Supply Chain and Vendor Relationships	Committees and Their Responsibilities	Innovation and Research & Development Focus
Voting Rights and Proxy Access	Crisis Management and Reputation Building	Employee Relations and Workplace Culture	Director Qualifications and Expertise	Acquisitions and Partnerships for Growth
Shareholder Activism and Engagement	Community Engagement and Social Responsibility	Environmental Sustainability and Impact	Board Evaluation and Performance Assessment	Performance Measurement and KPIs
Conflict Resolution and Dispute Handling with Shareholders	Media Relations and Public Perception Management	Community Development and Contributions	Decision-Making Processes and Transparency	Risk Management in Growth Initiatives

Step 4: Expert Weighting & Aggregation & Defuzzification Process: To ensure a comprehensive and fair evaluation, different levels of expertise among experts were accounted for by assigning specific weights to their assessments. These assessments were combined using aggregation and defuzzification methods, generating precise values for the six KPIs and five dimensions from 2020 to 2022. Assigning relative weights to experts based on their individual proficiency, finance experience, and stock market knowledge represented as $w(i)$, where i ranges from 1 to 3, was a deliberate process. These weights are given as 40 %, 30 % and 30 % (Kahraman et al. 2020), were calibrated to ensure $\sum w_i = w_1 + w_2 + w_3 = 1$. In the process of weighting and aggregation TRSWAM operator has been employed. In defuzzification process; It is then revisited aggregated expert evaluations of these eleven indicators (six KPIs + five dimensions) where:

For $n=1$ to 11 and For $j=2020$ to 2022

$$D(I_{n,j})^* = ((a\mu_{ji} + a\mu_{jm} + a\mu_{jn}) - (av_{ji} + av_{jm} + av_{jn}) - (av_{ji} + av_{jm} + av_{jn})/2)/3 \quad (4)$$

Where $D(I_{n,j})$ represent defuzzified indicator with number n belongs to year j . This procedure leads to a defuzzified expert evaluation for each indicator, playing a vital role in establishing the scores for long-term competitive power.

Step 5: Evaluation of Indicators: Recognizing the varying influence of different indicators on a company's long-term competitive advantage, three supplementary experts were engaged to assess these indicators based on their individual significance in determining a company's enduring competitive strength. Using a five-point linguistic scale—from 'not important' to 'very important'. These linguistic assessments were subsequently defuzzified using a triangular linguistic scale. The final crisp weight scores for the KPIs were then computed, portraying their respective importance levels.

Step 6: Calculation of Indicators: As of December 31, 2022, BIST 30 index companies listed. Four of these companies are financial institution, were excluded from the analysis due to the typical balance sheet structure of finance companies, which distorts the values of the first group of indicators. The first set of six indicators, referred to as KPIs for 2020-2022, were computed based on the financial statements (Url-1). On the other hand, a separate set of five indicators referred to as dimensions underwent evaluation by three experts. Employing a seven-point linguistic scale—from 'outstanding' to 'disaster', these experts conducted their assessments. These linguistic evaluations were then clarified using a triangular linguistic scale for five indicators.

Step 7: Normalization of Indicators and Relative Point Scoring: In the process of normalizing indicators, max-min normalization was applied to nine indicators, excluding the total liability / shareholder equity and market value / book value (Khanmohammadi et al. 2019). This is because this particular KPI lacks a specific optimal value, neither a maximum nor a minimum. For this indicator, the median value of the Borsa Istanbul 100 index companies over the past five years was adopted as the reference value for the normalization process for leverage ratio. On the other hand, industry averages has been employed for normalization of market value / book value (Url-2).

According to the selected approach of max-min normalization or optimum point normalization:

$$\text{For } n=1 \text{ to } 11, \text{ For } j=2020 \text{ to } 2022 \text{ in where; Normalized } (I_{n,j}) = (I_{n,j}) / (\text{Max } (I_{n,j})) \quad (5)$$

Following the normalization of all KPIs, the defuzzified expert evaluations of each KPI were multiplied by their corresponding normalized values, thus calculating the relative point for each KPI, as shown below (Gundogdu 2019):

$$\text{For } n=1 \text{ to } 11, \text{ For } j=2020 \text{ to } 2022 \text{ in where; Normalized } (I_{n,j}) * D(I_{n,j}) = \text{Relative Point of } (I_{n,j}) = \text{RP}(I_{n,j}) \quad (6)$$

In order to derive the ultimate relative point for each indicator, the median of $\text{RP}(I_{n,j})$ was chosen for the period from 2020 to 2022. This ultimate relative point stands as a fundamental gauge for evaluating the performance of each KPI and its influence on the overall scores for long-term competitive prowess.

Step 8: Final Scoring and Ranking: While determining the final scores for each BIST 30 company, a straightforward approach could involve summing up all the final relative points of the eleven distinct indicators. However, it is acknowledged that these indicators might hold varying degrees of importance when assessing a company's long-term competitive advantage. To account for this, Step 6 was implemented, with the assigned indicator weights. For each KPI, a final score was calculated as follows:

$$\text{Final Score of Stock} = \sum_{n=1}^{11} \text{RP}(I_{n,j}) * \text{Relative weight of } I_{n,j} \text{ where } \text{RP}(I_{n,j}) \text{ represents relative point of indicator with number } n.$$

A comprehensive list of 26 stocks were compiled based on the calculated final scores. Table 2 provides the final scores for all 26 stocks in ranked order, indicating their long-term competitive prowess and high valuation potential in the long run. Higher scores signify a greater valuation potential for the respective stocks.

Table 2: BIST 30 Valuation Potential and Ranking

Stock ticker	Stock	Final Score	#Ranking
KOZAA	KOZA ANADOLU METAL MADENCİLİK İŞLETMELERİ A.Ş.	43.19	1
TUPRS	TÜPRAŞ-TÜRKİYE PETROL RAFİNERİLERİ A.Ş.	42.84	2
SISE	TÜRKİYE ŞİŞE VE CAM FABRİKALARI A.Ş.	42.60	3
EREGL	EREĞLİ DEMİR VE ÇELİK FABRİKALARI T.A.Ş.	41.42	4
THYAO	TÜRK HAVA YOLLARI A.O.	39.97	5
ODAS	ODAŞ ELEKTRİK ÜRETİM SANAYİ TİCARET A.Ş.	39.81	6
ARCLK	ARÇELİK A.Ş.	39.64	7
KCHOL	KOÇ HOLDİNG A.Ş.	39.58	8
ASELS	ASELSAN ELEKTRONİK SANAYİ VE TİCARET A.Ş.	38.80	9
SAHOL	HACI ÖMER SABANCI HOLDİNG A.Ş.	38.19	10
ALARK	ALARKO HOLDİNG A.Ş.	37.80	11
TAVHL	TAV HAVALİMANLARI HOLDİNG A.Ş.	36.79	12
PGSUS	PEGASUS HAVA TAŞIMACILIĞI A.Ş.	36.28	13
ENKAI	ENKA İNŞAAT VE SANAYİ A.Ş.	35.39	14
BIMAS	BİM BİRLEŞİK MAĞAZALAR A.Ş.	34.72	15
FROTO	FORD OTOMOTİV SANAYİ A.Ş.	33.66	16
AKSEN	AKSA ENERJİ ÜRETİM A.Ş.	32.21	17
TOASO	TOFAŞ TÜRK OTOMOBİL FABRİKASI A.Ş.	28.75	18
KOZAL	KOZA ALTIN İŞLETMELERİ A.Ş.	28.43	19
SASA	SASA POLYESTER SANAYİ A.Ş.	26.64	20
TCELL	TURKCELL İLETİŞİM HİZMETLERİ A.Ş.	26.39	21
PETKM	PETKİM PETROKİMYA HOLDİNG A.Ş.	25.68	22
KRDMMD	KARDEMİR KARABÜK DEMİR ÇELİK SANAYİ VE TİCARET A.Ş.	25.34	23
EKGYO	EMLAK KONUT GAYRİMENKUL YATIRIM ORTAKLIĞI A.Ş.	22.10	24
GUBRF	GÜBRE FABRİKALARI T.A.Ş.	20.41	25
HEKTS	HEKTAŞ TİCARET T.A.Ş.	16.97	26

4. FINDINGS AND DISCUSSION

Experts have identified market to book value, business and growth strategy, gross profit margin, cash flow from operations / total liabilities and board of directors as the most crucial indicators in determining the long-term competitive advantage that drives substantial potential price increases in the stock market. The study shows that sector is not a direct indicator for BIST30 companies' performance. Ultimately, it directly reflects on indicators as higher gross profit margin, positive operating cash flow and declining liabilities as proxies.

Among the companies listed in the BIST 30 index, four entities from the Koc Group stand out, with three of them securing positions within the top eight in terms of highest points. This achievement appears to be a testament not only to their adherence to corporate governance principles but also to their sound financial management practices.

Among the top 10 ranked companies, all except Turkish Airlines belong to the production sector. This observation could indicate a distinct separation between production and service companies, potentially implying a glass ceiling effect favoring production-oriented enterprises over service-based ones. Hektas, positioned as the lowest-ranked company in the research, seems to affirm the conventional market wisdom by appearing overvalued. Another notable stock, Kardemir, holds a lower score and exhibits a widespread dispersion of shares among various investors, to the extent that a 5% shareholder holds a board seat. This scenario suggests that the competitive struggle for board representation might contribute to the company's perceived overvaluation.

5. CONCLUSIONS

This paper undertakes a thorough examination of distinguishing factors influencing certain BIST 30 stocks and their enduring value, employing the innovative Triangular Spherical Fuzzy Sets methodology for the first time in literature. The study delved into the 2023 Borsa Istanbul 30 index companies, assessing specific microeconomic Key Performance Indicators (KPIs) and corporate governance dimensions, encompassing pivotal factors such as gross profit margin, cash flow metrics, market to book ratio, and various governance perspectives.

A panel of distinguished experts provided comprehensive evaluations of these indicators, leading to a nuanced understanding of their significance. Aggregating and defuzzifying these assessments generated precise values for each indicator, while the experts' linguistic evaluations offered balanced perspectives on their importance. This research showcases the application of fuzzy logic in appraising stock

valuation potential, shedding light on their prospects for sustained growth. It not only aligns with the principles of value investing, advocated by Warren Buffett, but also contributes to modeling approaches within the Turkish public stock exchange context.

In summary, this study presents a distinctive viewpoint on the long-term valuation potential of BIST 30 stocks, offering valuable insights for investors, stakeholders, and analysts in the dynamic finance landscape. It underscores the imperative of comprehending companies' enduring competitive strength in an ever-evolving market.

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