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A COMPARATIVE ANALYSIS OF THE REAL SECTOR IN TURKEY FROM THE ECONOMIC AND FINANCIAL PERSPECTIVES WITH THE CRITIC-MAIRCA METHOD

Türkiye'de Reel Sektörün Ekonomik ve Finansal Açıdan CRITIC-MAIRCA Yöntemiyle Karşılaştırmalı Bir Analizi

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Keywords:
Real Sector, Economic Contribution, Financial Performance, CRITIC-MAIRCA Method.

JEL Codes:
D25, G32, O16.

Abstract

This study aimed to examine the economic contribution and financial performance of the real sector in Turkey. Using the real sector company accounts published by the Central Bank of the Republic of Turkey (CBRT), seventeen sectors were analysed with the CRITIC-based MAIRCA method. The economic contribution was evaluated with sub-indicators to economic growth, employment, and entrepreneurship; financial performance was evaluated with liquidity, financial structure, turnover and profitability indicators. The findings revealed that manufacturing sector provided the highest contribution to total economy and in all sub-indicators. While the sectors with the lowest contribution in the sub-indicators differed, it was determined that the sub-sector with the lowest total contribution was real estate activities sector. In terms of total financial performance and liquidity, financial structure, and profitability sub-indicators, human health and social work activities, and according to turnover ratios energy supply sector have the highest performance. The study revealed that the sectors with an increased contribution to the economy and those with high financial performance differentiate. Lastly, it has been seen that sectors with high economic contribution exhibit weak financial performance. The findings were checked by sensitivity analysis and proposed method produces consistent results against weight changes and the model is reliable.

Anahtar Kelimeler:
Reel Sektör, Ekonomik Katkı, Finansal Performans, CRITIC-MAIRCA Yöntemi.

JEL Kodları:
D25, G32, O16.

Öz

Bu çalışmada Türkiye'de reel sektörün ekonomik ve finansal yönden incelenmesi amaçlanmıştır. Türkiye Cumhuriyet Merkez Bankası (TCMB)'nın yayınladığı sektör bilançoları kullanılarak on yedi alt sektör CRITIC temelli MAIRCA yöntemiyle analiz edilmiştir. Ekonomik katkı ekonomik büyümeye, istihdama ve girişimciliğe katkı alt göstergeleriyle; finansal performans ise likidite, mali yapı, devir hızları ve kârlılık göstergeleriyle değerlendirilmiştir. Bulgular ekonomik büyüme, istihdam, girişimcilik ve toplam ekonomiye katkının en fazla imalat alt sektöründen sağlandığını ortaya koymuştur. Alt göstergelerde en düşük katkısı olan sektörler farklılaşırken toplam katkısı en düşük alt sektör gayrimenkul faaliyetleri alt sektörü olduğu saptanmıştır. Toplam finansal performans ve likidite, mali yapı, kârlılık alt göstergelerinde insan sağlığı ve sosyal hizmet faaliyetleri, devir hızlarında ise elektrik, gaz, buhar ve iklimlendirme üretim ve dağıtımı alt sektörleri en yüksek performansa sahiptir. Çalışma, ekonomiye katkısı yüksek olan sektörlerle finansal performansları yüksek olan sektörlerin farklılaştığını ve ekonomik katkısı yüksek olan sektörlerin finansal açıdan zayıf performans sergilediği sonucunu ortaya koymaktadır. Bulgular duyarlılık analizi ile kontrol edilmiş, önerilen CRITIC-MAIRCA yönteminin ağırlık değişimlerine karşı tutarlı ve modelin güvenilir sonuçlar ürettiği söylenebilir.

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1. Introduction

Despite the events, crises and risks in national and international politics, military, terrorism and finance, the Turkish economy is trying to achieve and maintain economic growth. The reduction of political uncertainty and crises in Turkey has improved the investment environment and increased foreign trade. Country risk reduction over the years, the improvement in the level of welfare through control and regulation in the financial system, and the increase in domestic consumption led to new initiatives in many sectors and supported economic growth.

One of the essential elements that increase the welfare of citizens in a country is the provision and continuity of economic growth. Meeting the households' health, education, cultural and social needs will be possible with justice in income distribution and economic growth. So much so that one of the essential elements of economic growth is the increase in the level of human development (Aydın, 2019: 41). Improvement of the investment environment, support and encouragement of entrepreneurship will ensure the growth of the real sector, which is one of the determinants of economic growth, increasing employment.

In Turkey, the low level of savings and the high need for financing from the public, private sector and households make funding one of the critical obstacles in terms of investments. The terrorism problem, political instability, Iraq war and Syrian civil war, and domestic and regional problems such as the Russian plane crisis and the July 15 coup attempt, have made Turkey relatively risky for capital investments. In addition to these, as mentioned before, despite the financing needs of both the public and private sectors and households, the fact that domestic savings are not at a level to meet this need increases the importance of finance and financial management in companies.

While economic growth is affected by the sectoral composition of economic activities, conversely, the sectoral composition is affected by economic growth (Echevarria, 1997). The determination of policies to increase productivity in the agricultural sector, which has a productivity level below the national average in Turkey, will be able to create a driving force for the manufacturing industry, as well as the contribution of the mining sector to production and employment with incentives and supports so that the growth of the Turkish economy will be ensured with the importance given to these sectors and related issues (Akbulut and Terzi, 2013).

Economic development and growth depend on sectoral development and inter-sectoral integration. The integration of agriculture and industry will provide many advantages, such as creating new business areas that will increase trade volume, efficiency in production, competitive advantage in the foreign market, and foreign capital investments. Economic integration depends on its organisation and realising the positive results of integration in appropriate conditions (Aydemir and Pıçak, 2008). According to the general development model, sectoral development in an economy is achieved in agriculture, industry and finally in the services sector, respectively (Bayat et al., 2015). While the sectoral distribution of employment in Turkey has been listed as the main sectors of services, agriculture and industry for many years (Şit, 2016), while the share of agriculture in employment has decreased in the last 20 years, there has been an increase, especially in the services and manufacturing sectors.

It is known that the real sector and the finance sector are parts of the whole economy. While this integrity is based on mutual interaction, the development of financial markets affects the real sector, and the growth and developments in the real sector affect the finance sector and financial

markets. The degree to which a country's financial system is bank-oriented and market-oriented is related to the level of development of the country's economy. While there is a bank-oriented financial system in developing countries, capital markets are the dominant element of the financial system in developed countries (Şendeniz-Yüncü, 2020).

In countries with a bank-oriented financial system, the credibility and financial performance of the parties to which banks provide loans ensures the healthy functioning of the country's economy. The essential condition for banks in providing loans to companies is the high level of company credibility. As it's known, the reimbursement risk of loans given to companies with low credibility will be high. In case of realising the risks affecting the activities, the banks due to bad loans and the country's economy will be adversely affected due to the contagion effect. For sustainable economic growth in bank-oriented economies, the banking sector and the financial system, in general, must work effectively (Kalkavan et al., 2020). The effective functioning of the banking sector and financial system depends on the healthy functioning of the real sector.

Examination of the sectors' economic contributions and financial performance will reveal the real sector's economic holistic performances. For this purpose, MAIRCA (Multi-Atrributive Ideal-Real Comparative Analysis) model based on CRITIC (Criteria Importance Through Intercriteria Correlation) method was used. Through the CRITIC method, which is one of the criteria weighting methods objectively, the subjective approaches of the decision-makers are eliminated. In addition, raw data are directly included in the analysis and weights are determined more realistically. MAIRCA, on the other hand, is a powerful analysis method with very recent history. The results obtained according to the method approach the theoretical results, so the relevant alternative becomes a better alternative. Data used in the study are gathered from the CBRT, the real sector company accounts. When the literature on the subject is checked over, it is seen that the sectors are mostly examined separately within the scope of economic dimensions or financial dimensions. While it's important to examine separately the sectors economically and financially it is beneficial to examine together to understand if a sector economically contributed and financially performed well. Within this direction, the study differs from other studies by examining the contribution of the real sector to the economy and its financial performance together. On the other hand, the used ratios based on the economic condition in the study differ from the literature. The findings of the study will keep light on policymakers, entrepreneurs, and sector professionals.

Within the scope of the research, the study consists of chapters. After the introduction, the general situation and development of the real sector in Turkey are emphasised. The next chapter includes the literature on the subject. The fourth title explains the variables used in the study, sampling, and analysis method. While the findings are presented in the fifth chapter, the sixth and last chapter includes the conclusion and evaluation within the framework of the study findings.

2. Real Sector in Turkey

The Turkish economy and the real sector, with the transformation process that started in 1980 and went down in history as the January 24 decisions, its participation in world trade has increased significantly compared to previous years. Despite the increase in exports of industrial products, the expected increases in production, employment and investments could not be

achieved for many years, while productivity and real wage developments displayed an unstable appearance.

The increase in the exports of industrial products has been concentrated in the labour-intensive sectors such as textiles, scale-intensive sectors such as iron-steel and low-price flexibility. They gain a competitive advantage based on low cost and price. While it was a relatively closed economy before 1980, after 1980, a growth period was entered. However, sufficient benefits were not achieved until the 2000s with the steps taken to integrate into the world economy. Constantly changing economic policies with political instability, delays in structural reforms, the high need for public finance, the inflationary environment, and the impact of regional and international crises have been observed as obstacles to investments and, thus, economic growth in Turkey (Arısoy, 2005).

In addition to the fluctuation and low level of growth, foreign direct investment, which continued to increase from 1985 to 2017, supported economic growth. The Turkish economy, which has been experiencing a lack of capital and entrepreneurship for a long time, has started to attract foreign direct investment at an increasing level, especially in the 2000s. The increased investments of foreign direct capital in the services sector and manufacturing industry in the 2000s concentrated mainly in the finance-insurance sector within the services sector (Balkanlı, 2019).

In a study covering services, transportation, agriculture and industry sectors, energy use positively affects growth due to national income (Koç, 2020). Turkey, which has limited energy supply and resources and high demand, also has increased risks such as inflation, interest and exchange rate risks, highlighting dollarization in the Turkish economy. In Turkey, an importer of energy resources such as oil and natural gas, and one of the countries with high exchange rate risk, the precautionary approach in debt dollarization contributes to the continuity of businesses to prevent bankruptcy. The increased need for financing is one of the essential handicaps in the entrepreneurial atmosphere. In this respect, participation banking, which has an increasing share in the Turkish banking system as well as in the international financial system in recent years, has increased the total cash loan volume provided by the banking sector to the real sector in Turkey by approximately 28 times in the 16 years from December 2005 to December 2020. Cash loans offered to the real sector increased 35 times (Bektaş and Baykuş, 2020; BDDK, 2021). This, on the other hand, indirectly supports entrepreneurship levels in sectors and growth in economic activities as an essential contribution in terms of the capital needs of companies.

The increase in investments and the sector's growth are the foundations of economic growth. Developments in the economy may vary in the investment shares of sectors. The changes in the shares of sectors in total revenue and employment in Turkey over time are indicators of the structural change in the economy. Deindustrialisation, which expresses the decrease in the share of the manufacturing industry in the total economy and total employment, has significant effects on the long-term growth expectations of countries. As the workforce turns to the services sector, the productivity growth rate in the services sector increasingly determines the average productivity and growth rate of the economy (Çetinkaya and Muratoğlu, 2020). However, in economic growth, Kaldor's law states that the increase in production value in the manufacturing industry is the essential element of economic growth. At the same time, Kaldor's law is also valid for the Turkish economy. So much so that in Turkey, the variability of industrial production value in economic growth is more effective than in South Korea and the USA (Akgündüz, 2020).

The Classification of Economic Activities in the European Community (Nomenclature des Activités Économiques dans la Communauté Européenne – NACE) is a statistical classification system of economic activities developed by the European Union in 1970. NACE Rev.2, which has been used in this system since January 1, 2008, is the version that classifies current economic activities and sectors (Eurostat, 2008).

Sectors in Turkey are also classified as secondary sub-sectors consisting of 17 sub-sectors (letter coded), two (81 sub-sectors) and three (247 sub-sectors) digit number classification according to their characteristics (CBRT, 2021). The first level sub-sector classification according to NACE Rev.2 is as in Table 1.

Table 1. Sector Classification

Sectors
A- Agriculture, Forestry and Fishing
B- Mining and Quarrying
C- Manufacturing
D- Electricity, Gas, Steam and Air Conditioning Supply
E- Water Supply; Sewerage; Waste Management and Remediation Activities
F- Construction
G- Trade
H- Transporting and Storage
I- Accommodation and Food Service Activities
J- Information and Communication
L- Real Estate Activities
M- Professional, Scientific and Technical Activities
N- Administrative and Support Service Activities
P- Education
Q- Human Health and Social Work Activities
R- Arts, Entertainment and Recreation
S- Other Service Activities

Source: CBRT, 2021.

The Real Sector Company Accounts, which were expanded to include administrative records in 2020 with the cooperation of the CBRT and the Turkish Statistical Institute (TURKSTAT), cover more than 1 million companies in total. In the last published sector balance sheets, 730,221 companies from 17 sectors in 2019 were shared based on sectors and scale. Sector identity information and structural indicators by sub-sectors for 2019 are presented in Table 2.

When Table 2 is examined, the sector with the highest number of companies, net sales, profit and loss share is sector G (Trade). Sector C (manufacturing) ranks second in terms of the number of firms, is the sector with the highest employment and the highest total assets and shareholders' equity. The sector F (construction) has the highest proportion among 12,688 companies with no profit or loss.

Table 2. Sector Identity Information and Structural Indicators for Sectors

	Firm		Labour		Net Sales		Total Assets	
Sector	**Numbers (1,000)**	**%**	**Number (1,000)**	**%**	**Million ₺**	**%**	**Million ₺**	**%**
A	10.3	1.41	63.5	0.59	41.95	0.5	52.79	0.6
B	5.4	0.74	116.8	1.08	64.73	0.8	162.73	1.9
C	114.6	15.69	3,366.5	31.27	2,395.21	30.8	2,330.83	27.1
D	8.1	1.11	113.1	1.05	345.18	4.4	627.97	7.3
E	2.2	0.30	39.7	0.37	20.32	0.3	22.81	0.3
F	115.8	15.86	1,070.3	9.94	469.99	6.0	1,244.09	14.5
G	225.8	30.92	2,048.5	19.03	3,289.21	42.3	1,809.26	21.1
H	41.1	5.62	628.9	5.84	448.24	5.8	603.49	7.0
I	41.3	5.66	761.4	7.07	141.19	1.8	236.28	2.8
J	22.6	3.09	227.1	2.11	146.65	1.9	233.61	2.7
L	12.6	1.73	57.6	0.53	31.74	0.4	213.40	2.5
M	57.8	7.91	374.1	3.48	103.96	1.3	770.15	9.0
N	32.0	4.39	1,104.1	10.26	189.93	2.4	162.81	1.9
P	13.3	1.82	327.4	3.04	25.13	0.3	37.73	0.4
Q	16.6	2.27	379.4	3.52	49.82	0.6	59.46	0.7
R	4.7	0.65	40.7	0.38	8.90	0.1	16.62	0.2
S	6.1	0.84	47.4	0.44	6.49	0.1	7.10	0.1
Total	730.2	100.0	10,766.5	100.0	7,778.64	100.0	8,591.11	100.0

	Total Equity		Profitmaking		Lossmaking		No P&L	
Sector	**Million ₺**	**%**	**Firm Numbers**	**%**	**Firm Numbers**	**%**	**Firm Numbers**	**%**
A	18.76	0.7	4,421	1.1	5,295	1.8	554	4.4
B	59.32	2.4	2,073	0.5	3,152	1.1	214	1.7
C	809.37	32.2	80,039	19.1	34,174	11.5	353	2.8
D	151.81	6.0	2,411	0.6	5,399	1.8	283	2.2
E	7.00	0.3	1,105	0.3	1,006	0.3	59	0.5
F	249.51	9.9	55,035	13.1	56,069	18.8	4,720	37.2
G	504.92	20.1	151,949	36.2	73,086	24.6	755	6.0
H	102.30	4.1	22,113	5.3	17,617	5.9	1,320	10.4
I	42.81	1.7	20,150	4.8	20,176	6.8	970	7.6
J	96.73	3.8	11,143	2.7	11,048	3.7	408	3.2
L	49.50	2.0	4,349	1.0	7,913	2.7	354	2.8
M	358.86	14.3	28,935	6.9	27,675	9.3	1,142	9.0
N	35.89	1.4	15,738	3.7	15,554	5.2	752	5.9
P	6.29	0.2	5,328	1.3	7,691	2.6	254	2.0
Q	19.04	0.8	10,411	2.5	5,887	2.0	300	2.4
R	3.59	0.1	1,966	0.5	2,649	0.9	109	0.9
S	1.39	0.1	2,800	0.7	3,176	1.1	141	1.1
Total	2,517.08	100.0	419,966	100.0	297,567	100.0	12,688	100.0

Source: CBRT, 2021. Prepared by the authors using real sector company accounts.

The sectoral distribution of the number of firms and employees based on the scale for 2019, which is announced in the sector company accounts, is presented in Table 3. Micro and small-sized companies are concentrated in the G sector, while medium and large-sized companies are gathered at sector C.

Several firms in Turkey in C, F and G sectors, several employees in C, G, N and F sectors, revenue G and H, asset and equity size and the number of firms making a profit and loss C, F, G and M, profit/loss. The number of no profit or loss firms are concentrated in the F, H and M

sectors. The sectors with the highest number of firms and employees on a scale basis were similarly observed as C, F, G, M and N.

Table 3. Number and Proportion of Firms and Employees Based on Sector-Based Scale

	Micro Scale		Small Scale		Medium Scale		Large Scale	
Sector	**Firm Number**	**%**	**Firm Number**	**%**	**Firm Number**	**%**	**Firm Number**	**%**
A	7,561	2	2,295	1,0	358	1	56	1
B	3,277	1	1,595	1,0	419	1	148	1
C	61,817	13	38,301	20,0	11,381	29	3,067	30
D	4,229	1	2,703	1,0	673	2	488	5
E	1,348	0	614	0,0	162	0	46	0
F	76,470	16	32,161	17,0	5,910	15	1,283	13
G	150,564	31	63,021	33,0	10,445	26	1,760	17
H	29,111	6	9,778	5,0	1,769	4	392	4
I	28,201	6	10,508	5,0	2,060	5	527	5
J	18,204	4	3,445	2,0	765	2	185	2
L	10,031	2	1,812	1,0	512	1	261	3
M	46,862	10	9,201	5,0	1,142	3	547	5
N	22,929	5	6,319	3,0	2,023	5	773	8
P	7,827	2	4,119	2,0	1,150	3	177	2
Q	11,837	2	3,698	2,0	737	2	326	3
R	3,832	1	727	0,0	133	0	32	0
S	4,759	1	1,258	1,0	94	0	6	0
Total	488,859	100	191,555	100,0	39,733	100	10,074	100
Sector	**Number of Employees**	**%**	**Number of Employees**	**%**	**Number of Employees**	**%**	**Number of Employees**	**%**
A	11,687	1	20,405	1	17,232	1	14,166	0
B	5,990	1	21,221	1	28,452	1	61,140	1
C	172,734	16	627,575	25	949,162	37	1,616,987	35
D	5,114	0	7,530	0	9,299	0	91,178	2
E	3,104	0	8,524	0	8,472	0	19,579	0
F	165,764	15	367,284	15	301,116	12	236,100	5
G	325,355	29	616,952	25	427,659	17	678,506	15
H	68,009	6	159,879	6	129,310	5	271,683	6
I	82,490	7	186,354	7	176,820	7	315,762	7
J	35,923	3	48,537	2	53,774	2	88,889	2
L	16,656	1	13,808	1	11,504	0	15,583	0
M	98,881	9	123,415	5	60,475	2	91,365	2
N	49,149	4	95,287	4	182,058	7	777,638	17
P	26,611	2	84,481	3	113,679	4	102,651	2
Q	23,058	2	71,716	3	74,143	3	210,518	5
R	8,532	1	11,477	0	9,997	0	10,646	0
S	13,279	1	22,044	1	8,180	0	3,929	0
Total	1,112,336	100	2,486,489	100	2,561,332	100	4,606,320	100

Source: CBRT, 2021. Prepared by the authors using real sector company accounts.

3. Literature Review

In the study, the economic contribution and financial performance of the real sector in Turkey are evaluated comparatively in terms of the determined indicators. In this context, current studies are divided into two parts the contribution of sectors to the economy and economic growth and financial performance and evaluation.

Table 4. Related Studies

Author(s)	Criterion(s)	Method(s)	Sector(s)
Köse and Diker (1999)	Contribution to the economy in terms of capacity, production, employment, domestic and international sales	Data-driven situation analysis	Mining and Mining Based Industries (Ceramic coating, cement, lignite, marble, boron, glass, sand, etc. industry)
Feng and Wang (2001)	Production, marketing and activity management activity	GIA-TOPSIS	Taiwan road passenger transport industry
Tuncer and Özuğurlu (2004)	Contribution to economic growth	Productivity analysis	Agriculture, Mining and Quarrying, Manufacturing, Industry, Energy, Infrastructure, Services
Lin et al. (2005)	Asset and equity input; operating income and net income output variables	Data Envelopment Analysis [DEA]	Taiwan's shipping industry
Yılancı (2008)	Intersectoral economic activities in production	Input-Output analysis	According to ISIC Rev.3, 25 sectors where 97 sectors are aggregated
Görener and Görener (2008)	Contribution to the economy in terms of production volume, foreign trade, employment	Data-based comparative situation analysis	Automotive industry
Doğan (2009)	Employment, input to the production of foodstuffs, contribution to the economy in terms of exports and contribution to national income	Data-driven situation analysis	Agriculture
Dekle and Vandenbroucke (2010)	The contribution of production growth per labour and the transition between sectors to economic growth in China	Factor efficiency method	Agriculture, Non-farm, public and private
Halkos and Tzeremes (2012)	Total assets, equity and sales, general administrative expenses input; net profit margin, equity and return on assets output variables	DEA	Greek manufacturing sub-sectors
Ömürbek and Mercan (2014)	Financial performance in terms of liquidity, financial structure, turnover ratios, profitability in terms of 9 ratios	TOPSIS-ELECTRE	22 manufacturing sub-sectors in the CBRT Company Accounts
Akbulut and Rençber (2015)	Financial (10 ratios in terms of liquidity, activity, profitability) and market performance (market value book value)	TOPSIS	32 companies from manufacturing sub-sectors traded in BIST
Rajakumar and Shetty (2015)	Contribution of sectoral growth to economic growth in India	Data-driven situation analysis	Industry, Services, Agriculture main sectors
Hacıevliyagil and Şit (2016)	Sectoral differences in terms of liquidity, financial structure, turnover ratios, and profitability ratios	ANOVA	24 manufacturing sub-sectors
Karadeniz et al. (2016)	Financial performance in terms of liquidity, financial structure, turnover ratios, and profitability ratios	GIA	6 tourism sub-sectors in the CBRT Sector Sector Balance Sheets
Abdioğlu and Albayrak (2017)	Contribution to employment	Employment elasticity coefficient	Agriculture, Industry (mining, manufacturing, electricity-gas and water), Services (construction, transport, trade) main sectors

Table 4. Continue

Karadeniz et al. (2017)	Financial performance in terms of liquidity, financial structure, turnover ratios, and profitability ratios	GIA	21 manufacturing sub-sectors in the CBRT Sector Balance Sheets
Uğurlu and Tuncer (2017)	Contribution to economic growth and employment	Input-Output analysis	According to NACE Rev.1, 35 sub-sectors
Usta and Berber (2017)	The effect of sectoral energy consumption on economic growth	Causality analysis	Agriculture, Industry, Transportation, Housing (Household)
Eyuboglu and Bayraktar (2018)	Financial performance in terms of liquidity, financial structure, turnover ratios, profitability in terms of 19 ratios	AHP+TOPSIS	Basic metal industry sub-sectors in CBRT Sector Company Accounts
Karaoğlan and Şahin (2018)	Financial performance in terms of liquidity, financial structure, turnover ratios, profitability in terms of 15 ratios	AHP+VIKOR-TOPSIS-GIA-MOORA methods	BIST Chemical, Petroleum, Plastics Index businesses
Kundak and Aktop (2018)	Contribution to other sectors and added value	Input-Output analysis	Air passenger transport
Öğünç (2018)	Financial performance in terms of liquidity, financial structure, turnover ratios, profitability in terms of 12 ratios	Comparative Ratio Analysis	The manufacturing sector and the food and textile products sub-sector in CBRT Sector Balance Sheets
Öztürk and Altınöz (2018)	The effect of business profitability on economic growth	Panel ARDL analysis	Manufacturing sector
Arslan and Belgin (2020)	Value-added, R&D expenditure per employee, exports, labour productivity, patent, utility model, design, registration, number of trademark applications, unit foreign sales price	AHP+GIA	Manufacturing sub-sectors in the high and medium high technology class
Yavuz et al. (2020)	Financial performance in terms of liquidity, financial structure, turnover ratios, profitability in terms of 10 ratios	Fuzzy VIKOR method	Chemical sector in CBRT Real Sector Company Accounts
Yiğit (2020)	Financial performance and financial risk levels in terms of liquidity, financial structure, turnover ratios, 11 ratios within the scope of profitability	TOPSIS (Financial performance) and Altman Z (financial risk) methods	Hospital services sub-sector in CBRT Real Sector Company Accounts
Nguyen et al. (2021)	Performance evaluation with Environmental, Sustainability, Corporate Governance and Financial variables	Regression analysis	Industries causing heavy environmental pollution in China
Pavelkova et al. (2021)	Return on assets, the profitability of sales, labour productivity, economic added value	Regression analysis	Czech plastic and textile industries

Since a company's financial performance is affected by sector-specific factors and features and the comparison within the sector reveals more meaningful results, studies on financial

performance gain weight on a sector basis. In contrast, studies on contribution to the economy focus on sector comparison. On the other hand, a limited number of studies in which the contribution to the economy and financial performance are considered together with various indicators. While multiple studies in the literature on the subject are summarised in Table 4, some other studies are briefly summarised in the sub-titles.

3.1. Studies Examining Sectors from an Economic Perspective

An increase in the production volume of a sector will provide economic growth. Sectors' contribution to the economy will be possible with the rise in the production factors required for the increase in the production volume, in other words, with the growth of investments, employment and expansion in companies in the sector. When the literature is examined, sectors' contributions to economic growth are discussed within the framework of the specified factors.

Tuncer and Altıok (2012) analysed the slope of production, employment, productivity and wages of the main sectors and manufacturing industry in Turkey during the 1980-2008 period. They aimed to determine the contribution of the manufacturing industry to employment. According to findings, in 1980, while the main sectors of agriculture and services were dominant in Turkey's GDP, in 2010, the industry sector rose to the second rank after the services sector. In terms of employment, while the share of the agricultural sector was 54% and the percentage of the services sector was 31% in 1980, the percentage of the agricultural sector decreased to 25%, and the share of the services sector reached 55% in 2010. It has been determined that the employment output elasticity measured by the employment growth rate was also in this period and remained at a low level in the 1981-2000 period, despite the value-added increase rate in the manufacturing sector, which was the highest in 2003-2008 period. Accordingly, it was stated that employment growth was realised at the expense of decreased labour productivity.

Özsağır and Akın (2012) investigated the effects of the services sector on national income and employment in the world and Turkey, identified the sub-sectors with strategic potential in Turkey, compared these sectors in order of importance and analysed the contributions of these sectors to the country. According to the findings of the study, it has been determined that the services sector in the Turkish economy ranks in the form of tourism, construction, transportation (1985-2010), data processing and back-of-office (2004-2009) services in order of importance according to the export and import indicator.

Akbulut and Terzi (2013) tested the validity of export-based economic growth with the export data of the main sectors of agriculture, manufacturing and mining. They concluded that exports are one of the essential elements of economic growth. Therefore, it can be said that export-intensive sectors should be supported for economic growth. Uğurlu and Tuncer (2017), on the other hand, comparatively examined the contributions of manufacturing and service sectors to economic growth and employment in Turkey in the input-output tables of the years 1995 and 2011. In the study, the key sectors of economic growth in Turkey are manufacturing sectors (textiles, leather and products, wood products, paper products, coal, refined petroleum products and nuclear fuel, chemical products, plastic and rubber products, other non-metallic mineral products, electricity, gas, steam and hot water production and distribution, and supporting and auxiliary transportation activities) occur, and the spill-over effect of the growth to be experienced in the service sectors on the economy is limited. The study shows that the deindustrialisation

phenomenon is invalid in the Turkish economy as of the analysed periods. At the same time, the manufacturing sector has a low and medium technology structure that produces mainly consumption and intermediate goods.

When the international literature on the subject is examined, Scarpetta et al. (2000) examined the economic growth in the OECD region based on country, whole and sector, according to various indicators in the 1979-1998 period. The study's findings show that the economic growth trend in the OECD region in the 1990s was lower than in the previous decade, and this difference showed country-based differences. Looking at the sectoral elements of growth, it has been observed that there is a sectoral convergence, especially in the G7 economies. Innovation and increase in workforce qualifications effectively increase productivity on a sectoral basis. Along with the developments, it was determined that the employment losses in the manufacturing sector in Continental Europe were compensated by the increase in employment in the service sectors, and the total productivity increase was preserved.

3.2. Studies Examining Sectors from a Financial Perspective

Studies examining the real sector from a financial point of view in Turkey have a more expansive place than the economic evaluation. In these studies, the insurance sector companies listed in Borsa Istanbul (BIST) (Akın and Ece, 2013), the food, beverage and tobacco sector in the CBRT sector balance sheets on a scale basis (Dağlı and Eker, 2016), the financial performances of maritime freight transport companies (Beller Dikmen, 2021) was evaluated with the ratio analysis method. On the other hand, Deran and Erduru (2018) analysed the road, and sea freight transport sectors in the sector's company accounts comparatively based on sector and year financially.

The financial performances of the companies in the BIST tourism companies were examined by the GIA (Ecer and Günay, 2014) and TOPSIS methods (Özçelik and Kandemir, 2015). The primary metal industry companies by the TOPSIS method (Uygurtürk and Korkmaz, 2012), Turkish sports clubs with GIA method (Ecer and Böyükaslan, 2014), information and technology companies with AHP-GIA (Tayyar et al., 2014), the Italian football teams by the GIA method (Pradhan et al., 2017), BIST financial leasing and factoring companies with TOPSIS method (Özçelik and Küçükçakal, 2019), and construction index companies with GIA and TOPSIS methods (Şahin and Karacan, 2019), and private banks with CRITIC-EDAS method (Işık and Ersoy, 2020). The BIST Electricity, Gas and Steam index were analysed by the entropy-based ARAS method by Arsu (2021).

Açıkgöz (2021) aimed to compare the financial performances of the manufacturing sector companies traded in Borsa Istanbul and implemented good corporate governance in the 2010-2019 period, with the sector performance announced by the CBRT. In the study, in which the performance was determined with the TOPSIS method, the performances of the business and the sector were compared on an annual basis in terms of growth, activity, profitability, liquidity, financial structure and general performance. According to the findings, while the sector performance is better in terms of growth performance, it has been determined that the performance of businesses with good corporate governance practices in terms of activity, financial structure, profitability, liquidity and general performance is better than the sector. This finding has been interpreted as corporate governance is the main factor for companies to succeed in their financial

performance. The fact that publicly traded companies are more significant than a large number of companies at different scale levels in the sector's company accounts is explained by the fact that they are managed with a professional management approach in addition to corporate management. In addition, it has been stated that these results are observed because the calculation of total assets, net profit, net sales and equity growth within the scope of the growth indicator is compared with the current size of the companies traded in the stock exchange with the sector average consisting of all micro, small, medium and large-sized companies in the sector.

As can be seen, although many studies are financial performance in terms of companies and sectors in the country sample of Turkey, the number of studies comparing different sectors is limited. When the international literature is examined, Feng and Wang (2001) looked at evaluating the performance of the road transport sector in Taiwan with the Multi-Criteria Decision Making (MCDM) method. They assessed the sector within production, marketing and activity management efficiency. In the study, in which 32 companies were examined, it was stated that an evaluation with financial ratios and activity indicators in performance evaluation would reveal more meaningful results. Malinic and Milicevic (2011) analysed the financial performances of 5 real sectors in Serbia, namely agriculture, mining, manufacturing, electricity generation and construction, based on sectors and years. The sectoral contributions of the sectors in which liquidity, short and long-term financial structure and profitability indicators are analysed have been determined in the total real sector performance. According to the findings, it has been observed that the manufacturing and construction sectors are the sectors with the highest contribution to the overall real sector performance.

When the literature review and the studies explained in this section are examined in general, the sectors are evaluated separately regarding their economic contributions and financial performance. However, some studies explore sectors' contributions to the economy and their financial performance together. Although studies that include all sectors in terms of both criteria are limited, there are hardly any studies that make comparisons based on objective evaluation in determining the weights of criteria. Considering these aspects, it is expected that the study will contribute to the plan and policymakers economically and financially and fill the gap in the literature.

4. Data and Method

In this study, in which the real sector in Turkey is evaluated in terms of economic and financial indicators, the Real Sector Company Accounts data published by the CBRT have been used. The sector company accounts published in 2020 have been expanded to include administrative records in partnership with the CBRT and the TURKSTAT. The study consists of 17 sector observations grouped according to NACE Rev.2. Economic indicators cover the fourth quarter of 2019, and the data on financial indicators cover the annual data for the 2009-2019 period. Therefore, the economic evaluation was based on the fourth quarter observations of 2019, and the financial review was based on the eleven-year observation averages. Economic indicators are produced based on published industry identity data. On the other hand, financial indicators consist of standard ratios created by the CBRT.

In the economic evaluation of the sectors, 31 variables were created in three indicators, Contribution to Economic Growth (CEG), Contribution to Employment (CE) and Contribution to

Entrepreneurship (CEN). In evaluating financial performance, 45 ratios in four main financial indicators as Liquidity, Financial Structure, Turnover (Efficiency) and Profitability Ratios, are included in the analysis. The analysis method of working with economic and financial indicators is presented in the subtitles.

4.1. Economic Indicators

In the economic evaluation of the sectors, three indicators were created under the headings of contribution to economic growth, contribution to employment and contribution to entrepreneurship. Thirteen variables were designed to measure the Contribution to Economic Growth (CEG). The CEG variables presented in Appendix (Table 1), the share of the number of companies operating in the sector in the total number of companies, the size of assets per company, sales revenues, the amount of equity, the share of the sector's asset size within all sectors, the percentage of sales revenues, the share of equity, including the investments and activities of the companies.

In the study, its contribution to economic growth has been tried to be determined. To evaluate the contribution to economic growth, the ratio of the number of profit-making, loss-making and non-profit-loss (idle firms) in the sector to the total number of firms in the sector, as well as the share of the sector within the overall total, which is profit-making, loss-making and inactive firms, are other variables. With the variables created, it aims to determine the contribution of sectors to economic growth by evaluating the share of any sector in all sectors, the activity results of the companies within itself, the size of investments, and the robustness of the sector.

One of the indirect effects of a sector's contribution to economic growth is the employment it creates. Thanks to the employment it creates, any sector will contribute to economic welfare and social welfare and thus development. In this respect, in this study, the contribution of the sector to employment was measured with ten variables presented in the appendix (Table 2), the number of employees operating in the sector, the share of the sector in total employment, the number of firm employees on a scale basis and their share in employment on a sectoral scale basis.

One of the factors underlying development and growth is the ease of employment and incentives. At the same time, the other is the willingness of entrepreneurs to invest in the relevant economy and sector. Various methods can measure entrepreneurship in a sector. In this study, the variables produced with the number of firms based on sector and scale are used as an indicator of the sector’s contribution to entrepreneurship. In this respect, the ratios of firms based on the scale within the total number of firms in the sector and the sector’s share in the total number of firms at the scale level have been calculated. The indicator of contribution to entrepreneurship was measured with eight variables presented in appendix (Table 3).

4.2. Financial Indicators

The annual sector ratios of the sectors covering the years 2009-2019 are analysed within the scope of financial indicators. Although the ratio analysis method has an important place in financial analysis, it is based on the firm's financial statement items to each other. Traditionally, companies are analysed in terms of liquidity, financial structure, efficiency and profitability in

ratio analysis. Examine the companies with ratio analysis according to the party performing the research and the purpose of the analysis provides information about operating and financial decisions. In this context, liquidity, financial structure, turnover (efficiency) and profitability ratios are also included in the sector company accounts announced by the CBRT, which are the financial indicators examined.

Liquidity is the ability of an asset to be quickly converted into cash at a low cost (Ceylan and Korkmaz, 2018). Liquidity ratios measure the ability of companies to pay their due debts and liabilities. Liquidity ratios show the power of the company to meet its short-term obligations. Liquidity ratios give information on the ability to maintain liquidity in case of disruption of business activities (Aydın et al., 2017) and are expected to be high in general. Receivables and inventory items have low liquidity compared to cash and cash equivalents. They cannot be quickly converted into cash due to risks such as non-collection of receivables, obsolescence and deterioration of stocks during periods of economic recession and crisis, and when sector or business activities are disrupted. Therefore, ratios related to inventory and receivables are expected to be low. The liquidity ratios, formulas and expectations included in the study are presented in the appendix (Table 4).

Turnover ratios, also called efficiency, activity, asset utilisation ratios, evaluate how much the company invests in assets or asset groups, compared to the income of these assets, and how efficiently the company uses its assets. In determining the turnover ratios that reveal the efficiency of the companies' activities based on the relations between input and output, asset items or equity are taken as input and sales are taken as output (Ayrıçay et al., 2013; Karapınar and Ayıkoğlu Zaif, 2013; Ceylan and Korkmaz, 2018). Although it does not provide clear information about the company's profitability, it is expected that the activity ratios will be high. Turnover ratios, formulas and expectations are given in the appendix (Table 5).

Profitability ratios are the ratios that are calculated ability using the financial data in the income statement and balance sheet and show the level of profits of the company against investments or sales. The business's source efficiency of its resources and investments provide are examined with the profitability ratios (Ceylan and Korkmaz, 2018). At the same time, they are the ratios that show how the company's asset management, debt management, and liquidity affect the operating results (Aydın et al., 2017). Profitability ratios also indicate the success of management and are expected to be high in general. However, the cost of goods sold, operating expenses, and interest expenses, which show the share of operating expenses and costs, are expected to be low since net sales ratios are cost indicators. Profitability ratios, formulas and expectations are shown in the appendix (Table 6).

Although there is no valid leverage ratio for all companies, a solid financial structure indicates high equity in financing resources. For this reason, it is expected that the percentage of foreign resources in the financial structure ratios is minimum, and the allocation of equity is maximum. Financial structure ratios, formulas used in the calculation and expectations are presented in the appendix (Table 7). Seventeen ratios are calculated and announced within the scope of financial structure ratios in the sector's company accounts. Among these ratios, the total debt ratio (*total loans to total assets ratio) and equity ratio (equity to total assets ratio) are complementary to each other, their sum is one, and it is not possible to evaluate them together in the method, so only equity ratio (FS1) is included in the analysis.

Fourteen ratios are calculated and announced in the sector's company accounts within the scope of profitability ratios. Among these ratios, the gross profit margin (*gross profit to net sales ratio) and the cost of sales ratio (cost of goods sold to net sales ratio) are complementary to each other, and only the cost of goods sold to net sales ratio (PR9) is included in the analysis.

4.3. Research Methodology

In this study, MCDM methods were used in the economic and financial evaluation of sectors. MCDM methods are mathematical models that determine the optimum one by comparing, evaluating, and rating alternative units with multiple criteria (Ecer, 2020). In this study, CRITIC and MAIRCA methods were used. Among these methods, the weights of the criteria used in evaluation and rating were determined objectively with the CRITIC method. The MAIRCA method was used to obtain performance scores and rankings. In the literature, this integrated model was used by Ayçin (2020) in personnel selection, Belke (2020) in determining the macroeconomic performance of countries, and Bektaş (2020) and Aydın (2020) in evaluating the financial performance of banks.

4.3.1 CRITIC Method

The CRITIC method, one of the multi-criteria decision-making methods, is used to determine the weights of the criteria objectively examined in rating and evaluation. The method prevents the evaluator from determining the subjective importance of the criteria. It enables the determination of statistical-based objective importance weights based on the correlation values between the criteria (Ecer, 2020). The method developed by Diakoulaki et al., (1995) is based on the analytical examination of the decision matrix, which contains all the information included in the evaluation criteria. The objective weights obtained by the method include information from all criteria included in the multi-criteria assessment. In addition, objective weights convey information about the nature of dilemmas created by conflicting criteria and ensure that interdependent criteria are included in the evaluation (Diakoulaki et al., 1995: 769).

In this respect, the study enables the evaluation of the ratios by having the whole of the criteria by determining the objective weights of the criteria with the CRITIC method, instead of a subjective selection and weighting among the ratios published by the CBRT. The CRITIC method calculates criterion weights in five steps (Diakoulaki et al., 1995: 764-765; Torkayesh et al., 2021).

Step 1. *Creation of decision matrix:* Consists of raw observation values.

Step 2. *Standardisation (Normalisation):* Decision matrix elements are normalised with the help of max-min linear normalisation. Equation 1 is used for benefit criteria and Equation 2 is used for cost criteria.

$$r_{ij} = \frac{x_{ij} - x_{min}}{x_{max} - x_{min}} \quad (1)$$

$$r_{ij} = \frac{x_{max} - x_{ij}}{x_{max} - x_{min}} \quad (2)$$

Step 3. *Calculation of standard deviations:* The standard deviations of the criteria are obtained using Equation (3).

$$s_j = \frac{\sum_{j=1}^{n} (r_{ij} - \bar{r}_{ij})^2}{n-1} \tag{3}$$

Step 4. *Calculation of the correlation coefficient*: In this method where correlation coefficients are calculated, Pearson Correlation coefficient is found for non-categorical data. The Pearson correlation coefficient is obtained using Equation (4).

$$p_{jk} = \frac{\sum_{i=1}^{m} (r_{ij} - \bar{r}_j) \cdot (r_{ik} - \bar{r}_k)}{\sqrt{\sum_{i=1}^{m} (r_{ij} - \bar{r}_j)^2 \cdot \sum_{i=1}^{m} (r_{ik} - \bar{r}_k)^2}} \tag{4}$$

Step 5. *Finding importance weights*: Finally, in the step of finding the importance weights, the importance weights of the criteria are calculated using Equation (5).

$$w_j = \frac{s_j \cdot \sum_{k=1}^{n} (1 - p_{jk})}{\sum_{k=1}^{n} (s_j \cdot \sum_{k=1}^{n} (1 - p_{jk}))} \tag{5}$$

4.3.2 MAIRCA Method

The MAIRCA method, which was introduced to the literature by Pamučar et al. (2014), is based on determining the difference (gap) between the theoretical (ideal) solution and the (actual, empirical) result. The alternative with the slightest difference is the most preferred option in this method. In other words, the alternative where the difference between the theoretical and real value is minimal is the ideal alternative (Ecer, 2020). The MAIRCA method has been used in many different areas in the literature. For example, determining the financial performance of companies during the pandemic process (Kehribar et al., 2021), battery electric vehicle selection (Ecer, 2021a), analysis of the financial performance of tourism companies (Günay and Ecer, 2020), coronavirus vaccine selection (Ecer, 2022), location selection (Zolfani et al., 2020), evaluation of sustainable suppliers (Ecer, 2021b). The method achieves results in six steps (Gigović et al., 2016; Zolfani et al., 2020).

Step 1. *Generating the initial decision matrix*: The observation values of each criterion are included in the initial decision matrix (Equation 6).

$$X = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \dots & C_n \end{array} \\ \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \end{array} \tag{6}$$

Step 2. *Determining the preference values of alternatives*: The decision-maker considers the alternatives as if each could be realised with the same probability. Therefore, the preference of any possible options is calculated as shown in Equation (7) to show the total number of alternatives (number of units examined based on the relevant criteria).

$$P_{A_i} = \frac{1}{m} \qquad \sum_{i=1}^{m} P_{A_i} = 1 \tag{7}$$

Step 3. *Obtaining the theoretical evaluation matrix*: Where n is the number of criteria, the theoretical evaluation matrix Tp' is found by multiplying the criteria weights with the alternative preference values (Step 2). The theoretical evaluation matrix obtained is shown in Equation (8).

$$T_p = \begin{matrix} \\ P_{A_1} \\ P_{A_2} \\ \vdots \\ P_{A_m} \end{matrix} \begin{matrix} \begin{matrix} w_1 & w_2 & \dots & w_n \end{matrix} \\ \begin{bmatrix} t_{p11} & t_{p12} & \dots & t_{p1n} \\ t_{p21} & t_{p22} & \dots & t_{p2n} \\ \vdots & \vdots & \ddots & \vdots \\ t_{pm1} & t_{pm2} & \dots & t_{pmn} \end{bmatrix} \end{matrix} = \begin{matrix} \\ P_{A_1} \\ P_{A_2} \\ \vdots \\ P_{A_m} \end{matrix} \begin{matrix} \begin{matrix} w_1 & w_2 & \dots & w_n \end{matrix} \\ \begin{bmatrix} w_1.t_{p_{11}} & w_2.t_{p_{12}} & \dots & w_n.t_{p_{1n}} \\ w_1.t_{p_{21}} & w_2.t_{p_{22}} & \dots & w_n.t_{p_{2n}} \\ \vdots & \vdots & \ddots & \vdots \\ w_1.t_{p_{m1}} & w_2.t_{p_{m2}} & \dots & w_n.t_{p_{mn}} \end{bmatrix} \end{matrix} \quad (8)$$

Since the decision-maker is neutral to all alternatives in the matrix shown in Equation (8), the operation essentially divides the weight of a criterion by the total alternative. Therefore, the theoretical evaluation matrix can be expressed in Equation (9). In Equation (8), n represents the total criteria, and tpi represents the theoretical value.

$$T_p = \begin{matrix} \\ P_{A_i} \end{matrix} \begin{matrix} \begin{matrix} w_1 & w_2 & \dots & w_n \end{matrix} \\ \begin{bmatrix} t_{p1} & t_{p2} & \dots & t_{p11} \end{bmatrix} \end{matrix} = \begin{matrix} \\ P_{A_i} \end{matrix} \begin{matrix} \begin{matrix} w_1 & w_2 & \dots & w_n \end{matrix} \\ \begin{bmatrix} P_{A1}.w_1 & P_{A2}.w_2 & \dots & P_{An}.w_n \end{bmatrix} \end{matrix} \quad (9)$$

Step 4. *Obtaining the actual evaluation matrix*: In finding the actual evaluation matrix, first, the initial decision matrix is standardised. Then, the theoretical evaluation matrix is multiplied by the standardised decision matrix. In finding the standardised matrix, it is necessary to determine whether the criterion is benefit-based (larger is better) or cost-based (smaller is better). After the criterion types are determined, Equation (10) is used for benefit-based criteria and Equation (11) is used for cost-based criteria.

$$t_{rij} = t_{pij}.\left(\frac{x_{ij} - x_{min}}{x_{max} - x_{min}}\right) \quad (10)$$

$$t_{rij} = t_{pij}.\left(\frac{x_{max} - x_{ij}}{x_{max} - x_{min}}\right) \quad (11)$$

After the standardized matrix values according to Equation (10) and (11), the real evaluation matrix is obtained with Equation (12).

$$T_r = \begin{matrix} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{matrix} \begin{matrix} \begin{matrix} C_1 & C_2 & \dots & C_n \end{matrix} \\ \begin{bmatrix} t_{r11} & t_{r12} & \dots & t_{r1n} \\ t_{r21} & t_{r22} & \dots & t_{r2n} \\ \vdots & \vdots & \ddots & \vdots \\ t_{rm1} & t_{rm2} & \dots & t_{rmn} \end{bmatrix} \end{matrix} \quad (12)$$

Step 5. *Obtaining the difference (gap) matrix*: The total difference matrix is obtained by subtracting the theoretical evaluation matrix Tp from the actual evaluation matrix Tr. The difference matrix is constructed as shown in Equation (13).

$$G = T_p - T_r = \begin{bmatrix} g_{11} & g_{12} & \dots & g_{1n} \\ g_{21} & g_{22} & \dots & g_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ g_{m1} & g_{m2} & \dots & g_{mn} \end{bmatrix} = \begin{bmatrix} t_{p11} - t_{r11} & t_{p12} - t_{r12} & \dots & t_{p1n} - t_{r1n} \\ t_{p21} - t_{r21} & t_{p22} - t_{r22} & \dots & t_{p2n} - t_{r2n} \\ \vdots & \vdots & \ddots & \vdots \\ t_{pm1} - t_{rm1} & t_{pm2} - t_{pm2} & \dots & t_{pmn} - t_{rmn} \end{bmatrix} \quad (13)$$

Step 6. *Calculating the criteria function values of the alternatives and obtaining the rankings*: Criterion function values are found separately for each alternative by adding the difference values as shown in Equation (14).

$$Q_i = \sum_{j=1}^{n} g_{ij} \quad (14)$$

Calculated values (Qi values) of the alternatives are ordered from smallest to largest, with the smallest Qi value indicating the best and the alternative with the most considerable Qi value showing the worst.

5. Findings

The results of the economic and financial evaluation of the real sector in Turkey with the CRITIC-MAIRCA integrated method are presented in this section. The final findings reached with the CRITIC-MAIRCA method are reported in this section's first sub-title. Table 12 shows the rankings based on economic indicators and Table 13 is based on financial indicators. Secondly, the method has been tested by the sensitivity analysis to check the method's robustness. The findings of the sensitivity analysis are reported in the sub-title of the section.

5.1. CRITIC-MAIRCA Results

When Table 5, which includes the findings on economic indicators, is examined, the highest performance in terms of economic growth (CEG), contribution to employment (CE), contribution to entrepreneurship (CEN) and total contribution to the economy (TCE) was realized in the Manufacturing (C) sector.

On the other hand, the second highest performance in terms of contribution to economic growth and contribution to entrepreneurship indicators were realized in the Trade (G) sector and the sector showed the second-highest performance in terms of total contribution to the economy (TCE). This finding coincides with the results of the study (Tuncer and Özuğurlu, 2004; Tuncer and Altıok, 2012; Uğurlu and Tuncer, 2017), which reveal that Turkey is one of the key sectors in its economic growth and its contribution to the economy is gradually increasing.

In the sub-indicator of contribution to economic growth (CEG), measured by variables such as the number of firms, investment per firm, sales revenues, and equity, the second and third highest performances are, respectively, Trade (G) and Electricity, Gas, Steam and Air Conditioning Supply (D) sectors. Similar to Yılancı's (1998) finding that the trade sector is important in the Turkish economy along with agriculture according to 1998 data, in this study, the trade sector is in the top three positions in terms of sub-indicators and contribution to the total economy.

Table 5. CRITIC – MAIRCA Findings Based on Economic Indicators

Sector	CEG (Q_i)	CEG Rank	CE (Q_i)	CE Rank	CEN (Q_i)	CEN Rank	TCE (Q_i)	Total Rank
A	0.017	16	0.015	15	0.012	15	0.044	16
B	0.015	5	0.012	10	0.011	10	0.038	9
C	0.008	1	0.004	1	0.006	1	0.018	1
D	0.011	3	0.017	17	0.010	4	0.038	8
E	0.015	8	0.013	12	0.011	13	0.039	12
F	0.018	17	0.012	9	0.009	3	0.039	11
G	0.010	2	0.009	5	0.006	2	0.026	2
H	0.015	9	0.010	7	0.011	8	0.036	7
I	0.016	11	0.009	4	0.011	6	0.036	5
J	0.015	7	0.012	11	0.011	14	0.039	10
L	0.017	13	0.017	16	0.011	12	0.044	17
M	0.015	6	0.013	14	0.011	7	0.039	13
N	0.016	10	0.007	2	0.010	5	0.034	3
P	0.017	15	0.008	3	0.011	9	0.036	6
Q	0.015	4	0.009	6	0.011	11	0.035	4
R	0.017	14	0.013	13	0.012	16	0.041	15
S	0.016	12	0.011	8	0.012	17	0.039	14

A- Agriculture, Forestry and Fishing; B- Mining and Quarrying; C- Manufacturing; D- Electricity, Gas, Steam and Air Conditioning Supply; E- Water Supply; Sewerage; Waste Management and Remediation Activities; F- Construction; G- Trade; H- Transporting and Storage; I- Accommodation and Food Service Activities; J- Information and Communication; L- Real Estate Activities; M- Professional, Scientific and Technical Activities; N- Administrative and Support Service Activities; P- Education; Q- Human Health and Social Work Activities; R- Arts, Entertainment and Recreation; S- Other Service Activities

The sectors with the second and third highest performance in the contribution to employment (CE) sub-indicator are Administrative and Support Service Activities (N) and Education (P) sectors, respectively. The highest performance in Contribution to Entrepreneurship (CEN) sub-indicator is Manufacturing (C) sector took place, followed by Trade (G) and Construction (F) in second and third place, respectively. When the sectors with the worst performance level are examined, it is observed that Construction (F) sub-sector is observed in the CEG sub-indicator, Electricity, Gas, Steam and Air Conditioning Supply (D) in the CE sub-indicator, and Other Service Activities (S) sub-sectors in the CEN sub-indicator.

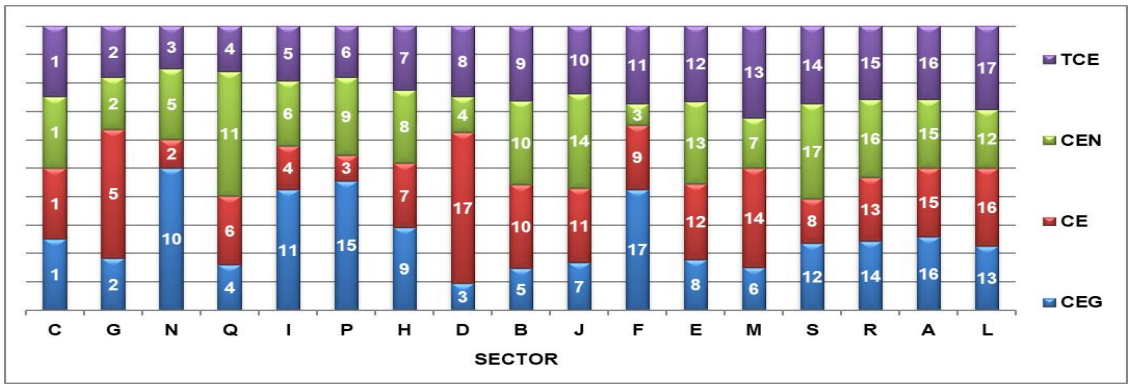

Fig. 1. Sector Rankings in terms of Contribution to the Economy

Figure 1, which includes the total contribution (TCE) of the sectors to the economy, is examined, Manufacturing (C), Trade (G) and Administrative and Support Service Activities (N) sub-sectors took the top three places. According to the overall performance ranking, Real Estate Activities (L) is in the seventeenth place, Agriculture, Forestry and Fishing (A) is in the sixteenth place, and Culture, Arts, Entertainment, Leisure and Sports (R) sub-sector is in the fifteenth place.

Table 6, which includes the findings regarding the financial performance evaluation determined according to the eleven-year financial ratio averages of the sectors, is examined, the highest performing sector is Human Health and Social Work Activities (Q) in terms of liquidity ratios (LR), financial structure ratios (FSR), profitability ratios (PR) and general performance (Total). In terms of turnover ratios, the highest performance was realized in the Electricity, Gas, Steam and Air Conditioning Supply (D) sector.

Table 6. CRITIC – MAIRCA Findings Based on Financial Indicators

Sector	LR (Q_i)	LR Rank	FSR (Q_i)	FSR Rank	TR (Q_i)	TR Rank	PR (Q_i)	PR Rank	Total (Q_i)	Total Rank
A	0.007	9	0.013	16	0.008	14	0.008	11	0.036	17
B	0.007	14	0.010	9	0.009	16	0.008	12	0.034	13
C	0.007	15	0.013	17	0.007	13	0.006	4	0.034	14
D	0.004	2	0.012	11	0.004	1	0.013	17	0.032	9
E	0.007	13	0.013	15	0.007	10	0.007	5	0.034	12
F	0.007	12	0.012	12	0.009	15	0.007	8	0.035	16
G	0.008	17	0.013	14	0.007	9	0.007	6	0.034	15
H	0.007	11	0.012	13	0.006	4	0.008	10	0.033	10
I	0.005	4	0.010	10	0.006	3	0.007	9	0.028	4
J	0.006	6	0.008	2	0.007	7	0.005	3	0.026	2
L	0.007	8	0.009	4	0.009	17	0.009	15	0.034	11
M	0.007	10	0.008	3	0.007	12	0.004	2	0.027	3
N	0.007	16	0.010	8	0.006	2	0.007	7	0.030	5
P	0.005	3	0.009	5	0.006	5	0.010	16	0.030	6
Q	0.003	1	0.006	1	0.007	8	0.002	1	0.018	1
R	0.006	5	0.009	6	0.007	11	0.008	14	0.030	7
S	0.006	7	0.010	7	0.006	6	0.008	13	0.031	8

While the Electricity, Gas, Steam and Air Conditioning Supply (D) sub-sector ranks second in terms of liquidity ratios, it ranks ninth in general performance due to being eleventh in terms of financial structure indicator and last in terms of profitability ratios. The second-best performing sector in terms of financial structure ratios was Information and Communication (J), while the third best performing sector was the Professional, Scientific and Technical Activities (M) sector. In terms of turnover ratios, Administrative and Support Service Activities (N) and Accommodation and Food Service Activities (I) sectors take the second and third places, respectively. In terms of profitability Professional, Scientific and Technical Activities (M) ranked second, while Information and Communication (J) sector took third place. In terms of overall performance, Information and Communication (J) and Professional, Scientific and Technical Activities (M) sectors were the second and third highest performing sectors, respectively.

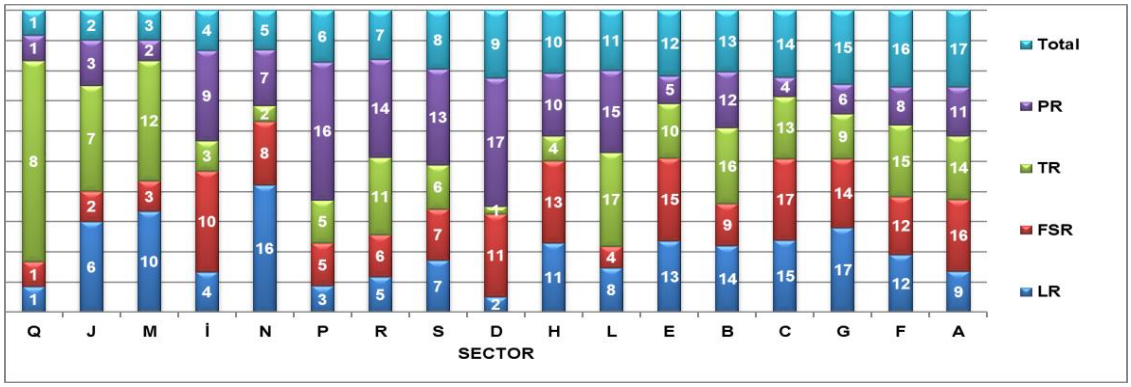

Fig. 2. Sector Rankings in Terms of Financial Performance

As can be seen in Figure 2, the lowest performance was observed in the Agriculture, Forestry and Fishing (A) sector according to the general financial performance evaluation, while Construction (F) is in the sixteenth rank. Malinic and Milicevic (2011) examined the agriculture, mining, manufacturing, electricity generation and construction sectors in Serbia and found that the best performance in terms of liquidity, financial structure and profitability indicators was in the manufacturing and construction sectors. In this study, in which seventeen sectors are examined, the construction sector is not among the top ten sectors, but the manufacturing sector is ranked fourth only in profitability performance and in the lower ranks in other indicators. The Trade (G) sector, which ranks fifteenth in terms of overall performance, also ranked last in liquidity ratios.

5.2. Sensitivity Analysis Results

A sensitivity analysis was performed to test the robustness of the CRITIC-MAIRCA integrated model utilized in this study. In this context, firstly, the level of being affected by the change in criterion weight of economic indicators was analysed. While the scenarios are presented in Table 7, the ranking results are presented in Table 8.

Table 7. Scenarios

Scenarios	Weights
Current	Values obtained with CRITIC
Sc1	All weights are equal (0.0322)
Sc2	Contribution to economic growth ratios are 0.04, others are equal (0.0266)
Sc3	Contribution to employment ratios are 0.04, others are equal (0.0285)
Sc4	Contribution to entrepreneurship ratios are 0.04, others are equal (0.0295)

According to Table 8, the order of sectors Manufacturing (C), Trade (G), Administrative and Support Service Activities (N), Other Service Activities (S) and Arts, Entertainment and Recreation (R) are in the same order in all scenarios. To put it more clearly, manufacturing ranks first, trade second, administrative and support service activities third, other service activities fourteenth and arts, entertainment and recreation fifteenth. According to the results of Spearman's rank correlation analysis, at least 89.2% similarity was found between the rankings.

Table 8. Rankings Based on Scenarios in the Context of Economic Indicators

	Current	Sc1	Sc2	Sc3	Sc4
A	16	16	17	16	17
B	9	11	11	10	11
C	1	1	1	1	1
D	8	9	8	11	9
E	12	12	13	12	12
F	11	5	7	6	4
G	2	2	2	2	2
H	7	6	4	5	6
I	5	4	6	4	5
J	10	13	12	13	13
L	17	17	16	17	16
M	13	10	10	9	10
N	3	3	3	3	3
P	6	8	9	8	8
Q	4	7	5	7	7
R	15	15	15	15	15
S	14	14	14	14	14

Afterwards, the level of being affected by the changes in the ratio importance weights of the rankings of the sectors according to the financial indicators was analysed. The scenarios developed are given in Table 9 and the ranking results obtained are given in Table 10.

Table 9. Scenarios

Scenarios	Weights
Current	Values obtained with CRITIC
Sc1	All weights are equal (0.0222)
Sc2	Liquidity ratios are 0.03, others are equal (0.0205)
Sc3	Financial structure ratios are 0.03, others are equal (0.0179)
Sc4	Turnover ratios are 0.03, others are equal (0.0205)
Sc5	Profitability ratios are 0.03, others are equal (0.019)

As seen in Table 10, the Education (P) and Human Health and Social Work Activities (Q) sectors are in the same order in all scenarios. According to the results of Spearman's rank correlation analysis, at least 85.5% similarity was found between the rankings. This result indicates that the rankings are very similar.

Table 10. Rankings Based on Scenarios in the Context of Financial Indicators

	Current	Sc1	Sc2	Sc3	Sc4	Sc5
A	17	17	17	17	17	16
B	13	12	13	11	14	13
C	14	11	12	14	12	11
D	9	13	10	13	10	17
E	12	10	11	12	11	10
F	16	16	16	16	16	14
G	15	14	15	15	13	12
H	10	9	9	9	9	9
I	4	4	4	5	4	5
J	2	2	2	2	2	2
L	11	15	14	10	15	15
M	3	3	3	3	3	3
N	5	5	5	4	5	4
P	6	6	6	6	6	8
Q	1	1	1	1	1	1
R	7	8	7	7	8	7
S	8	7	8	8	7	6

In summary, sensitivity analyses focusing on the changes in criterion weights within the framework of both economic and financial indicators revealed that there are quite high similarities between the rankings. Thus, it can be said that the proposed CRITIC-MAIRCA method produces consistent results against weight changes and the model is reliable.

6. Conclusion and Evaluation

In addition to the transformation process in the economic activities that started after the January 24 decisions in the Turkish economy, international developments and many national dynamic economic activities have been renewed and changed for the last forty years. Along with the effects created by technological developments in every field, the effects on human behaviour as well as the factors that directly affect companies such as information and communication, logistics and transportation bring about change in economic activities.

As a result of the developments in the economy, there will be economic growth - contraction, increase or decrease in the welfare level of the society, efficient use of scarce resources or their destruction by consumption. Plans and policies will determine the direction of the economy as well as the developments. With the regulation made in May 2018 regarding the borrowing of the corporate sector, the use of foreign currency loans was made subject to the condition of income in foreign currency, and restrictions were imposed on the use of foreign currency or foreign currency indexed loans. As a result of this, in April 2018, the number of companies using foreign currency debt decreased by 40% in September 2020, the amount of foreign currency debt decreased by 22% and foreign currency short position decreased by approximately 30%. In fact, the FX short position of the real sector, which started in May 2018, decreased by 12% in August 2020 compared to the same period of the previous year (CBRT, 2020). With the regulation made, the exchange rate risk that companies will bear due to the use of foreign currency loans has been prevented, although there is no foreign currency income.

The findings obtained in the study show that manufacturing, trade, administrative and support services sectors are high in terms of contribution to the economy within the scope of the examined indicators. The sectors of manufacturing, trade, electricity, gas, steam and air conditioning supply, human health and social work activities stand out in the economic growth contribution sub-indicator. Manufacturing, administrative and support services and education sectors are the leading sectors in the contribution to employment sub-indicator, while manufacturing, trade and construction sectors are the leading sectors in the contribution to entrepreneurship sub-indicator. The study also demonstrated that the real estate activities sector is the worst performing in the economy's total contribution.

On the other hand, human health and social work activities, information and communication, and professional, scientific and technical activities sectors are successful in the overall performance in the financial evaluation. Human health and social work activities, electricity supply, activities education, accommodation and food service and arts, entertainment and recreation sectors stand out in the liquidity indicator. In terms of financial structure, human health and social work activities, information and communication, professional, scientific and technical activities, real estate activities and education sub-sectors are the sectors with the highest performance. In the turnover indicator, electricity supply, administrative and support services, accommodation and food service activities, transporting and storage, and education are the sectors with the best performance. In terms of profitability, sectors of human health and social work activities, professional, scientific and technical activities, information and communication, manufacturing and water supply are the sectors with the highest performance. The lowest performance was observed in the agriculture, forestry and fishing, sector according to the general financial performance evaluation, while construction is in the sixteenth rank. While the electricity, gas, steam and air conditioning supply sector has the best performing sector in terms of turnover ratios, it has the worst performance in terms of profitability and the second highest performance in terms of liquidity, the trade sector has the lowest performance in this indicator. The worst performing sector in financial structure indicator is the manufacturing sub-sector.

In light of the study findings, it has been observed that the sectors with high contribution to the economy and the sectors with high financial performance are different. There may be many reasons for this result, as well as the indicators and variables used in the analysis, the fact that the contribution to the economy is based on a one-year average and the financial performance is based on an 11-year average. Depending on the economic conjuncture and developments, the sectoral growth and entrepreneurship atmosphere is affected. In addition, developing technology can be a determinant in the workforce needs and employment creation capacities of the sectors. In this context, while growth in a sector and new investments depend on many macroeconomic and sectoral issues, issues related to financial performance may be company-based. Although financial performance is affected by the developments in the sector and economy and the conditions in the financial markets, it mainly depends on the firm's asset structure, the receivables, stock, sales, and financing policy it determines. The success of the companies in financial performance depends on the finance manager in particular and the managerial decisions and behaviours of the production and marketing departments in general. One of the important results reached by the study is that the findings of the study show the necessity of making sector-based situations and needs analysis for the good financial management of the sectors that contribute to the economy. Thus, financial risks will be identified, and possible real sector crises will be prevented.

It will be beneficial to adopt an incentive and support approach in accordance with the information needs, in addition to issues such as providing resources from production factors by highlighting the sectors that create employment and where entrepreneurship is intense and entrepreneurial potential in support and incentives. It can be suggested to expand the incentive and support system to increase the knowledge and competence levels of the entrepreneurs and company internal stakeholders in the changing conditions and intense competitive environment. Scarpetta et al.'s (2000) finding showed that growth is achieved by the increase in productivity achieved because of innovation and increasing the qualifications of the workforce in the G7 countries. In Turkey, too it can be stated that economic development and growth can be achieved through sectoral productivity increases as well as the sustainable financial performance of companies.

In fact, with the studies carried out in recent years, it has been determined that economic growth will be positively affected by attracting foreign direct investments to the country with incentives and stable policies (Turan Koyuncu, 2017; Balkanlı, 2019). However, foreign direct investments that support economic growth in Turkey do not create employment since they are purchased in the form of existing investments (Turan Koyuncu, 2017). A strong ecosystem should be created to ensure prosperity in the country and to protect and develop the entrepreneurship culture, which is an important factor in creating employment, contributing to the growth and establishing social justice. In Turkey, where efforts are made in this direction, inflation, geopolitical risks, economic turmoil, legislation, and incentive policies are among the obstacles waiting for a solution for the development of entrepreneurship (Uzuntepe, 2017). Therefore, although it has certain problems, to ensure sustainable economic growth along with positive developments, policies that will increase domestic savings levels should gain continuity with the incentives and supports provided for new investments. Thus, it will be possible to support investment and entrepreneurship financially by meeting the financing needs with domestic savings, despite the negative effects of energy deficit and exchange rate risk.

The results of this study, which examines letter-coded sub-sectors in terms of their contributions to the economy and their financial performance, should be evaluated based on the data obtained from the sector balance sheets, periods and methods. It can be stated that future studies should examine different periods, larger samples, sector-based sub-sectors, directly obtained data and different methods. So much so that while the studies are based on the macro view in economic growth, there is a lack of integration with micro-issues originating from companies, which are economically important units. It is recommended to carry out studies covering these aspects in more detail, with a larger data set and case studies, since the effects from micro dimension to macro dimension are important in the country's economy.

Declaration of Research and Publication Ethics
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

Researchers' Contribution Rate Statement
The authors declare that they have contributed equally to the article.

Declaration of Researcher's Conflict of Interest
There is no potential conflicts of interest in this study.

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APPENDIX

Table A-1. Indicator of Contribution to Economic Growth Variables, Calculation and Expectations

Code	Variable	Calculation	Expected
CEG1	Sector Share	$\frac{\text{Number of Firms in Sector}}{\text{Total Number of Firms in Sectors}}$	Max
CEG2	Size Per Firms	$\frac{\text{Total Assets of Sector}}{\text{Number of Firms in Sector}}$	Max
CEG3	Sales Revenues per Firms	$\frac{\text{Total Net Sales of Sector}}{\text{Number of Firms in Sector}}$	Max
CEG4	Total Equity Per Firms	$\frac{\text{Total Equity of Sector}}{\text{Number of Firms in Sector}}$	Max
CEG5	Size Share	$\frac{\text{Total Assets of Sector}}{\text{Total Assets of All Sectors}}$	Max
CEG6	Share of Sales Revenues	$\frac{\text{Total Net Sales of Sector}}{\text{Total Net Sales of All Sectors}}$	Max
CEG7	Share of Equity	$\frac{\text{Total Equity of Sector}}{\text{Total Equity of All Sectors}}$	Max
CEG8	Ratio of Profit-Making Firms in the Sector	$\frac{\text{Number of Profit-Making Firms in Sector}}{\text{Number of Firms in Sector}}$	Max
CEG9	Ratio of Lose-Making Firms in the Sector	$\frac{\text{Number of Lose-Making Firms in Sector}}{\text{Number of Firms in Sector}}$	Min
CEG10	Idle Firm Rate in the Sector	$\frac{\text{Number of Idle Firms in Sector}}{\text{Number of Firms in Sector}}$	Min
CEG11	Profit-Making Firm Ratio	$\frac{\text{Number of Profit-Making Firms in Sector}}{\text{Number of Profit-Making Firms in All Sectors}}$	Max
CEG12	Lose-Making Firm Ratio	$\frac{\text{Number of Lose-Making Firms in Sector}}{\text{Number of Lose-Making Firms in All Sectors}}$	Min
CEG13	Idle Firm Ratio	$\frac{\text{Number of Idle Firms in Sector}}{\text{Number of Idle Firms in All Sectors}}$	Min

Source: Prepared by the authors.

Table A-2. Employment Contribution Indicator Variables, Calculation and Expectations

Code	Variable	Calculation	Expected
CE1	Number of Employees per Firms	$\frac{\text{Number of Employees in Sector}}{\text{Firm Numbers in Sector}}$	Max
CE2	Share in Total Employment	$\frac{\text{Number of Employees in Sector}}{\text{Number of Employees in All Sectors}}$	Max
CE3	Number of Employees per Micro-Scale Firms	$\frac{\text{Number of Employees of Sector Micro-Scale Firms}}{\text{Number of Micro-Scale Firms in the Industry}}$	Max
CE4	Number of Employees per Small-Scale Firms	$\frac{\text{Number of Employees of Sector Small-Scale Firms}}{\text{Number of Small-Scale Firms in the Industry}}$	Max
CE5	Number of Employees per Medium-Scale Firms	$\frac{\text{Number of Employees of Sector Medium-Scale Firms}}{\text{Number of Medium-Scale Firms in the Industry}}$	Max
CE6	Number of Employees per Large-Scale Firms	$\frac{\text{Number of Employees of Sector Large-Scale Firms}}{\text{Number of Large-Scale Firms in the Industry}}$	Max
CE7	Micro-Scale Firms Employee Share	$\frac{\text{Number of Employees of Micro-Scale Firms in Sector}}{\text{Total Number of Employees in Micro-Scale Firms}}$	Max
CE8	Small-Scale Firms Employee Share	$\frac{\text{Number of Employees of Small-Scale Firms in Sector}}{\text{Total Number of Employees in Small-Scale Firms}}$	Max
CE9	Medium-Scale Firms Employee Share	$\frac{\text{Number of Employees of Medium-Scale Firms in Sector}}{\text{Total Number of Employees in Medium-Scale Firms}}$	Max
CE10	Large-Scale Firms Employee Share	$\frac{\text{Number of Employees of Large-Scale Firms in Sector}}{\text{Total Number of Employees in Large-Scale Firms}}$	Max

Source: Prepared by the authors.

Table A-3. Contribution to Entrepreneurship Indicator Variables, Calculation and Expectations

Code	Variable	Calculation	Expected
CEN1	Micro-Scale Firm Ratio	$\frac{\text{Number of Micro-Scale Firms in Sector}}{\text{Total Number of Firms in Sector}}$	Max
CEN2	Small-Scale Firm Ratio	$\frac{\text{Number of Small-Scale Firms in Sector}}{\text{Total Number of Firms in Sector}}$	Max
CEN3	Medium-Scale Firm Ratio	$\frac{\text{Number of Medium-Scale Firms in Sector}}{\text{Total Number of Firms in Sector}}$	Max
CEN4	Large-Scale Firm Ratio	$\frac{\text{Number of Large-Scale Firms in Sector}}{\text{Total Number of Firms in Sector}}$	Max
CEN5	Micro-Scale Firm Share	$\frac{\text{Number of Micro-Scale Firms in Sector}}{\text{Total Number of Firms}}$	Max
CEN6	Small-Scale Firm Share	$\frac{\text{Number of Small-Scale Firms in Sector}}{\text{Total Number of Firms}}$	Max
CEN7	Medium-Scale Firm Share	$\frac{\text{Number of Medium-Scale Firms in Sector}}{\text{Total Number of Firms}}$	Max
CEN8	Large-Scale Firm Share	$\frac{\text{Number of Large-Scale Firms in Sector}}{\text{Total Number of Firms}}$	Max

Source: Prepared by the authors.

Table A-4. Liquidity Ratios, Formula and Expectations

Code	Ratio	Formula	Expected
LR1	Current Ratio	$\frac{\text{Current Assets}}{\text{Short-Term Liabilities}}$	Max
LR2	Acid-test Ratio	$\frac{\text{Current Assets - (Inventories + Prepayments and Accrued Income for the Next Months + Other Current Assets)}}{\text{Short-Term Liabilities}}$	Max
LR3	Cash Ratio	$\frac{\text{Liquid Assets + Marketable Securities}}{\text{Short-Term Liabilities}}$	Max
LR4	Inventories to Current Assets	$\frac{\text{Inventories}}{\text{Current Assets}}$	Min
LR5	Inventories to Total Assets	$\frac{\text{Inventories}}{\text{Total Assets}}$	Min
LR6	Inventory Dependency Ratio	$\frac{\text{Short-Term Liabilities - (Liquid Assets + Marketable Securities)}}{\text{Inventories}}$	Min
LR7	Short-Term Receivables to Current Assets	$\frac{\text{Short-Term Trade Receivables + Other Short-Term Receivables}}{\text{Current Assets}}$	Min
LR8	Short-Term Receivables to Total Assets	$\frac{\text{Short-Term Trade Receivables + Other Short-Term Receivables}}{\text{Total Assets}}$	Min

Source: CBRT, 2021.

Table A-5. Turnover Ratios, Formula and Expectations

Code	Ratio	Formula	Expected
TR1	Inventory Turnover	Cost of Goods Sold (Current Year) / (Prev. Year's Inv. + Current Year's Inventory)/2	Max
TR2	Receivables Turnover	Net Sales / Short-Term Trade Rec. + Long-Term Trade Rec.	Max
TR3	Working Capital Turnover	Net Sales / Current Assets	Max
TR4	Net Working Capital Turnover	Net Sales / Current Assets - Short-Term Liabilities	Max
TR5	Tangible Fixed Assets Turnover	Net Sales / Tangible Fixed Assets (Net)	Max
TR6	Fixed Assets Turnover	Net Sales / Fixed Assets	Max
TR7	Equity Turnover	Net Sales / Equity	Max
TR8	Asset Turnover	Net Sales / Total Assets	Max

Source: CBRT, 2021.

Table A-6. Profitability Ratios, Formula, Expectations

Code	Ratio	Formula	Expected
PR1	Return on Equity	Net Profit / Equity	Max
PR2	Profit Before Taxes to Equity	Profit Before Tax / Equity	Max
PR3	EBIT to Total Assets	Earnings Before Interest and Taxes / Total Assets	Max
PR4	Return on Assets	Net Profit / Total Assets	Max
PR5	Operating Profit to Assets Used in Carrying out the Operations	Operating Profit / Total Assets - Financial Fixed Asset	Max
PR6	Cumulative Profitability Ratio	Reserves from Retained Earnings / Total Assets	Max
PR7	Operating Profit to Net Sales	Operating Profit / Net Sales	Max
	Gross Profit to Net Sales*	Gross Profit / Net Sales	
PR8	Net Profit to Net Sales	Net Profit / Net Sales	Max
PR9	Cost of Goods Sold to Net Sales	Cost of Goods Sold / Net Sales	Min
PR10	Operating Expenses to Net Sales	Operating Expenses / Net Sales	Min
PR11	Interest Expenses to Net Sales	Financing Expenses / Net Sales	Min
PR12	EBIT to Financing Expenses	Earnings Before Interest and Taxes / Financing Expenses	Max
PR13	Net Profit and Financing Expenses to Financing Expenses	Net Profit + Financing Expenses / Financing Expenses	Max

* Not included in the analysis.

Source: CBRT, 2021.

Table A-7. Financial Structure Ratios, Formula and Expectations

Code	Ratio	Formula	Expected
	Total Loans to Total Assets*	$\frac{\text{Short-Term Liabilities + Long-Term Liabilities}}{\text{Total Assets}}$	
FSR1	Equity to Total Assets	$\frac{\text{Equity}}{\text{Total Assets}}$	Max
FSR2	Equity to Total Liabilities	$\frac{\text{Equity}}{\text{Short-Term Liabilities + Long-Term Liabilities}}$	Max
FSR3	Short-Term Liabilities to Total Assets	$\frac{\text{Short-Term Liabilities}}{\text{Total Assets}}$	Min
FSR4	Long-Term Liabilities to Total Assets	$\frac{\text{Long-Term Liabilities}}{\text{Total Assets}}$	Min
FSR5	Long-Term Liabilities to Permanent Capital	$\frac{\text{Long-Term Liabilities}}{\text{Long-Term Liabilities + Equity}}$	Min
FSR6	Tangible Fixed Assets to Equity	$\frac{\text{Tangible Fixed Assets (Net)}}{\text{Equity}}$	Max
FSR7	Tangible Fixed Assets to Long-Term Liabilities	$\frac{\text{Tangible Fixed Assets (Net)}}{\text{Long-Term Liabilities}}$	Max
FSR8	Fixed Assets to Total Liabilities	$\frac{\text{Fixed Assets}}{\text{Short-Term Liabilities + Long-Term Liabilities}}$	Max
FSR9	Fixed Assets to Equity	$\frac{\text{Fixed Assets}}{\text{Equity}}$	Max
FSR10	Fixed Assets to Permanent Capital	$\frac{\text{Fixed Assets}}{\text{Long-Term Liabilities + Equity}}$	Max
FSR11	Short-Term Liabilities to Total Liabilities	$\frac{\text{Short-Term Liabilities}}{\text{Total Liabilities}}$	Min
FSR12	Bank Loans to Total Assets	$\frac{\text{Short-Term Liabilities + Long Term Bank Loans Principal Installments and Interests + Long Term Bank Loans}}{\text{Total Assets}}$	Min
FSR13	Short-Term Bank Loans to Short-Term Liabilities	$\frac{\text{Short-Term Liabilities + Long Term Bank Loans Principal Installments and Interests}}{\text{Short-Term Liabilities}}$	Max
FSR14	Bank Loans to Total Liabilities	$\frac{\text{Short-Term Liabilities + Long Term Bank Loans Principal Installments and Interests + Long Term Bank Loans}}{\text{Short-Term Liabilities + Long-Term Liabilities}}$	Min
FSR15	Current Assets to Total Assets	$\frac{\text{Current Assets}}{\text{Total Assets}}$	Min
FSR16	Tangible Fixed Assets to Total Assets	$\frac{\text{Tangible Fixed Assets (Net)}}{\text{Total Assets}}$	Max

* Not included in the analysis.

Source: CBRT, 2021.