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Does Sustainability Level Affect the Profitability Ratios of Publicly Listed Energy Companies? A Research on BIST Electricity Index*

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Abstract

As technological innovations depend on energy to function and are increasingly being used by businesses and households, the need for energy has increased; as an immediate consequence, energy production has gained importance in terms of sustainability. Furthermore, sustainability needs to be profitable to make energy producing companies, whose main goal is to maximize profit and value, comply to sustainability principles. Within this framework, we empirically investigate the relationship between 'sustainability level' and 'profitability' in the energy industry. We could not find though an evidence reporting any relationship between them. We argue that sustainability can be made indirectly profitable.

Keywords: Sustainability Level, Energy Industry, Profitability, Climate Change, Borsa Istanbul (BIST)

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Sürdürülebilirlik Düzeyleri Halka Açık Enerji İşletmelerinin Kârlılık Oranlarını Etkiliyor mu? BİST Elektrik Endeksi Üzerine Bir Araştırma

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Özet

Teknolojik cihazların hane halkları ve işletmeler tarafından kullanımının yaygınlaşmasıyla birlikte enerji ihtiyacı artmış; enerji üretimi sürdürülebilirlik açısından önem kazanmıştır. Temel amacı kâr ve değer maksimizasyonu olan enerji işletmelerinin sürdürülebilirlik ilkelerine uyabilmesi için ise sürdürülebilirliğin kârlı olması gerekmektedir. Çalışmada, enerji sektöründeki işletmelerin sürdürülebilirlik düzeyleri ile kârlılıkları arasındaki ilişki istatistiki olarak araştırılmıştır. Çalışma sonuçları, enerji sektöründeki işletmelerin sürdürülebilirlik düzeyleri ile kârlılıkları arasında anlamlı bir ilişki bulunmadığını ortaya koymaktadır. Çalışmada, sürdürülebilirliğin enerji sektöründeki işletmeler açısından dolaylı olarak kârlı hale getirilebileceği tartışılmaktadır.

Anahtar Kelimeler: Sürdürülebilirlik Düzeyi, Enerji Sektörü, Kârlılık, İklim Değişikliği, Borsa İstanbul (BİST)

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1. INTRODUCTION

Sustainable development through sustainability practices has become an absolute necessity for all countries in recent decades. As firms play a crucial role in achieving sustainable development; it became crucial to understand how sustainability practices, which are expected to improve firms' stakeholder relations and overall efficiency, impact firms' financial performance and profitability. On the other hand, the energy industry is integral to sustainable development; and the current state of energy production in terms of sustainability is a matter of deep concern.

In this context, the purpose of this study was to examine the relationship between the sustainability level of the publicly listed companies in the energy industry in Türkiye and their profitability ratios. By analyzing key profitability ratios, we aimed to provide empirical insights into whether publicly listed energy companies with higher sustainability levels exhibit superior financial outcomes.

The study was organized into several key sections. Following the Introduction section, the Literature Review section explored the association between sustainability and profitability, especially in the energy industry. The Methodology section outlined the research design and empirical techniques employed to gather and assess data. Then, the findings derived from the statistical analysis were presented for perusal in the Results section; and finally, the implications of these findings were discussed in the Conclusion section.

2. LITERATURE REVIEW

Businesses have many responsibilities to their stakeholders; and communicating the information about these responsibilities to their stakeholders requires new and mainly non-financial reports, which are highly and increasingly demanded from the science and profession of accountancy. Due to this demand, there are many emerging and propagating reports that particularly communicate non-financial facts and data about climate change, environment, emissions, intellectual capital and so on. Moreover, there is the concept of integrated reporting in which the financial and non-financial information are communicated together in an integrated way to highlight the interactions between them. On the other hand, international accounting/financial reporting authorities have recently started to consider and evaluate all of these newly emerging reports, which are in essence about the responsibilities of businesses to their stakeholders, as "Extended External Reporting (EER)" with a holistic approach and an emphasis on assurance; and the discussions about this concept are ongoing (IAASB, 2019; Krasodomska et al., 2021; Sayar & Özdemir, 2022; Venter & Krasodomska, 2024; Venter & van Eck, 2021).

Today, sustainability reporting, which communicates sustainability related information to stakeholders, is understandably one of the most scrutinized forms of reporting; as the subject of sustainability is literally vital for every individual on the planet.

2.1. Sustainability

The term "sustainability" was initially defined by the Brundtland Commission of the United Nations (UN) in 1987 as *"meeting the needs of the present without compromising the ability of future generations to meet their own needs"* (UN, 2024). Ever since, the significance of the concept of sustainability has been continually increasing, because *"the ability of future generations to meet their own needs"* has been continually decreasing.

In 2015, world leaders determined 17 Sustainable Development Goals (SDGs) to be achieved by 2030 and they are collectively working towards achieving the SDGs (UN, 2024). Consequently, sustainable development through sustainability practices is essential for all countries today and

it is among their primary objectives.

As achieving the SDGs is of vital importance and of highest priority, almost all activities worldwide are gradually being redesigned and reshaped so that they will be conducted in line with the sustainability principles and will contribute in achieving one or more of the SDGs. Firms' activities are naturally and inevitably affected by these changes as well; and thus, they too are being redesigned and reshaped accordingly, becoming increasingly noble, central and special activities. When conducting any business, it is now a fundamental duty of all firms and their managers to remember the needs of youth and future generations before fearsome and irreversible troubles occur which would make everything meaningless and futile (Akışık & Gal, 2011; Beck et al., 2017; Maas et al., 2016; Sayar & Karataş, 2017; Sayar & Tokdemir, 2018).

2.2. Sustainability and Profitability

The sustainability practices may help firms to have stronger stakeholder relations, achieve a more institutional structure and increase the overall efficiency of their operations. Therefore, sustainability may have a positive impact on the financial performance and profitability of firms (Eccles et al., 2015; Eccles & Krzus, 2010, 2014; Gal & Akışık, 2020; Sayar & Tokdemir, 2018).

There are studies in the literature that investigate the relationship between sustainability and profitability. Aydoğmuş et al. (2022) collected data of the largest publicly listed companies with a market cap of USD 2.85 billion and above from Bloomberg database and analyzed the impact of sustainability on profitability. They found that sustainability has a significant and positive impact on profitability. Taha et al. (2023) examined the impact of sustainability on profitability in the Jordanian industrial sector and found a significant and positive impact. Lu and Khan (2023) used data of companies from both developed and emerging economies and investigated the effect of sustainability on profitability. They found that sustainability affects profitability significantly and positively in both developed and emerging economies.

Moreover, there are studies in the literature that document the relationship between sustainability and profitability in Türkiye. Emir and Kıymık (2021) examined the relationship between sustainability on profitability by using data of the companies in BIST Metal Goods and Machinery Index, and found that there is a significant and positive relationship between them. Özkan et al. (2018) used data of the companies in BIST Sustainability Index in their study where they analyzed the impact of sustainability related disclosures on profitability and found that sustainability related disclosures significantly and positively affect profitability. Akbaş (2023) analyzed the impact of sustainability on profitability by using data of Turkish participation banks and found that sustainability has a significant and positive impact on profitability.

Additionally, there are several meta-analyses in the literature about the relationship between sustainability and financial performance. Alshehhi et al. (2018) included 132 papers in their study and found that 78% of papers documented a positive relationship between sustainability and financial performance. Friede et al. (2015) combined the results of around 2200 papers and found that about 90% of papers documented a favorable relationship between sustainability and financial performance.

2.3. Sustainability and Profitability in the Energy Industry

Energy production is one of the primary sources of greenhouse gas emissions, significantly contributing to climate change (UN, 2023). Furthermore, the need for energy is steadily increasing because technological innovations, which depend on energy to function, are being increasingly utilized by both businesses and households. Therefore, energy production must be sustainable amivd the current developments.

Sustainable energy production is so important that it is one of the 17 Sustainable Development Goals of the United Nations. Sustainable Development Goal 7 is "Affordable and Clean Energy" and its aim is summarized as to ensure access to affordable and sustainable energy for all (UN, 2023).

Additionally, sustainability needs to be profitable in the energy industry, otherwise it cannot be adopted by businesses. The main goal of businesses, and therefore of energy producing companies, is to maximize profit and value (Ebert & Griffin, 2020; Brealey et al., 2020; Keown et al., 2014). This is also a necessity for them, because otherwise they cannot remain competitive and they cannot keep funding their operations. In such a case, the energy producing companies wouldn't be able to continue producing energy; and that would create another major problem.

Therefore, while the energy producing companies need to increase their sustainability levels, they should also be financially rewarded.

2.4. Hypothesis Formulation

Consequently, it is understood that the impact of sustainability on profitability in the energy industry needs to be carefully analyzed; which was the purpose of this study. Accountancy, as a central component of business intelligence through financial and non-financial reports, makes it possible to measure both the sustainability level of companies and their profitability; which isi a service internationally appreciated. Reporting, audit and assurance are critically and uniquely valuable in improving firms' compliance with sustainability principles (Fidancı & Yükçü, 2018; Lodhia & Sharma, 2019; Sayar & Özdemir, 2022; Schaltegger et al., 2006; Sultanoğlu, 2020). In fact, international accounting/financial reporting authorities have brought up the discourse of *"Accountants are going to save the world!"* (Sayar, 2017; Wammes, 2016) in a recent past which remains valid to this day.

Accordingly, with the help of accounting science, the required reliable data for conducting statistical analyses about this important subject becomes available. Indeed, the accounting science provides comprehensive ratios to measure profitability; and based on some of the most fundamental ones of these ratios, the hypotheses of the study were formulated as below:

H1: Sustainability level significantly affects the profitability and thus the return on equity ratio of publicly listed energy companies.

H2: Sustainability level significantly affects the profitability and thus the return on assets ratio of publicly listed energy companies.

H3: Sustainability level significantly affects the profitability and thus the gross profit margin ratio of publicly listed energy companies.

H4: Sustainability level significantly affects the profitability and thus the operating profit margin ratio of publicly listed energy companies.

H5: Sustainability level significantly affects the profitability and thus the net profit margin ratio of publicly listed energy companies.

3. METHODOLOGY

We obtained data of the companies in the BIST Electricity Index which comprises all 33 publicly listed companies whose industry is electricity, gas and steam in Türkiye (Appendix 1). Linear regression method, which is often used to analyze and estimate the direction and strength of the linear relationships between variables in econometric analyses, was utilized in the study (Wooldridge, 2013). Accordingly, we investigated the relationship between the sustainability level of the publicly listed companies in the energy industry in Türkiye and their profitability

ratios by conducting multiple linear regression analyses. The analyses were conducted by using SPSS software. The variables of the research models are shown in Table 1.

Table 1. Variables of the Research Models

Variable			Calculation
Dependent	Return on Equity	ROE	Net Profit / Equity
Dependent	Return on Assets	ROA	Net Profit / Total Assets
Dependent	Gross Profit Margin	GPM	Gross Profit / Net Sales
Dependent	Operating Profit Margin	OPM	Operating Profit / Net Sales
Dependent	Net Profit Margin	NPM	Net Profit / Net Sales
Control	Firm Size	SIZE	Natural Logarithm of Total Assets
Control	Financial Leverage	LEV	Total Debt / Total Assets
Explanatory	Sustainability Score	SYS	

The econometric models of the research are as below:

Model 1: $ROE_{it} = \beta_0 + \beta_1 SYS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \varepsilon_{it}$

Model 2: $ROA_{it} = \beta_0 + \beta_1 SYS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \varepsilon_{it}$

Model 3: $GPM_{it} = \beta_0 + \beta_1 SYS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \varepsilon_{it}$

Model 4: $OPM_{it} = \beta_0 + \beta_1 SYS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \varepsilon_{it}$

Model 5: $NPM_{it} = \beta_0 + \beta_1 SYS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \varepsilon_{it}$

Scoring tables can be created and used in the measurement of concepts like sustainability and transparency (Sayar et al., 2010; Tümer & Sayar, 2023). This method was used in the study to measure the companies' sustainability levels. The decision of Capital Markets Board of Türkiye (CMB) dated 23.06.2022 and numbered 34/977 set forth a new format for the Sustainability Principles Compliance Report (Capital Markets Board of Türkiye, 2022). The reports with the new format were first published by the companies for the year 2022, so the scope of the study was determined as 2022-2023.

In the calculation of the sustainability level of the companies, which was used as explanatory variable, the answers of the companies for the questions in the Sustainability Principles Compliance Report were scored (Yes: 2; Partial: 1; No: 0; Not Applicable: Excluded) and then their overall scores were proportioned as a percentage. However, the required data for calculating the sustainability scores could not be collected for AHGAZ, AKFYE, CONSE, CWENE, CATES, ENERY, HUNER, ENTRA, IZENR, MOGAN, TATEN for 2022; and for AKFYE, ENERY, ENTRA, MOGAN for 2023. The detailed scoring of the Sustainability Principles Compliance Report for the years 2022 and 2023 are respectively presented in Table 2 and Table 3.

Table 2. The Detailed Scoring of the Sustainability Principles Compliance Report (2022)

FIRMS	Score (%)	Score	Yes	Partial	No	Not Applicable	Maximum
AKENR	94,55	104	51	2	2	1	110
AKSEN	70,75	75	26	23	4	3	106
AKSUE	20,00	20	3	14	33	6	100
ALFAS	34,82	39	10	19	27	0	112
AYDEM	88,39	99	48	3	5	0	112
AYEN	0,00	0	0	0	56	0	112
BIOEN	85,71	96	47	2	7	0	112
CANTE	33,33	36	10	16	28	2	108
ARASE	27,68	31	14	3	39	0	112
ENJSA	96,23	102	50	2	1	3	106
ESEN	63,39	71	31	9	16	0	112
GWIND	75,00	84	34	16	6	0	112
KARYE	36,61	41	16	9	31	0	112
LYDYE	7,14	8	3	2	51	0	112
MAGEN	64,29	72	32	8	16	0	112
NATEN	65,18	73	32	9	15	0	112
NTGAZ	15,69	16	7	2	42	5	102
ODAS	33,33	36	10	16	28	2	108
PAMEL	66,67	72	21	30	3	2	108
SMRTG	82,41	89	38	13	3	2	108
ZEDUR	35,85	38	15	8	30	3	106
ZOREN	97,32	109	54	1	1	0	112
			(2 Points)	**(1 Point)**	**(0 Points)**	**(Excluding)**	

Table 3. The Detailed Scoring of the Sustainability Principles Compliance Report (2023)

FIRMS	Score (%)	Score	Yes	Partial	No	Not Applicable	Maximum
AHGAZ	23,96	23	9	5	34	8	96
AKENR	89,09	98	48	2	5	1	110
AKSEN	79,81	83	35	13	4	4	104
AKSUE	18,52	20	3	14	37	2	108
ALFAS	83,33	90	42	6	6	2	108
AYDEM	91,07	102	50	2	4	0	112
AYEN	0,00	0	0	0	56	0	112
BIOEN	70,54	79	37	5	14	0	112
CONSE	89,29	100	48	4	4	0	112
CWENE	5,36	6	1	4	51	0	112
CANTE	31,48	34	8	18	28	2	108
CATES	62,04	67	27	13	14	2	108
ARASE	22,32	25	11	3	42	0	112
ENJSA	98,11	104	52	0	1	3	106
ESEN	76,79	86	42	2	12	0	112
GWIND	93,75	105	51	3	2	0	112
HUNER	34,82	39	15	9	32	0	112
IZENR	25,45	28	7	14	34	1	110
KARYE	34,82	39	15	9	32	0	112
LYDYE	1,82	2	1	0	54	1	110
MAGEN	76,79	86	42	2	12	0	112
NATEN	80,36	90	44	2	10	0	112
NTGAZ	14,00	14	6	2	42	6	100
ODAS	30,56	33	7	19	28	2	108
PAMEL	66,67	72	21	30	3	2	108
SMRTG	84,91	90	38	14	1	3	106
TATEN	20,19	21	9	3	40	4	104
ZEDUR	46,23	49	20	9	24	3	106
ZOREN	97,32	109	54	1	1	0	112
			(2 Points)	**(1 Point)**	**(0 Points)**	**(Excluding)**	

On the other hand, we conducted ratio analysis (Brealey et al., 2020; Kılıç & Alp, 2021; Önce, 2013; Simga-Mugan & Akman, 2012) to measure the profitability of the companies by using profitability ratios. We used the profitability ratios as separate dependent variables. Furthermore,

we used "firm size" (Becchetti et al, 2008; Gal & Akışık, 2020; McWilliams & Siegel, 2000; Orlitzky, 2001) and "financial leverage" (Bhandari, 1988; Dimitrov & Jain, 2008; Gomes & Schmid, 2010; Modigliani & Miller, 1958) as control variables. The required financial data of the companies were collected from the companies' relevant financial statements (Appendix 2); and the values of the dependent and control variables are presented in Appendix 3.

4. RESULTS

The summary of the results concerning the relation between the sustainability levels of the publicly listed companies in the BIST Electricity Index and ROE (Model 1) is given in Table 4.

Table 4. The Results of Model 1

Variable	**Coefficient**	**Standard Error**	**t-statistics**	**p value**
SYS	0,002	0,002	1,285	0,205
SIZE	0,029	0,032	0,920	0,362
LEV	-0,412	0,362	-1,139	0,260
R-Square		0,075		
Adjusted R-Square		0,016		
F		1,264		
F (p)		0,298		

Dependent Variable = ROE

The analysis of the F probability value indicates that the model does not demonstrate a statistical significance (F: 1,264; F (p): 0,298). Upon individual examination of the variables, it is evident that the SYS explanatory variable does not exert a statistically significant and positive influence on the dependent variable, ROE (Coefficient: 0,002 ± 0,002; t: 1,285; $p > 0,05$). In other words, it can be concluded that sustainability level does not have a significant impact on the ROE ratio of publicly listed energy companies; therefore, H1 is rejected.

The summary of the results concerning the relation between the sustainability levels of the publicly listed companies in the BIST Electricity Index and ROA (Model 2) is given in Table 5.

Table 5. The Results of Model 2

Variable	**Coefficient**	**Standard Error**	**t-statistics**	**p value**
SYS	0,000	0,001	0,345	0,731
SIZE	0,000	0,010	0,031	0,975
LEV	-0,204	0,114	-1,796	0,079
R-Square		0,070		
Adjusted R-Square		0,011		
F		1,177		
F (p)		0,328		

Dependent Variable = ROA

The analysis of the F probability value indicates that the model does not demonstrate a statistical significance (F: 1,177; F (p): 0,328). Upon individual examination of the variables, it is evident that the SYS explanatory variable does not exert a statistically significant and positive influence on the dependent variable, ROA (Coefficient: 0,000 ± 0,001; t: 0,345; p > 0,05). In other words, it can be concluded that sustainability level does not have a significant impact on the ROA ratio of publicly listed energy companies; therefore, H2 is rejected.

The summary of the results concerning the relation between the sustainability levels of the publicly listed companies in the BIST Electricity Index and GPM (Model 3) is given im Table 6.

Table 6. The Results of Model 3

Variable	**Coefficient**	**Standard Error**	**t-statistics**	**p value**
SIS	3,280E-5	0,001	0,045	0,965
SIZE	0,010	0,012	0,818	0,418
LEV	-0,158	0,139	-1,137	0,261
R-Square		0,054		
Adjusted R-Square		-0,007		
F		0,891		
F (p)		0,453		

Dependent Variable = GPM

The analysis of the F probability value indicates that the model does not demonstrate a statistical significance (F: 0,891; F (p): 0,453). Upon individual examination of the variables, it is evident that the SYS explanatory variable does not exert a statistically significant and positive influence on the dependent variable, GPM (Coefficient: 3,280E-5 ± 0,001; t: 0,045; p > 0,05). In other words, it can be concluded that sustainability level does not have a significant impact on the GPM ratio of publicly listed energy companies; therefore, H3 is rejected.

The summary of the results concerning the relation between the sustainability levels of the publicly listed companies in the BIST Electricity Index and OPM (Model 4) is given in Table 7.

Table 7. The Results of Model 4

Variable	**Coefficient**	**Standard Error**	**t-statistics**	**p value**
SYS	0,002	0,004	0,610	0,545
SIZE	-0,143	0,059	-2,428	0,019*
LEV	-1,537	0,669	-2,298	0,026*
R-Square		0,162		
Adjusted R-Square		0,108		
F		3,025		
F (p)		0,039*		

Dependent Variable = OPM, * Represents statistical significance at %95 confidence level

The analysis of the F probability value indicates that the model demonstrates a statistical significance (F: 3,025; F (p): 0,039). Furthermore, the explanatory variables collectively account for around 11% of the variability in the dependent variable (Adjusted R-Square: 0,108). However, upon individual examination of the variables, it is evident that the SYS explanatory variable does not exert a statistically significant and positive influence on the dependent variable, OPM (Coefficient: 0,002 ± 0,004; t: 0,610; p > 0,05). In other words, it can be concluded that sustainability level does not have a significant impact on the OPM ratio of publicly listed energy companies; therefore, H4 is rejected.

The summary of the results concerning the relation between the sustainability levels of the publicly listed companies in the BIST Electricity Index and NPM (Model 5) is given in Table 8.

Table 8. The Results of Model 5

Variable	**Coefficient**	**Standard Error**	**t-statistics**	**p value**
SYS	0,003	0,003	1,051	0,299
SIZE	-0,141	0,053	-2,665	0,011*
LEV	-1,832	0,600	-3,052	0,004*
R-Square		0,220		
Adjusted R-Square		0,170		
F		4,423		
F (p)		0,008*		

Dependent Variable = NPM, * Represents statistical significance at %95 confidence level

The analysis of the F probability value indicates that the model demonstrates a statistical significance (F: 4,423; F (p): 0,008). Furthermore, the explanatory variables collectively account for 17% of the variability in the dependent variable (Adjusted R-Square: 0,170). However, upon individual examination of the variables, it is evident that the SYS explanatory variable does not exert a statistically significant and positive influence on the dependent variable, NPM (Coefficient: 0,003 ± 0,003; t: 1,051; p > 0,05). In other words, it can be concluded that sustainability level does not have a significant impact on the NPM ratio of publicly listed energy companies; therefore, H5 is rejected.

5. CONCLUSION

We empirically investigated the relationship between the sustainability level of the publicly listed companies in the energy industry in Türkiye and their profitability ratios.

Contrary to the theoretical expectations (Eccles et al., 2015; Eccles & Krzus, 2010, 2014; Gal & Akışık, 2020; Sayar & Tokdemir, 2018) and the findings of other studies that report a positive association between sustainability and profitability in different contexts (Akbaş, 2023; Alshehhi et al., 2018; Aydoğmuş et al., 2022; Emir & Kıymık, 2021; Friede et al., 2015; Lu & Khan, 2023; Özkan et al., 2018; Taha et al., 2023); the outcomes of the present study document that there was not a significant relationship between the sustainability level of the publicly listed companies in the energy industry in Türkiye and their profitability ratios. The results are worrying, because it is not possible to effectively combat climate change unless the energy companies who comply more with the sustainability principles are rewarded.

Financial and non-financial reports as valuable instruments may be helpful on this important and critical subject. The contents of financial and non-financial reports are continually being improved according to the changing needs of accounting information users. Therefore, financial and non-financial reports are increasingly becoming even more important, and if they are jointly utilized with regulations and auditing; sustainability could be made indirectly profitable in the energy industry through incentives, supports and sanctions.

To make sustainability indirectly profitable in the energy industry, the sustainability level and profitability of companies need to be measured in a systematic, regulated and comparable way; the relevant financial and non-financial reports make this possible. Moreover, audit and assurance make it possible to discern the truthful statements.

The study contributes to the literature by using the most recent financial and non-financial reports of the companies and emphasizing the importance of accountancy on the subject. However, the present study has some limitations to be acknowledged. The scope of the study was limited due to data availability for measuring sustainability levels. Similar analyses can be conducted in the future with a wider scope and also by using different statistical methods. Also, we specifically focused on profitability. The impact of sustainability on other aspects of financial performance can be examined. Research and analysis within the scope of different industries and countries can be conducted as well; making comparisons between industries and/or countries to determine if there is any difference.

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APPENDIX

Appendix 1. The Codes and the Company Names of the Companies in the BIST Electricity Index

Code	Company Name
AHGAZ	AHLATCI DOĞAL GAZ DAĞITIM ENERJİ VE YATIRIM A.Ş.
AKENR	AKENERJİ ELEKTRİK ÜRETİM A.Ş.
AKFYE	AKFEN YENİLENEBİLİR ENERJİ A.Ş.
AKSEN	AKSA ENERJİ ÜRETİM A.Ş.
AKSUE	AKSU ENERJİ VE TİCARET A.Ş.
ALFAS	ALFA SOLAR ENERJİ SANAYİ VE TİCARET A.Ş.
AYDEM	AYDEM YENİLENEBİLİR ENERJİ A.Ş.
AYEN	AYEN ENERJİ A.Ş.
BIOEN	BİOTREND ÇEVRE VE ENERJİ YATIRIMLARI A.Ş.
CONSE	CONSUS ENERJİ İŞLETMECİLİĞİ VE HİZMETLERİ A.Ş.
CWENE	CW ENERJİ MÜHENDİSLİK TİCARET VE SANAYİ A.Ş.
CANTE	ÇAN2 TERMİK A.Ş.
CATES	ÇATES ELEKTRİK ÜRETİM A.Ş.
ARASE	DOĞU ARAS ENERJİ YATIRIMLARI A.Ş.
ENJSA	ENERJİSA ENERJİ A.Ş.
ENERY	ENERYA ENERJİ A.Ş.
ESEN	ESENBOĞA ELEKTRİK ÜRETİM A.Ş.
GWIND	GALATA WIND ENERJİ A.Ş.
HUNER	HUN YENİLENEBİLİR ENERJİ ÜRETİM A.Ş.
ENTRA	IC ENTERRA YENİLENEBİLİR ENERJİ A.Ş.
IZENR	İZDEMİR ENERJİ ELEKTRİK ÜRETİM A.Ş.
KARYE	KARTAL YENİLENEBİLİR ENERJİ ÜRETİM A.Ş.
LYDYE	LYDİA YEŞİL ENERJİ KAYNAKLARI A.Ş.
MAGEN	MARGÜN ENERJİ ÜRETİM SANAYİ VE TİCARET A.Ş.
MOGAN	MOGAN ENERJİ YATIRIM HOLDİNG A.Ş.
NATEN	NATUREL YENİLENEBİLİR ENERJİ TİCARET A.Ş.
NTGAZ	NATURELGAZ SANAYİ VE TİCARET A.Ş.
ODAS	ODAŞ ELEKTRİK ÜRETİM SANAYİ TİCARET A.Ş.
PAMEL	PAMEL YENİLENEBİLİR ELEKTRİK ÜRETİM A.Ş.
SMRTG	SMART GÜNEŞ ENERJİSİ TEKNOLOJİLERİ ARAŞTIRMA GELİŞTİRME ÜRETİM SANAYİ VE TİCARET A.Ş.
TATEN	TATLIPINAR ENERJİ ÜRETİM A.Ş.
ZEDUR	ZEDUR ENERJİ ELEKTRİK ÜRETİM A.Ş.
ZOREN	ZORLU ENERJİ ELEKTRİK ÜRETİM A.Ş.

Appendix 2. The Values of the Relevant Financial Statement Items (TRY)

The Values of the Relevant Financial Statement Items (TRY) (2022)

Firm	Net Profit	Total Assets	Total Debt	Equity	Gross Profit	Profit Before Tax from Operations	Net Sales
AKENR	2.104.990.445	37.804.276.653	27.865.404.610	9.938.872.043	2.468.746.611	1.994.448.836	32.710.184.429
AKSEN	6.276.629.186	55.203.703.045	22.789.493.424	32.414.209.621	10.591.006.620	8.156.853.219	87.101.671.476
AKSUE	-385.953	636.097.822	304.687.031	331.410.791	33.009.472	91.141.465	64.334.631
ALFAS	816.015.003	3.420.240.235	1.754.560.307	1.665.679.928	867.873.059	730.674.818	4.179.599.529
AYDEM	4.973.023.571	59.788.434.916	30.466.185.713	29.322.249.203	4.188.861.520	10.098.794.554	7.565.576.718
AYEN	2.782.557.191	18.553.679.813	9.283.775.827	9.269.903.986	4.245.210.697	3.537.045.912	11.635.021.906
BIOEN	576.555.082	6.644.030.002	4.168.840.028	2.475.189.974	797.042.744	685.282.808	2.337.689.221
CANTE	2.607.990.010	17.089.295.521	5.266.254.880	11.823.040.641	3.906.960.316	1.717.328.232	11.399.575.659
ARASE	250.884.330	11.177.229.237	6.522.560.166	4.654.669.071	3.798.120.314	497.561.681	29.194.941.451
ENJSA	20.634.560.000	126.123.660.000	67.285.574.000	58.838.086.000	23.199.685.000	4.169.135.000	163.312.312.000
ESEN	-1.047.606.395	13.496.672.612	4.973.781.191	8.522.891.421	595.053.562	-1.401.811.159	1.795.941.481
GWIND	1.464.627.189	8.761.974.105	1.821.269.626	6.940.704.479	1.644.420.181	1.604.769.935	2.296.830.032
KARYE	116.169.473	2.084.501.255	711.956.830	1.372.544.425	97.338.669	110.990.685	179.002.231
LYDYE	-25.154.696	50.146.799	39.026.976	11.119.823	3.784.569	-24.802.668	47.184.182
MAGEN	-1.243.431.429	13.082.946.174	4.658.598.667	8.424.347.507	504.121.787	-1.527.079.827	1.240.640.923
NATEN	-588.116.188	13.899.489.490	5.138.699.139	8.760.790.351	622.338.914	-834.206.898	1.868.170.595
NTGAZ	1.107.812.870	3.724.039.366	971.389.297	2.752.650.069	1.802.447.756	1.222.266.068	7.003.677.528
ODAS	1.806.448.450	24.079.050.696	8.922.186.356	15.156.864.340	6.233.868.713	1.510.723.547	15.804.775.578
PAMEL	142.424.559	886.505.284	319.536.865	566.968.419	21.003.179	183.472.317	49.991.582
SMRTG	69.836.661	4.294.263.789	2.862.115.352	1.432.148.437	606.339.883	112.669.866	3.973.288.754
ZEDUR	191.312.625	1.440.115.767	465.258.823	974.856.944	46.236.757	155.349.372	144.121.860
ZOREN	9.508.736.000	117.744.528.000	83.223.996.000	34.520.532.000	5.658.234.000	10.168.164.000	38.806.100.000

The Values of the Relevant Financial Statement Items (TRY) (2023)

Firm	Net Profit	Total Assets	Total Debt	Equity	Gross Profit	Profit Before Tax from Operations	Net Sales
AHGAZ	4.121.776.352	42.924.055.942	18.177.797.689	24.746.258.253	1.469.129.942	-1.589.341.684	20.018.347.385
AKENR	5.039.858.378	31.949.666.370	18.168.448.472	13.781.217.898	1.505.195.776	2.146.052.741	23.672.315.031
AKSEN	6.105.843.549	55.806.281.421	21.170.640.364	34.635.641.057	7.215.402.107	7.141.504.849	35.172.257.432
AKSUE	63.775.397	571.235.063	176.392.876	394.842.187	17.180.795	73.334.928	50.996.318
ALFAS	1.039.125.349	5.074.913.301	2.340.752.337	2.734.160.964	1.609.534.193	1.234.999.362	7.733.021.378
AYDEM	-1.280.100.539	55.606.785.506	26.986.010.382	28.620.775.124	2.747.878.507	1.856.838.737	6.358.818.133
AYEN	1.342.206.134	16.436.045.564	5.959.969.763	10.476.075.801	1.042.807.685	1.172.899.491	5.286.186.715
BIOEN	950.113.870	6.668.203.235	3.816.907.665	2.851.295.570	338.282.375	928.097.823	2.233.028.757
CONSE	209.432.485	3.663.709.504	2.385.473.023	1.278.236.481	183.789.967	-59.142.992	1.181.047.937
CWENE	378.713.603	10.302.405.326	4.388.385.000	5.914.020.326	2.686.997.548	430.996.533	11.503.287.301
CANTE	446.760.950	17.763.288.201	935.149.749	16.828.138.452	970.422.069	-104.558.596	5.830.921.755
CATES	1.521.440.284	11.174.103.857	3.091.150.367	8.082.953.490	837.884.588	1.010.575.963	5.295.914.841
ARASE	5.229.722.388	16.481.936.520	6.736.897.206	9.745.039.314	6.299.834.010	2.148.884.048	23.485.111.136
ENJSA	4.517.326.000	132.096.404.000	74.321.938.000	57.774.466.000	25.554.479.000	5.268.471.000	168.664.639.000
ESEN	307.259.658	13.453.490.181	4.634.344.898	8.819.145.283	164.570.419	173.045.932	926.193.105
GWIND	623.547.735	9.159.539.055	2.126.743.969	7.032.795.086	1.105.746.566	1.005.061.436	1.859.032.808
HUNER	44.227.374	6.337.330.309	3.324.992.802	3.012.337.507	189.016.342	41.577.032	557.770.850
IZENR	1.093.676.335	10.538.751.541	585.829.234	9.952.922.307	738.331.519	724.658.442	7.536.983.745
KARYE	4.633.837	3.137.980.068	970.948.520	2.167.031.548	59.170.558	-4.560.074	261.478.496
LYDYE	46.406.308	111.124.935	45.662.493	65.462.442	10.072.351	56.175.752	49.457.648
MAGEN	310.842.172	13.197.910.818	4.425.573.847	8.772.336.971	214.361.101	222.237.312	758.552.989
NATEN	229.826.417	13.988.763.934	4.951.883.267	9.036.880.667	307.226.050	101.570.010	1.843.653.751
NTGAZ	96.503.519	2.948.570.193	600.201.801	2.348.368.392	783.362.866	120.606.070	4.041.498.030
ODAS	4.291.642.892	22.561.779.186	4.786.450.661	17.775.328.525	1.762.407.145	4.325.305.209	7.441.098.289
PAMEL	186.897.775	893.277.611	139.411.417	753.866.194	1.188.453	118.529.042	54.340.508
SMRTG	1.037.416.755	10.550.691.463	8.422.332.476	2.128.358.987	1.847.285.363	960.627.163	8.093.257.032
TATEN	803.164.200	8.818.888.986	4.133.898.389	4.684.990.597	750.803.846	513.201.208	1.352.064.479
ZEDUR	196.493.089	1.550.647.500	366.215.953	1.184.431.547	22.195.854	244.148.786	97.079.553
ZOREN	10.985.976.000	98.510.973.000	60.038.904.000	38.472.069.000	3.762.317.000	4.680.760.000	27.281.884.000

Appendix 3. The Values of the Dependent and Control Variables

The Values of the Dependent and Control Variables (2022)

Firm	Dependent					Control	
	ROE	ROA	GPM	OPM	NPM	SIZE	LEV
AKENR	0,21	0,06	0,08	0,06	0,06	24,36	0,74
AKSEN	0,19	0,11	0,12	0,09	0,07	24,73	0,41
AKSUE	0,00	0,00	0,51	1,42	-0,01	20,27	0,48
ALFAS	0,49	0,24	0,21	0,17	0,20	21,95	0,51
AYDEM	0,17	0,08	0,55	1,33	0,66	24,81	0,51
AYEN	0,30	0,15	0,36	0,30	0,24	23,64	0,50
BIOEN	0,23	0,09	0,34	0,29	0,25	22,62	0,63
CANTE	0,22	0,15	0,34	0,15	0,23	23,56	0,31
ARASE	0,05	0,02	0,13	0,02	0,01	23,14	0,58
ENJSA	0,35	0,16	0,14	0,03	0,13	18,65	0,53
ESEN	-0,12	-0,08	0,33	-0,78	-0,58	23,33	0,37
GWIND	0,21	0,17	0,72	0,70	0,64	22,89	0,21
KARYE	0,08	0,06	0,54	0,62	0,65	21,46	0,34
LYDYE	-2,26	-0,50	0,08	-0,53	-0,53	17,73	0,78
MAGEN	-0,91	-0,10	0,41	-1,23	-1,00	23,29	0,36
NATEN	-0,07	-0,04	0,33	-0,45	-0,31	23,36	0,37
NTGAZ	0,40	0,30	0,26	0,17	0,16	22,04	0,26
ODAS	0,12	0,08	0,39	0,10	0,11	23,90	0,37
PAMEL	0,25	0,16	0,42	3,67	2,85	20,60	0,36
SMRTG	0,05	0,02	0,15	0,03	0,02	22,18	0,67
ZEDUR	0,20	0,13	0,32	1,08	1,33	21,09	0,32
ZOREN	0,28	0,08	0,15	0,26	0,25	18,58	0,71

The Values of the Dependent and Control Variables (2023)

Firm	Dependent					Control	
	ROE	ROA	GPM	OPM	NPM	SIZE	LEV
AHGAZ	0,17	0,10	0,07	-0,08	0,21	24,48	0,42
AKENR	0,37	0,16	0,06	0,09	0,21	24,19	0,57
AKSEN	0,18	0,11	0,21	0,20	0,17	24,75	0,38
AKSUE	0,16	0,11	0,34	1,44	1,25	20,16	0,31
ALFAS	0,38	0,20	0,21	0,16	0,13	22,35	0,46
AYDEM	-0,04	-0,02	0,43	0,29	-0,20	24,74	0,49
AYEN	0,13	0,08	0,20	0,22	0,25	23,52	0,36
BIOEN	0,33	0,14	0,15	0,42	0,43	22,62	0,57
CONSE	0,16	0,06	0,16	-0,05	0,18	22,02	0,65
CWENE	0,06	0,04	0,23	0,04	0,03	23,06	0,43
CANTE	0,03	0,03	0,17	-0,02	0,08	23,60	0,05
CATES	0,19	0,14	0,16	0,19	0,29	23,14	0,28
ARASE	0,54	0,32	0,27	0,09	0,22	23,53	0,41
ENJSA	0,08	0,03	0,15	0,03	0,03	18,70	0,56
ESEN	0,03	0,02	0,18	0,19	0,33	23,32	0,34
GWIND	0,09	0,07	0,59	0,54	0,34	22,94	0,23
HUNER	0,01	0,01	0,34	0,07	0,08	22,57	0,52
IZENR	0,11	0,10	0,10	0,10	0,15	23,08	0,06
KARYE	0,00	0,00	0,23	-0,02	0,02	21,87	0,31
LYDYE	0,71	0,42	0,20	1,14	0,94	18,53	0,41
MAGEN	0,04	0,02	0,28	0,29	0,41	23,30	0,34
NATEN	0,03	0,02	0,17	0,06	0,12	23,36	0,35
NTGAZ	0,04	0,03	0,19	0,03	0,02	21,80	0,20
ODAS	0,24	0,19	0,24	0,58	0,58	23,84	0,21
PAMEL	0,25	0,21	0,02	2,18	3,44	20,61	0,16
SMRTG	0,49	0,10	0,23	0,12	0,13	23,08	0,80
TATEN	0,17	0,09	0,56	0,38	0,59	22,90	0,47
ZEDUR	0,17	0,13	0,23	2,51	2,02	21,16	0,24
ZOREN	0,29	0,11	0,14	0,17	0,40	18,41	0,61