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The Impact of Carbon Accounting on Corporate Financial Performance: Evidence from the Energy Sector in Jordan

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Abstract

This study examined the impact of carbon accounting on firms' financial performance. using data from the Jordanian national electric power company annual reports for a period of 16-year from 2000 to 2015. the study employed a linear regression model, the dependent variable of the study was the return on assets ratio ROA and the independent variable was co2 emissions in metric tons. the findings show that firms' financial performance is negatively related to carbon emission; meaning that an increase in corporates' carbon emissions would negatively affect corporates' financial performance

Keywords

Carbon Accounting, Carbon Emissions Disclosure, Corporate Social Responsibility, Financial Performance and Regression Analysis

1. Introduction

Recently, the growing interest in climate change and the growing technological sophistication of industries have made carbon accounting the focus of many researchers and environmental organizations. Climate change at the corporate level is linked to the concept of environmental accounting, particularly carbon accounting. Carbon accounting is a new term in the accounting field and currently attracting the attention of many scholars and academic studies in the past few years, many researchers and professionals in the field of accounting believe in the role that companies must play in contributing to the preservation of the environment, especially that they contribute through their daily production in the increasing pollution of the environment, For example, many factories throw down their residues in seas and rivers, threatening the lives of fish in the seas, which are reflected by a negative effect on our health, adding to the emission of carbon and toxic gases from these factories to the air we breathe.
"*Evolving climate change governance mechanisms such as the Regional Greenhouse Gas Initiative (RGGI) carbon auctions, the European Union Emission Trading System (EU ETS) and the potential federal cap-and-trade system in the USA also place pressure on companies to track and disclose their CO2 emissions. Investors are increasingly taking note of carbon profiles in their evaluation of asset prices and potential investments. In response, companies are learning to report their carbon management initiatives, some going so far as to track CO2 emissions through the value chain at the product level and disclose this information on consumer product labels".* Bowen F and Wittneben B (2011).
Corporates should disclose the environmental impact of their industries on the environment and clarify the contribution and role they play in preserving the environment. Carbon Accounting, Carbon Emission disclosure, and Environmental Disclosure should be integrated with Corporate Social Responsibility in the Jordanian companies listed on Amman Stock Exchange (ASE). According to the instructions and legislation issued by the Jordanian Securities Commission, the Jordanian companies are required to disclose their environmental activities and their role in serving the local community. However, following the annual reports of Jordanian companies, we found that the environmental disclosure in the Jordanian companies did not reach the minimum required level and that there is no financial data in the annual reports on environmental disclosure or environmental expenses in their financial statements. this study tries to investigate the impact of carbon emission and environmental disclosure on Jordanian companies' financial performance according to the viewpoint of the study participants and tries to answer the following questions: 1- does Carbon Emissions disclosure affect Jordanian firms' performance? 2- is it the time for

Jordanian companies to have a separate section in their financial statements for carbon emissions and their related expenses?

2. Literature Review

In accounting discipline, carbon accounting is still a recent term, which has emerged in the last decade in parallel with climate change. Bowen F and Wittneben B (2011) define carbon accounting as "*the measurement of carbon emissions, the collation of this data and the communication thereof, both within and between firms".* Najah, M (2012) defined carbon accounting as "set of quantitative and qualitative information that relates to a firm's past and forecasted carbon emissions levels; its exposure to and financial implications of climate change associated risk and opportunities; and its past and future actions to manage these risks and opportunities". Fortune G and Khazamula S (2018) investigated the impact of carbon emission on corporate financial performance on 63 South African companies in 2015. they used a multiple regression model to assess the impact of the carbon emission as the model independent variable measured by (Scope 1, Scope 2 and Scope 1 and 2) on companies' financial performance as the dependent variable in the model measured by (ROE, ROI, and ROS). they found that carbon emissions have a negative relationship with the companies' performance, they concluded that companies that try to lower carbon emissions can effectively manage financial performance. Yang S. L. et al (2016) investigated how carbon emission and carbon emission disclosure are related to corporates financial performance. they constructed an index to quantify the quality of corporates carbon emissions disclosure and regression analysis for 62 companies in the period of 2010 to 2012. they found that carbon emission is negatively correlated with financial performance and the level of carbon disclosure is significantly and positively related to financial performance. Salbiah and Mukhibad H, studied empirically the effect of size, leverage, and composition of the board of commissioners to carbon emission disclosure and its effect on future profitability on a sample of the manufacturing companies listed on the Indonesia Stock Exchange. by using path analysis method to analyze the collected data. The results show that size has a positive effect on carbon emission disclosure. Leverage and ratio of independent board commissioners have no impact on carbon emission disclosure. Companies that have high carbon emission disclosure have no effect on future profitability.

3. Methodology

This study tries to test empirically the impact of Carbon emission and carbon disclosure on the financial performance of a sample company from the energy production sector in Jordan. for the assessment of the company's financial performance, the financial performance is the dependent variable in the study model. this variable is measured by return on assets (ROA). the independent variable of the study is CO2 emissions. This study is sought to examine the main hypothesis:

H1: There is a relationship between company's financial performance as measured by return on assets ratio and carbon accounting as measured by CO2 emissions.

very few studies investigated the relationship between firm's financial performance and carbon emissions and no single study was conducted on the Jordanian companies; this may be attributed due to the lack of carbon emissions disclosure in the Jordanian companies' annual reports. The financial performance data were collected from the National Electric Power Company annual reports for the period from 2000 to 2015. CO2 emissions data used in the study are taken from Alrabai et al., (2017) CO2 emissions estimation.

Table 1. CO2 emissions. (Adapted from Alrabai et al., 2017)

Year	Electricity consumption (GWh)	CO2 emissions Mt
2000	**6133**	**5.56**
2001	**6392**	**5.6**
2002	**6900**	**6.0**
2003	**7346**	**5.92**
2004	**8089**	**6.1**
2005	**8712**	**6.4**
2006	**9593**	**6.94**
2007	**10553**	**7.57**
2008	**11509**	**8.10**
2009	**11956**	**8.27**
2010	**12843**	**8.427**
2011	**13535**	**9.2**
2012	**14274**	**10.49**
2013	**14564**	**10.83**
2014	**15418**	**11.72**
2015	**16178**	**10.96**

This study employed a simple linear regression model to test the relationship between the financial performance variable as measured by ROA and the carbon accounting variable as measured by CO2 emissions for a 16-year period from 2000 to 2015.

$$\boldsymbol{Y = a + \beta X + \mathcal{E}}$$

$$\boldsymbol{ROA = a + \beta CO2E + \mathcal{E}}$$

Where,
Y, is the dependent variable ROA = Net Income / Average Total Assets.
a, Alpha; a constant.
β, Beta; the coefficient of the independent variable. (the slope of the regression model)
X, the value of the Independent variable, CO2E.

$\boldsymbol{\mathcal{E}}$, the error term.

4. Results and discussion

Table 2 provides a summary of descriptive statistics which could be explained in the consideration of firstly, the performance (ROA) of the national electric power company (NEPCO) and secondly, the Carbon Accounting (Co2 emissions) of the national electric power company (NEPCO) for the period of 15 years from 2000 to 2015.

Table 2. Descriptive Statistics (Author' calculations using SPSS software)

	Mean	Std. Deviation	N
ROA	.0964	.04085	16
CO2emission	8.0054	2.09813	16

The mean value of ROA is .0964; this indicates a poor performance in terms of ROA, the mean value of CO2 emissions is 8.0054 mt (metric tons).

Table 3 shows the correlation between CO2 emission and return on assets ratio ROA. The result indicated a strong negative correlation of -.705 between the two variables. In other words, both variables move in opposite directions.

Table 3. Correlations (Author' calculations using SPSS software).

		ROA	CO2emission
Pearson Correlation	ROA	1.000	-.705
	CO2emission	-.705	1.000
Sig. (1-tailed)	ROA	.	.001
	CO2emission	.001	.
N	ROA	16	16
	CO2emission	16	16

Table 4 shows the linear regression model summary; the correlation coefficient R is equal to -.705 which represents a strong negative correlation between the study variables. The P value is equal to .002 shows a statistically significant relationship between the two variables ($P < .05$).

Table 4. Model Summary (Author' calculations using SPSS software).

Model	R	R Square	Adjusted R Square	Sig.
1	-.705	.498	.462	.002

a. Predictors: (Constant), CO2emissions

b. Dependent Variable: ROA

Figures 1 and 2 indicate no problems with the assumption that the residuals are normally distributed at each level of Y and the study data are normally distributed.

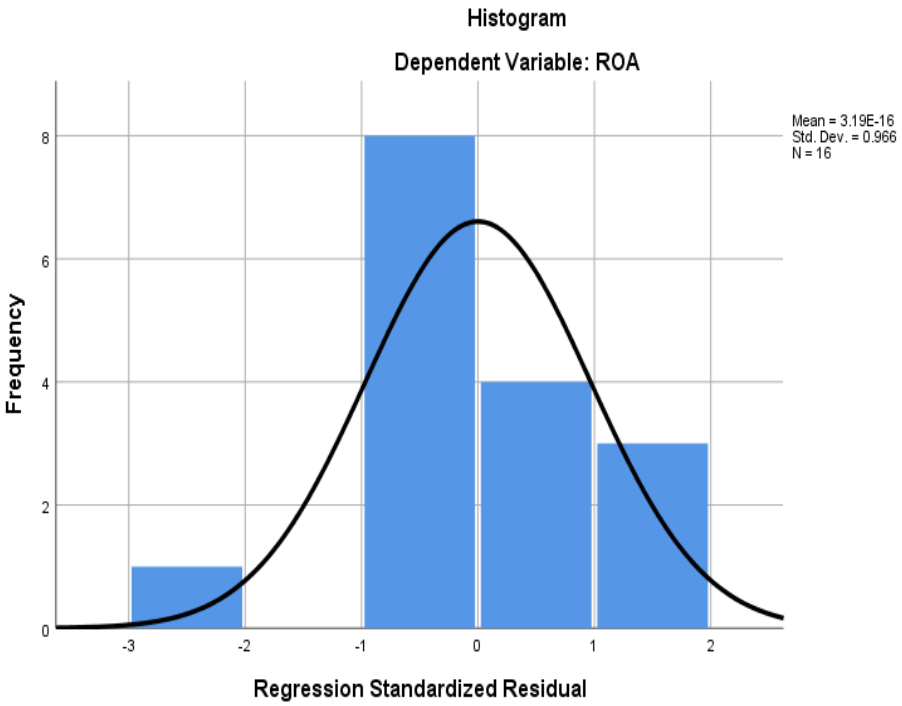

Figure 1. Histogram Dependent Variable: ROA.

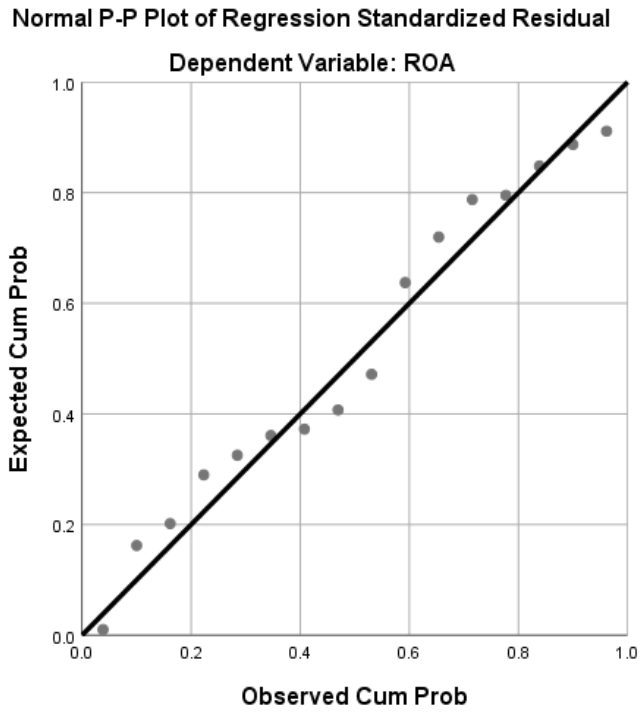

Figure 2. Normal P-P plot of Regression Standardized Residual.

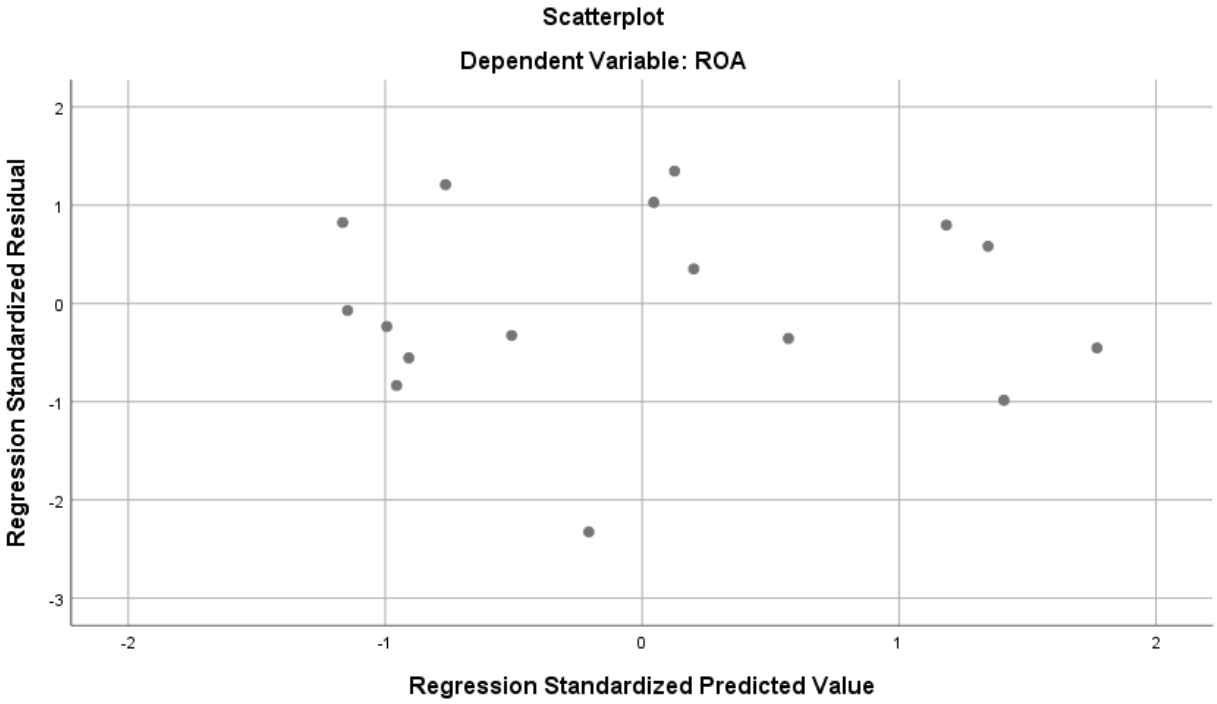

Figure 3. Scatterplot for the Dependent Variable ROA.

5. Conclusion

This study examined the impact of carbon accounting on firms' financial performance. using data from the Jordanian national electric power company annual reports for a period of 16-year from 2000 to 2015. the study employed a linear regression model, the dependent variable of the study was the return on assets ratio ROA and the independent variable was co2 emissions in metric tons. the findings show that firms' financial performance is negatively related to carbon emission; meaning that an increase in corporates' carbon emissions would negatively decrease corporates' financial performance.

Based on the analysis in this study and after reviewing Jordanian companies' annual reports, the study concludes the following:

1- Company's financial performance is negatively related to carbon emissions; the more corporates make "green investments" the less corporates carbon emissions; leading to a better financial performance.
2- There is no separate section for disclosing carbon emissions and carbon management expenses in the Jordanian companies' annual reports.

Based on the findings, the study recommends the following:

3- legislators should oblige the Jordanian companies listed on Amman Stock Exchange (ASE) to disclose carbon emissions and carbon management cost data in their annual reports.
4- Carbon management expenses should be included in firm's Tax Shield.
5- legislators should impose a penalty on carbon emissions disclosure failure.
6- Companies should have a section for environmental activities and green investments information in their annual reports.
7- Financial statements audit should be accompanied by environmental audit report.

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Biography

Ahmad Ababneh is a PhD student in Management, Banking and Commodity Sciences at Sapienza University of Rome and Certified Management Accountant. His research areas concern operations and risk management, Cost Accounting, Managerial Accounting, Corporate Governance and Organizational Performance, moreover he has two years' experience working as Finance Consultant for the United Nations agencies in Rome.