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A differential effect of energy instability on share price and income statement

This paper evaluated the differential effect of energy instability on the share price and income statement performance of companies in South Africa during the energy supply instability (loading shedding period) and during the energy supply stability period. Data was collected from the Fusion Media investment archives (for JSE share price of companies), and from STATS SA (for aggregate income statement of all South African industries). The data was analysed by applying the paired sample T-test for mean difference. At an alpha value of 0.05, the results indicate that share price of companies in the JSE during the period of energy stability significantly exceeds the share prices during periods of energy instability at a p-value of 0.0001, far below the alpha level. In addition, the results on the income statement differential analysis show that income statement (turnover and income) during the period of energy stability significantly exceeds the turnover and income during periods of energy instability at a p-value of 0.0001, which is below the alpha level of 0.05. The practical implication thus signifies the importance of energy stability in bolstering the market value, the turnover and income of industries in South Africa. This also shows that energy instability might be a problem for accounting valuation analysis given the income statement variations due to energy instability. The paper provides further research agenda to examine this phenomenon in other regions of Africa where industries face severe energy shortage and to examine the implication on corporate accounting valuation.

Keywords: *accounting; financial market; share price; energy stability; stock exchange*; *finance.*

Problem statement. Accounting valuation is more reliable and beneficial under conditions of low variability in the market value of corporate stock price [1]. Investors and other users of accounting statement rely on the previous and forecast values of the company share price to make informed decisions about investments, credit extensions and other business transactions that are underpinned by accounting valuation of corporate market value of shares. However, given the efficient market hypothesis which opines that share prices in financial markets respond to events and/or information within and out the financial market, accounting for corporate value becomes nebulous and hence unreliable for short and long term financial and investment decisions where energy supply is unstable for corporation operations.

Energy is key to business operations and the attendant revenue and financial flows, including the concomitant effect on stock market performance. Energy stability is one among the catalytic variables for general economic growth and development, including the attraction of foreign investments. However, in recent years, South Africa has struggled to cope with energy supply shortages as population growth and attendant increase in energy demand appears to surpass installed and ageing energy generation facilities [2].

In October 2007, the Electricity Supply Commission (EsKom) of South Africa implemented an emergency load shedding in the country, which according to Eskom was to circumvent a possible general nationwide power cut [3]. This resulted in alternating energy load-shedding to manage equitable distribution of limited energy supply. The disruptions arising from energy rationing affected the socio-economic life of citizens and obstructed continuous business activities amid high cost of operations as standby energy generation machines of corporations were in constant use to fill the energy loadshedding vacuum [4, 5]. The South African energy shortage thus affected the entire economy – from household to small and large businesses, with negative effect on the attraction of foreign investments [2]. The year 2022 experienced one of the highest months of energy loadshedding and instability in South Africa. Comparatively, 2024, which is the presidential election year in South Africa experienced a dramatic energy stability during the three months before the general election and after the elections.

Given the importance of energy sustainability in social and economic life of every country, it is important for contemporary energy management systems in South Africa to have an inbuilt energy stability within their energy management and attendant financial support systems. This is significant as the integration of renewable energy sources into the conventional power grids grows as global new energy economy model for energy sufficiency and stability. In addition, several elements of concern, such as the dependability of energy storage options, the controls in place, and the properties of the energy sources being used, all have an impact on how stable energy systems turns out. Given therefore the vital role of energy in business operations, instability in energy provision affects the continuous operations of business, and in some instances escalates the cost of business operation where business rely on self-generation of energy. The effect of high cost of operations reflects on increases in the prices of the products, which often leads to lower sales revenue and attendant reverberation in the stock price of concerned goods as investors take a step on stocks with low returns.

Therefore, given that energy stability or instability affects the stock market performance and income statement performance, it becomes pertinent to evaluate the extent to which the two scenarios of energy supply in South Africa affected the stock prices in the Johannesburg Stock Exchange (JSE) and income statement of South African industries. This article is very important because since the reemergence of energy stability in South Africa around March 2024 after years of energy instability, there is scarcity of research on how the two periods of energy supply affect stock price performance in the JSE exchange performance. Furthermore, despite numerous literatures, which hypothesize the likelihood that energy instabilities might have an adverse effect on share price performance, hardly have prior research conducted the assessment during the election period to check if energy stability may prove to have a differential effect on stock under all conditions such as during election. This article thus bridges this existing gap in the literature and conducts a differential effect of energy availability on share price and income statement (during periods of energy instability and stability).

Analysis of recent research and publications. Oberndorfer [6] presents an initial evaluation on stock performance of energy companies from the Eurozone. Their paper dwells on the link between energy market increases and the price of European energy companies' stock. Their result show that oil price increase poses a negatively effect on stock value returns of European utilities. Nevertheless, they orchestrate some gain in oil and gas stocks. Although oil market volatility, which are forecastable may negatively impact European oil and gas stock values, but this may signal good profit prospects for strategic energy investors. In a contrasting view though, they find that the gas market may not play a significant role for price variations of Eurozone energy stock values. Furthermore, they discover that coal price increases impact the stock earnings of European utilities. But this effect is not big in comparison to the impacts from oil price, even though oil is hardly used for electricity generation in Europe. This therefore implies that for the European stock market, the oil price appears to be the main gauge for energy price advances [6].

Song [7] investigated the dynamic directional information spillover regarding returns and volatility inside the fossil energy market by applying the connectedness network technique of measurement. The empirical results suggest that there is a more obvious transfer of risk throughout the markets, with the spillover effects within the volatility system being generally more prominent than those within the return system. In both systems, investor sentiment has less of an impact on the renewable energy stock market than the fossil energy sector, especially the crude oil market. Song [7] finding emphasizes how closely the stock markets for fossil fuels and renewable energy are related. The findings imply that the profits and volatility of the renewable energy stock market can be partially explained by investor sentiment toward renewable energy.

To investigate the actual relationships between the prices of alternative energy stocks, technology stocks, oil prices, and interest rates, Henriques [8] presents and estimates a four-variable vector autoregression model. According to our research, the stock prices of alternative energy firms are independently influenced by the cost of technology and oil. Moreover, the results of the simulation indicate that a perturbation in the prices of technology stocks has a greater impact on the prices of alternative energy stocks than does a comparable perturbation in the prices of oil. The goal of these insights is to help policymakers, managers, and investors.

Wu [9] investigates how investments in renewable energy, which includes green finance and a range of sources like geothermal, solar, bioenergy, hydropower, and wind power projects, affect the economic performance of OECD member nations. Wu [9] research makes use of secondary data that was obtained from the World Development Indicators (WDI), the Global Green Finance Index (GGFI), and the International Renewable Energy Agency (IRENA) between 2001 and 2019. The Fixed-Effect Model (FEM) and Generalized Method of Moments (GMM) are used in the study to examine the correlations between these variables. The results show that the economic performance of the chosen economies is significantly and favourably impacted by investments in green financing and renewable energy resources.

Grigore [10] investigated the relationship between energy resources, financial stability, and economic growth using uni- and multi-factorial linear regression techniques. Throughout the period under investigation, they performed a predictive analysis and evaluated several study hypotheses. Their results show that developments and trends in the trade of energy products, particularly in the oil industry, have a positive impact on Azerbaijan's economic growth.

The purpose of the article. Accordingly, drawing from the above problem of gap in the literature on differential effect of two periods of energy supply differences in South Africa, the purpose of this article is to conduct an analysis of the differential effect of energy supply differences on the share price and income statement of industries in South Africa. This is done by focussing on whether share price and income statement differences between the two periods demonstrate a significant difference to provide practical insight for stock investment and income statement analysis and company accounting valuation.

Presentation of the main material. This article sought to analyse the differential effect of energy supply stability on the Johannesburg stock exchange share price performance. Accordingly, the paper adopted a positivist paradigm which draws from the ontology of single reality (in this case a single research technique) and the epistemology of measurability of knowledge (measurability of variables). Data on share price performance was

collected from two different periods of energy supply namely from January to February 2024 (during period of electric supply instability through scheduled load shedding). The second period was during March to April 2024 (period of stable energy supply stability). The two phases of share price data totalled 39 stock trading days on each side of the sample of the paired data set. A paired sample T-test for means was used to analyse the likelihood of differential significance in paired for mean (table 1). Therefore table 1 presents the statistics results for paired sample T-test for mean difference in stock price between two energy supply periods in South Africa.

Data on JSE historical share price were collected from Fusion Media's Investing statistics archive of Fusion Media [11]. In addition, the data on aggregate income statement data for South African industries were collected from STATS SA [12, 13]. The data were analysed by applying the paired sample T-test for mean difference in share price (table 1), and in South African industries' income statement (table 2). The share price differential analysis examined the significance in mean share price differences between the first quarter of 2008 and the first quarter of 2024. On the one hand, the first quarter of 2008 was chosen because it was the second quarter of energy instability in South Africa immediately following the last quarter of 2007 when the EsKom South Africa implemented energy loadshedding in October 2007. Hence the researcher chose the first quarter of 2008 when the industries had begun to experience disruptions in operations and rising expenditure in internal-company electricity generation. On the other hand, the first quarter of 2024 was chosen because energy supply experience stabilisation from the first quarter of 2024 just before the national general election in South Africa.

Table 1 presents the paired sample T-test statistics which sought to ascertain if the mean industries' share differences is significantly different between share prices during the energy loading and the share prices during the energy supply stability. The results in table 1 show that the mean share prices during energy stability are significantly higher and different from the mean share prices during the energy instability at a p-value of less than 0.05. This finding indicates that energy instability affects the market value of companies as energy instability caused instability in industry operations [14]. Furthermore, the analysis in table 2 presents the effect on industries' income statement.

This analysis used a broad aggregate income statement data for the whole industries in South Africa with data from Statistics South Africa (STATS SA) which provides a broad quarterly aggregate income statement for all «industries in South African economy excluding agriculture, financial intermediation, insurance, government and educational institutions» [12, 13]. Accordingly, the paired T-test analysis on the aggregate income statement of industries in South Africa (with a focus on turnover and income) indicate a significant difference in come statement of industries. Table 1 show that the South African industries' income statements (turnover and income) during the 2024 period of energy supply stability significantly outweigh the industries' income statement during the period of energy instability at a p-value below the alpha level of 0.05. The results of this paper thus provide first research contributions which jointly show combined differential effect of energy instability on market value (share price) and on turnover and income of industries in South Africa. These findings therefore confirm a practical industry importance of electricity stability in sustaining the market value of companies, boosting companies' sales turnover and the income of industries in South Africa.

Table 1

Paired Sample T-test for Mean Difference in Share Price between two energy supply periods in South Africa

T-test : Paired Two Sample for Means		
	Share Price Jan-March_2024	*Share Price Jan-MarchPrice2008*
Mean	8781.241935	6740.774194
Variance	36980.84215	495679.7187
Observations	62	62
Pearson Correlation	0.62255756	
Hypothesized Mean Difference	0	
df	61	
t Stat	26.62717423	
P(T < = t) one-tail	0.000000011	
t Critical one-tail	1.670219484	
P(T < = t) two-tail	0.000000001	
t Critical two-tail	1.999623585	

Source: author's analysis with data from [11]

Table 2

T-test: Paired Two Sample for Means of Turnover and Income of South African Industries (ending first Quarter March 2008 and First Quarter March 2024)

	March 2024	*March 2008*
Mean	748320.7059	233521.8824
Variance	1.21836E + 12	1.47554E + 11
Observations	17	17
Pearson Correlation	0.96589045	
Hypothesized Mean Difference	0	
df	16	
t Stat	2.870324825	
P(T < = t) one-tail	0.005551848	
t Critical one-tail	1.745883676	
P(T < = t) two-tail	0.011103695	
t Critical two-tail	2.119905299	

Source: author's analysis with data from [11, 12]

Conclusions and prospects for further research. This paper contributes by examining the differential effect of energy instability on share price and income statement of South African industries during the periods of electricity supply shortages (loading shedding period) and during the electricity supply stability period in South Africa. The results from the paired T-test analysis show that share price of companies in the JSE during the period of energy stability significantly exceeds the share prices during periods of energy instability at a p-value of 0.0001, which is way below the statistics alpha level of 0.05. Furthermore, the analysis results on the differential impact on income statements indicates that income statement items (turnover and income) during the period of electric energy stability significantly surpasses the turnover and income during periods of energy instability at a p-value of 0.0001, which is below the alpha level of 0.05. The practical implication of this paper is that energy stability plays an important role in strengthening the market value, the turnover and income of industries in South Africa. This paper's finding unravels a problem for accounting valuation, which is that energy instability possess an accounting data consistency problem for accounting valuation analysis since the income statements during periods of energy instability is inclined to disparities due to energy instability. Therefore, since this research data focussed on South Africa, it provides prospects for further research, which is recommended to explore this phenomenon in other African countries, including other developing countries outside of Africa to examine the implication of energy supply on corporate accounting valuation.

References:

1. Huang, S., Tan, H., Wang, X. and Yu, C. (2023), «Valuation uncertainty and analysts' use of DCF models», *Review of Accounting studies*, Vol. 28, No. 2, pp. 827–861.
2. Naidoo, C. (2023), «The impact of load shedding on the South Africa economy», *Journal of Public Administration*, Vol. 58, No. 1, pp. 7–16.
3. Eskom (2024), «Our Recent Past – Shift performance and grow sustainably», [Online], available at: https://www.eskom.co.za/heritage/history-in-decades/eskom-2003-2012/
4. Erero, J.L. (2023), «Impact of loadshedding in South Africa: A CGE analysis», *Journal of Economics and Political*.
5. Foster, V. and Steinbuks, J. (2009), «Paying the price for unreliable power supplies: In-house generation of electricity by firms in Africa», World Bank Policy Research Working Paper, [Online], available at: https://documents1.worldbank.org/curated/pt/341551468191961797/pdf/WPS4913.pdf
6. Oberndorfer, U. (2009), «Energy prices, volatility, and the stock market: Evidence from the Eurozone», *Energy Policy*, Vol. 37, No. 12, pp. 5787–5795.
7. Song, Y., Ji, Q., Du, Y.J. and Geng, J.B. (2019), «The dynamic dependence of fossil energy, investor sentiment and renewable energy stock markets», *Energy Economics*, [Online], available at: https://www.sciencedirect.com/science/article/pii/S0140988319303597
8. Henriques, I. and Sadorsky, P. (2008), «Oil prices and the stock prices of alternative energy companies», *Energy Economics*, Vol. 30, No. 3, pp. 998–1010.
9. Wu, H. (2023), «Evaluating the role of renewable energy investment resources and green finance on the economic performance: Evidence from OECD economies», *Resources Policy*, doi: 10.1016/j.resourpol.2022.103149.

10. Grigore, G.E., Nicolae, S. and Vlăduț, O. (2024), «A Multivariate Analysis of the Interplay between Energy Resources, Economic Growth, and Financial Stability. Evidence from Azerbaijan», *In Proceedings of the International Conference on Business Excellence*, Vol. 18, No. 1, pp. 3185–3211.
11. Fusion Media (2024), «JSE Historical Price», [Online], available at: https://za.investing.com/equities/jse-historical-data
12. Statistics South Africa (2024), *Quarterly Financial Statistics, March 2024*, [Online], available at: https://www.statssa.gov.za/publications/P0044/P0044March2024.pdf
13. Statistics South Africa (2008), *Quarterly Financial Statistics, March 2008*, [Online], available at: https://www.statssa.gov.za/publications/P0044/P0044March2008.pdf
14. Mabuza, S. and Maphosa, M.R. (2023), «The impact of load shedding on the performance of manufacturing SMES in South Africa», *10th Biennial Academy of World Business, Marketing and Management Development Conference*, Perth, Western Australia, [Online], available at: https://www.researchgate.net/publication/374001399

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- environmental management accounting;
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- stock market performance;
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Диференціальний вплив енергетичної нестабільності на ціну акцій та звіт про прибутки та збитки

У статті оцінювався різний вплив енергетичної нестабільності на курс акцій і показники звіту про прибутки і збитки компаній в Південній Африці в період нестабільності енергопостачання (період зниження навантаження) і в період стабільності енергопостачання. Дані були зібрані з інвестиційного архіву Fusion Media (для розрахунку вартості акцій компаній на Йоганнесбурзькій фондовій біржі) і з Статистичного управління Південної Африки (для складання звіту про сукупний дохід усіх галузей Південної Африки). Дані аналізували за допомогою т-тесту парних зразків для визначення різниці в середньому. При альфа-значенні 0,05 результати показують, що ціна акцій компаній на Йоганнесбурзькій фондовій біржі в період енергетичної стабільності значно перевищує ціни акцій в періоди енергетичної нестабільності при р-значенні 0,0001, що значно нижче альфа-рівня. Крім того, результати диференціального аналізу звіту про прибутки і збитки показують, що звіт про прибутки і збитки (оборот і прибуток) в період енергетичної стабільності значно перевищує оборот і дохід періоди енергетичної нестабільності при р-значенні 0,0001, що нижче альфа-рівня 0,05. Таким чином, практичний результат свідчить про важливість енергетичної стабільності для підвищення ринкової вартості, обороту і доходів підприємств Південної Африки. Це також показує, що енергетична нестабільність може бути проблемою для аналізу бухгалтерської оцінки, враховуючи зміни у звіті про прибутки та збитки через енергетичну нестабільність. У статті пропонується подальша програма досліджень для вивчення цього явища в інших регіонах Африки, де галузі промисловості стикаються з гострою нестачею енергії, і для вивчення наслідків для оцінки корпоративного обліку.

Ключові слова: *бухгалтерський облік; фінансовий ринок; ціна акцій; енергетична стабільність; фондова біржа; фінанси.*

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