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ASSESSING THE IMPACT OF COVID-19 ON ENERGY SECTOR PERFORMANCE IN THE ASIA-PACIFIC

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ABSTRACT

This study explores the effects of the COVID-19 pandemic on the performance of energy sector companies, focusing on how the pandemic interacts with company characteristics—such as size, liquidity, and capital structure—impacting Return on Assets (ROA), which is used as a key measure of company performance. It further distinguishes between fossil fuel and alternative energy sectors, as well as between companies in developed and emerging markets, to assess whether the pandemic's effects varied across these categories. The analysis utilizes unbalanced panel data from publicly listed energy firms in the Asia Pacific region from 2013 to 2023. The results reveal that the fossil fuel sector experienced a sharper decline in performance compared to the alternative energy sector during the pandemic. Additionally, significant differences emerged between energy companies in developed and emerging markets; firms in developed markets, benefiting from larger sizes, higher liquidity, and sufficient cash reserves, were generally better equipped to withstand the pandemic's challenges.

Keywords : Enery Sectors, Covid 19 Pandemic, Company's Performance

INTRODUCTION

The International Energy Agency (IEA) reported that global energy demand in 2020 was 5% lower than in 2019, primarily due to reduced demand for fuels like coal and oil. Capital investment in the energy sector also dropped by 18% as spending on new oil and natural gas resources decreased. This trend may influence the energy market and prompt shifts in corporate strategies, investment decisions, and consumer behavior (IEA, 2020). The Covid-19 pandemic poses a potential threat to energy systems worldwide, possibly slowing the growth of clean technology, which had shown promising but uneven progress before the pandemic. However, according to Gollakota and Shu (2023), the pandemic could create new opportunities for clean energy. The pandemic has created new challenges for energy companies to transition to cleaner energy sources, providing long-term benefits. Temporary fossil fuel production shutdowns may highlight the importance of alternative energy for future energy security amid unprecedented challenges (Jiang et al., 2021). Governments and major investors are increasingly focusing on alternative energy, which offers sustainable resilience benefits due to its environmentally friendly nature.

A study by Nurlia et al. (2023) analyzed the impact of Covid-19 on energy companies worldwide across 64 countries, categorizing them by developed or developing markets, fossil energy, and alternative energy. This research will build on that study, but with a focus on the energy sector in the Asia-Pacific region. It will examine energy companies in this region, divided into developed and emerging markets, fossil fuels, and alternative fuels.

The energy sector's heavy reliance on global commodity prices led to a significant drop in energy demand during the pandemic due to industrial activity restrictions, causing price fluctuations, especially for fossil fuels like oil and gas. This study will evaluate how resilient companies are during a global crisis like Covid-19. This study will clearly investigate the effect of Covid 19 Pandemic and role of company characteristics towards company's performance on Energy Sector Companies in Asia Pacific. Although the pandemic has limited company operations, it has also accelerated interest in alternative energy as countries increasingly invest in sustainable, green policies. Many companies have adapted their business models as a result.

The goal of this study is to assess the success of companies in optimizing asset use during a crisis. The global Covid-19 pandemic has served as a "stress test" to reveal effective strategies for maintaining financial performance in uncertain times. This research will provide insights into how Asia-Pacific energy companies have navigated the challenges of the pandemic era..

LITERATURE REVIEW

2.1 Company Performance

This study measures company performance using Return on Assets (RoA). RoA is a useful metric for evaluating how efficiently an energy sector company utilizes its resources—such as coal, oil, gas, and renewable energy—to generate profit. The RoA results can serve as a benchmark for identifying potential improvements in performance through better resource optimization (Nurlia et al., 2023).

2.2 Companies Characteristics

Company characteristics are important factors in assessing performance. In this study, these characteristics include company size, liquidity, and capital structure. The Log TA (Total Assets) theory explains the relationship between company size and performance, where Log TA can be used as an independent variable to analyze the impact of size on financial performance. Higher Log TA values indicate stronger financial performance. Companies with high liquidity and a balanced capital structure are generally better positioned to achieve higher profitability.

Liquidity reflects a company's capacity to fulfill its short-term obligations (Herry, 2015). High liquidity can increase profitability potential and help prevent losses from delayed payments (Altman, 1968). Capital structure reflects a company's approach to managing funding sources from liabilities and equity for its operations. This structure includes a mix of short-term debt, long-term debt, and equity capital to support business activities (Sritharan, 2015). A high capital structure ratio suggests a larger reliance on debt financing, which can drive profit generation but also increases financial risk. A stable capital structure, however, indicates the company's resilience to financial risks.

Cash reserves are another key factor in supporting a company's stability, especially in volatile economic conditions like the global Covid-19 pandemic. These reserves provide a financial cushion, allowing the company to meet its obligations without needing loans or external funding. This flexibility is vital for adapting to uncertain market shifts. However, inflation can

erode cash value over time, making effective cash management crucial for maintaining long-term profitability and performance.

2.3 Interation between Covid 19 and Company Characteristics

2.3.1. Interaction between (COVID*SIZE) towards Company's Performance

A company is considered large if it possesses substantial resources, which enhance its resilience. Examining the interaction between COVID-19 and company size helps determine whether larger companies are better equipped to withstand the pandemic's negative impacts compared to smaller companies.

2.3.2 Interaction between (COVID*LEV) towards Company's Performance.

Higher debt levels naturally increase financial risk for a company, as debt obligations must be met regardless of fluctuations in income. The interaction between COVID-19 and leverage assesses whether companies with high leverage are more vulnerable or perhaps benefit from lower interest rates during the pandemic.

2.3.3.Interaction between (COVID*LIQ) towards Company's Performance

In theory, high liquidity suggests a company's effective management of assets to meet short-term obligations. The interaction between COVID-19 and liquidity tests whether companies with higher liquidity are more resilient during the pandemic, enabling them to sustain performance and operational stability.

2.3.4. Interaction between (COVID*CASH) towards Company's Performance

A substantial cash reserve can serve as a valuable asset for a company in times of economic uncertainty, allowing it to cover operational costs without needing external funding. The interaction between COVID-19 and cash reserves illustrates how cash availability can help companies maintain performance during the pandemic.

The COVID-19 pandemic has restricted economic activities, leading to declines in industrial and transportation sectors. This reduction in activity has caused a drop in energy demand, which directly affects revenue, resulting in narrower profit margins for energy sector companies. Decreased revenues may lead to potential losses, with the worst-case scenario being a company's inability to meet operational costs, leading to bankruptcy. This leads to the hypothesis:

H1: COVID-19 has a significant negative impact on company performance.

METHODOLOGY

This study used unbalanced panel data sourced from S&P Capital IQ, covering the period from 2003 to 2023. It includes data from energy sector companies across 17 countries in the Asia-Pacific region totaling 609 companies. However, the research will not analyze all these companies simultaneously. Instead, separate analyses will be conducted for each of the criteria: developed markets, emerging markets, fossil fuels, and alternative fuels.

Table 1. Sample of Observation

No	Country	Number of Companies	%
1	Australia	116	19.05
2	Bangladesh	7	1.15
3	China	99	16.26
4	Hong Kong	48	7.88
5	India	56	9.20
6	Indonesia	52	8.54
7	Jepang	38	6.24
8	Malaysia	13	2.13
9	New Zealand	7	1.15
10	Pakistan	18	2.96
11	Philippines	21	3.45
12	Singapore	11	1.81
13	South Korea	20	3.28
14	Sri Lanka	9	1.48
15	Taiwan	7	1.15
16	Thailand	43	7.06
17	Vietnam	44	7.22
Total		609	100

Empirical Model :

$$ROA_{i,t} - a_{i,t} + \beta_1 COVID_t + \beta_2 SIZE_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CASH_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$ROA_{i,t} - a_{i,t} + \beta_1 COVID_t + \beta_2 SIZE_{i,t} + \beta_3 COVID_t{}^* SIZE_{i,t} + \beta_4 LIQ_{i,t} + \beta_5 COVID_t{}^* LIQ_{i,t} + \beta_6 LEV_{i,t} + \beta_7 COVID_t{}^* LEV_{i,t} + \beta_8 CASH_{i,t} + \beta_9 COVID_t{}^* CASH_{i,t} + \varepsilon_{i,t} \quad (2)$$

Table 2. Operational Definition

Variable	Code	Formulation	Expected Sign
Dependent			
Return on Asset	RoA	$\frac{Net\ Profit}{Total\ Asset\ (\%)}$	
Independent			
The first year of COVID-19	COVID1	This dummy variable has a value of 1 if the first year of the COVID-19 pandemic (2020), or 0 otherwise	-
The second year of COVID-19	COVID2	This dummy variable has a value of 1 if the second year of	-

		the COVID-19 pandemic (2021), or 0 otherwise	
Control			
Firm Size	SIZE	Ln total aset	+/-
Liquidity	LIQ	$\frac{Current\ Asset}{Total\ Asset\ (\%)}$	+
Leverage	LEV	$\frac{Total\ Debt}{Total\ Equity\ (\%)}$	+/-
Cash	CASH	$\frac{Cash\ \&\ Cash\ Equivalent}{Total\ Asset\ (\%)}$	+

Source : Nurlia et al.,(2023)

This study employs two COVID-related variables, labeled COVID1 and COVID2. These variables do not represent different virus variants but instead denote two distinct phases for analysis purposes. The study uses 10 years data, from 2013 to 2023. COVID1 is assigned the value of 1 during the first year of the COVID-19 pandemic, covering years such as 2019, 2020, 2021, and 2022, with other years marked as 0. Similarly, COVID2 is assigned the value of 1 for the subsequent year of the pandemic, covering 2020, 2021, 2022, and 2023, with 0 assigned to all other years.

Following the approach of Kusumawardani et al.,(2021) and Maria et al.,(2022), this analysis applies the OLS method with robust standard errors. To ensure that the regression estimates meet the assumptions for a Best Linear Unbiased Estimator (BLUE), robust standard errors that account for heteroscedasticity and autocorrelation (HAC) in panel data are used to address potential issues with heteroscedasticity and autocorrelation (Wooldridge, 2010).

RESULTS

Table.3. Descriptive Statistics

Variable	All Countries (N = 5756)		Developed Markets (N = 2383)		Emerging Markets (N = 3373)		Fossil Fuels Sector (N = 4683)		Alternative Fuels Sector (N = 1073)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
COVID1	0.27	0.45	0.27	0.45	0.27	0.45	0.27	0.45	0.27	0.45
COVID2	0.27	0.45	0.27	0.45	0.27	0.45	0.27	0.45	0.27	0.45
SIZE	12.43	2.79	11.85	3.00	12.84	2.55	12.46	2.88	12.32	2.35
LIQ	0.38	0.62	0.41	0.88	0.35	0.31	0.40	0.67	0.30	0.28
LEV	2.61	177.41	0.61	5.60	4.01	231.34	2.91	197.10	1.34	5.03

Source : Data Processing (2024)

The table indicates that liquidity levels in developed countries are higher than in developing countries, suggesting that developing nations face greater challenges in meeting their short-term

obligations. Several factors, such as limited financial resources, low cash reserves, and high economic instability—exemplified by the Covid-19 pandemic—can contribute to this lower liquidity. This reflects the lower cash value in developing countries compared to developed ones. Companies in developing countries often rely more on external funding due to limited access to capital markets, making them more susceptible to market volatility and economic crises. The low liquidity of companies in these countries indicates the difficulty they face in surviving crises, with a higher risk of bankruptcy.

The findings suggest that the debt ratio in developing countries is higher than in developed countries, implying that firms in developing countries rely more on debt for operational expenses. Since these companies struggle to access equity capital, they are forced to take on loans to meet their working capital needs. High debt levels become particularly risky if revenues decline. While debt can signal growth potential if companies generate stable profits to cover their debt obligations, it also increases financial risk.

Table 4. Regression Result

Explanatory Variables	Dependent Variables: ROA			
	(1)	(2)	(3)	(4)
COVID1	1.06 (0.16)	1.30 (0.58)		
COVID2			2.23 (0.00)*	3.99 (0.24)
SIZE	2.90 (0.00)*	2.90 (0.00)*	2.83 (0.00)*	2.84 (0.00)*
COVID1*SIZE		-0.09 (0.56)		
COVID2*SIZE				-0.20 (0.33)
LIQ	3.15 (0.5)	3.46 (0.05)*	2.80 (0.08)	3.68 (0.40)
COVID1*LIQ		-1.84 (0.42)		
COVID2*LIQ				-3.15 (0.17)
LEV	-0.29 (0.13)	-0.25 (0.22)	-0.26 (0.15)	-0.17 (0.32)
COVID1*LEV		-0.24 (0.42)		
COVID2*LEV				-0.68 (0.10)
CASH	-12.87 (0.02)*	-15.77 (0.01)*	-12.10 (0.02)*	-17.70 (0.00)*
COVID1*CASH		13.40 (0.06)		
COVID2*CASH				19.32 (0.01)*
Constant	-36.31 (0.00)*	-36.11 (0.00)*	-35.70 (0.00)*	-35.66 (0.00)*
Adj R>Squared	0.24	0.25	0.25	0.26
Prob>F	0.00	0.00	0.00	0.00
Num of. Obs	5756	5756	5756	5756

Source : Data Processing (2024)

Table 5. Regression Result of COVID-19 towards Company's Performance (Fossil Fuels & Alternative Fuels)

Explanatory Variables	Dependent Variables: ROA							
	Fossil Fuels Sector				Alternative Fuels Sector			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
COVID1	1.53 (0.12)	1.72 (0.57)			-0.00 (0.10)	1.11 (0.51)		
COVID2			3.01 (0.00)*	4.46 (0.30)			-0.92 (0.33)	4.01 (0.05)
SIZE	3.44 (0.00)*	3.45 (0.00)*	3.36 (0.00)*	3.38 (0.00)*	0.40 (0.08)	0.340 (0.9)	0.41 (0.07)	0.49 (0.08)
COVID1*SIZE		-1.12 (0.54)				0.02 (0.79)		
COVID2*SIZE				-0.26 (0.36)				-0.15 (0.26)
LIQ	4.23 (0.01)*	4.36 (0.01)*	3.89 (0.01)*	4.54 (0.00)*	-0.93 (0.38)	0.11 (0.94)	-0.87 (0.40)	0.60 (0.72)
COVID1*LIQ		-1.38 (0.0.60)				-35 (0.03)		
COVID2*LIQ				-2.31 (0.37)				-6.27 (0.00)
LEV	-3.32 (0.14)	-0.29 *0.20)	-0.29 (0.15)	-0.24 (0.18)	-0.16 (0.01)	-0.15 (0.05)	-0.16 (0.01)	0.15 (0.04)*
COVID1*LEV		-0.18 (0.53)				-0.07 (0.76)		
COVID2*LEV				0.40 (0.35)				-0.30 (0.06)
CASH	-14.21 (0.02)	-17.44 (0.01)	-14.47 (0.02)	-19.71 (0.00)	-.50 (0.79)	-0.22 (0.89)	-0.52 (0.79)	-6.64 (0.71)
COVID1*CASH		14.26 (0.05)				-0.76 (0.74)		
COVID2*CASH				20.47 (0.01)				-1.31 (0.56)
Constant	-44.26 (0.00)	-43.99 (0.00)	-43.67 (0.00)	-43.46 (0.00)	-1.41 (0.63)	-1.64 (0.60)	-1.54 (0.60)	-2.81 (0.44)
Adj R>Squared	0.27	0.28	0.28	0.29	0.03	0.03	0.03	0.03
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Num of. Obs	4683	4683	4683	4683	1073	1073	1073	1073

Source : Data Processing (2024)

Table 6. Regression Result of COVID-19 towards Company's Performance (Developed & Emerging Markets)

Explanatory Variables	Dependent Variables: ROA							
	Developed Markets				Emerging Markets			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
COVID1	2.93 (0.05)*	8.48 (0.24)			0.46 (0.42)	-1.86 (0.03)		
COVID2			4.99 (0.00)*	14.48 (0.13)			1.14 (0.00)	-3.09 (0.00)
SIZE	4.86 (0.00)*	5.02 (0.00)*	4.75 (0.00)*	4.97 (0.00)*	0.47 (0.04)*	0.40 (0.02)*	0.41 (0.05)*	0.28 (0.03)*
COVID1*SIZE						0.16 (0.05)		
COVID2*SIZE				-0.88 (0.18)				0.30 (0.00)*
LIQ	-0.20 (0.93)	0.54 (0.26)	-0.16 (0.94)	1.62 (0.07)	1.88 (0.14)	1.80 (0.10)	1.46 (0.19)	1.27 (0.15)
COVID1*LIQ		-5.53 (0.17)				0.27 (0.72)		
COVID2*LIQ				-9.24 (0.03)				1.03 (0.16)
LEV	-0.48 (0.16)	-0.46 (0.20)	-0.42 (0.22)	0.31 (0.39)	-0.26 (0.02)	-0.21 (0.08)	0.25 (0.01)*	0.19 (0.06)
COVID1*LEV		0.25 (0.64)				-0.37 (0.78)		
COVID2*LEV				-0.84 (0.07)				-0.44 (0.05)
CASH	15.39 (0.07)	-18.97 (0.04)	15.93 (0.05)*	-22.22 (0.01)	6.05 (0.00)*	4.47 (0.00)*	5.98 (0.00)*	4.20 (0.00)*
COVID1*CASH		17.10 (0.10)				4.60 (0.03)*		
COVID2*CASH				26.80 (0.02)				4.34 (0.06)
Constant	63.36 (0.00)	-64.96 (0.00)	-62.75 (0.00)	-64.94 (0.00)	-3.19 (0.22)	-2.15 (0.18)	-2.58 (0.34)	-0.67 (0.59)
Adj R>Squared	0.33	0.33	0.34	0.35	0.06	0.06	0.07	0.08
Prob>F	0.0000	0.0000	0.0000	0.0000	0.00	0.00	0.00	0.00
Num of. Obs	2383	2383	2383	2383	3373	3373	3373	3373

Source : Data Processing (2024)

Table 4 presents regression results that examine how COVID-19-related factors and company characteristics affect Return on Assets (RoA), an indicator of company performance, within the energy sector in the Asia Pacific region. The variables analyzed include COVID1, COVID2, company size, liquidity, leverage, and cash. Four regression models are shown, each with RoA as the dependent variable and varying independent variables. In each model (except model 3), COVID1 and COVID2 have p-values greater than 0.05, indicating that the COVID-19 variables do not significantly impact the company's RoA. Company size, however, shows a positive and highly significant coefficient across all models, suggesting that larger companies possess strong resources to weather the crisis, thus maintaining stable performance.

Cash consistently shows a negative and significant coefficient in all models, indicating that firms with higher cash ratios tend to perform worse. This suggests that companies holding more cash may be less effective in managing their assets. There are various interactions between the COVID variable and company characteristics. Specifically, the interactions between COVID and factors like company size, liquidity, and leverage do not have a significant effect. This means that many company's performance do not get affected by COVID. However, unlike these interactions, the interaction between COVID and cash exhibits a positive coefficient in the table.

Overall, the SIZE variable consistently shows a significant positive coefficient in all regression models, suggesting that company size is closely linked to profitability. This is consistent with my previous research by Nurlia et al.,2023; Shen et al., (2020) dan Alsamhi et al., (2022). This implies that larger companies tend to have stronger profitability performance. Several factors contribute to the stability of larger firms: they can achieve lower production costs by distributing fixed costs over more units, enhancing operational efficiency. Lower costs allow these companies to improve their profit margins. Additionally, large companies typically have more substantial resources and well-established relationships with various stakeholders, which helps them secure external financing at lower interest rates.

Fossil Fuels Sector

Table 5 highlights notable differences in results across various sectors, particularly fossil fuels and alternative fuels. In each model on Fossil Fuels Sector, company size consistently shows a significant ($p < 0.01$) positive relationship with ROA, with a coefficient around 3.4. The interactions of COVID1 and COVID2 with SIZE, LIQ, and LEV reveal varying levels of significance. Liquidity demonstrates a stable trend, with higher liquidity positively associated with ROA. Cash, however, has a significant negative impact on ROA, with a coefficient around -14. In this sector, liquidity and size are the variables with consistently significant positive values across all models. This suggests that companies in the fossil fuel sector are effectively managing assets to meet short-term obligations and that larger companies in this sector tend to be more stable and competitive. Overall, this indicates that these companies perform quite well.

Alternative Fuels Sector

In each model, the SIZE variable demonstrates a positive relationship, consistently aligning with results in the fossil fuel sector. The interaction between COVID and both company size and

leverage is significant at the 10% level. Leverage, however, negatively impacts ROA, indicating that as a company's debt increases, its performance is adversely affected.

Developed Market

Table 6 presents the performance of companies in developed and emerging markets throughout the Covid-19 pandemic. COVID 1 and COVID 2 exhibit a significant positive relationship with ROA, suggesting that companies in developed markets have adapted well to the Covid-19 pandemic. Company size consistently shows a significant positive relationship with ROA ($p < 0.01$), indicating strong performance among larger companies in developed markets. CASH, however, shows mixed results across models, with some displaying negative coefficients and others positive.

Developing Market

The results for COVID1 and COVID2 differ across the four models, indicating that the pandemic's impact has been inconsistent. Company size shows a consistently significant positive relationship with ROA. The influence of leverage on ROA also varies, with positive values in some models emphasizing leverage as an important source of external funding for many firms in developing countries. Cash has a significant positive effect on ROA in all four models for developing countries, highlighting its essential role in helping companies navigate the challenges of the Covid-19 pandemic.

Conclusion

The fossil fuel energy sector experienced a more significant decline in performance compared to the alternative energy sector during the Covid-19 pandemic. Companies in the fossil fuel sector were impacted by falling demand and shifts in global energy prices, whereas the alternative energy sector is viewed as more sustainable in the long term, benefiting from increased investment interest. As a result, alternative energy companies displayed greater resilience, reflected in a more stable ROA, indicating that firms in this sector are better equipped to withstand energy market fluctuations.

There were also notable differences between energy companies in developed and emerging markets. Companies in developed markets generally had better resources, including larger sizes, higher liquidity, and adequate cash reserves, which enabled them to better cope with the challenges of the pandemic, particularly during the second phase (COVID2), which showed more stability. On the other hand, energy companies in emerging markets demonstrated higher volatility, relying more on external funding and having fewer resources, which made them more susceptible to market fluctuations.

This study also offers insights into various company characteristics as benchmarks for performance. Larger companies tend to have more stable financial outcomes, with the ability to weather downturns in the energy sector. Company size has been shown to significantly boost ROA, as larger companies are better able to optimize assets during crises. High liquidity enhances financial flexibility, allowing companies to meet short-term obligations and manage risks more effectively. Liquidity is linked to better performance during the pandemic, particularly in the

alternative energy sector. Conversely, a higher capital structure, which indicates more reliance on debt, tends to lower performance by increasing financial risk, particularly during uncertain periods. The regression results in this study reveal a negative correlation between leverage and ROA, especially in developing markets, signifying a reliance on debt to navigate the crisis.

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