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主 論 文 の 要 旨

論文題目 Stock Returns of Clean Energy Companies and Macroeconomic Influences
(クリーンエネルギー企業の株式リターンとマクロ経済の影響)
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論 文 内 容 の 要 旨

This study aims to investigate clean energy stock markets from a macroeconomic perspective focusing on the impact of macroeconomic factors on clean energy stock returns. Being aware of the importance of energy security and climate change, in these two decades, a vast amount of investments flow into the clean energy sector to support technological progress for producing energy from renewable resources practically and lucratively. Therefore, financial performance of clean energy listed companies is of interest to investors, and it also provides useful information for researchers and policymakers. As a policy-oriented and energy-related sector, the development of clean energy sector is affected by various macroeconomic factors, such as oil price, technology, and uncertainty. Therefore, it is worthwhile to investigate the relationship between macroeconomic factors and clean energy stock returns.

Research conducted in this area was originally inspired by the impact of oil prices and several basic macroeconomic variables, such as technology and interest rate on clean energy indices. With the rapid development of clean energy sector, existing studies have considered other driving variables, such as carbon emission, economic uncertainty, and exchange rate. However, the results of oil prices and uncertainty are not conclusive. Therefore, the main motivation of this analysis is to offer a rich research

background to scholars and investors on the impacts of oil price changes and some uncertainty-related factors on the clean energy stock returns.

Clean energy can be viewed as alternative energy for oil in power-supply. Oil price changes affect the cost of energy consumers and trigger the energy transition making the profit and expected returns of clean energy companies change. Furthermore, the impact of oil prices also can be transmitted from the macroeconomy to clean energy stocks through aggregate demand or inflation. The previous research results of oil price's impact vary with different methods, countries, and sample periods. However, the study considering the different causes of oil price changes on clean energy stock returns is limited. Kilian (2009) proposes a decomposition method of oil price shocks that separate three kinds of oil price shocks caused by oil production disruption, real economic activity increase, and precautionary demand of oil users increase. This study extends the existing research to examine the impact of three oil price shocks with different underlying reasons and policy uncertainty on clean energy stock returns.

After the Global Financial Crisis, uncertainty has played a fundamental role in influencing energy prices. The contagious uncertainty affects the energy market by rendering the price changes of traditional energy and the stock returns of clean energy higher. Therefore, it is necessary to examine the impact of uncertainty on clean energy stock returns with appropriate uncertainty measures to identify uncertainty from different sources. Existing literature has reported the significant impacts of policy uncertainty, oil price uncertainty, and financial uncertainty on clean energy stocks. In the previous research, however, the impacts of macroeconomic uncertainty and geopolitical risk have not been examined on clean energy stock returns. But their impacts cannot be ignored due to the following two reasons. First, strongly correlated with the uncertainty proxies mentioned above, macroeconomic uncertainty can affect any participants in economic activity by forcing them to adjust their decision according to this uncertain background. As one of emerging sectors, a stable macroeconomic environment benefits the development of clean energy sector. But a turbulent macroeconomic environment makes investors reduce investment

in the emerging industry and thus leads to a decline in green investment. Second, oil supply disruptions usually follow geopolitical crises. Geopolitical risk evaluates the uncertainty level of the geopolitical events, reflecting the uncertainty in the fossil fuel supply. This uncertainty threatens oil-importing countries and finally affects energy consumers who are afraid that oil supply disruption disturbs their economic activity. Therefore, to maintain a stable energy-supply, some energy-consumers switch to clean energy, leading to an increase in demand for clean energy. Therefore, it is necessary to examine the impacts of these two ignored kinds of uncertainty on clean energy stocks.

This study has four chapters to investigate stock returns of clean energy companies and macroeconomic influences. Chapter 1 “Introduction” introduces the development status of clean energy sector and green investment trends, showing a background of the investment in the clean energy sector. The existing literature in this subsection elaborates on the impact of various macroeconomic influences on green investments. Furthermore, the motivation and the structure of this study are also introduced in this chapter.

Chapter 2 “Do oil price shocks and policy uncertainty affect clean energy stock returns?” investigates the impacts of oil price shocks and policy uncertainty on clean energy stock returns using a Structural Vector Autoregression model. Based on the underlying sources of oil price changes, this chapter examines three kinds of oil price shocks from oil supply, aggregate demand, and oil-specific demand (Kilian, 2009). As for the uncertainty sources, this chapter examines four kinds of policy uncertainty using the information from social media news, inflation, government purchase, and tax expiration (Baker et al., 2016). The results show that the substitution effect makes the oil supply shocks and aggregate demand shocks positively affect the clean energy stock returns. However, when a heavy dependence on oil makes oil-users reject transition, no substitution effect implies that oil-specific demand shocks negatively affect the clean energy stock returns. Furthermore, an indirect impact of oil shocks on clean energy stock returns through policy uncertainty is confirmed by including the policy

uncertainty factor endogenously in the SVAR model. Regarding policy uncertainty, the results of the policy uncertainty index and all four components indicate a significantly negative impact on the clean energy stock returns. Among the four uncertainty components, the uncertainty in the inflation forecast has the most significantly-negative impact on the clean energy stock returns. Finally, the results from impulse response functions also indicate that the impact of oil shocks and policy uncertainty lasts in a relatively long time on the clean energy stock returns.

Chapter 3 “Does energy insecurity affect global energy stock volatilities in the long run?” focuses on the volatility of clean energy stock returns, investigating the impacts of three oil price shocks, macroeconomic uncertainty, and geopolitical risk on the long-run variances of the global oil and gas index and the global clean energy index. As the variance of stock returns is a key financial tool to measure the risk in financial market, Generalized Autoregressive Conditional Heteroskedasticity-Mixed Data Sampling (GARCH-MIDAS) model and Autoregressive Distributed Lag (ARDL) model are employed in this chapter. The results show that oil-specific demand, aggregate demand, and geopolitical risk positively affect the long-run variance of the oil and gas index, whereas they negatively affect the long-run variance of the clean energy index. The opposite reactions of clean energy stock variances and oil and gas stock variances imply that clean energy stocks have a relatively low risk under the energy insecurity circumstances. The macroeconomic uncertainty shows a positive impact on the long-run variances of both indices. However, the impact of oil supply is insignificant on the long-run variances of both indices. Regarding the volatility of considered factors, only the volatility of aggregate demand, reflecting the volatility of macroeconomic activity, has a significant long-run impact on the long-run variances of both energy indices. Therefore, we emphasize that the impact of the macroeconomic uncertainty is of importance to the long-run variance of the clean energy stock returns. And we notice that the impact from oil supply side on the long-run variance of the clean energy stock returns cannot last in a long time, implying a relatively weak impact of oil supply on the risk of the clean energy sector

in the stock market.

Chapter 4 “Conclusion” concludes this study and discusses some remaining questions and future tasks about green investments in the clean energy stock market or other financial instruments.