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Analysis of market entry, restructuring and economic risks at energy companies – literature review

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Abstract

The entry of companies dealing with renewable energy sources into the market will be analyzed firstly, in addition to the companies dealing with fossil-based energy production, which are still strongly present. Here the game-theoretic stylization of the competition between two types of companies is in scope, while the incumbents determine the energy prices, and those entering the market can respond with quantitative adjustments.
After that, the cyber security issues of the market-leading energy companies are under revision. Nowadays, due to the widespread use of computer control systems, a possible cyber-attack is a big risk for a power plant, as it can result in a complete system shutdown or, in the worst case, even irreparable damage. In light of these, risk networks are analyzed in three layers, reflecting normal and extreme market conditions.
Ultimately, we will analyze the strategic steps of companies' restructuring and withdrawal. In the current economic situation, many dominant companies have a diversified portfolio, which on one hand promises beneficial profit opportunities and financial stability due to the parallel presence of diverse investment and production directions, but also makes it necessary to abandon the given route and to reallocate resources to another sector if necessary.
Based on these points, by the end of the analysis, we will have a clearer picture of the struggle for market dominance of large energy companies and the steps necessary for success.

Key words energy sector, decarbonisation, sustainable development, cyber security, government policy.

1. Introduction

Governments are trying to provide incentives to the energy sector to replace old technologies with new, renewable energy sources, as this is the most effective way to combat climate change. However, in the energy sector, companies using fossil fuels dominate the market in almost all cases, which can block the entry of new players using renewable energy. I will deal with the game-theoretic stylization of competition between two types of firms. The fossil energy producers on the market determine the prices, to which the entrants can react with quantitative adjustments. [1]

Our goal is to be able to predict the outcome of the competition between the players currently in the market and those entering the market, as well as the impact of financial and budgetary policies, taking into account the strategies.
It is a worldwide accepted fact that the widespread use of fossil fuels has pushed humanity to the brink of climate catastrophe, which will cause enormous problems for millions of people and the ecosystem in the near future. [2] In order to prevent this, according to international agreements, more and more emphasis is being placed on avoiding dependence on fossil energy carriers and on opening up to renewable energy sources, but breaking into the century-old energy market is not easy, even with state aid. [3]
The energy industry is a concentrated oligopolistic market that increases the market power of fossil fuel companies and can prevent new competitive renewable energy companies from entering the market comprehensively. In an oligopolistic market, the success of new entrants is difficult, or in some cases, a rare event. For the described results, the authors of the article used the dynamic limit pricing model introduced by Judd and Petersen (1986), and their solutions were obtained using a nonlinear model predictive control (NMPC) algorithm. [4]
The results highlight the importance of initial cash-flow levels. We can observe that when competitive fringe companies (companies about to break in or breaking in) enter the market with a positive cash flow, the dominant companies do not react to this threat at first, but change their prices after a while and try to prevent entry into the industry. Instead, when competitive fringe firms enter the market with negative profits, given supportive policy measures and technological and financial support, fringe firms can not only stay in the market but also achieve gradually increasing profit levels. In this case, dominant firms start to cut prices from the first period to prevent new entrants into the industry; however, the retained proportion of fringe firms declines from entry and profits decline later. [5]
The results show that financial support can help achieve higher capacity levels of renewable energy sources. They also show that, compared to other policies, subsidies

ultimately result in a higher capacity in peripheral areas. However, after reaching the highest level, the capacity may gradually decrease. [6]

The current dynamics of the energy market - with the general encouragement of the introduction of clean energy sources - shaped the strategies of energy industry companies. Since the 2000s, the share of renewable energy sources in the global energy market has increased significantly. This is particularly true of the European Union and the United States' electricity investments, challenging the dominant fossil companies. [7]

This previously mentioned dynamic can also be observed in the case of the development of energy prices. As shown in Figure 1, the global price of renewable energy has decreased since 2010, increasing green energy's competitiveness. However, since non-renewable producers still dominate the market, the dynamics of the average market price remain more stable. In the 2010s, the price of energy in the United States increased for the first time, and then decreased slightly after 2014.

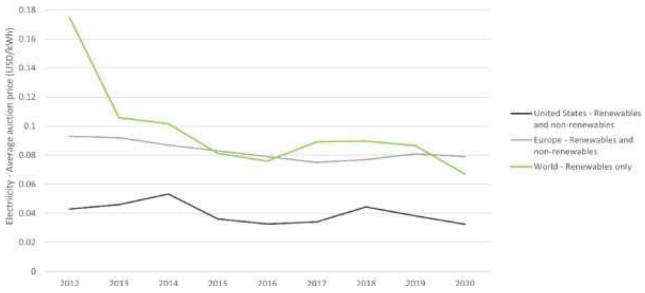

Fig. 1. Electrical energy price development [6]

The results of the analysis show that the initial cash-flow level of renewable energy sources is a key factor for understanding market dynamics, as it greatly influences the behavior of dominant companies in finding the optimal pricing strategy or limit pricing. [8]

It can be observed that when a group of competitive fringe firms enters this game with positive cash flow, the dominant firms do not react to this threat at first, but after a while set the price below the profit-maximizing price level of the static monopoly and try to prevent entry into the industry. This behavior aimed at market results can be overcome by the effects of environmental protection public policy supporting renewable energy companies. However, it is possible that when renewables enter the competition with positive profits, they do not need political support, while dominant firms react with some delay to the entry of renewables. [9]

Conversely, entering with a negative profit often indicates the need for public policy support, with subsidies. Different direct and indirect policies can be developed, and financial support can be introduced to facilitate the entry of renewable energy companies into the energy market and to compensate for entry barriers. Dominant companies usually react more sensitively when they observe that marginal companies can use renewable subsidies. In this case, compared to the case where marginal firms are supported by other renewable energy policies and/or investments, the price is likely to decrease faster. [10]

2. Economic risk analysis in large energy companies

This chapter shows a multi-layered network approach to uncovering risk contagion using the example of the world's leading energy companies. Large energy companies play a decisive role in the international energy market. Mapping their reactions to different types of shocks has profound consequences for understanding the functioning of international energy markets and can create significant value for energy sector investors. [11]

We distinguish three layers of risk spillover, which cover return correlations and upper and lower tail dependence.

The global energy market is currently undergoing a slow rebalancing amid severe uncertainties and the challenges of a clean transition to renewable energy sources. These uncertainties and changes become systemic, which can challenge not only the entire energy system, but even the company level. A large volume of capital flowed from financial markets to the energy sector, leading to stronger co-movement between energy and financial markets. In addition, it can be observed that this capital flow is not related to the previously dominant driving forces, such as supply and demand. As a result, the market has become more volatile and riskier. These changes present serious challenges to energy companies and require a better understanding of how risks spread in the market and change over time. Companies are often connected across borders or across sectors. [12]

As a result, shocks and uncertainties can spread to these companies through their various relationships with each other. Such a shock can be, for example, the increase in oil prices experienced in the 1970s or the economic recession caused by COVID-19. In other words, increased interconnectedness between large energy firms can potentially form a channel or track or risk transmission, increasing the structural vulnerability of the entire energy system. [13]

In practice, network patterns between companies usually differ in the case of regular and extreme risk spillovers. Of course, these are not entirely independent of each other, making it necessary to examine the connections between networks. In the course of the study, a multi-layer network model was set up, with the help of which they were able to carry out a risk analysis of companies of varying sizes and connections with high accuracy. [14]

Network layers are defined according to the nature of market conditions, such as regular and extreme market conditions. This approach not only allows us to explore the connectivity and centrality patterns of energy companies within a network, but also to identify differences across layers. [15]

The three layers used are called upper, Kendall, and lower layers, which correspond to the terms Upper Tail, Kendall, and Lower Tail, which we will use later. (Fig.2.)

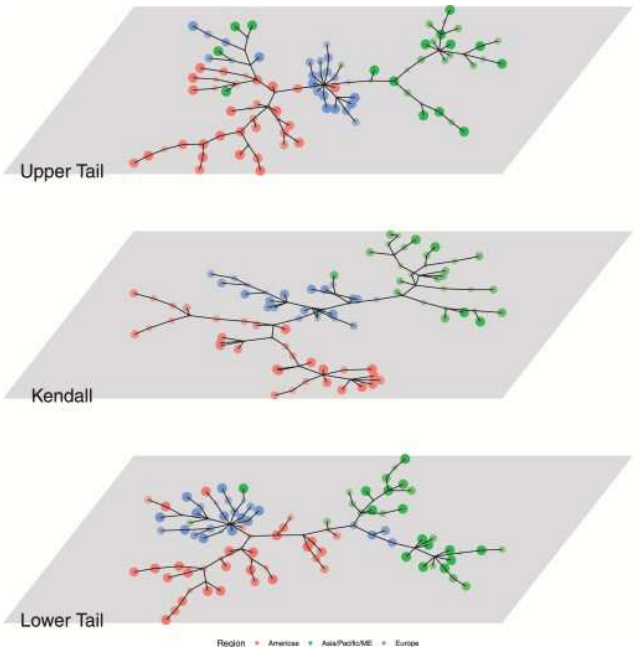

Fig. 2. Static multi-layer network for the entire sample based on closeness/centrality [15]

Clustering effects are clearly visible in all three layers in the figure, which manifests in the phenomenon that companies from the same region are much more closely connected than companies from the different regions, forming groups in all layers. [16]

European firms appear to be the most central nodes in both the Upper tail and Kendall strata, suggesting that they play a significant role in controlling the transmission of risk and information in typical or uptrend markets. When the market experiences an extreme downturn, the network center shifts from Europe to the Americas, in other words, energy companies in the Americas tend to be leaders in bad market conditions. [17]

Of course, the connections between companies change over time, so they form a dynamic system, which is recorded in a 200-day trading interval.

The static company-level results of this study show that companies from the Americas can be identified as leading nodes in the network structure, which play a crucial role in connecting network nodes and strengthening network cohesion. This finding means that firms from the Americas are more likely to act as risk transfer channels, thus facilitating the spread of risks in the energy network. [18]

European companies also play a role and have a significant impact on network cohesion. In contrast, Asia/Pacific/Overseas companies occupy only a marginal position in each layer. The results presented are consistent with some existing literature and experience that oil shocks from Asia-Pacific countries are smaller than those from North America and Europe, which can be attributed to oil trade patterns. [19]

The 2008 global financial crisis and the US shale gas revolution are often seen as the main drivers of the spread of extreme downside risk in international oil markets.

In terms of corporate-level influence, US and European companies have an alternating balance of power in the face of the European debt crisis, while Asian companies have greater room for improvement during market upswings. [20]

3. Alternative restructuring and exit strategies

As mentioned earlier, companies with large, diverse portfolios tend to withdraw from certain markets or restructure themselves in order to increase their shareholder value by changing the composition of their assets, liabilities, equity and operations. These activities are commonly referred to as restructuring strategies. Reorganization can include both growth and exit strategies. [21]

This chapter will look at the strategic options that allow a company to maximize shareholder value by reallocating assets by downsizing or refocusing the parent company. Capital withdrawals, spin-offs, disposals and spin-offs are discussed separately, not as a unique form of spin-off. [22]

Restructuring can have many motivating factors. Companies often decide to simplify their business portfolio by focusing on units with the highest growth potential and exiting businesses that are not related to the company's core business strategy. Greater focus often improves firm value by better allocating its limited resources and reducing competition for such resources within multi-divisional firms. Parent companies often exit businesses that fail to meet or exceed the parent's threshold rate requirements. By changing the structure, tax benefits can be realized, parent companies can decide to finance new initiatives or reduce leverage - or other financial obligations - by selling or partially selling units that are no longer considered to be of strategic importance. [23]

In addition, it is worth mentioning the change as a result of risk analysis, the principle of "it is worth more to others", downsizing/selling a subdivision of a purchased company, avoiding conflict with customers or shareholders, and finally achieving easier transparency.

Selling companies choose the sales process that best serves their goals and influences the types of buyers they attract, such as strategic and private equity. The sales process can be reactive or proactive. Reactive selling occurs when the parent company is approached unexpectedly by a buyer, either for the entire company or for a part of the company, such as a product line or subsidiary, while proactive selling can be characterized as public or private inquiries. The sales process is shown in Fig.3. below.

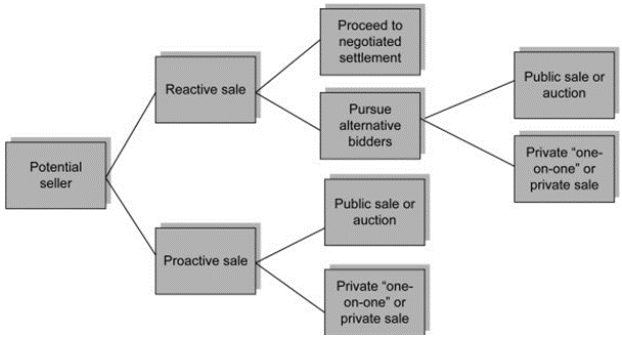

Fig. 3. Sales journey flow chart [23]

In addition to sales, the company has many other opportunities to change its structure.
A spin-off is a stock dividend paid by a company to existing shareholders that consists of shares in an existing or newly created subsidiary. Shareholders' approval is not required as only the board of directors can decide on the amount, type and timing of dividends. Parent companies with a low tax basis in a business may choose to separate the entity as a tax-free distribution to shareholders rather than sell the business and incur significant tax liabilities. [24]
If properly structured, a company can distribute the shares of a subsidiary in which it has a controlling interest to its shareholders tax-free.
Equity carve-outs have similar characteristics to spin-offs, resulting in the subsidiary's shares being traded separately from the parent company's shares and cash being provided to the parent company. However, unlike a spin-off or divestiture, in a spin-off transaction the parent company usually retains control over the subsidiary. A potentially significant disadvantage of a spin-off is the creation of minority shareholders. Capital withdrawals provide an opportunity to obtain funds for reinvesting in the subsidiary, paying off debts or paying dividends to the parent company. The exclusion also applies if the parent company has significant contractual obligations, such as supply agreements with its subsidiary.
During the split-off, the parent company makes an offer to its shareholders to exchange the parent company's shares for all or part of the subsidiary's shares. This is equivalent to the parent company buying back its own shares using the subsidiary's shares instead of cash. A spin-off is most appropriate when the parent company owns less than 100% of the shares of the subsidiary. A demerger reduces pressure on the demerged company's share price, as shareholders who exchange their shares are less likely to sell the new shares. [25]
A split-up refers to a restructuring strategy in which a single company is separated into two or more separately managed companies. [26]
Divestitures, spin-offs, divestments, spin-offs and spin-offs are frequently used restructuring strategies that aim to reallocate assets by returning cash or non-cash assets to shareholders in the form of special dividends or using the cash proceeds to pay down debt. These restructuring strategies produce, on average, positive abnormal financial returns to shareholders around the time of the announcement because they usually remedy the problems of the parent company. However, the longer-term performance of spin-offs, spin-offs and tracking stocks can be problematic in the long run. [27]

4. Conclusion

By analyzing the presented scientific materials, we were able to gain important insight into the operating principles of profit-oriented large companies that influence economic factors and, together with them, into the conclusions related to the energy market and its actors. We were able to learn about the behavior of the dominant energy companies, which typically produce with fossil fuels, as a market lock, and the basis for creating optimal entry conditions for a new company dealing with renewable energy production with subsidies and tax incentives. After that, we analyzed the entanglements caused by the global economy, affecting both large and small companies, which can significantly aggravate the impact of a possible shock event and its ripple effect on the economy. This, of course, affects the energy companies in the same way, especially the current drastic natural gas and crude oil market prices, which mostly only affect Europe due to the Ukrainian-Russian conflict.
Finally, we were able to gain insight into the strategic options of large companies expanding into several sectors in relation to strengthening or weakening, selling and downsizing a specific market, and we were able to find out what economic benefits these steps can cause, and when they should be used, which can be specifically applied in the energy sector - also supported by shareholders - transformation towards emerging renewable energy production.

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