ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis [Financial Economics]

Value effects of mergers and acquisitions for shareholders of acquiring firm in energy and power industry

Name: Duje Kovačev

Student ID number: 478739

Supervisor: N.R.D. Dwarkasing

Second assessor: Amy Li

Date final version: 27.7.2021.

Abstract

This research paper observes mergers and acquisitions in the energy and power industry. The main purpose of the research was to answer the research question: *What are value effects of mergers and acquisitions for shareholders of acquiring firms in energy and power industry from 2011 to 2019 in the US and the European market?* An event study was conducted to answer the question. The research assumed CAPM and EMH as cornerstone models. The main finding was that there are negative effects for shareholders of acquiring firm in the US market.

Table of Contents

1. Introduction

Developments in the energy and power industry have recently become a hot topic for all people, not only economists. It is because it generates externalities that impact the whole world. A few years ago, fossil fuels comprised around 80 percent of the world's total demand for energy (Foster & Elzinga, 2013). This creates vast pollution effects on the global climate. Therefore, there have been many conventions that discussed how to control fossil fuels demand and induce usage of renewable energy sources. The ecological situation in the world is one of the intangible components of the standard of life. Also, there has been outreach for companies to switch to renewable energy sources more and more. Switching to renewable energy sources has been seen as a signal for corporate social responsibility.

This research will not focus solely on the effect of switching to renewable energy sources, but it recognises that there could be an extra incentives for changes in the energy and power industry. One way to do so is to partake in an M&A deal, which enables firms to gain either cost efficiency, revenue efficiency, or market power. By adhering to corporate social responsibility, the firm can extract more gains as people value that aspect.

1.1. Research question

This research will focus on two markets, the US market, and the European market (Loughran, 2008). Because regulation for mergers and acquisitions is different in the two mentioned regions (Akbar & Suder, 2006), this research will answer if the location has an impact on the value effects of mergers and acquisitions. Also, effects will be examined for the acquiring firm in the transaction. The performance of the acquiring firm will be observed because often target firm is dissolved after M&A and data is not available. The period that will be analysed will be from 2011 to 2019. It was chosen to avoid unwanted effects of financial crisis in 2010s and avoid effects of COVID-19 pandemic. An event study will be conducted, and hopefully, it will provide instruments to draw a conclusion and answer the research question.

Taking all above mentioned into account, research question was formed:

What are value effects of mergers and acquisitions for shareholders of acquiring firm in energy and power industry from 2011 to 2019 in the US and the European market?

1.2. Paper outline

In the rest of the paper, mergers and acquisitions will be discussed more in detail. Section 3 will provide a theoretical background, which will discuss academic papers that covered a similar topics. The theoretical background is essential to introduce implications that have already been found in the past. Section 4 will give insight into the US and European energy industry. Section 5 will discuss the methodology that will be used to answer the research question. This research will use event study with Capital Asset Pricing Model and Efficient Market Hypothesis as important implications and tools for the research. Section 6 will discuss data that has been used and what restrictions and limitations the researcher has encountered. In section 7, results will be analysed. Finally, in section 8, final remarks will be made based on the results of the research and implications that based on the theoretical background.

2. Mergers and acquisitions

Mergers and acquisitions (M&A) have been used side by side for some time, and many people think they are perfect substitutes. Although both mergers and acquisitions often give the same net result, distinction between the two needs to be made.

Mergers are defined as a process that unites two companies into a single entity. Companies decide to merge for several reasons, some of them being gaining market share, reducing production costs, or raising profits and revenues. Mergers are usually separated into five categories: conglomerate, congeneric, market extension, horizontal, and vertical. In this research, mergers will not be compared at the category level (Hargrave, 2021).

On the other hand, acquisitions are defined as a process when one company enough other's company shares to gain control of that company. Purchasing more than 50% of the target firm's stock and assets authorizes the acquirer to decide about the target firm's business fully and consolidate it. Acquisitions may be with and without the target firm's approval. When it happens without approval, it is often referred to as a takeover. The reasons why companies decide to go through acquisition are gaining market share, acquiring a

department that does not exist in the acquirer's firm, reducing production costs, entering a new market, and others (Kenton W. , 2021).

As it was, hopefully successfully, explained, there is a clear distinction between mergers and acquisitions. However, it is evident that in both processes, at the beginning, we have two firms, and after, we have one firm, either as a new entity (if we talk about mergers) or just an acquirer's firm (if we talk about acquisitions). Also, as it was mentioned above, mergers and acquisitions occur because of similar reasons. Therefore, in this research, mergers and acquisitions will be studied as comparable.

3. Theoretical background

This section will discuss previous research that covered similar topic. Insight about M&As, energy industry, motives for M&As and impact of location will be given.

3.1. Paper by Pilloff and Santomero

A paper by Pilloff and Santomero is named: The value effects of bank mergers and acquisitions. This is a review of studies that focused on mergers and acquisitions. Although the paper was published 25 years ago, it is an overview of essential studies that this research will also study. Authors base their research on the literature review of academic papers that focus on bank mergers and acquisitions. M&A activity is beneficial to shareholders when a consolidated post-merger firm is more valuable than the sum of values of two individual firms that entered a merger. The main reasons for mergers are improvements in the efficiency. The most frequent reason is that M&A improves cost efficiency by assuming that the consolidated firm will achieve economies of scale or scope. Also, with the same reasoning, firms can improve revenue efficiency. Another reason for M&A could be to increase market power. This gain would be at the expense of the competitors in the market. Therefore, increasing market power can be exploited to some limit because the Federal Reserve and Department of Justice are formed to ban all M&As that create possible monopolistic markets (Pillof & Santomero, 1996).

In the next part, an overview of different results will be given. These researches were discussed in the paper by Pilloff and Santomero. A study by Berger and Humphrey examined accounting data of mergers that involved banks with at least $1 billion in assets. The authors

find that, on average, mergers led to no significant gains in X-efficiency, which is defined as deviation between a bank's actual costs and the minimum cost point on the frontier that corresponds to an institution similar to a viewed bank. The same study finds that, when analysing return on assets and total costs to assets, yields the same conclusion.

Another paper that Pilloff and Santomero discuss is a paper by DeYoung. DeYoung finds that in his dataset of 348 bank-level mergers, cost benefits do not exist. However, when both acquirer and target were poor performers, mergers resulted in improved cost efficiency.

Pilloff and Santomero also discuss a paper by Spindt and Tarhan, which finds that scale economies do exist for institutions holding less than $100 million in assets.

Hannan and Wolken, in their paper, find that target capital was negatively correlated to the change in total value.

Empirical evidence in the paper shows that, on average, there is no statistically significant benefit from M&A activity. Moreover, shareholders of acquired firms gain at the expense of the shareholders of acquiring firms. Authors have consolidated work from various academic papers that covered different locations and different periods. Authors are even more disturbed by the fact that the market is unable to predict whether the M&A will be successful. And still, mergers continue. The final truth about this question is not known, but it is still unclear if empirical evidence is wrong or that managers are acting to their benefit at the expense of shareholders (Pillof & Santomero, 1996).

In recent years, the managerial process has been monitored more closely, so we can expect that results from M&As could be more optimistic. Although this paper will not focus only on bank mergers, but on energy and power industry, a paper by Pilloff and Santomero will serve as a good theoretical background.

3.2. Paper by DeYoung, Evanoff and Molyneux

A paper by DeYoung, Evanoff, and Molyneux is named: Mergers and acquisitions of Financial Institutions: A Review of the Post-2000 Literature. This paper focuses on post-2000 literature about mergers and acquisitions. The paper aimed to provide an update of the previous literature reviews about mergers and acquisitions. It also studies motives to partake in mergers and acquisitions and tries to explain different dimensions of the motives,

namely raising managerial utility and becoming "too big to fail" (DeYoung, Evanoff, & Molyneux, 2009).

Authors separate two primary sources of M&A financial gains, namely improvements in operational efficiency and increases in market power. They suggest that the success of M&A can be tested by comparing pre-and post-merger levels of accounting ratios. Another way is to conduct an event study to capture the stock or bond market reaction to M&A announcements. Event studies calculate abnormal return, which is the amount by which the actual stock exceeded the stock price predicted by the asset-pricing model. The problem with this approach is that it is complicated to detect the source of value creation. Event studies of bank M&A in the 1980s and 1990s show, on average, that shareholders of acquired firms earn strong positive abnormal returns. In contrast, shareholders of acquiring firms earn marginal negative returns, and the combined abnormal returns were statistically insignificant (DeYoung, Evanoff, & Molyneux, 2009).

3.3. Paper by Andriuškevičius and Štreimikiene

Perspective about merger and acquisition activity in energy and power will be given by the discussion about the paper by Andriuškevičius and Štreimikiene. The development of energy drives composition of the energy industry. M&A activity follows trends in the industry and considers which sectors of the industry are attractive. Thus, changes in the global energy market influence the approach of each M&A deal. Also, since the energy source is often fixed to the location and has other unique characteristics, it creates unique advantages and disadvantages for possible acquirers. The energy industry is specific because of its declining levels of accessible oil and gas reserves. It consists mostly of non-traditional players such as national oil and gas companies, and companies in oilfield services market. Also, it is impacted by initiatives of governments worldwide to promote renewable energy sources (Andriuškevičius & Štreimikiene, 2021).

Throughout history, the energy industry has been exposed to several shocks. This was primarily due to geopolitical decisions, varying prices, and low economic growth. Also, the energy industry is relatively new, and the market is still evolving. The first shock was due to oil price changes in the 1980s and 2000s, which influenced more active market-altering

composition activity. As a response to the oil shocks, large-scale M&A deals were completed (Andriuškevičius & Štreimikiene, 2021).

Developments in the industry have forced companies to adapt and to search for new ways to gain market share and improve their market position. Many view M&A transactions as a more effective way to develop than internal development or strategic alliances. However, empirical evidence still does not provide results that M&A deals generate an economic return. Also, M&A deals are considered when companies want to increase operational efficiency. Since in the energy industry, especially for oil and gas companies, prices are depressed, increasing operational efficiency is important for a profitable company. Also, recent development in the industry has forced many companies to investigate renewable energy sources, which is expensive since the infrastructure is still not entirely built. Changes in the energy source imply that the industry changes reflect demand for green development (Andriuškevičius & Štreimikiene, 2021).

The fact that the energy and power industry is still not entirely exploited gives M&A specialists many opportunities to create value. However, there is still a knowledge gap that slows the development. The knowledge gap is mostly manifested from a methodological and managerial perspectives. The industry still needs to be studied thoroughly to reach its full potential.

3.4. Paper by Motis

Paper by Motis will provide insight into various motives that companies have for partaking in M&A deals. This paper has been chosen because it has used many sources, and it creates a thorough overview of the motivation for M&A deals. Motis segments motives in two main categories, a motive for shareholders' gains and motive for managerial gains. Since this research focuses on shareholders' gain, a paper by Motis will be discussed primarily concerning shareholders' gain. The author continues to segment shareholders' gains into the following subcategories: efficiency gains, synergy gains, cost savings, financial cost savings, enhancement or strengthen of market power (Motis, 2007).

Efficiency gains are defined as efficiencies that could be obtained, not only using mergers but also by internal growth, joint ventures, specialisation agreements. One way to achieve efficiency gain is to establish economies of scale. Economies of scale are present when

companies' average cost decreases as the output increases. So, short-run economies of scale can result from merging because two companies would get rid of double fixed costs, thus decreasing average cost of production. In the long-run, economies of scale can be achieved from mergers when the increase in output is more than double the increase in input. This usually happens when a larger firm invests in technology to induce production efficiency. Similar efficiency gain to economies of scale is economies of scope. Economies of scope are economies of scale when applied to multi-product firms (Motis, 2007). It is reached when the average cost of production of two products decreases when the products are produced jointly. The last reason for efficiency gains that Motis discusses are economies of vertical integration. They are realised when the sum of costs of separately owned stages of production falls when a single entity performs all stages of production. It can also be seen as an instrument to prevent opportunistic behaviour among firms with common investment contracts. Consequently, positive effects on specific investments that both parties may have together are also a valid argument of efficiency gains in vertical mergers.

The abovementioned efficiency gains are mostly related to technical efficiencies. Sinergy gains go beyond. It is mostly manifested in intangible gains that companies gain when merging, such as diffusion of know-how and research and development. Diffusion of know-how relies on the saying that "two heads are smarter than one." Via merger, companies combine their technological capabilities, human capital, organisational cultures, and patents, and if it is complementary, it will most likely result in technological progress. Also, the research and development department can benefit from the merging as the combined information can achieve more efficient technological progress (Motis, 2007).

Although cost savings and financial cost savings may seem redundant, Motis has separated them because he defines cost savings with respect to production savings, and financial cost savings with respect to administrative savings. Cost savings are realised by rationalisation, which relates to more optimal production across the different lines of production of the merging firms. Also, it can be achieved by greater purchasing power that the post-merger entity will have. It will create greater bargaining power, and therefore enable the entity to lower the price of supplies (Motis, 2007).

In the past, M&A deals achieved financial cost savings by creating a tax shield, thus decreasing tax liability for acquirer firms. Nowadays, tax laws have adapted, so this motive

cannot be exploited as in the past. However, there are other financial cost savings that firm can achieve by merging. Firstly, companies often do not have good credit ratings to borrow money and using mergers they gain better access to external capital with better terms. Also, another motive for M&A is to diversify the company. This motive lies in the modern portfolio theory, which states that the market value of the firm can be increased if it incurs optimal risk by investing in many uncorrelated instruments (Motis, 2007).

The last motive that will be discussed in a paper by Motis will be an enhancement or strengthen of market power. The author defines market power as the ability of a firm to raise prices above the level that would prevail under competitive conditions. M&A deals enhance market power by means of, among others, raising entry barriers, spreading portfolio. If the entry barriers are set low, the entity has a higher opportunity of tougher competition. Thus, by raising the entry barrier, the merging company increases its market power. A possible merger can increase market power if it unifies two potentially competing technologies. Spreading portfolio was already discussed in the text above, but it can also enhance market power by means of higher bargaining power. Portfolio theory states that buyers prefer to be supplied with different inputs by the same firm rather than by different firms, which results in higher bargaining power. Higher bargaining power may induce competitors to even exit the market (Motis, 2007).

3.5. Paper by Guo, Yang and Wang

Paper by Guo, Yang and Wang discusses Geographies of mergers and acquisitions of worldwide oil companies. This will provide background about the impact of location in M&A deals in the studied industry. Paper finds that oil and gas M&As are mostly domestic. This mostly relates to the complex political and economic relationships between countries. Due to the global oil and gas supply imbalance, companies are more inclined to achieve resource acquisition through M&As. Also, the paper found that North America and Europe are the most active regions for global oil and gas M&As. These regions are either economically developed or have a long history in the oil and gas sector. Companies from these regions have significant financial power and dominate the market. Recently, more and more M&As have been concentrated in few countries, which created a scale-free network. Scale-free

network means that there is an imbalance in market distribution, with oil and gas M&As deals being done by few countries while other countries maintain passive. The abovementioned finding implies that the entry barrier is set high. This research focuses on the US and European market and will try to determine any differences in the effects of M&As in these two markets (Guo, Yang, & Wang, 2021).

In conclusion, improvements in efficiency that are the main reason for M&A have not been verified. This goes along with the conclusion of the paper by Pilloff and Santomero. Above mentioned papers will provide a background of all important literature about mergers and acquisitions from 1980 to 2009. The provided background will serve as a foundation for the event study that conducted to answer the research question.

4. Industry

In this section, both US and European energy industries will be discussed, with respect to general market and also to regulation. Firstly, both markets will be discussed separately, and then in the conclusion of the section, apparent differences will be stressed. Overview of the market will be given from the MarketLine report. The last available consolidated report for Europe is from 2019, while the report for the US is from 2021.

In 2020, the US energy industry reached the value of $ 453.6 billion. It is forecasted to grow 6% annually and reach value of $ 480.7 billion in 2025. The largest segment of the US energy industry is conventional (fossil fuels) power generation, which accounts for 59.3% of the industry's total volume. US energy market accounts for 18.3% of the global energy industry value (MarketLine, Power Generation in the United States, 2021).

The energy industry is specific because there is a low opportunity for differentiation in the products. It is almost impossible to produce product that is significantly superior to the competitor's product. Therefore, companies gain market share by producing more efficiently. Leading players in the US market are Dominion Energy, Duke Energy Corp., NextEra Energy, and The Southern Company. The main strength of leading players in this industry is the existence of vertically integrated operations. So, companies are not just involved in the production but also in the energy distribution. Strategic acquisitions have become an effective way to enhance operational capabilities and drive growth. Many players in the market have switched more and more to renewable energy sources. However,

companies that are engaged in renewable energy production heavily depend on government policies and subsidies. The government provides incentives to support renewable production, but in the future, it may reconsider its policies and therefore leave companies without incentives to partake in renewable energy production (MarketLine, Power Generation in the United States, 2021).

In 2018, the European energy industry reached a value of $ 747 billion. It is forecasted that it will grow annually by 8.2 % to reach a value of $ 808 billion in 2023. As it is in US market, in European market conventional energy source represents biggest share, accounting for 47% of the industry's total volume. The energy industry can be divided into three areas: fossil fuel, renewable energy, and nuclear. For most European countries, fossil fuels or nuclear power dominate their power generation mix. However, demand for renewable energy sources has been increasing, which creates opportunities for new players in the market. The leading players in the European market have a strong presence in multiple countries, with diversified operations. Leading players are Centrice Pls., Electricite de France, Enel s.p.a, and E.ON SE. They are all characterised by their diversified operations (MarketLine, Power Generation in Europe, 2019).

Hopefully successfully, it was explained, both in US and European market companies rely mostly on fossil fuels with renewable energy sources still not being entirely utilised. The main difference between the markets is that US market is more homogenous in terms of regulation since it is in one country. European market, on the other hand, consists of many countries, and even though European Union tries to unify the market, there is still a lot of differences in the regulation from country to country. Every country has its national regulatory authority. In both markets, governments play an important role in utilising renewable sources as they all provide substantial support.

5. Methodology

5.1. Event study

Event studies have become an essential tool in finance. Therefore, in this research event study will be used as the main method. An event study is an empirical analysis that studies the impact of a certain event on some value, such as company stock. If the assumption that

the market is efficient holds, the impact of the M&A announcement can be measured by the change in the stock return around the time of the announcement. Paper by de Jong identifies three steps in conducting an event study (de Jong, 2007). First, identifying the event of interest. In this research, it will be the announcement date of the merger and acquisition. Second, specifying a benchmark for normal stock return behaviour. S&P 500 index has been chosen as a benchmark for the US market, and iShares Core MSCI Europe ETF for the European market. To estimate normal return of the target firm, CAPM (Capital Asset Pricing Model) will be used. Within CAPM, excess returns are modelled as:

$$R_{it} - R_{ft} = \beta_i(R_{mt} - R_{ft}) + \epsilon_{it}$$

CAPM is discussed in detail in chapter 5.2.

Third, calculate and analyse abnormal returns. Abnormal returns are defined as return minus the benchmark (de Jong, 2007). Typically, not only event date is studied, but also the period around the event date. This is called the estimation window. The usual method to study performance over a longer period is by calculating cumulative abnormal returns. Abnormal returns are aggregated from the start of the event period, t_1, up to time t_2, as follows (de Jong, 2007):

$$CAR = AR_{i,t1} + \cdots + AR_{i,t2} = \sum_{t=t1}^{t2} AR_{i,t}$$

In this research, the estimation window will include two days before the event, the event date, and two days after the event. The decision about estimation window could be crucial since it is necessary to include just the days impacted by the announcement of the merger and acquisition. Stock's normal returns are forecasted by comparing the movement of stock's returns with the movement of the benchmark's returns. This is done over a so-called estimation period which is before the event and does not overlap with the estimation window. In this research, the estimation period was a 100-day window starting at t-105 until t-5. An estimation period of 100 days was chosen to get precision when estimating α and β, but also so these coefficient do not become out-of-date (Armitage, 1995). For observation points that are more in history (from years 2012, 2011 and 2010) there was possibility that estimation period captures financial crisis. So, to avoid unwanted effects estimation period

was set a bit shorter. Both estimation period and estimation window are visible in Figure 1 below.

Figure 1

Estimation period, 100 days		Estimation window, 5 days

Event date

T= -105	T= - 5	T= - 2	T=0	T= 2
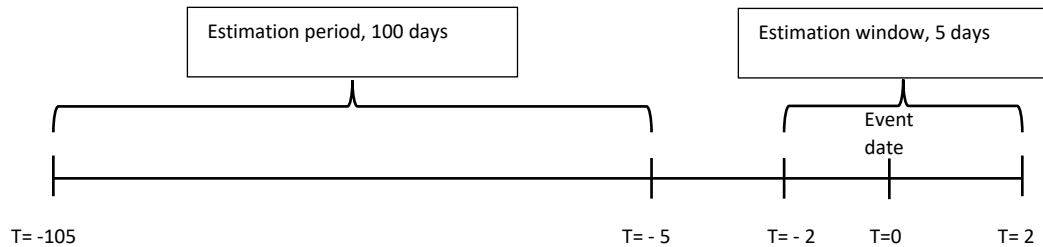
Even though reporting cumulative abnormal returns is often instructive and suggestive, it is supported by statistical tests (de Jong, 2007). Therefore, t-tests will be conducted to answer if the calculated CAR is significantly different from zero. The null hypothesis is as follows:

$$H_0: E(AR_{it}) = 0$$

Conducted t-test will be two-sided because it is still uncertain if there are any effects from M&As, i.e., abnormal returns could be positive and negative. If the t-test gives enough evidence to reject the null hypothesis, we can conclude that the abnormal return for the observed day is significantly different from zero.

Another hypothesis that this research will set is to test if the reaction from the US market (in terms of cumulative abnormal returns) is significantly different from the reaction from the European market. The null hypothesis is as follows:

$$H_o: CAR_{us} = CAR_{eu}$$

If the t-test gives enough evidence to reject the null hypothesis, we can conclude that the reaction of the US market is significantly different from the reaction of the European market.

The difference between the two datasets will also be tested by calculating Cohen's d (Statistics Solutions, 2021). The formula for the calculation is given below:

$$d = \frac{CAR_{us} - CAR_{eu}}{s}$$

Where CAR$_{us}$ is the mean cumulative abnormal return for the US market, while CAR$_{eu}$ is the mean cumulative abnormal return for the European market. S is the standard deviation of the consolidated dataset. Effect size and Cohen's d correspondingly measures the strength of the relationship between the two datasets. The greater the effect size, the greater the difference between the two datasets.

5.2.   Capital Asset Pricing Model

Capital Asset Pricing Model (CAPM) will be used to predict normal stock returns. By rearranging formula from above, we get:

$$NR_{it} = \widehat{\alpha_\iota} + \widehat{\beta_\iota} R_{mt}$$

The above-mentioned formula can be separated into three variables.

Firstly, $\hat{\alpha}$ represents abnormal returns that stock achieves that are not correlated to market returns. Thus, $\hat{\alpha}=0$ would indicate that the stock is tracking market movement perfectly and that the manager has not added nor lost any additional value compared to the market (Kenton W. , 2021). In this research, $\hat{\alpha}$ is calculated with Excel function, "intercept." Inputs for the Excel function were returns of reviewed stock as known y's and market returns as known x's. As function suggest $\hat{\alpha}$ is an intercept of the CAPM formula.

Secondly, $\hat{\beta}$ is a measure of volatility of the analysed stock. It represents the unsystematic risk that the stock encounters (Kenton W. , 2021). In CAPM, $\hat{\beta}$ is used to explain how much a risk stock has, relative to market risk. $\hat{\beta}=1$ means that the stock returns are perfectly correlated with market returns. $\hat{\beta}$ that is greater than one suggests that the stock has taken more risk than the market, while $\hat{\beta}$ that is lower than one suggest that market has higher level of risk than the stock. $\hat{\beta}$ captures three key determinants, namely nature of business, operating leverage and business leverage. In this research, $\hat{\beta}$ is calculated with Excel function, "slope". Inputs for the Excel function were returns of reviewed stock as known y's and market returns as known x's. As function suggest $\hat{\beta}$ is slope coefficient of the CAPM formula.

Lastly, R_{mt} represents market return, which often set by a benchmark proxy. Index fund is designed to mirror the financial performance of the market, and with diversification of the

risk it represents close approximation for market returns (Kenton W. , 2021). In this research, benchmark for US market is S&P 500 Index while for the European market it is iShares Core MSCI Europe ETF. S&P 500 Index tracks 500 large companies that are listed on the US stock exchanges. It is chosen because it should closely replicate market performance (Kenton W. , 2021). Finding benchmark for European market is a bit more challenging since it is a consolidation of many smaller markets. iShares Core MSCI Europe ETF tracks results of an index composed of large-, mid- and small-capitalisation European equity. Thus, it was chosen as a benchmark for European market.

CAPM is the most widely used model for asset pricing, mostly because there is not widely accepted alternative that computes expected returns (Chen & Dodd, 2002).

5.3. Efficient Market Hypothesis

Efficient Market Hypothesis (EMH) is a hypothesis that states that share prices reflect all available information in the market. So, if there is new information, such as M&A announcement, market would react quickly to that shock and correct prices. EMH is controversial assumption, and it is probably false, but it is a cornerstone of modern financial theory. However, advantage of EMH is that researchers can avoid the decision about what is reasonable information and trading costs. Instead, they can focus on the adjustment of prices (returns) to various kinds of information (Fama, 2017).

Fama introduces three market efficiency levels: a strong level where stock price is a valid representation of all relevant information about the stock, a semi-strong where all publicly available information forms the stock price, and a weak level where current prices are represented by all history of the prices.

Therefore, this research will, to some extent, test how efficient is the market. If the market is efficient, it should quickly react to the shock that announcement of M&A represent. Thus, if there are significant abnormal returns before the event, we can assume that there has been leakage of information. Also, abnormal returns after the event would signify that market reaction to the news is slower than expected.

This research will use stock returns, and not stock prices, because they can be compared between two observations.

While EMH assumes that market is efficient, CAPM assumes that portfolios are efficient (Chen & Dodd, 2002). This research will assume descriptive validity of both theories, and if the event study shows significant abnormal returns, the conclusion will be that market is inefficient.

6. Data

Merger and acquisition announcement dates will be retrieved from ThomsonOne database. Stock prices will be retrieved from ThomsonOne database. Data for S&P 500 Index and iShares Core MSCI Europe ETF will also be retrieved from ThomsonOne database. Data processing will be done in Excel.

Total number of observations is 186, with 34 being from European market and 152 from US market. Both datasets are presented in the appendices of the research paper (Appendix 1 and Appendix 2). It is clearly visible that US market is much more active. Restrictions that were set when extracting data were:

- Period was set between 2010 and 2020.

- More than 50 % of target shares were acquired.

- Both acquiring and acquired firms are public.

- Deal was completed.

Performance of acquiring firm was observed because often acquired firm would be dissolved and continue functioning as a branch of acquiring firm, and therefore data would be not available. Another limitation is that data for firms that went into default is not available in ThomsonOne database and therefore it cannot be observed. Also, if the firm changed name from the one it had when it was a part of M&A, it would create difficulties to find the exact firm, and not to bias results.

Stock prices that were retrieved were transformed into returns with the following formula:

$$R = \ln \left(\frac{P_t}{P_{t-1}} \right)$$

Where P_t and P_{t-1} are stock prices at time t and t-1.

7. Results

Results section will be separated in three parts. Firstly, we will discuss results of data from European market. Secondly, we will discuss results of data from US market. Thirdly, consolidated data from aforementioned two sets of data will be discussed. Lastly, we will discuss the results of testing if there is significant difference between the two markets. Also, effect size of the dataset will be discussed.

7.1. Results from European data

Results of t-test based on the European data is present in the Table 1 below.

Table 1.

T-test based on the European data	T-2	T-1	T=0	T+1	T+2	CAR
Mean	0.00699	0.00782	- 0.00730	0.00043	0.00143	0.00936
Variance	0.00052	0.00141	0.00159	0.00076	0.00083	0.00320
Observations	34	34	34	34	34	34
df	33	33	33	33	33	33
t Stat	1.78240	1.21415	- 1.06820	0.09026	0.28986	0.96479
P(T<=t) two-tail	0.08389	0.23331	0.29318	0.92862	0.77374	0.34167
t Critical two-tail	2.03452	2.03452	2.03452	2.03452	2.03452	2.03452

When significance levels of estimation window are considered, it is visible that only t-2 is significant at 10% significance level, while all other days are not significant at any conventional significance levels.

Presented CAR in the table represents cumulative abnormal return that includes t-2 to t+2. CAR (-1,1) equals 0.094%, while CAR (0,1) equals -0.68%. All days, except for event date (t=0), yield positive abnormal returns which results in positive CAR, in the amount of 0.94%. This signals that may have been leakages of the information, which, on average, yielded positive return for the shareholders of the acquirer's firm.

7.2. Results from US data

Results of t-test based on the US data is present in the Table 2 below.

Table 2

T-test based on the US data	T-2	T-1	T=0	T+1	T+2	CAR
Mean	- 0.00022	- 0.00314	- 0.01528	- 0.00424	- 0.00669	- 0.02957
Variance	0.00064	0.00060	0.00360	0.00186	0.00176	0.00744
Observations	152	152	152	152	152	152
df	151	151	151	151	151	151
t Stat	- 0.10908	- 1.58465	- 3.14020	- 1.21085	- 1.96699	- 4.22694
P(T<=t) two-tail	0.91328	0.11514	0.00203	0.22785	0.05102	0.00004
t Critical two-tail	1.97580	1.97580	1.97580	1.97580	1.97580	1.97580

If significance levels of all days are considered, it is visible that T-2 is insignificant, T-1 is around 10% significance level, T=0 is significant at 1% significance level, T+1 is insignificant while T+2 is around 5% significance level. So, for T-1, T=0 and T+2 null hypothesis that they equal zero can be rejected.

It is visible that all days over the estimation window yield negative abnormal returns, which results in CAR in the amount of -2.96%. CAR (-1,1) yields - 2.265%, while CAR (0,1) yields -1.952%. It is apparent, that also in the US market there are possible leakages of information which lead to negative abnormal returns.

7.3. Results from consolidated data

Results of t-test based on the consolidated data is present in the Table 3 below.

Table 3

T-test of Consolidated Data	T-2	T-1	T=0	T+1	T+2	CAR
Mean	0.00109	- 0.00113	- 0.01382	- 0.00338	- 0.00520	- 0.02245
Variance	0.00062	0.00076	0.00323	0.00166	0.00159	0.00687
Observations	186	186	186	186	186	186
df	185	185	185	185	185	185
t Stat	0.59850	- 0.56195	- 3.31653	- 1.13370	- 1.77854	- 3.69420
P(T<=t) two-tail	0.55024	0.57483	0.00110	0.25839	0.07696	0.00029
t Critical two-tail	1.97287	1.97287	1.97287	1.97287	1.97287	1.97287

This table could probably be biased towards the results of US data because there is around 5 times more observations of US market than the European market. Thus, results of consolidated data yield similar results as the US data with CAR being negative 2.22%. The fact that there are 5 times more observations from US data than the European data tells us that the US market is much more active in the M&A transactions.

7.4.   Testing for differences between the two datasets

In the methodology section, hypothesis to test whether there is significant difference between the two dataset was formed. In the table below we present the results of the t-test.

Table 4

t-test: Two-Sample	CAR (US)	CAR (EU)
Mean	-0.02957	0.009365
Variance	0.007437	0.003203
Observations	152	34
t Stat	-3.25392	
P(T<=t) two-tail	0.001735	
t Critical two-tail	1.993464	

T-test implies that two datasets yield significantly different results. So, CAR (-2,2) from US dataset is significantly different from the European dataset at 1% significance level.

Also, difference between the two datasets was tested by calculating Cohen's d effect size. Calculation resulted with Cohen's d being *0.48* which means there is medium effect size. Medium effect size also signifies there is difference between the two datasets.

8. Conclusion

In the introduction research question was formed. It stated:

What are the value effects of mergers and acquisitions for shareholders of acquiring firm in energy and power industry from 2011 to 2019 in the US and the European market?

To answer that question, author has undertaken event study on two datasets of firms that were part of M&As over the analysed period. Performance of the acquiring firm was observed because acquired firm was often dissolved with M&A in place. Based on the 34

observations from Europe dataset, and 152 observations from US dataset, event study found that CAR in Europe was positive, while CAR of US data was negative. However, CAR from European data set was insignificantly different from zero, while the US CAR from significantly different from zero. Therefore, we can draw conclusion based on the US data but the results from European dataset remain inconclusive.

Moreover, we have tested if the two datasets are significantly different and came to the conclusion that indeed they are significantly different. This hypothesis was tested by t-test and also by calculating Cohen's d.

Findings from US dataset correspond with the two academic papers that were discussed in the section of thereotical background. In papers by Pilloff and Santomero, and by DeYoung, Evanoff and Molyneux, it was concluded that M&As for shareholders of the acquiring firm result in loss.

Therefore, to answer the research question two answers are formed:

Firstly, for the US dataset, mergers and acquisitions have negative value effects for shareholders of acquiring firm in energy and power industry from 2011 to 2019.

Secondly, for the European dataset, mergers and acquisitions have insignificant positive value effects for shareholders of acquiring firm in energy and power industry from 2011 to 2019.

9. Bibliography

Akbar, Y. H., & Suder, G. G. (2006). The New EU Merger Regulation: Implications for EU-U.S. Merger Strategies. *Thunderbird International Business Review*, 667-685.

Andriuškevičius, K., & Štreimikiene, D. (2021). *Developments and Trends of Mergers and Acquisitions in the.* Kaunas: Energies.

Armitage, S. (1995). *Event Study Methods and Evidence on Their Performance.* Edinburgh: University of Edinburgh.

Chen, S., & Dodd, J. L. (2002). *Market Efficiency, CAPM, And Value-Relevance Of Earnings Abd EVA: A Reply To The Comment by Professor Paulo.* Pittsburg: Pittsburg State University.

de Jong, F. (2007). Event Studies Methodology. *Tilburg University*.

DeYoung, R., Evanoff, D. D., & Molyneux, P. (2009). Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature. *Journal of Financial Services Research*, 87-110.

Fama, E. (2017). Efficient Capital Market: II. In E. Fama, *The Fama Portfolio.* Chicago: University Chicago Press.

Foster, S., & Elzinga, D. (2013). *The Role of Fossil Fuels in a Sustainable Energy System*. Retrieved from UN Chronicle: https://www.un.org/en/chronicle/article/role-fossil-fuels-sustainable-energy-system

Guo, Y., Yang, Y., & Wang, C. (2021). *Global energy networks: Geographies of mergers and acquisitions of worldwide oil companies.* Beijing: Renewable and Sustrainable Energy Reviews.

Kenton, W. (2021, April 23). *Acquisition*. Retrieved from Investopedia: https://www.investopedia.com/terms/a/acquisition.asp

Kenton, W. (2021, April 1). *Capital Asset Pricing Model (CAPM)*. Retrieved from Investopedia: https://www.investopedia.com/terms/c/capm.asp

Loughran, T. (2008). The Impact of Firm Location on Equity Issuance. *Financial Management*, 1-21.

MarketLine. (2019). *Power Generation in Europe.* MarketLine.

MarketLine. (2021). *Power Generation in the United States.* MarketLine.

Motis, J. (2007). *Mergers and Acquisitions Motives.* Touluse: Toulouse School of Economics.

Pillof, S. J., & Santomero, A. M. (1996). The Value Effects of Bank Mergers and Acquisitions. *Financial Institution Center*.

Statistics Solutions. (2021, July 26). *Complete Dissertation*. Retrieved from Effect Size: https://www.statisticssolutions.com/free-resources/directory-of-statistical-analyses/effect-size/

Appendix 1. US dataset

Date Announced	Target Name	Acquiror Name	Enterprise Value at Announ. ($mil)	Equity Value at Announ. ($mil)
09.16.2019	SemGroup Corp	Energy Transfer LP	4,260	1,352.89
08.26.2019	SRC Energy Inc	PDC Energy Inc	1,637	971.57
08.21.2019	Kinder Morgan Canada Ltd	Pembina Pipeline Corp	1,329	923.65
07.15.2019	Carrizo Oil & Gas Inc	Callon Petroleum Co	2,624	722.38
06.28.2019	Hydrogenics Corp	Cummins Inc	231	231.55
06.24.2019	NRC Group Holdings Corp	Us Ecology Inc	1,873	480.81
05.06.2019	Amplify Energy Corp	Midstates Petroleum Co Inc	512	267.95
04.24.2019	Anadarko Petroleum Corp	Occidental Petroleum Corp	53,990	38,157.51
04.15.2019	Advanced Disposal Services Inc	Waste Management Inc	4,567	2,731.13
04.02.2019	AmeriGas Partners LP	UGI Corp	6,089	3,285.44
02.07.2019	Crius Energy Trust	Vistra Energy Corp	377	377.20
12.26.2018	Frontier Oilfield Services Inc	Galenfeha Inc	9	1.18
11.19.2018	Resolute Energy Corp	Cimarex Energy Co	1,520	832.01
11.08.2018	Western Gas Partners LP	Western Gas Equity Partners LP	12,116	7,680.06
11.01.2018	Newfield Exploration Co	Encana Corp	7,734	5,562.30
10.22.2018	EnLink Midstream Partners LP	Enlink Midstream LLC	11,966	6,517.49
10.10.2018	Blackpearl Resources Inc	International Petroleum Corp	527	434.57
10.09.2018	Antero Midstream Partners LP	Antero Midstream GP LP	7,209	5,691.98
09.19.2018	Dominion Energy Midstream Part	Dominion Energy Inc	5,792	2,306.41
09.13.2018	Marquee Energy Ltd	Prairie Pvdnt Resources Inc	45	12.41
08.14.2018	Energen Corp	Diamondback Energy Inc	9,100	8,307.67
08.13.2018	Trinidad Drilling Ltd	Ensign Energy Services Inc	728	349.55
07.16.2018	GulfMark Offshore Inc	Tidewater Inc	301	252.62
06.18.2018	Raging River Exploration Inc	Baytex Energy Corp	1,408	1,215.48
06.05.2018	Xtreme Drilling Corp	Akita Drilling Ltd	156	147.72
05.31.2018	Transbotics Corp	Scott Technology Ltd	np	-
05.17.2018	Enbridge Energy Partners LP	Enbridge Inc	11,223	3,749.07
04.30.2018	Andeavor Corp	Marathon Petroleum Corp	31,337	23,037.26
04.23.2018	Vectren Corp	CenterPoint Energy Inc	8,089	5,981.81
04.16.2018	Spartan Energy Corp	Vermilion Energy Inc	1,064	910.42
03.28.2018	Willbros Group Inc	Primoris Services Corp	138	37.94
03.15.2018	Connecticut Water Service Inc	SJW Group	1,125	830.29
03.12.2018	Grenville Strategic Royalty	Logiq Asset Management Inc	10	10.37
02.26.2018	HRG Group Inc	Spectrum Brands Holdings Inc	7,599	3,423.46
02.08.2018	Nustar GP Holdings LLC	NuStar Energy LP	780	738.26
01.24.2018	US Geothermal Inc	Ormat Technologies Inc	187	109.95
01.03.2018	SCANA Corp	Dominion Energy Inc	14,220	7,675.62
01.02.2018	Archrock Partners Lp	Archrock Inc	2,386	1,033.35
10.30.2017	Alterra Power Corp	Innergex Renewable Energy Inc	583	375.28
10.30.2017	Dynegy Inc	Vistra Energy Corp	10,223	1,738.85
09.15.2017	TerraVia Holdings Inc	Corbion NV	155	20.00
08.14.2017	Tesco Corp	Nabors Inds Ltd	141	216.20
07.06.2017	Trilogy Energy Corp	Paramount Resources Ltd	886	512.42

06.19.2017	Rice Energy	EQT Corp	6,400	5,287.63
05.15.2017	Ceiba Energy Services Inc	Secure Energy Services Inc	27	18.99
05.01.2017	Veresen Inc	Pembina Pipeline Corp	5,606	4,285.44
03.22.2017	Canyon Services Group Inc	Trican Well Service Ltd	448	427.18
03.07.2017	TerraForm Global Inc	Brookfield Asset Management	902	576.37
02.01.2017	ONEOK Partners LP	ONEOK Inc	23,324	15,515.51
01.25.2017	WGL Holdings Inc	AltaGas Ltd	6,584	4,519.31
12.12.2016	Seventy Seven Energy Inc	Patterson-UTI Energy Inc	1,530	1,124.22
11.24.2016	Savanna Energy Services Corp	Total Energy Services Inc	308	126.80
11.21.2016	Energy Transfer Partners LP	Sunoco Logistics Partners Lp	51,426	21,318.73
10.25.2016	PennTex Midstream Partners LP	Energy Transfer Partners LP	1,127	977.80
10.25.2016	Trans Energy Inc	EQT Corp	200	59.92
10.14.2016	Alon USA Energy Inc	Delek Us Holdings Inc	984	592.49
09.06.2016	Spectra Energy Corp	Enbridge Inc	43,144	28,286.20
08.22.2016	CST Brands Inc	Alimentation Couche-Tard Inc	5,275	3,688.49
06.07.2016	Striker Exploration Corp	Gear Energy Ltd	43	42.66
05.16.2016	Memorial Resource Dvlp Corp	Range Resources Corp	5,812	3,251.01
03.17.2016	Columbia Pipeline Group Inc	TransCanada Corp	12,026	10,195.95
02.01.2016	Questar Corp	Dominion Resources Inc	6,068	4,380.17
01.19.2016	Waste Connections Inc	Progressive Waste Solutions	8,083	5,932.04
12.17.2015	Lynden Energy Corp	Earthstone Energy Inc	96	67.52
11.12.2015	Petroamerica Oil Corp	Gran Tierra Energy Inc	88	110.71
11.03.2015	Targa Resources Partners LP	Targa Resources Corp	11,958	6,670.81
10.26.2015	Piedmont Natural Gas Co Inc	Duke Energy Corp	6,578	4,794.90
10.05.2015	Canadian Oil Sands Ltd	Suncor Energy Inc	4,453	2,907.29
09.04.2015	TECO Energy Inc	Emera Inc	10,361	6,480.19
08.26.2015	Cameron International Corp	Schlumberger Ltd	13,879	12,766.29
07.13.2015	MarkWest Energy Partners LP	MPLX LP	22,845	18,146.12
06.29.2015	Mapan Energy Ltd	Tourmaline Oil Corp	70	84.29
05.26.2015	Legacy Oil + Gas Inc	Crescent Point Energy Corp	1,167	458.06
05.06.2015	Crestwood Midstream Partners	Crestwood Equity Partners LP	6,081	3,532.63
02.23.2015	Artek Exploration Ltd	Kelt Exploration Ltd	206	170.76
02.17.2015	Pinecrest Energy Inc	Cardinal Energy Ltd	112	23.01
01.26.2015	Regency Energy Partners LP	Energy Transfer Partners LP	18,223	11,647.80
12.19.2014	Pan African Oil Ltd	Eco(Atlantic)Oil & Gas Ltd	0	3.42
12.18.2014	Pantry Inc	Alimentation Couche-Tard Inc	1,710	857.78
12.15.2014	Talisman Energy Inc	Repsol SA	12,798	8,288.97
12.04.2014	Anderson Energy Ltd	Freehold Royalties Ltd	108	30.75
10.13.2014	Atlas Energy LP	Targa Resources Corp	5,047	1,869.08
10.01.2014	Oiltanking Partners LP	Enterprise Products Partners	6,907	6,703.05
09.29.2014	Athlon Energy Inc	Encana Corp	6,609	5,693.19
09.03.2014	Bolt Technology Corp	Teledyne Technologies Inc	167	191.24
06.23.2014	Integrys Energy Group Inc	Wisconsin Energy Corp	9,120	5,746.97
05.07.2014	Richfield Oil & Gas Co	Stratex Oil & Gas Holdings Inc	23	18.12
04.30.2014	Pepco Holdings Inc	Exelon Corp	12,198	6,829.45
03.31.2014	Longview Oil Corp	Surge Energy Inc	363	250.28
03.11.2014	MGM Energy Corp	Paramount Resources Ltd	44	53.23
03.04.2014	Santonia Energy Inc	Tourmaline Oil Corp	162	140.97
02.18.2014	Pennant Energy Inc	Blackbird Energy Inc	2	1.62

12.17.2013	Syntroleum Corp	Renewable Energy Group Inc	24	40.28
12.11.2013	UNS Energy Corp	Fortis Inc	4,489	2,515.38
09.03.2013	Novus Energy Inc	Yanchang Petroleum Intl Ltd	290	220.47
08.20.2013	Sure Energy Inc	Tamarack Valley Energy Ltd	45	16.39
04.30.2013	Crimson Exploration Inc	Contango Oil & Gas Co	386	146.99
04.26.2013	Anatolia Energy Corp	CUB Energy Inc	nm	2.95
04.08.2013	Lufkin Industries Inc	General Electric Co	3,324	3,067.16
03.18.2013	Invicta Energy Corp	Whitecap Resources Inc	51	42.79
02.22.2013	IROC Energy Services Corp	Western Energy Services Corp	189	163.63
01.29.2013	Copano Energy LLC	Kinder Morgan Energy Partners	4,868	3,652.42
12.10.2012	Spartan Oil Corp	Bonterra Energy Corp	399	430.98
12.05.2012	Plains Expl & Prodn Co	Freeport-McMoRan Copper & Gold	17,204	6,450.39
11.01.2012	APIC Petroleum Corp	Dundee Corp	14	8.76
10.15.2012	Shona Energy Co Inc	Canacol Energy Ltd	130	121.05
08.20.2012	Pure Energy Services Ltd	FMC Technologies Inc	312	285.22
07.03.2012	Open Range Energy Corp	Peyto Expln & Dvlp Corp	176	114.75
06.04.2012	Credo Petroleum Corp	Forestar Group Inc	144	146.69
04.30.2012	Sunoco Inc	Energy Transfer Partners LP	5,850	5,262.55
03.15.2012	Reliable Energy Ltd	Crescent Point Energy Corp	106	94.06
02.28.2012	Midway Energy Ltd	Whitecap Resources Inc	557	444.66
01.20.2012	Bellamont Exploration Ltd	Storm Resources Ltd	108	77.95
01.16.2012	Provident Energy Ltd	Pembina Pipeline Corp	3,701	3,204.42
01.09.2012	SilverBirch Energy Corp	Teck Resources Ltd	413	413.39
10.31.2011	Pacific Northern Gas Ltd	AltaGas Ltd	229	139.18
10.17.2011	Brigham Exploration Co	Statoil ASA	4,782	4,406.76
08.26.2011	Realm Energy International	San Leon Energy PLC	116	142.72
08.16.2011	Tonbridge Power Inc	Enbridge Inc	216	70.76
07.20.2011	Nalco Holding Co	Ecolab Inc	8,110	5,411.91
07.14.2011	Petrohawk Energy Corp	Bhp Billiton PLC	15,557	11,776.25
06.20.2011	Capital Power Income LP	Atlantic Power Corp	1,964	1,075.23
06.16.2011	Southern Union Co	Energy Transfer Equity LP	9,275	5,560.76
06.06.2011	RockBridge Resources Inc	Cache Exploration Inc	0	0.25
05.24.2011	Cinch Energy Corp	Tourmaline Oil Corp	202	179.35
05.04.2011	Marsulex Inc	Chemtrade Logistics Income	418	437.62
05.02.2011	Torque Energy Inc	Eurogas Corp	9	7.67
04.28.2011	Constellation Energy Group Inc	Exelon Corp	11,431	7,840.11
04.20.2011	DPL Inc	AES Corp	4,672	3,519.17
04.08.2011	ProspEx Resources Ltd	Paramount Resources Ltd	171	152.03
04.07.2011	Stoneham Drilling Trust	Western Energy Services Corp	244	200.85
04.06.2011	Peak Energy Services Ltd	Clean Harbors Inc	213	174.78
04.01.2011	Spartan Exploration Ltd	Penn West Petroleum Ltd	146	143.39
03.08.2011	Lion Energy Corp	Africa Oil Corp	9	35.59
03.07.2011	Plutonic Power Corp	Magma Energy Corp	450	195.48
02.22.2011	Frontier Oil Corp	Holly Corp	2,645	2,853.91
01.17.2011	Petrolifera Petroleum Ltd	Gran Tierra Energy Inc	194	154.86
01.10.2011	Progress Energy Inc	Duke Energy Corp	25,649	13,618.33
12.23.2010	TG World Energy Corp	TVI Pacific Inc	8	4.16
11.30.2010	Baldor Electric Co	ABB Ltd	4,184	3,092.47
11.09.2010	Atlas Energy Inc	Chevron Corp	3,094	3,115.02

10.18.2010	Pantera Drilling Income Trust	Western Energy Services Corp	65	45.36
10.18.2010	NSTAR Inc	Northeast Utilities	6,930	4,198.40
09.13.2010	Excelsior Energy Ltd	Athabasca Oil Sands Corp	103	104.50
09.07.2010	Enterprise GP Holdings LP	Enterprise Products Partners	21,416	8,367.91
07.27.2010	American Oil & Gas Inc	Hess Corp	389	440.71
06.23.2010	Ryland Oil Corp	Crescent Point Energy Corp	91	85.61
06.09.2010	Storm Exploration Inc	ARC Energy Trust	600	512.64
05.10.2010	Redcliffe Exploration Inc	Paramount Resources Ltd	35	35.09
05.03.2010	Boralex Power Income Fund	Boralex Inc	311	224.08
02.11.2010	Allegheny Energy Inc	FirstEnergy Corp	8,974	4,733.31
02.01.2010	Innergex Renewable Energy Inc	Innergex Power Income Fund	348	159.02
01.15.2010	Landis Energy Corp	AltaGas Income Trust	20	20.12

Appendix 2. European dataset

Date Announced	Target Name	Acquiror Name	Enterprise Value at Announ. ($mil)	Equity Value at Announ. ($mil)
12.18.2019	Interregional Distn Grid Co	Rosseti PAO	np	-
12.05.2019	Energa SA	PKN ORLEN SA	2,432	546.77
10.15.2019	Eland Oil & Gas PLC	Seplat Petro Dvlp Co Ltd	451	451.15
01.31.2019	Ulusoy Elektrik Imalat	Eaton Corp PLC	244	260.10
11.26.2018	Faroe Petroleum PLC	DNO ASA	719	758.73
10.27.2018	G-Energy SA	Starhedge SA	1	1.37
09.04.2018	Ocean Rig UDW Inc	Transocean Ltd	2,716	2,959.59
04.18.2018	Direct Energie SA	Total SA	2,877	2,369.54
08.15.2017	Songa Offshore SE	Transocean Ltd	2,903	679.46
02.06.2017	Ithaca Energy Inc	Delek Group Ltd	1,592	630.29
10.10.2016	ANK Bashneft'	Rosneft Oil Co	10,593	10,593.43
05.30.2016	CHORUS Clean Energy AG	Capital Stage AG	620	327.96
05.19.2016	Technip SA	FMC Technologies Inc	6,291	6,773.25
05.09.2016	Saft Groupe SA	Total SA	1,131	1,071.81
12.10.2015	Tomskenergo	Inter RAO UES JSC	np	-
12.02.2015	Renewable Energy Generation	BlackRock Inc	104	97.23
11.24.2015	Falkland Oil & Gas Plc	Rockhopper Exploration PLC	nm	86.33
08.27.2015	MPI SA	Maurel et Prom SA	nm	216.35
04.08.2015	BG Group PLC	Royal Dutch Shell PLC	81,011	69,446.75
01.20.2015	Interoil Expl & Prodn ASA	Andes Energia PLC	46	3.61
05.23.2014	Mediterranean Oil & Gas PLC	Rockhopper Exploration PLC	59	76.70
05.23.2013	Lochard Energy Group PLC	Parkmead Group PLC	29	22.12
11.12.2012	Aurelian Oil & Gas PLC	San Leon Energy PLC	14	98.06
08.17.2012	Melrose Resources PLC	Petroceltic International PLC	586	259.87
02.07.2012	Bashkirenergo	Inter RAO UES JSC	1,147	1,121.62
12.12.2011	Newave Energy Holding SA	ABB Ltd	158	180.91
10.28.2011	Kamchatskenergo	RusHydro	np	-
10.05.2011	EnCore Oil PLC	Premier Oil PLC	289	316.92

06.07.2011	FIPP SA	Acanthe Developpement SA		2	2.19
12.16.2010	OGK-3	Inter RAO UES JSC		1,049	2,729.14
11.29.2010	Centric Energy Corp	Africa Oil Corp		44	44.24
11.15.2010	Solarparc AG	SolarWorld AG		91	56.98
10.25.2010	Peterburgskaya Sbytovaya	Inter RAO UES JSC	np		-
10.20.2010	Petrol Ofisi AS	OMV AG		2,482	2,570.94
06.21.2010	Subsea 7 Inc	Acergy MS Ltd		2,479	2,496.02
04.22.2010	Saratovenergo	RusHydro	np		-
04.22.2010	Peterburgskaya Sbytovaya	RusHydro	np		-
04.02.2010	OGK-6	OGK-2		1,862	1,532.21