

M&As in European and North American Energy Markets: Implications for the Assessment of Legal and Ownership Unbundling

An Event Study Analysis

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Abstract

Competition and antitrust law aims to prevent companies from engaging in anti-competitive behavior and to promote and protect market competition. In this context, mergers and acquisitions are under particular scrutiny, since they are often assumed to be motivated by possible market power increases, thus adversely affecting market efficiency. With a view to recent efforts within the European Union to increase competition law effectiveness in the energy market (i.e. legal and ownership unbundling as policy tools geared towards forcing corporations into demerging transactions), an event-study approach is applied in this paper to evaluate the market response to the announcement of mergers and acquisitions in EU and US energy markets and to determine whether or not the hypothesis that M&As result in increased market power of the joined companies actually holds true. Findings indicate that increases in market power are not the main motive for energy market M&As. The results thus do not confirm the general adequacy of legal and ownership unbundling as veritable competition law instruments against market imperfections and failures.

Keywords

Mergers, Acquisitions, Energy Markets, Regulation, Unbundling

JEL Classification

G34, G38, L40, L97

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1. Introduction

Competition or antitrust law is geared towards preventing companies from anti-competitive behavior by promoting and protecting market competition. Thus, lawmakers want to secure and improve market efficiency, minimize the risk of market imperfections or failures, and to safeguard and improve social welfare in general as well as consumer welfare in particular.

In reaching these objectives, controlling mergers and acquisitions (M&As) plays a crucial role. Both in the EU and the US, competition law enables competition authorities to supervise M&As and, if deemed necessary, to either intervene – such that market competition is no longer threatened – or even prohibit them. An important concept in this context is market power, which is seen as the primary and crucial factor in enabling companies to actually behave abusively. Mergers and acquisitions are therefore under special scrutiny with regard to whether or not the market power of the companies involved increases as a result of the proposed M&A transaction.

This paper focuses on the energy market, i.e. a market that has drawn growing attention of researchers since increased liberalization efforts – started in the 1980s in the US and the mid-1990s in the EU – destroyed formerly monopolistic structures and introduced market competition in a previously nationalized sector. In recent years, with the EU Commission and Parliament pushing to improve the “functioning” of its internal energy market in order to reach the objectives set by its Europe 2020 Strategy for a “competitive and sustainable supply of energy to our economy and society”(Oettinger, 2010), new ideas have been put forward on how to reach these goals.

Among the various options discussed, a special emphasis is put on the competition law concepts of legal and ownership unbundling. Legal unbundling can be considered as being the less disruptive approach, where companies retain ownership of all corporate assets (for generation and transmission) but need to create a separate legal entity for the autonomous management of transmission assets. Ownership unbundling is a more aggressive approach, where companies are forced to sell off either transmission or generation assets. Ownership unbundling, and to some extent also legal unbundling, can therefore be interpreted as concepts forcing energy market companies to take part in what can be referred to as demerger processes, thus neutralizing any positive (or negative) effects resulting from the initial pooling of operations. This also provides the main rationale for the EU’s interest in legal and ownership unbundling, as both options are expected to decrease the market power of companies currently operating in the energy market, resulting in increased competition and generating positive effects on consumer welfare.

However, there are certain caveats to be considered. According to M&A literature, market power considerations are not the sole motivation for mergers and acquisitions. In fact, there are at least three additional hypotheses that may influence managers to engage in M&As, i.e. the Efficiency Hypothesis, the Hubris Hypothesis, and the Principal-Agent Hypothesis. In this working paper, an event-study approach to evaluate market response to M&A announcements is used in order to test which hypothesis/hypotheses is/are supported by the results achieved. If the Market Power Hypotheses is thus confirmed to be the sole hypothesis explaining mergers and acquisitions in the energy market, then it seems feasible to conclude that legislation resulting in demerging transactions (i.e. legal and ownership unbundling) may actually address market power issues, thus improving market competition and consumer welfare. However, if the Market Power Hypothesis plays only a minor role (or no role at all) in persuading corporate management bodies to participate in M&A transactions, legal and ownership unbundling might not be suitable policy instruments to achieve regulatory objectives and may in fact even have counterproductive effects that could lower market efficiency and adversely affect consumer welfare.

The following working paper is thus organized as follows: Section 2 gives a short overview of the literature dealing with event-study methodology and its application to mergers and acquisitions. In Section 3, four mainstream hypotheses on what drives M&A transactions are discussed and a theoretical framework for the interpretation of their effects, using the event-study approach, is introduced. Following a short description of the data sets and a methodological overview for evaluating the effects of merger announcements in Sections 4 and 5, Section 6 highlights the computational results and summarizes and discusses possible policy implications. Finally, Section 7 concludes and indicates future steps for additional research and refinement.

2. Event Studies and Mergers

The event-study methodology has a long history. According to a historic overview by Binder (1998), it was originally introduced by Fama, Fisher, Jensen and Roll (1969), who applied it to measure the effects of stock split announcements on stock prices. Since then various extensions and modifications of the original methodology have been published, with some of them addressing issues such as different methods and models to compute normal returns used for benchmarking (see for example Dyckman, Philbrick, & Stephan, 1984), others discussing shortcomings of the statistical tests applied (see for example Boehmer, Masumeci, & Poulsen, 1991; Corrado, 1989; Cowan, 1992) and still others challenging the theoretical approach (see below) underlying the methodology. Nonetheless, countless papers have applied the event study approach over a broad variety of topics until today and continue doing so (Corrado, 2011).

The basic approach of an event study is to analyze the effects of a specific “event” (e.g. earning announcements, media reports, industry news or M&A announcements) on the value of a company via testing financial markets’ data for statistically significant changes attributable to that event. The theoretical framework that provides for the rationale of using the event study methodology to evaluate whether an event has effects on a company, is commonly referred to as the semi-strong version of the Efficient Market Hypothesis.

According to the Efficient Market Hypothesis, a concept dating back to 1967, all publicly available information is reflected in current market prices, which immediately (and without bias) adapt as new information becomes available (Brealey & Myers (1995) and Cornell & Morgan (1990) in Cox & Portes, 1998). In the case of mergers and acquisitions, the actual announcement of an M&A can be considered as the event where information about a proposed merger is first released to the public. Therefore, as soon as news of a planned M&A reaches the market (i.e. on the announcement day), the stock prices of both the acquiring company as well as the target company adjust in order to reflect the new situation and indicate the market’s updated estimation about the present value of the involved companies’ future cash flows. The market’s reaction can thus be interpreted as the “single best estimate, based on publicly available information”, on how an announced M&A transaction impacts future company profits (Cox & Portes, 1998).

A large number of event studies has already been conducted in the area of mergers and acquisitions, yet empirical research yields mixed results, as has been shown by Sudarsanam (2003). In his overview of event studies on M&As, he evidences that acquiring companies may either experience small abnormal gains or losses following an acquisition announcement, whereas the effects on target companies are more consistently found to be positive.

3. Theoretical Merger Framework

The ambiguous results of event studies on mergers and acquisitions reflect the fact that a number of diverse motives may serve as the rationale behind M&A transactions. Several authors have published hypotheses trying to capture and explain these motives and, based on Sudarsanam, Holl and Salami (1996) as well as Wårell (2007), the most important of these hypotheses are presented and discussed in the following.

Merger hypotheses are usually classified as belonging to one of two broad categories of theoretical frameworks, i.e. the Neoclassical Framework or the Managerial Framework, which are set apart by a

fundamentally different approach as to what triggers and motivates mergers and acquisitions. According to the Neoclassical Framework, companies (i.e. their managers) act efficiently and aim to enhance and maximize shareholder wealth through M&A transactions. Under the Managerial Framework however, manager decisions on M&As may be motivated by non-efficient behavior or self-interest and thus have negative effects on shareholder wealth.

3.1 Neoclassical Theory Framework

Hypothesis 1, Market Power

In accordance with the main assumption of the Neoclassical Framework, the Market Power Hypothesis implies that M&A transactions are motivated by participating companies trying to maximize shareholder wealth. The value of the combined companies is therefore supposed to exceed the values of individual constituents operating separately. Under the Market Power Hypothesis, this increase in shareholder wealth is directly attributable to an increase in the combined companies' ability to control the market and set prices, thus raising their profitability. In addition, shareholder wealth of rivaling businesses is also expected to rise, as greater market consolidation enables them to step up prices as well. However, as a result of these developments, in particular the general increase in prices, consumer welfare is expected to drop under the Market Power Hypothesis, as consumers will be exploited and adversely affected. Hence, as has already been suggested, this hypothesis provides the main support for the legislative approach of legal and ownership unbundling, as competition law in general and thus also the specific concept of unbundling in the energy market is geared towards making and keeping markets efficient, promoting and protecting market competition and safeguarding and improving consumer welfare.

| | |
|-----------------------------|---|
| H ₁ Market Power | Both the acquiring and target company experience significant wealth gains ¹ , with a total positive effect on the combined companies. Rivals also experience significant wealth gains, while consumer welfare decreases. |
|-----------------------------|---|

Hypothesis 2, Efficiency

Under the Efficiency Hypothesis, which is also attributable to the Neoclassical Framework, the value of the combined companies is also supposed to exceed the values of the formerly separated entities. However, in contrast to the Market Power Hypothesis, companies do not try to maximize shareholder wealth by increasing their control over the market. Instead, additional profits are ascribed to increases

¹ i.e. Cumulative Average Abnormal Returns as given by the applied event study methodology (see section 5)

in efficiency through synergy effects. Various sources for these synergies have been identified in the relevant literature, ranging from operational synergies (e.g. centralization of production and merging of distribution channels) over managerial synergies (e.g. competent management team for both companies) to financial synergies (e.g. tax advantages) (Sudarsanam et al., 1996). Also, in contrast to the Market Power Hypothesis, rivaling companies' shareholder wealth is supposed to decrease under the Efficiency Hypothesis. This is due to the more efficient competitor in the market (i.e. the now merged companies) and the resulting competitive disadvantage for rivals, as downward pressure is applied on market prices and thus also on rivals' profitability. Decreasing consumer prices, however, are expected to lead to an increase in consumer welfare.²

H₂ Efficiency Both the acquiring and target company experience statistically significant wealth gains, with a total positive effect on the combined companies. Rivals experience significant wealth losses, while consumer welfare increases.

3.2 Managerial Theory Framework

Hypothesis 3, Hubris

The Hubris Hypothesis, initially developed and described by Roll (1986), is the first Managerial Theory Framework discussed in this paper. In contrast to the Neoclassic Hypotheses presented above, its influences on merging companies are more heterogeneous. Under the Hubris Hypothesis, it is assumed that the management of the acquiring company overvalues the possible gains from an M&A transaction and thus pays a higher price than what would be warranted following a correct validation of the future value of the combined companies. Accordingly, target shareholder wealth increases, while acquirer shareholder wealth decreases. The total effect on the combined company should therefore be zero or slightly negative (e.g. due to transaction costs). No effects on rivals or on consumer welfare are considered under the Hubris Hypothesis.

² There is a caveat worth noting: The negative effect of the Efficiency Hypothesis on rivals may be outweighed by what Eckbo (1989) refers to as the positive information signaling effect, arising from the merger indicating to the market that also non-merging firms might be merger targets for as of yet unrealized but possible efficiency gains (see also Cox & Portes, 1998). This essentially means that not all mergers categorized as being assigned to the H₁ Hypothesis of Market Power, may really be motivated by market power increases, but that they may also be attributable to the Efficiency H₂ Hypothesis, even though rivaling companies in these cases experience a rise in shareholder wealth.

H₃ Hubris The acquiring company experiences a statistically significant wealth loss, while the target company exhibits a significant wealth gain. The total effect on the combined companies is close to zero.³

Hypothesis 4, Principal-Agent

The Principal-Agent Hypothesis, based on Jensen and Meckling (1976), is another hypothesis within the Managerial Theory Framework. The Principal-Agent Hypothesis suggests that the acquiring company's management's (i.e. the agent's) aims might differ substantially from those of its shareholders (i.e. the principal) and that, motivated by self-interest, the management may therefore decide to acquire a specific target company for the wrong reason(s), thus jeopardizing shareholder wealth. Possible explanations for this kind of behavior include managerial remuneration being linked to company revenue, managerial job satisfaction and power position or other factors closely related to total company size (which would increase as a result of an M&A transaction, regardless of the motive). Accordingly, under the Principal-Agent Hypothesis, acquiring company shareholder wealth is supposed to decrease. Simultaneously, two diametrically opposed forces affect target shareholder wealth, on the one hand an upward force resulting from the acquirer's bid for the target (at above the current target market price), on the other hand a downward force due to the precarious consequences an ill-motivated merger might have on the target's future cash flows. Accordingly, the total wealth effect on the combined company may be positive or negative, depending on how the market assesses these effects. Again, no effects on rivals or on consumer welfare are considered under this hypothesis.

H₄ Principal-Agent The acquiring company experiences a statistically significant wealth loss, while the target company either exhibits a significant wealth gain, loss or no significant result at all. The total effect on the combined companies is either positive or negative.⁴

Table 1 summarizes the implications and effects of an M&A announcement on merging companies according to hypotheses H₁₋₄.

³ In order to differentiate between M&As attributable to H₃ and H₄, total effects on the combined company value are therefore assumed to be close to zero for the H₃ Hubris Hypothesis: $0.009 > \overline{CAR}_{(-2,2)} > -0.009$ (Wårell, 2007).

⁴ In order to differentiate between M&As attributable to H₃ and H₄, total effects on the combined company value are therefore assumed to be clearly positive or negative for the H₄ Principal-Agent Hypothesis: $\overline{CAR}_{(-2,2)} > 0.009, \overline{CAR}_{(-2,2)} < -0.009$.

| | Acquirer | Target | Portfolio* | Rivals | Consumer Welfare |
|--------------------------------|-----------------|---------------|-------------------|---------------|-------------------------|
| H ₁ Market Power | + | + | + | + | - |
| H ₂ Efficiency | + | + | + | - | + |
| H ₃ Hubris | - | + | 0 | N/A | N/A |
| H ₄ Principal-Agent | - | +/- | +/- | N/A | N/A |

Notes: * market-value weighted portfolio of acquirer and target (see below)

Table 1, Hypotheses effect overview

The above analysis of the implications of the various hypotheses for mergers and acquisitions leads to the conclusion that in order for market-wide demerging legislation (legal or ownership unbundling) to be a generally warranted regulatory policy in the energy market, all (or at least the better part of all) analyzed M&A transactions should be attributable to the H₁ hypothesis. If however, market power is not the main motive for M&As in the energy market, then competition regulation forcing corporations into demergers, will not be a suitable policy instrument to reduce the market power of affected companies.

Under the hypotheses H₂₋₄, consumer welfare and market competition is either positively affected or not affected at all by M&A transactions, in which case competition authorities should not introduce legislation forcing energy companies to demerge.⁵

4. Dataset

This paper is based on two unique datasets of energy sector mergers and acquisitions announced in the European Union and North America between 1990 and 2010. The data was collected using the Thomson SDC Platinum database.

Several restrictions were applied for M&A events to be included. First, only M&As between companies already operating in the energy sector were considered, and selected on the basis of their NAICS (North American Industry Classification System) codes.⁶ Second, both the acquirer and the target of each M&A were required to be publicly traded companies in order to ensure stock data availability. Third, share buybacks (by default part of the M&A database of Thomson SDC Platinum) were eliminated from the study. The resulting datasets comprise 105 mergers and acquisitions in the European Union and 78 M&As in North America.

⁵ The hypotheses H₁ through H₄ are not mutually exclusive reasons for M&A transactions. However, the event study methodology helps to ascertain the dominant motive in accordance with the market's perception.

⁶ NAICS codes of companies included in the sample: 22111A, 221121, 221122, 221112, 221111, 221210, 221113, 221119, 486210. This selection is largely based on the "utility"-sector data classification in the Thomson SDC Platinum database, while companies with non-energy NAICS codes were omitted.

Rivals were selected on the basis of NAICS codes shared with the two companies engaged in an M&A and their geographic proximity, i.e. only rivaling businesses located in the same country (EU) or same federal state (US) were considered. Both, the Amadeus database (EU data) as well as SEC's EDGAR (Electronic Data Gathering, Analysis, and Retrieval system) system (US data), were used in this classification process.

For the OLS regression, national stock market indices were used as a reference for the European Union sample wherever possible, while the S&P 500 was used for the US sample. For the market-value weighted portfolios, EURO STOXX 50 (EU) and S&P 500 (US) were considered appropriate market indices. Company stock prices and market values as well as stock market data were gathered using Thomson Reuters Datastream.⁷

5. Methodology

Following the event study approach as outlined by Brown & Warner (1980, 1985), the announcement day of an M&A is defined as Day 0 and the event period (including Day 0 and consisting of a total of 11 trading days) ranges from day -5 to day +5.

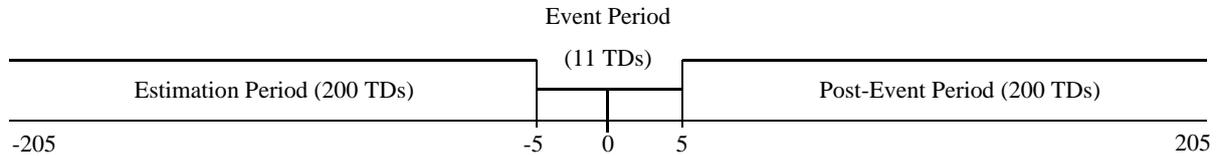


Figure 1, Event study period overview

From a total observation period of 411 trading days for each company i , a 200 trading-day-interval of Actual Returns from day₋₂₀₅ to day₋₆ (the estimation period) is used to run an OLS regression on stock market data in order to compute the model parameters α and β . This is commonly referred to as the market model approach:

$$R_{it} = \alpha_i + \beta_i * R_{mt} + \tilde{\epsilon}_{it} \quad (1)$$

where

R_{it} = actual rate of return, company i , day t

R_{mt} = rate of return, market index m , day t

⁷ Returns for the market-value-weighted portfolio are calculated using daily market values of both the acquiring and target company as follows: $R_{it}^P = [(R_{it}^A * MV_{it}^A) + (R_{it}^T * MV_{it}^T)] / [MV_{it}^A + MV_{it}^T]$.

α_i, β_i = regression coefficients

$\tilde{\epsilon}_{it}$ = error term.

Following this, α and β are then used to calculate Expected Returns ER_{it} for each company i and every day t .

$$ER_{it} = \alpha_i + \beta_i * R_{mt} \quad (2)$$

A subtraction of the Expected Return from the Actual Return yields the Abnormal Return AR_{it} , which can be interpreted as being conditional on the event (i.e. on the merger announcement) only and unconditional on market influences (Kothari, Warner, & Eckbo, 2007).

$$AR_{it} = R_{it} - ER_{it} \quad (3)$$

As the 11-day event period is defined as ranging from day₋₅ to day₊₅, this is also the period of interest for every day of which a cross-sectional Average Abnormal Return \overline{AR}_t is computed as in equation 4. It is important to note that these sample averages are calculated separately for both the EU and US datasets, and for 3 sub-samples each (the acquiring companies, the target companies and the market-value-weighted portfolios of acquirer and target⁸), thus yielding a total of six sub-samples.

$$\overline{AR}_t = \frac{1}{n} \sum_{i=1}^n AR_{it} \quad (4)$$

Furthermore, Average Abnormal Returns from the event period are also aggregated over time (starting at $t1$ through $t2$) in order to compute a Cumulated Average Abnormal Return $\overline{CAR}_{(t1,t2)}$ as in Halpern (1983). This allows to detect Abnormal Returns attributable to the M&A announcement, even though they might have occurred just before the official announcement (e.g. due to information leaks or insider trading) or immediately after it (e.g. delayed publication of announcement).⁹

$$\overline{CAR}_{(t1,t2)} = \sum_{t=t1}^{t2} \overline{AR}_t \quad (5)$$

For significance testing of both Average Abnormal Returns and Cumulative Average Abnormal Returns, the nonparametric rank test approach established by Corrado (1989; Corrado & Zivney, 1992) and expanded by Cowan (1992) is used, as it offers improvements over parametric tests

⁸ Market-value-weighted portfolios are built in order to be able to evaluate the total effects of merger announcements on both the acquiring companies and target companies. Returns are market-value-weighted to control for different company sizes and thus differences in how much individual returns of involved firms affect total merger effects.

⁹ Individual company i Abnormal Returns can also be aggregated over time (starting at $t1$ through $t2$) in order to compute Cumulated Abnormal Returns $CARS_{(t1,t2)}$.

concerning specification and power for a vast number of event conditions (Campbell & Wasley, 1993). Most importantly, the nonparametric rank test does not require normal distribution of returns to be properly specified under the null hypothesis of no Abnormal Returns (Campbell & Wasley, 1996). This is an essential feature for this paper, as Corrado (2011) notes that non-normality poses a serious threat with Returns data of non-NYSE stock exchanges and that this might lead to rather poorly specified parametric tests. In addition (and also in contrast to parametric tests), the rank test offers superior power under the alternative hypothesis of Abnormal Returns and is considerably less affected by event-induced variance increases, while at the same time being robust to whether or not the cross-sectional distribution of Abnormal Returns is skewed (Corrado, 1989, 2011).

Thus, following the computation of Average Abnormal Returns as well as Cumulative Average Abnormal Returns, each security's time series of Abnormal Returns, ranging from day₋₂₀₅ to day₊₅ (i.e. from the estimation period and the event period, a total of 211 days), is transformed into a series of relative ranks K_{it} ¹⁰:

$$K_{it} = \text{rank}(AR_{it}), t = -205, \dots, +5 \quad (6)$$

where

$$AR_{it} \geq AR_{ij} \text{ implies } K_{it} \geq K_{ij} \text{ and } 211 \geq K_{it} \geq 1.$$

The rank test statistic Z_R ¹¹ for Average Abnormal Returns on day t is then given by equation 7:

$$Z_R = \left[\frac{1}{n} \sum_{i=1}^n (K_{it} - 106) \right] / S(K) \quad (7)$$

with 106 being the average rank of Abnormal Returns¹² and the standard deviation $S(K)$ being computed with data from the estimation and event period (211 trading days) as in equation 8.

$$S(K) = \sqrt{\frac{1}{211} \sum_{t=-205}^5 \left(\frac{1}{n} \sum_{i=1}^n (K_{it} - 106) \right)^2} \quad (8)$$

¹⁰ The method of mid-ranks is used on ties.

¹¹ Z_R = near standard normal distributed test-variable (Corrado & Zivney, 1992; Güttler, Paveleanu, & Behr, 2005; Renneboog, 2006)

¹² By design of the rank test, the average rank of abnormal returns from the estimation and event period (211 trading days), is half the number of abnormal returns plus one half, thus yielding 106 in this case.

Equation 9 illustrates the rank test statistic for Cumulative Average Abnormal Returns as specified by Cowan (1992):

$$Z_R = \frac{[\sqrt{d} * (\bar{K}_D - 106)]}{S(K)} \quad (9)$$

where

d = number of days over which \overline{CAR} has been accumulated

\bar{K}_D = average rank across n securities and d days.

However, there are caveats to be considered, as according to Cowan (1992), the rank test still rejects the null hypothesis too frequently under conditions of variance increases. Moreover, the test's statistical power drops rapidly with an increase in the number of days over which the Cumulative Average Abnormal Return has been accumulated – an obvious issue, as after the transformation of Abnormal Returns to rank numbers, the magnitudes of Returns are no longer captured for the purpose of the rank test, but replaced by a relative rank system (Kolari & Pynnonen, 2011). This makes it more likely that ranks cancel each other out, the longer the observed \overline{CAR} time frame. Significant results are therefore interpreted as high boundaries of real-world effects.

6. Results

For the EU sub-sample (Table 2), results indicate that acquiring companies experience no significant \overline{AR} s on most days of the event window. An exception is day₀ with a small positive Average Abnormal Return of 0.35% (statistically significant at 10% level). Targets exhibit a highly significant (p-value <0.01) positive \overline{AR} on the announcement day (day₀: +1.19%) and several significant Abnormal Returns on the 4 days immediately surrounding day₀. There is also a statistically significant \overline{AR} on day₄, at -0.29%. Portfolios show a highly significant positive Abnormal Return on day₀ (+0.71%).

| EU: Average Abnormal Returns | | | |
|------------------------------|----------|-----------|-----------|
| Day | Acquirer | Target | Portfolio |
| -5 | -0.12% | 0.01% | -0.02% |
| -4 | -0.01% | 0.19% | 0.06% |
| -3 | -0.29% | 0.10% | -0.04% |
| -2 | -0.10% | -0.01% * | -0.11% |
| -1 | -0.13% | 0.55% * | 0.00% |
| 0 | 0.35% * | 1.19% *** | 0.71% *** |
| 1 | -0.43% | 1.09% * | 0.30% |
| 2 | -0.05% | 0.37% ** | 0.16% |

| | | | |
|----------|--------|----------|--------|
| 3 | 0.01% | 0.24% | 0.15% |
| 4 | -0.12% | -0.29% * | -0.18% |
| 5 | 0.10% | -0.10% | 0.09% |

Note: ***, **, * indicate significance at 1%, 5% and 10% levels respectively.

Table 2, EU Average Abnormal Returns & significances, acquirers, targets & market-value weighted portfolios

Concerning the US sample (Table 3), findings show some similarities but also several differences. Acquiring companies feature a significant negative \overline{AR} on day₀ of -0.64%. Target companies' \overline{AR} is highly significant on day₀ (+7.84%) as well as on day₋₃ (0.83%) with an additional significantly positive Abnormal Return (+2.34%) on day₁. Portfolio Average Abnormal Returns are also positive and significant on day₀ with 1.65% (p-value<0.01).

| US: Average Abnormal Returns | | | |
|-------------------------------------|-----------------|---------------|------------------|
| Day | Acquirer | Target | Portfolio |
| -5 | 0.05% | -0.15% | 0.03% |
| -4 | 0.02% | 0.66% | 0.02% |
| -3 | -0.25% | 0.83% *** | 0.00% |
| -2 | -0.08% | 0.30% | 0.11% |
| -1 | -0.23% | 0.51% | -0.02% |
| 0 | -0.64% ** | 7.84% *** | 1.65% *** |
| 1 | -0.17% | 2.34% * | 0.49% |
| 2 | -0.26% | 0.24% | -0.11% |
| 3 | -0.13% | 0.54% | -0.19% |
| 4 | 0.05% | 0.06% | -0.04% |
| 5 | -0.15% | 0.07% | -0.18% |

Note: ***, **, * indicate significance at 1%, 5% and 10% levels respectively.

Table 3, US Average Abnormal Returns & significances, acquirers, targets & market-value weighted portfolios

\overline{CAR} s for the EU and the US (Table 4) resemble each other closely in terms of the statistical significance of results (with the exception being acquirer \overline{CAR} s) as well as their direction (i.e. positive/negative values). It is also interesting to note that significant US \overline{CAR} s are roughly 2 to 4 times larger than corresponding EU \overline{CAR} results.

For \overline{CAR} s computed over the entire event period (11 trading days, day₋₅ through day₅), targets in both datasets yield highly significant \overline{CAR} s (EU: 3.35%, US: 13.23%). Portfolio results are positive but insignificant and acquirers experience negative Cumulative Average Abnormal Returns of -0.78% (EU, insignificant) and -1.80% (US, p-value<0.1). With \overline{CAR} s calculated over a core event period of 5 trading days (day₋₂ through day₂), target results remain highly significant at 3.19% (EU) and 11.23%

(US). Portfolio results are also significant for both datasets (EU: 1.05%, US: 2.12%). The EU \overline{CAR} for acquiring companies is not statistically significant, while the US \overline{CAR} for acquirers is again statistically significant at -1.39%.¹³

| EU: Cumulative Average Abnormal Returns | | | |
|--|-----------------|---------------|------------------|
| Days | Acquirer | Target | Portfolio |
| -5/5 | -0.78% | 3.35% *** | 1.10% |
| -2/2 | -0.36% | 3.19% *** | 1.05% ** |
| US: Cumulative Average Abnormal Returns | | | |
| Days | Acquirer | Target | Portfolio |
| -5/5 | -1.80% * | 13.23% *** | 1.76% |
| -2/2 | -1.39% ** | 11.23% *** | 2.12% ** |

Note: ***, **, * indicate significance at 1%, 5% and 10% levels respectively.

Table 4, US Cumulative Average Abnormal Returns & significances, acquirers, targets & market-value weighted portfolios

As already discussed in chapter 3, the analysis of the implications of the various hypotheses for mergers and acquisitions leads to the conclusion that in order for regulatory action in the form of legal and ownership unbundling to be generally justified, all analyzed M&A transactions should be attributable to the H₁ Market Power Hypothesis. However, with a view to the $\overline{CAR}_{(-2,2)}$ results as presented in Table 4, it becomes obvious that this does not seem to be the case and that as Table 5 shows, actual results are strongly pointing in the direction of the H₄ Principal-Agent Hypothesis.

| | Acquirer | Target | Portfolio |
|-----------------------------------|-----------------|---------------|------------------|
| H ₁ Market Power | + | + | + |
| H ₄ Principal-Agent | - | +/- | +/- |
| $\overline{CAR}_{(-2,2)}$ results | - | + | + |

Table 5, Expected effects VS. actual results

The real picture is however somewhat more heterogeneous. On the basis of acquirer-, target- and portfolio-Cumulative Abnormal Returns $CARS_{(-2,2)}$, roughly one third of all M&As in either dataset can be assigned to both the H₁ hypothesis of Market Power and the H₂ hypothesis of Efficiency. Between 10% (EU) and just under 20% (US) of all mergers fall under the H₃ Hubris Hypothesis and about 40% seem to be attributable to the H₄ Principal-Agent Hypothesis (Table 6).

¹³ As previously mentioned, the power of the Corrado rank test drops rapidly with an increase in the number of days over which the Cumulative Average Abnormal Return has been accumulated. This is clearly reflected in the results presented in Table 4. Therefore, for the remainder of this paper, $\overline{CARS}_{(-2,2)}$ are used as the main result and discussed in further detail. With the classic parametric t-test as proposed by Brown & Warner (1985), all statistically significant $\overline{CAR}_{(-2,2)}$ results according to the Corrado rank test, are also significant over 11 trading days.

| | EU | | US | |
|--------------------------------|------------|-------------|-----------|-------------|
| | # | % | # | % |
| H ₁ Market Power | 35 | 33.3% | 28 | 35.90% |
| H ₂ Efficiency | 35 | 33.3% | 28 | 35.90% |
| H ₃ Hubris | 11 | 10.48% | 14 | 17.95% |
| H ₄ Principal-Agent | 42 | 40.00% | 32 | 41.03% |
| No Hypothesis | 17 | 16.19% | 4 | 5.13% |
| Total | 105 | 100% | 78 | 100% |

Table 6, Numbers & percentages of mergers attributable to specific hypotheses on the basis of $CARS_{(-2,2)}$ (not including $CAR_{(-2,2)}$ results of rivaling companies)

Following the approach established in for example Eckbo (1983, 1989), Abnormal Returns of rivaling businesses (i.e. rivals to the companies engaging in merging transactions) are used at this point to discriminate between M&As belonging to the H₁ Market Power or the H₂ Efficiency Hypothesis. As outlined in Table 7, in the EU sample, the rivals of 16 merging companies experience positive Cumulative Abnormal Returns $CARS_{(-2,2)}$, while 11 rivaling companies show negative $CARS_{(-2,2)}$. In the US sample, rivals have positive $CARS_{(-2,2)}$ in 22 cases, with the rivals of 5 M&A transactions exhibiting negative $CARS_{(-2,2)}$. Either no rivals were found or no $CARS_{(-2,2)}$ could be calculated for 8 EU M&As and 1 US M&A, respectively.

| | EU | | US | |
|-----------------------------|-----------|--------------|-----------|---------------|
| | # | % | # | % |
| H ₁ Market Power | 16 | 15.24% | 22 | 28.21% |
| H ₂ Efficiency | 11 | 10.48% | 5 | 6.41% |
| No Hypothesis | 8 | 7.62% | 1 | 1.28% |
| Total | 35 | 33.3% | 28 | 35.90% |

Table 7, Breakdown of M&As attributable to H₁ or H₂ (based on $CAR_{(-2,2)}$ data of rivaling companies)

7. Conclusion

With a view to recent efforts in the European Union to increase the effectiveness of competition law in the energy market, an event-study approach is applied in this working paper to evaluate the market's response to announced mergers and acquisitions in the energy markets of both the EU and the US between 1990 and 2010. The basic proposition is that the results of this analysis can be used to ascertain what constitutes the primary motivation for M&A activities, and that, on the basis of these findings, inferences can be drawn as to whether or not regulatory legislation aiming at forcing corporations into demerging transactions (i.e. legal and ownership unbundling) actually makes sense from a competition-law point-of-view.

From the four mainstream hypotheses usually used to explain M&A motivations (Market Power Hypothesis, Efficiency Hypothesis, Hubris Hypothesis, Principal-Agent Hypothesis), the Market Power Hypothesis is the only one under which consumer welfare as well as market competition would adversely be affected and thus also the only hypothesis under which market intervention through demerging legislation would be justified in order to promote market competition and increase consumer welfare.

The observed Cumulative Average Abnormal Returns over a core event period of trading days -2 to +2 relative to the announcement day (day_0), do not seem to support this hypothesis. Overall, $\overline{CAR}_{(-2,2)}$ results indicate that M&A announcements have negative effects on acquiring company shareholders, while target shareholders' wealth increases. The total effect on the combined companies is positive as well. These results are completely at odds with expected effects under the Market Power Hypothesis.

Further evidence against the Market Power Hypothesis being the main factor in energy market M&A decisions, is added by the number of specific mergers that are attributable to the Market Power Hypothesis. Based on an evaluation of acquirer-, target-, portfolio- and rival- $CARs_{(-2,2)}$, only slightly less than one sixth (15.24%) of all M&A transactions in the EU sample and just below one third (28.21%) of M&As in the US sample can be considered to have been motivated by market power increases (thus being attributable to the Market Power Hypothesis), rendering market intervention undesirable in 84.76% (EU) and 71.79% (US) of all cases. This can be seen as a conservative interpretation of results, as the caveat of the positive information signaling effect (overestimation of market-power-triggered-M&As, see Footnote 2) is not considered in these percentages.

With the Market Power Hypothesis not being the main motive for energy market mergers, the results obtained oppose the ability of legal and ownership unbundling legislation to be used as a standard policy instrument to effectively address market power and consumer welfare issues. In fact, findings indicate that competition regulation aimed at forcing corporations into demerging transactions in some cases might actually have negative effects on market efficiency and, thus, be unable to safeguard or improve market competition and consumer welfare as a general tool applied to the whole energy market.

Competition laws that enable regulating authorities to decide on an individual basis on whether or not a specific energy market company should be forced to demerge therefore do seem to be a viable policy solution for improving market competition. Market-wide legal und ownership unbundling does not.

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