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Competition effects of mergers: An event study of the German electricity market

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ABSTRACT

This paper investigates the competition effects of the entry of Vattenfall into the German electricity market. While the competition authorities supported the entry by approving Vattenfall's acquisition of three regional utilities, other market participants raised concerns over the emergence of an upcoming oligopoly in the German market for power generation. We contrast the efficiency hypothesis postulating pro-competitive effects of mergers with the market power hypothesis postulating anti-competitive effects. For the analysis of the two opposing hypotheses, we use an event study approach to the stock prices of Vattenfall's competitors in the German market. While we find no empirical evidence for increased market power in the German electricity market due to Vattenfall's mergers, there is some indication for efficiency increases. We therefore cannot oppose the view of the competition authorities predicting an overall positive effect for consumers as a result of Vattenfall's entry into the German electricity market.

1. Introduction

During the period 1999–2002, the Swedish company Vattenfall entered the German electricity market by acquiring three regional utility companies (HEW, VEAG and Bewag). The German competition authority (Bundeskartellamt) and the European Commission both approved without any conditions the acquisitions and the subsequent merger of the three formerly separate German utilities. The Bundeskartellamt expressed the view that Vattenfall as a fourth player in the German electricity market (in addition to E.ON, RWE and EnBW) would be able to compete in prices against the existing big players.[1] However, the question whether the formation of Vattenfall in the German market indeed resulted in lower prices for consumers, or whether it brought about higher prices by reducing the number of players and thereby increasing the market power of the new oligopoly, is a controversial issue today.

Against the background of rising electricity prices, several empirical studies recently analysed whether power generation in Germany is a competitive market (e.g. Schwarz et al., 2007; Weigt and von Hirschhausen, 2008; Ockenfels, 2007). Although there is some indication that the large utilities possess market power, it is controversial whether prices charged for power generation are indeed set above the competitive levels. Given this dissent and the difficulties of estimating price-cost margins due to limited data availability, it is a challenging task to assess whether the entry of Vattenfall into the German market had a pro-competitive or an anti-competitive effect. We use an alternative approach in tackling this question by applying an event study, which analyses the reaction of the stock market to the merger announcements by Vattenfall. We consider the three cases in which Vattenfall acquired regional utility companies, and identify eight event dates on which important news about the takeovers was released. Following Eckbo (1983) and Stillman (1983), we expect that an analysis of the stock returns of the merging parties' competitors will reveal the competition effects of the merger. Our results support the view of the competition authorities, since we find no indication that the formation of Vattenfall had anti-competitive consequences.

This paper is organised as follows: Section 2 presents the background of the liberalisation process in the German electricity market. Section 3 describes the competition effects of horizontal mergers. Section 4 derives our methodology and the data used to create the event study. Section 5 presents the results and relates them to the debate on efficiency gains versus market power. Section 6 concludes.

2. Liberalisation of the electricity market in Europe

2.1. Liberalisation and market power

The electricity sector can be subdivided into four vertically linked stages: generation, transmission, distribution and retailing. While stages two and three represent classical network industries and will continue to be regulated throughout Europe, competition

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[1] The German wholesale electricity market is dominated by E.ON and RWE with a combined market share of more than 50%. These two players gained dominance in 1999/2000: E.ON was created out of a merger between VEBA and VIAG while RWE strengthened its position by merging with VEW.

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has been introduced at both the generation and the retail stage. The European Commission started the EU-wide policy of liberalisation in 1996 with Directive 96/92/EC and speeded up the process with Directive 2003/54/EC. The economic rationales for liberalisation are expectations for lower prices and higher efficiency in the electricity industry, which would lead to an economic surplus through direct and indirect consumer price effects (see e.g. Martin et al. 2005). Although the potential benefits of liberalisation are well acknowledged, an oligopolistic market structure with only few suppliers can represent a major obstacle. This is especially the case for the stage of power generation, which we will examine in more detail.

For an initial analysis of the effects of an oligopolistic market structure on prices, we employ the standard Cournot–Nash equilibrium. Although its application to electricity markets is controversial and alternative concepts like supply function equilibrium (SFE) exist, the Cournot framework provides a reasonable approach and is still widely used in electricity market modelling due to its advantages in computational manageability (Ventosa et al., 2005).[2] Proceeding from the Cournot oligopoly, the Lerner index for firm i, measuring how strong price exceeds marginal cost is given by

$$\frac{p-C_i'}{p} = \frac{s_i}{\eta}, \tag{1}$$

where p is the price of power in the wholesale market, C_i' is the marginal cost of the firm i, s_i is the share of firm i in total output and η is the price elasticity of demand. It is obvious from (1) that the margin over marginal cost is higher when the market share of a company is high and when the price elasticity of demand is low. An aggregate Lerner index over all firms weighted by market shares can be related to the Herfindahl–Hirschmann Index (HHI) of market concentration (e.g. Vives, 1999)

$$\sum_{i=1}^{n}\left(s_i\frac{p-C_i'}{p}\right) = \frac{HHI}{\eta} \quad \text{with} \quad HHI = \sum_{i=1}^{n} s_i^2. \tag{2}$$

Thus, an increase in concentration in the market, measured by the *HHI*, pushes the price further away from the marginal cost. The price elasticity of demand is typically low in the electricity market, increasing the potential to raise price over marginal cost. This tendency is aggravated by the absence of real-time billing to end-users, which causes a severe lack of demand elasticity in the short-run (Stoft, 2002). Another issue, which can potentially strengthen market power in generation, is its close relation with transmission and distribution networks that connect generation and final demand. A transmission service operator (TSO) manages transmission and allocates capacity to generators. If a generator owns the network or especially the TSO, the integrated company has the possibility to discriminate against other generators. Furthermore, it has an incentive to reallocate profits from generation to transmission in order to keep margins at the generation level low and deter new entrants.

In general, two issues can restrict the potential for exercising market power: competition from abroad via imports and the existence of contestable markets. In power supply, competition from abroad or outside specific regions is typically insufficient due to regional networks and limited capacity of interconnections. At the European level, the relevant geographic markets for electricity are still of limited size, often coinciding with national borders. This is due to few and congested interconnections at the borders of the national states. The theory of contestable markets claims that even if firms possess large market shares and thus market power, they may be deterred from setting price above marginal cost because this would attract new entrants into the market. In power generation, however, new entrants are typically discouraged by large sunk costs and a complicated approval procedure so that incumbents are able to set prices higher than marginal costs up to a certain extent.

We conclude from this first examination that in the case of market power, the prediction of falling prices due to liberalisation might turn out premature. Newbery (2007) claims that electricity restructuring in Europe – as opposed to the US – has tended to overlook issues of market power. This may also apply to the specific case of Germany since several mergers after liberalisation led to an increase in the concentration of the market.

2.2. Market power in the German electricity market

Several indicators and techniques can be used to analyse market power in the German electricity market.[3] The market shares reveal that the largest producers exceed the shares defined by German antitrust law as thresholds for the supposition of market power.[4] As shown in Fig. 1, the five largest producers in Germany, among them Vattenfall, have a cumulative share in generation capacity of about 68% and in actual power generation of about 87% (Zimmer et al., 2007).

Similarly, the Herfindahl–Hirschmann Index (HHI) of 1840 points indicates high concentration (Zimmer et al., 2007).[5] When accounting for criticism that the conventional measures of market power underestimate the potential market power in the electricity market due to inelastic demand (e.g. Stoft, 2002), these numbers cause even more concern. The Residual Supply Index (RSI) measures the potential market power of a single company. It determines if and for how long the capacity of one producer is essential to satisfy the final demand, thus if the company is a pivotal supplier. Schwarz et al. (2007) calculate the *RSI* values for the two biggest German companies RWE and E.ON and find a high potential for the exertion of market power.

While the previous indicators assess only potential market power, a different approach uses a simulation model of marginal costs to calculate the price-cost margins as an indicator for the actual exertion of market power. Schwarz and Lang (2006) have calculated such a model for the German wholesale electricity market in the period 2000–2005 and come to the conclusion that while in 2000 marginal cost pricing could be assumed, prices rose above marginal costs in 2003 and thereafter. Weigt and von Hirschhausen (2008) find in their analysis that wholesale market prices in 2006 were on average 12% higher than predicted by the competitive benchmark model. Though appealing, studies simulating price-cost margins of power generators are criticised for difficulties in identifying the true cost structures and in coping with the dynamics on electricity markets (Ockenfels, 2007).

From the evidence presented for the German market, it can be supposed that the major utilities, especially E.ON and RWE, possess considerable market power. There is also some indication that they at least partially exert this market power to set prices above the marginal costs. However, while evidence for market

[2] For a discussion on Cournot versus supply functions in electricity markets see Willems et al. (2009).

[3] For an overview of the methods to detect market power in electricity markets see Twomey et al. (2004). A comprehensive application to six European wholesale electricity markets including Germany is given in London Economics (2007).

[4] These thresholds are: 33% market share of the biggest supplier, 50% market share of the three biggest suppliers together and 66% market share of the five biggest suppliers together (Gesetz gegen Wettbewerbsbeschränkungen §19, 3).

[5] While the German authorities mention no explicit thresholds for the *HHI*, the US Department of Justice considers a market to be highly concentrated for a *HHI* of more than 1,800 points.