



# Market (in)efficiency in valuing electric utilities—The case of Norwegian generating companies

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## ABSTRACT

After deregulation of the energy market in Norway, a number of mergers and acquisitions of hydropower generating companies have taken place. However, valuation of these companies has proved controversial. From an ex-post perspective, there is support for the criticism that generation assets have been sold too cheaply. This article presents a simple valuation model providing evidence of how value has evolved. On the basis of these results, we discuss the valuation from an ex ante perspective and in the light of the market efficiency hypothesis of Fama (1970, 1991).

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## 1. Introduction

The sales of shares in Norwegian hydropower generation companies have sparked significant controversy. Several public owners (municipalities and counties) have in the post-deregulation period (after 1991) sold off their shares, capitalizing values in power generation assets in order to finance immediate public services. These transactions have been criticized by several commentators, both politicians and others, claiming that the assets have been sold too cheaply. The rapid increase in electricity prices has shown severe undervaluation, ex post, of companies sold before the electricity price shock occurring in the fall of 2002. In response to such accusations, sellers have claimed the presence of market efficiency and pointed out that the agreed price thus reflected the information available at the time of the negotiations.

This article analyzes the transactions of generation companies in order better to understand the transaction values, and hence assess whether there has been a lack of market efficiency thus supporting the criticism of sellers. The study is supposed to be performed in the light of the literature on market efficiency and valuation, particularly applied to the energy sector. Transaction data and accounting data enables us to understand how generation assets have been valued, and hence give a foundation for discussing and commenting on the presence or lack of market efficiency; i.e. whether the prices have fully reflected information available and relevant risk at the time of the transactions.

### 1.1. Background

The Norwegian Government implemented the Energy Act in 1991 in order to make electricity markets more competitive (Al-Sunaidy and Green, 2006). The intention was to stop erroneous investment and other inefficient policies by enforcing some market discipline. This Act encouraged a profound restructuring of the industry. One consequence was separation of generation, transmission, distribution and wholesale trading. Another feature was the privatization of companies in the industry. Public ownership (municipalities, counties or state) was no longer required.

The Energy Act promoted restrictions in private ownership of hydropower facilities: regulation of pre-emption, time-limited licenses and reversion to the state at license expiration. However, the deregulation<sup>1</sup> of the industry led to an emerging new market of tradable electric utilities. The vast majority of generating capacity is as of 2009 still publicly owned. The state-owned company Statkraft SF owns 35%, municipalities and counties own approximately 50% and private investors 15% according to EBL (The Electricity Industry Association) (2006). However, in the post-deregulation period (1991–2008), there have been more than 430 transactions in which electric utilities have been involved in mergers or acquisitions.

All these transactions have included assessments of the value of the companies involved, creating a need for qualified calculation of business value. Almost all of these companies were not open for trading on the stock exchange:<sup>2</sup> limiting the access to

<sup>1</sup> Transmission and distribution networks continue to be natural monopolies and were, and still are, regulated (Al-Sunaidy and Green, 2006).

<sup>2</sup> Two exceptions can be mentioned: Hafslund ASA and Arendals Fossekompani ASA.

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value relevant information and complicating business value calculations.<sup>3</sup> Nevertheless, the industry has high importance for the Norwegian economy as it controls large values. Indeed the only industry possessing more values is the oil and gas industry.

Another consequence of deregulation was the introduction of a Nordic power exchange, Nord Pool. This unification of the Nordic system had great importance and by 1997 most trading products, including derivatives, were established. With this settled an important source of knowledge became available in order to better understand electricity prices and hence the value of companies possessing generation capacity. The financial market includes forward contracts up to four years ahead, determining long-term prices and hence expected future earnings, which in turn affect value calculations. This means of course using a relatively short horizon in business valuation; nevertheless, these long-term forward contracts provide the best available input for the valuation of generation assets (Lucia and Schwartz, 2002).

## 1.2. Article structure

This article is structured as follows: Section 2 introduces briefly the relevant theory for the study—market efficiency and valuation of hydropower generation assets. The empirical model for explaining the valuation of companies involved in mergers or acquisitions is presented in Section 3. The sample, data, results and discussion of the results are also summarized in this section. Conclusions and implications are reported in Section 4.

## 2. Theory

The relevant theory for this study relates to market efficiency and valuation of generation assets.

### 2.1. Market efficiency

Market efficiency topics have been studied from a number of angles in finance, economics and accounting. Several survey articles of the market efficiency literature have been carried out (Ball, 1992, 1994; Campbell et al., 1997; Fama, 1970, 1991, 1998; Kothari, 2001; LeRoy, 1989; MacKinlay, 1997). There is also an abundance of articles testing market efficiency. Most empirical studies relate to general stock-listed companies, such as event studies or cross-sectional tests of abnormal returns (Kothari, 2001). Many studies do also show apparent market inefficiency, leading to test such anomalies of different kinds of human behavior explanation (Barberis et al., 1998; Daniel et al., 1998; Fama, 1998).

Market inefficiency concerning non-stock-listed companies is more difficult to study. The lack of information and the illiquidity of trading should make one cautious in interpretation of any results indicating possible lack of market efficiency. Regarding the electricity industry in the Nordic countries, there have been studies of electricity prices in the light of market efficiency (Lucia and Schwartz, 2002) The Nordic electricity market has also been studied regarding potential market power (Skaar and Sørgard, 2006). However, no studies of the value of hydropower generating companies are found in the literature.

These facts do make a study of electric utility sales in the Norwegian context in the light of market efficiency literature interesting, but also challenging. Nevertheless, the core of the

study remains the use of available information. Analyzing the transactions enables us to explain how valuation is performed and one can hence discuss the relevant independent variables in the light of the overall information picture of future electricity prices in the time period concerned.

The definitions of Fama (1970, 1991) consider the *weak form* market efficiency hypothesis to concern prices reflecting the information in historical prices. The *semi-strong form* of market efficiency states that prices also reflect other publicly available information. The relevant question in the light of Fama's definitions relates to whether the transaction values of Norwegian generating companies have reflected all public available information or just pure historical data. If the last can be proven or indicated, meaning support just for the weak form market efficiency hypothesis, there will be arguments in favor of the critics of too low prices in a number of the transactions.

### 2.2. Valuation of generation assets

Concerning the valuation of generation capacity two comments can particularly be made: *Firstly*, the industry norm is to measure value per kWh annual capacity. This is a relative approach, corresponding to P/E and P/B models for stock pricing (Bhoraj and Lee, 2002; Palepu et al., 1996). Normal value has typically ranged from just below NOK 2.00 to NOK 2.50/kWh average yearly generation capacity. *Secondly*, participants in the industry make use of traditional, intrinsic valuation. This typically consists of estimating future cash flow, included assumptions of a terminal value. This approach is used in the valuation reports on the state-owned generation company Statkraft SF, ordered by the Ministry of Petroleum and Energy in 2000 (Dresdner Kleinwort Benson, 2000; Ernst and Young, 2000) and 2006 (Lehman Brothers, 2006).

The most crucial point in such a valuation is definitely the assumptions of future electricity price development. However, electricity prices are very volatile, especially in the hydropower dominated context of Norway (and the Nordic countries) (Koekebakker and Ollmar, 2005). And with only four-year ahead forward prices publicly available, the task to value long lasting hydro-generation assets becomes difficult.

## 3. The model

The approach for testing market efficiency in the transactions of hydropower generation companies is somehow different than traditional approaches (which often focus on abnormal returns). To provide a foundation for the research question we present a simple model for explaining valuation of the generation companies involved in mergers or acquisitions. Such an approach yields empirical results which can be used as a starting point for discussing and commenting on the negotiated prices.

### 3.1. Data

The data of the transactions in this study is obtained from the database of Europower AS (a privately owned consulting firm monitoring the industry). As far as the author knows, no alternative source of information about the relevant transactions exists. The information was obtained during the post-deregulation period (1991–2006) based on public disclosures. The information concerns the date of transaction, object of transaction, transaction value, and the size of generation capacity at the time of the transaction—as well as some supplementary information.

In the post-deregulation period from 1991 to 2006, 431 transactions have taken place involving large blocks of shares of electricity

<sup>3</sup> The term *transaction value* refers to the compensation given for the shares of the company. If only a part of the shares of the company is involved in a transaction, the term refers to the value as if the whole company was involved.

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