Hannes Weigt and Christian von Hirschhausen

PRICE FORMATION AND MARKET POWER IN THE GERMAN ELECTRICITY WHOLESALe MARKET – IS BIG REALLY BEAUTIFUL?

Hannes Weigt - Corresponding author: Dresden University of Technology, Faculty of Management and Economics, Chair of Energy Economics, D – 01069 Dresden, Germany
Phone:+49-(0)351-463-39764, Fax: +49-(0)351-463-39763, e-mail:hannes.weigt@tu-dresden.de
URL: www.ee2.biz

Overview
During 2004 and 2006 German wholesale electricity prices nearly doubled. The purpose of this paper is to estimate the factors for this price increase differentiated by fuel costs, CO2-permits and market power. We develop a competitive benchmark model, taking into account power plant characteristics, fuel and CO2-certificate-prices, wind generation, and other market characteristics. Taking into account real load, we estimate the difference between estimated generation costs and observed market prices.

Methods
Even though electricity wholesale markets are contestable in theory, market power issues regularly play a role in the liberalization process. This is also the case in Germany, where the restructuring of the national markets has started from oligopolistic structures. Among the theoretical literature, Stoft (2002) and Twomey et al. (2004) show that electricity wholesale markets are particularly subject to market power problems, due to the technical characteristics of generation technologies and demand behavior; even relatively small market players can have a high market power potential. The oligopolistic structure of most electricity markets lead to additional incentives for strategic company behavior. In addition to Cournot modeling, Green and Newbery (1992) have developed the Supply Function Equilibrium (SFE) to achieve a more realistic representation of reality. The empirical literature has thus far focused on the British market (e.g. Newbery, 1995, Wolfram, 1998 and 1999, Sweeting, 2001) and the US markets, particulary California (e.g. Joskow and Kahn, 2002, Harvey and Hogan, 2002).

The German wholesale electricity market features a structure that is particularly sensitive to market power: two companies hold a dominant duopoly, with about 60% market share of generation, whereas the four largest players have a market share of about 90% (Bundeskartellamt, 2006). The literature on market power in Germany is scarce, but the three studies available thus far all concur that market power does effect the functioning of the German electricity wholesale market (Müsgens 2006, Ellersdorfer, 2005, and Schwarz and Lang, 2006).

This paper provides a model-based assessment of German wholesale electricity prices between 2004 and 2006. We develop a competitive benchmark model (such as provided in Joskow and Kahn, 2002), taking into account power plant characteristics, fuel and CO2-prices, wind generation, and other market characteristics. Taking into account real load, we estimate the difference between estimated generation costs and observed market prices.

Results
Our results confirm previous research to the extent that a significant difference between marginal generation costs and market prices can be observed. The simulation model shows clear markups on marginal costs in the observed period which are particularly significant during peak times, ranging up to 30% (Figure 1). Fuel costs and CO2 prices seem to be the main cost drivers, but market power is likely to contribute to the price-cost markups.
Conclusion
The paper analyzed the competitiveness of the German wholesale electricity market during 2004 till summer 2006 using a competitive benchmark model. The results correspond to former studies finding that observed market prices in Germany are above competitive levels. The simulation model shows clear markups on marginal costs in the observed period. The robustness of the obtained conclusion has been verified by carrying out a sensitivity analysis. Thus missing information can not be the only explanation for the observed price differences making market power abuse likely to play a significant role in Germany.

Figure 1: EEX wholesale prices and estimated marginal costs (September 15, 2004)

Source: Own calculation

References