MARKET POWER IN THE NZ WHOLESALE ELECTRICITY MARKET 2010-2016

Stephen Poletti, University of Auckland, +6499237664, s.poletti@auckland.ac.nz

Overview

Over a decade ago the NZ Commerce Commission engaged Frank Wolak to investigate market power in the New Zealand wholesale electricity market. Professor Wolak (2009) found evidence of substantial market power with market power rents of $4.3 billion over the seven-year period (2001-2007) covered by the report. There were a number of criticisms of the report, the most substantial of which was the assumptions made around the value of water, which was capped at the marginal cost of thermal plants. Browne et al (2012) using a different methodology argued that water values during dry years would at times be higher than this. Using a computer agent based approach to model market power and a calibrated water value curve they found similar market power rents to those calculated by Wolak. Philpott and Guan (2013) using stochastic dynamic programing to calculate water values also found high market rents.

Since the Wolak report, Browne et. al. (2012) and Philpott and Guan (2013) there has been no quantitative investigation into market power in the NZ wholesale market, even though there have been considerable changes in market conditions. Despite little demand growth over the last decade there has been a significant increase in new wind and geothermal generation. More recently, a number of thermal plants have exited the market and there have also been line upgrades. Furthermore there has been a number of market design changes aimed at alleviating market power and managing risk better in years of low inflows into the hydro dams. Thus it is timely to investigate whether there are still market power issues in the wholesale market.

Methods

The approach used in this report to model market power is to construct the competitive benchmark, where all plants bid into the market at their marginal cost. There is one exception - hydro bids into the market using the water value. The water value curve is computed as a function of the actual lake level, compared to the mean, for any given day. We compare the competitive benchmark to the prices simulated by the computer agent-based firms trying to maximise profits and attribute the difference as market power rents. We also compare the competitive benchmark to actual prices and compute rents using this approach. It turns out both approaches give similar results.

We start off using the approach advocated by Browne et. al (2012), to investigate market rents over a seven year period from 2010-2016 using computer agents. This approach gives substantial market rents. However we argue that there is a dynamic inconsistency in this approach, as the competitive benchmark consistently dispatches more water than the strategic simulations, which cannot continue for any length of time as the lakes would eventually become empty. We constructed a model that is dynamically consistent by keeping track of dispatch and inflows for each time period and updating the lake level to find new water-values in the following period. This is our preferred approach as it is dynamically consistent and has simulated prices close to actual.

Results

The computed markets power rents over the period 2010-2016 are substantial. They are similar or even higher, as a fraction of revenue, to those found by Wolak (2009). Table (i) below shows computed market power rents for each

year using our dynamic competitive benchmark and market power simulations. Over the 7-year period of the study total simulated market revenue was $14.9 billion. Total market rents are $5.4 billion, which is 36% of revenue

Table i: Simulated market power rents.

Year	Simulated Competitive Benchmark Revenue ($million)	Simulated Market rents ($ million)	% of total revenue	Simulated Wholesale Revenue ($million)
2010	1861	588	24%	2449
2011	1668	678	29%	2346
2012	1569	1305	45%	2874
2013	1146	554	33%	1700
2014	1290	831	39%	2121
2015	1142	759	40%	1901
2016	856	688	45%	1544
SUM	**9532**	**5403**	**36%**	**14935**

Conclusions

Market power rents in the New Zealand electricity market are substantial. Furthermore there is some evidence that market power rents have increased over the last few years.There is a strong case for policy intervention by the regulator to mitigate market power.

References

Browne,O.,Poletti,S.,Young,D.,2012.Simulating market powering in the NZ electricity market. N.Z.Econ.Pap.46(1),35–50.

Philpott, A., & Guan, Z. (2013). Models for estimating the performance of electricity markets with hydro-electric reservoir storage. Technical report, Electric Power Optimization Centre, University of Auckland. http://www.epoc.org.nz/publications.html

Wolak, F., (2009) An Assessment of the Performance of the New Zealand Wholesale Electricity Market (public version), Report to the Commerce Commission 2009. Available at http://www.comcom.govt.nz/investigation-reports/