



Market power issues in the reformed Russian electricity supply industry



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ABSTRACT

The paper examines long-run and short-run levels of market power in the liberalised Russian electricity market. We observe that despite potential for market power abuse, actual exercise of market power remained low. We attribute the result to the bid-at-cost rule implemented as a part of a special unit commitment procedure on the day-ahead market. We first look at the industry restructuring and subsequent mergers and acquisitions. The M&A were undertaken in different market zones and did not seem to increase concentration although planned zone integration may worsen competition in the long run. We then examine short-run aspect of market power by estimating hourly price–cost mark-ups and assessing their dynamics in 2010 and 2011, a year preceding and following the market liberalisation, respectively. The hypothesis of actual market power abuse is tested, and rejected, using time series AR models. Further, a Tobit regression shows that the liberalisation decreased the mark-ups by about 1.66 percentage points.

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1. Introduction

In many electricity markets around the world, restructuring and liberalisation led, at least at the early stage, to higher market power, as measured by the price–cost mark-up. By contrast, in Russia, a similar electricity market reform conducted in 2003–11 did not translate into higher price–cost mark-ups. This is especially surprising given a merger wave that followed soon after the industry restructuring, and historically low volumes of contracting in the electricity markets. In this paper, we investigate the dynamics of market power in the post-reform Russian electricity market and discuss how the Russian reform makers handled the issues of competition and potential market power abuse. We observe that the actual exercise of market power has been quite low, and attribute the result to the unique self-cap procedure implemented on the wholesale power market.

Our finding of low market power is in contrast to the experience of most reformed and liberalised electricity markets. The electricity reforms aim typically at improving efficiency of the industry and/or attracting private investment (for a review, see e.g. Sioshansi and Pfaffenberger, eds., 2006; Sioshansi, ed., 2013). However, many post-

reformed markets do not avoid competition-related problems, such as mergers and acquisitions to gain a larger market share, or manipulations with capacity-price offers to rip off excessive profits. England and Wales in the early 1990s and the California electricity crisis in 2000 represent, perhaps, the most notable examples of market power abuse in the newly created markets (Wolfram, 1999, and Borenstein et al., 2002, respectively). Other markets with documented evidence of market power are Spain (Ciaretta and Espinoza, 2009), Germany (Möst and Genoese, 2009), south-eastern Australia (Brennan and Melanie, 1998), and New Zealand (McRae and Wolak, 2009).

International experience shows that in liberalised markets, private generators use capacity withholding as a typical strategy to exercise market power. A large producer with several power plants would withhold some capacity, so that a more expensive power plant comes into operation that otherwise would remain idle and determines a higher price on the market. The actual level of market power is measured by the price–cost mark-up, where ‘price’ is usually a system marginal price and ‘cost’ is the system marginal cost of generation. Since capacity withholding leads to higher mark-ups, the change in mark-ups depending on the slope of the supply curve, detecting excessive mark-ups becomes a tool to identify market power.¹ Theoretical results by Allaz and Vila (1993) show that contracting can drive price–cost mark-up

Abbreviations: DA, Day-ahead market; ESI, Electricity supply industry; FAS, Federal Antimonopoly Service of Russia; FFZ, Free flow zone; HHI, Herfindahl–Hirschman index; NOREM, New wholesale market for electricity and capacity (Russian abbreviation); TGC, Territorial generation company; UC, Unit commitment procedure; WGC, Wholesale generation company.

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¹ Of course, one should exclude other reasonable explanations for insufficient capacity supply and the resulting high mark-ups; for example, extreme weather conditions (hence excessively high demand), a transmission line failure or other major technical accident, amongst other factors.

down to zero. A regulatory requirement to bid at marginal cost may be another tool to keep mark-ups low: such a requirement exists, for example, on the Irish electricity market.

The reform of the Russian electricity industry tried to address potential competition problems by creating ex ante a large number of companies, gradual liberalisation and introducing a self-cap bidding procedure. A wave of mergers among the new generation companies narrowed down the pool of owners in the industry, which suggests stronger potential for market power abuse. The gradual market liberalisation, i.e., removal of regulated contracts, was undertaken in 2007–11. The regulated contracts were by nature vesting contracts; their expiration from January 2011 meant lower contract cover, stronger incentives to exercise market power, and higher mark-ups. Bilateral free contracts on the market turned out to be unpopular, constituting only 5–10% of the traded volume.

The self-cap bidding appears to be a unique feature of the Russian market. It is implemented through weekly and daily market biddings. The unit commitment (UC) procedure is run weekly by the System Operator on Friday. The generators submit the start-up cost and price-quantity bids for all available capacity for the whole week. The procedure determines only the start/stop time of the generation equipment for the following week, not the output schedule. The UC price-quantity bids are used on the day-ahead (DA) market as self-enforcing price caps. On the DA market, the generator may submit a new bid, which would determine the actual hourly production, but the DA bids cannot exceed the UC bids. If a generator submits high UC bids, he risks being idle for the next week, and if he submits high DA bids, he will be capped with his own UC bids.

Geographically, the Russian electricity market was divided into 28 free flow zones (FFZ) as defined by the major transmission lines. Within the zones, trade is unrestricted while interzonal trade is subject to transmission constraints. The already mentioned post-reform merger wave concerned companies in different zones, so the mergers did not affect the local level of concentration.

While there is no formal offer-at-cost rule, the Federal Antimonopoly Service monitors prices and bidding in FFZs with one dominant producer. Several companies operating in such zones were already proved to manipulate price offers and were subject to fines (*ByiskEnerg* in 2008², the company *TGC-11* in 2010 and *Mosenergo* in 2012). The ongoing development of the transmission network means that smaller zones are merged together, as it has already happened with some zones, and we would expect the regulatory oversight to reduce greatly, if not be removed.

In Russia, where pre-reform regulated tariffs³ on electricity were kept artificially low, mark-ups would naturally be negative. Market liberalisation should lead to price rises, ideally up to the level of generation cost, and mark-ups would increase from negative values to zero. In other words, this increase in mark-ups that follows liberalisation does not immediately signal market power abuse. Rather, an increase beyond zero (or some other threshold level) would testify against those market participants suspected of market power abuse.

In parallel to the two aspects of the reform, restructuring and price liberalisation, our paper focuses on two main issues of market power—concentration and mark-ups. Analysis of concentration provides insight on long-term perspectives of market power, whereas dynamics of mark-ups illuminate the short-term perspective.

While *Pittman (2007)* and *Gore et al. (2012)* calculated the Herfindahl–Hirschman index (HHI) for the Russian electricity market and found it to be relatively high, neither of the papers accounted for power flows between the zones, which can be quite significant as

compared to the intra-zone production. We re-calculate the HHI given the final industry structure, ownership, and import flows into FFZ, and conclude that the concentration is not severe. Mergers and acquisitions have little impact on HHI as the merging companies were located in the different zones. We observe that reducing the number of zones, alleviating transmission constraints, and unlocking small zones could significantly improve competition in the smallest zones of the market.

In addition to concentration, we evaluate price–cost mark-ups in the Russian electricity industry during 2010 and 2011, namely, a year preceding and following the market liberalisation on January 1, 2011. The mark-ups appear to be low and stable, which contradicts the hypotheses of stronger market power due to concentration or removal of contracts. We use a Tobit regression to quantify the impact of the regulated contracts and other counterfactuals on the mark-up dynamics. Our main finding is somewhat surprising: removing price regulation decreased the mark-up by about 1.66 percentage points. We attribute the seeming discrepancy to the bidding rules implemented in the unit commitment procedure and in the day-ahead trading.

The rest of the paper is organised as follows. *Section 2* presents a brief historical overview of the Russian ESI, in the first subsection, and theoretical measures of market power, in the second subsection. *Section 3* presents and discusses the results in three subsections: the concentration on the market, the dynamics of the Lerner index, and the relationship between the Lerner index and market liberalisation. The final section concludes the paper.

2. Russian electricity supply industry—background information

We first review the industry restructuring, which took place in 2003–8, and then look at the market liberalisation that started in late 2007 and was completed by January 2011. A broad review of the reform process can be found in *Xu (2004)* and *IEA (2005)*; for a discussion of the results, see, e.g., *Solanko (2011)*, *Chernenko (2013a)*, or *Gore et al. (2012)*.

2.1. Industry restructuring

The Russian electricity supply industry has c. 223 GW of the installed capacity, 157 GW of peak demand, and 1,032 TWh of annual consumption (as of 2012). As a part of the 2003–11 reform, the incumbent monopoly called RAO UES was unbundled into many generation companies, and independent grid and network companies. The dispatch division became an independent System Operator, while the Commercial Operator, called Administrator of the Trade System (ATS), was created from scratch. Small independent power producers were also required to separate generation and distribution and create independent companies.

For the purpose of market operation, the country was divided into two pricing areas, ‘Europe’ and ‘Siberia’, and was further subdivided into free flow zones (FFZ), 6 in ‘Siberia’ and 22 in ‘Europe’.⁴ The FFZs were defined on the basis of major transmission constraints and ex ante to the market dynamics, price differentials, etc. There are separate markets for electric energy, based on nodal pricing, and capacity, based on zonal FFZ pricing. In both markets, trading between FFZs is restricted due to transmission constraints.

To avoid problems with concentration observed in other electricity markets, the number and composition of the new generation companies across FFZs had to be carefully designed (installed capacity, technology, plant location). There are currently two types of companies: wholesale and territorial. A wholesale generation company, WGC, has large power plants that are dispersed across the country, so as to avoid

² *ByiskEnerg* attempted to appeal the FAS decision but unsuccessfully. Final court decision: *ByiskEnerg v. FAS, 2010*.

³ In the Russian regulatory practice, a tariff means a regulated price in general. In this paper the tariff refers to the regulated price of electricity on the wholesale market; a household/retail tariff is named in full.

⁴ There are two small non-pricing areas: one at the north of the European part of the country; the other one at the Far East. Both remain under government regulation. Together, they account for only 5% of the total demand and their operations hardly interfere with those of the main markets.

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