

ESD.934, 6.974

Engineering, Economics and Regulation of the Electric Power Sector

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Homework HW5. Market power and wholesale market design

Question 1. Description of a specific wholesale electricity market.

Describe the wholesale electricity market in the country or system that you have chosen. Organize your answer by addressing the following issues:

- A. Select within the corresponding Electricity Act (or the highest level norm that applies) those articles that correspond to the functioning and regulation of the wholesale electricity market. Identify the secondary regulation that describes in more detail the rules and organization of the wholesale market: type of market and level of liberalization, transactions that are allowed in this market, agents that can participate, existence of organized trading platforms, allocation of the roles of system operation and market operation, rules for the functioning of the short-term (day-ahead, then maybe spot, typically) market, how the prices of these markets are computed, type of auctions that is used (simple or complex bids, any other features), procedure of determination and allocation of the operating reserves, any intraday markets, management of congestions, basic norms of the balancing market. For each one of these items include a brief description that can be sufficient for somebody who does not know this market to understand how it works, ignoring the details (market rules or trading codes typically have 500 pages or more). <To be added once we cover the module on the transmission network: How this market handles network losses and congestions. If you already understand it you may start including this information now.>
- B. If available, describe the motivation that led to the creation of this market. Provide some description of how this wholesale market has functioned since it was created or during the last few years: Adequacy of its structure (number and size of the agents, private or public ownership, any other relevant characteristic of the agents, mergers and acquisitions that have taken place), role of the system operator, market operator, transmission owners, governance of the market, prices and volumes in the several markets (day-ahead, spot, reserves, congestion, intraday, balancing), imports and exports, any significant incidents, existence (proved or supposed) of market power abuse, any other characteristic trait.
- C. Provide the list of relevant references that you have used to answer this question.

If, for some reason, you do not find information on your system to answer any of the items above, do your best effort in filling the gaps with your opinions (please, indicate explicitly when you are not describing what actually happens in the system of your choice).

Question 2. Market structure and competition.

- A. Do you consider that the present level of horizontal concentration in your power system is compatible with the existence of a working electricity wholesale market? Do you consider that there is any other major barrier that should be removed if you want a wholesale market to function correctly (or to create one, whatever is the case)? If the answer is affirmative, indicate (in priority order: first those measures that you would recommend first) the regulatory measures that you would advise to adopt. Justify your answer.
- B. You have to hypothesize an operation of acquisition or of voluntary merger involving the largest generation utility in your power system and another large one, also within your power system, which also owns generation assets (if this situation does not exist in your market, just invent it). Now you are supposed to examine this situation as a regulator with responsibilities on competition matters, as well as on the proper functioning of the wholesale generation market. You are asked to give or to deny the authorization for this operation and to explain the reasons for your decision. The authorization might be subject to conditions to alleviate any undesirable situation of excessive concentration and subsequent market power, vertical or diagonal integration. If you think that the operation should be subject to conditions, indicate which type of conditions and justify your answer.

Try to answer this question as much as possible within the actual legal, economic, political and social context of the specific power system and its institutions.

Question 3. Market structure and competition.

Now we examine the potential of long-term contracts as an instrument for market power mitigation and other purposes. In some countries (Ireland, for instance) it has been considered, or actually implemented, a method to reduce market power of the large incumbent generation companies (like ESB in Ireland or Endesa or Iberdrola in Spain) that is based on long-term contracts. This same method was proposed, for instance, in the 2005 Spanish White paper on the electricity market. The method consists of mandating the dominant generation companies to sign long-term (e.g. 3 years or more) contracts with consumers or load-serving entities (retailers of different kinds). The minimum volume of these contracts and its price is fixed ex ante by the regulator. Give your opinion on the following issues:

- A. Do you think that this is an effective method to mitigate market power? How would you implement this regulation? Which are the pros & cons of this approach? Would you propose another regulatory instrument? Think of this in the context of your power system.
- B. How significant is the potential interference of this regulatory mechanism on the functioning of the short-term market? Identify all possible effects of this regulatory measure on the market behaviour and classify them as desirable or harmful.

These “directed contracts” (this is the terminology in Ireland) or “contratos virtuales” (virtual contracts, terminology in the Spanish White Paper) can be used for a dual purpose without losing its capability to mitigate market power. This second application is to extract rents from the generation companies that are mandated to sign contracts at a regulated price, for instance to counteract windfall profits that result from a cap-and-trade mechanism to limit CO₂ emissions¹, such as the EU ETS, or from other sources.

¹ Think of some nuclear power plants or hydro plants that were built more than twenty years ago. If now a CO₂ price is imposed on any emissions from electricity generation units, the energy market price will increase and therefore the revenues of all generators. The regulator may want to intervene and claw back

- C. Does this new use of the “directed contracts” (or “virtual contracts”) reduce their capability to mitigate market power? Does it augment any possible interference with the functioning of the market? Do you think that this is an effective method to extract any excessive rents from generation companies? Would you propose any other regulatory instruments?

Question 4. CO2 and electricity markets.

- A. Examine the implications that the introduction of a price for CO2 emissions (some externally determined price in \$/ton of CO2 emitted) would have on generators and consumers of a vertically integrated electric utility that is regulated under traditional cost-of-service.
- B. Examine the implications that the introduction of a price for CO2 emissions (some externally determined price in \$/ton of CO2 emitted) would have on generators and consumers in a power system that has fully adopted a market oriented approach.
- C. Examine the implications that the introduction of a cap-and-trade system for CO2 emissions would have on the power system of your choice.

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