



European
University
Institute

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES

EUI Working Papers

RSCAS 2010/12

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Florence School of Regulation

WHY (AND HOW) TO REGULATE POWER EXCHANGES IN THE
EU MARKET INTEGRATION CONTEXT?

Leonardo Meeus

EUROPEAN UNIVERSITY INSTITUTE, FLORENCE
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
FLORENCE SCHOOL OF REGULATION

Why (and how) to regulate Power Exchanges in the EU market integration context?

LEONARDO MEEUS

EUI Working Paper **RSCAS** 2010/12

This text may be downloaded only for personal research purposes. Additional reproduction for other purposes, whether in hard copies or electronically, requires the consent of the author(s), editor(s). If cited or quoted, reference should be made to the full name of the author(s), editor(s), the title, the working paper, or other series, the year and the publisher.

ISSN 1028-3625

© 2010 Leonardo Meeus
Printed in Italy, March 2010
European University Institute
Badia Fiesolana
I – 50014 San Domenico di Fiesole (FI)
Italy
www.eui.eu/RSCAS/Publications/
www.eui.eu
cadmus.eui.eu

Robert Schuman Centre for Advanced Studies

The Robert Schuman Centre for Advanced Studies (RSCAS), directed by Stefano Bartolini since September 2006, is home to a large post-doctoral programme. Created in 1992, it aims to develop inter-disciplinary and comparative research and to promote work on the major issues facing the process of integration and European society.

The Centre hosts major research programmes and projects, and a range of working groups and ad hoc initiatives. The research agenda is organised around a set of core themes and is continuously evolving, reflecting the changing agenda of European integration and the expanding membership of the European Union.

Details of this and the other research of the Centre can be found on:

<http://www.eui.eu/RSCAS/Research/>

Research publications take the form of Working Papers, Policy Papers, Distinguished Lectures and books. Most of these are also available on the RSCAS website:

<http://www.eui.eu/RSCAS/Publications/>

The EUI and the RSCAS are not responsible for the opinion expressed by the author(s).

Florence School of Regulation

The Florence School of Regulation (FSR) is a partnership between the RSCAS at the EUI and the Council of the European Energy Regulators (CEER), and it works closely with the European Commission. The Florence School of Regulation is sponsored by leading European energy companies.

The objectives of the FSR are to promote informed discussion of key issues; to provide state-of-the-art training for practitioners; and to produce analytical studies in the field of regulation. It is a European forum dedicated to economic regulation. While its primary focus is on energy regulation, particularly in the electricity and gas markets, it is extending its coverage to other areas of regulation.

This series of working papers aims at disseminating the work of scholars and practitioners on current regulatory issues.

For further information

Florence School of Regulation

Robert Schuman Centre for Advanced Studies

European University Institute

Via Boccaccio, 151

I-50133 Firenze

Tel.: +39 055 4685 751

Fax: +39055 4685755

E-mail: fsr@eui.eu

<http://www.eui.eu/RSCAS/ProfessionalDevelopment/FSR/>

Abstract

Power Exchanges (PXs) are key market institutions in open and market-based electricity industries. This paper aims at contributing to the ongoing debate on why and how to regulate Power Exchanges in the EU market integration context.

The paper starts by stating that two different types of PXs have to be distinguished, i.e. “Merchant” PXs and the “Cost of Service Regulated” PXs. The paper continues by comparing the typical incentives of these two types of PXs to perform the basic PX tasks in an isolated national market and in a market integration context. The paper concludes by deriving from this analytical frame the most relevant regulatory actions.

Keywords

Regulation, Exchanges, Grid access, Power Markets

Introduction*

Power Exchanges (PXs) are key market institutions in open and market-based electricity industries. This paper aims at contributing to the ongoing debate on why and how to regulate Power Exchanges in the EU market integration context.

The paper starts by stating that two different types of PXs have to be distinguished, i.e. “Merchant” PXs and the “Cost of Service Regulated” PXs. The paper continues by comparing the typical incentives of these two types of PXs to perform the basic PX tasks in an isolated national market and in a market integration context. The paper concludes by deriving from this analytical frame the most relevant regulatory actions.

Two types of PXs

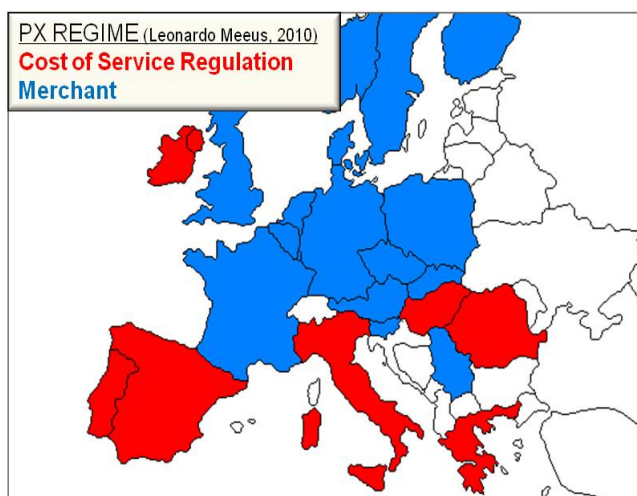
Power trading (financial and physical) in the EU has reached the threefold of annual consumption (over 8 million GWh traded in 2007 for a 2.7 million GWh level of consumption)¹. In terms of physical exchanges, 10% of total trade and 30% of consumption is traded on Power Exchanges (PXs). The traditional market for PXs is an auction organized every day around midday to execute orders for the delivery of electrical energy the next day. Some PXs have also started organizing trade before the day-ahead stage (e.g. financial “futures” products) and after the day-ahead stage (“intra-day”), but the focus in this paper is on the traditional day-ahead PX market. Two types of PXs have to be distinguished in Europe because they can be expected not to behave the same way in the operation of their typical exchange tasks. They are (Figure 1):

- *Merchant PXs*: being for-profit market institutions whose income depends on the users they have (i.e. user registration fees, and annual membership fees) and the volume of trade executed by the PX for its users (i.e. commissions on the traded volumes). Merchant PXs are mostly private initiatives that compete with other exchanges and bilateral or over-the-counter markets (OTC). Providing trade services is their core business. Examples of Merchant PXs include APX (the Netherlands), Belpex (Belgium), EPEX (Germany and France), Nord Pool (Nordic region), OTE (Czech Republic), PolPX (Poland), etc.
- *Cost of Service (CoS) Regulated PXs*: being not-for-profit or regulated-profit market institutions whose income depends on approved costs for approved tasks. Like Merchant PXs, some of them charge fees to their members, but these fees are approved by the regulator or the ministry. CoS Regulated PXs are typically public initiatives that perform several tasks. For instance in Spain, OMEL has the additional task of allocating capacity payments, which is a public incentive scheme designed to promote generation adequacy. In Italy, GME has the additional task to manage internal congestions in the country. In Greece and Ireland, the CoS Regulated PXs are dispatching power plants.

* This work has been supported by the French Energy Regulatory Authority, CRE. The analysis and conclusions are of course the sole responsibility of the author.

¹ The 2008 review of EU wholesale energy markets, available at: http://ec.europa.eu/energy/gas_electricity/studies

Figure 1: Different types of PXs across Europe²



Boisseleau (2004) discusses that in countries without a public initiative to set-up a CoS Regulated PX, Merchant PXs have been created following initiatives from various private entities, including:

- *Market parties*: e.g. APX (the Netherlands) was founded in 1999 by energy companies active in the Netherlands, which could have been motivated by their interest in reducing transaction costs. Note that later APX became subsidiary of the Dutch TSO Tennet, while keeping its for-profit status.
- *Financial market institutions*: e.g. EEX (Germany) was founded in 1999 by the exchange group Eurex, which could have been motivated by its interest in leveraging its competence from running financial markets.
- *Transmission System Operators (TSO)*: e.g. Nord Pool (originally Norway, and later the whole Nordic region) was founded in 1996 by the Norwegian TSO Statnett.
- *A combination of the above*: e.g. Powernext (France) was founded in 2001 by the exchange group NYSE Euronext and the French TSO RTE, with several French utilities and banks having a smaller share. The French TSO could have been motivated by the regulatory obligation to procure losses that is imposed on many TSOs in Europe, often making them the largest electricity consumer.

Most countries in Europe have one PX, but there are or have been several cases of competing PXs in the same country (like in Germany and the UK). PXs operating in different countries are executing orders for different products because they imply commitments to withdraw from or inject into the network of that country. This does however not prevent a PX from one country to also offer its services in another country. There have been several cases, like Nord Pool that founded the Leipzig Power Exchange (LPX) in 2000, which competed in Germany with EEX until they merged in 2002.

² Based on the limited available information on the PX websites.

PX incentives to behave in a national isolated market

The Merchant PXs' case in a national isolated market

Interests in analyzing financial markets have contributed to analyzing power exchanges. Lee (2010) is a typical case of such contributions. He does notice that there is a widespread presumption that the for-profit model is the best governance structure for an exchange, while he also warns that potential benefits may not materialize and that there may be significant cons associated with the for-profit model.

The most important of the cons arises when the PX has a dominant position in the provision of one or more of its market services, and succeeds in exploiting its market power to act anti-competitively. As discussed by other authors, including Oesterle et al. (1992), McInish and Wood (1996), Pirrong (1999, 2000), and Lee (2010), anti-competitive behavior can consist of cartelizing the supply of trading services, passing self-interested and inefficient rules, deterring access to the exchange, deterring competition, or practicing monopoly pricing.

Exchanges can have natural monopoly characteristics. First, trading systems can benefit from a positive “network externality” because liquidity attracts liquidity. Second, significant economies of scale have been demonstrated in empirical work on exchanges, e.g. by Malkamäki (1999), Hasan and Malkamäki (2001), and Schaper (2009).

Furthermore laws and regulations can create or reinforce the market power of Merchant PXs. Examples include (Frontier³, 2005; EC Sector Inquiry⁴, 2006):

- *Prudential regulations*: while such regulations may be needed to protect market parties trading on the PX from a financial failure of market participants, they also reinforce the incumbent PXs by making it more costly to enter into the business of exchange services. Prudential regulations are typical financial market regulations, but for instance in Germany and the UK, the PX spot markets are subject to these financial market regulations.
- *Liquidity supporting measures*: while providing a reliable price reference can be considered as a public service that might need to be supported with liquidity supporting measures, these measures typically target the incumbent PX, and thereby can reinforce its market power. For instance in the Dutch market, there is an obligation for importers being active at the day-ahead stage to trade on the incumbent PX. In the Nordic market, market parties have to transact via the incumbent PX to get access to interconnection capacity.
- *Cooperation with Transmission System Operator (e.g. ownership)*: while it may be beneficial for the ongoing market integration process in the EU (see discussion in the next session), deep cooperation with the Transmission System Operator (TSO) can also reinforce the market power of the incumbent PX. The TSO can be a very big customer due to the common regulatory requirement for the procurement of losses. The TSO - PX cooperation can also imply that the incumbent PX monopolizes certain services. For instance in the Czech market, the incumbent PX is organizing the balancing market in cooperation with the TSO.

The Cost of Service Regulated PXs' case in a national isolated market

The fact is that there has been little regulation to control prices and/or service levels of exchanges in financial markets (Lee, 2010). On the contrary in power markets, CoS Regulated PXs are not

³ Regulation of power exchanges, a report prepared for DTe by Frontier Economics.

⁴ DG COMP report, available at: <http://ec.europa.eu/competition/sectors/energy/inquiry/index.html>

uncommon. As illustrated in Figure 1, there are 8 markets that have a PX with some form of CoS Regulation, while 15 markets have Merchant PXs. CoS Regulated PXs by definition have fewer incentives to abuse market power than Merchant PXs, but they also have fewer incentives to provide an efficient trading service, or to innovate in trading systems.

Lee (2010) lists various costs that may arise when such a model is adopted by a market institution. It includes:

- Costs of the services provided may not be efficiently managed
- Decision-making at the PX may be cumbersome and expensive
- It may be hard to incentivize management to perform better

Resulting potential for regulatory actions in a national isolated market

Table 1 summarizes the relative pros and cons of the two types of PXs in an isolated market, as discussed in the previous paragraphs. In such a closed market, PXs do not have to cooperate with each other; each one can sell its services on its own footing. In this context, Merchant PXs can be better at providing efficient services to their users while they also can try to exert their market power if any. It results in this typical structure of incentives and behavior where both type of PX may have pros and cons.

Table 1: isolated market incentives comparison

Incentives to	CoS Regulated PX	Merchant PX
Provide efficient services	-	+
Abuse market power	+	-

However regulation can act to correct the expected behavior and outcome. Promising regulatory actions to improve the incentive frame of Merchant PXs are:

- *Regulatory requirement for transparency on pre- and post-trade data (prices, volumes, etc).* A merchant PX can have an incentive to restrict transparency to lower the capacity of its users to oversight its operation. Regulatory transparency requirements can help avoid that the PX restricts transparency to deter the effect of competition. Note that without such a requirement, the PX will anyway be somewhat transparent to attract enough trading, but not necessarily as transparent as possible.
- *Carefully design liquidity supporting measures.* Forcing transactions via a Merchant PX is a questionable measure to deal with structural liquidity problems, especially when alternative measures could be used to tackle these problems. This includes targeting lack of interconnection, excessive concentration in generation, complete integration of supply with generation, etc. The PX itself can also be a problem, for instance when its offer in terms of price and quality is not attracting enough trade vis-à-vis OTC trading.

PX incentives to behave in a market integration context

Exchange of energy and access to grid capacity are two related but distinct commodities. Auctioning the access to interconnection separately from the energy market auctions has proven to create inefficiencies because the access rights are frequently underused or misused, even though they are scarce (e.g. Newbery and Mcdaniel, 2002; CRE⁵, 2009).

Moreover the uses of interconnections part of a network are physically interdependent following the Kirchhoff laws of power flows. Consensus is then growing in the EU that the use of connection access rights needs to be coordinated with the coupling of the day-ahead auctions organized by PXs in order to better eliminate inefficiencies. At the last Florence Forum,⁶ a target model was presented and welcomed by PXs proposing to cooperate to implement it. The PX incentives have then to be re-examined in this context.

Merchant PXs' case in a market integration context

The new EU target model implies that trade across borders at the day-ahead stage will be transacted as a bundle “energy – access capacity” via the PXs. A Merchant PX therefore has a clear incentive to cooperate in the implementation of this model as it can generate significant additional trade volumes and thus income for the PX.

However, the new EU target model can also reinforce the market power of PXs which can hamper the potential benefits. First, market power could be reinforced because the needed cooperation among PXs implies that they have to cartelize the supply of trading services and to monopolize the operation of trade across borders. Second, the potential benefits may not materialize because eliminating existing cross-border trade inefficiencies is far from trivial. For instance in the Dome Coupling initiative⁷ the potential benefits did not materialize - at least initially - because the involved PXs did not coordinate the calculation of their prices, and did not harmonize sufficiently their operation (FGH/IAEW⁸, 2009). A sufficiently efficient arrangement on these issues may not be obvious for all existing PXs for the following reasons.

- *To coordinate prices calculation.* Many PXs followed by their association Europex insist on a decentralized approach which can go up to avoid having to coordinate the calculation of their prices. One can presume that they consider as their exclusive business the manner with which they set the price in their zone⁹.
- *To harmonize operation.* Harmonizing can be costly and is frequently unevenly costly (or beneficial) for all partners. It is then not necessarily easy to implement in a decentralized process of convergence among PXs. Harmonizing PX price caps for instance is not necessarily included in a coordination initiative, while it causes cross-border trade inefficiencies.

⁵ Management and use of electric interconnections in 2008, available at: <http://www.cre.fr>

⁶ The Electricity Regulatory Forum, or Florence Forum, was set up in 1998 to discuss the creation of a true internal electricity market. Consensus was reached at the XVII meeting:
http://ec.europa.eu/energy/gas_electricity/forum_electricity_florence_en.htm

⁷ A cooperation between Nord Pool (Nordic region) and EEX (Germany) operational since September 2008.

⁸ Report on Supervision of Tests and Evaluation of a System for Market Coupling operated by EMCC, available at: <http://www.marketcoupling.com>.

⁹ It started with the 2003 paper: “using implicit auctions to manage cross-border congestion: decentralized market coupling”, and see for instance also the 2009 paper: “development and Implementation of a coordinated model for regional and inter-regional congestion management”. All these papers are available at www.europex.org.

Cost of Service Regulated PXs's case in a market integration context

Cooperating with another PX to eliminate cross-border trade inefficiencies could in principle be just another regulated task for the CoS Regulated PX. However exactly here we do suffer a “regulatory gap” in Europe.

As discussed in Vasconcelos (2005), the achievement and operation of the EU internal energy market is a common European regulatory task, but the corresponding regulatory function is not assigned to a European wide regulatory entity. When dealing with problems related to cross-border trade, the national regulatory authorities frequently do not have effective and independent powers to define and enforce the needed regulation at EU level.

Each regulator would need to act in interaction with its own national decision-making process, introducing coherent modifications of the CoS Regulated PXs' task frame at the same time in the entire EU to achieve market integration through this model.

Potential for regulatory actions in a market integration context

Table 2 summarizes the relative positive and negative points of the two types of PXs in a context of market integration, as discussed in the previous paragraphs. One may think that when integrating markets, eliminating cross-border trade inefficiencies appear as a new criterion along with providing efficient other trading services and not abusing market power. Again no model of PX provides an absolutely perfect picture for all the relevant criteria.

Table 2: integrated market incentives comparison

Incentives to	CoS Regulated PX	Merchant PX
Provide efficient services	-	+
Eliminate cross-border trade inefficiencies	-	+
Abuse market power	+	-

However some regulatory measures can mitigate this or that possibly bad outcome. A promising regulatory action here to counter the reinforced market power from implementing the new EU target model could be to combine PX and OTC in the allocation of the interconnection capacity.

- *Long-term explicit auctions.* If TSOs would at least initially continue to offer part of the physical rights to trade across their borders in separate auctions (the “explicit auctions”) ¹⁰, OTC markets could continue to provide physical customized trading services across borders. Following Lee (2010), there is a common belief about the importance of OTC in competing (e.g. Nystedt, 2004) and complementing (e.g. Kroszner, 1999) organized exchanges. Note also that 90% of total trade in Europe is OTC, with the main exception being the Nordic region where it is only half of trade (there are no explicit auctions in this region) ¹¹.

Another set of promising regulatory actions to help materialize the potential benefits of the EU target model (i.e. elimination of the cross-border trade inefficiencies) could be of interest.

¹⁰ The alternative is to have long term financial transmission rights so that all physical rights would be reserved for PXs. This would improve the liquidity of PXs, goes the argument, but this would then be another liquidity supporting measure that would need to be carefully designed and that would re-open the debate on regulation of PXs.

¹¹ The 2008 review of EU wholesale energy markets, available at: http://ec.europa.eu/energy/gas_electricity/studies

- *Regulated price properties.* In the Trilateral Market Coupling (TLC) initiative,¹² stakeholders had agreed with regulators on a set of price properties that the coordination initiative would comply with: e.g. prices have to be equal if there is unused capacity, etc. The properties were defined so that the initiative should eliminate all cross-border trade inefficiencies, which it then also did. Note however that the optimal properties for a Pan-European coordination initiative will be different from the ones used for TLC. Of course France, Belgium and the Netherlands are interconnected with a connection between France and Belgium and between Belgium and the Netherlands, but the Netherlands and France are not directly connected and therefore there is no mesh. As discussed in Meeus et al. (2009), in meshed networks with flow based network constraints, price properties are more complicated to define, and several sets of optimal prices may exist. However the properties would have to be defined and regulated.
- *Minimum prerequisites.* Pre-requisites for the implementation of the target model have already been suggested at the Florence Forum. They include: use of a single pricing algorithm, harmonized gate closure times, sharing of all bid data between PXs, compatible bids/products, etc. The experience with Dome Coupling however indicates that there are many factors that can contribute to inefficiency so it could be difficult to make a good working list of prerequisites. Considering however, that regulators will need to regulate the price properties of the initiative coming from PXs, a prerequisite could be that the costs of setting up and running the initiative are covered by the regulated tariffs, as in the TLC initiative.¹³ This was not the case in the Dome Coupling initiative (there are no regulated price properties for Dome Coupling).
- *Apply netting at the day-ahead stage.* In the TLC initiative, TSOs have continued to organize separate auctions for long term rights to trade across their borders. At the day-ahead stage, the TSOs calculate the available capacity, deduct the capacity they have already auctioned, and add the part of that capacity that has not yet been used. This remaining capacity is then used by the PXs to coordinate the execution of their day-ahead orders books. There are still inefficient nominations from the long term auctions, but the TSOs apply “netting” so that inefficient nominations before the day-ahead stage simply increase the remaining capacity at the day-ahead stage.

¹² Cooperation between Powernext (France), Belpex (Belgium) and APX (the Netherlands) operational since November 2006

¹³ In this initiative, the costs have been invoiced by the PXs to the TSOs so that it could then be considered as an approved cost by the regulators to be added to the transmission tariff.

Conclusions

In the EU market integration context, why and how to regulate Power Exchanges (PXs) can be provocatively rephrased as why and how to regulate a closed “cartel” of “incumbent” and “merchant” PXs that is proposing to “monopolize” the organization of trade across borders.

Even though building such a cartel is questionable from an economical point of view, it is likely to be the only institutionally feasible way to eliminate the significant cross-border trade inefficiencies that Europe is currently experiencing.

It is true that a theoretical alternative could be to adopt the Cost of Service Regulated PX model all over Europe because such a PX has no profit incentives to abuse the monopoly of cross-border trade. However it will require having all of them perfectly regulated, while coordinating and harmonizing across borders is far from just another regulated task in a mainly national regulatory frame.

It is not an accident that merchant PXs are already organizing trade across borders in some parts of Europe. And there are several promising regulatory actions that could help preventing that Europe’s increasingly monopolistic market infrastructure would generate new trade inefficiencies. First, the price properties of the cross-border PX coordination initiative could be regulated to make sure that the potential benefits from coordination materialize. Second, the long-term rights to trade across borders could continue to be auctioned separately to temper the reinforced PXs’ market power. Third, netting at the day-ahead stage would make sure that these auctions for long term rights do not reduce the benefits from coordination. Fourth and last, enhanced transparency requirements and external market oversight could also help tempering the reinforced PX market power.

References

- Boisseleau, F., 2004, The role of power exchanges for the creation of a single, European electricity market: market design and market regulation, PhD dissertation, Delft University Press.
- Hasan, I., Malkamäki, M., 2001, Are expansions cost effective for stock exchanges? A global perspective, *Journal of Banking and Finance*, 25 (12), 2339-2366.
- Kroszner, R., 1999, Can the Financial Markets Privately Regulate Risk?, *Journal of Money, Credit, and Banking*, 31(3), 596–618.
- Lee, R., 2010, The Governance of Financial Market Infrastructure, Oxford Finance Group, Princeton University Press, Forthcoming.
- Malkamäki, M., 1999, Are there economies of scale in stock exchange activities?, Bank of Finland Discussion Papers 2/2003.
- McInish, T., Wood, R., 1996, Competition, fragmentation, and market quality, The Industrial Organization of the Securities Industry, University of Chicago Press.
- Meeus, L., Vandezande, L., Cole, S., Belmans, R., 2009, Market coupling and the importance of price coordination between power exchanges, *Energy*, 34(3), 228-234.
- Newbery, D., Mcdaniel, T., 2002, Auctions and trading in energy markets: an economic analysis, DAE Working Paper WP 0233.
- Nystedt, J., 2004, Derivative market competition: OTC markets versus organized derivative exchanges, IMF Working Paper WP/04/61.
- Oesterle, D., Winslow, D., Anderson, S., 1992, The New York stock exchange and its outmoded specialist system: can the exchange innovate to survive?, *Journal of Corporate Law* 17, 223-310.
- Pirrong, C., 1995, The self-regulation of commodity exchanges: the case of market manipulation, *Journal of Law and Economics* 38, 141-206.
- Pirrong, C., 2000, A Theory of Financial Exchange Organization, *Journal of Law and Economics*, 43(2).
- Vasconcelos, J., 2005, Towards the Internal Energy Market: how to bridge a regulatory gap and build a regulatory framework, *European Review of Energy Markets*, 1(1).
- Schaper, T., 2009, Organizing Equity Exchanges, Goethe-University Frankfurt, Discussion Paper 22/200.

Author contacts:

Leonardo Meeus

Florence School of Regulation

European University Institute, RSCAS

Villa Malafrasca

Via Boccaccio, 151

I-50014 San Domenico di Fiesole (FI)

Email: leonardo.meeus@eui.eu