

# Contracts in the restructured electricity markets

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## 7. Conclusions

The EU Directives 96/92/EC and 2004/544 EC represent the cornerstone of the European electricity liberalisation process. However, it provides *“a framework in the loosest sense of the word: its objectives are laid down in general terminology and moreover, member states are given a substantial degree of choice in how they are about introducing more competition into their electricity markets. Indeed the margin is so substantial that it would seem possible for the determined anti-market countries to avoid introducing any meaningful degree of competition at all”* (Hancher, 1997).

Starting from this remark, and on the fact that the Directives are silent on the regulation of electricity trading arrangements, the manuscript contains an economic analysis of electricity wholesale contract. This study aims to understanding electricity market common practices and to scrutinize electricity agreements with economic theory and econometric technique.

In the first chapter, we have surveyed three types of power purchase contracts operating in the electricity wholesale market, from the most rigid to the most flexible, in order to underline how competitive contracting can increase efficiency pressures and, at the same time, increase investment risk. We have defined a theoretical contractual model, highlighting the tension between the two opposite directions: designing agreements to reduce uncertainty and risk in order to attract private investment and operating the power system as more efficiently as possible. We then used our theoretical model in order to analyse the formal structure of a selected sample of power purchase agreements, really operating in the restructured electricity markets all over the world. From the above analysis, we can derive that competitive contracting is crucial for ensuring efficient operation. “Take-or-pay” contracts are attractive to producers because eliminate demand risks but do not achieve efficient results. Under this contract, in fact, dispatch can occur out of merit order and excess production of energy, with the buyer being obliged to buy all production, can occur. The

economic dispatch contract can create some competitive pressures: a system of bonuses and penalties that respectively awards capacity availability and punishes capacity shortcuts can force private producers and investors to generate efficiently and can ensure merit-order dispatch. In our opinion, an incentive formula for long-term contracts, can benefit sharing agreements and provide an appropriate way for dealing in the new deregulated electricity market. This is a way to continuously renegotiate the contract and adapt it to changed circumstances.

The competitive pool contract sets the most competitive conditions. Such system worked very well in the Argentina electricity restructuring experience. In England and Wales, on the contrary, a pool system has caused an oligopolistic-strategic situation: the two dominant generators (National Power and PowerGen) have taken advantage of their market power, restricting the capacity offered to the market in order to increase the price of available capacity.

The second chapter has empirically analysed the effects of legal provisions setting penalties and incentives, and regulating the parties' obligations and risks, on electricity contracts price formation. We have considered 27 California long-term electricity contracts for the trade of electricity between generators. We have created a dataset by using the contracts' main legal provisions, in order to perform an econometric exercise and target the main determinants that affect price provisions in long-term wholesale electricity contracts. Given that the contracts set a minimum and a maximum price threshold, we have performed separated econometric exercises. The general result is that the provision increasing (decreasing) the trading risk for the seller increase (decrease) the price; those provisions setting penalties (incentives) for the seller decrease the price. A peculiarity is that the legal provisions regulating obligations and risks and setting incentives and penalties affect the maximum contract price. Estimated coefficients for legal provisions are not statistically significant when the dependent variable is the minimum price. Economic variables (like fuel types, construction costs and so on) are more robust explanatory variables for minimum price. The general results are robust to different model specifications and estimation techniques.

The third chapter has attempted to test Williamson's theory (about the relationship between asset-specificity and market organizational forms) in the restructured electricity markets. In particular, it is an attempt to empirically capture the positive relationship between physical assets specificity and the duration of long-term contracts, stipulated between California electricity generators. In addition, following Masten and Crocker, the study to capture the effect of legal provisions and interpret them as efficient instruments for providing flexibility in long-term relationships. As the investment in relationship-specific assets becomes more important, the longer becomes the contractual duration. However, the parties will mitigate the long-term contracts inflexibility, based on *ex ante* bargained terms and conditions, with provisions that allow for contingent adaptation. The empirical results provide support for the hypothesised relationships and are robust to different model specifications and alternative estimation techniques. The fourth chapter is a case-study, which analyzes the Nuclear Energy Agreement (NEA), a long-term "take or pay" contract for the trade of wholesale electricity between Scottish Nuclear and Scottish Power and Hydro-Electric. Since NEA contractually fixed the energy quantity to be sold, the European Commission considered this type of contract rather problematic from the competition policy point of view. We have criticized the EU Commission's NEA decision. We have shown that contractually fixing the quantity in markets where market power exists helps overcoming double marginalization problems and allows the total (single) margin to be lower than the sum of the margins in the disintegrated case. In this perspective, we think that the NEA contract does not have anticompetitive effects; on the contrary, given the peculiar structure of the electricity markets, it set provisions, instrumental to the working and the existence of competitive dynamics and represents a valid tool for dealing with market power in electricity markets. In our perspective, a long-term agreement between wholesaler and retailer might help overcoming market power in electricity markets. Most competitive market policies aim at maintaining the relevant market structure by preventing that any firm dominates its market. This economic reasoning has inspired the EU Treaty economic provisions and the NEA decision. For the EU Commission, in fact, the contract is anticompetitive

*ex* Article 85, because it fixes the quantity to be traded. Notwithstanding the acknowledgement that this agreement might restrict competition (*ex lege*), the Commission has awarded an exemption, on the ground that the NEA contract is fundamental to the restructuring of the UK electricity market, and has disposed for some adjustments and changes in the contract content.

Our analysis can provide some general remarks for policy guidance. First, a (maybe) obvious policy conclusion is that private parties are perfectly able to adapt to the specificity of the transactions in an efficient transaction costs minimising manner. In our opinion, this is the real challenge of electricity markets restructuring: let the parties adapt to the legal and institutional deregulated setting. Second, studying the relationships between competition and governance structures (long-term contracts might be considered hybrid governance structures) represents a way to design and implement competition policies. This approach may represent a challenge to competition: contractual agreements, for instance, involve some restrictions and/or conditions on quantities, qualities, or prices, which raise the question of the acceptability of these coalitions. Standard competition policies might interfere in the trade-off among governance structures; they are inadequate and might be misinterpreted, when applied to particular organization forms. In the presence of market power, for instance, long-term contracts might help reducing prices and increasing efficiency, by avoiding the double marginalization problem. In this perspective, some governance structures (long-term contracts and/or vertical integration) are better adapted to the characteristics of the transaction at stake.

Finally, several factors affect power purchase contracts. Sociopolitical, legal, operational, management and technical factors are a serious concern, which must be taken into account in any major long-term investment. All these factors will lead to difficulties in deciding on values for contractual parameters and provisions and in understanding their relationships, in order to design efficient power purchase contracts.

A pragmatic "learning-by-doing" approach and some solid field experience will show, in the future, the most proper way to re-organize transactions in the restructured electricity market.

## Samenvatting

Decennia lang was de elektriciteitsindustrie over de hele wereld hoofdzakelijk gestructureerd door middel van verticaal geïntegreerde en vooral publieke monopolies. In de afgelopen jaren hebben zich daarin grote veranderingen voorgedaan als gevolg van het liberalisatieproces gericht op de introductie van concurrentie in het energieopwekkende en -leverende segment van de industrie. In Europa heeft de eenduidige doelstelling om een concurrerende elektriciteitsmarkt te creëren, zoals geformuleerd in Richtlijn 96/92 en vervolgens in Richtlijn 2003/53 van het Europees Parlement en de Raad, een onverwacht effect. Hoewel de vorming van pan-Europese enkelvoudige elektriciteitsmarkten de doelstelling van de Richtlijnen was, heeft het reorganisatieproces inmiddels geleid tot 15 min of meer gefragmenteerde markten; daarbij is elke markt tot een ander niveau geliberaliseerd en is aan elke markt op basis van uiteenlopende principes vorm gegeven.

De kritiek op de EU-richtlijnen vormt het uitgangspunt voor dit proefschrift. Het gaat daarbij vooral om kritiek met betrekking tot het gebrek aan bepalingen voor handelsstelsels die nodig zijn om het reorganisatieproces te ondersteunen met het oog op de vorming van een geïntegreerde Europese markt voor elektriciteit. Centraal in dit onderzoek staat de analyse van langdurige handelsovereenkomsten voor elektriciteit op grote schaal. Aangezien in de EU-richtlijnen over dit belangrijke onderwerp wordt gezwegen, was het onderzoek vooral gericht op de beoordeling van en het inzicht in de reactie van marktspelers op de deregulerende dynamica; op de beoordeling van de inhoud van grootschalige elektriciteitscontracten tussen energiebedrijven; en op het gedetailleerde onderzoek van overeenkomsten binnen het strakke kader van economische theorieën, vooral om te kunnen beoordelen of hier een taak is weggelegd voor beleidsmakers.

Dit proefschrift bestaat uit vier originele essays, die binnen een algemeen kader worden gepresenteerd. De essays kunnen worden beschouwd als cognitieve instrumenten die inzicht bieden in het manuscript. Het proefschrift wordt afgesloten met een aantal eindopmerkingen.

Het eerste essay is een analyse van het spanningsveld tussen het ontwerpen van grootschalige elektriciteitsovereenkomsten waarbij de onzekerheid van particuliere investeerders wordt beperkt en het binnen de gereorganiseerde elektriciteitsmarkt zo efficiënt mogelijk leiden van krachtcentrales. Het theoretisch contractmodel dat in dit essay wordt gedefinieerd, benadrukt het spanningsveld tussen twee tegengestelde richtingen: de beperking van onzekerheden en risico's om particuliere investeerders aan te trekken enerzijds, en de doeltreffende bedrijfsvoering van krachtcentrales anderzijds. Dit model wordt gebruikt voor de analyse van de formele structuur van geselecteerde voorbeelden van koopovereenkomsten voor elektriciteit die over de hele wereld worden gebruikt binnen de gereorganiseerde elektriciteitsmarkt.

In het tweede essay wordt beoordeeld wat de gevolgen zijn van wettelijke bepalingen betreffende de prijsbepaling in elektriciteitscontracten. We hebben daartoe 27 langlopende elektriciteitscontracten uit Californië<sup>97</sup> bekeken en de handel in elektriciteit tussen energiebedrijven bestudeerd. De gegevens zijn verzameld aan de hand van de belangrijkste wettelijke bepalingen in de contracten om een econometrische studie te kunnen uitvoeren en de belangrijkste prijsbepalende factoren voor langlopende elektriciteitscontracten te kunnen benaderen. Over het algemeen zijn deze bepalingen van invloed op de manier waarop het risico van transacties wordt verdeeld tussen partijen en daardoor de transactie meer (of minder) lonend maakt voor de partij die het hoogste (laagste) risico draagt. Deze interpretatie van de resultaten bevestigt de economische theorie over stimuleringsmaatregelen voor agenten. De empirische resultaten ondersteunen de veronderstelling van betrekkingen en zijn krachtig ten opzichte van verschillende modelspecificaties en alternatieve schattingstechnieken.

Het derde essay is één van de eerste pogingen om de theorie van Williamson (over de relatie tussen bedrijfsspecificiteit en organisatievormen op de markt) te testen op de gereorganiseerde elektriciteitsmarkt. Hoe belangrijker de investering in relatiespecifieke bedrijfsmiddelen, hoe langer

<sup>97</sup> Omdat het moeilijk was om dergelijke overeenkomsten te vinden en de inhoud daarvan te beoordelen is slechts een klein aantal contracten onderzocht.

de contractduur. Partijen zullen de inflexibiliteit van langlopende contracten echter matigen op basis van vooraf onderhandelde bepalingen en voorwaarden met voorzieningen voor eventuele aanpassingen. De empirische resultaten ondersteunen de veronderstelling van betrekkingen en zijn krachtig ten opzichte van verschillende modelspecificaties en alternatieve schattingstechnieken.

Het vierde essay is een case study waarin de relatie tussen langlopende contracten en verticale integratie in de reorganisatie van de elektriciteitsmarkt in het Verenigd Koninkrijk centraal staat. In het begin van de jaren negentig stelden de drie belangrijkste Schotse elektriciteitsmaatschappijen bij de reorganisatie van de elektriciteitsmarkt in het Verenigd Koninkrijk een langlopend "take-or-pay" contract op, de Nuclear Energy Agreement. Daarin waren bepalingen opgenomen voor de grootschalige handel in elektriciteit in Schotland.

De Europese Commissie heeft dat contract bestudeerd om te bepalen in hoeverre deze overeenkomst voldoet aan de Europese wetten. De Commissie erkende de interne anti-concurrerende inhoud en de potentiële gevolgen van het contract. In dit laatste essay wordt kritiek gegeven op het besluit van de Commissie aangaande de Nuclear Energy Agreement en de economische gedachtengang daarover, en geeft een alternatieve lezing en analytische benadering. Deze leidde tot tegengestelde resultaten en conclusies: de Nuclear Energy Agreement is niet anti-concurrerend en vergroot efficiency op concurrerende elektriciteitsmarkten.