

# ***RISK HEDGING AND COMPETITION : THE CASE OF ENERGY MARKETS***

Dr Raphaël Homayoun BOROUMAND

Professor of Economics, ESG Management School, Paris

Lecturer in Executive Education, DAUPHINE University

IAEE international conference, New York City, June 2014

## **Overview**

The advent of retail competition in the electricity industry was concomitant with the explicit emergence of electricity retailers<sup>1</sup>. The latter buys electricity on the wholesale market or contractually from producers and resells it to its customers. The “textbook model” of competitive decentralized electricity markets required the vertical separation of generation, retail, as well as network activities (transmission and distribution). Introducing competition at the retail level was thought to imply the emergence and development of “asset-light retailers” who neither own generating nor distribution assets. By offering innovative retail contracts with attractive prices to electricity consumers, those retailers were expected to generate a fierce price-competition (Hunt 2002; Hunt and Schuttleworth, 1997). However, in stark contrast to this theoretical vision, asset-light retail entry has never eventuated as expected. Asset-light retailers bankrupted, left the market, were taken over, or evolved towards an integration into production in all retail markets. Departing from this unexpected result, the paper compares vertical arrangements through the analytical lens of risk management taking the new perspective of an electricity retailer specific’s intermediation function.

The paper is organized as follows: in section 2 we put forward the market risks faced by a retailer. Section 3 demonstrates the limits of pure contractual hedging in liberalized electricity markets compared to physical hedging. Section 4 is devoted to comparing from numerical simulations the risk profiles of different portfolios’ made exclusively (or conjointly) of contracts, financial options, and/ or physical assets. Section 5 studies empirically the pricing strategies of vertically integrated electricity retailers. We rely on data from the UK market, described in the literature as a mature retail market. The last section concludes and provides policy recommendations.

## **Methods**

We demonstrate through a Monte Carlo simulation study based on 3000 hourly volume and price data, how a portfolio consisting of forward contracts, options, and/or physical assets can be optimized to reduce the retailer’s net revenue exposure. We use the Value at Risk (95%) to compare the risk profile of the portfolios. The simulation results are confirmed by the case study of the UK retail market.

---

<sup>1</sup> Prior to liberalization, electricity retailing was not dissociated from the distribution’s segment.

## Results

Through the presented numerical simulations we provide evidence, that a retailer can hedge the market risks originating from a standard retail contract by either a combination of forwards and options on the spot price or by a combination of forwards and physical assets. In all observed electricity markets, however, liquid derivatives on the spot market are absent (Geman, 2005; Hull, 2005). Thus, the only real choice for a retailer is to hedge its retail obligations through physical assets. These, however, might help to significantly reduce a retailer's risk exposure. In our example the VaR(95%) with physical assets decreases by more than 80% compared to a situation where only forward contracts are allowed. Consequently, as long as derivative markets are not sufficiently liquid, retailers will strive to vertically integrate to better hedge their risk exposure. Vertically integrated, they will adopt price parallelism strategies to collectively exercise market power in a setting a multi market competition.

## Conclusions

Our paper demonstrates that physical hedging, supported to some degree by forward contracting and spot transactions is an efficient and sustainable approach to risk management in decentralized electricity markets. In contrast to the theoretical premises, financial contracts are imperfect substitutes to vertical integration in the current market environment. The failure of asset-light electricity retailers is indicative of the intrinsic incapacity of this organizational model to manage efficiently the combination of sourcing and market risks. Vertically integrated, retailers will maximize profits by relying on tacit price collusion, which contrasts with the expected price competition envisioned in the reference market model of the electricity reforms.

## References

- Chao H.P. & Huntington H.G. (eds) (1998), *Designing Competitive Electricity Markets*, Kluwer.
- Deng SJ, Xia ZD (2003). "Pricing and hedging power supply contracts: the case with tolling Agreements". Working paper, Georgia Institute of Technology
- Geman, H, (2005), *Commodities and Commodity Derivatives. Modeling and Pricing for Agriculturals, Metals and Energy*. Wiley Finance editors
- Hunt S. (2002), *Making Competition Work in Electricity*, Wiley.
- Hunt S., Shuttleworth G. (1997), *Competition and Choice in Electricity*, Wiley.
- Littlechild, S. (2006), "Competition and contracts in the Nordic residential electricity markets", *Utilities Policy*, vol. 14
- Markowitz, H. (1952), "Portfolio selection", *Journal of Finance*, 7 (1), 77-91.
- Spulber, D.F (1999), *Market microstructure : intermediaries and the theory of the firm*, Cambridge University Press, Cambridge
- Waddams Price (2008), "The Future of Retail Energy Markets ", *The Energy Journal* special issue : The future of electricity: papers in honor of David Newbery"