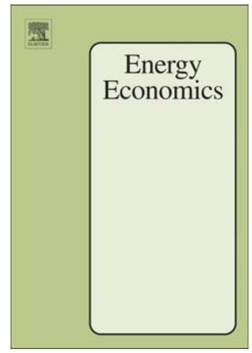

Risk-minimisation in electricity markets: Fixed price, unknown consumption

Martin Tegnér, Rune Ramsdal Ernstsen, Anders Skajaa, Rolf Poulsen

PII: S0140-9883(17)30355-9
DOI: doi:10.1016/j.eneco.2017.10.014
Reference: ENEECO 3787

To appear in: *Energy Economics*

Received date: 13 January 2016
Revised date: 6 October 2017
Accepted date: 16 October 2017

Please cite this article as: Tegnér, Martin, Ernstsen, Rune Ramsdal, Skajaa, Anders, Poulsen, Rolf, Risk-minimisation in electricity markets: Fixed price, unknown consumption, *Energy Economics* (2017), doi:10.1016/j.eneco.2017.10.014

Risk-minimisation in electricity markets: Fixed price, unknown consumption*

Martin Tegnér[†‡] Rune Ramsdal Ernstsen[†] Anders Skajaa[§]
Rolf Poulsen[†¶]

October 17, 2017

Abstract

This paper analyses risk management of fixed price, unspecified consumption contracts in energy markets. We model the joint dynamics of the spot-price and the consumption of electricity, study expected loss minimisation for different loss measures, and derive optimal static hedge strategies based on forward contracts. The strategies are implemented empirically and compared to a benchmark strategy widely used by the industry. On 2012–2014 Nordic market data, the suggested hedges significantly outperform the benchmark: The realised cumulative profit-and-losses are greater for almost every single one-month period and the hourly realised pay-offs result in an approximate 65% out-performance probability. Hedges based on asymmetric loss measures yield markedly higher reward-to-risk ratios than the benchmark, which can be exploited to release a premium from the contract in the financially significant order of 1.5% of the fixed price.

JEL codes: G13, G29, Q4

*We thank Antje Mahayni, Nina Lange, and Mads Schreiner, as well as the editor and two anonymous referees for valuable comments and suggestions. Tegnér and Poulsen gratefully acknowledge support from the Danish Strategic Research Council, Program Committee for Strategic Growth Technologies, via the research center HIPERFIT: Functional High Performance Computing for Financial Information Technology (hiperfit.dk) under contract number 10-092299.

†University of Copenhagen, Department of Mathematical Sciences, Universitetsparken 5, 2100 København Ø, Denmark

‡University of Oxford, Department of Engineering Science, Parks Road, Oxford, OX1 3PJ, United Kingdom

§DONG Energy, Kraftværksvej 53 - Skærbæk, 7000 Fredericia, Denmark

¶Corresponding author. E-mail addresses: martin.tegner@eng.ox.ac.uk (Tegnér), rre@math.ku.dk (Ernstsen), anska@dongenergy.dk (Skajaa), rolf@math.ku.dk (Poulsen).