Benchmarking & Regulation in Energy Industry: An Overview

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http://www.econ.cam.ac.uk/electricity/

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Outline

- Introduction
- Benchmarking methods
- From benchmarking to price setting
- Current issues and conclusions
Benchmarking

- What is benchmarking (BM)?
  - Comparison of ‘actual’ performance of a DMU relative to a ‘reference or benchmark’ performance

- Benchmarking what?
  - Performance dimensions e.g. cost, investments, quality
  - Total vs. partial

- Benchmarking approaches
  - Unlinked vs. cost-linked
  - Average vs. frontier

- The techniques
  - OLS (average), COLS (frontier), SFA (frontier)
  - DEA (frontier)
How is benchmarking used in energy industry?

- Assessing the efficiency of:
  - Electricity - generation, transmission, distribution systems
  - Gas - Networks and pipelines
  - Oil - Refineries
- Public and private companies
- Internal (voluntary) and external use
- Public utility regulation
Many electricity regulators have made some use of BM

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<td>Austria</td>
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_Jamasb and Pollitt (2001)_
Data Envelopment Analysis (DEA)

- Measures the distance between the frontier of best-practice firms and the scatter of less efficient Decision-Making Units (DMUs)
- Ascribes deviation from the best-practice frontier to inefficiency
- Overall inefficiency can be broken down into:
  - technical and allocative inefficiency
  - scale, and “pure” technical inefficiency
- Can be either input or output-oriented
DEA in practice

**Capital per unit of output**

- $K/Y$

**Labour per unit of output**

- $L/Y$

**Firm R**: Techn. eff. = $OJ/OR$  
Alloc. eff. = $OM/OJ$  
Tot. econ. eff. = $OM/OR$

* Source: DTe (1999)
Econometric techniques

- A cost (or production) equation is estimated
- OLS: Regression analysis identifies a central tendency or an “averaged function”
- COLS: A function is estimated, then shifted, so that the firms lie on or above the frontier
- SFA: Uses ML technique and estimates an efficient frontier that splits performance differences into:
  - measurement error and/or stochastic shocks, and
  - firm inefficiency
OLS in practice

Cost, C

Output, Y

C=f_1(Y)
C=f_2(Y)
C=f_3(Y)

= Regulated firm
How is BM used in regulation?

- In a price/revenue cap $P_1 = P_0 * (1 + \text{RPI-X})$ model the regulator needs to set:
  - $P_0$ - the initial price in the first year of the period
  - X-factors - the rate of price decline (Glide Path)

- The regulator decides the scope of one off $P_0$ adjustments and the X factors to be set

- Individual X-factors still need to decide:
  - WACC and uncontrollable costs
  - General productivity component of X-factor

- Allowed revenues may need to be adjusted for:
  - Quality of service and windfalls w. sharing schemes
Allowed revenue and X-factor

Actual Revenue 2000

Actual Opex

Allowed Revenue

Eff. Opex

Depreciation

WACC x RAB

X factor

Frontier Shift

2000

2005
## From BM to X setting: NORWEB

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<td>20 $P_0$'s and X values</td>
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Current issues (1): International benchmarking

- Many jurisdictions with too few domestic comparators
- Reduces the effect of M&A on efficiency scores and loss of information
- Enables regulators to use a wider range of techniques
- Can measure performance relative to world best practice
- Can shed light on distinctive features of the sector e.g. operating environment, regulatory framework, scale of firms
Regulatory implications of cross-jurisdictional BM

- Standardisation of cost and technical data problematic across countries
- Continuity - commitment to long-term co-operation
- Trust - should be able to rely on each others’ quality of data and timing of submission
- Increased transparency and possibilities for dissemination of data and results
- Increased convergence likely as same set of data will encourage standardisation of technique and model

Jamasb and Pollitt (2002)
Current issues (2): Choice of technique and process to X-factor

- At present, no one best measure - the issue of choosing the best method can not be settled on theoretical grounds

- The practical nature of the issue underlines the importance of “processual” aspect of utility benchmarking and regulation

- Good process - transparent, participatory, consensus-based
Consistency conditions for assessing methods

☐ Different approaches should have comparable means, standard deviations and distributional properties.

☐ Different approaches should rank firms in approximately the same order.

☐ Different approaches should identify mostly the same firms as best and worst practice.

☐ All approaches should demonstrate stability over time.

☐ Efficiency scores should be consistent with competitive market conditions.

☐ Measures should be consistent with non-frontier performance measures.

Bauer et al. (1997)
Current issues (3): models and new directions

- Appropriate models and input and output variables
- Appropriate handling of OPEX and CAPEX
- Sensitivity of results to errors/stochastic factors (e.g. SDEA)
- Inclusion of quality of service in revenue caps
- Intra-country state-level BM (e.g. USA, Brazil, India)
- Intra-firm BM (e.g. France, Italy)
Current issues (4): Company strategy under BM

- Recognise that price review is a negotiation and is not subject to legal standards of proof
- The regulator is in the superior position:
  - Legislative backing
  - Political support
  - Future reviews
- Techniques not robust and subject to specification and measurement errors
- Avoid measurement errors by providing accurate data
- Engage in debate about model specification
- Check information provided and verify workings
- Produce own analysis
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