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Benchmarking & Regulation in Energy Industry: An Overview

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**IAEE, 26th Annual Conference
4-7 June 2003, Prague**

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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

Austria ✔	Ireland ? ✔	USA - California ✔
Denmark ✔	Hungary ✔ ✔	Brazil ✔
Canada – Ontario ✔	Italy ✔ ✔	Chile ✔
Finland ✔	Spain ✔	Colombia ✔ ✔
Norway ✔ ✔	Sweden ✔	India ✔
Netherlands ✔ ✔	Japan ✔	
England & Wales ✔ ✔ Northern Ireland ✔	Victoria ✔ ✔ Queensland ✔ ✔ Tasmania ✔ ✔ NSW ✔ ✔	

Jamasb and Pollitt (2001)

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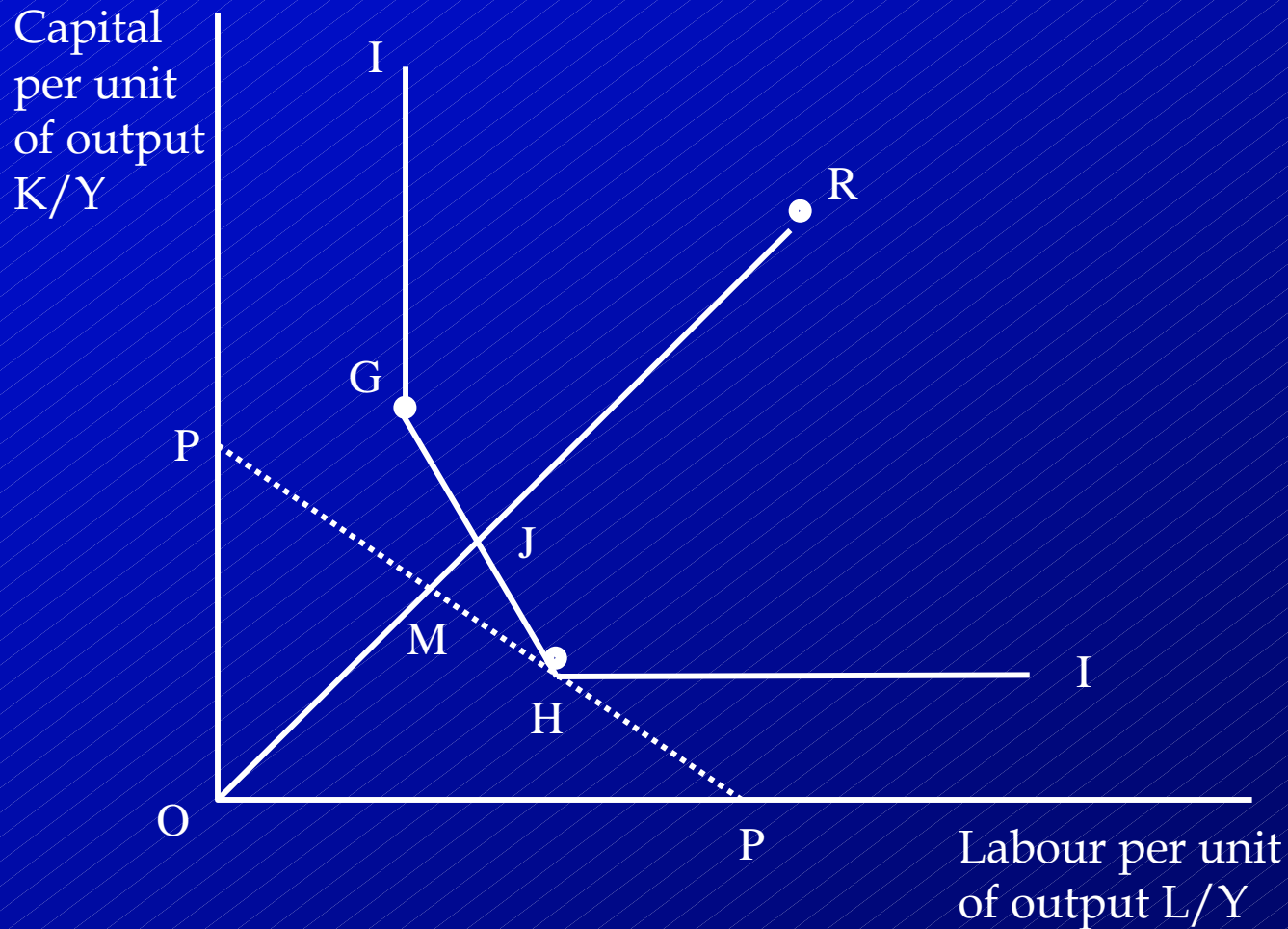
**Firm R: Techn. eff.= OJ/OR   Alloc. eff.= OM/OJ   Tot. econ. eff.=OM/OR**

* Source:DTe (1999)

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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

B C

C=f$_1$(Y)

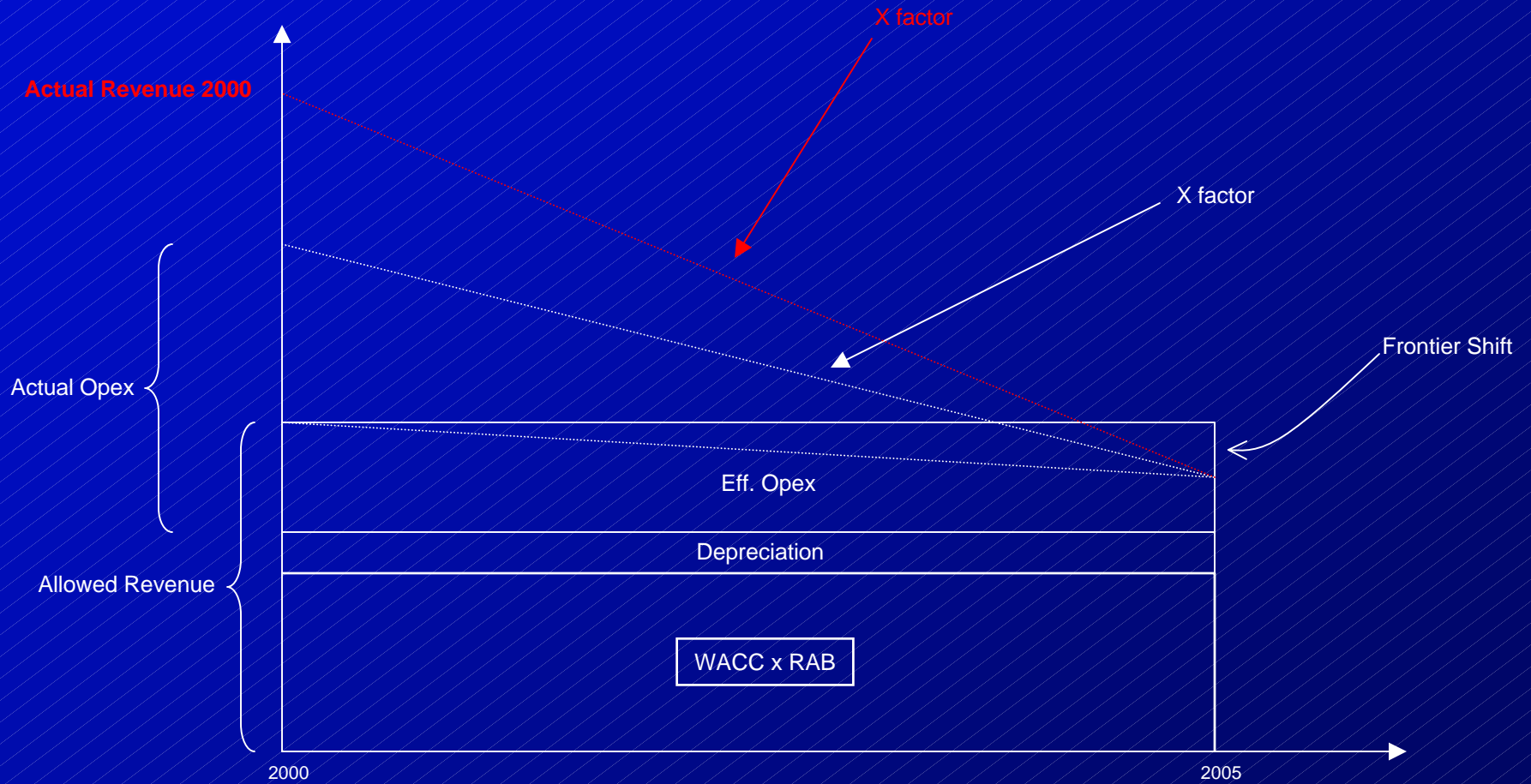C=f$_2$(Y)

C=f$_3$(Y)

D

A

E

O F Output, Y
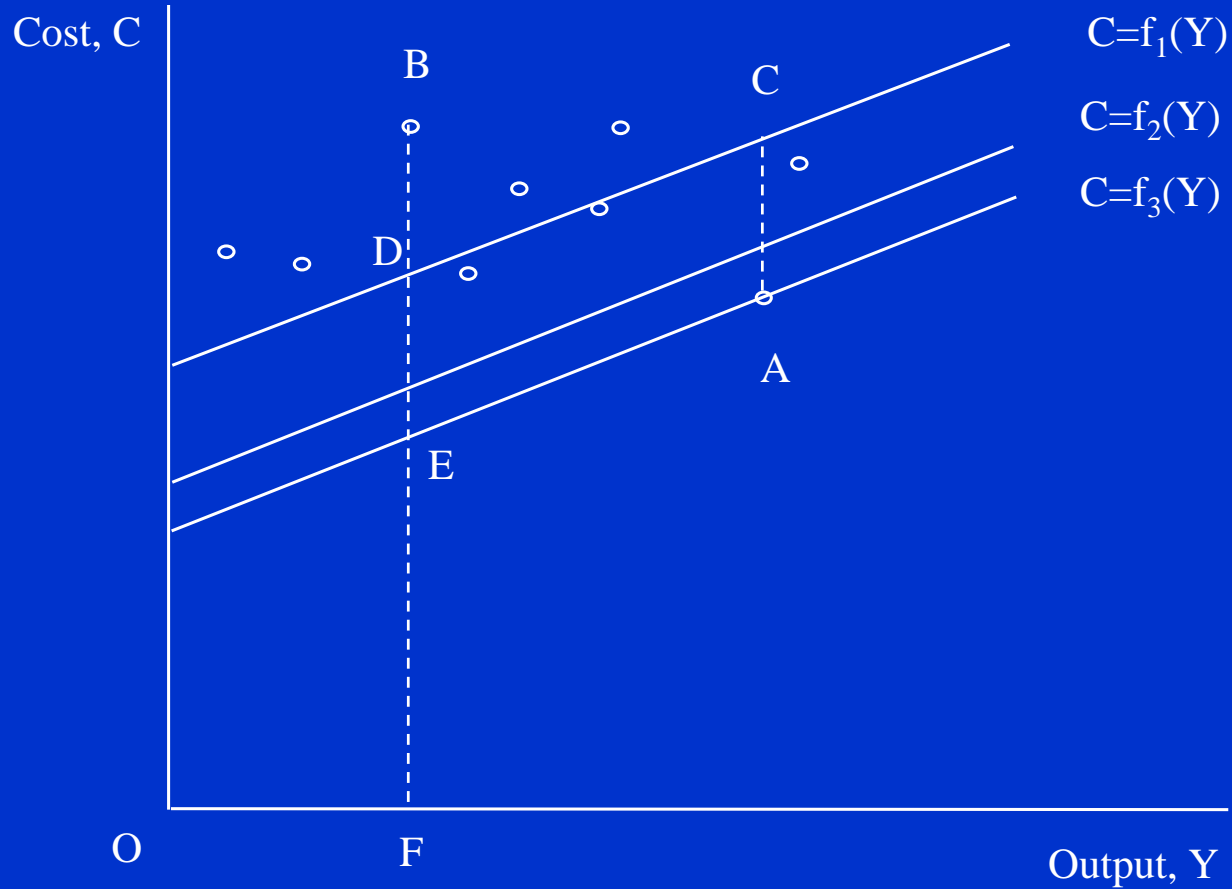
• = Regulated firm

How is BM used in regulation?

- In a price/revenue cap $P_1 = P_0 * (1+RPI-X)$ 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

X factor

Actual Revenue 2000

X factor

Frontier Shift

Actual Opex

Eff. Opex

Depreciation

Allowed Revenue

WACC x RAB

2000

2005

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From BM to X setting: NORWEB

		1999/0	2000/1	2001/2	2002/3	2003/4	2004/5
1	Network capex		90	97	101	101	99
2	Connection charges		-9	-10	-10	-10	-9
3	**Net network capex**		**81**	**87**	**91**	**92**	**89**
4	Opening asset value		720	719	739	782	821
5	Depreciation		-83	-67	-48	-53	-57
6	Net network capex		81	87	91	92	89
7	Closing asset values		719	739	782	821	853
8	**Return**		**47**	**47**	**49**	**52**	**54**
9	Depreciation		83	67'	48	53	57
10	**Operating costs**		**111**	**104**	**102**	**100**	**98**
11	Total		240	218	199	205	210
12	PV of totals	918	232	197	169	163	157
13	**Base price control rev**		**261**	**194**	**190**	**186**	**183**	**179**
14	Excluded revenue		32	28	27	27	27	27
15	Total rev (excl DIVIS)		293	221	217	213	210	206
16	PV of totals	918		214	198	182	168	155
17	Adj price control rev		261	193	190	186	183	179
18	DMS revenue		8	5	5	5	5	5
19	Total rice control rev		270	199	195	192	188	184
20	Po's and X values			P_o	27%	X	3%	

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)

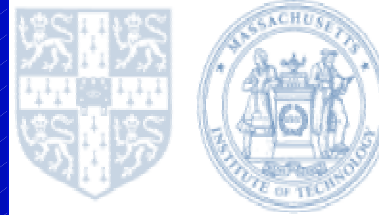16

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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