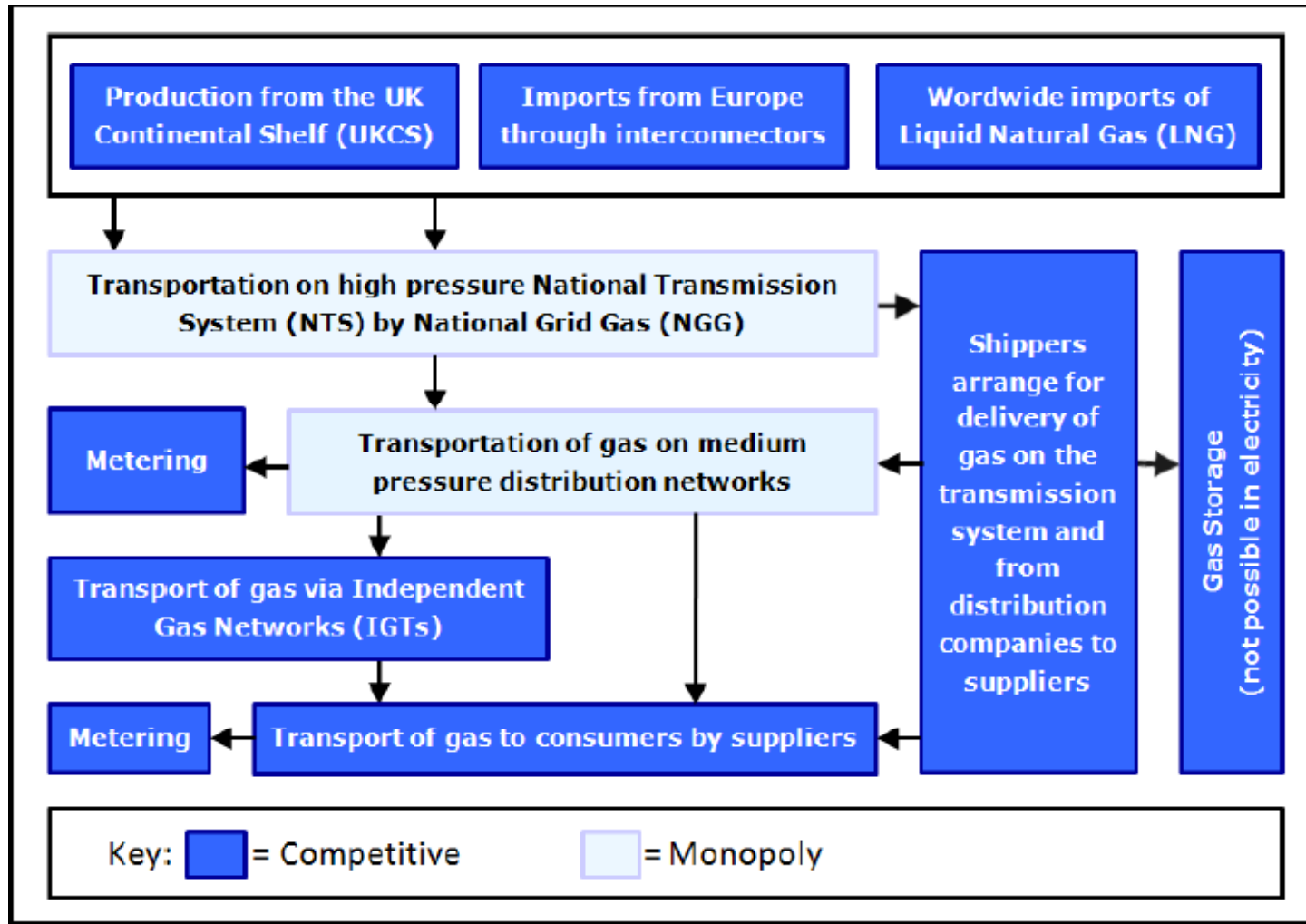

Quantitative Techniques for Regulation

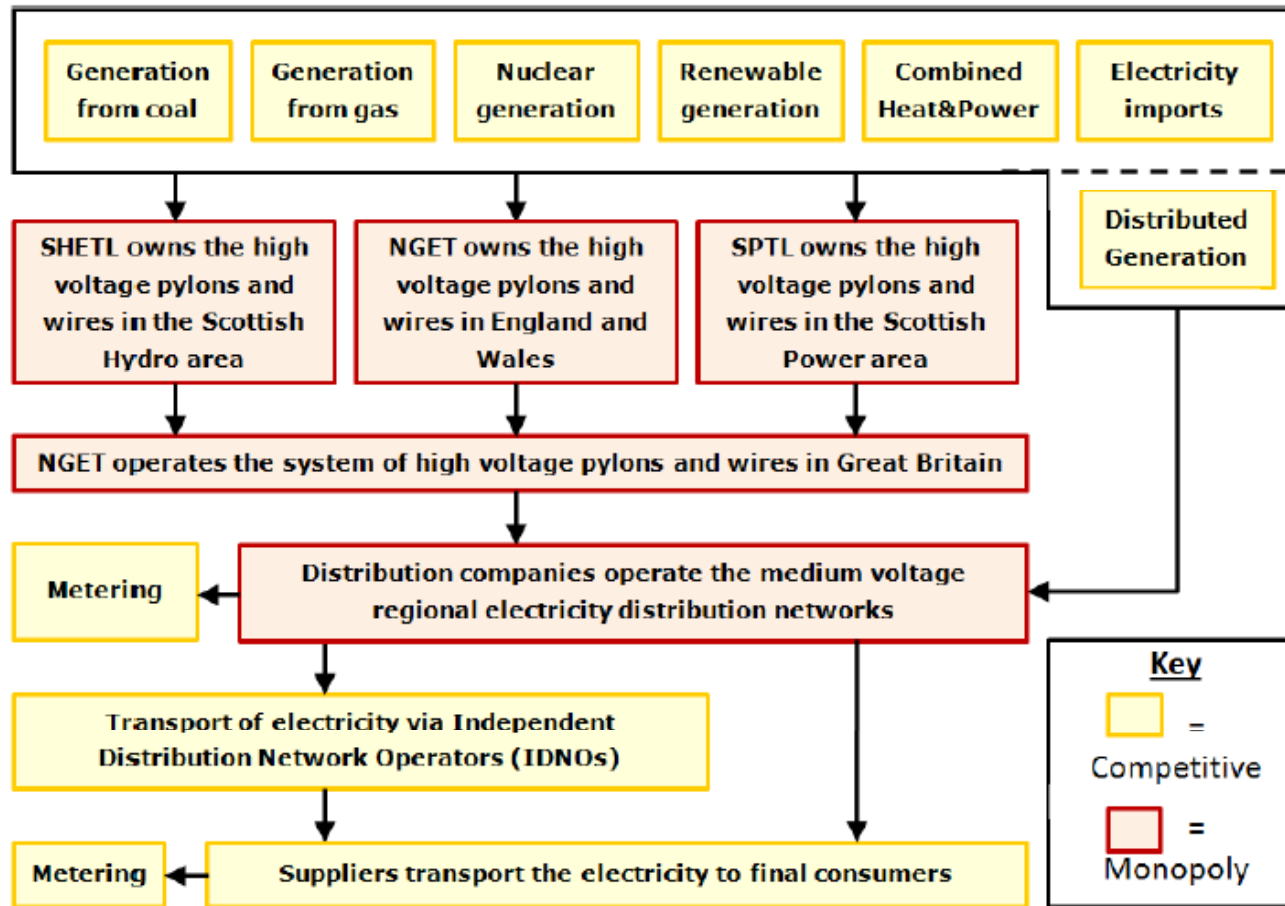
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Structure of the gas industry (UK)



Structure of the electricity industry (UK)



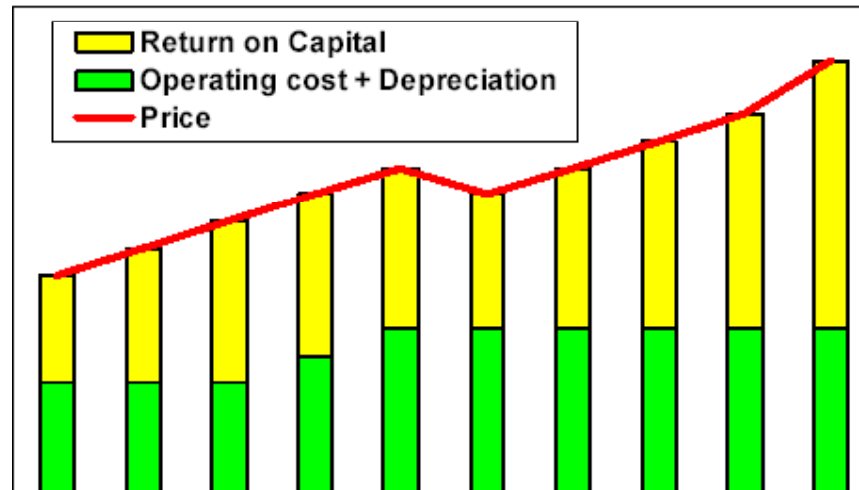
Regulation of a Natural Monopoly

- **Examples:**
 - electricity and gas transmission and distribution
 - telephone service
 - ?
- **Benefits of regulation: ?**
- **Costs:**
 - Direct: regulatory burden
 - Indirect: side effects

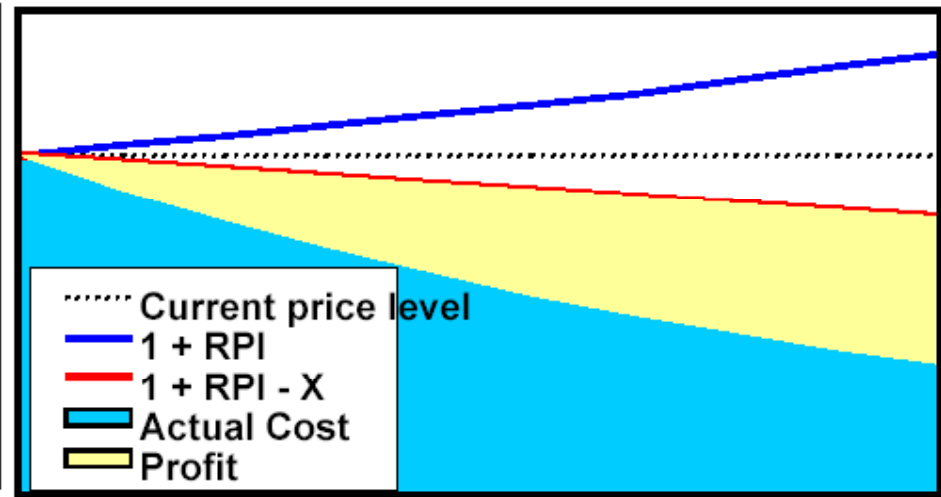
Regulatory Objectives

- **Allocative efficiency**
 - price reflect costs
 - optimal product variety and quality
- **Productive efficiency**
 - costs are minimised
 - dynamic as well as static
- **Redistribution**
 - minimise excess profit
- **Regulatory burden**
 - informational requirements; monitoring
 - regulatory costs; lobbying

Rate of Return Regulation



Cap Regulation



■ Rate of Return:

- Revenue/price follow costs
- Disadvantages: Frequent regulatory reviews (costly) and informational problems
- Advantages: Predictable and transparent

■ Cap regulation:

- Revenue not linked to current costs
- Disadvantages: Quality may suffer (control needed)
- Advantages: High-powered incentives

Framework

- How costs are taken into account?
- Regulator sets ρ, P_o such that $P(c) = \rho P_o + (1-\rho)c$
 1. Fixed price ($\rho = 1$)
 - strong incentive to minimise costs, firm keeps benefit
 - but price may depart from cost
 2. Set price = cost ($\rho = 0$)
 - no excess profit
 - but little incentive to minimise costs
 3. Intermediate ($0 < \rho < 1$):
 - *More cost sensitive (smaller ρ), less risk borne by the firm*
 - *However, less incentives to improve efficiency*
- In practice, most regulated systems are intermediate

Rate of Return Regulation in practice (US)

- Idea: set prices s.t.: Revenues=Costs (Profits = 0)
(point 2 in previous slide)
- Remark:
 - Regulatory lags do provide some incentive to minimise costs
 - Once prices set, they remain unchanged until next rate case
 - During this period, firms have incentives to be cost efficient
 - However, period may be very short (one year) (there might be distributional losses)

Price cap in practice: RPI-X (UK)

- Price cap regulation adjusts the operator's prices according to:
 - Index that reflects the overall rate of productivity in the economy
 - Operator's ability to gain efficiencies relative to the average firm, and
 - Operator's input prices inflation relative to the average firm
- In practice...
 - An average price reduction in the first year (P_0) and
 - Real rate of decline for subsequent years (X -factors, productivity gains)
- Objectives:
 - give incentives to eliminate inefficiencies and
 - pass the benefits to the consumers through lower prices
- Remarks:
 - Cost index not industry-specific: retail price index (RPI)
 - X can change from year to year but is fixed between price reviews
 - P_0 and X may be firm-specific

Remarks

- Prices are not completely independent of costs:
 - Sometimes allowing pass-through of exogenous costs
 - Costs are taken into account in the price review (possibly lowering incentives, “ratchet effect”)
- Refined to improve performance:
 - Example: performance of electricity distributors on supply interruptions and response to customer enquiries allows revenues to vary up to 2% in the UK

Price-cap or rate of return regulation?

- With *pure price caps*, the regulator
 - never directly observes the operator's profits
- In practice, distinction between price-cap and cost-plus may be lost
 - price cap regimes base prices on past costs or expected costs
 - regulators make implicit decisions on acceptable real rates of return on capital employed in order to arrive at price limit determinations
- Still, main difference between rate of return and price cap
 - price cap regimes have fixed time periods between price reviews
 - rate of return regulation price reviews are triggered by high or low earnings (relative to the cost of capital)

Price cap, in practice: RPI-X

- Revenues are determined by setting...
 - Setting initial starting value for revenues (P_0)
 - Specifying an exogenous input price index (RPI)
 - And a productivity factor (X) (+ve, -ve, or zero)
- ... so that firm can recover...
 - efficient operating and capital expenditures, including depreciation and cost of capital
 - “Building blocks” approach
- How to compute efficient costs?
 - Benchmarking and yardstick competition

Plan of the course

- Introduction
- Building blocks approach:
 - Weighted average cost of capital
 - Allowable costs
 - Computing allowable revenues
- Estimating cost and production functions
- Benchmarking methods
 - Linear programming techniques
 - Econometric techniques
- Concluding remarks
 - Incentive regulation: is it worth it? Going forward