



UNIVERSITY OF
CAMBRIDGE | **Electricity Policy
Research Group**



Is ‘cost-of-service plus incentives’ the best that we can do?

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<http://www.eprg.group.cam.ac.uk>

Outline

- Regulation is inevitable for grids & distribution
 - Legacy of under-pricing state assets
- need for increased investment => pricing problems
 - raises questions about efficacy of regulation
- natural monopolies in power networks
 - What have we learned? What remains the same?
 - How to set the *X*-factor?
- Future possibilities
 - Making networks contestable?

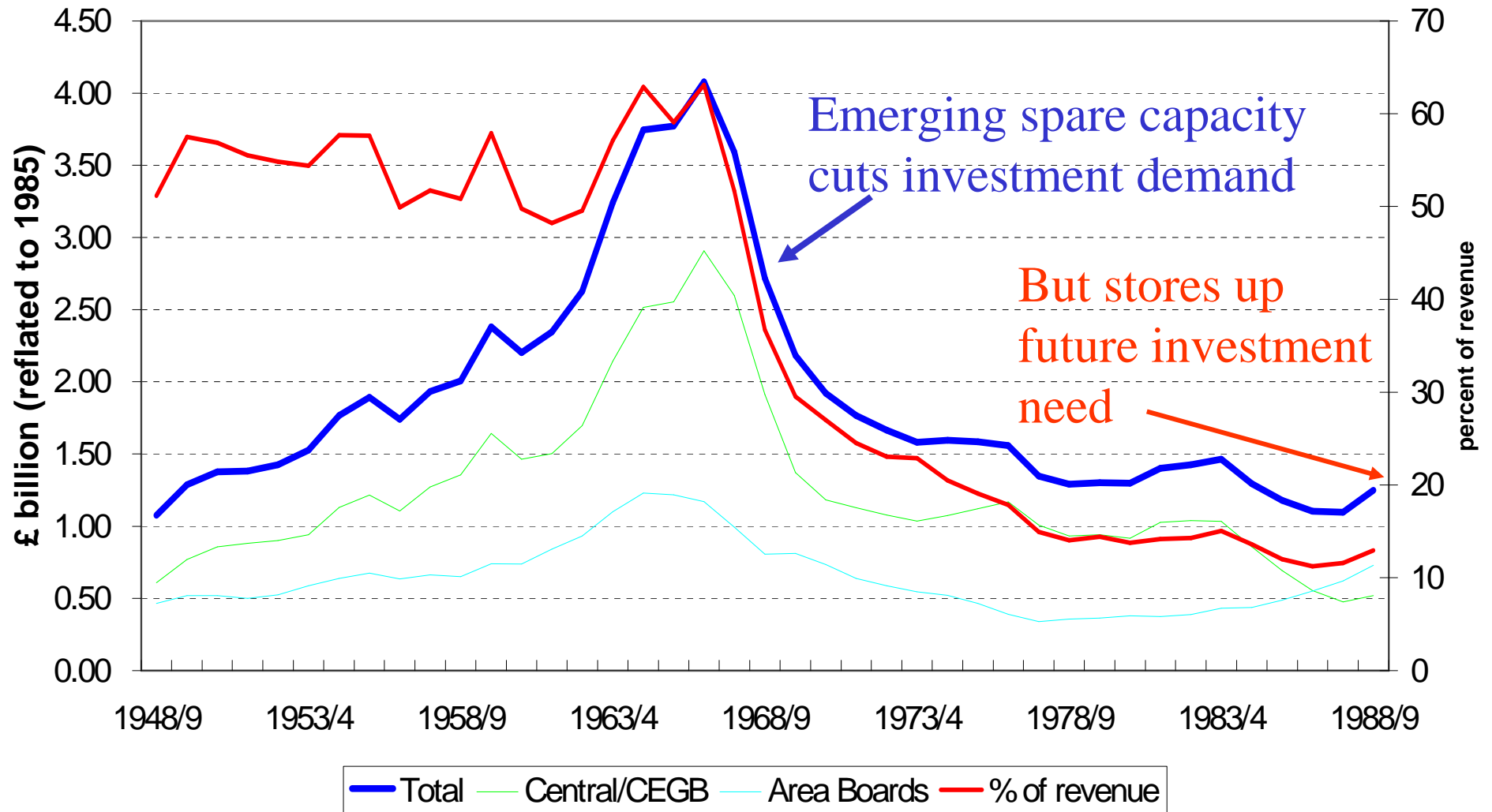
Classic network utilities

e.g. electricity grids

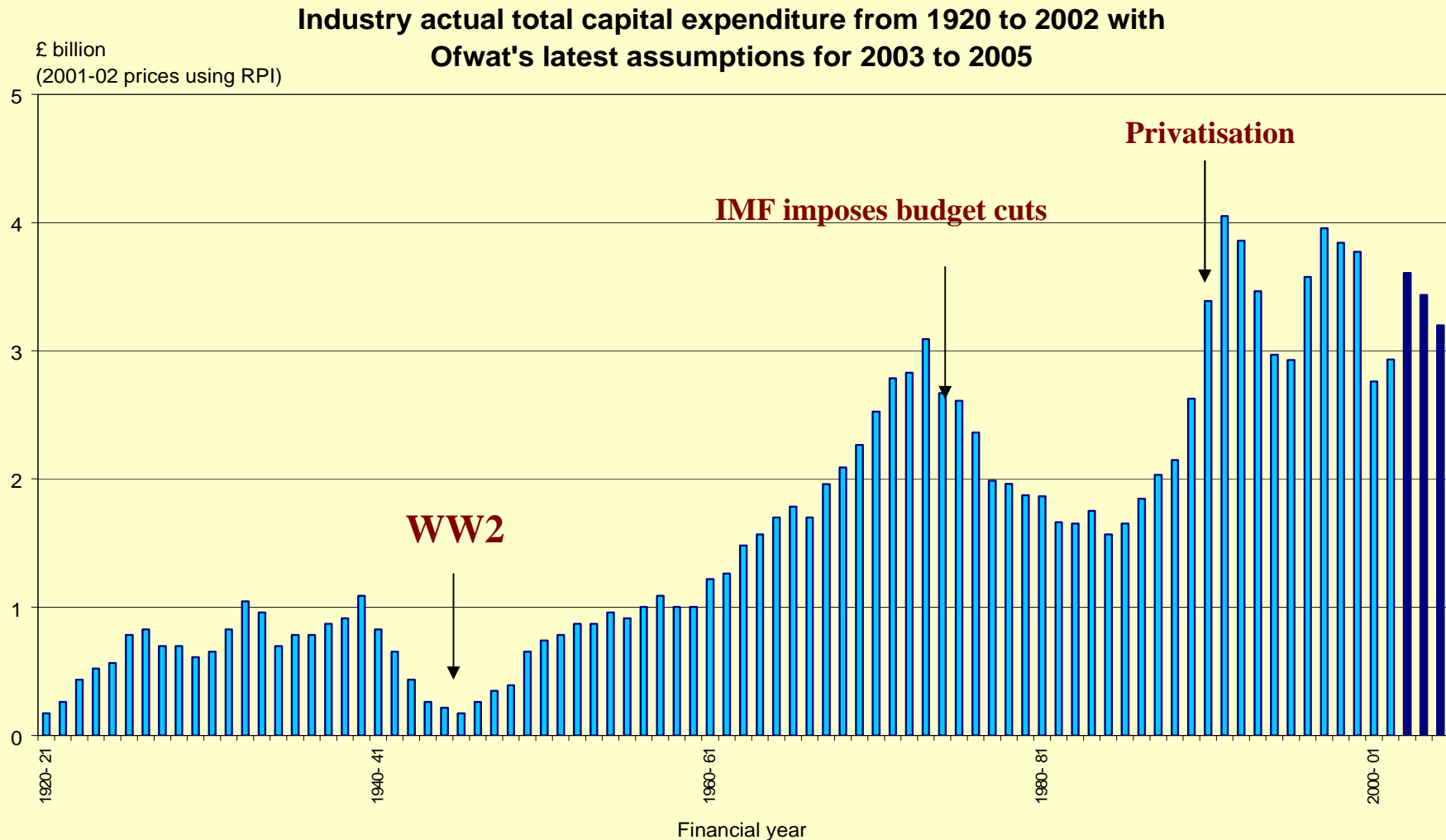
- network is natural monopoly
 - competition from rival networks uneconomic
- capital-intensive
- provides essential services
- connected to consumer/voter

Regulation inevitable, state ownership likely

Capital Investment ESI 1948-1989



Investment in Water in England and Wales



Notes

1. Original data for the period 1920 to 1980 was for water and sewerage companies only. These figures have been increased by 8% (based on a long term average of actual spend since 1980), to allow for expenditure by the water supply companies over this period.
2. Projected expenditure from 2002-03 to 2004-05 is that assumed in Ofwat's 1999 price limits but with a) the underspend in investment from 2000-01 and 2001-02 included and b) an estimated efficiency saving of 7% removed.

GB infrastructure needs



Dynamic efficiency

- main determinant of prosperity is **quantity and quality of investment**
- Investment: hazard current \$ for uncertain future gain
- private investors require:
 - secure title to future returns
 - commercial not political risks

Regulatory credibility

- Public (regulator) and utility both want investment \Rightarrow **cooperate**
 - both want rents \Rightarrow **conflict**
- \Rightarrow Sunk investment risks regulatory opportunism
- easier to privatise and restructure if prices fall

Regulation/public ownership evolves to finance investment and distribute rent

Regulation

- Transfer efficiency gains to consumer

$$p \leq bp + (1-b)c$$

p = efficient price, c is unit cost

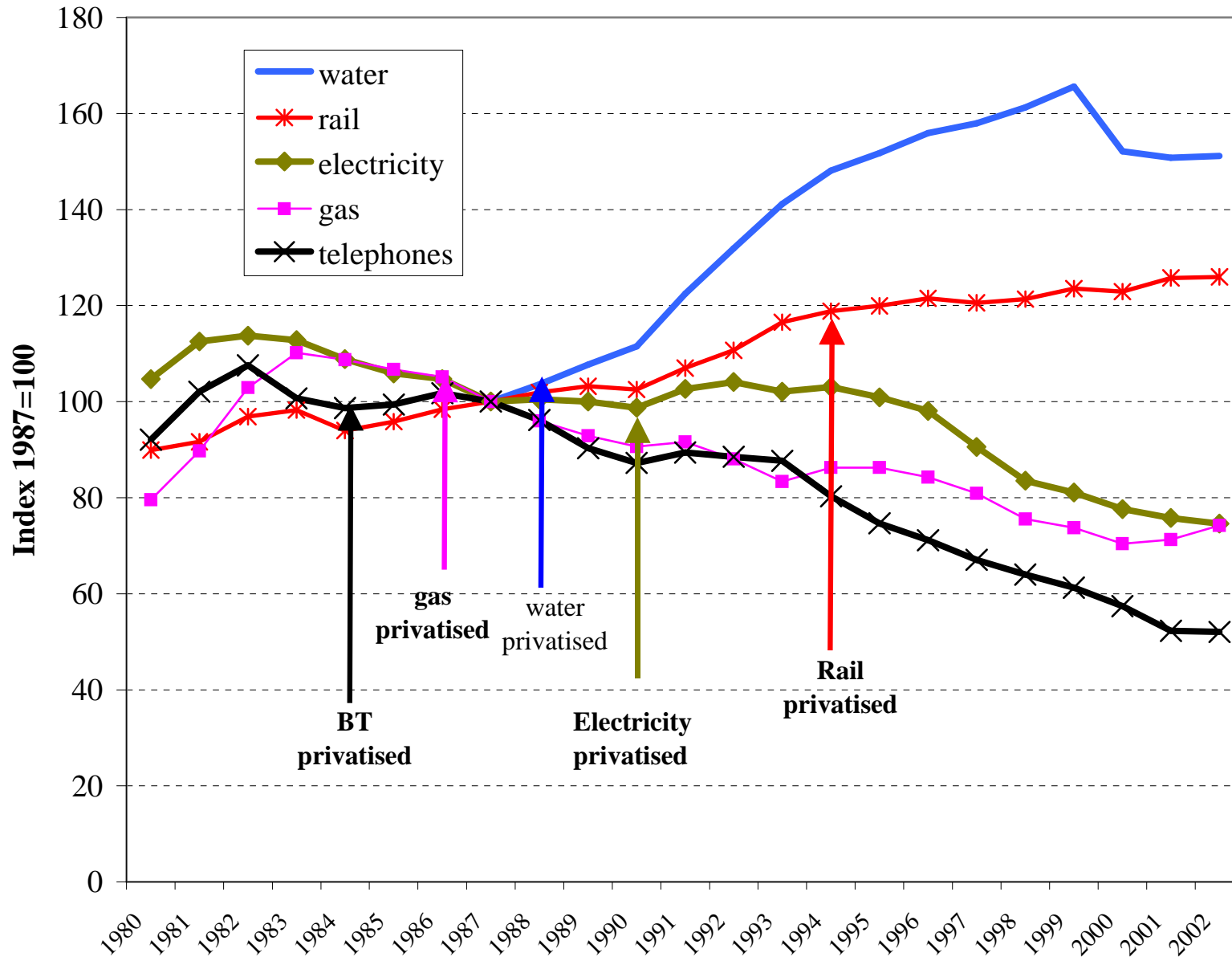
b is *power* of incentive

- conflict between incentives and transfers
- high power=strong efficiency incentive
- low power for rent transfer

Applies to public ownership and regulation

Retail prices after privatisation

UK real domestic utility prices



Basic trade-offs

- Efficiency vs equity
- Increase credibility => reduces required return
 - longer-term **guarantees** vs **flexibility**
 - **contracts** vs market support/**subsidies**
- Reduce cost of capital to lower price (rises)
 - delivering investment efficiently => allocate risk
 - reduce risk => reduce WACC but increase cost?

reduce informational asymmetries

eases equity-efficiency trade-off

Setting Price-caps

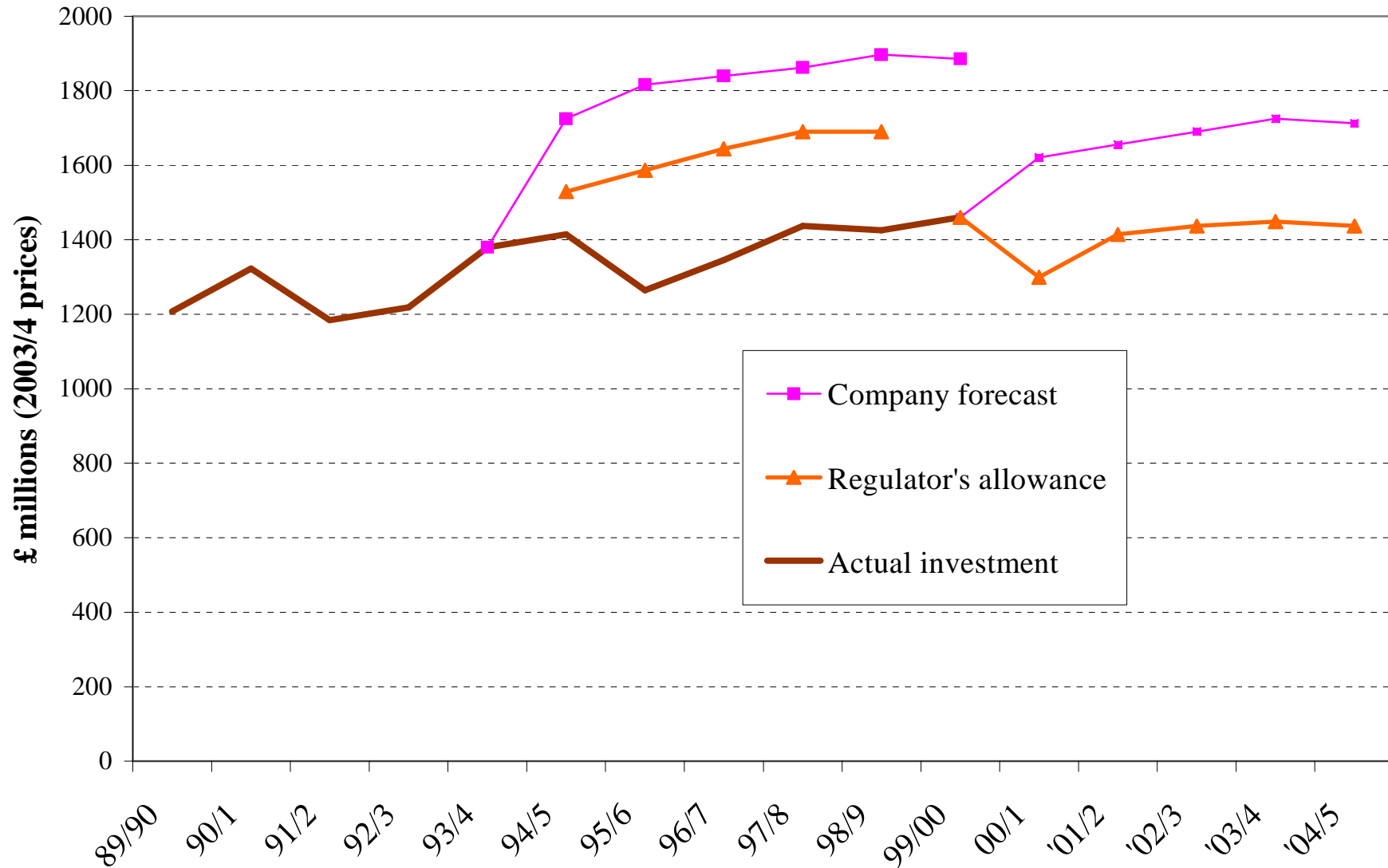
- Initial P_0 , X set at privatisation
 - P_0 for smooth transition, X for good sale
 - Price controls reset every 5 years
 - but how to reset and still preserve incentives?
 - P_0 to claw back some efficiency gains
 - X : catch up frontier, then **industry prod growth?**
- ⇒ benchmark where possible
- fine for distribution companies, hard for grids

Incentives for investment

- benchmarking used for opex, hard for capital
- Investment plans \Rightarrow RAB_{*t+i*} \Rightarrow price path
 \Rightarrow Utility overstates investment plans
 - delay investment until end of price control period
 - if RAB updated \Rightarrow rate-of-return regulation?
 - If RAB based on benchmarks \Rightarrow under-invest?

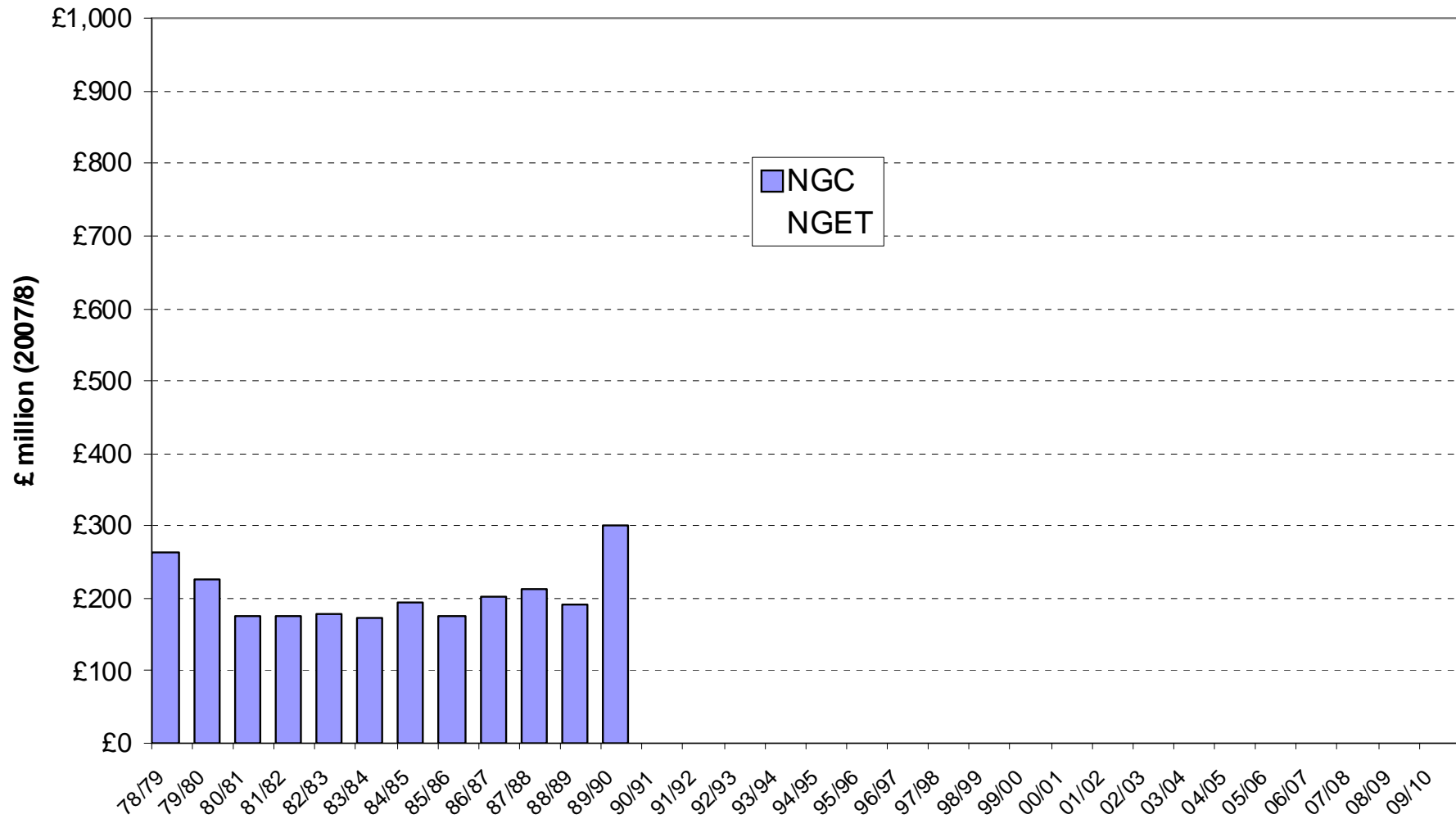
How judge if investment is good value?

British Electricity Distribution Investment



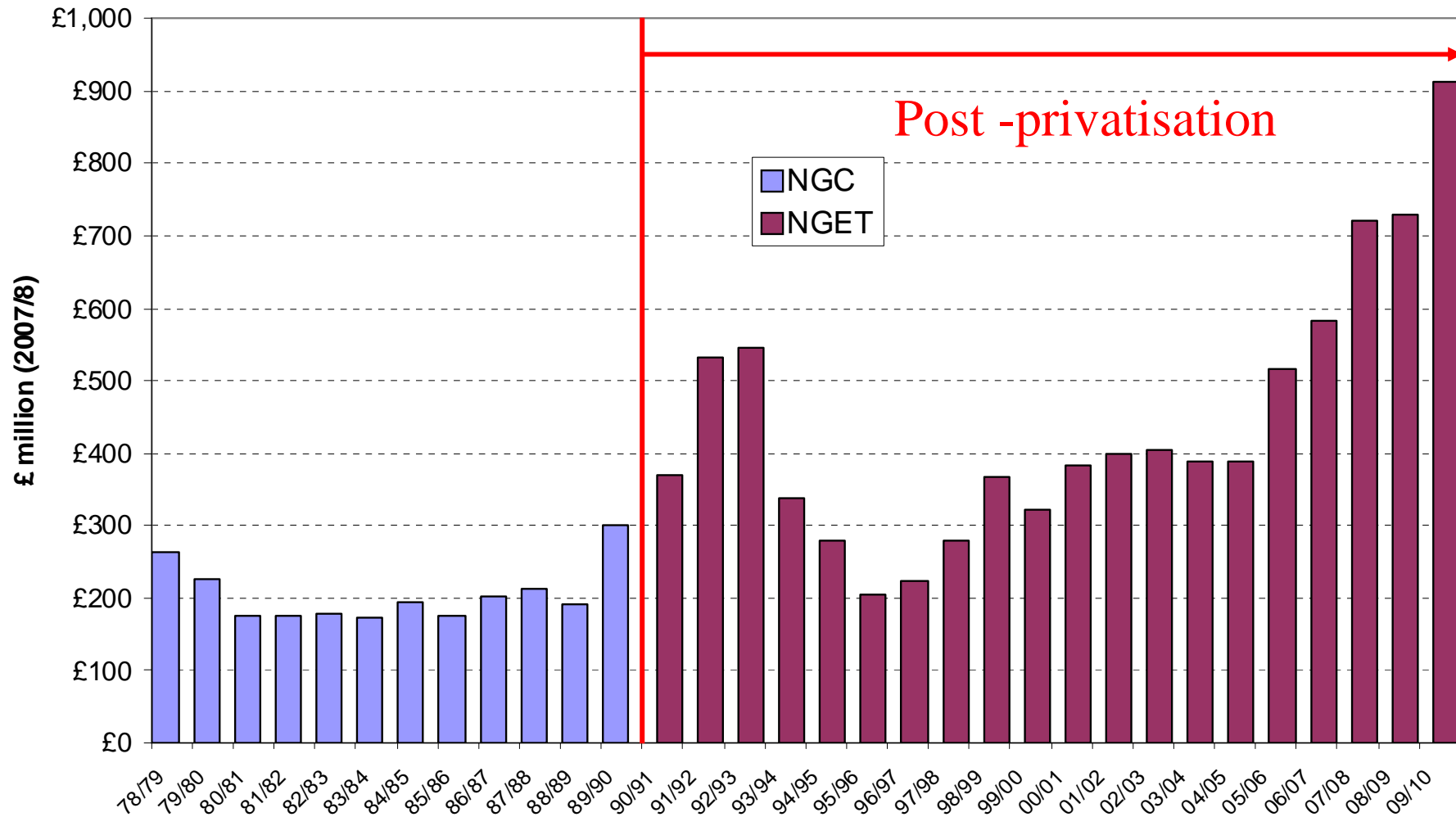
Transmission investment pre-privatization

Transmission investment England and Wales 1978-2011



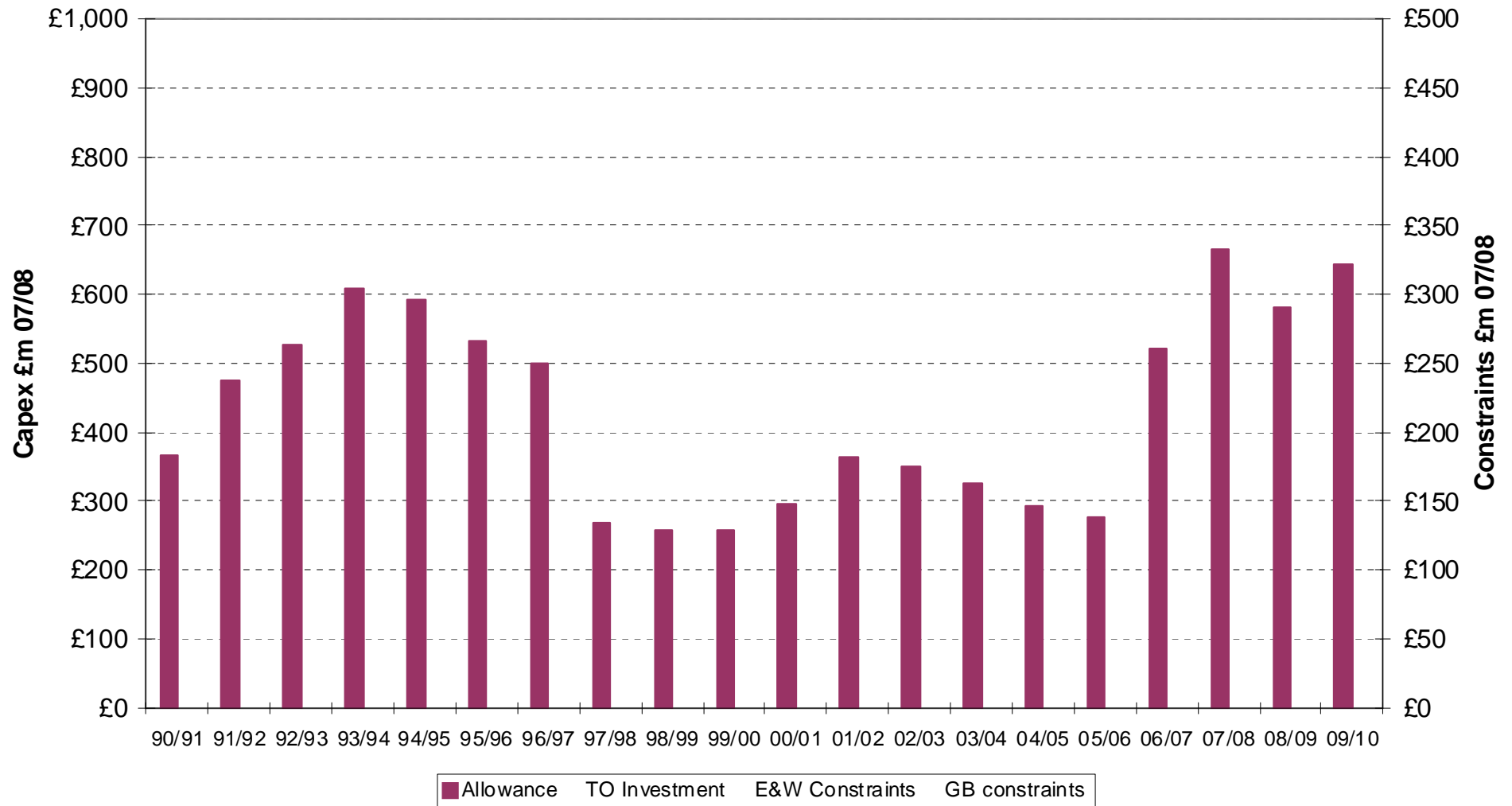
Transmission investment is increasing rapidly

Transmission investment England and Wales 1978-2011

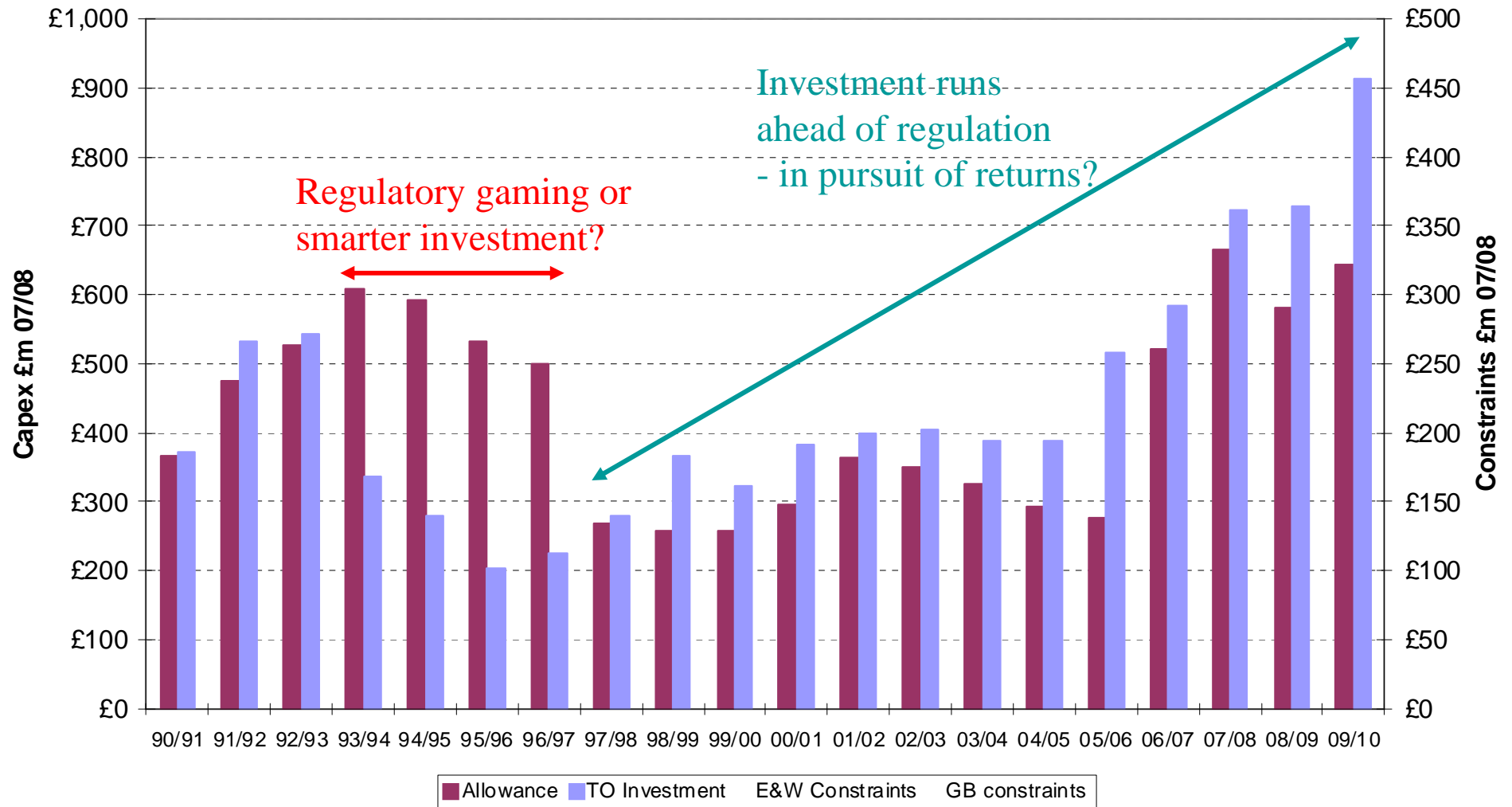


GB transmission investment

Capex, Allowances & Constraints



Capex, Allowances & Constraints



Reforming regulation

- Reduce informational asymmetry
 - **standardized accounting no-brainer** (free-ish lunch?)
 - allows benchmarking
 - menu regulation => incentive compatible efficiency revelation
 - higher b for lower P_0
 - Most regulatory choices address power b
 - longer periods, glide paths, marking up capex, ...
- is P_0 , X for PDV of planned I or future incentives?**

Ofgem's RIIO

- Revenue=Incentives+Innovation+Outputs
- Intended to be more output-oriented
 - Utility specifies outcomes
 - Remove capital bias -look at total operating budget
 - 8-year price control, **longer depreciation periods**
(lowers initial cost, charge future customers more)
 - Contestable investment; customer engagement
- Competition for innovation trials - LCNF

Contestable networks

- Aim – to deliver low-C at least cost
- Problem – grid proposes expensive solution
 - Lengthy assessment, misaligned incentives
- Solution: invite proposals – choose best value
 - Encourages customer engagement
 - Upgrades, relocate wind, different quality
 - Encourage local partners for planning applications
 - Bid on payment stream from regulated revenues

Risk: entrants overoptimistic on planning

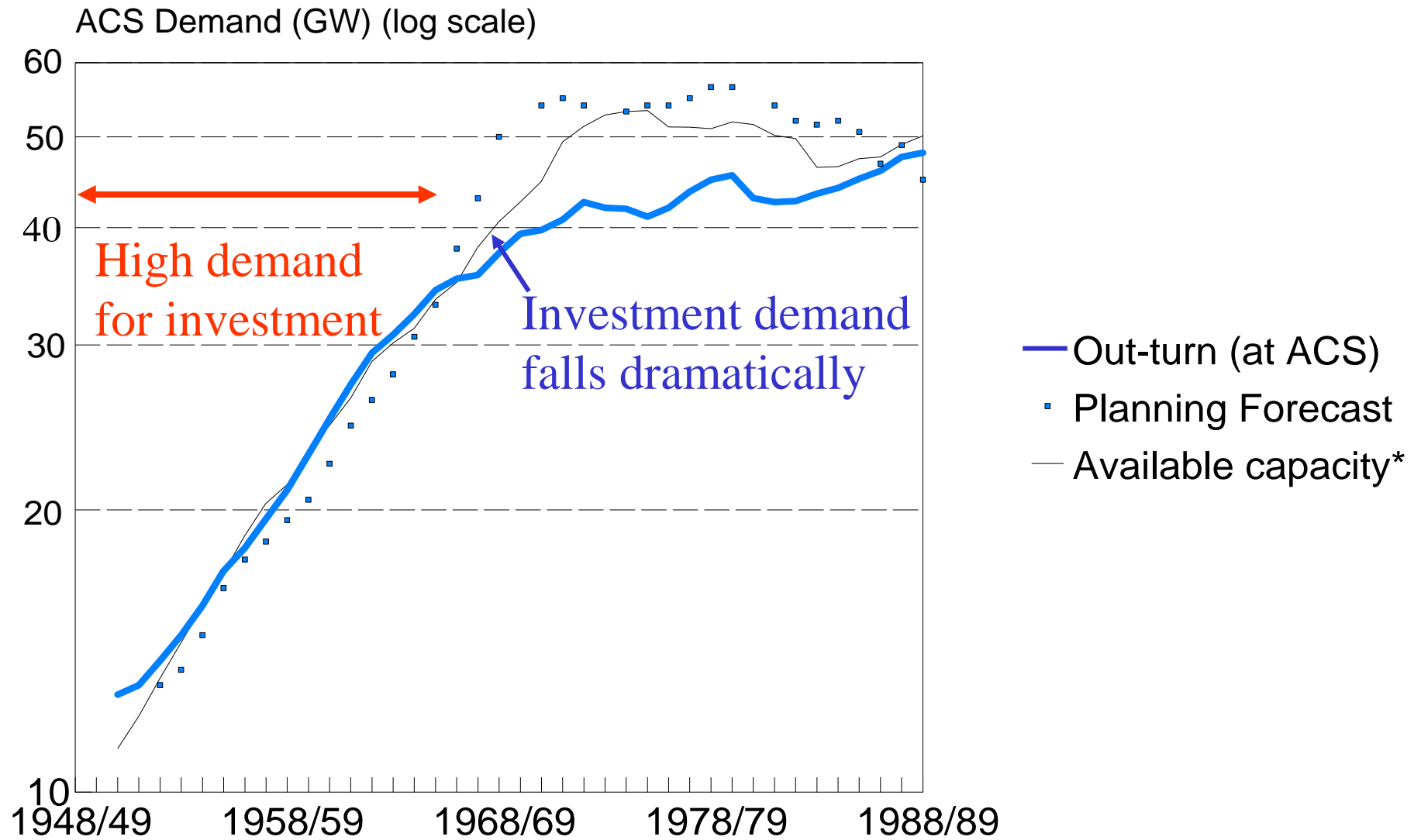
=> greater delay

Conclusions

- Regulation is inevitably inefficient: conflict between efficiency and rent extraction
 - least bad option if competition not possible
 - but there are ways of making networks contestable
 - and reducing informational asymmetries
- Main problems - predicting future:
 - **setting X ; financing investment**
- Regulatory reforms aim to remove distortions
 - between capex and opex, over life of price control

but the change in incremental, not radical

Forecasts and outturns CEEGB 1950-88



*assuming 10% planning margin
Electricity Council

Capital under-valuation

- CEGB 1947-90 earned 2.7% real
 - GB water industry sold for £6bn, MEA > £100bn
 - Railtrack sold for £2.5bn, WCML costs £10bn
 - Eskom value = US\$8.5 bn, HC = US\$18.5 bn
inflation adjusted, ODV > US\$47 bn
 - Economic return < 2.3% on ODV
- => underpricing when investment falls
- difficult to fund investment without **price rises**

privatize and take asset write-down?

if private, revisit regulation?

Why undervalue assets?

- Writing down existing assets rapidly
 - companies want fast depreciation (tax, cash-flow)
 - public sector bad at current cost accounting
- $HC < ODV$ (unless rapid obsolescence)
 - flatters return on assets, justifies equity premium?
 - => lower prices when demand, investment low
 - => **higher prices when demand, investment high**
 - OK in competitive markets
 - **politically difficult for regulated assets**