



## **Infrastructure Regulation and Investments**

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# Key Points:

- **Problems exist in evaluating and handling wider economic impacts of infrastructure investment in a regulated firm context**
- **Price caps need not lead to under investment and can work well, but lead to profits**
- **Conditional trigger price caps can resolve the “excess profit” problem**
- **But give the regulator large discretion and can lead to excessive investment**



# Outline

- **The problem of regulating investment**
- **Regulators' objectives**
- **Price regulation and incentives for investment**
- **The evaluation of investment**
- **Structural and institutional options**
- **Conclusions**



# The Problem of Regulating Investment

# Significance of the Problem

- **Infrastructure investment done extensively by (regulated) monopolies**
- **High cost of mistakes and bottlenecks**
- **Few alternatives- other firms cannot invest**
- **Market power is present and can be used to fund excessive investment**
- **There may be wider economic benefits from infrastructure**

# Regulatory Theory

- **Relatively little attention given to investment incentives until recently**
- **Adequate capacity at time of privatisation/corporatisation**
- **Move from public enterprise to regulated private enterprises**
- **Incentive regulation: regulator imperfectly informed about operating costs, cost of quality, and cost of increasing capacity**
- **Price caps- a practical form of IR**



# Investment

- **To increase capacity or output; to improve quality, to reduce congestion (mix of the two)**
- **Objectives for efficiency: achieving the right quantity/ capacity, the right quality, minimising cost of investment**

# Other Issues

- **Regulatory gaming**
- **Problem of long term commitment of regulator**
- **Handling risks**



# Regulators' Objectives

# Welfare Maximisation

- **Typical model: sum of consumers and producers surpluses (plus tax)**
- **Surpluses may have different weights**
- **Regulator might only be concerned about consumers surplus**

# Actual Objectives

- **Keep profits low- prices close to average costs**
- **Profits of monopolies likely to be controversial**
- **Regulator may be set narrow objectives by the government (look after consumer interests)**
- **Making sure that investment happens may become an imperative**



# Political Pressures on Regulators

- **Keep prices and profits down- can lead to under investment**
- **Invest regardless of cost- resolve the “infrastructure crisis”**
- **Can flip between these quickly**



# Information Asymmetry and Profits

- **Firms possess better information than regulators**
- **IR models require rents for superior information**
- **Regulators cannot keep  $P=LAC$  and still achieve efficiency**
- **Profits could be large in some cases**
- **This can lead to problems of inadequate investment if regulators seek to keep prices and profits down**



# Price regulation and Incentives for Investment

# Price Caps

- **Concern that price caps lead to under investment**
- **Not necessarily the case- may or may not be so**
- **Variants of price caps (conditional triggers) can lead to excessive investment**

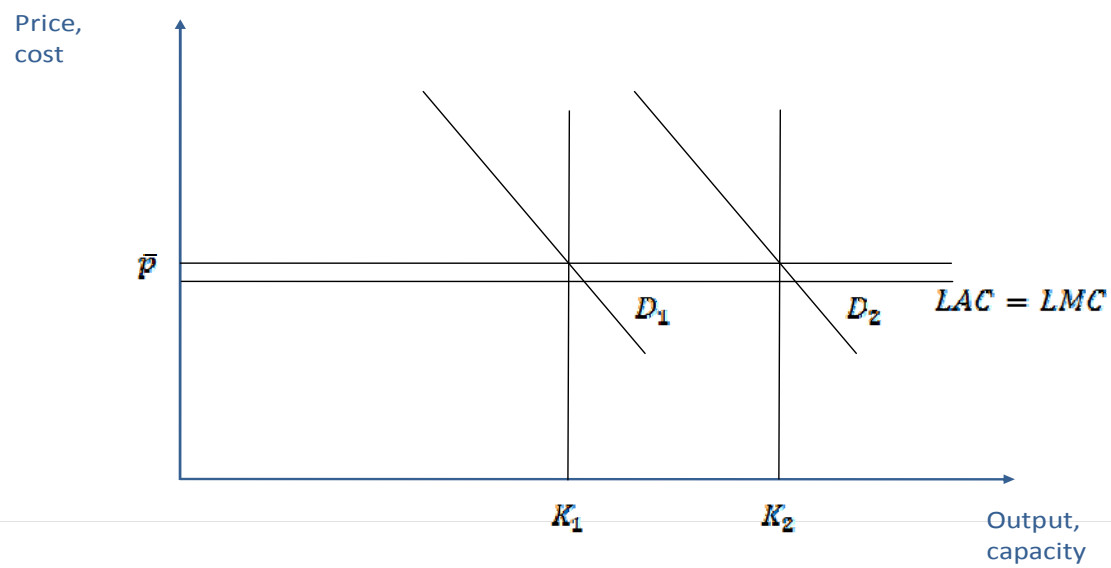
# The Problem

- **Existing capacity at K1 is adequate now**
- **Demand forecast to increase from D1 to D2**
- **Price cap is in place**
- **Various cost conditions will be considered**
- **Indivisible investment (K1 to K2), but LMC curve will be used**



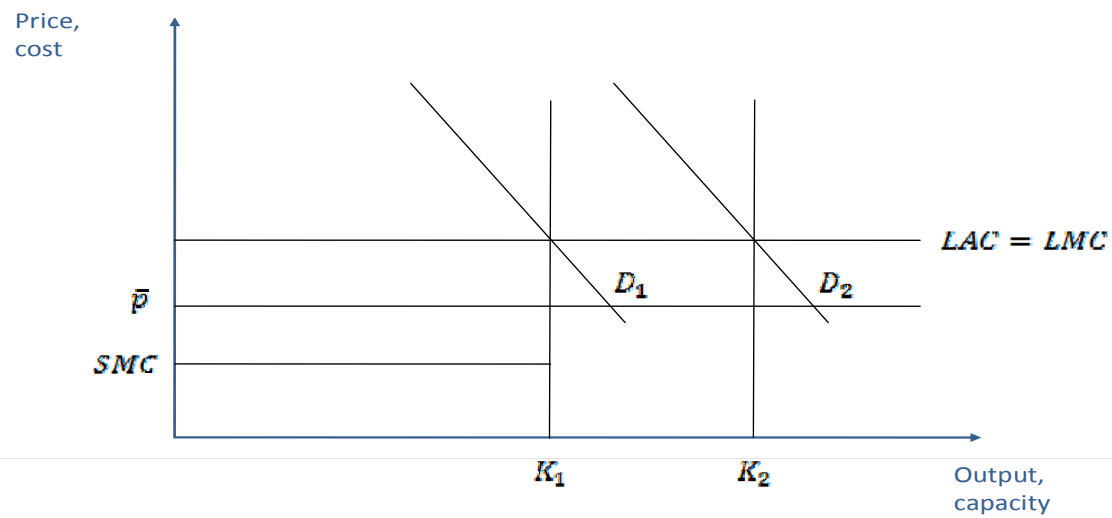
# Constant Costs

- **Price cap is sufficient to cover the cost of investment**
- **Firm makes small profit from investing**
- **No problem**



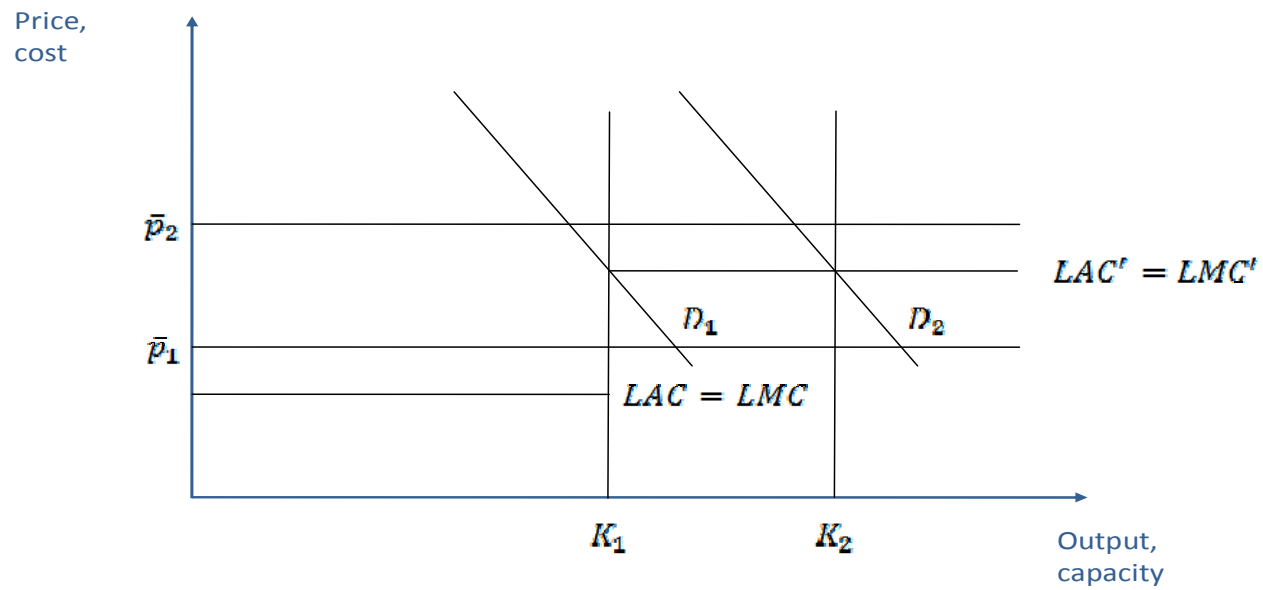
# Opportunistic Regulation

- **Regulator wants to keep profits low**
- **Perhaps regulator has poor information about replacement costs**
- **Firm earns “profits” even when  $p < LAC = LMC$**
- **Price too low to encourage investment**
- **Inadequate investment**



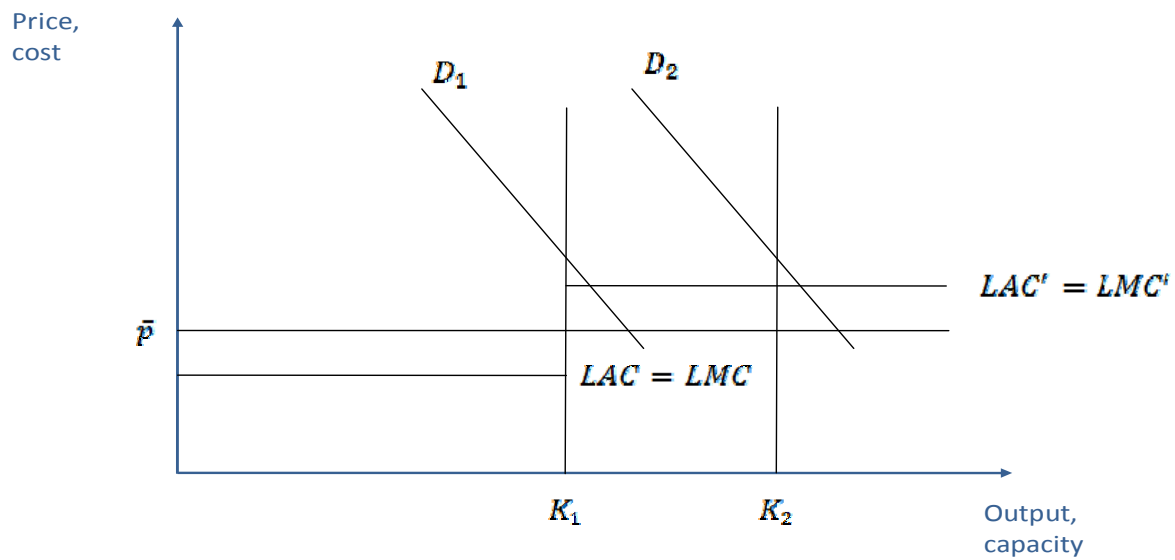
# Increasing Costs of Investment

- **Extra tranche of investment will be more costly (e.g. adding extra rail lines to existing track, extra port facilities in confined spaces)**
- **Firm is currently profitable at  $p_1$**
- **Will not expand capacity beyond  $K_1$**
- **Can set an unconditional price cap at  $p_2$ , and firm will invest**
- **Will mean high profits for the firm even in the LR**



# Conditional Trigger Price Caps

- **Same cost conditions as before**
- **Regulator offers price cap of  $p$  IFF firm makes the investment**
- **Extra revenue just covers the extra costs**
- **Firm invests**
- **Firm profit increases slightly**

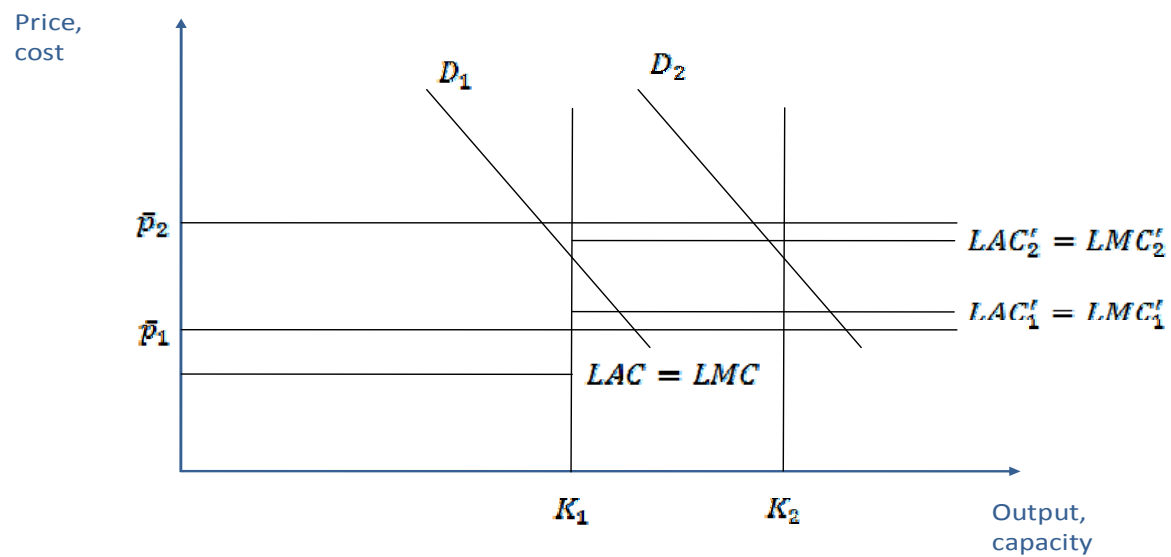




# Unknown Investment Cost

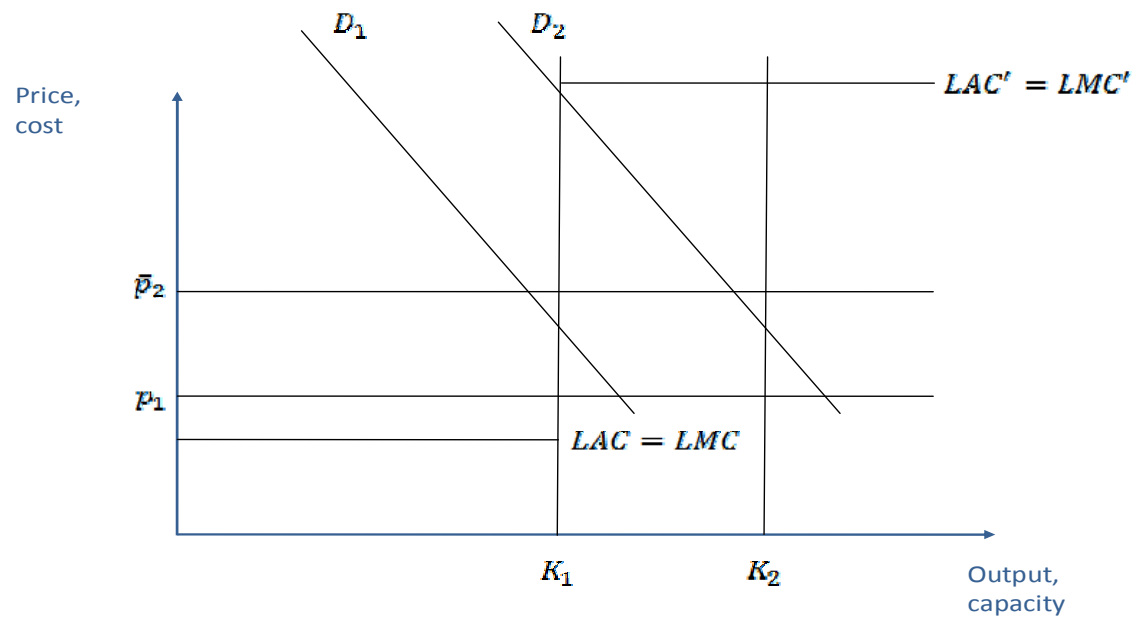
- **Under unconditional price cap, regulator can offer  $p_2$  (high profit)**
- **Cost might be LMC1 or LMC2**
- **Conditional trigger- regulator offers  $p_1$ - no profits**
- **If trigger depends on actual investment expenditure then regulation is effectively cost based**
- **Weak incentive to minimise cost**
- **Conditional triggers could be set without regard to actual expenditure to improve incentives**





# Excessive Investment

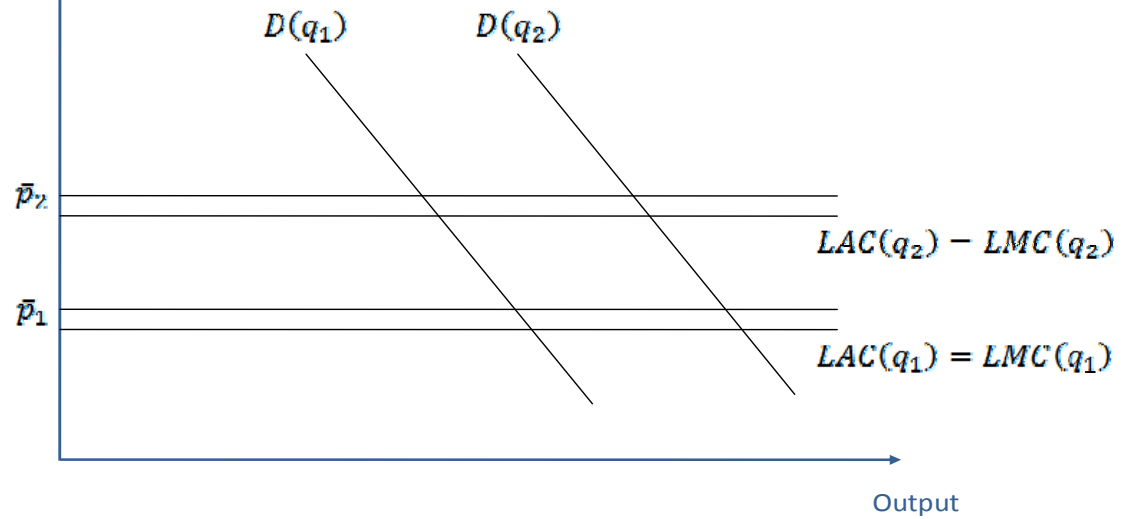
- **Benefits of investment are less than costs- investment not worthwhile**
- **At cap of  $p_1$ , extra investment is not worthwhile**
- **Regulator offers conditional higher price of  $p_2$ - extra revenues cover extra costs**
- **Using monopoly power to fund excess investment**
- **Could be done through cross subsidisation**
- **“But this is happening under price caps!”**



# Investments in Quality

- **Higher quality shifts up costs**
- **Users are willing to pay for higher quality**
- **Firm gains little from offering higher quality under  $p_1$**
- **Regulator can offer conditional cap of  $p_2$  if firm supplies higher quality**
- **In this case, a conditional trigger is necessary**
- **But the regulator may be poorly informed about the cost of quality and users WTP**
- **Similar for the congestion case**

Price,  
cost



# Conditional Trigger Price Caps in Perspective

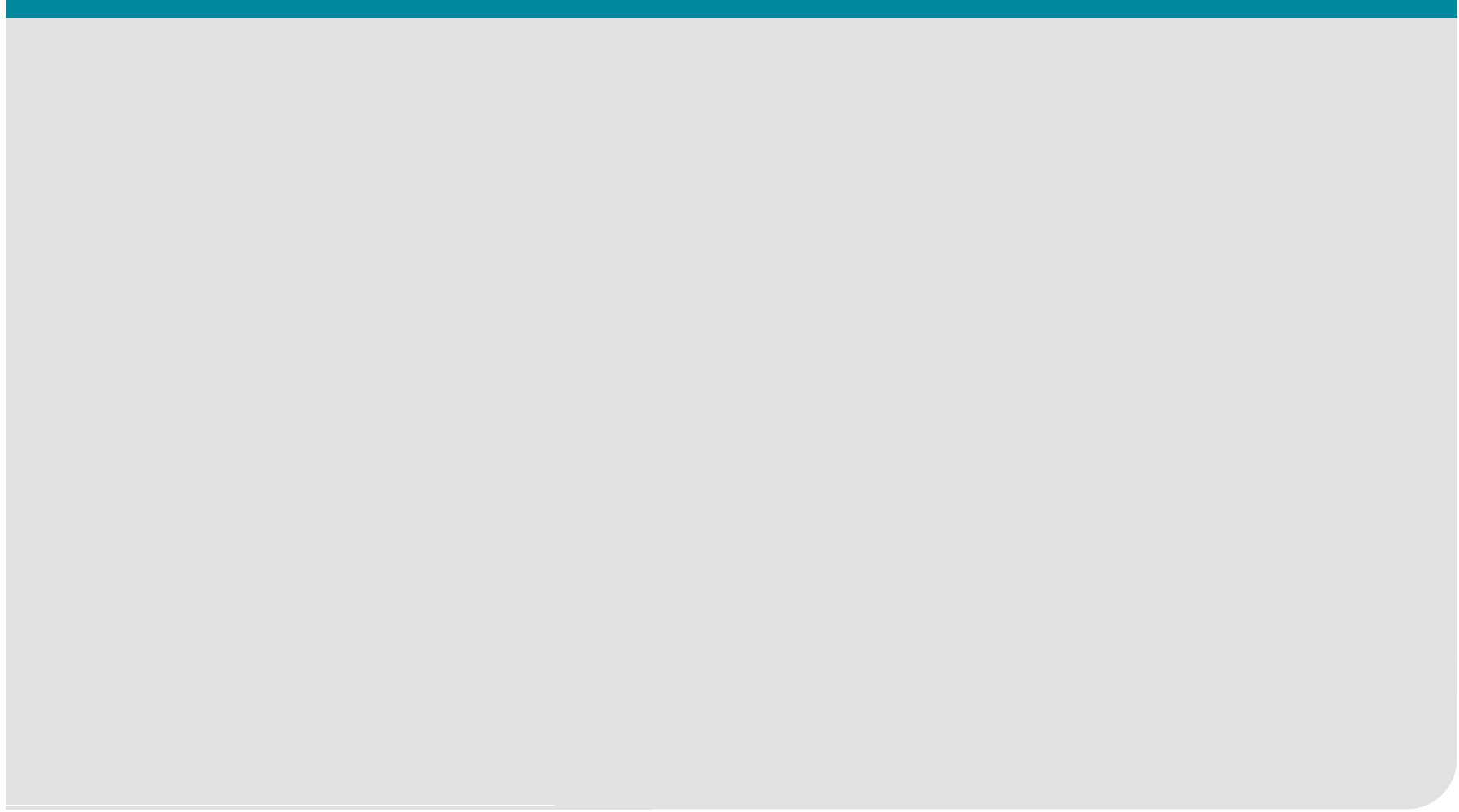
- **Can encourage investment while keeping prices and profits low**
- **More demanding of information than unconditional caps**
- **If expenditure is used as the trigger, poor incentives for keeping investment costs low**
- **Consistent with excessive investment**
- **More discretion to the regulator**

# Investment and Regulation in Australia

<b>Industry</b>	<b>Adequacy</b>
<b>Telecoms</b>	<b>Inadequate</b>
<b>Airports</b>	<b>Slight Excess</b>
<b>Rail Track</b>	<b>Excess and Inadequate</b>
<b>Water</b>	<b>Excess Developing</b>
<b>Gas Pipelines</b>	<b>Adequate</b>
<b>Urban Transport</b>	<b>Risk of Excess</b>
<b>Electricity</b>	<b>Adequate</b>
<b>Coal Loaders</b>	<b>Inadequate</b>



# The Evaluation of Investment



# Wider Impacts and Investment Assessment

- **Infrastructure investment typically involves more than just producers and consumers surpluses**
- **Externalities (greenhouse emissions, agglomeration benefits), shadow pricing (labour under unemployment); impacts on substitutes (rail investments and road congestion)**
- **Traditional response: do a cost benefit analysis**
- **Government can do this- but will a regulator?**
- **Government can set parameters (carbon price through an ETS; noise charges)**
- **This issue is not resolved well**

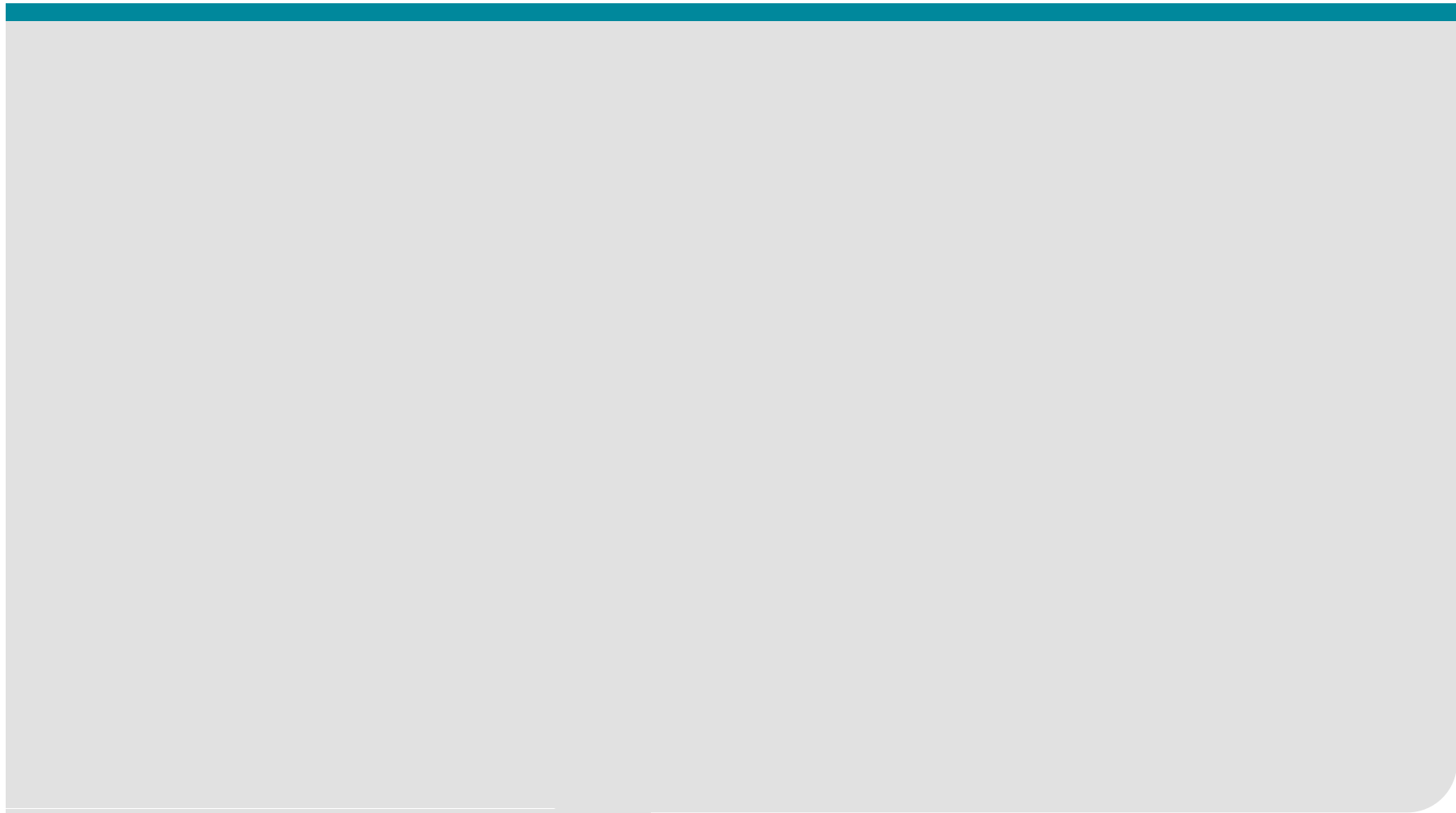
# Structural and Institutional Options

# Options for Regulators

- **Competition at some levels may be feasible (changes regulatory options)- e.g. in electricity generation**
- **Vertical structure of firms- can impact on regulatory problem**
- **Light handed regulation- can facilitate deals between users and supplier, but also can lead to over investment**
- **Overall institutional environment: how can institutions be set up so that regulators pursue efficiency and recognise wider impacts?**



# Conclusions



# Conclusions

- **It is difficult to handle the wider impacts in the regulated firm model**
- **In practice, regulators often have objectives inconsistent with efficiency (such as keeping profits low)**
- **Unconditional price caps can work well to encourage investment for capacity, though not for quality improvement or congestion reductions**
- **They will lead to high profits**
- **Conditional trigger price caps can be used to encourage efficient investment and keep profits down**
- **But they can lessen incentives to reduce the costs of additions to capacity, may depend on the regulator having good information, and can easily be used to encourage excessive investment**
- **In an “infrastructure crisis” environment, the last point is a real concern**

**Vielen Dank!**

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