



Economic Evaluation of Draft Recommendation to Control Gas Pipelines

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Presentation Overview

- 1. Address the theoretical basis for the Commission's modeling of welfare impacts of gas price control**
 - The role of cost benefit analysis
 - The welfare tests used in the assessment of the benefits of control
 - Propose that volatility and uncertainty is critically important and should be recognised
 - Dynamic efficiency
- 2. Survey issues relating to the approach of the Commission**
- 3. Welfare / efficiency of Price Regulation: provide findings of a relevant approach**

Basis for Assessing the Benefits and Costs of Price Control

Principles of Cost-Benefit Analysis

Cost-Benefit Analysis (CBA) is a powerful tool for evaluating the effect of a policy decision relative to some defined alternative(s)

Issue is whether any static gains from lower pipeline charges would be offset by losses of dynamic efficiency

Well conducted CBA involves

- Specifying clearly the factual and counterfactual
- Encapsulating all the important behavioural impacts of the policy decision
- Determining models that are capable of representing actual behaviour
- Collecting data (or other evidence) to support population of the models
- Evaluating sources of uncertainty and their impact on the strength of the decision

Welfare tests

Commission is required by the Act to look at benefits to acquirers, but the Minister has specifically sought advice on a public benefits test and any other matter that the Commission considers relevant to whether control should be introduced

Act focuses on the long-term interests of consumers

Regulation to transfer profits between producers and ‘acquirers’ (not necessarily end users) risks making decisions that harm long-term interests of consumers and acquirers by reducing dynamic efficiency

Benefits to acquirers might also be measured with respect to their long term interest

Welfare tests: transfers

Transfer issues arise in benefits to acquirers and treatment of foreign ownership

Producer profits are the same concept as consumer surplus

Transfers redistribute income among individuals: incidence is the only justification

Incidence among individuals is impossible generally to pin down

- At a point in time, especially for suppliers of inputs to other firms,
- Over time with investment, and
- Between individuals in different countries

Welfare tests: transfers and foreign ownership

Profits have major roles in an economy of private ownership of the means of production

The Commission's "excess" profits

- Incidence of transfer impossible to assess
- Will generally differ from returns to foreign (and domestic) shareholders
- Is generally not "functionless" (see Amps A) and treating it as such must adversely affect economic performance.

Because price regulation affects investment, quality and competition (see Productivity Commission Draft Report)

- Any regulation entails trade-offs among these and performance at a point in time, and so
- The "excess" profits cannot be functionless

There is no need for "excess" and "functionless" producer surplus to satisfy the same test

Net public benefits will provide most comprehensive framework for evaluating welfare benefits and costs of control

Comment on the Framework

**Object of the Inquiry is to test whether competition is limited
and, if so**

Whether the benefits of price control exceed the costs

We continue to consider that

- a) Inter-fuel competition materially constrains pipeline pricing**
- b) Greenfields pipelines/upgrades have additional competition**

**We see no reason why a finding that no control at this time relaxes
existing constraints on the pipeline industry**

Way to Implement the Cost-Benefit Assessment

1. The cost benefit analysis should specify the factual (price control under the Commission's nomenclature) and the counterfactual
2. The costs and benefits of price control should be assessed looking forward from the date of implementation 2005: this provides the benefits/costs of the policy to society that are relevant to the decision of the Minister
3. The past can provide information that aids assessing future performance under the counterfactual and (plus assumptions) the factual
4. The (unadjusted) past cannot inform on the factual vs counterfactual because behaviour is different between the alternative regimes
5. Applying Monte Carlo simulation analysis - informed by i) historic information on variability in key operating variables such as operating costs, demand and customer numbers, ii) anticipated structural changes in the economic environment, iii) assumptions on behavioural effects of regulation - simulate the range of potential ex post outcomes
6. Calculate the distributions of net benefit arising from price control.

“excess” profits should only be assessed in the context of the factual vs the counterfactual, the behaviour this implies, and the associated net public benefits

Commission's Approach Does Not Do Those Things

The Commission's approach

- Does not reflect the qualitative description of the factual
- Focuses on static “excess” profits at the expense of assessing dynamic costs and benefits
- Mixes up the past and the future in calculation of benefits
- Does not seriously consider risk
- Makes negligible/ even questionable behavioural adjustments between the factual and counterfactual
- Makes arbitrary adjustment for regulatory costs
- Makes a range of mistakes in its calculation of “excess” profits (on its own approach)

We review these issues and offer a simple alternative

Past and Future

The Calculation of “Excess” Profits

The Commission calculates “excess” profits as

First: calculate excess profits for each year 1997- 2004 and 2005-2008

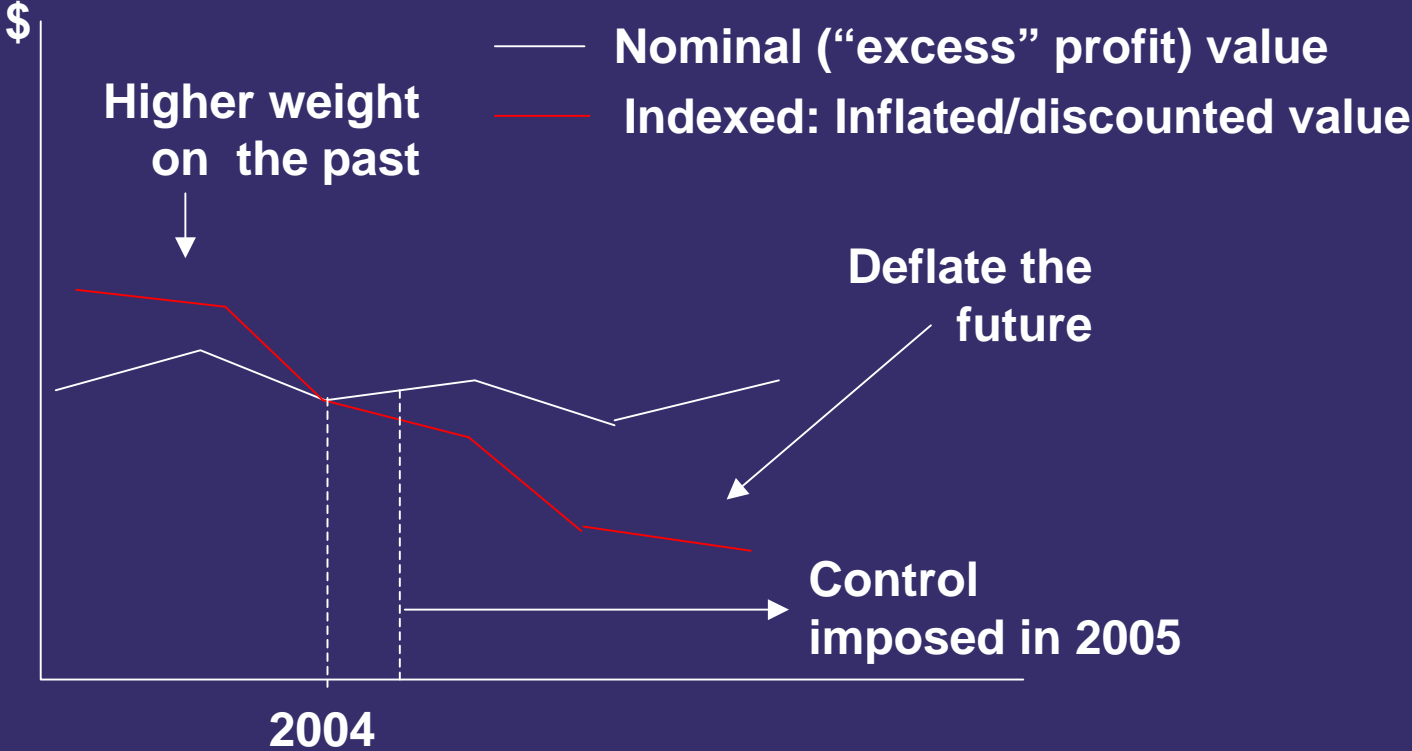
Second: measure the total as at 2004 by summing

The 1997- 2004 excess profits compounded up to 2004

and the 2005-2008 excess profits discounted back

Third: calculate the average annual benefit from price control as the the total of the excess profits valued in 2004 divided by the number of years in the period

History, Future and Cost-Benefit Analysis



Resulting Commission Benefit Measure

A) The best interpretation of the Commission's total "excess" profit is that it is an assessment of the benefits of price control today as if it had been imposed in 1997 and would last to 2008: but

- i. Backwards discount rate should be lower than the discount rate looking forward
- ii. Adjustment for behaviour under regulation is negligible at best
- iii. Note: it weights the past very heavily vs the future: e.g. the weight of "excess" profit in 1998 is more than 2.5 times higher than that of 2010 (at 8.5%)

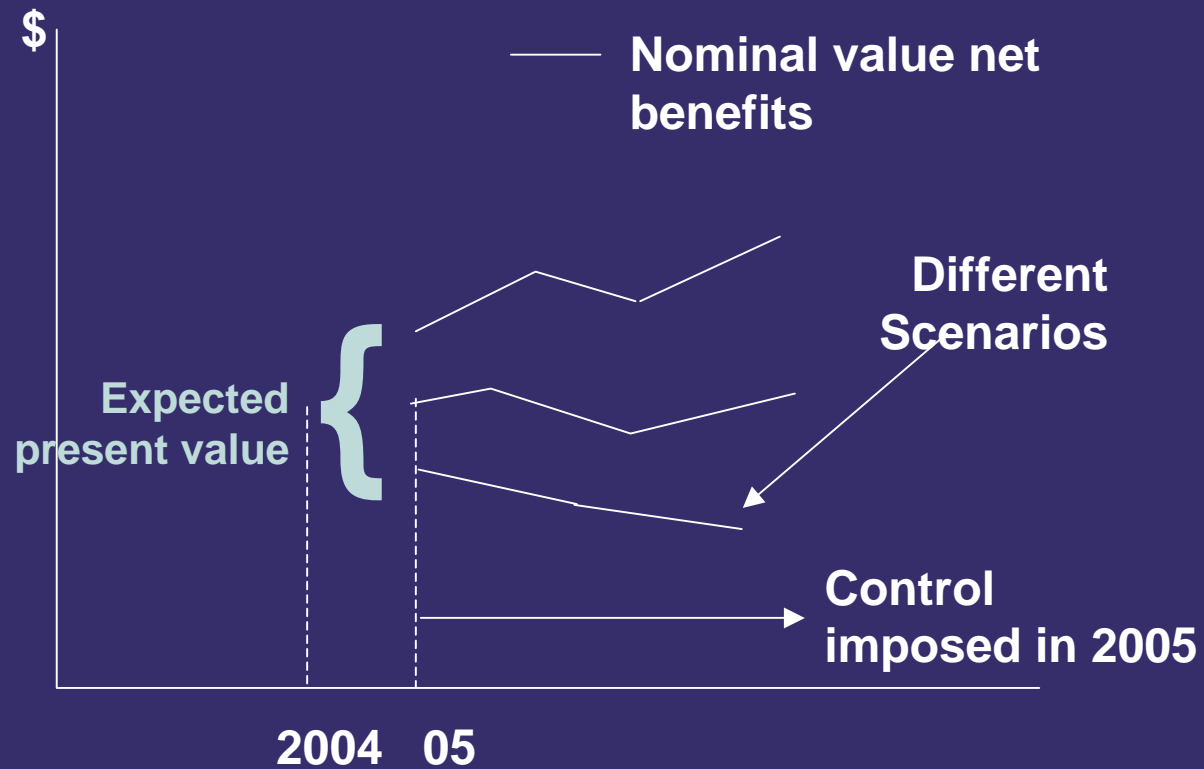
B) The "average" is not an average annual "excess" profit

- i. Weights do not add to one so is not an average
- ii. Is biased up as an average by roughly 20%.

C) The Commission's net benefit is not an indicator of the social benefit of price regulation from 2004 (the decision date). The past is irrelevant in this calculation:

- i. Except insofar as it informs likely outcomes in the future.
- ii. Shouldn't be weighted more than the future: it should have zero weight:
- iii. Upward bias in not assessing *ex ante* of the order of 60-90% for Net Public & Net Acquirer benefits for NGC transmission and distribution

Correct Approach is “Informed” Forward Looking



Some Specific Issues on the Commission's Calculation of Excess Profits

Key Underpinnings of Commission's Excess Profit Calculation

The Commission relies on several propositions to support its 'excess' profit calculation

- NPV should equal zero over the life of an asset/business
- There exists a methodology that enables $NPV = 0$ to be accurately measured from a snapshot of the life of the asset/business
- Pipeline businesses use *ex post* pricing to recover any unexpected costs
- Costs of stranded assets are recovered instantaneously (or within very short timeframes) from customers
- Pipeline businesses should not be entitled to benefit from efficiency gains (as there is no evidence that New Zealand pipeline businesses are superior performers)

If these assumptions are not valid, then the resulting calculations do not measure 'excess' profits even if implemented "correctly"

Net Present Value Equal to Zero?

In any actual market (which will be far from perfect competition) NPV will be unlikely to be equal to zero

- In competitive markets it cannot occur *ex post* ie in observed data
- Unpredictable volatility in revenues, costs and options mean that it is very often desirable to wait before investing
- In competitive markets *in equilibrium* may well have $NPV > 0$ (equivalently Tobin's Q (market value/replacement cost) > 1)
- In competitive markets it is unlikely to occur *ex ante*
- Even appropriately regulated incumbents may have $NPV > 0$

Only a very unusual price technique could deliver $NPV=0$

- Transpower only utility we are aware of that has had this objective
- Since 1998 when it first adopted this pricing approach, it has 'over-recovered' \$68 million, seemingly its investment adversely affected, and customers have had volatile charges

Ex post versus *ex ante* pricing

The assumption of *ex post* pricing is the foundation stone to much of the Commission's analysis, but whether it is consistent with reality is not examined

“The Commission's view is that assuming businesses act in this way provides the most straight-forward way of handling the risks of asset stranding and optimisation in the assessment of excess profits...” paragraph 7.83

If businesses do not price in this manner, then the resulting profit calculations will not shed any light on whether such profits are 'excessive' or not: see Lally (2004) pages 3-4

Ex post versus *ex ante* pricing

Continued...

We observe that:

- NGC states that it does not set prices using an *ex post* approach
- It is unlikely that NGC **could** (long term contracts, bypass, interfuel competition) or its customers **would** want to price in this manner (inefficient risk sharing)
- NGC is demonstrably exposed to significant stranding/optimisation risks (24% on transmission and 6% on distribution, to date) and revenue and demand volatility

The assumption of *ex post* pricing and low risk does not match the facts and the corresponding calculation of ‘excess’ profits is therefore uninformative

Implications for Calculating Past Excess Profits

Pipeline businesses use *ex ante* pricing methods and are therefore exposed to volatility in earnings

Require a risk premium to bear the (asymmetric) risks of asset stranding or unexpected costs

Ex post profits will differ from *ex ante* expected profits

Computation of excess profits must therefore take the approach which considers whether observed profits are statistically consistent with targeting an *ex ante* reasonable rate of return, given the degree of uncertainty in variables affecting returns

Given that profitability is examined over a short period in the physical lifetime of pipeline assets (12 years out of 60+), extreme care is needed before concluding that profits in excess of a simple CAPM WACC are evidence of excess earnings

Terminal Value Issue

Snapshot measurement of “excess” profit depends on factors including

- the relationship between pricing and asset values, and
- what the final snapshot period asset value represents

The terminal ODV value in the snapshot excess profit calculation is critical to the assessment of excess profits as it purports to represent the expected cashflows going forwards

But when optimisation has an asymmetric impact on potential future cashflows, the terminal ODV actually embodies a lot of uncertainty about the future and may not embody a close representation of actual pricing strategy

The Commission’s analysis fails to recognise that future asset stranding may not allow the cashflows associated with terminal ODV values to be recovered, as NGC bears the risks of asset stranding

Excess Profit and the Factual

Excess profit only exists in the context of the factual and counterfactual

Price regulation incurs extra cost and induces reactive behaviour

By lowering the probability of profit retention it reduces

- Incentives to be productively efficient
- Incentives for ownership/management take-over and thereby one form of competition
- Incentives for investment in quality and quantity

Thus the regulatory counterfactual to the past is not obtained by using unadjusted historical data and measuring a high-tide of “excess” profits

All the incentives point to lower “excess” profits in the factual, particularly given the fact that gas pipelines are still subject to owner discretion in New Zealand

Modelling the Impacts of Price Control

Modelling Price Control

Must specify the factual and counterfactual precisely in the models

Requires recognition of risk and uncertainty and behaviour

Key concerns with Commission model

- Model of price control used in measurement more closely represents rate of return regulation: prices go up and down with changes in costs/demand
- Deterministic – does not examine uncertainty and yet risk is paramount
- Internally inconsistent – draft recommendation states pipeline businesses reduce investment in the factual, but the model does not reflect this. Capital expenditure is held constant in the model regardless of WACC, or missing markets
- Narrow range of quality effects examined only – voluntary adoption of interruptible tariffs

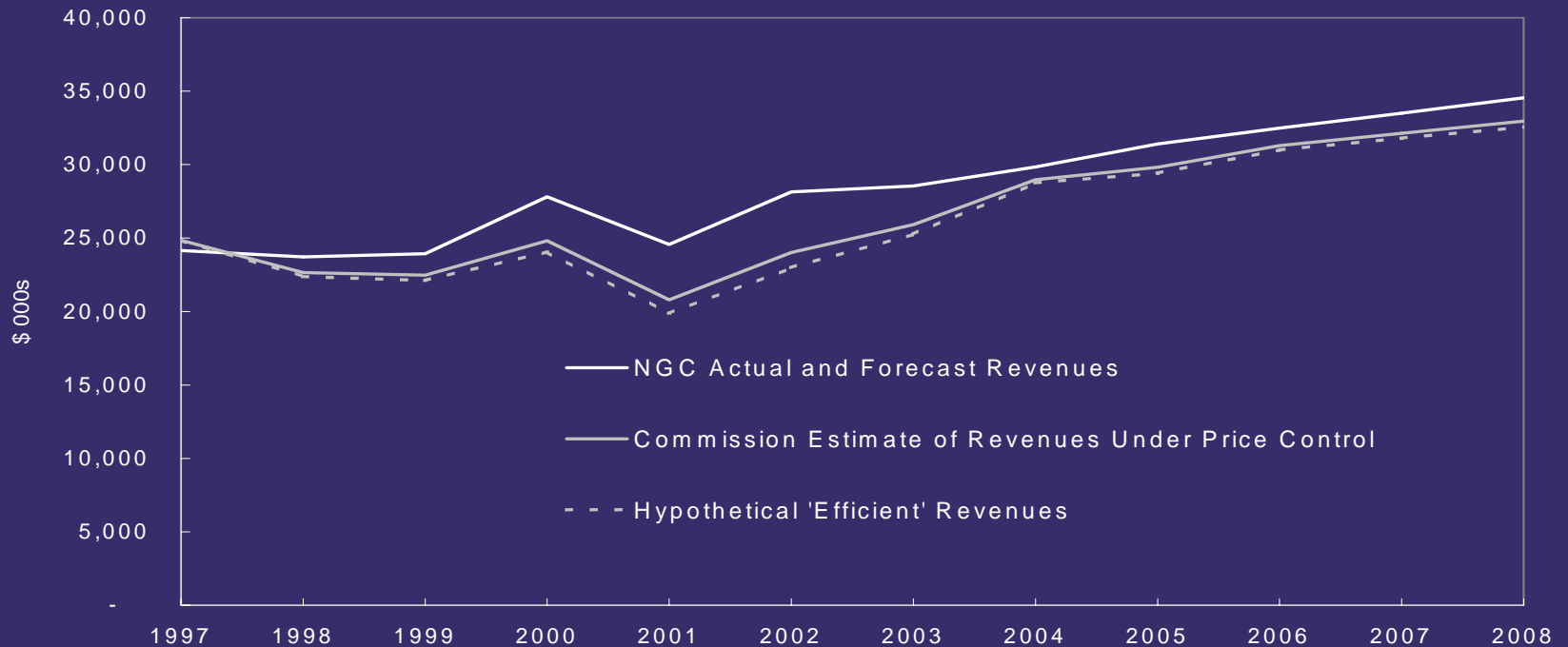
Commission Approach:

Confounds history and future

Point estimate: no variation

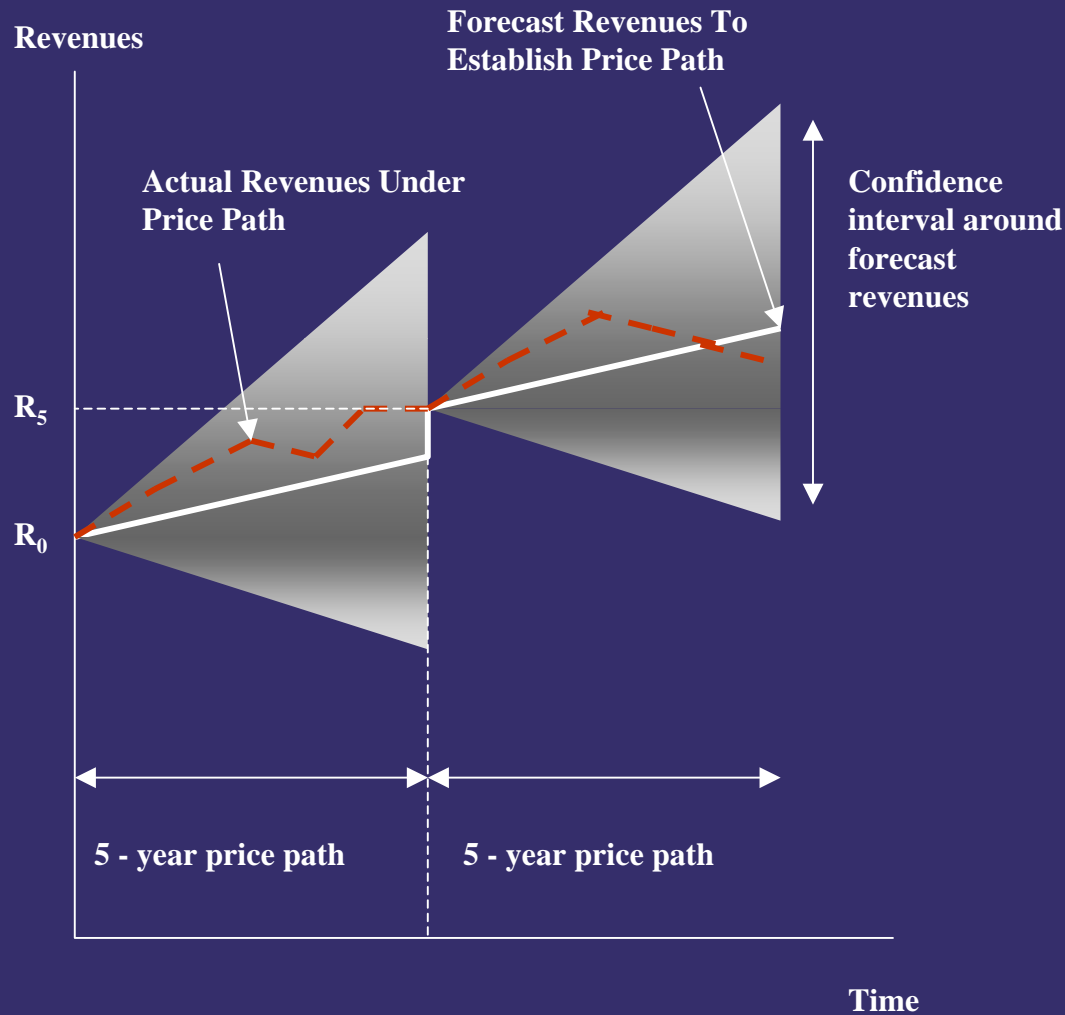
Factual differs from the assumption of price control

Small adjustment to revenues for “costs”



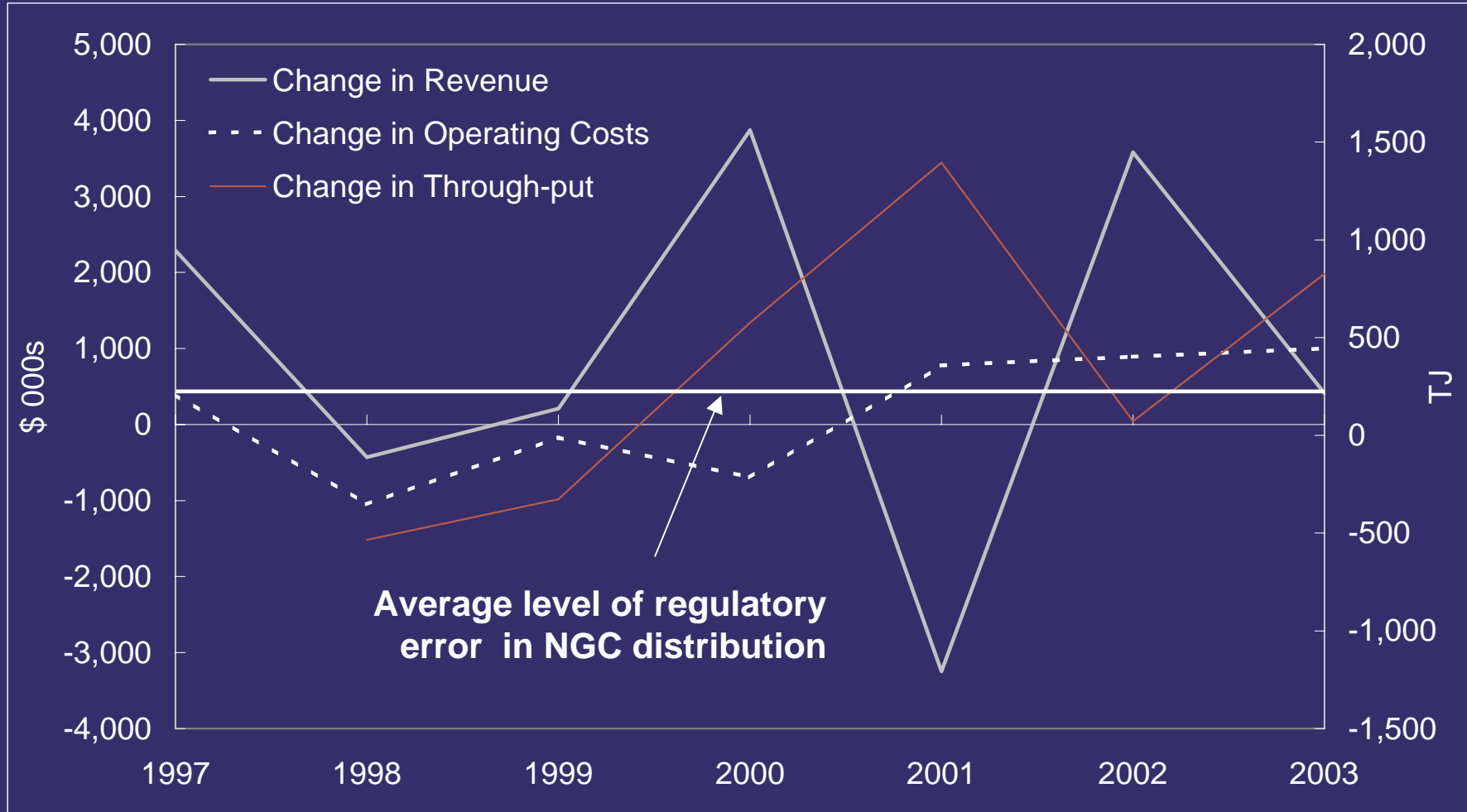
Distribution of Revenue Outcomes

Price Control



Evidence for Volatility NGC Distribution

\$ Nominal



Commission's Comparison of Revenue Outcomes

The Commission considers that 20% of excess profit reduction may not be achieved under price control – this equates to errors in the price path of 2% for NGC distribution

Overseas regulation of electricity distributors have made substantially larger unplanned adjustments

- OFGEM (1999) P_0 adjustments of 4 to 33%
- IPART (2004) P_0 adjustments of -5 to -7% (with further price increases to avoid 'rate shock')
- ESC (1999) P_0 adjustment of 12.4 to 21.8%
- Queensland (2002) P_0 adjustment of -18.8% to -9.5%

No justification for assuming that regulator of NZ gas pipelines would be less prone to forecast error than regulation of electricity distribution, when gas volumes and costs are so volatile

Volatility and irreversibility affect WACC too

Dynamic Efficiency

Commission Model of Dynamic Inefficiency of Control

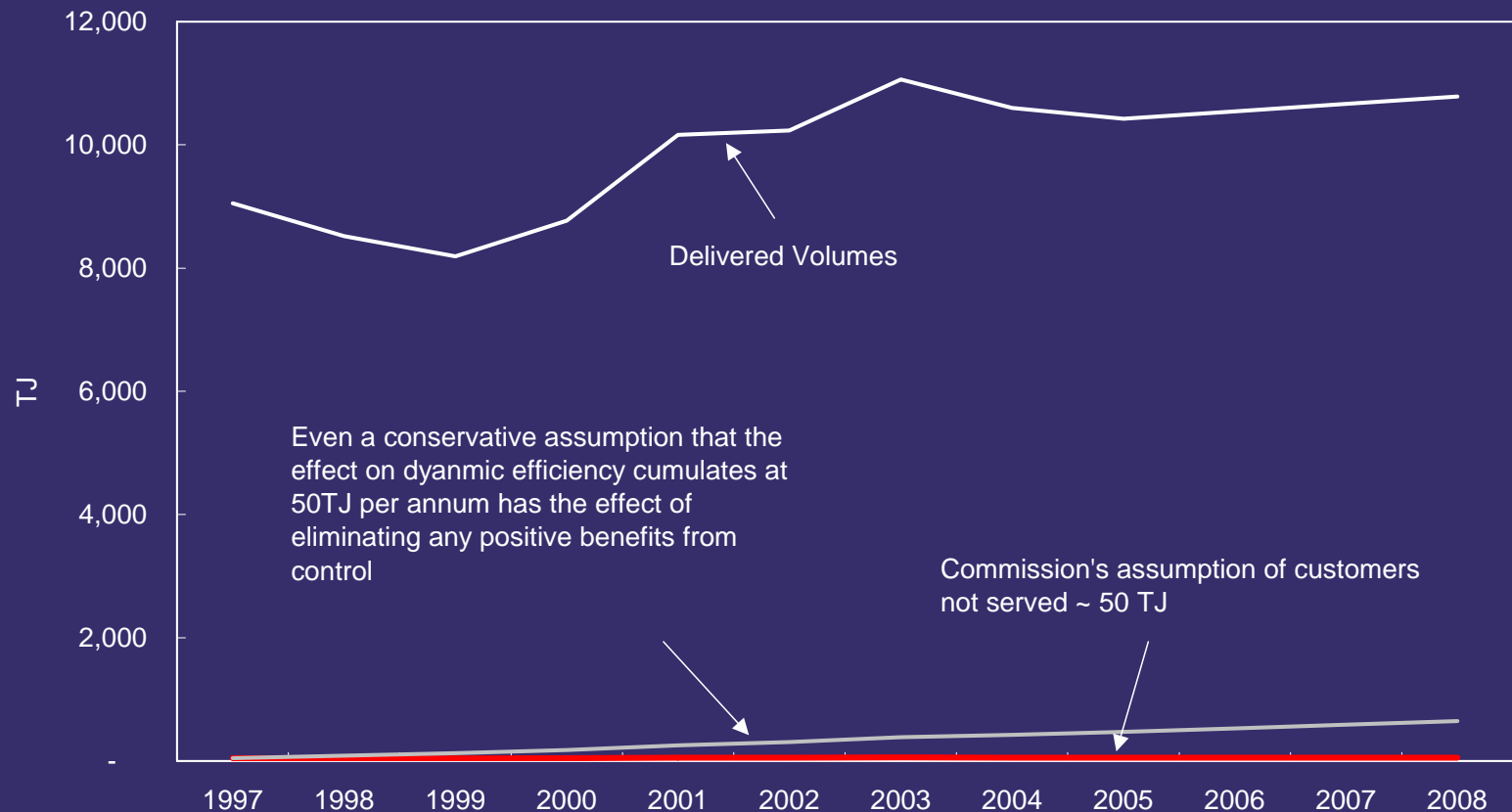
Assumes that over 12 year period a constant 0.5% of the counterfactual quantity would not be served as NGC reduces investment

- Unrealistically conservative – why 0.5%? In NGC's case this equates to a around 50 TJ, yet the 16 regional charts of gate station demands in our report, show customers regularly connecting and disconnecting from NGC's network over time at multiples of this level
- Effectively assumes that NGC stops investing for one year and then resumes at previous levels
- The effect should be cumulative – the number of subdivisions not served, or commercial/industrial customers forced to use other fuels will likely grow over time under the factual

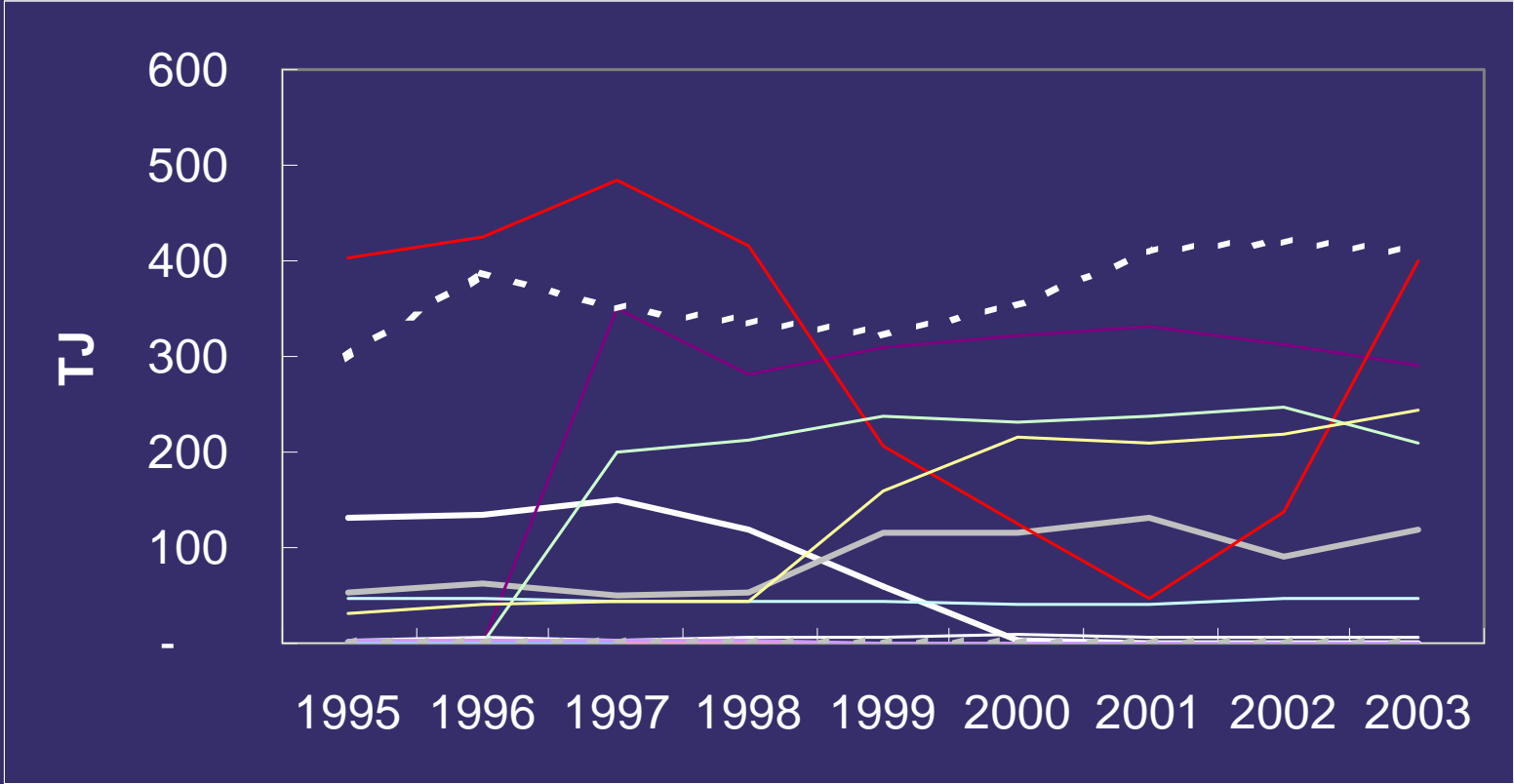
Sensitivity testing a conservative assumption of 0.5% per annum compound growth in the size of the market not served, reduces acquirers and net public benefits in NGC distribution's case by around \$1.3 million per annum on average, rendering the benefits of control negative

'Missing Markets'

Commission's model of dynamic inefficiency from control (across the industry) is \$1m per annum or 0.1% of market turnover



Gate Station Demand



Implications of Control for Dynamic Efficiency

Counterfactual (of current regulation) NGC would continue to invest

Suppressing returns below NGC's stated hurdle rates, will cause NGC to reduce/cease discretionary investment

Commission assumes that if control is imposed and NGC reduces investment then other pipeline providers or customers would meet the investment shortfall

- Customers: prefer NGC to bear the costs and risks of long-term irreversible investments. Sample of NGC projects where a capital contribution required to make the project expected NPV positive shows 50% of subdivision projects did not proceed where developer required to make capital contribution
- Other pipeline providers: likely to have the same investment hurdle rates as NGC (disclosed to investors as 8.5% to 10%) – unlikely to invest in pipeline assets if regulation is triggered by these rates of return.
- Inefficient if supplier determined by who is regulated - (substantially) lessens competition in the market

Quality Effects of Control

Commission's model is based on the assumption that 5% of customers would be shifted to interruptible supply contracts and the loss of value would be equivalent to 10% of the current pipeline charges, giving a loss of quality valued at \$422,000 for NGC transmission and \$160,000 per annum for NGC distribution

Across the industry the loss associated with reductions in quality is ~\$1 million per annum out of a ~\$1 billion industry

The Commission notes that “the costs of unplanned interruptions to inframarginal customers are likely to be higher, but are not considered in the discussion below.” (5.99)

This is an important omission, and should be noted in the conclusions drawn by the Commission, as the costs of control are therefore underestimated

Quality is extremely difficult for a regulator to determine

Summary of Specific Concerns with Commission Model

Summary of Variations to Commission Model Distribution

	Net Acquirers Benefits		Net Public Benefits		Net Benefits to New Zealanders	
	Change	Net Benefit	Change	Net Benefit	Change	Net Benefit
Baseline		1,077		-780		435
Excluding gain on sale of Taranaki	-456		1		-296	
More realistic cumulative dynamic efficiency loss	-1,346		-1,346		-1,346	
Forward looking Characterisation	-508		354		-205	
More realistic direct costs of control	-88		-88		-88	
More realistic producer surplus assumption	0		608		608	
More realistic productive efficiency approach	-210		-210		-210	
Corrected tax data	-195		-1		-129	
Combined Effect (without WACC adjustment)	-2,100	-1,023	-1,192	-1,973	-1,489	-1,054
More realistic WACC estimate	<u>-98.6</u>		<u>-22</u>		<u>-65.6</u>	
Combined Effect	-3168^{1,2}	-2091	-1,547	-2,327	-2,526	-2,091

Summary of Variations and Modifications

Transmission

	Net Acquirers Benefits		Net Public Benefits		Net Benefits to New Zealanders	
	Change	Net Benefit	Change	Net Benefit	Change	Net Benefit
Baseline		3,322		-342		2,117
Excluding Revaluations from Kapuni	-3,947		-54		-2,623	
More realistic cumulative dynamic efficiency loss	0		-2,390		-2,390	
Forward looking Characterisation	-1,271		157		-672	
More realistic direct costs of control	-88		-88		0	
More realistic producer surplus assumption	0		176		176	
More realistic productive efficiency approach	-566		-566		-566	
More accurate historic easement valuation	-237		10		-149	
Corrected Tax data	-596		0		-393	
Combined Effect (without WACC adjustment)	-4,870	-1,548	-3,113	-3,455	-5,850	-3,733
More realistic WACC estimate	<u>-3,311</u>		<u>-16</u>		<u>-2,176</u>	
Combined Effect	-8,342	-5,019	-3,362	-3,704	-8,365	-6,248

More Appropriate Modelling Strategy

The variations suggested in the previous slides are based on more realistic data, but the model framework itself is not appropriate

Evaluating the effect of price control on welfare needs to replicate the actual process of setting prices, with uncertainty specifically modeled

Implementing price control is essentially a year-long forecasting exercise designed to equate expected revenues with expected costs for the next five years

Model should be cast on the basis of an internally consistent view of likely behaviours with and without price control

Model should be forward looking

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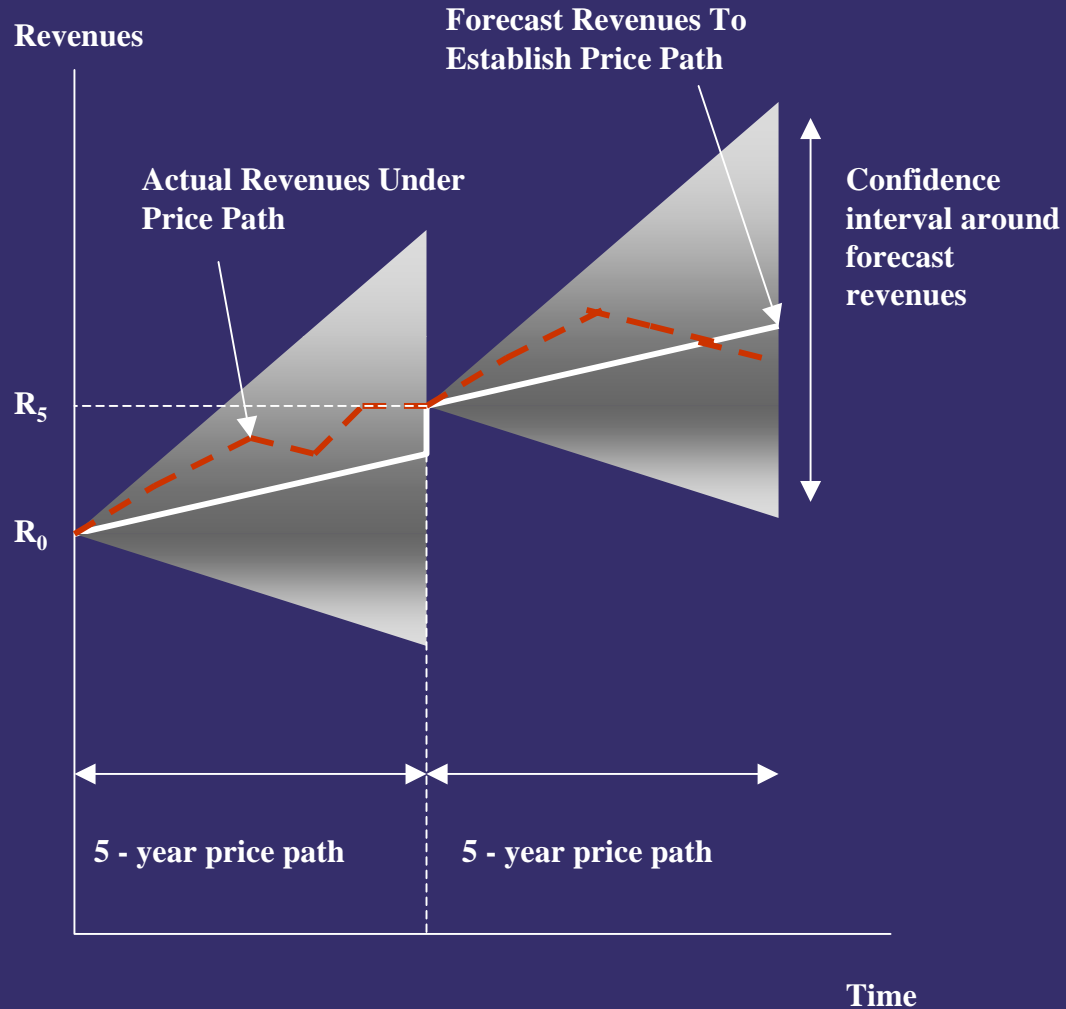
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Distribution of Revenue Outcomes Under Price Control



Distribution of Revenue Outcomes Under Light-handed Regulation

Price setting is annual with prices set to equate expected revenues with expected costs

Price setting behaviour is ex ante, so any over-recoveries or under-recoveries do not affect future prices

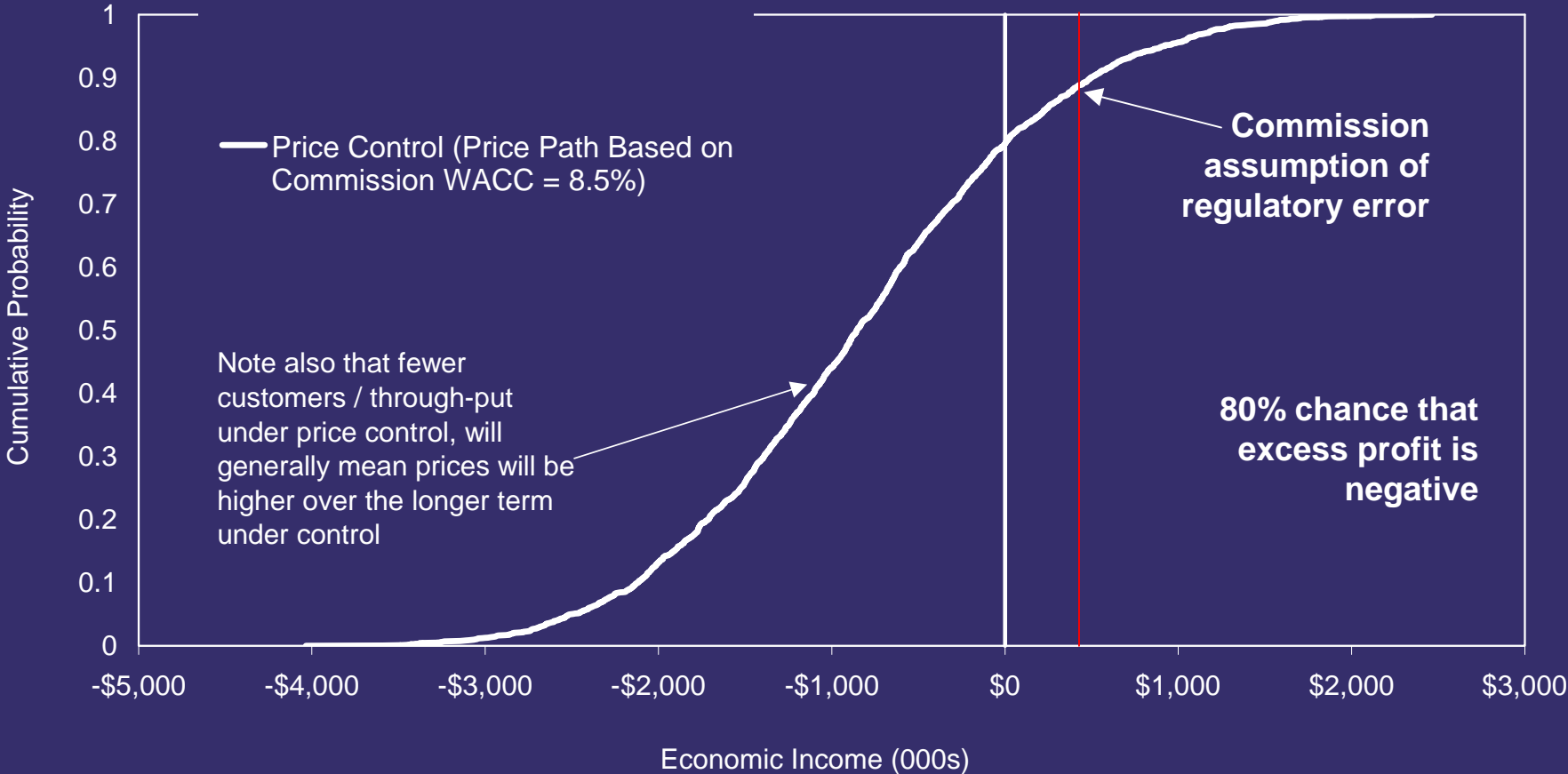
Model is forward looking from 2006

Provides the outcomes for 2000 future scenarios based on

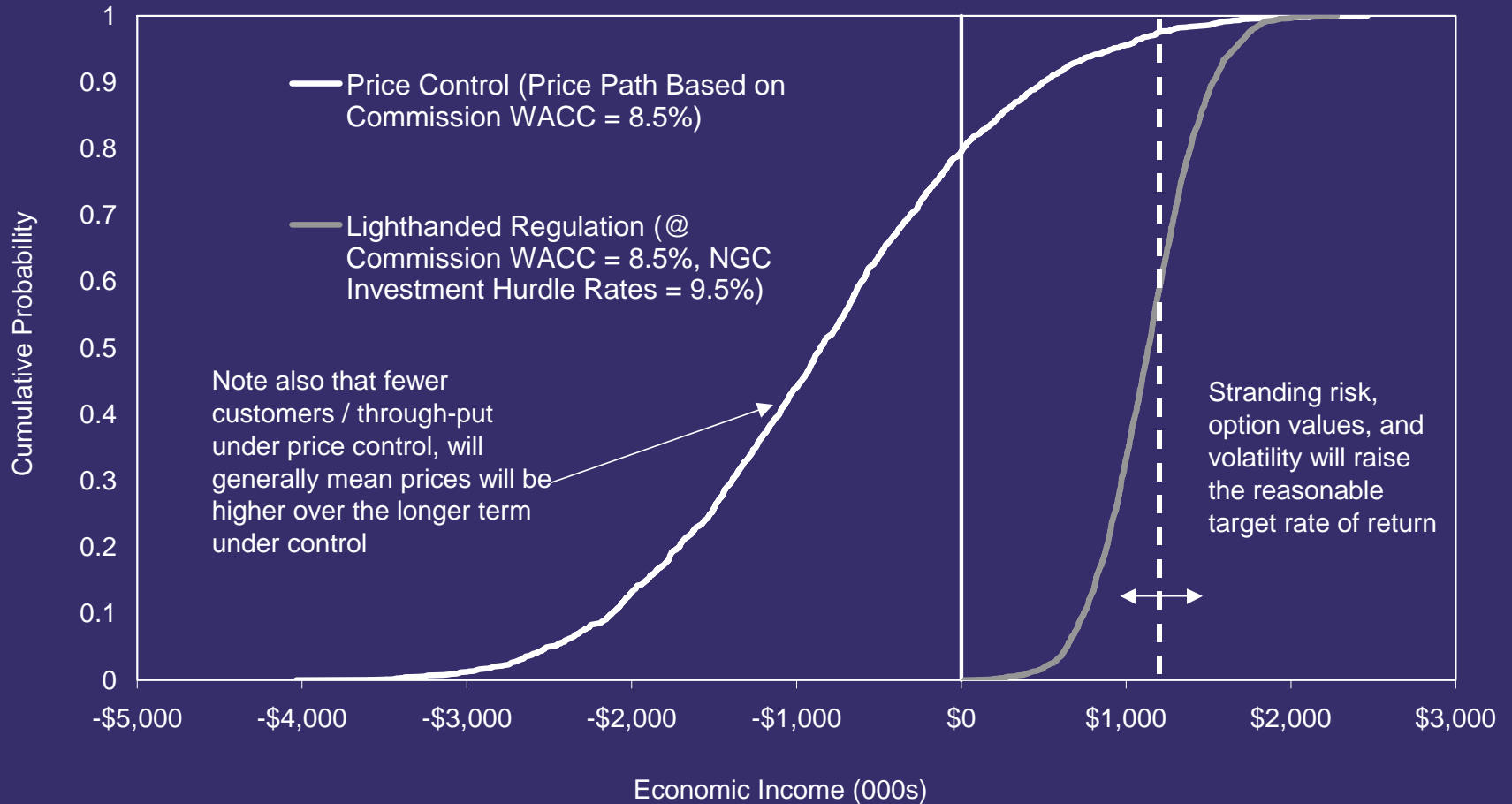
- Counterfactual behaviour
- Data history of variation

Hurdle rate is 9.5% (consistent also with Commission finding in its model)

Simulated Economic Profit Outcomes of Price Control



Simulated Economic Profit Outcomes of Price Control Relative to Light-handed Regulation



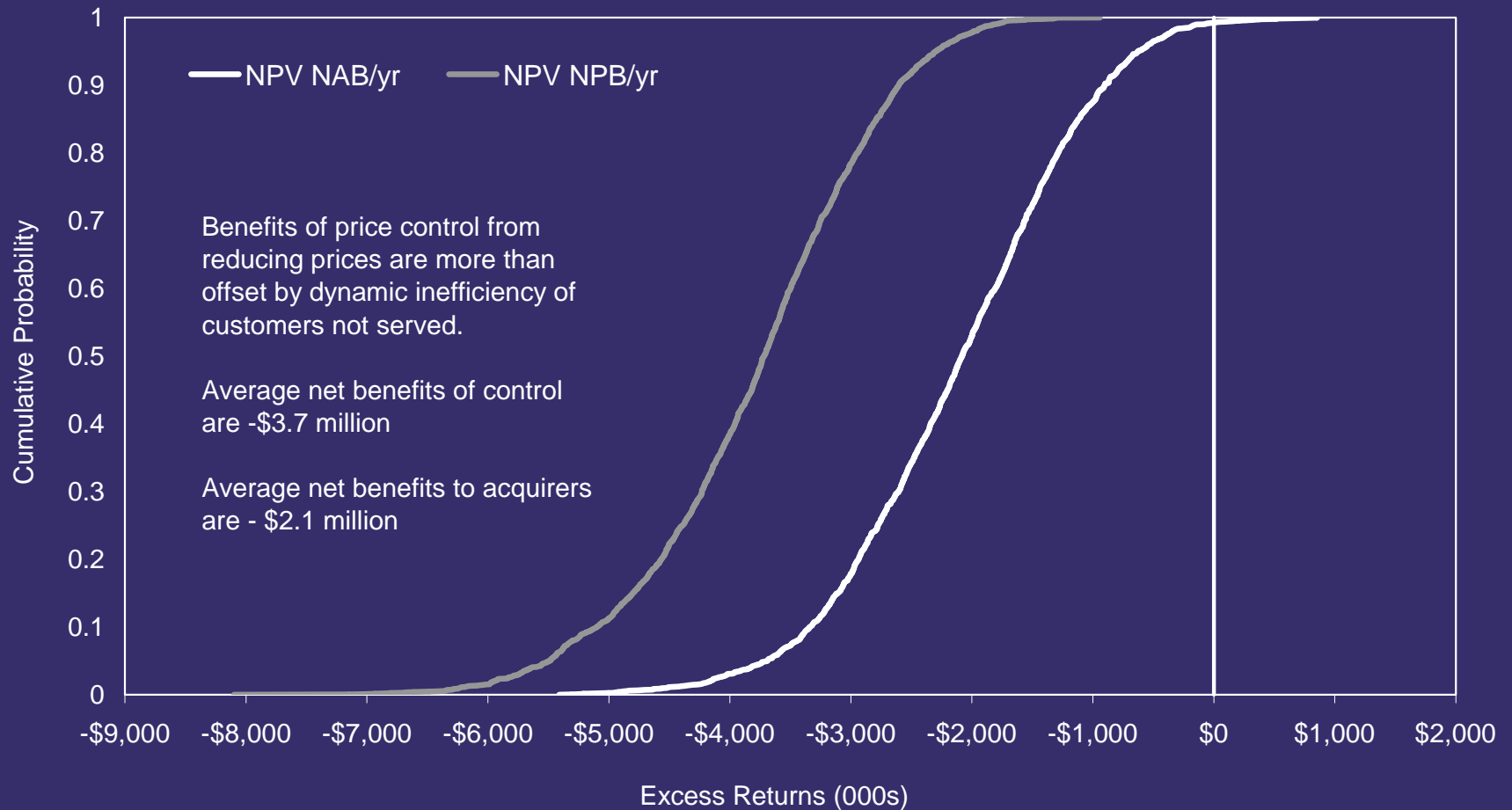
Other Welfare Impacts

As with the Commission's model, allocative and productive efficiency effects of control and administrative costs are immaterial to the welfare analysis

The welfare calculations in the model generally reproduce the Commission's methods, except we adopt a more realistic model of productive efficiency effects of control

- Productive efficiency is constant in each year in both the factual and counterfactual (1% gains) **except**
- In years 4 and 5 prior to the price path reset, efficiency gains are saved up until year six, the first year of the second price cap period

Net Benefits Tests



Net Benefits Tests

Continued...

These results are conservative

- Adopt the Commission's approach to quality effects (no modeling of involuntary interruptions, or restrictions on appliance pressures)
- No account is taken of potential stranding on downside revenue/profit risks
- Model is likely to be too optimistic on upside growth potential
- Structural change likely to increase volatility

Summary: Simulation Model Illustrates

That risk, behaviour, and dynamic response can be modelled in a way that is germane to the decision

That the counterfactual and the factual behaviours should be specified

That decisions affect welfare and benefits to acquirers over time in ways static calculations cannot measure: price caps may reduce welfare even to acquirers

That “excess” profit

- is the outcome of a factual/counterfactual comparison
- is under simulated simulation of factual is negative (so regulation is not sustainable)
- under current regulation the Commission’s excess profit is not *functionless* : simulated counterfactual produces higher profit (stranding needs to be examined) and welfare

Concluding Comment

"Prediction is very difficult, especially if it's about the future."

--Niels Bohr, Nobel laureate in Physics

Regulation imposes restrictions on the rewards from investing in gas pipelines, which has important implications for behaviour that may run counter to the long-term interests of consumers

The models used to evaluate the policy decision should be conceptually well-specified and address key issues to the extent possible

In general, the Commission should adopt a high standard on robust evidence for concluding that regulation would improve long-term outcomes