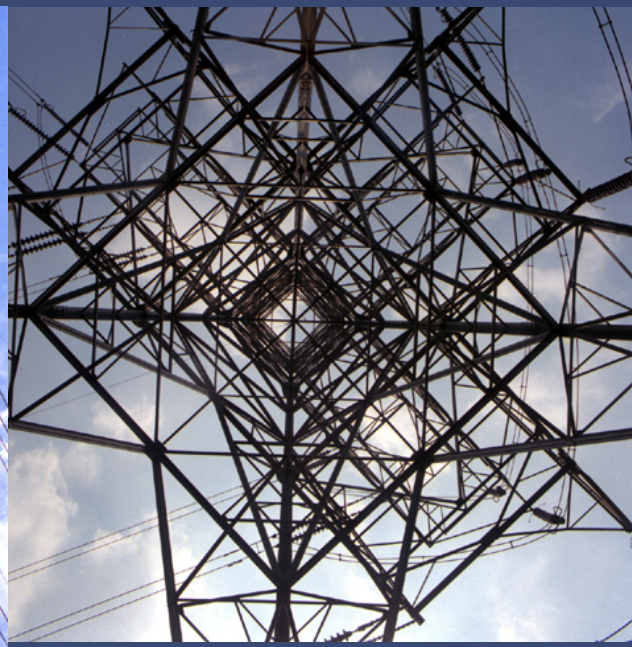
UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

Ownership Unbundling in New Zealand



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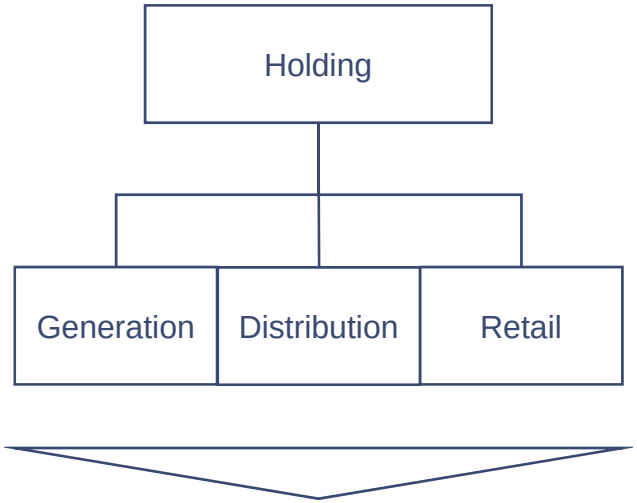
Agenda

1. Unbundling Debate in Electricity
2. New Zealand Electricity Reform
3. Hypotheses about Ownership Unbundling
4. Evidence from New Zealand
5. Conclusions

Unbundling of electricity network businesses

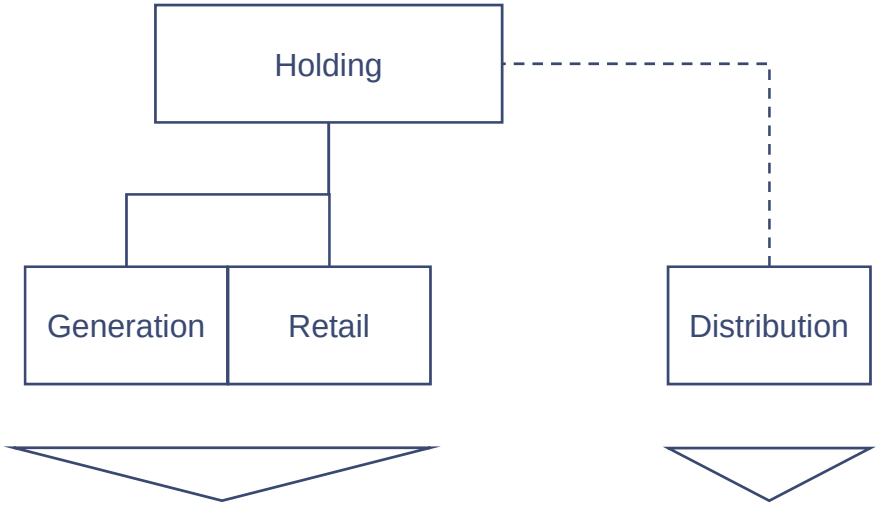
Pre-liberalisation



Pre liberalisation companies had monopoly for distribution and retail of energy in specific region

No regulation and no competition

Post-liberalisation



Following liberalisation companies compete in generation and retail of energy.

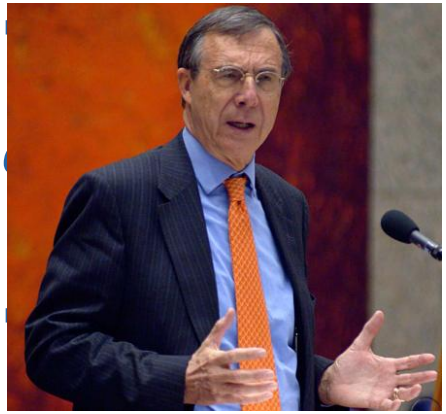
Possible to buy electricity from any supplier

Network separated from commercial activities and regulated

What types of unbundling exist?

Type of unbundling	Description
Management	• Lightest form • Separate management for the operation of the network • Separate management accounts, but is not required to publish (audited) accounts.
Accounting	• Separate (audited) accounts for the network operation • Accounts are open to public and regulatory scrutiny
Legal	• Separate legal entity responsible for the network operation • This legal entity has its own accounts and management
Ownership	• Most extreme form of unbundling • Separate company owns and operates the network assets.

The Unbundling Debate in the EU



"The internal energy market with good interconnections and an effective unbundling is for me the absolute of the story and the basis, the substance on which the energy policy should be founded"

Minister Brinkhorst, Energy reading 'the energy policy in an international perspective", 21 March 2007

"On the basis of the evidence we have collected and analyzed, I have high expectations of the benefits of ownership unbundling of transmission networks'

"… effective unbundling is a necessary condition for creating a competitive energy market"

Neelie Kroes, Speech: "Building a competitive European energy market, 1st Oct 2007

Legal unbundling of networks: is it enough?

- Current debate focuses on benefits of further unbundling between monopoly networks and commercial activities
- Legal unbundling may not be enough and full ownership unbundling should take place
- Remember our organogram?
  - Network business no longer also part of integrated energy company but should be sold to an “independent” party that only owns and operates networks (no commercial activities)

- What are the main arguments **for** ownership unbundling?
- What are the main arguments **against** ownership unbundling?

Arguments for and against ownership unbundling

For

- Removes possibility for cross-subsidisation of commercial activities that compete with monopoly network activities
- Increases competition in the commercial market (retail) – more level playing field – resulting in lower prices
- Increases transparency and focus in network business – leading to additional cost savings
- Increases investment potential of network business – thereby increasing the quality of the network
- Removes incentives to restrict access

Against

- Removes operational synergies, such as IT, call centre, back office
- Removes financial synergies by reducing scale to attract financing and risk profile (increasing cost)
- Regulation works – no complaints so no reason
- Structural remedy versus behavioural remedy – we do not know the consequences and we can not “un do” ownership unbundling

Relevant Evidence on Vertical Integration?

- Michaels (2006) reviews 12 papers on vertical integration in electric power
  - 11 show benefits to vertical integration.
  - Of these, 8 test the separability of generation from either transmission alone, or a combination of distribution and transmission
  - 3 examine vertical economies between generation and distribution.
- Kwoka & Pollitt (2007) and Nillesen & Pollitt (2008) find advantages of VI for US distribution wires business costs.
- Davies & Waddams-Price (2007) examine whether co-ownership of a network and commercial activities in the UK
  - Find lower prices in fully unbundled regions.

The current status

- For transmission most people agree that ownership unbundling is beneficial (see e.g. Pollitt, 2008)
- Distribution is not straightforward
  - EU does not consider it beneficial
  - UK has some voluntary ownership unbundling – but not forced
  - No empirical analysis to date of costs/benefits
- Netherlands is requiring full distribution ownership unbundling by 2011
  - The only EU country requiring this
- New Zealand introduced ownership unbundling in 1998 and forms a great case study to empirically test the costs and benefits of this structural remedy

New Zealand: 1994 fully liberalised, but no regulator

- New Zealand started preparing for liberalisation of the electricity industry in 1987 and started the actual liberalisation process in 1992
- From 1992 to 1995 significant reforms took place:
  - Deregulation: the removal of distributors' statutory monopolies and of the obligation to supply;
  - **Self-regulation**: ring-fencing of network business and mandatory information disclosure focusing;
  - Provision for price controls: **implicit threat** of regulation in Act; and
- Regulations designed with the aim of enabling customers and analysts to identify any excess profit component in network pricing
- Light-handed approach, where the contestable markets theory would ensure that monopoly rents were eliminated or prevented

New Zealand: problems started to appear…

- **Competition**: Switching rates were low and price levels did not decrease following liberalisation
- **Technical**: No system to reconcile the distribution of electricity and no standard profiles to estimate the load share of individual customers
- **Distribution price inflation**: Additional profits by re-valuing the network assets and justifying price increases of electricity distribution
- **Economies of scale**: Economies of scale to be gained if network operators merged and consolidated their activities
- **Monopoly rents**: Concern that integrated distribution companies would have an incentive to charge monopoly rents for the use of their networks
- **Cross-subsidies**: Concern that integrated companies could subsidise retail activities with profits from the monopoly networks
- **Access**: Concern that integrated companies could restrict access to the networks

The proposed solution…

- Full ownership unbundling between the network and the commercial activities

- Electricity Industry Reform Act (EIR) was introduced in 1998
- Corporate separation of lines and energy businesses to be achieved by 1 April 1999 and full ownership separation no later than 31 December 2003
- The EIR prohibited the same party being involved in both a network business and a company that sold or generated electricity

Hypotheses about Competition Effects

Hypothesis I: Competition		Indicator measures:	Following ownership unbundling we expect this indicator to…
I.a.	Price levels	The electricity price for the total sector. As a result of increased competition we would expect, *ceteris paribus*, that prices decrease.	*Decrease as competition increases*
I.b.	Price variance	The variance of electricity prices in the sector. As a result of more competition we would expect, *ceteris paribus*, the variance to increase	*Increase as competition increases*
I.c.	Number of players and concentration	The number of players operating in a market. More players and less concentration is an indication of more competition and more customer choice.	*Increase as competition increases*
I.d.	Non-incumbent market shares in former franchise area	The market shares of non-incumbent players in former franchise areas provides an indication of the movement of customers and the success of "new entrants".	*Increase as competition increases*
I.e.	Price-cost margins	The price-cost margin measures the available profits in the sector. In a competitive market margins will decrease to competitive levels.	*Decrease as competition increases*

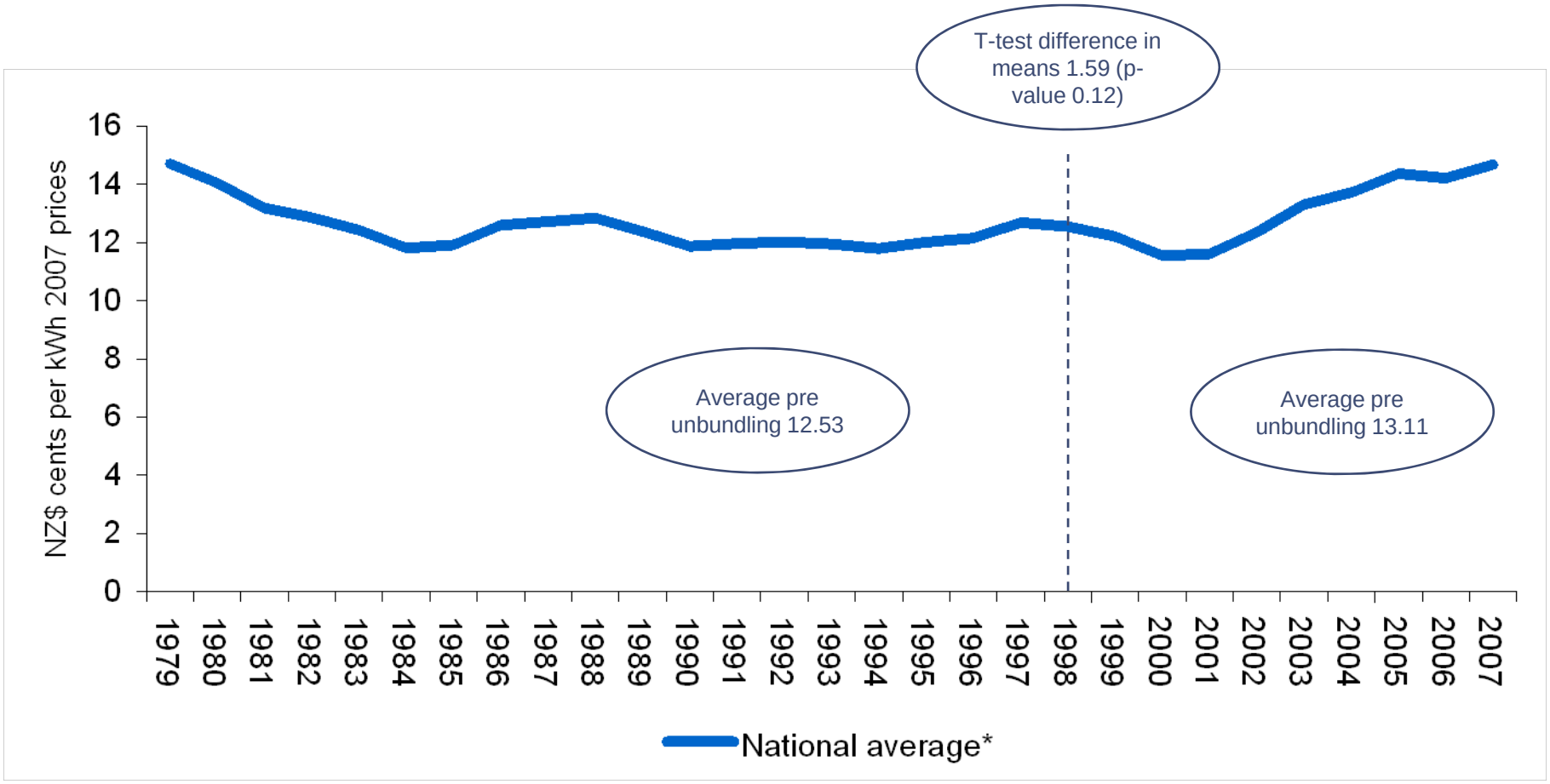
Hypotheses about Quality Effects

Hypothesis II: Quality		Indicator measures:	Following ownership unbundling we expect this indicator to:
II.a.	Network losses	The loss ratio is a measure of the technical and administrative losses of the network. Lower losses suggest a more efficient network.	*Initially increase (following one-off unbundling administrative burden) then decrease*
II.b.	Capacity utilisation	Capacity utilisation measures the degree to which the network is being used at full capacity. A certain minimum spare capacity (reserve margin) is always required.	*Could decrease because network is run more optimally, or could increase as more investment in (spare) capacity is possible*
II.c.	SAIDI	System Average Interruption Duration Index (SAIDI) measures the average annual number of minutes a retail customer is without service.	*Decrease*
II.d.	SAIFI	System Average Interruption Frequency Index (SAIDI) measures the number of interruptions per year.	*Decrease*
II.e.	CAIDI	Customer Average Interruption Duration Index (CAIDI) is calculated by dividing SAIDI by SAIFI and gives the average outage duration that any given customer would experience. It can therefore be viewed as a proxy for the average restoration time	*Decrease*
II.f.	Quality variance	The variance in the quality delivered is likely to vary over time. The stability in delivered quality can therefore be seen as a measure of quality consistency	*Decrease*

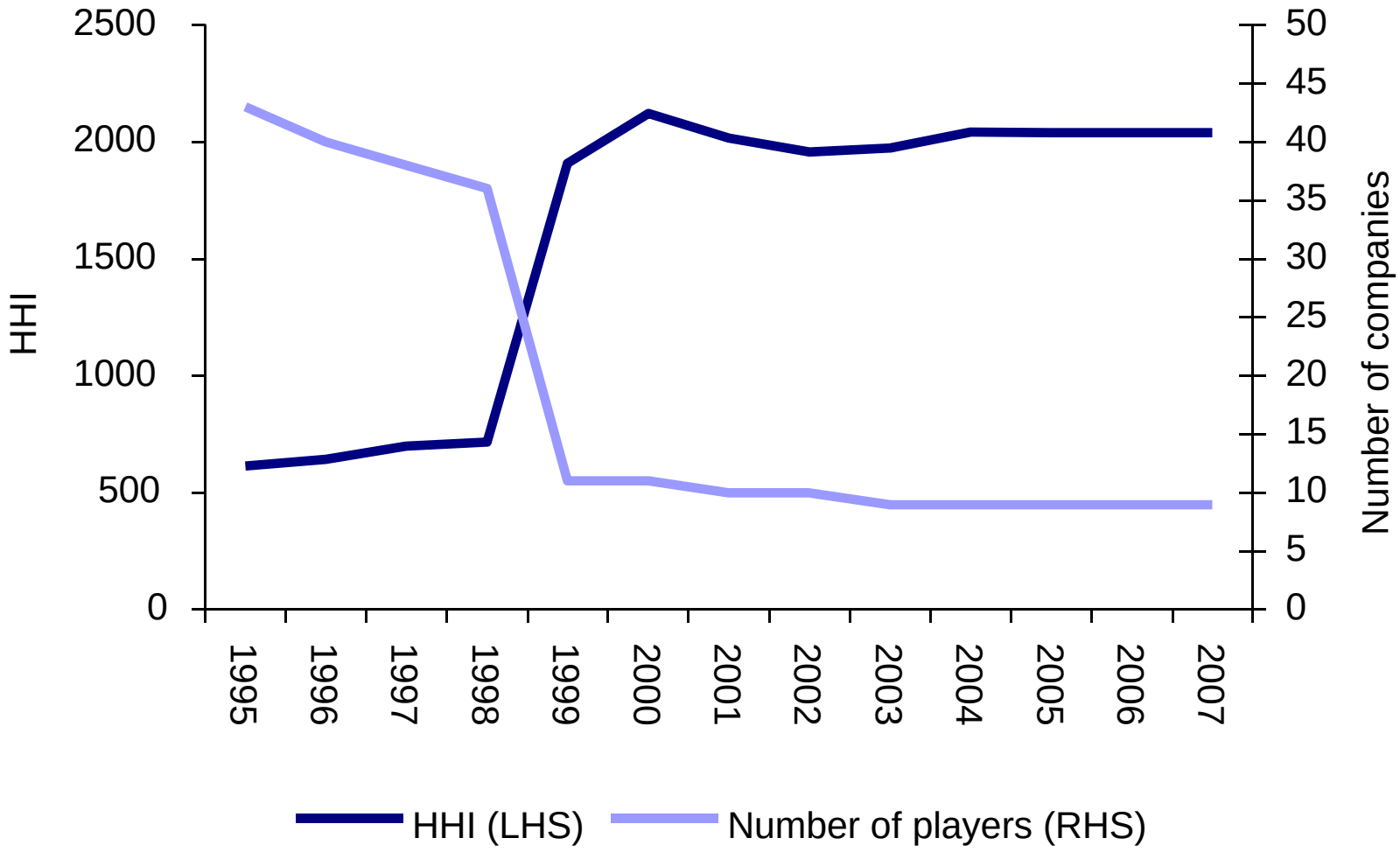
Hypotheses about Cost Effects

Hypothesis III: Costs		Indicator measures:	Following ownership unbundling we expect this indicator to:
III.a.	One-off costs	There will be substantial one-off transaction costs associated with ownership unbundling.	*One-off costs*
III.b.	Structural costs	Unit operational costs for the distribution companies measures the efficiency of operations over time. There can be both a one-off drop in operational costs and a structurally different rate of change of unit costs	*One-off decrease in operational costs and more rapid unit cost reduction over time following unbundling*
III.c.	Price-cost margins	The price-cost margin measures the available profits for the network companies. In a more transparent market margins will decrease to competitive levels.	*Decrease in price-cost margin for the sector following ownership unbundling*

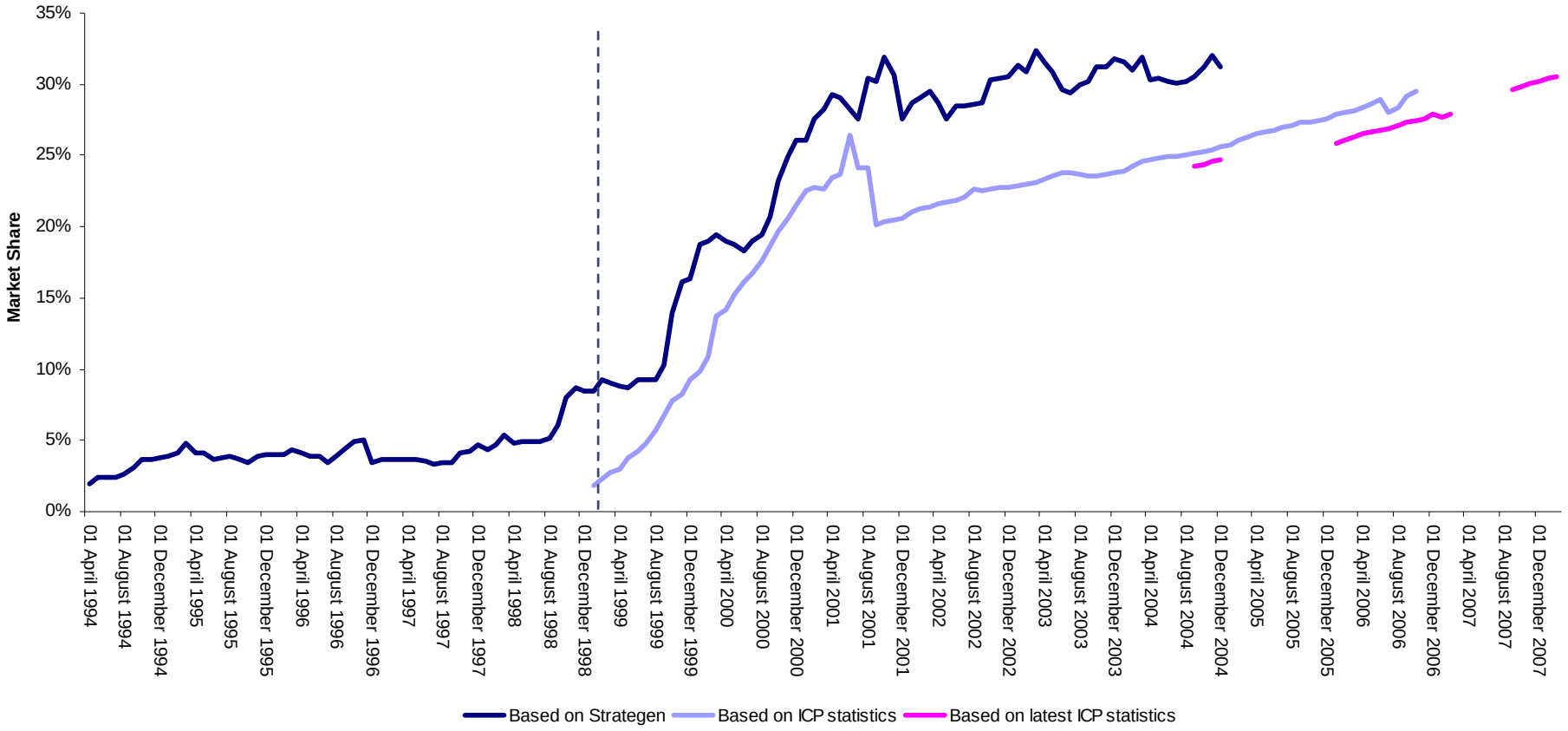
H1a: Average electricity prices (2007 NZ$)



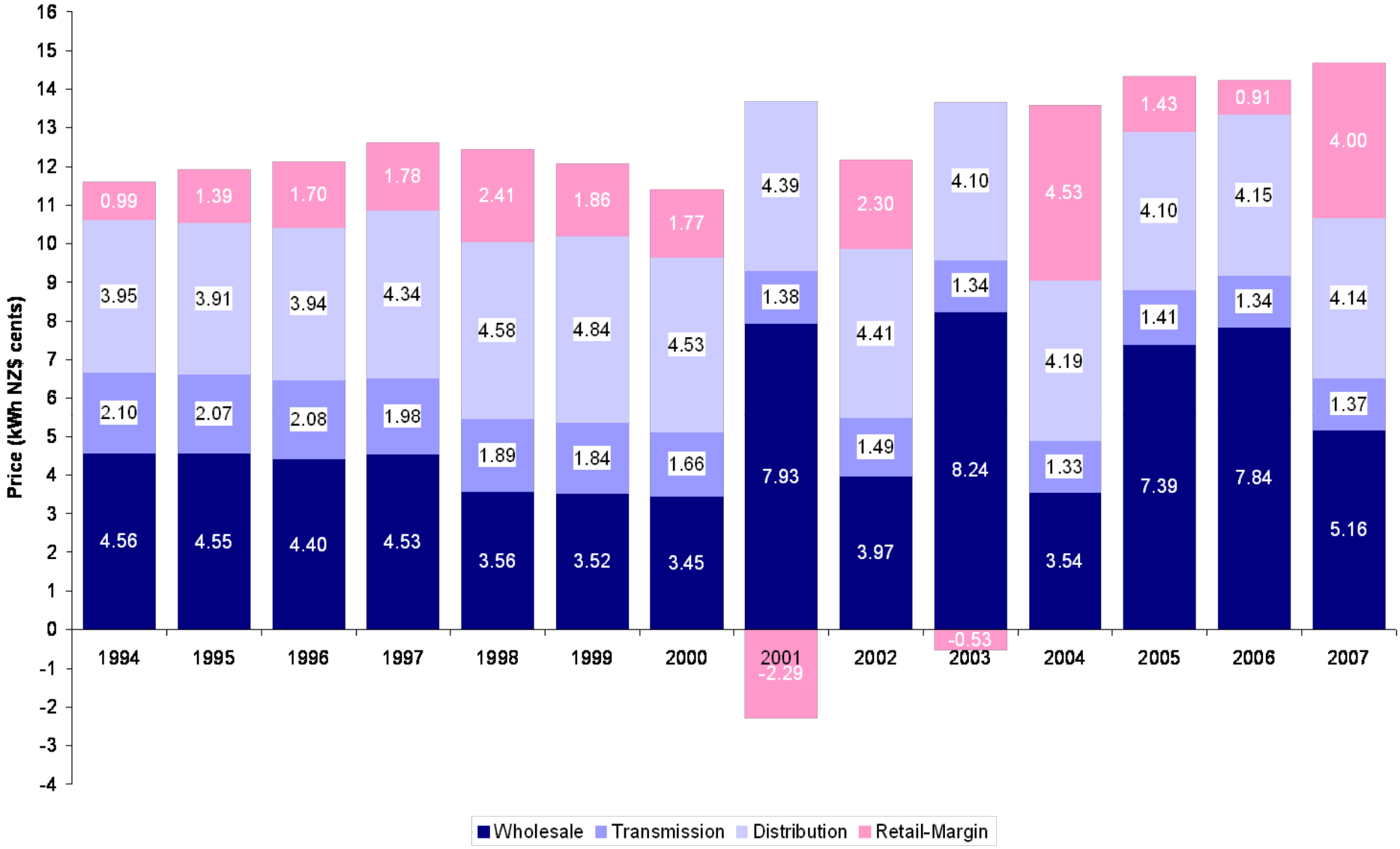
H1c: Number of players and the Herfindahl-Hirschman-index for retail



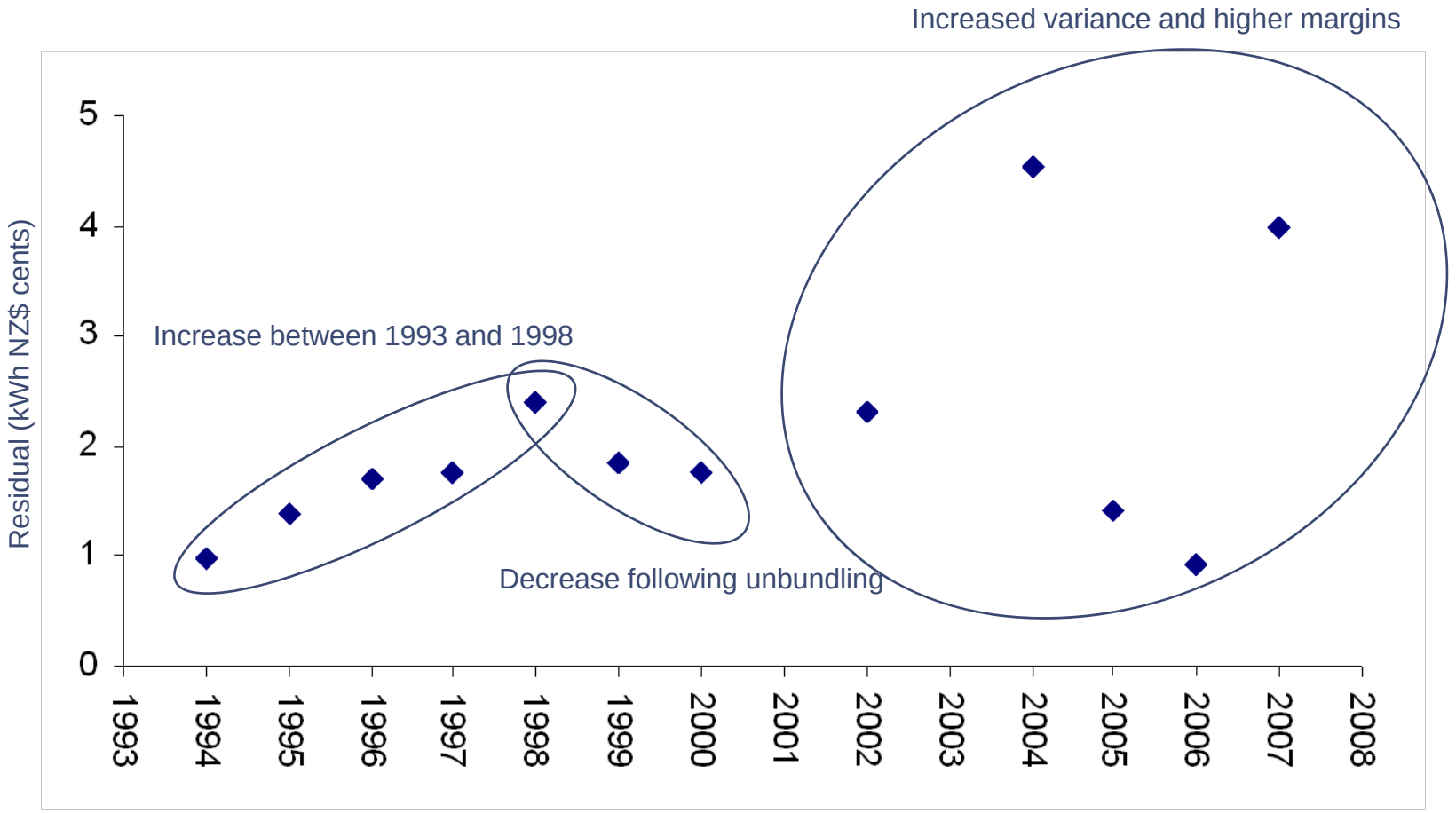
H1d: Market share non-incumbent players



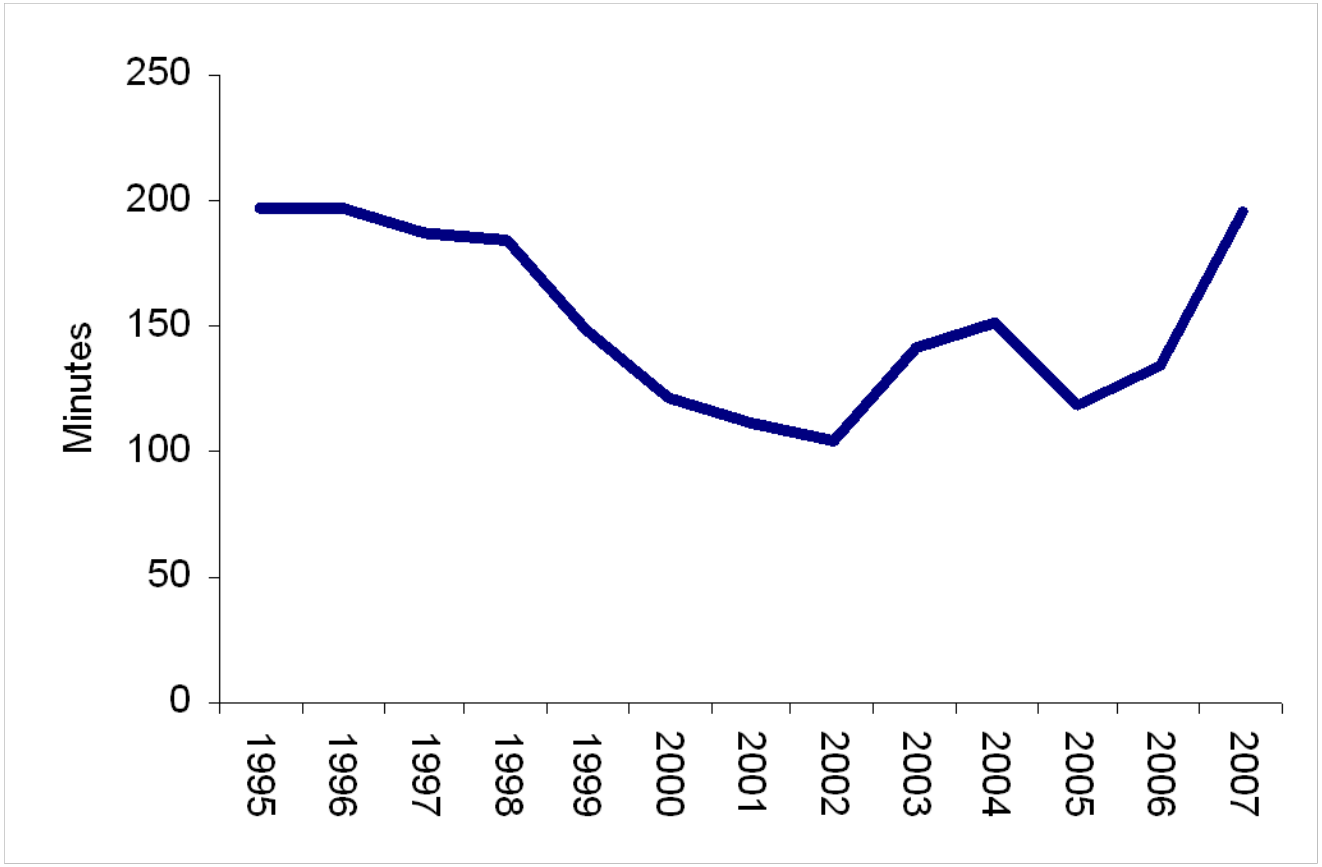
H1e: Residual margins in the sector (1/2)



H1e: Residual margins in the sector (2/2)



H2c: SAIDI Quality Index



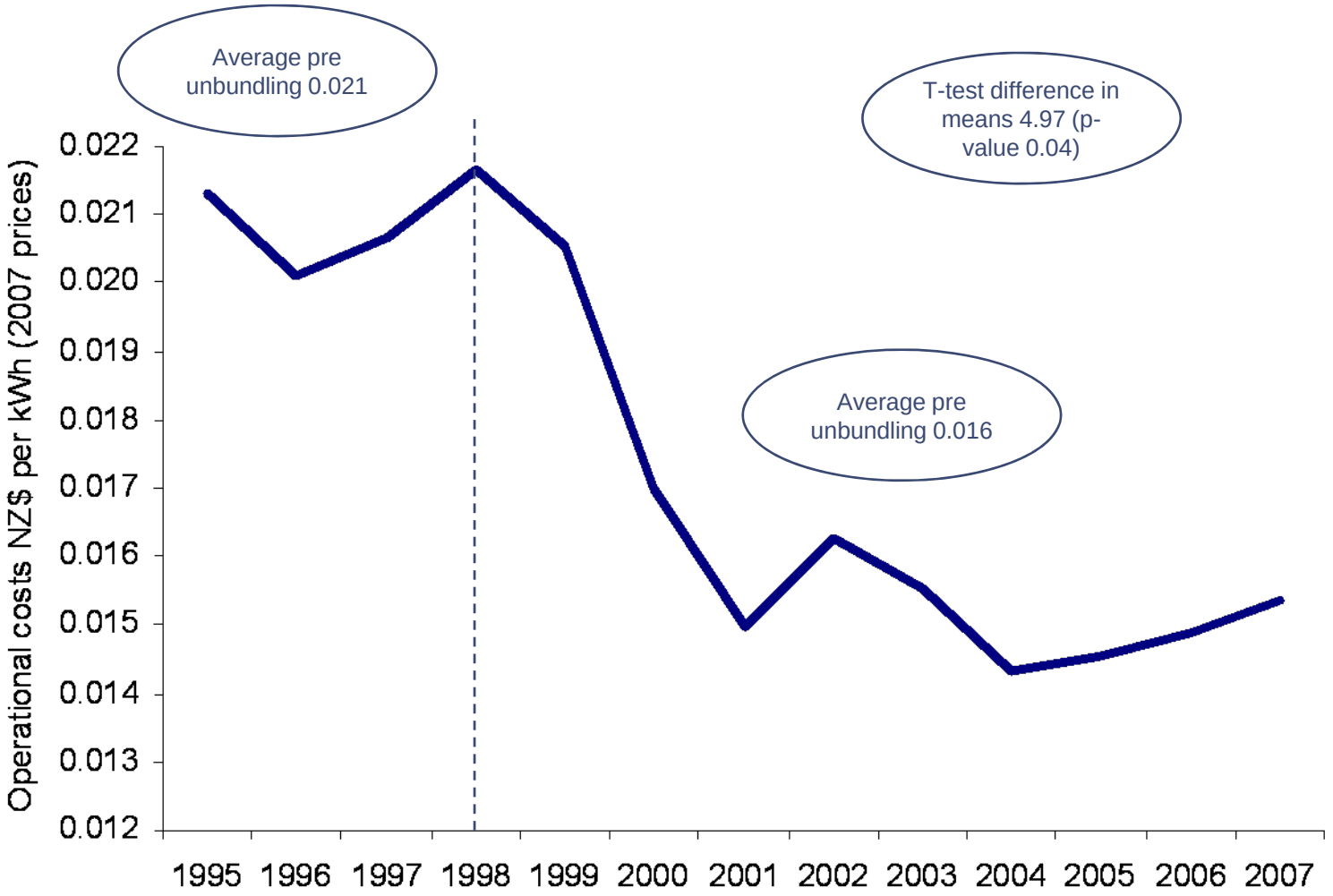
H3a: One-off transaction costs

Table 1. One-off restructuring costs due to EIR Act 1998

	Cost NZ$ mln.	Market share	Reason
Powerco	10.0	5.6%	*Loss on disposal of generation assets.*
Vector	50.8	17.7%	*Loss on sale of electricity contracts associated with retail business.*
United Networks	42.0	25.6%	*Restructuring costs and loss on sale of electricity contract.*
Total	102.8	48.8%	
Estimated sector cost NZ$ mln.		210.6	
Total customers (#)		1,129,067	
Cost per customer 1999 NZ$		187	
Cost per customer 2007 NZ$		237	

Sources: Annual Reports 1999 Powerco, Vector and United Networks.

H3c: Unit operational costs (2007 NZ$)



Can we attribute this drop to ownership unbundling?

- We have a dataset for 28 companies between 1995 and 2007
- Construct a cost function and include a dummy for ownership unbundling
- A standard Cobb-Douglas cost function looks like:

$$C = f(Q, P, X)$$

- Where Q is output, P are factor prices, and X are exogenous factors
- In our case we specify the cost function as:

$$\ln(C_{it}) = \alpha + \beta_1 \ln(Output_{it}) + \beta_2 \ln(Quality_{it}) + \beta_3 \ln(Density_{it}) + \beta_4 Dummy_{unbundling(t)} + \beta_5 Trend_t + \varepsilon_{it}$$

- A priori, we expect that the coefficient on Output is < 1 and that the Dummy is negative

Panel regression results (364 observations, 28 companies)

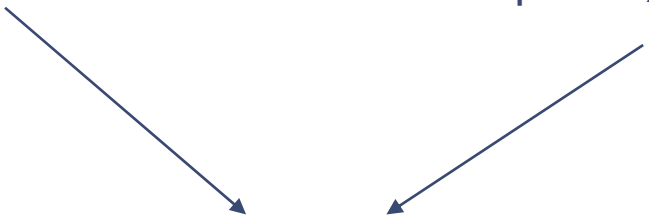
Coefficient		
Constant	4.097	***
	(-0.38)	
Output	0.816	***
	(-0.0536)	
Quality	0.105	***
	(-0.033)	
Density	0.0134	
	(-0.0944)	
Dummy	-0.172	***
	(-0.0591)	
Trend	-0.00801	
	(-0.00844)	
Rho	0.511	
p value Mundlak test	0.127	
Random Errors		
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Ownership unbundling responsible for 17% reduction in unit costs

A simple cost benefit calculation

One-off transaction costs in 1998 were NZ$267mln. for the sector (2007 prices)

Additional cumulative operational costs savings attributable to ownership unbundling NZ$404mln. (2007 prices, discounted at 6%)



Net benefit per 2007 is NZ$137mln. or NZ$121 per customer

A quick summary

- OU introduced because market not functioning: more competition was the central aim. In addition unbundling increases efficiency in distribution
- Evidence shows that:
  - Competition increased initially but has since stagnated
  - Substantial one off transaction costs
  - Significant reduction in unit operational costs
- But
  - Retail has no stand-alone survival basis. We have witnessed retail integrated with stable asset-backed distribution to retail integrated with asset-backed generation
  - This was not foreseen at time – so from one form of vertical integration to another form
  - Cost reduction in distribution attributable to unbundling although a large part also to economies of scale

So can we translate the results?

- NZ is special…
  - It is an island and far away…
  - No regulator (finally introduced in 2003 – sort of!)
- Ownership unbundling did not increase competition – it may actually have reduced competition (including vertical foreclosure)
- Ownership unbundling did decrease unit operational costs and the one-off transaction costs have been earned back

So:

- If you want competition to increase this may not be the right move
- If you want costs to decrease this could work…but couldn't a decent regulator do the same…?
- Still not clear what long run environmental policy impact might be…

Appendix: Competition Effects

Hypothesis I: Competition		Indicator measures:	Following ownership unbundling we expect this indicator to…	Empirical evidence suggests…	Criteria achieved?
I.a.	Price levels	The electricity price for the total sector. As a result of increased competition we would expect, *ceteris paribus*, that prices decrease.	*Decrease as competition increases*	*No statistically significant change in national average electricity prices*	*N*
I.b.	Price variance	The variance of electricity prices in the sector. As a result of more competition we would expect, *ceteris paribus*, the variance to increase	*Increase as competition increases*	*Variance in national electricity price has increased following unbundling*	*Y*
I.c.	Number of players and concentration	The number of players operating in a market. More players and less concentration is an indication of more competition and more customer choice.	*Increase as competition increases*	*Number of players has decreased dramatically following unbundling. No retailer active without asset-backing of generation capacity*	*N*
I.d.	Non-incumbent market shares in former franchise area	The market shares of non-incumbent players in former franchise areas provides an indication of the movement of customers and the success of "new entrants".	*Increase as competition increases*	*Market share increased substantially following unbundling although it has stabilised since 2001. Not clear whether increase is fully attributable to unbundling or to introduction of deemed profiling*	*Y*
I.e.	Price-cost margins	The price-cost margin measures the available profits in the sector. In a competitive market margins will decrease to competitive levels.	*Decrease as competition increases*	*Price cost margins look to have temporarily decreased with ownership unbundling and have since recovered. This supports anecdotal evidence of initial intense competition and subsequent reduction in competition*	*N*

Appendix: Quality Effects

Hypothesis II: Quality		Indicator measures:	Following ownership unbundling we expect this indicator to:	Empirical evidence suggests…	Criteria achieved?
II.a.	Network losses	The loss ratio is a measure of the technical and administrative losses of the network. Lower losses suggest a more efficient network.	*Initially increase (following one-off unbundling administrative burden) then decrease*	*Initial increase then reversion back to pre-unbundling average*	*N*
II.b.	Capacity utilisation	Capacity utilisation measures the degree to which the network is being used at full capacity. A certain minimum spare capacity (reserve margin) is always required.	*Could decrease because network is run more optimally, or could increase as more investment in (spare) capacity is possible*	*Capacity utilisation does not differ statistically pre- and post-unbundling*	*N*
II.c.	SAIDI	System Average Interruption Duration Index (SAIDI) measures the average annual number of minutes a retail customer is without service.	*Decrease*	*Average SAIDI is statistically significantly lower post-unbundling*	*Y*
II.d.	SAIFI	System Average Interruption Frequency Index (SAIDI) measures the number of interruptions per year.	*Decrease*	*Average SAIFI is statistically significantly lower post-unbundling*	*Y*
II.e.	CAIDI	Customer Average Interruption Duration Index (CAIDI) is calculated by dividing SAIDI by SAIFI and gives the average outage duration that any given customer would experience. It can therefore be viewed as a proxy for the average restoration time	*Decrease*	*Average CAIDI is not statistically significantly lower post-unbundling*	*N*
II.f.	Quality variance	The variance in the quality delivered is likely to vary over time. The stability in delivered quality can therefore be seen as a measure of quality consistency	*Decrease*	*Variance has increased post-bundling. However, this could be due to data limitations*	*N*

Appendix: Cost Effects

Hypothesis III: Costs		Indicator measures:	Following ownership unbundling we expect this indicator to:	Empirical evidence suggests…	Criteria achieved?
III.a.	One-off costs	There will be substantial one-off transaction costs associated with ownership unbundling.	*One-off costs*	*Substantial one-off restructuring costs*	*Y*
III.b.	Structural costs	Unit operational costs for the distribution companies measures the efficiency of operations over time. There can be both a one-off drop in operational costs and a structurally different rate of change of unit costs	*One-off decrease in operational costs and more rapid unit cost reduction over time following unbundling*	*Statistically significant one-off decrease in unit operational costs of approximately 17 percent*	*Y*
III.c.	Price-cost margins	The price-cost margin measures the available profits for the network companies. In a more transparent market margins will decrease to competitive levels.	*Decrease in price-cost margin for the sector following ownership unbundling*	*Price-cost margins have increased over the time period suggesting tariffs have not been adjusted to account for decrease in unit operational costs*	*N*