Identifying and estimating excess profits in the New Zealand electricity industry

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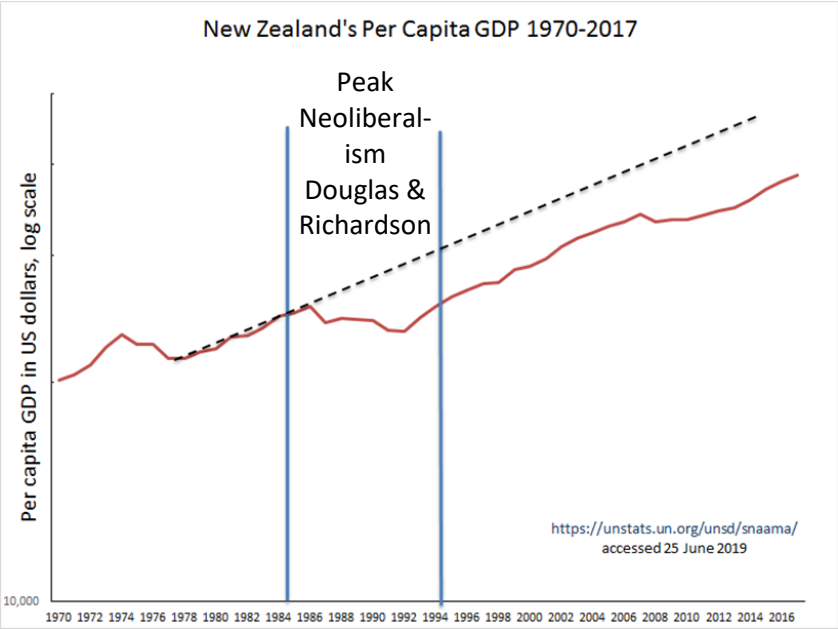
Three decades after the 1989 Electricity Task Force report triggered radical changes to the New Zealand electricity industry, a post-restructuring equilibrium of sorts has been established, characterised by healthy profits, exceptionally weak productivity performance, and continued public disquiet over high prices charged to household consumers. The paper updates and extends previous work by the author on the theoretical and practical issues in identifying and measuring "function-less rents" secured by the various industry participants. Rents and rent-seeking are examined at multiple levels, ranging from simple old-fashioned Ricardian rents to outright monopoly profits, with reference to the final report of the Government's Electricity Price Review. Some policy suggestions are offered

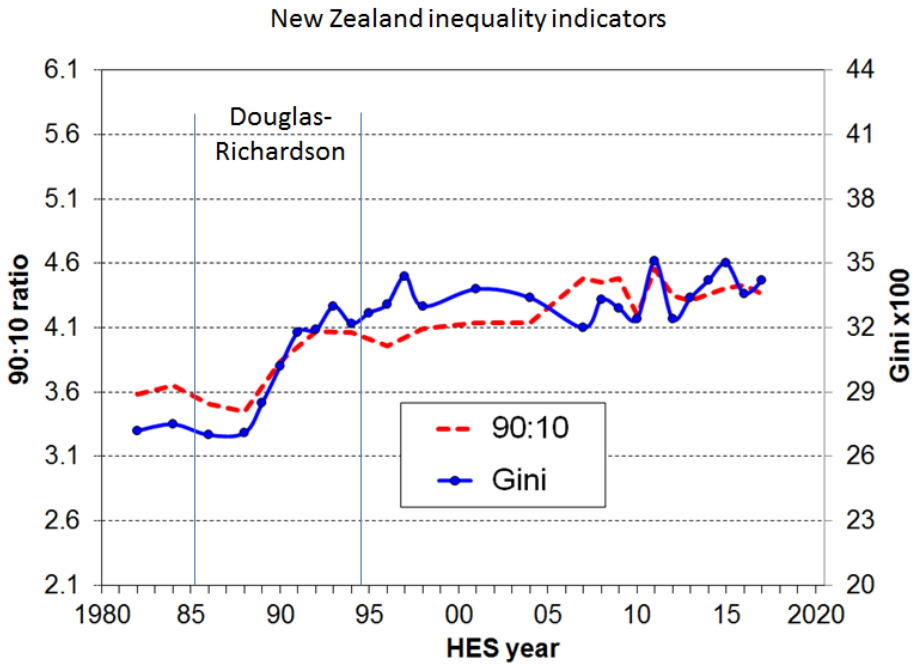
Introduction

There has been growing disquiet in the international literature over the accumulating evidence that market power, unleashed by the deregulation, financialisation and privatisation trends of the past three decades, has been a key factor driving rising inequality ad weak productivity growth in developed western economies (Baker 2019 Chapter 1; Barkai 2016; , De Loecker and Eeckhout 2017, 2018; Diez et al 2018).

In New Zealand's case the application of the 'neoliberal' policy programme was unusually abrupt and uncompromising by international standards and the impacts were dramatic on both macroeconomic and microeconomic levels. Per capita GDP growth stalled for a decade:



Income inequality took a once-for-all hit:



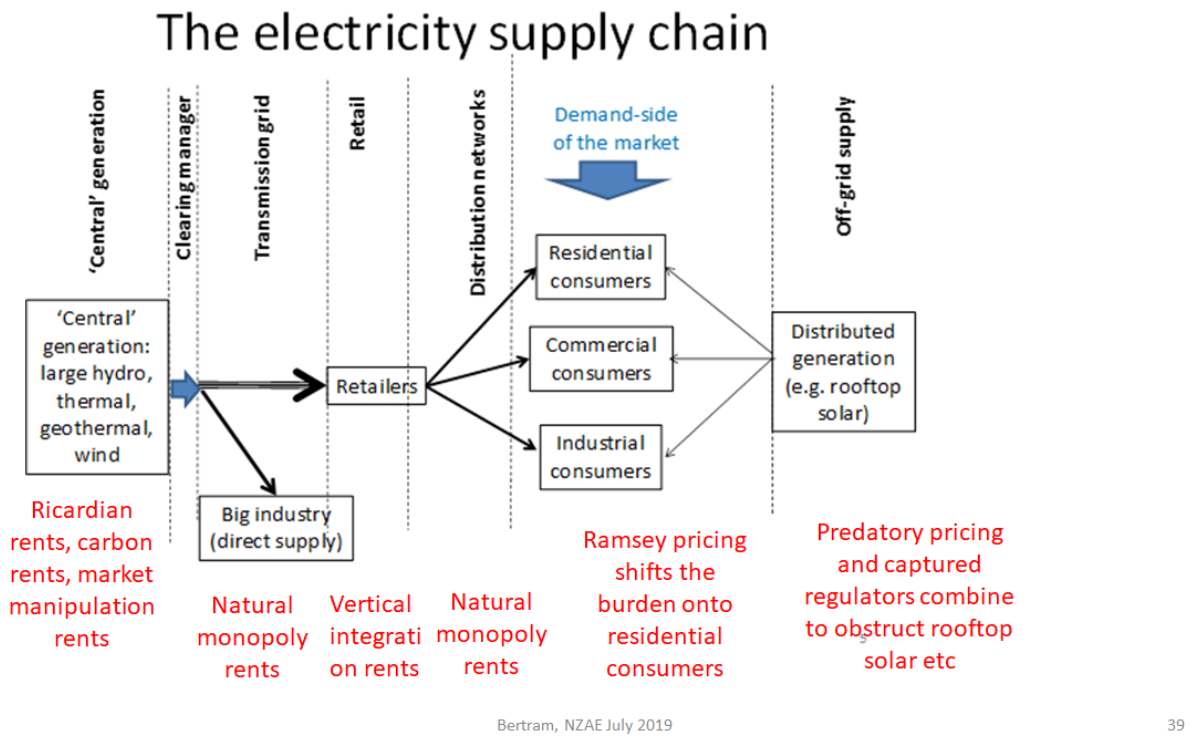
Source: Brian Perry, *Household incomes in New Zealand: Trends in indicators of inequality and hardship, 1982 to 2017,* Wellington: MSD, October 2018, p.90.

Many of the reforms of that time were introduced and justified with the promise that the short-term pain would be more than offset by long term gains, and although those promises turned out to be hollow, they were buttressed by two influential streams of thinking in the Law and Economics literature: the Chicago-school case for rolling back antitrust regulation (Bork, 1978; Posner, 1978; Stigler, 1971) and the public-choice assault on the welfare state and progressive taxation (Buchanan and Tuillock 1962, cf Maclean 2017).

The post-GFC reappraisal of neoliberalism has highlighted concerns about the damaging effects of market power and rent-seeking behaviour on the rate of productivity growth and the distribution of income and wealth in advanced western economies (for earlier worries on this front see Tullock 1975, Parente and Prescott 1999). An important strand in this new literature is a focus on rising markups and the possibility that these reflect the taking of profits that are excessive relative to the benchmark of what quantum of profit is socially necessary to sustain productive endeavour in a capitalist economy..

New Zealand's electricity sector has provided from the outset an interesting case study in the application of the neoliberal programme. The sector was continually shaken up and restructured beginning with corporatisation of ECNZ in 1987, proceeding to Parliament's expropriation of supply authority distribution network assets in 1992, corporatisation and privatisation of distribution, forced divestiture of lines from energy businesses at both wholesale and retail levels, forced breakup of ECNZ's generation portfolio, creation of an

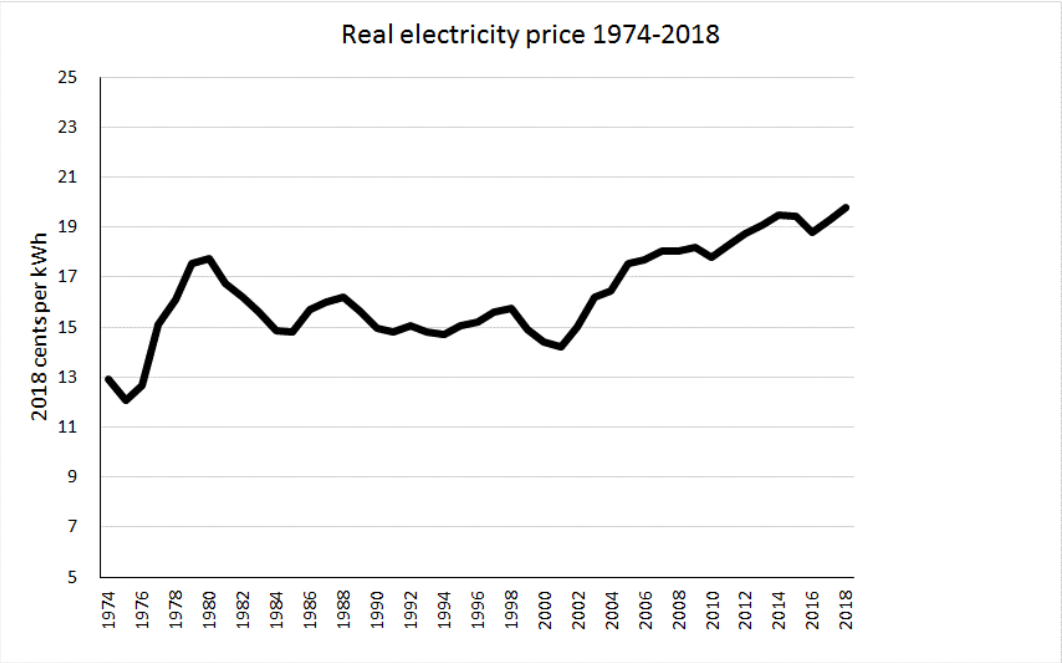
energy-only spot market, and finally the part-privatisation of the remaining SOE generation assets. Along the way Parliament passed legislation to govern both industry structure and the regulatory procedures to be applied by the Commerce Commission. The term "excessive profit" first appeared in the Commerce Amendment Act (No 2) 2001 s.3 and was repeated in the Commerce Amendment Act 2008 s.4, in the "purpose" statement for regulation under Part 4 of the main Act which directed the regulator only to "limit", not to eliminate, excessive profits (Commerce Act 1986 s.52A(1)(d))[1]. As the Commerce Commission subsequently noted in connection with its separate investigation of possible excess profits in electricity generation, "the Commission's analysis, based upon quantitative evidence provided by Professor Frank Wolak, suggests that over a period of some six and a half years the generators have exercised their substantial market power to earn market rents estimated conservatively to be $4.3 billion, which averages to 18 percent of the total wholesale market revenues received by all generators over the entire period. The exercise of market power to earn market power rents is not by itself a contravention of the Commerce Act, but is a lawful, rational exploitation of the ability and incentives available to the generators (Commerce Commission 2009, p.6, emphasis added.)

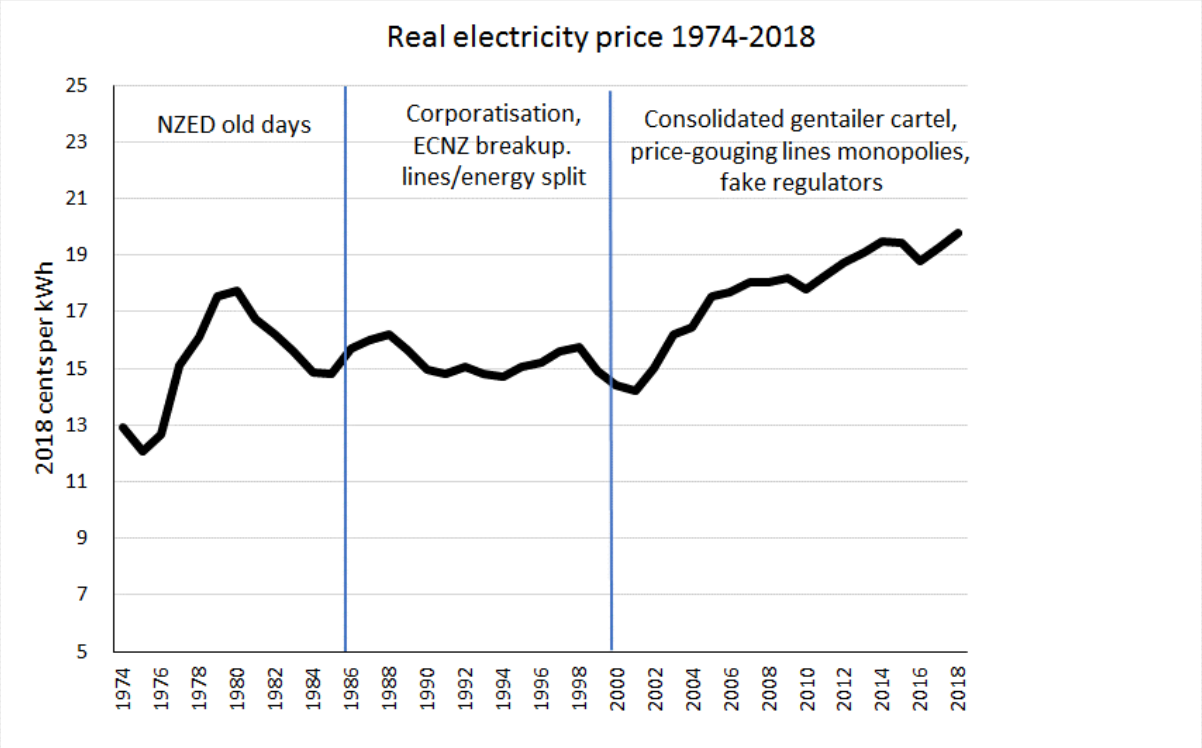


Since the onset of reform, the industry has recorded three clear-cut trends:

[1] Elementary economics texts teach that the profits of a firm are always and everywhere limited by the demand curve; thus profit-maximising monopolists hit a limit at their profit maximum. The Commerce Commission operating under Part 4 of the Commerce Act can ensure that monopolists are "limited in their ability to extract excessive profits", as the Act puts it, by doinbg nothing at all.

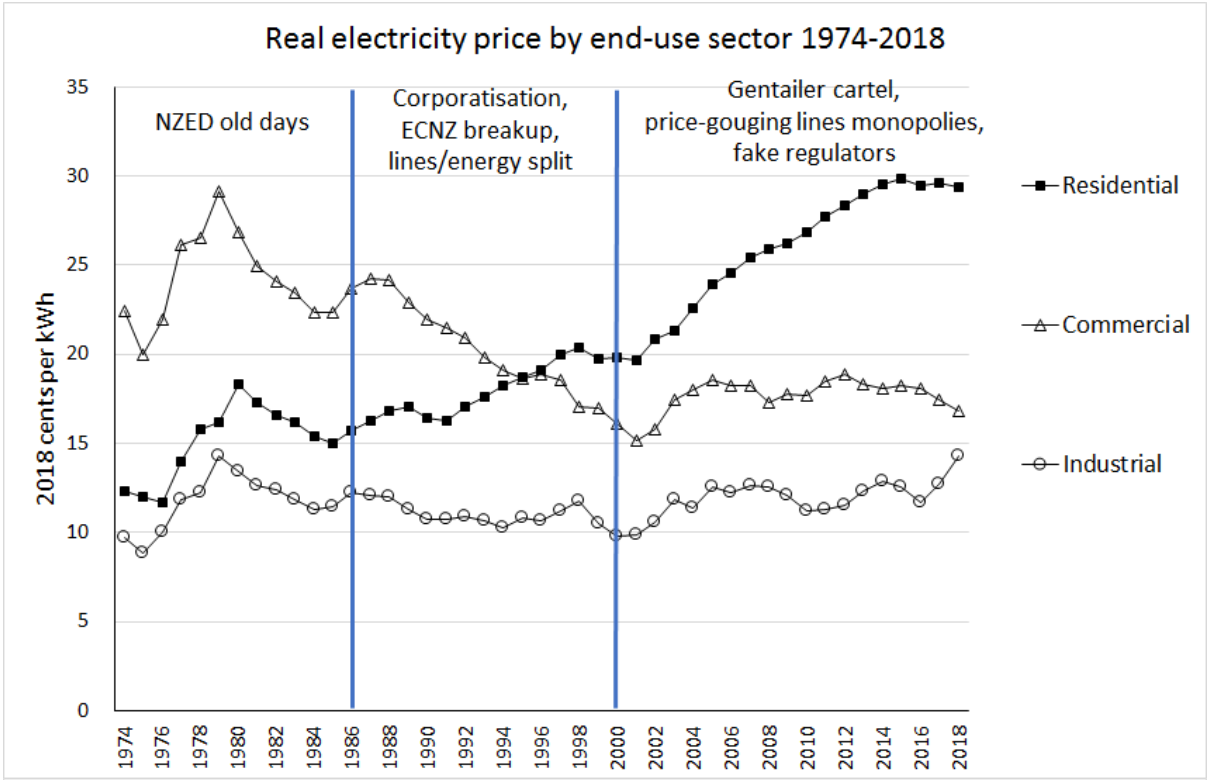
- Rising price for residential consumers while commercial and industry users were protected and favoured; overall average price driven up since 2000 mainly by rising residential prices.

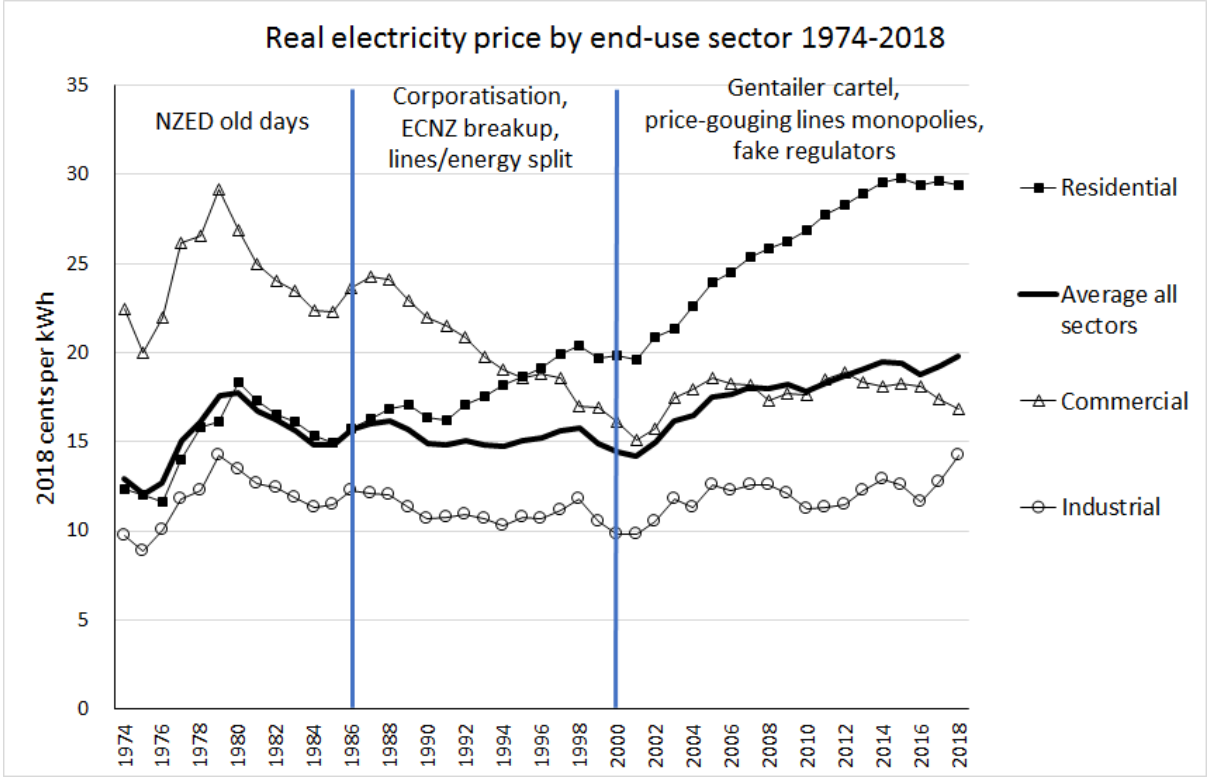




[Workbook 'Average price calculations' sheet 'Dollars by sector'.]

Sources: Prices by sector from MBIE energy price tables downloaded 30 June 2019 from https://www.mbie.govt.nz/assets/Data-Files/Energy/energy-quarterly-statistics/q1-march-2019/f0208a8a33/Prices.xlsx . Quantities from MBIE "Data tables for electricity" Table 2, downloaded 30 June 2019 from https://www.mbie.govt.nz/assets/Data-Files/Energy/energy-quarterly-statistics/q1-march-2019/fb33c7964a/Electricity.xlsx .





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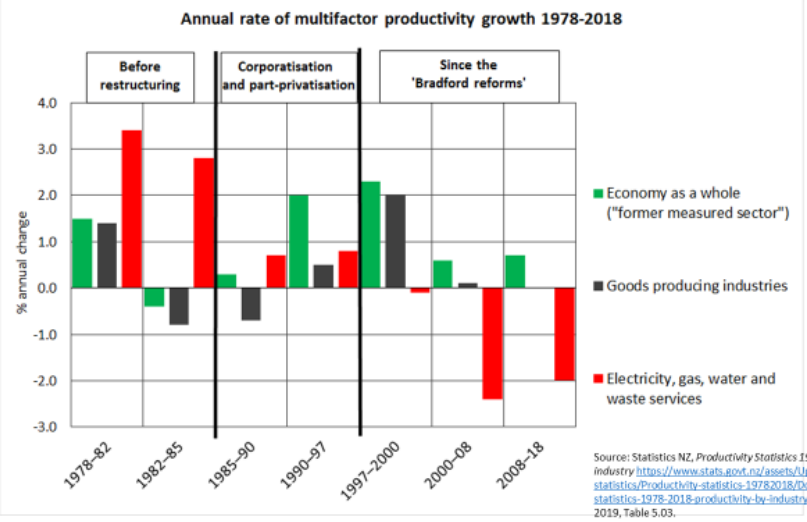
- Falling productivity as the industry's jmarket power was exercised and the resulting rents were dipartly dissipated iin high-paid unproductive staffing and wasteful capital spending: The case for restructuring was pushed hard on the basis of promised efficiency gains. In practice, there is no evidence that these have eventuated. Figures 1 and 2 show the productivity performance of the "electricity, gas and water" (EGW) sector compared with the economy as a whole, with all other measured sectors (Figure 1) and with the average performance of goods-producing industries (Figure 2). The EGW sector had the second-worst performance 1986-2015 on total factor productivity (only the very volatile mining sector performed worse)



Source: Statistics NZ, *Productivity Statistics 1978-2018 – productivity by industry* https://www.stats.govt.nz/assets/Uploads/Productivity-statistics/Productivity-statistics-19782018/Download-data/productivity-statistics-1978-2018-productivity-by-industry.xlsx accessed 20 May 2019, Table 5.03.

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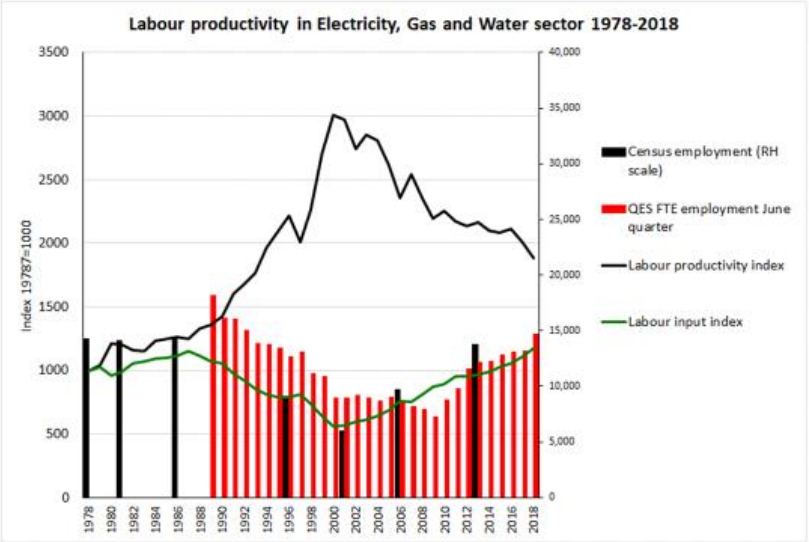

Sources: Statistics NXZ Infoshare tables PRD016AA and PRD014AA.
Quarterly Employment Survey data from Statistics New Zealand Infoshare table QEX019AA.
Census data 1996 on from http://nzdotstat.stats.govt.nz/WBOS/Index.aspx?DataSetCode=TABLECODE8212 downloaded 15 May 2019. Earlier census data from published volumes.

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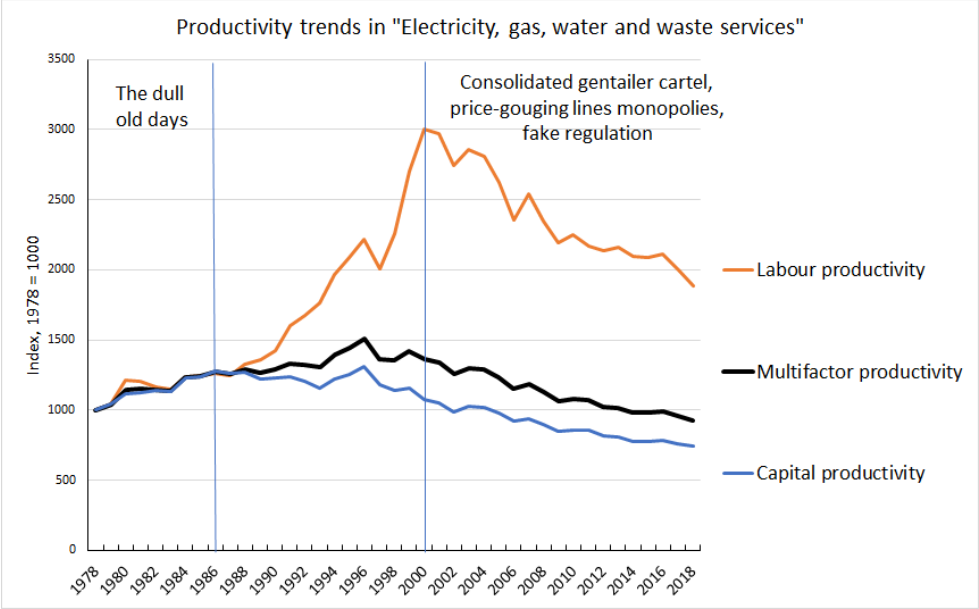
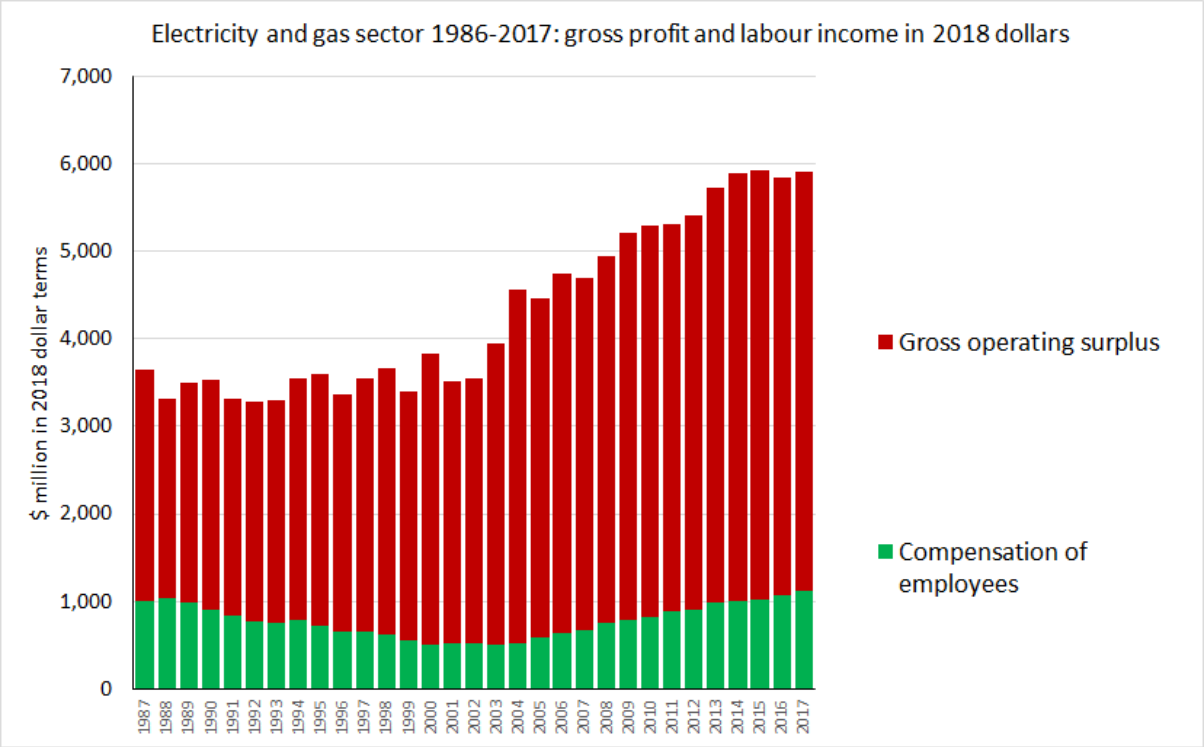
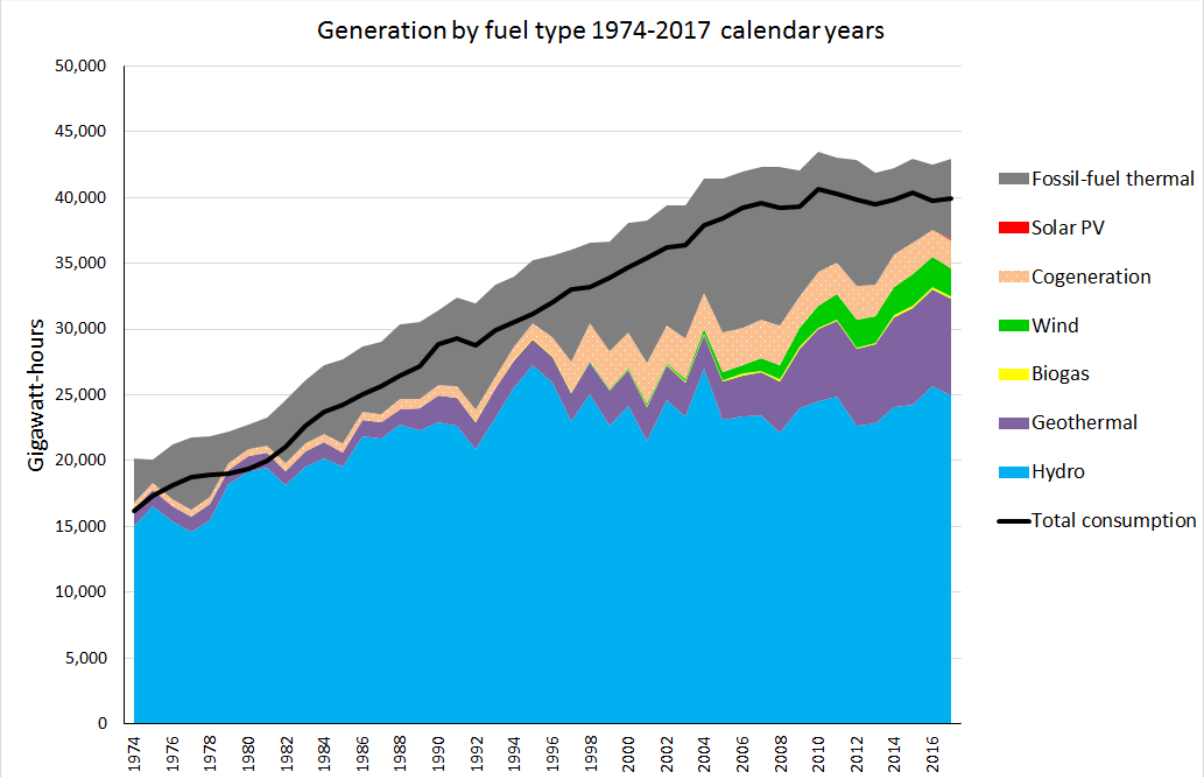
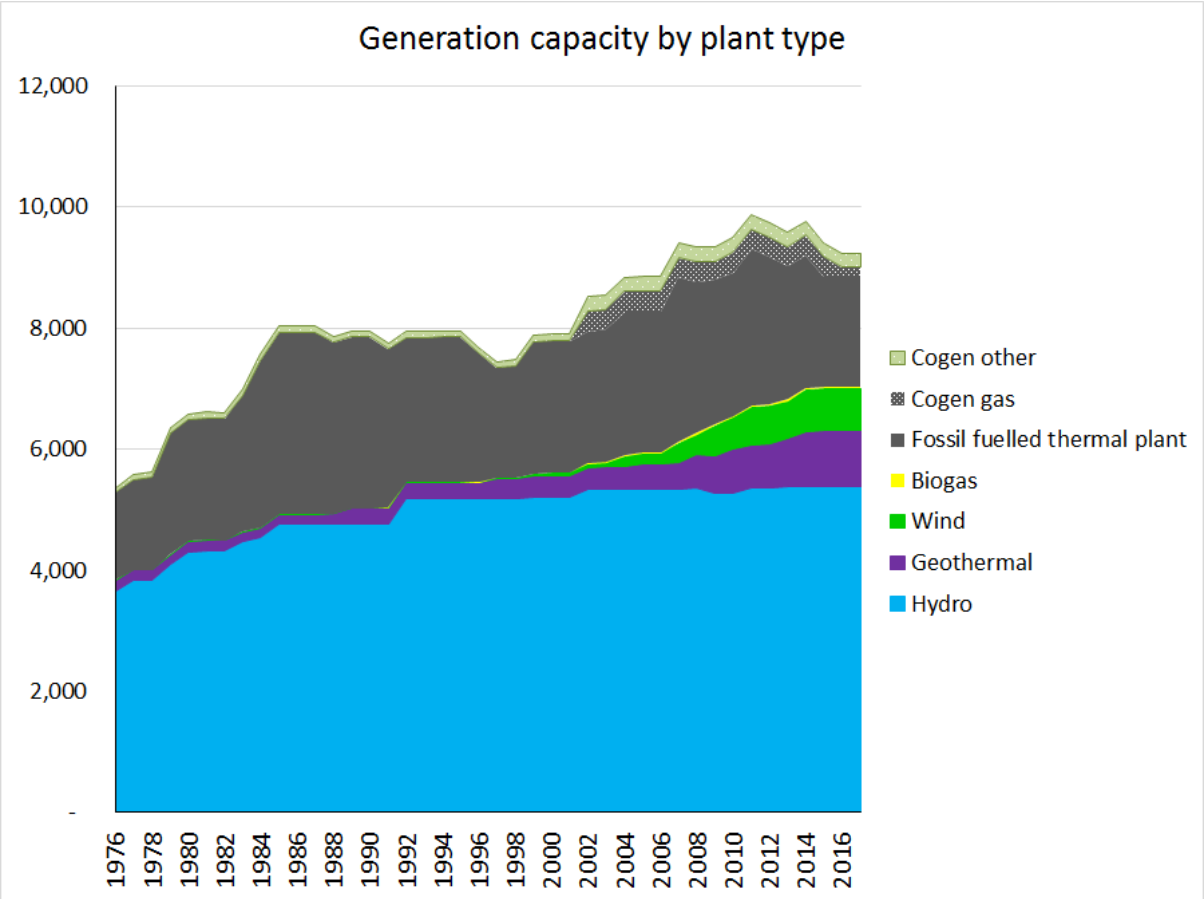


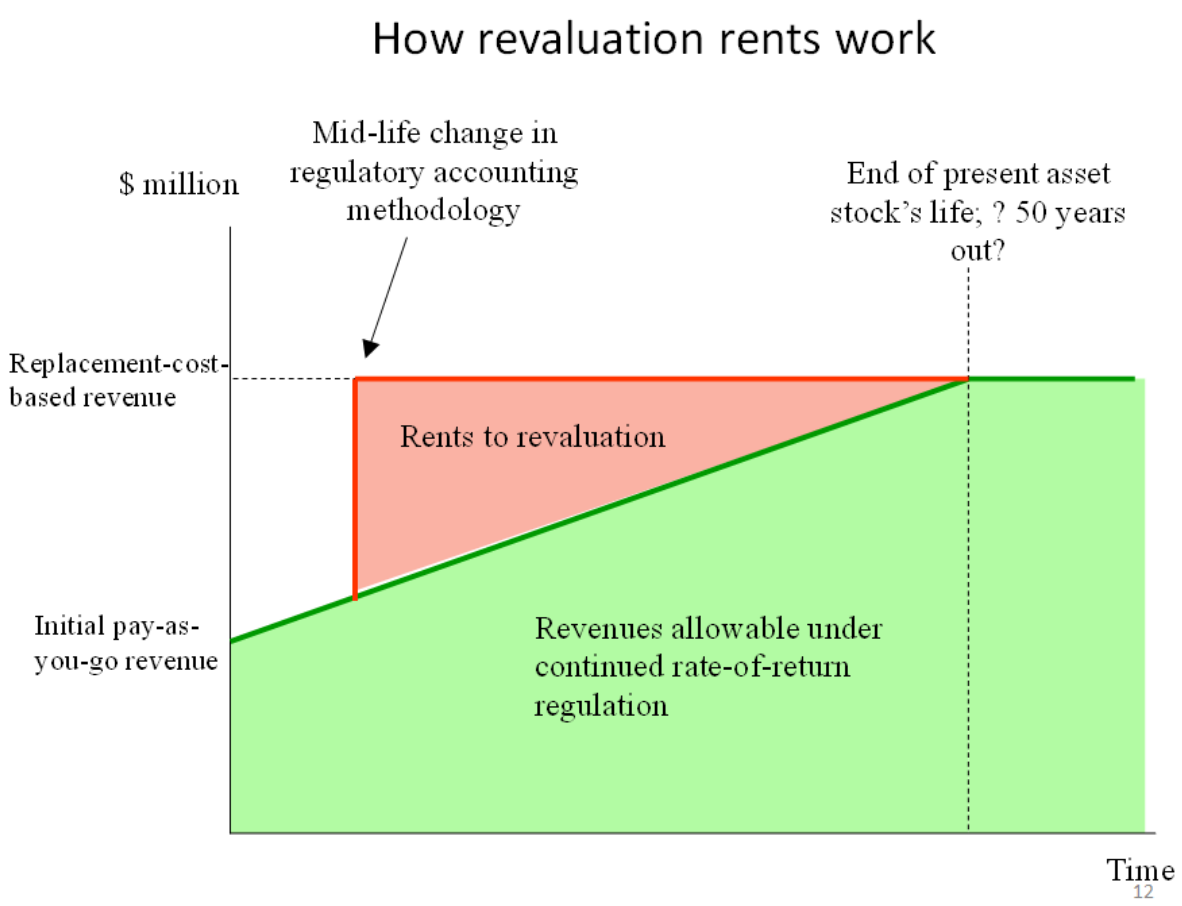
- Very strong profit performance with rich rewards collected by asset owners (and speculators in asset ownership) at all levels.

Looking at the stream of operating surplus, the total since 1986 has been.




Generation by fuel type 1974-2017 calendar years
Gigawatt-hours
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Fossil-fuel thermal
Solar PV
Cogeneration
Wind
Biogas
Geothermal
Hydro
Total consumption


Generation capacity by plant type
12,000
10,000
8,000
6,000
4,000
2,000
-
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Cogen other
Cogen gas
Fossil fuelled thermal plant
Biogas
Wind
Geothermal
Hydro



Of this how much has been excess attributable to market power?

The gentailers have booked $11 billion of revaluations since 1996. That suggests an outer limit for excess profits. At a 10% discount rate you would be looking at $1.1 billion p.a. of annual expected profits over and above what would have returned a market return on historic cost. At 5% it would be $550 million p.a. Back in 2013 when the "single buyer" proposal was in circulation, estimates of the potential savings to consumers if excess profit was squeezed out of the gentailers ranged between $700 million and $1.2 billion.

The share prices of the MOM gentailers rose sharply between February 2014 when the single buyer proposal was live, through to April 2015 after National had won the election; the shares then dropped back a bit by late 2015. Mercury, with 1.4 billion shares outstanding (Annual Report 2014 p.78) saw its share price move from $2 (implying a market valuation of $2.8 billion) in February 2014 to $3.50 (valuation of $4.9 billion) in March 2015 before settling back around the $3 mark (valuation $4.2 billion) since. For that company the defeat of the Labour-Greens policy was worth $1.4 billion.

Over the same period Meridian went from $1.50 per share on 2.563 billion shares (=$3.8 billion)(at August 2014 – Annual Report p.124) to $2.50 ($6.4 billion) in early 2015, dropping back to $2.20 ($5.6 billion) in mid 2015 and then rebounding above $2.50 by 2016. So there was $1.8 billion of market valuation gained there.

Genesis floated at around $1.70 in May 2014 and rose following the election to $2 on a register of 1 billion shares – around a $300 million gain.

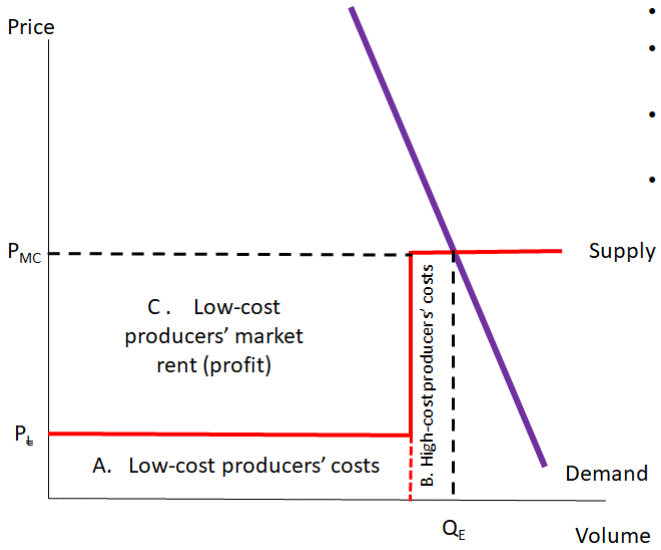
Contact Energy was trading around $5.50 for 733.3 million shares (Annual Report 2014 p.69 note 6) in mid 2014 (4.0 billion) and rose to over $7 for 733.4 million shares (Annual Report 2015 p.59 note 5) in early 2015 ($5.1billion) before dropping back to around $6 in mid 2015 ($4.4billion). (Since then it drifted lower but is now between $7 and $8 for 716 million shares). So there was $400 million - $1.1 billion of value affected there – say $500 million.

So there was $3.5 – 4 billion of market cap at stake on the 2014 policy, consistent with annual profits around half a billion – but the market even at the worst point probably discounted the probability of Power NZ getting done.

Meantime the distribution networks have booked $4.5 billion of revaluations – suggesting between $225 million and $450 million of excess. Back in 2005 Dan Twaddle and I estimated annual excess of around $200 million.

The orders of magnitude are thus up to $1.6 billion of annual revenues collected from electricity consumers and users over and above the level required to sustain the industry - roughly one-quarter of the total revenues of about $7 billion.

Marginal-cost pricing implies large rents for low-cost suppliers such as the hydro generators. Those rents are immune to competitive pressures – their capture and redistribution requires policy intervention by taxes, long-term contracts, expropriation or something along those lines. At present the gentailers are asserting and exercising a de facto property right to water.



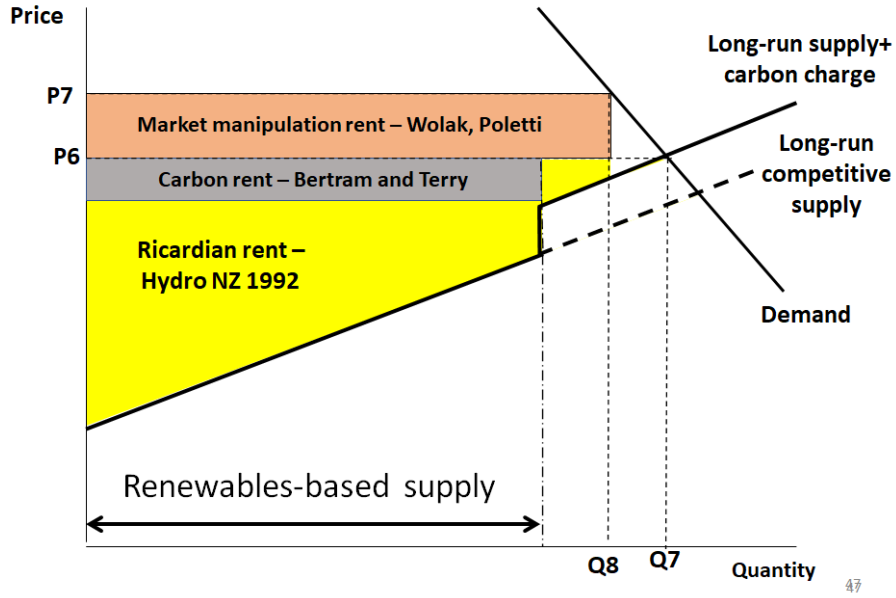
- The total cost of supplying quantity Q_E is (A + B)
- The total revenue from selling this quantity at the marginal-cost price P_{MC} is (A + B + C)
- Area C is pure rent collected by the owners of the low cost plant
- So which is the "true cost" - (A+B) or (A+B+C)?

Average-cost pricing (NZED) → Happier consumers

Marginal-cost pricing (Treasury) → Less happy consumers

Manipulation of that market margin is strategically central to the conduct of the big gentailers: keeping the marginal supply price high by preserving market share for fossil fuels at Huntly and Stratford, while keeping the demand curve pushed to the right by concessionary contracts to large users such as Tiwai Point.

With both a carbon charge on non-renewable generation and market manipulation:



I turn now to the distribution networks.

Updating our excess profit estimates

Bertram and Twaddle (2005) applied a model proposed by Lally (2002) to measure excess earnings of electricity distribution businesses (EDBs), and this section updates their results to the year ended March 31 2018. The model compares three revenue paths year by year, starting at 1992 when the Energy Companies Act was passed.[2] The three paths are:

1. The actual path of revenue as disclosed by the lines businesses starting with March year 1995, carried back to 1992 using the "gross margins" reported by the former electricity supply authorities.
2. A hypothetical path that network charges would have had to follow if a regulator had utilised the "building-blocks" methodology currently used by the Commerce Commission, with revaluations of the asset base allowed to occur and counted as income (capital gains) accruing in the year of revaluation, meaning that to keep total

[2] The reason for starting at this point is that some of the electricity supply authorities began revaluing their assets in anticipation prior to their actual corporatisation, and these revaluations are now included in the analysis (they were excluded from Bertram and Twaddle 2005). Nillesen and Pollitt (2011) used the same data.

revenues on a warranted path, network charges must be sharply reduced – for example, by rebates to customers.

3. An alternative hypothetical path that network revenues would have been allowed to follow had regulation been imposed from 1992 on using the building-block model with assets valued at historic cost, along the lines of US regulation since the *Hope* decision in 1944.

Excess earnings are the amount by which the actual revenues collected exceed the two warranted revenue paths. It is important to note at the outset that the regulator is assumed to be targeting total revenue, without seeking to control how the resulting charges are allocated across customer groups; the issue here is not, therefore the extent to which the charges imposed on residential consumers, for the benefit of commercial and industrial users, may have exceeded what would be a fair and reasonable share of total lines charges.

The formulae used to calculate the two hypothetical revenue streams are as follows:

Warranted revenue stream 1:

$$R_t^{W1} = C_t + D_t + T_c(R_t^{W2} - C_t - D_t) - REV_t + kA_{t-1}^{RA} \quad (1)$$

Where R_t^W is warranted revenue

C_t is operating costs exclusive of depreciation and interest

D_t is the depreciation on the revalued asset base at start of the year, A_{t-1}^{RA}

T_c is the company tax rate

REV_t is revaluations of assets during the year

k is the warranted rate of return on the asset base (e.g. the WACC)

Then excess earnings are given by

$$Excessprofit_t^1 = R_t - R_t^{W1} \quad (2)$$

where R_t is actual revenue disclosed for the year

Warranted revenue stream 2:

$$R_t^{W2} = C_t + D_t + T_c(R_t^{W2} - C_t - D_t) - REV_t + kA_{t-1}^{HC} \quad (3)$$

where A_{t-1}^{HC} is the historic-cost asset base calculated as cumulative actual capital spending minus depreciation

and $$Excessprofit_t^2 = R_t - R_t^{W2} \quad (4)$$

To calculate the three revenue paths in nominal terms, data has been assembled from the annual information disclosures which all EDBs have been required to furnish since 1994, supplemented by individual supply authority information from the electricity statistics published annually prior to that time.

Having calculated excess profit year by year in nominal terms, the resulting series were deflated to 2018 prices using the Consumer Price Index, and then cumulated over the twenty-six year period to give an estimate of the total wealth transfer from electricity purchasers to EDBs. To illustrate the range of possible estimates, the excess earnings have been added up using two procedures. The first simply adds up the annual figures, without compounding. The second compounds each year's excess compounded forward at some discount rate.

Tables 1 and 2 present two sets of results from these calculations[3]. In Table 1 the cost of capital used is the WACC calculated in Bertram and Twaddle, extended to 2018. This lies significantly below the WACCs used by the Commerce Commission and advocated by industry lobbyists. In Table 2, therefore, 2% is added to the WACC used for Table 1 and the calculations are repeated.

The two alternative methodologies for calculating warranted revenues give outcomes that differ dramatically from year to year, but cumulatively give pretty much identical answers. In Table 1, using the Bertram/Twaddle WACC, over the twenty-six years roughly $8.6 billion of excess charges have been extracted from customers. If a 5% interest rate is used to compound the resulting potential claw-backs, the compounded total comes to around $16 billion plus or minus a billion.

Table 2 uses a higher WACC to obtain less dramatic results. Cumulative undiscounted excess earnings now total around $5 billion, and compounding the annual excesses forward at 5% raises this to $10 billion.

In further sensitivity testing, the WACC was raised further until cumulative excess earnings were reduced to zero; this required raising the WACC used in Table 1 by over five percentage points.

[3] This is an update, with some revisions, of Table 10 in Bertram and Twaddle 2005.

Table 1: Estimates of excess profits of EDB, 1992-2018

	1	2	3	4	5	6	7	8
	Warranted revenue version 1 with revaluations allowed	Warranted revenue version 2 using a historic-cost asset base	Actual disclosed revenues	Excess earnings version 1	Excess earnings version 2	Excess earnings version 1 compounded to 2018 at 5%	Excess earnings version 2 compounded to 2018 at 5%	WACC used
	$ million at 2018 prices							
1992	1,126	1,259	1,083	-43	-176	-153	-658	9.04%
1993	1,093	1,227	1,142	49	-85	166	-302	8.05%
1994	856	1,142	1,129	274	-13	883	-43	7.16%
1995	10	1,019	1,127	1,117	108	3,432	347	8.62%
1996	1,047	915	1,203	155	288	455	883	8.25%
1997	304	954	1,268	963	314	2,683	917	8.39%
1998	1,445	1,109	1,344	-102	234	-270	652	7.77%
1999	1,502	953	1,387	-115	434	-290	1,152	6.99%
2000	1,464	932	1,381	-83	449	-200	1,135	7.50%
2001	1,179	849	1,400	221	550	505	1,324	7.29%
2002	1,386	939	1,502	116	563	254	1,289	7.27%
2003	270	1,002	1,231	961	229	1,998	499	6.99%
2004	772	1,168	1,464	692	296	1,370	615	6.67%
2005	1,531	1,229	1,515	-16	286	-30	566	7.14%
2006	288	1,203	1,571	1,283	368	2,305	694	6.91%
2007	1,275	1,310	1,610	335	300	573	539	7.28%
2008	1,462	1,195	1,696	234	501	381	857	7.61%
2009	1,338	1,187	1,707	369	520	572	847	6.65%
2010	1,423	1,198	1,725	301	526	445	817	6.39%
2011	1,051	1,180	1,564	513	385	722	568	6.35%
2012	1,471	1,245	1,737	266	492	356	692	5.63%
2013	1,478	1,225	1,656	178	431	227	577	5.13%
2014	1,489	1,359	1,621	132	262	161	335	5.85%
2015	1,701	1,385	1,729	28	344	33	418	5.71%
2016	1,627	1,394	1,746	119	352	132	407	5.04%
2017	1,383	1,410	1,734	351	323	369	356	4.68%
2018	1,585	1,487	1,767	182	280	182	294	4.76%
Totals				8,482	8,560	17,259	15,780	

Table 2: Calculations with WACC increased by 2%

	1	2	3	4	5	6	7	8
	Warranted revenue version 1 with revaluations allowed	Warranted revenue version 2 using a higtoric-cost asset base	Actual disclosed revenues	Excess earnings version 1	Excess earnings version 2	Excess earnings version 1 compounded to 2018 at 5%	Excess earnings version 2 compounded to 2018 at 5%	WACC used
	$ million at 2018 prices							
1992	1,186	1,341	1,083	-103	-258	-366	-962	11.04%
1993	1,154	1,308	1,142	-11	-166	-39	-590	10.05%
1994	918	1,220	1,129	211	-91	682	-309	9.16%
1995	82	1,103	1,127	1,045	24	3,208	76	10.62%
1996	1,129	981	1,203	73	221	214	679	10.25%
1997	392	1,020	1,268	875	248	2,438	725	10.39%
1998	1,544	1,176	1,344	-201	167	-533	466	9.77%
1999	1,607	1,025	1,387	-220	362	-555	962	8.99%
2000	1,579	1,012	1,381	-198	369	-477	932	9.50%
2001	1,294	924	1,400	106	476	242	1,145	9.29%
2002	1,513	1,032	1,502	-11	469	-25	1,076	9.27%
2003	398	1,109	1,231	833	122	1,733	266	8.99%
2004	916	1,294	1,464	548	170	1,084	354	8.67%
2005	1,689	1,356	1,515	-174	159	-329	315	9.14%
2006	448	1,329	1,571	1,123	242	2,017	457	8.91%
2007	1,451	1,440	1,610	159	170	272	305	9.28%
2008	1,651	1,335	1,696	45	361	74	618	9.61%
2009	1,511	1,333	1,707	196	374	304	609	8.65%
2010	1,595	1,342	1,725	130	383	192	594	8.39%
2011	1,217	1,328	1,564	347	236	488	349	8.35%
2012	1,656	1,404	1,737	81	333	108	468	7.63%
2013	1,685	1,409	1,656	-30	246	-38	330	7.34%
2014	1,582	1,444	1,621	39	177	47	226	6.83%
2015	1,886	1,560	1,729	-157	169	-182	205	7.60%
2016	1,797	1,561	1,746	-51	185	-56	214	6.74%
2017	1,520	1,549	1,734	214	185	224	204	6.03%
2018	1,747	1,654	1,767	20	112	20	118	6.29%
Totals				4,890	5,445	10,751	9,830	

Figure 1 plots the three revenue paths from Table 1, and Figure 2 does the same for Table 2.

Figure 1

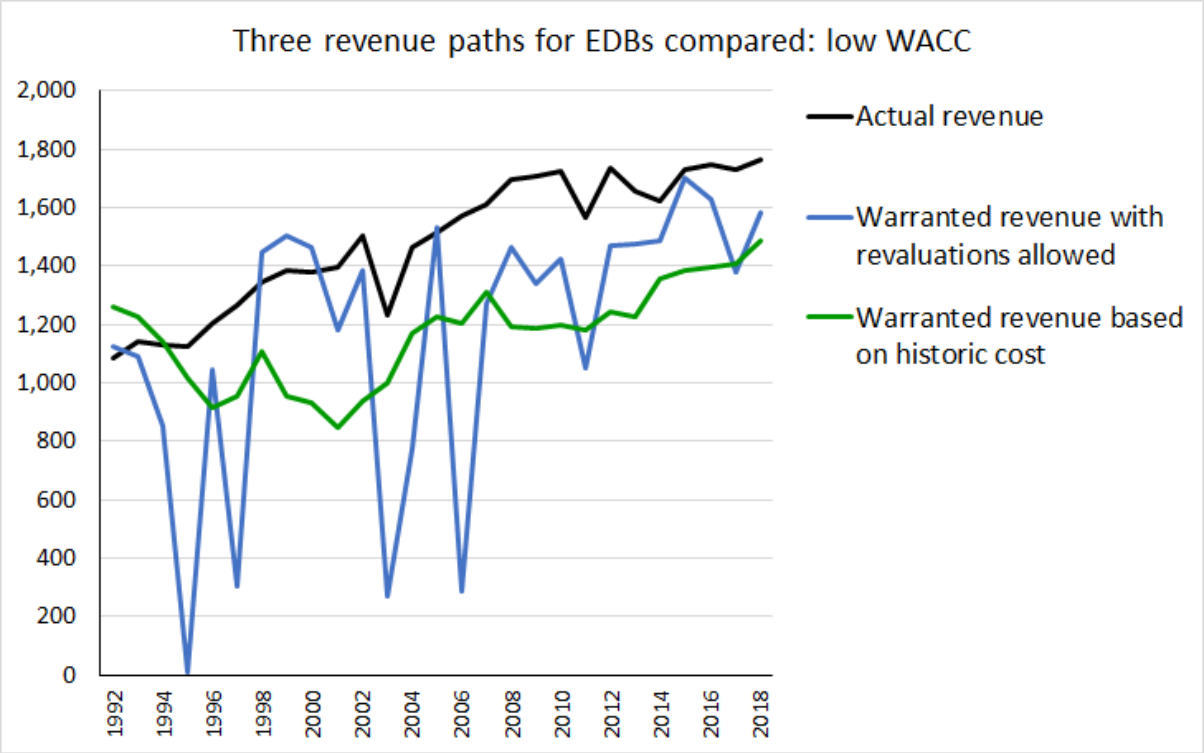
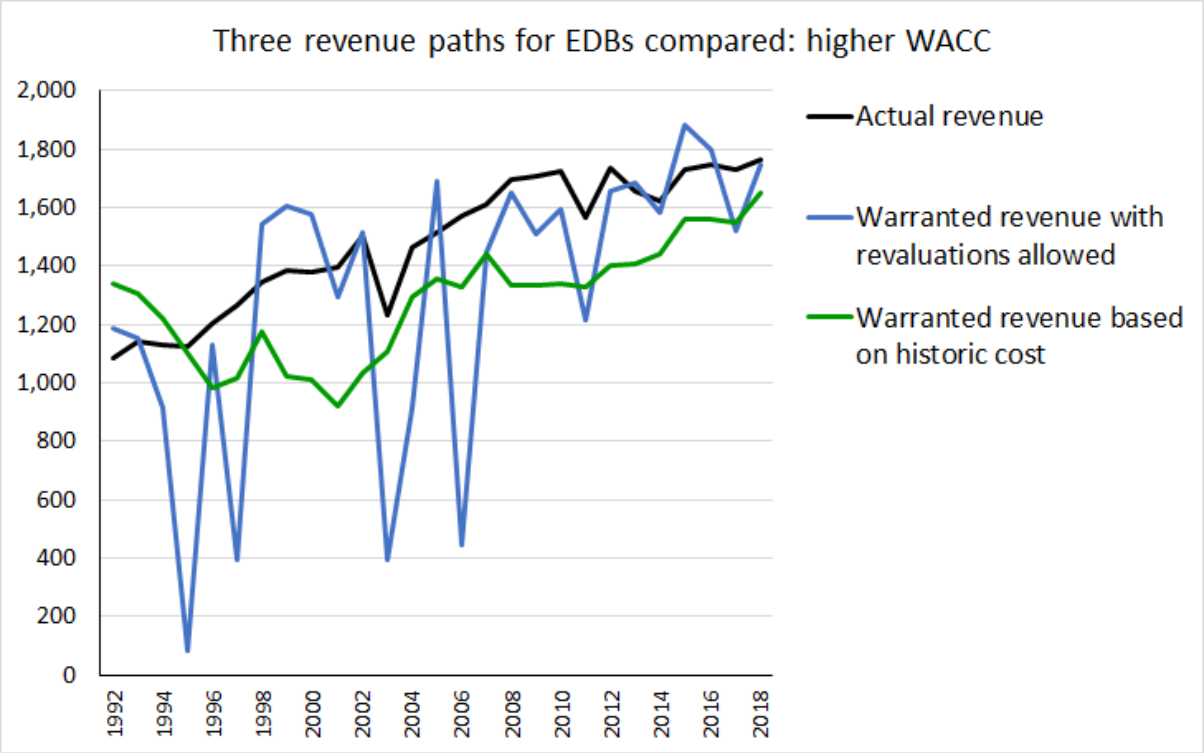


Figure 2



The bottom line is that the regulated revenues allow to the EDBs include excess profits of the order of $200 million per year even after two and a half decades of catchup of the historic-

cost asset base; while the cumulative wealth transfer from consumers and users of electricity stands well in excess of $10 billion. The great bulk of this wealth transfer has been from captive residential consumers who have been victims of a straightforward application of Ramsey pricing principles.

To add insult to injury, there has been a rebalancing of the previous allocation of lines charges away from commercial and industrial towards residential consumers, so that residentials have had to bear not only the consequences of lax regulation of the total quantum of network charges, but also a shifting of the pre-existing burden of those charges.

Conclusion

The basic problem with electricity restructuring in New Zealand has been that the benefits (mainly lower costs from tighter corporate management) have passed to industry owners and players – not to ordinary New Zealanders, who have face inexorably rising price in a deregulated setting. To add insult to industry the biggest price burden has landed on the most vulnerable (hence mot easily exploited) consumers, namely residentials. The Government's incentive to keep prices high in order to secure dividends and taxes from a very profitable industry evidently outweighs the prospect of political gain from relieving the predatory pricing pressure on households/voters. The Electricity Authority has from the outset been explicitly relieved of any responsibility for "equity" outcomes of the electricity market, while the Commerce Commission has operated under a model that is no more than a caricature of US regulatory procedures:

- Regulation of electricity lines started by locking-in high asset values[4] => persistently allows too high a capital charge;
- The Commission defended these before the High Court in 2013 by falsely claiming that no historic cost figures existed[5];
- The regulator places no pressure on firms to improve efficiency: in (CPI-X), the X value is always zero;
- Having already forced consumers to pay for the assets a second time at inflated prices, the Commission is now proposing "accelerated depreciation" to make them pay yet again.

Overall, it's not hard to estimate over $1 billion p.a. of annual excess earnings in the current $7 billion of industry total revenues. There is plenty of room to change assumptions and change the precise figure – but most plausible adjustments are upwards, in my view. There

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4 Commerce Commission, *Regulation of Electricity Lines Businesses Targeted Control Regime Draft Decisions 23 December 2002*, no longer accessible online.

5 See *Wellington International Airport and Ors v Commerce Commission* [2013] NZHC 3289 paragraph 428.

would seem to be clear benefits to consumers from serious political attention to the possibility for squeezing total profits and shifting some of the pricing burden off residential consumers. But as Ramsey long ago showed, revenue recovery is most "efficiently" done where demand elasticity is lowest, and Government is desperate for fiscal revenue that does not have to be defended as "tax". The bottom line is that the much-hyped "long term benefit of consumers" has never really been taken seriously by the policymakers or the Parliament.

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