



# COMPETITION & REGULATION TIMES

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One of the key themes in ISCR's new publication *Alternating Currents or Counter-Revolution? Contemporary Electricity Reform in New Zealand*<sup>1</sup> is that the driving forces of New Zealand's electricity sector in the last 15 years have been little different from those of the preceding 80 years: politics, special interest groups, and water. Developing this, co-author Lew Evans argues that the physics, economics and politics of electricity share one common feature: their sensitivity to hydrology. Electricity prices set in New Zealand's wholesale electricity market provide real-time forecasts of what future rainfall is worth – but not all electricity customers value this information equally. And there are lessons here for managing water more generally.

Until the 1990s electricity was produced by a government central-planner that built capacity according to estimated forecast electricity requirements, which were usually independent of cost or price. This approach produced periods of excess capacity (when industries that would make up the deficit were actively sought) and periods of under-capacity (when shortages would arise). Shortages were managed by involuntary power cuts, imposed mostly on households. Imbalances in supply and demand arose because of mis-estimation and because of the subsidised electricity production and consumption of the period. But even without this subsidisation and mis-estimation there would have been variation in capacity, because of the variation in water availability that is intrinsic to New Zealand. There is little that can be done about New Zealand's volatile river inflows and limited hydro storage; and so our institutional

arrangements should allow us to make best use of these limitations.

### Imperfect market forces

The market-based system in place since 1996 allocates the responsibility of water-shortage management quite differently. Electricity users now conserve water during periods of shortage that are signalled by high wholesale electricity prices. So consumers using relatively large amounts of electricity have commensurate incentives to conserve their use of electricity (water) in such times. But households – who in aggregate consume some 35% of total electricity production – face prices that do not vary with water scarcity.

Some argue that this is a market deficiency, and there is little doubt that peak prices would be lower if small (household) consumers were price responsive. If they were, then larger consumers would have less of an incentive to lobby for interventions that would lower peak electricity

prices. But the 65% of electricity consumption by non-households leaves room for the management of water scarcity, even if the household sector does not vary its demand in times of water shortage. It is striking, and almost certainly welfare enhancing, that since 1996 households have not suffered blackouts arising from water shortages.

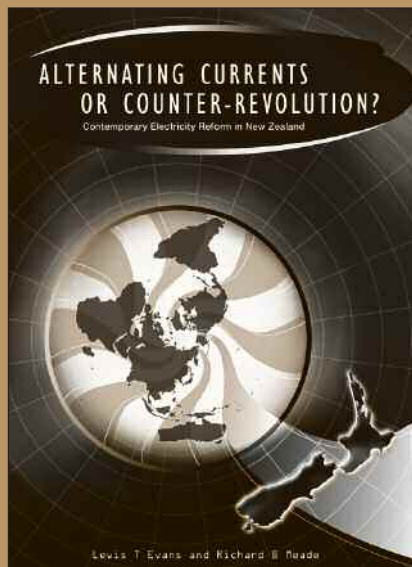
If electricity prices properly reflect the value of water in its next best alternative use (including deferred generation), then society benefits when electricity (water) conservation decisions are sensitive to those prices. But is it in society's best interests that the non-household sector bears the cost of water volatility?

Large consumers of electricity can enjoy larger cost savings by managing shortages, rendering it more economic for them to put in place alternative (back-up) energy

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**Lewis Evans** and **Richard Meade** place New Zealand's current institutional arrangements for its electricity sector within the context of successive waves of economic reform. They compare these arrangements with developments internationally, drawing together lessons for future policymaking both in New Zealand and overseas. *Alternating Currents or Counter Revolution?* is a work of political economy that carefully analyses the interplay between technology, economics and politics that has at different times driven the sector.

*Alternating Currents or Counter Revolution?* addresses topical themes in electricity reform such as:

- What can be learned from 20 years of electricity reform in New Zealand, and the contemporary experience of other countries?
- Does electricity sector liberalisation help politicians, power companies or consumers?
- Will central planning or market forces be more likely to ensure supply security?
- Is regulation or ownership the best way to protect consumers from electricity monopolies?
- Can electricity reforms succeed with centralised transmission planning?

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sources and meters that record and allow management of electricity usage in real time. Households, too, should implement measures to manage high prices – but only if the benefits of doing so outweigh the costs. So, where households have fixed-price contracts, these should include a premium representing the expected cost of water-shortage management by their suppliers. This is a legitimate source of cost differential; it may have been influential in the tariff rebalancing that has taken place since the early 1990s and that, for average prices, has advantaged commercial entities.

#### Value not equal to cost

The importance of electricity to households has certainly grown with the proliferation of electronic devices, and the social cost of poor-quality electricity (especially blackouts) is even higher than in the past. Yet the major role of electricity in households is belied by the fact that they typically spend only 3-5% of their total weekly expenditure on electricity and other domestic fuels combined. On items that would more properly be regarded as 'essentials' – such as housing and food – households typically spend around 24% and 16% respectively. Even superannuitants and beneficiaries spend less each week on power and domestic fuel than they do on vehicle-ownership expenses.

Overall, New Zealand households spend less or around the same each week on electricity and other domestic fuels as they do on takeaways, apparel, or overseas travel. Even if all households were to implement the four simple energy-saving measures suggested by the Energy Efficiency and Conservation Authority (EECA), this would shave little more than 0.5% off weekly household expenditures – despite reducing annual electricity demand by around 5%.

There is a consequent disjuncture between the effect (on the market) of a reduction in demand by all households, and the associated benefit to any individual household. A household's cost saving from a significant reduction in electricity use is so small that household responses to price fluctuations are negligible. Without responses to price, price variation has no private or social benefit; rather, it is simply a private nuisance. In these circumstances it is socially desirable that the charge to households be a fixed-price

tariff, even if it contains an 'insurance' premium.

#### Powering down

Nevertheless, there are schemes afoot that facilitate, at ever-declining cost, the management of electricity consumption by small consumers and even by households. Providing that the response is economic, devices such as real-time metering and other electricity consumption management tools will have an important role to play – along with alternative sources of supply.

To be effective, these devices will have to be very low cost. They will also have to allow individual households (and even interior circuits) to be tailored to energy management that not only reduces cost but also provides revenue from the electricity saved. Given competition amongst electrical energy suppliers, these devices will have to be household-specific rather than applicable to groups of households (which is the problem with ripple control). The applicability of these devices to commercial entities will vary with electricity use and business type; their costs and benefits also mean that households will be the last to take them up.<sup>2</sup> But they are beginning to emerge, and their cost is tumbling.

Fluctuations in water availability are an unavoidable feature of New Zealand. A market approach to managing scarcity enables decisions to be taken throughout the economy. It therefore shares the management of water availability among those who are best able to manage it and have the greatest incentives to do so. This is the approach taken by New Zealand's electricity market; it should be considered more generally for the allocation of water.

1 L Evans and R Meade. 2005. *Alternating Currents or Counter-Revolution? Contemporary Electricity Reform in New Zealand*. Victoria University Press. Wellington.

2 C Goldman, G Barbose and B Neenan. 2005. 'Real-Time Pricing as an Optional Service: It's Alive, But Is It Well?' *The Electricity Journal* 1 pp18-28 conclude that real time pricing – an input to electricity management in smaller entities – is not uniformly effective and utilised where it is available, but that entities with particular characteristics benefit and use it.

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# PUTTING THE REAL INTO REAL ESTATE

## look again at your agent's effort

When they're selling a house, owners frequently hire a real estate agent to act on their behalf. But can they be sure the agent is acting in their interests? Recent US research suggests not. René Le Prou reports.

**M**uch like car mechanics or doctors, real estate agents are hired because of their specialist knowledge. The agent knows a lot more about the housing market than the homeowner, and so homeowners hope to make use of this knowledge in order to get the best price possible for their house.

However, the agent's expert knowledge may also work against the seller. A typical real estate contract requires the agent to bear much of the costs in time and effort associated with selling the house; in return they receive approximately 2% of the house's sale price, with their company receiving a similar share. As a result, the incentives of agent and homeowner can diverge.

For example, the agent receives only \$200 of an additional \$10,000 in sale price – which may not adequately compensate them for the time and effort involved. Because real estate agents receive such a small fraction of the extra value of a house, it may be in their interests to promote a quick sale at a lower price, contrary to the interests of homeowners. And precisely because agents have specialist expertise in the housing market, such behaviour is extremely difficult for owners to detect or monitor.

Some recent overseas research has identified an ingenious method for measuring the extent of incentive misalignment in real estate contracts. If agents do act in their clients' best interests, then the prices they obtain should

be indistinguishable from those they get for their own houses, all else held constant. In fact, however, real estate agents in Illinois and Texas receive an average price premium of 3.7-4.5% for their own homes – even after controlling for differing house characteristics and differing real-estate-agent experience. These houses also tend to stay on the market a little longer, suggesting that agents are more inclined to 'go the extra mile' when they are the primary beneficiaries.

While such differences could be attributed to a variety of factors, other features of the data suggest the differences are indeed due primarily to information asymmetries and associated incentive problems. For example, price premiums for agents' own houses and the length of time their houses remain on the market are much greater in areas where there is considerable variety in the style and quality of the housing stock (that is, where agents have the greatest informational advantage). Premiums have also fallen significantly since the growth of internet listings, which suggests that the ability of agents to exploit superior information has declined as that information has become more widely available.

This research confirms the view that incentives lie at the very heart of economics, and that they are the primary mechanism by which agents can be induced to expend effort<sup>1</sup>. As a result, getting the incentive structure wrong can be costly.

The research described above suggests that standard real estate contracts provide only weak incentives for real estate agents to try to obtain the best possible price for homeowners, and that homeowners may need to think twice about the 'super deal' offered to them by their real estate agent.

But the research also raises a number of questions. Could the price premium obtained by agents acting on their own behalf simply reflect the fact that agents are better at selecting houses that have superior intangible qualities unobservable to the researcher? If not, then what explains the persistence of contracts that contain low-powered incentives? And, finally, can the conclusions be applied more generally to markets for other types of experts?

Because most people change houses only infrequently, real estate sales are typically one-shot deals. By contrast, other expert services involve frequently repeat business and their practitioners thus face 'reputational' or 'career' concerns. Such dynamic incentives may be sufficient to discipline agent behaviour.

<sup>1</sup> See I J Horstmann, G F Mathewson and N C Quigley 'Motivating Agent Effort in a Competitive Environment' *Competition and Regulation Times* issue 18 p12.

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# Price regulation and investment: a two-way street



Much of the debate surrounding regulation focuses on investment, because investment is crucial to both prices and quantities in the long run. Regulation continues to evolve as regulators grapple with the challenges of regulating markets that have elements of competition or for which rate-of-return regulation has failed. This has prompted recent research into the impact of regulation on investment. Graeme Guthrie outlines the lessons for regulators and the firms they regulate.<sup>1</sup>

A simplistic view of the world recognizes only rate-of-return and price-cap regulation, yet there are so many variations of these two forms of regulation that it helps to focus on a few key aspects: (1) the freedom the regulated firm has in choosing its investment and changing prices between formal regulatory hearings; (2) the timing of these hearings; and (3) the rule that determines what costs the firm is allowed to recover. Under rate-of-return regulation, the regulator sets prices for every one of the firm's goods and the firm must apply for a price review before any of these prices may be changed; prices are set so that the firm can expect to recover all of the costs it incurs. Under price-cap regulation, the regulator restricts the total price of a basket of goods for a fixed period and allows the firm to set individual prices itself; the price cap is

designed so that the firm can recover "benchmark" costs – the estimated costs that a hypothetical efficient firm would incur. In between these extremes lie a multitude of different schemes for regulating prices.

The relationship between the way in which prices are regulated and the investment behaviour of regulated firms originates from the investment flexibility that firms enjoy. Like all firms, regulated firms use this flexibility to maximize their market value. By affecting the impact of investment on firms' market values, regulation alters the investment choices that firms make. In the long run, this investment influences the quality and quantity of the goods that firms produce.

The most important lessons to be drawn from the literature on regulation and investment are that there is no single combination of regulatory settings that is best in all situations

and that regulating on the basis of simple models of the world may result in very poor performance. The institutional environment and the characteristics of the firm and industry being regulated determine the most appropriate regulatory scheme.

## Cost measures

The cost measure determines how much revenue the regulated firm will be allowed to collect and how risk will be shared amongst customers and investors. If firms do not expect to recover their costs, they will not invest in the first place. Compensating firms for the costs they actually incur is simple in principle, but in practice is complicated by the difficulties external observers face in determining exactly what costs firms incur. However, cost benchmarking exercises are even more complicated, and agreement about the costs

that a hypothetical efficient firm would incur is rare. The best choice of cost measure can be guided by considering a series of questions.

*Does the regulated firm face competition?*

Recovery of actual costs may not be credible if the firm's regulated activities are subject to competition – if demand falls, prices would have to rise in order to maintain the required revenue, but this would lead to a further reduction in demand. If the firm operates in both competitive and non-competitive markets and is promised recovery of its actual costs, it has an incentive to attribute shared costs to the non-competitive markets. Benchmark cost measures, where the firm's price settings are unrelated to its (reported) actual costs, remove this incentive.

*Are there limits on regulatory opportunism?* If the regulator is able to behave opportunistically, such as by preventing firms from recovering the cost of their existing (irreversible) investments, it is important that it be given as little discretion as possible. Otherwise firms, anticipating such behaviour, will either invest in ways that offer some protection against opportunism or will decline to invest in the first place.<sup>2</sup> In either case, investment will be adversely affected. Allowing the regulator to base prices on the costs of a hypothetical efficient firm gives it the opportunity to transfer surplus from shareholders to consumers under the cloak of benchmark cost calculations. In contrast, if the regulator has to allow the firm to recover its actual costs, such transfers will be impossible to disguise (and will be more likely to attract sufficient attention to discourage their occurrence). Therefore, allowing the recovery of actual costs helps protect investors against regulatory opportunism.<sup>3</sup>

*Are good substitutes for irreversible investment available?* If ex post demand information is used to calculate costs (as, for example, occurs during the calculation of benchmark costs), the regulated firm will invest in a way that reduces its exposure to bad news. For example, it may invest in small increments, use technology with a higher salvage value, or simply delay investment. If these possibilities are not too costly for welfare, benchmark costs can be used without significantly degrading welfare. Otherwise, consideration should be given to allowing the firm to recover its actual costs.

How easily can consumers diversify risk? Allowing the recovery of actual costs exposes customers to the risk of demand fluctuations, since then prices will have to rise at future

hearings if demand falls. If customers have much more difficulty than investors in bearing this risk, regulation should favour recovery of benchmark costs, calculated using ex post demand information. The firm's allowed rate of return will have to rise to reflect the extra risk imposed on investors.

*Are capital prices trending downwards?* In industries where construction costs are expected to fall, allowing firms to recover their actual costs gives them an incentive to invest early and 'lock-in' a permanently high rate base that ensures relatively high regulated prices in the future. In contrast, if capital costs are expected to rise over time, allowing firms to recover the replacement cost of their assets can lead to accelerated investment.

**"Regulated firms  
facing competition,  
in particular, need price  
flexibility. If all of their  
prices are set by a  
regulator, their ability to  
respond to competitors  
will be reduced..."**

#### **Other settings**

Regulators will not set prices in a once-and-for-all hearing. Rather, future hearings will be held to raise prices if the firm finds itself unable to cover its costs, or to lower them if the firm earns large profits. The optimal frequency of these hearings depends on the costs the firm is allowed to recover and other industry-specific factors.

If the regulated firm is allowed to recover its actual costs, any efficiency gains it makes will be largely lost at the next hearing. In order to give the firm a strong incentive to make these gains, hearings should be held relatively infrequently. This is less important if some benchmark cost measure is used instead, since

(at least in theory) the firm should be able to keep its efficiency gains even after the next hearing. However, future reviews will inevitably take some notice of past cost savings or they will not be politically sustainable. Hence, infrequent hearings will improve investment incentives regardless of the cost measure used.

Early reviews provide risk-shifting opportunities, which can affect investment incentives. For example, firms that can be bailed out of bad investments by requesting an early price rise have an incentive to undertake excessively risky projects. To reduce these distortions, hearings will have to be scheduled more frequently if the industry is relatively volatile or competition increases the volatility of the regulated firm's environment.

Finally, the ideal scheme delegates as many decisions to the firm as possible, since regulatory lags make direct price-setting a blunt regulatory instrument and firms can respond more quickly to exogenous shocks. Thus, price caps are useful in industries with rapid technological change, volatile demand, and other factors that make regulatory lags especially costly. Regulated firms facing competition, in particular, need price flexibility. If all of their prices are set by a regulator, their ability to respond to competitors will be reduced – either regulatory reviews will have to be scheduled more frequently or there will be more instances where firms require regulatory reviews before the scheduled date.

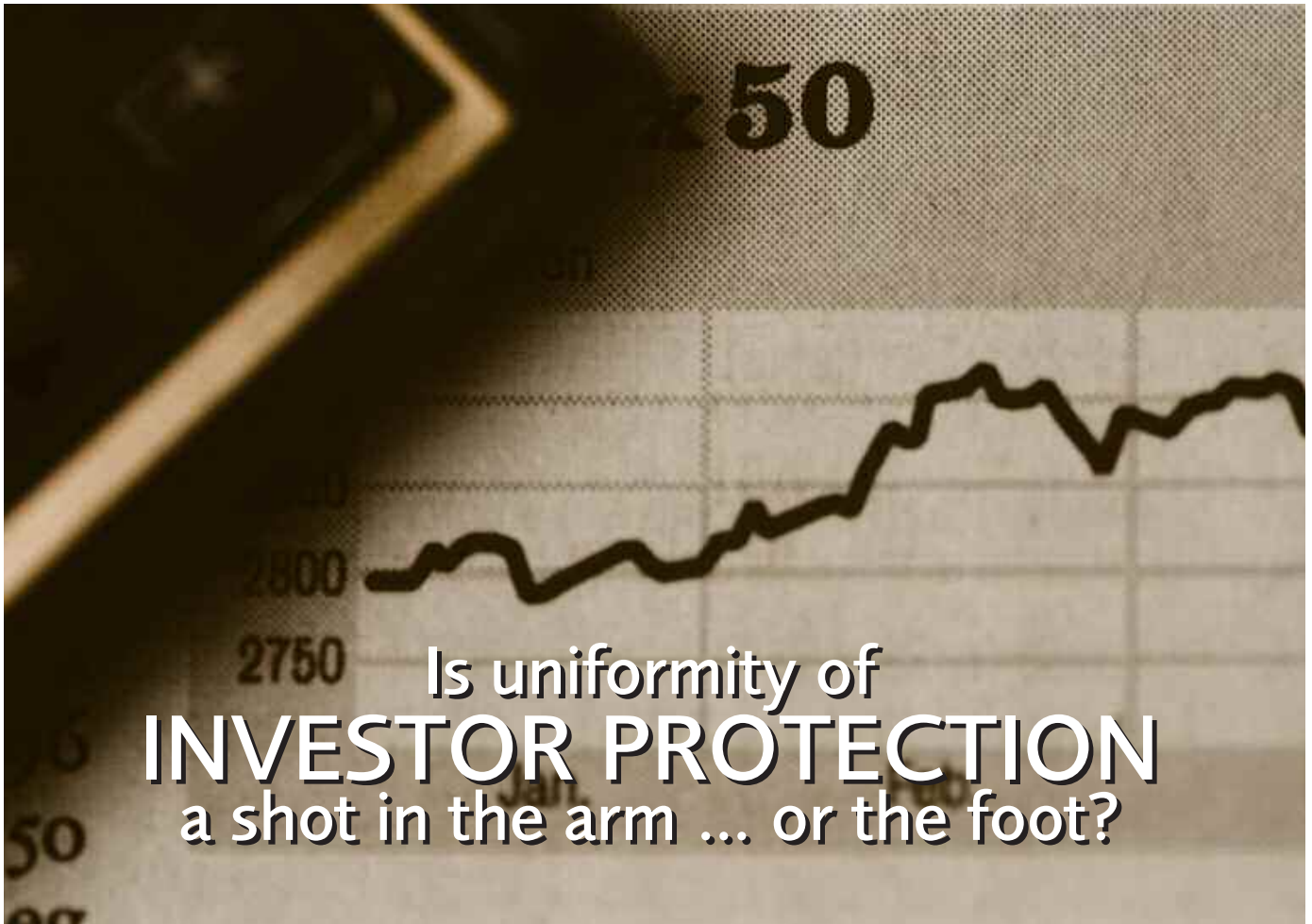
Fitting the various pieces of the regulatory jigsaw together can be difficult, but if good outcomes are to be achieved in the long run, investment considerations should influence the way in which price regulation is implemented.

1 This article is based on a comprehensive survey of the effect of price regulation on investment: Graeme Guthrie, 2006, 'Regulating Infrastructure: The Impact on Risk and Investment' *Journal of Economic Literature* (forthcoming, June). A draft version is available at [www.iscr.org.nz/navigation/research.html](http://www.iscr.org.nz/navigation/research.html).

2 For example, firms will favour expensive reversible technology, invest in small increments, delay as much investment as possible for as long as possible, and so on.

3 Industry characteristics matter here as well. For example, the use of benchmark costs will be feasible if the need for ongoing investment is so great that the regulated firm's threat to cease investing prevents opportunistic behaviour.

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## Is uniformity of INVESTOR PROTECTION a shot in the arm ... or the foot?

A growing body of international evidence suggests that thriving capital markets should include protections for minority investors against expropriation by dominant investors. But does this imply that all capital markets should adopt the same protections? And, supposing they did, would that improve the lot of investors? According to Richard Meade, the answer is no.<sup>1</sup>

**T**hese questions are topical in New Zealand, with proposals for share trading and capital raising on the popular website Trade Me apparently receiving government favour.<sup>2</sup> They follow on the heels of a 2005 back-down on an earlier government move to subject the trading-services provider Unlisted to Securities Markets Act requirements applying to New Zealand's main listed stock exchange NZX. They naturally arouse the interest of regulators keen to distance New Zealand's capital markets from their historical 'wild west' reputation, which some suggest will be revived if the Trade Me proposal proceeds.<sup>3</sup>

Yet the importance of investor protection is easily overstated. Capital markets thrived around the world long (in some case centuries) before the advent of securities regulation. Insider trading laws, for example, are a relatively recent innovation, with the US first to introduce such laws in 1934. France was second in 1967; but most developed countries followed suit only in 1989 (New Zealand in 1988).<sup>4</sup> By many measures, capital markets were actually more developed in 1913

than they were in 1980, with this reversing only recently.<sup>5</sup> And many studies highlight the fact that foreign-investor security holdings – often considered a barometer of capital market integrity – are proportionately higher in countries with relatively weak investor protections.<sup>6</sup>

### One rule rules, OK?

Arguments for the imposition of uniform securities regulations across trading platforms include the importance of limiting investor confusion, the desirability of minimising risks of cross-market contagion, and the need to avoid 'regulatory arbitrage' whereby regulated issuers reduce compliance costs by migrating to less regulated trading platforms.

The 'investor confusion' argument is paradoxical, in that contemporary securities regulation emphasises the importance of continuous and widespread information disclosures. If these disclosures are important, it is because investors of all capacities are presumably competent to understand their trading implications. Yet these same investors are unable to distinguish trading providers that

are subject to investor-protection regulation from trading providers that are not. And if foreign investors are not deterred by weak investor protections, why would they be deterred merely by uncertain protection?

Cross-market contagion is in principle a valid concern, with the possibility of disturbances spreading from less regulated markets to those that are more regulated, and perhaps being caused by a relative lack of regulation in the first place. But the risk of such contagion is also easily overstated. Market crashes are rare events, and co-market crashes are rarer still. Cross-market crashes (from markets for one type of security to those for others) are particularly rare – and the 'flight to quality' and 'flight to liquidity' phenomena illustrate that cross-market events are as often positive as they are negative.<sup>7</sup> Furthermore, analysis of major cross-market events shows they are almost always precipitated by major macroeconomic shocks, not episodes of individual company failures (whether induced by lack of investor protections or otherwise).<sup>8</sup>

In any case, the risk of cross-market disturbances is not clearly increased for



regulated markets by the co-existence of less regulated ones. Theoretical research, consistent with the experience of recent major episodes such as the Asian financial crisis of 1997-1998, predicts that shocks emanating from less regulated markets tend to be transmitted via more regulated markets to other less regulated ones, with the more regulated markets surviving unscathed.<sup>9</sup> Might this suggest that more developed markets should become less regulated, if reducing financial contagion is the aim?

But what of regulatory arbitrage – the possibility that issuers will evade high compliance costs in regulated markets by migrating to less regulated ones, leaving ill-equipped investors at the mercy of the rapacious? New Zealand's experience to date shows this has not in fact materialised – we have not witnessed a mass migration of smaller companies from NZX's alternative exchange NZAX to the less regulated Unlisted. Furthermore, issuers opting for less regulated and/or less liquid and transparent markets bear a cost of this choice in the form of a higher cost of capital. Investors in their securities demand a premium for illiquidity and risk, relative to like securities that are instead liquid and less risky. Issuers must therefore weigh savings in compliance costs against increases in their cost of capital when choosing trading venue: this is true of an issuer choosing between issuing on the NYSE and NZX, as much as it is of issuers choosing between Unlisted and NZX.

Furthermore, if all issuers were to opt for less regulated trading venues when significant portions of investors preferred higher levels of investor-protection regulation, an unmet clientele of investors would result, leaving 'money on the ground' for those issuers willing to meet that clientele's preferences. Investment bankers worldwide spend considerable time identifying and tapping into these unmet clienteles – effectively arbitraging persistent pricing advantages offered by their existence. Such 'functional convergence' in investor protection is increasingly common, with issuers opting into their preferred regulatory regime – whether in New York, London, Sydney or elsewhere – and exploiting the preferences of investors trading there (or bearing a cost for getting it wrong).

#### Regulating to hold back the waves?

This raises an important issue when considering whether or not to extend investor-protection regulation across all of New Zealand's

securities trading facilities. Will this result in all existing trades becoming subject to such protections, or will those issuers and investors preferring less regulatory compliance cost and protection simply take their business elsewhere?

**“Risk-averse investors are likely to be left trading the 'safer' securities that they were already trading without uniform investor protections, thus creating losers without winners.”**

Quite clearly at least some trades will revert to the natural home of trading in most New Zealand businesses – the relatively unregulated over-the-counter (OTC) markets. Only a small subset of New Zealand businesses have listed securities traded on an organised exchange, with the vast majority trading securities by less formal means. These include via company websites, accountants, or word of mouth. If the objective of securities regulation is to reduce the proportion of trading in such non-transparent ways, and to improve liquidity and price discovery in securities trading, then imposing uniform investor protection on all organised trading platforms is likely to be retrograde. Securities watchdogs can regulate exchanges, but they will struggle to regulate exchange.

When there is only 'one show in town' (with a resulting lack of competition for trades), the case for investor-protection regulation is stronger – although regulation may in fact simply foreclose trading competition. When trading venues face competition from home and abroad, the case for uniform investor protection is weak. Indeed, it risks denying less risk-averse investors the centralised trading opportunities they would otherwise enjoy, with issuers who are unable to justify the compliance costs of centralised

trading (in terms of the cost of capital savings) reverting to less centralised trading. Risk-averse investors are likely to be left trading the 'safer' securities that they were already trading without uniform investor protections, thus creating losers without winners.

Finally, even if the case for uniform investor protection across New Zealand's organised trading platforms is considered sound, care must be applied in defining the 'norm' to which uniformity inclines. Differing regulatory approaches are evidenced overseas, with even the US tolerating the relatively unregulated 'Pink Sheets' and OTC Bulletin Board markets alongside the NYSE and NASDAQ. Conversely, stricter US corporate-governance regulations have precipitated a reduction in dual listings in the US by foreign issuers.

Trading activity will find its most natural home, irrespective of where the regulatory boundaries are drawn. Increasingly this is an international phenomenon, and it persists despite moves towards formal convergence in worldwide securities regulation.

- 1 This article is based on G Boyle and R Meade. 2005. *One Size Fits All? Investor Protection Regulation of Centralised Trading Platforms* (available at [www.iscr.org.nz/navigation/research.html](http://www.iscr.org.nz/navigation/research.html)).
- 2 'Government in talks over Trade Me sharemarket' *The National Business Review* 27 January 2006 p1.
- 3 'Trade Me sharemarket proposal crazy' media release by National Party finance spokesman John Key 27 January 2006.
- 4 U Bhattacharya and H Daouk. 2002. 'The World Price of Insider Trading' *Journal of Finance* LVIII(1) February pp75-108.
- 5 R G Rajan and L Zingales. 2003. 'The Great Reversals: The Politics of Financial Development in the Twentieth Century' *Journal of Financial Economics* 69 pp5-50.
- 6 See, for example, E Kelley and T Woidtke 'Investor Protection and Real Investment by US Multinationals' *Journal of Financial and Quantitative Analysis* (forthcoming); and R G Gelos and S Wei. 2005. 'Transparency and International Portfolio Holdings' *Journal of Finance* 60 pp2987-3020.
- 7 P Hartmann, S Straetmans and C G De Vries. 2001. *Asset Market Linkages in Crisis Periods* European Central Bank Working Paper 71 (July).
- 8 G Kaminsky, C M Reinhart and C A Vegh. 2003. 'The Unholy Trinity of Financial Contagion' *Journal of Economic Perspectives* 17(4) Fall pp51-74.
- 9 Kodres L E and M Pritsker. 2002. 'A Rational Expectations Model of Financial Contagion' *Journal of Finance* LVII(2) April pp769-799.

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# WHAT DOES IT COST?

## The risks of output-based subsidy schemes

Subsidy schemes, even those linked to output, expose the provider to significant fiscal risks. Successful management of these risks requires that they be identified. It also requires that they be quantified – a technically challenging task. Glenn Boyle and Tim Irwin reflect on some of the issues that arise in doing this.<sup>1</sup>

**O**utput-based payments are an important tool of infrastructure policy. Sometimes, governments offer 'output-based aid' to subsidise services sold to households. Guatemala, for example, subsidises new electricity connections, while Paraguay is piloting a programme to subsidise new water connections. At other times, governments are the sole source of a private infrastructure firm's revenue. Britain and Portugal, for example, pay 'shadow tolls' to privately financed roads; and dozens of developing countries buy wholesale electricity from independent power providers. In all cases, the government pays only when the firm delivers a service (when a connection is made, a car uses a road, or power is made available).

However, in agreeing to make such payments, the government assumes a liability not unlike that created by taking on debt. When the government commits itself to making payments for only a year (allowing itself the opportunity to decide at the end of the year whether to renew the payments), the fiscal risks are likely to be small. But if the payments are to encourage investment that will provide ongoing services, a government may have to commit itself in advance to

offering the payments for many years – perhaps for as long as the life of the assets used to provide the service. Even in this case, if the amounts of money are small or not subject to much risk, there may not be a strong case for carefully measuring the government's fiscal risks and valuing its obligations. But when the subsidies represent long-term commitments of potentially large and uncertain amounts, a government would be wise to understand the costs and risks associated with its decisions.

Output-based payments come in many forms, as do the risks they present. A selection of these appears in Table 1.

The payment structure associated with output-based schemes also varies. In some schemes, such as connection subsidies, the payment in any year depends only on output in that year. In others, such as access subsidies, the payment reflects not only this year's output but also the cumulative result of previous annual outputs. In addition, subsidy expenditure can be capped or uncapped. Under a capped scheme, the government places a ceiling on the number of outputs it will subsidise. Moreover, the cap can apply to annual or cumulative output.

### Measuring risks

Measuring the risks and costs of output-based schemes is feasible – but also, inevitably, mathematical. Quantifying risk necessarily involves some knowledge and application of probability and statistics; estimating the cost of uncertain payments that occur at different points in time requires asset-pricing techniques from modern finance theory. Nevertheless, most of the important issues are conceptual rather than technical.

At its simplest, the risk associated with output-based schemes can be thought of as the potential volatility of required payments mandated by these schemes. But surprises can be pleasant as well as unpleasant, and simple volatility measures do not distinguish between the two. Instead, measures that explicitly focus on the potential for unpleasant surprises, or so-called downside risk, are more useful. One such measure, known as the excess-payment probability, calculates the probability of payments exceeding some pre-specified level. Another measure, known as cash-flow-at-risk, estimates the maximum payment likely under normal conditions. Both measures are particularly useful if the government's fiscal position is threatened mainly by particularly high payments. To get a full picture of the fiscal risks it faces from output-based schemes, a government can also estimate the probabilities that payments will fall in each of several intervals (see Figure 1 for an example). Table 2 summarises the options.

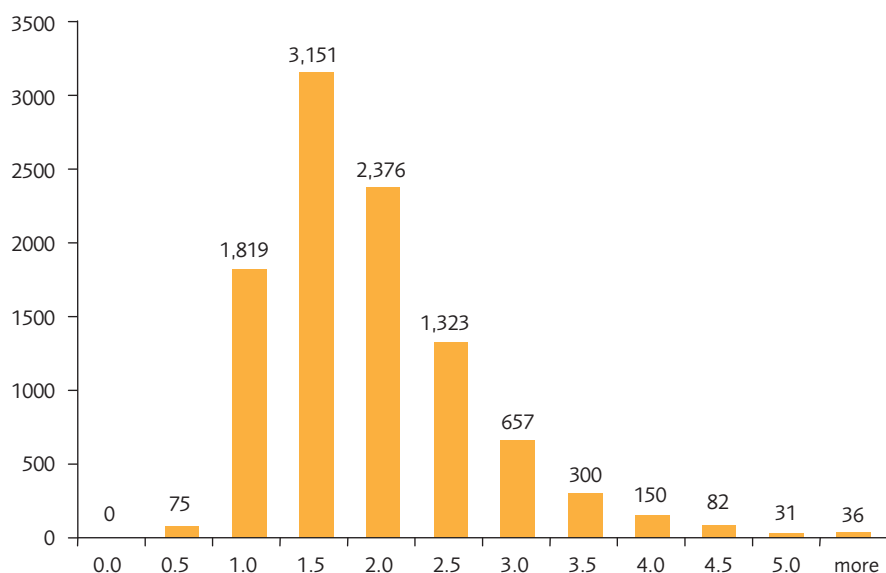
All risk measures require estimation of some component of the underlying probability distribution. In many cases, the best option is to assume that the future will look much like the past and, accordingly, attempt to build up a picture of the distribution implied by historical data. In some cases, when we have reasonable grounds for assuming the annual subsidy payment comes from a well-understood distribution, the desired risk measure can then be calculated using a simple formula. In other cases, particularly when subsidy payments depend on cumulative output or are capped, it can only be inferred from a numerical

**Table 1: Output-based subsidy schemes**

Type	Usage	Source of risk
Consumption subsidies	Water, electricity	Consumption per subsidised customer, number of eligible customers
Vouchers	Education, health	Number of eligible customers, propensity to enrol
Connection subsidies	Water, electricity, gas, telecommunications	Demand for new connections, supply of new connections, number of eligible customers
Access subsidies	Water, electricity, gas, telecommunications	Propensity of customers to maintain access (as well as factors for connection subsidies)
Availability payments	Wholesale water and electricity, roads, and school, hospital and prison facilities	Supply of capacity
Shadow tolls	Roads	Traffic flows



**Figure 1: Estimated frequency distribution for a hypothetical output-based payment**



Note: the bin on the far left, labelled '0.0' shows the estimated frequency in 10,000 trials of payments of zero or less (zero). The next, labeled '0.5,' shows the frequency of payments between 0 and 0.5 million (75). The rightmost bin, labelled 'more,' shows the frequency of payments greater than 5 million (36).

technique such as Monte Carlo simulation. With appropriate modification, each technique can be applied to portfolios of output-based schemes, as well as to individual schemes.

#### Valuing obligations

More-complex issues arise in trying to value the obligations imposed by output-based schemes. One of these issues involves the

appropriate pricing of risk. In general, a subsidy that mandates low payments when the government is flush and high payments when the government is constrained is costlier than one that offers the reverse payment pattern. The standard approach from finance for quantifying this insight – the Capital Asset Pricing Model (CAPM) – has at its core the result that everyone (including governments) holds a perfectly diversified portfolio, so what

matters for the government's fiscal position is simply the return on the overall market of assets. However, to the extent that governments hold imperfectly diversified portfolios, the market return is only a proxy for the appropriate pricing factor.

A second valuation issue concerns the best way of incorporating risk pricing in the calculation of a subsidy's cost. The standard approach estimates the expected payment in each year, discounts each of these at a rate adjusted for risk (using, for example, the CAPM), and then adds all these discounted payments together. However, the complex nature of output-based subsidy payments means that estimation of the discount rate is often infeasible. An alternative approach that bypasses this problem estimates the certainty-equivalent payment in each year (which is the expected payment less a risk adjustment), discounts each of these at a riskless rate of interest, and then adds all these discounted payments together.

For some schemes, the latter approach yields a complicated-looking expression for cost that is in fact simply an application of the growing-annuity formula. In most cases, however, no such formula exists and Monte Carlo simulation must be used to estimate the certainty-equivalent payments before proceeding to the final two steps. For a sufficiently large number of simulations, the estimated cost should be fairly accurate (given, of course, accurate input information about the underlying distribution and the appropriate adjustment for risk).

Quantifying the risks and costs of output-based aid schemes is not a simple task. But the growing popularity of such schemes suggests that the effort is well worth it: making good decisions is easier if the government understands the size of the liability and the nature of the risks.

<sup>1</sup> For full details of these issues, and methods for dealing with them, see G Boyle and T Irwin. 2005. *Techniques for estimating the fiscal costs and risks of output-based payments*, GPOBA Working Paper 5 (available at <http://www.gpoba.org/oba/wps.asp>).

**Table 2: Risk measures for output-based subsidy schemes**

Measure	Description	Advantages	Disadvantages
Volatility of payments	Standard deviation of annual change in payments	Provides government with a single number summarising how variable payments are	Doesn't distinguish between upside and downside risk
Excess-payment probability	Probability that subsidy payments exceed X	Provides government with a single number that helps determine whether risk to government's fiscal position is significant	Doesn't offer much information on the probabilities of other payments
Cash-flow-at-risk	Maximum payment with $\alpha\%$ probability	Provides government with a single number that helps determine whether risk to government's fiscal position is significant	Doesn't offer much information on other possible payments; may be mistaken for maximum possible payment
Frequency distribution of payments	Probability of payments in each of several intervals	Provides government with a picture of the entire range of possible outcomes	The information requires a graph or table to convey; it is not succinct

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# Healthcare lessons for telcos



Similarities between telecommunications and healthcare markets? Not at first glance. One deals in services provided through high-technology equipment; the other in highly customised people-focused services provided by highly skilled human capital. But Bronwyn Howell argues that underlying these superficial differences is a common and very significant similarity.

**B**oth of these markets require 'up front' investment in significant amounts of sunk capital before a single product or service can be made or sold.<sup>1</sup> In telecommunications, the sunk capital is the investment made in high-technology network infrastructures. In healthcare, the majority of the sunk capital relates to the investments made by medical professionals in developing their human capital – between three (nurses) and twelve (medical specialists) years of basic education and training, plus years of experience in their respective practices.

## From one little bundle to another

Given the recent appeals to reconsider local loop unbundling (LLU) in New Zealand's telecommunications as a means of stimulating competition, innovation and product variety,<sup>2</sup> it is apposite to consider the effects that a similar 'unbundling' of access to key infrastructures has had in one of New Zealand's healthcare markets – the provision of maternity care.

Prior to 1990, doctors had a monopoly over the provision of maternity care. State-

funded maternity services formed part of a comprehensive primary healthcare service provided by community-based general practitioners (GPs) with additional obstetric training. These GPs typically had an ongoing professional relationship with families for all their primary healthcare needs before, during, and after the pregnancy. Hospital-based services provided an option for families without a regular GP, as well as specialist services. Hospital midwives, 'supervised' by the doctor, provided care during birth and in the immediate post-natal period.

The Nurses Amendment Act 1990 removed the legal barriers preventing midwives 'unsupervised' by doctors from providing all maternity and post-natal care. Funding changes in 1996 required pregnant women to nominate a 'lead maternity carer' (a doctor or midwife) who would then manage all their state-funded maternity care.

The maternity arrangements effectively 'unbundled' a component of primary healthcare monopolists' comprehensive practice and granted access to it to 'new entrants' – the

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midwives – at prices determined by a third party 'regulator' (the Ministry of Health). As with local loop unbundling, this enabled an element of competition to be introduced in the monopolists' businesses. The GP in effect was required by the law to 'lease' to midwives the right to provide a component of the integrated comprehensive service that, because of the ongoing relationship with the family, had previously been presumed to be the GP's 'right' to provide.

However, GPs were still required to maintain all other functions required to keep the primary healthcare infrastructure operating (akin to exchange housing and 'back office' services provided by telecommunications incumbents). They also had to manage the interfaces between themselves and the 'new entrants' – for example, patient handovers and liaising on pregnancy-relevant medical matters (equivalent to standards management and technology integration in LLU). Midwives were able to 'bolt' their human capital on to the existing primary healthcare infrastructure, just as unbundling entrants 'bolt' their equipment into incumbents' exchanges. As with LLU,

midwives were able to compete with the incumbents using a lower-cost entry model – a three-year training investment compared with seven to ten years for a GP-obstetrician.

#### Been there, seen that

Just as with LLU, maternity 'unbundling' advocates cited increased patient choice, service innovation, and consumer welfare as the inevitable outcomes of the legislative and funding change.

In hindsight, however, the maternity unbundling outcomes appear uncannily similar to those cited by telecommunications unbundling opponents. These critics warn of the effects of inadequate access prices upon long-term capital investment, and the magnitude of transaction costs necessary for efficient interactions between the parties.<sup>3</sup> If the regulated prices do not adequately compensate the incumbent, its investment will be insufficient for maintaining the quality of the underlying infrastructure; there will also be excessive investment by new entrants. The core infrastructure then decays, putting at risk both the incumbent's and the new entrants' investments, and reducing the quality of service that both provide to the end consumers.

#### Who's counting?

The transaction costs of the maternity unbundling arrangements appear to be considerable. Inadequate communication during client handovers, especially in cases where medical conditions necessitate medical intervention, have been implicated in poorer outcomes for both mothers and babies.<sup>4</sup> Neither doctors nor midwives appear satisfied that the regulated prices adequately compensate them for the costs of co-ordinating their activities.<sup>5</sup>

However, larger costs may be seen in the quality of the underlying primary healthcare infrastructure. The number of GP-obstetricians offering maternity services has fallen from around 2000 in 1996 to fewer than 20 in 2005.<sup>6</sup> In most locations, only midwife services are available. Arguably this is because, at the regulated prices, only they can make a worthwhile financial return on their (substantially smaller) sunk capital. Incumbents, unable to make a worthwhile return, are left with stranded assets – their investment in obstetric training, and their

## "If the regulated prices do not adequately compensate the incumbent, its investment will be insufficient for maintaining the quality of the underlying infrastructure..."

years of experience. Consequently, GPs have virtually ceased investing in obstetric capital. In 2005, only six doctors voluntarily enrolled in the University of Auckland's postgraduate diploma of obstetrics and gynaecology, compared with two 75-student intakes a year in the early 1990s.<sup>7</sup>

The flow-on effects of this loss of human capital for the primary healthcare infrastructure are critical. A large and vital chunk of knowledge is now missing from GPs' repertoires. Most newly-qualified GPs will have never been present at a normal birth, and most likely will never have conducted a pelvic examination on a pregnant woman. This leaves them ill-equipped to handle a core component of primary healthcare. One study reveals that many doctors are unable to satisfactorily treat mothers presenting with stressed-out babies or post-natal problems, simply because they have had no training or exposure to it.<sup>8</sup> The core infrastructure has decayed and is not being replaced.

The lessons for telcos from the maternity care 'unbundling' are clear. Competition for the incumbent may lead to short-term gains and a redistribution of the returns in the industry. But there are very real risks for long-term investment. Can we afford to expose core aspects of our telecommunications infrastructure in the same way as we have exposed primary healthcare?

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- 1 Sunk capital differs from other sorts of capital used to produce goods and services because its costs are neither recoverable nor avoidable if economic circumstances in the market change. The 'sunk' assets become 'stranded' because their owners are left with no other opportunities for selling or utilising them to derive an income.
- 2 'Telecom handbrake stalls the nation' *National Business Review* 3 February 2006 p1.
- 3 'More broadband? More competing platforms!' *Competition and Regulation Times* Issue 16 May 2005 p10.
- 4 <http://www.stuff.co.nz/stuff/0,2106,3552445a7144,00.html>
- 5 <http://www.nzma.org.nz/news/media-releases/7nov-maternitycoroner.html>
- 6 Jenny Chamberlain. 2006. 'Baby Don't Leave Me' *North and South* February 2006 p54.
- 7 When incentives were provided, a further 17 enrolled – making it financially viable for the course to proceed. *ibid* p54.
- 8 *ibid* p55.

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of these firms make monitoring more difficult for outside directors.

With the greater perceived liabilities and the stricter penalties imposed by the new Act, directors of these firms may therefore wish to restrict derivatives usage. Our evidence implies that this indeed occurred: the use of derivatives by higher-than-average growth companies fell after the introduction of the new Act.

What can we conclude from this? Although the evidence is certainly not definitive, it is consistent with the view that the 1993 Companies Act had an unforeseen consequence. The increase in perceived personal liability caused directors to most sharply restrict derivatives usage in the very firms in which they can be most useful.

- 1 The authors appreciate the comments of Glenn Boyle on this article. All errors remain the authors' responsibility.
- 2 For more details, see A Marsden and A Prevost. 2005. 'Derivatives use, corporate governance and legislative change: An empirical analysis of New Zealand listed companies' *Journal of Business Finance and Accounting* 32(1) & 32(2) pp255-296.
- 3 See, for instance, J Overdahl and B Schachter. 1995. 'Derivatives Regulation and Financial Management: Lessons from Gibson Greetings' *Financial Management* 24 pp68-78.
- 4 See, for instance, R Breeden. 1993. 'Directors, Control your Derivatives' *Wall Street Journal* March 7 pA14.
- 5 D Jones. 1993. *Company Law in New Zealand. A Guide to the Companies Act 1993* Butterworths New Zealand Ltd.
- 6 S Cahan And B Wilkinson. 1999. 'Board Composition and Regulatory Change: Evidence from the Enactment of New Companies Legislation in New Zealand' *Financial Management* 28 pp32-42.
- 7 W Buffett. 2003. Avoiding a 'mega-cat' *Fortune* March 17 pp50-53.
- 8 'Dairy Board in \$500 Forex Flop' *Independent Business Weekly* 26 August 1998 p1. 'Forex Loss Dogs Dumped Coal Board' *Independent Business Weekly* 12 May 1999 p36. 'Solid Energy's Gargantuan Losses Revealed in Latest Report' *Independent Business Weekly* 13 October 1999 p3.
- 9 It also showed that the mean proportion of outside directors on a board rose from 0.418 to 0.517. This is unsurprising, as the increased responsibilities of outside directors meant that more were needed to carry the load.
- 10 K Froot, D Scharfstein and J Stein. 1993. 'Risk Management: Coordinating Corporate Investment and Financing Policies' *Journal of Finance* 48 pp1629-1648.



# COMPANIES ACT SCORES OWN GOAL



The Companies Act 1993 not only increased directors' fiduciary responsibilities; it also heightened perceptions about their liability. Alastair Marsden and Andrew Prevost examine some consequences of this<sup>1</sup> – and find one that may not have been intended.<sup>2</sup>

**F**inancial derivatives enable companies to hedge or manage foreign exchange risk, interest rate risk, and commodity price risk – and so increase company value by reducing reliance on external capital markets, lowering interest rate charges by debtholders, reducing cashflow variability, and lowering expected taxes.

But not all hedging is beneficial. In the absence of proper oversight by the company's board, risk management may enable managers to invest in projects that enhance their own wealth at the expense of shareholders. And there are many examples of large losses incurred by companies as the result of lax controls on derivatives usage.<sup>3</sup>

Directors have an important role in monitoring a company's derivatives usage.<sup>4</sup> So how might their incentives to perform this role be affected by their obligations and responsibilities, and by the legal environment in which they operate? The revised Companies Act that came into effect on 1 July 1994 (replacing its 1955 predecessor) provides an ideal setting for addressing this question.

## The Act and its implications

The 'new' Companies Act set out the fiduciary role of directors, raised expectations of their duty of care, and increased their perceived risk of liability for bad investment decisions. It was accompanied by considerable public discussion that raised awareness of directors' new responsibilities, including the rights of shareholders and creditors to sue if directors failed in their duties. As noted at the time:

... 'codification' of the duty of care, as well as other duties, will increase directors' potential liability, if through no other factor than 'expectation' [emphasis added].<sup>5</sup>

While the provisions of the Act applied to all directors, the greater responsibilities seemed likely to fall disproportionately on non-executive ('outside') directors:

... [the new legislation] imposes stricter penalties [for inappropriate] oversight and monitoring. Because inside directors cannot monitor themselves, monitoring is undertaken only by outside directors.<sup>6</sup>

The language of derivatives is technical and the techniques used for valuing them are

not for the faint hearted. Consequently, the risks of derivative usage may not be fully understood by outside directors. Even the legendary US investor Warren Buffett has described derivatives as 'financial weapons of mass destruction'.<sup>7</sup>

In New Zealand, leading business newspapers have publicised companies' derivatives losses. For instance, *The Independent Business Weekly* published several articles describing a '\$500 [million] Forex Flop' by the New Zealand Dairy Board and also highlighted large foreign-exchange losses on 'inappropriate' derivatives usage by the state coal company, Solid Energy Ltd.<sup>8</sup>

## What happened?

Given the potential for large losses and heightened public scrutiny of such losses, the Act might be expected to have had a significant effect on directors' monitoring of derivatives usage. To investigate this, we collected data for a sample of companies listed on the New Zealand Exchange (NZX) before and after the Act's introduction.

Our analysis of these data showed that, although the percentage of companies using derivative contracts fell from 45% to 40%, this change was not statistically significant.<sup>9</sup> The new Act appeared to have no discernible overall effect on the incentives and inclination of directors to approve derivatives usage.

However, further analysis of this phenomenon suggested that the fall was significantly greater in the subset of high-growth firms (as proxied by the market-to-book ratio).

Such firms are often characterised by less-transparent activities and greater information advantages for company insiders, leading investors to require a return premium for the perceived greater risk. On the one hand, this should encourage greater use of hedging and derivatives, in order to provide more certainty about internal funds and hence reduce dependence on relatively expensive external funds as a source of capital.<sup>10</sup> On the other hand, the significant information asymmetries

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