ISCR

COMPETITION & REGULATION TIMES

NOVEMBER 2012 ISSUE 39

IN THIS ISSUE

1 Paying the piper's price

3 ISCR board welcomes new chair

4 Bank regulation: upping the ante

6 Will they fly? PPPs and the ultra-fast broadband intiative

8 Smart power pricing … sometimes

10 Good as gold?

12 A new professional regulator on the block

paying *the piper's* price

The question of how (or even whether) to price water is a sensitive subject in New Zealand. The subject is no less fraught in other countries. Yigit Saglam illustrates the effects that an optimal pricing policy could have in mitigating water shortages in semi-arid but agriculturally important southern Turkey.

In most countries, the allocation of reticulated water is considered important enough to have the water-distribution markets controlled (and in many instances owned) by public entities.

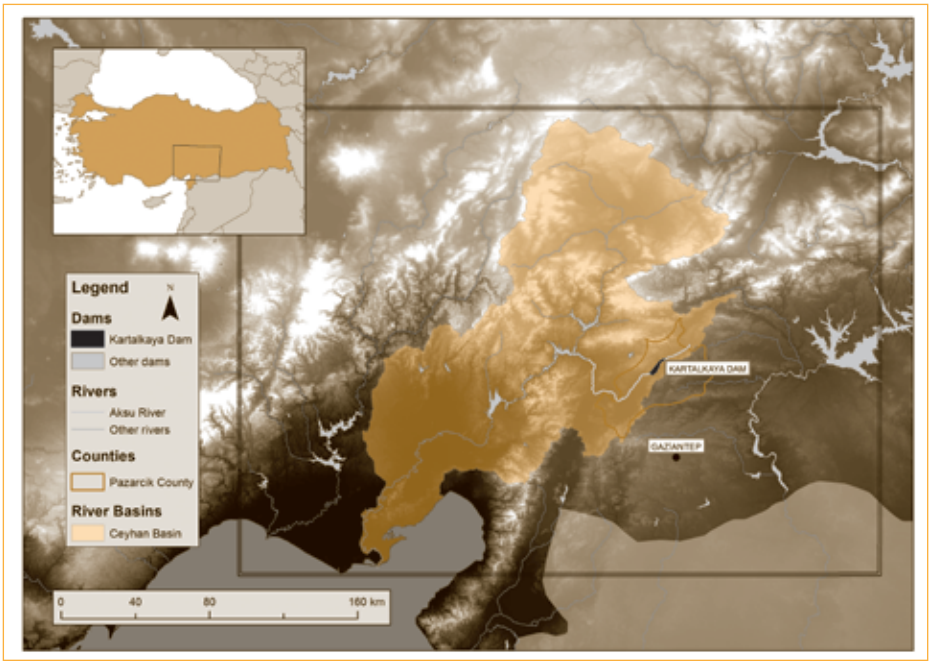
Two features characterise publicly controlled water-distribution markets.

The first is that running a *balanced budget* is a top priority, regardless of whether the controlling entity is the government or a local water authority. In many countries this is enforced by law. To run a balanced budget, a water supplier typically sets a water price equal to the average cost of service. This rule is commonly known as the average-cost pricing rule and it has a crucial drawback: it does not reflect water scarcity. So it is hard for the water supplier to undertake measures that will guard against a potential drought, even though low water prices could lead to high levels of use that are not sustainable in the long run. Furthermore, the water supplier often chooses to cross-subsidise a particular sector (such as agriculture). In many OECD countries, the marginal price of water used by agriculture can be as low as one one-hundredth of the marginal price of water used by households or industry. Even though urban or industrial water use may require higher water quality, which would certainly raise the water cost for these sectors, it seems implausible that this is the main cause of such a high difference between sectoral water prices.

The second is *water shortages*. Many parts of the world (such as sub-Saharan Africa, the Middle East, southern Europe, and parts of the United States including California) suffer from water-supply volatility with temporary but frequent shortages of water. Several OECD countries also experience periodic water shortages because of high levels of leakage in the water-supply systems or inefficient

to page 2

Figure 1: Southeastern Anatolia Region



from page 1

usage induced by inefficient pricing policies. Although low precipitation is often seen as the biggest cause of these water shortages, inappropriate water-pricing systems that cause excessive use of water cannot be overlooked as a contributor to supply volatility.

Tuning the model

My recent study[1] explains the extent to which an optimal pricing policy can help avoid these water shortages. It uses a stochastic dynamic programming model, which is commonly used to solve complex problems defined over multiple periods, to determine the effectiveness of water prices on water shortages.

The model combines several interesting features.[2]

First, the effects of both revenue and resource constraints are considered. The optimal water price for each sector consists of three components: marginal production cost, marginal value of water (which arises from the resource constraint), and marginal value of money (which arises from the revenue constraint).

Secondly, the model has two user groups: households and agriculture. This is because water quality often differs across different user groups, and distinguishing between them is useful for ensuring efficient distribution of water across sectors.

Thirdly, agricultural producers adjust their crop choice according to water scarcity (along with other factors). This could be important for policy analysis because changes in the crop composition will further affect the aggregate demand for irrigation water.

Finally, the water supplier can charge higher prices, if needed, to prevent a possible water shortage in the future. This action would lead to profits for the water supplier, with these being rebated to households and agriculture in proportion to their water withdrawal. As a result, efficiency in water pricing can be achieved while still breaking even.

Data from the real world

The model is calibrated using data supplied by the state waterworks and covers two river basins in southern Turkey. This region is exceptionally important to Turkish agriculture.

Cukurova, located in southern Turkey, is that country's biggest agricultural plain. One of the many reservoirs in the Ceyhan Basin (see Figure 1) is the Kartalkaya Dam, which has supplied water for both irrigation and residential uses since 1972. This dam has a reservoir capacity of 173.173 cubic hectometres, is fed by the Aksu river, and serves a total irrigation area of 22,810 hectares. It supplies water for agriculture to Pazarcik county and water for residential use to the city of Gaziantep. With a population of about 1.5 million in 2007, Gaziantep is the ninth largest city in Turkey and the largest city in Turkey's Southeastern Anatolia Region.

A reservoir is necessary in this semi-arid region because no rainfall occurs during summer, when irrigation is carried out. Throughout the year the volume of water in the dam averages around 92 cubic hectometres (about half of the reservoir capacity). The government releases water for three purposes: tap, irrigation, and flood control.[3] Unlike irrigation use, which occurs only in summer, tap water use shows little seasonality; and between 1984 and 2007 monthly tap-water use increased, because of population growth, from 5 to 10 cubic hectometres. Because of seasonally high levels of inflows and limited capacity, water is also released from the reservoir to avoid overflows.

Inflows are much higher during winter and spring. During the summer, the inflows drop to almost zero because of the lack of rainfall.

What if ...

The model used the data from Turkey to make a structural estimation of tap-water and irrigation demands. My study then examined several 'what if' scenarios.

Under the average-cost pricing rule, it takes on average eight years for the water supplier to run into a water shortage where it cannot meet sectoral demands. By contrast, under the model's optimal pricing rule, water shortages are

to page 3

ISCR Competition & Regulation Times is the newsletter of the New Zealand Institute for the Study of Competition and Regulation, PO Box 600, Wellington, New Zealand. Ph:+64 4 463 5562, fax:+64 4 463 5566, e-mail: iscr@vuw.ac.nz, website: www.iscr.org.nz

The ISCR editorial team for this issue was Toby Daglish, Bronwyn Howell and Tracy Warbrick.

ISSN 1175-2912

ISCR Board *welcomes new* Chair

This issue of the *Competition & Regulation Times* welcomes Christine Southey as Chair of the New Zealand Institute for the Study of Competition and Regulation. In this role she is responsible for chairing the board meetings of the trustees of the institute and the annual meetings of its members. The role is facilitative: the chair does not have a vote unless there is a tie.


Christine Southey

Christine brings a wealth of experience to this role. She has been a partner in a national law firm, general counsel, legal consultant to government and the private sector on energy sector issues, co-owner of a strategic consulting firm, regulator, board member and the chief executive of an industry body tasked with developing rules and regulations to meet the government's objectives for the gas sector. Currently Christine works four days a week as a consultant in the corporate team of Minter Ellison Rudd Watts where her special interest area is the regulation of the energy sector.

The institute's services agreement with VUW enables nominated employees to be appointed as an administrative unit for the institute. Currently Toby Daglish fulfils the role of Research Director, Bronwyn Howell fulfils the role of General Manager and Tracy Warbrick is the Executive Assistant. Christine works closely with this team who have the day-to-day responsibility for delivery of the institute's agreed work programme. She has recently told the board of the institute:

"I have been impressed by the commitment and enthusiasm the team are bringing to their research, teaching, communication and administrative activities. This is vital to the achievement of the Trust's objectives."

At her initial interview Christine warned the institute that she would be an active chair. She has already shown this through her role in overseeing a revamp of the trust deed which governs the institute and amendments to its reporting framework. Christine also has plans to assist the institute to expand the corporate membership base so if you are on her list of business contacts, expect a call!

At their last meeting on 6 September, the board thanked Anton Nannestad for the performance of his roles as deputy chair and acting chair pending Christine's appointment.

Christine Southey was appointed Chair of the New Zealand Institute of Competition and Regulation Board in August 2012.

from page 2

practically non-existent for 100 years. In fact, under optimal pricing the government has to experience a series of significantly low inflows to be unable to meet sectoral demands; but the probability of such an event occurring is calculated to be close to zero.

Another striking result is that, under average-cost pricing, the standard deviation of the number of years without water shortage is around eight years. This implies that the government may run into the water shortage problem as early as the next year, or not for 16 years. The reason behind this high standard deviation is vulnerability to the reservoir's inflows. A low level of inflows causes water shortages, while a high level postpones water shortages for a long time.

I also conducted several counterfactual experiments to assess the effectiveness of optimal pricing relative to alternative demand- and supply-side actions for addressing water shortages. Under the current policy of average-cost pricing, a 1% improvement in irrigation technologies results in about 12 years without water shortages and a 2% increase in average monthly inflows would delay water shortages for about 17 years. The model suggests that optimal pricing would be more effective than these alternatives in avoiding water shortages. However, from a policy perspective it is not a matter of 'one or the other': when used in conjunction with pricing to control demand, the alternative actions offer important options for policymakers.

Downstream implications

An average-cost pricing policy (that is, running a balanced budget) is often viewed as improving welfare because charging prices only to recover costs leaves users more income to spend on other commodities. But when low prices lead to excessive withdrawals and water shortages to the extent that not all demands in a given period can be met, the government may refuse to provide water to agriculture as well as households and this may prove costly to the economy. My model demonstrates the existence of alternative pricing policies which save enough water for the future, distribute water to user groups efficiently, and respect the balanced-budget rule.

1 Y Saglam (2012) 'Supply-Based Dynamic Ramsey Pricing with Two Sectors: Avoiding Water Shortages' (at www.iscr.org.nz/f741,20502/Supply-Based_Dynamic_Ramsey_Pricing.pdf).

2 The model assumes that a benevolent water utility manages the water supply.

3 Water release for flood control has no economic return except for flood prevention.

Yigit Saglam is a lecturer in the School of Economics and Finance at Victoria University of Wellington and a research principal at ISCR.

BANK REGULATION
upping the ante

In the last issue of *Competition & Regulation Times*, Alfred Duncan explored the benefits and costs of bank regulation. Here he focuses on particular features of its implementation in New Zealand. He also suggests a possible way of better aligning bankers' incentives with financial-system safety and capital-allocation efficiency.[1]

The Reserve Bank of New Zealand (RBNZ) regulates bank leverage in accordance with the Basel II capital adequacy framework adopted in 2008. These regulations are designed to ensure that banks' liabilities include a significant share of loss-absorbing capital, ideally reducing the risk of bank failures and lessening the incentive to rely too much on on-demand deposit funding. This recognises the 'moral hazard' problem that occurs when implicit or explicit government guarantees on bank deposits separate bank risk from the interest rates demanded by depositors.

Under Basel II, broad capital requirements are prescribed against different types of assets. Each asset is assigned a risk weight and the bank's equity share of funding must exceed 8% of aggregate risk-weighted assets. In this way, rather than being a constant limit on bank leverage, the leverage limits prescribed by the Basel II framework are dependent on the risk of the assets held by the bank, at least as adjudicated by the regulations. In lieu of accepting prescribed risk weights, banks can apply weights determined by their own internal risk models (providing these models and their inputs are approved by the RBNZ).

In June 2011, the RBNZ adjusted its estimates of risk parameters for the determination of rural-lending risk weights. Banks using internal risk models are required to adopt the RBNZ's estimates for the expected losses in the event of default for all farm lending.[2] This will increase the risk weights associated with rural loans and therefore the amount of regulatory capital those banks are required to hold against these loans. Banks that do not use their own risk models, including TSB and SBS, are unaffected by this change.

Equity capital is an expensive source of funding for banks. The increased capital requirements will force higher interest rates on farm borrowers and will divert bank lending towards other uses including residential mortgages. From the perspective of farm businesses, there will be less bank credit available; this will encourage borrowing from non-bank financial institutions such as finance companies and from foreign lenders. Family farming businesses relying greatly on local bank finance will see their costs of borrowing

increase and may struggle to compete for funding with corporate farm businesses (which have access to cheaper, perhaps foreign, capital).

Vertically integrated banks can often operate more efficiently than other finance companies in markets such as farm lending. This is because the relationships built between the bank and the borrower can be developed over years and through a range of products. Over time, the bank increases its knowledge about the borrower and is able to better judge the risk associated with the borrower's loans. Banks with personal relationships may be able to offer loans at lower interest rates, and more adroitly renegotiate or modify loans when covenants are broken or payments are missed.

As bank-intermediated funding is replaced by direct non-bank financing in this and other markets, bank risks associated with rural loan performance may subside. But these new unregulated and more opaque capital flows may bring with them new systemic risks. Simply shifting capital flows from banks to other financial institutions is unlikely to reduce the risks of future financial crises. Moreover, the RBNZ's main levers for supporting the financial system in times of crisis (the target interbank lending rate or 'official cash rate', and direct lending to banks) will likely be far less effective in combating crises arising from disruptions to non-bank financial institutions.

Heading off bank runs

The on-demand nature of bank deposits leaves them reliant on depositor sentiment. At any time, depositors could withdraw their funds: an 'en masse' withdrawal creates a so-called bank run. Banks not holding sufficient cash to meet withdrawals may need to liquidate assets at any price, and low prices could lead to bank insolvency.

In order to tackle the risks associated with bank runs, the RBNZ has introduced a limit on the extent to which banks can rely on short-term or on-demand debt. The core funding ratio places a lower bound on retail deposits, long-term debt and equity funding as a share of the total liabilities of New Zealand banks. The contribution of retail deposits to regulatory core funding is dependent on the concentration of those deposits. For example, ten depositors each with $100,000 deposited contribute more regulatory core funding than one depositor with $1,000,000 in their account.

These rules affect markets in a number of ways. Most importantly, the requirement increases the costs associated with wholesale and (to a lesser extent) retail deposit funding. While retail deposit funding may be less volatile than wholesale funding, it is no less subject to shifts in sentiment. With electronic banking, household depositors can withdraw their funds very quickly. The dramatic queues of depositors outside failed UK bank Northern Rock in September 2007 also provide a stark reminder of the spectre of bank runs.

No more 'them versus us'

The RBNZ regulates bank activity directly through capital and liquidity controls. In this way, bankers have incentives to circumvent RBNZ rules. A better approach would align the incentives of bankers with the safety of the financial system and the efficient allocation of capital.

Specifically, regulating liability rather than activity would encourage banks to reduce risk while allowing them to choose the most efficient way of doing so. Most large banks are incorporated as single liability companies: shareholders stand to lose only their initial investment if the bank becomes bankrupt. This contrasts with **extended liability** for bank shareholders, which was popular in the UK in the 19th century: if the bank failed, shareholders were jointly and severally liable for losses over and above the amount invested. One common form of extended liability was **multiple liability**, where shareholders were liable up to a pre-determined multiple of the face value of their shares (a system which was in place in New Zealand until the 1950s).

Extended-liability regimes force depositors to monitor the shareholders as well as the managers of the bank. Shareholders also must consider their counterparts' ability to pay their share if bankruptcy occurs. Where it is more costly to monitor shareholders than managers, single liability is likely to be more efficient than extended liability.

In many large OECD countries some banks issue shares publicly; these are freely traded in stock exchanges and private transactions. Under extended liability, depositors would need to monitor shareholders and shareholders would need to monitor each other. The added complexity of the contract could also decrease liquidity in the market for such shares. These factors could make it very difficult for banks to raise the same amounts of capital that they could raise under a single-liability regime.

In New Zealand, however, the five major banks (ANZ,[3] Westpac, ASB, BNZ and Kiwibank) are wholly owned by single shareholders. Their shares are not publicly traded so would not suffer from the aforementioned costs associated with decreased share liquidity and cross-shareholder monitoring.

Reducing moral hazard

One potential form of extended liability might take the form of a guarantee of a given percentage of the retail deposits of the bank. Retail deposits are most likely to be guaranteed by the government in the case of bankruptcy because of their importance to trade and to households. The expectation of government guarantees causes moral hazard: depositors don't consider the health of their bank, as they expect to be guaranteed by the government even if the bank fails. An extended-liability scheme forcing bank shareholders to guarantee a significant share of retail deposits would shift the costs of this moral hazard from the government back to the banks' shareholders.

Limited liability can encourage bank shareholders to extract deposits from the bank if they suspect that their bank is insolvent. They stand to lose only the deposits that are tied up in the bank. Under extended liability, shareholder deposits invested in the bank are independent of the depositors' claim on the shareholders in case of insolvency. Shareholders are more likely to keep funds in the bank, potentially leading to a faster and smoother resolution or sale of the bank.

Regulating liability rather than activity thus offers new options for consideration in the New Zealand regulatory debate.

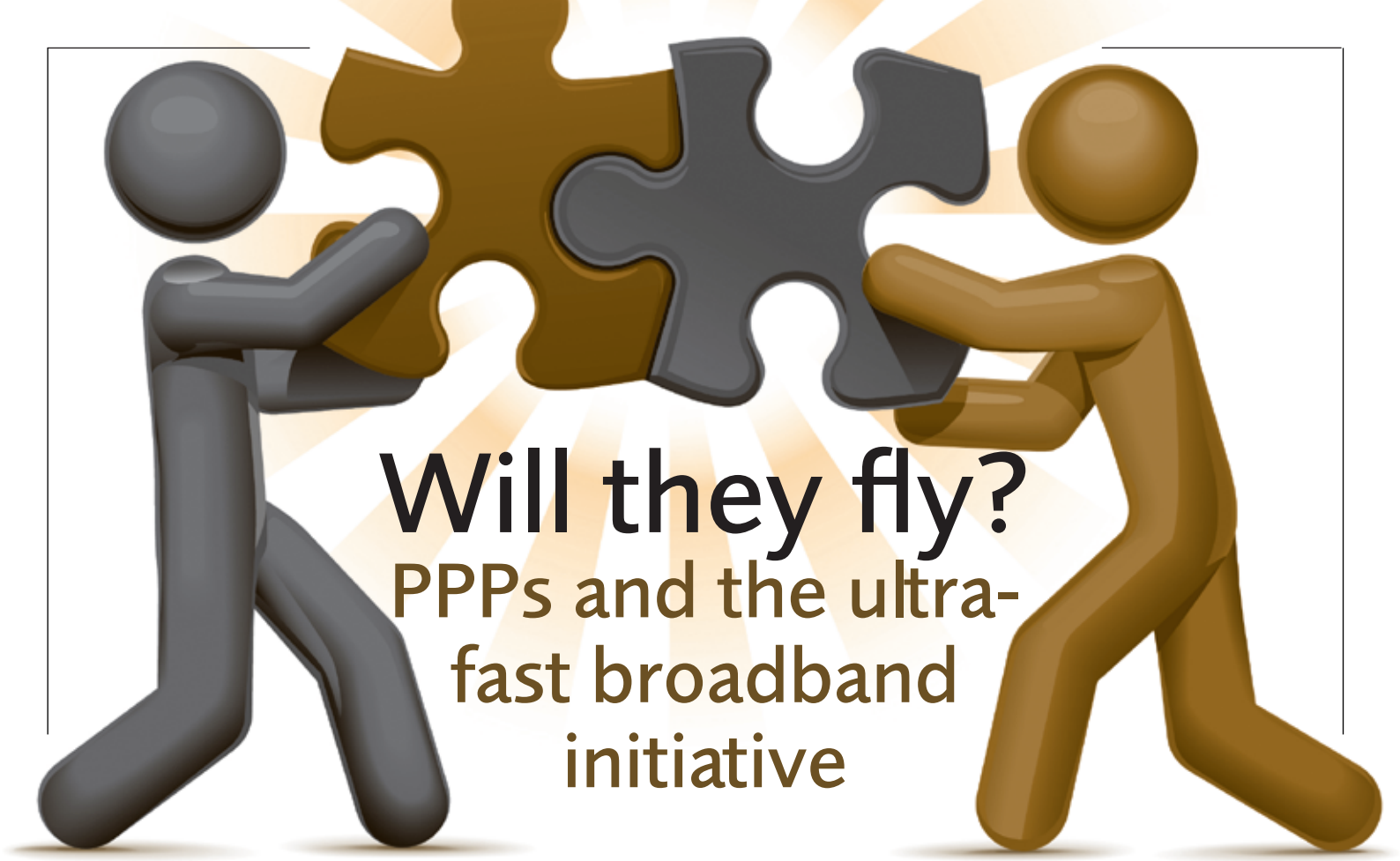
---

1 This project was suggested by Lewis Evans, who also provided comments on earlier drafts. A formal analysis of extended liability regimes, and a description of the Scottish banking market of the 19th century (where banks of varying liability regimes competed) can be found in: L Evans & N Quigley (1995) 'Shareholder Liability Regimes, Principal-Agent Relationships, and Banking Industry Performance' *The Journal of Law and Economics* 38(2) pp497-520.

2 I Harrison & K Hoskin (2011) 'Bank farm capital: does it cost the earth?' *Reserve Bank of New Zealand Bulletin* 74(2) pp5-14.

3 The National Bank is now fully subsumed into ANZ.

Alfred Duncan is a PhD student in financial economics at the University of Glasgow and a former research assistant at ISCR.



Will they fly?

PPPs and the ultra-fast broadband initiative

The political perception of New Zealand's broadband market performance as 'poor' has underpinned many significant changes to the telecommunications policy and regulatory environments since 2001. Most recently, this has been manifested in substantial government subsidies by way of public-private partnerships (PPPs) for an ultra-fast broadband (UFB) network that promises to deliver fibre connections with upload/download speeds of 100Mbps/50Mbps to 75% of New Zealanders by 2019. Bert Sadowski and Bronwyn Howell explore the pros and cons of the New Zealand PPPs.[1]

New Zealand was one of the first OECD countries to fully privatise its incumbent telecommunications company. Throughout the 2000s, successive governments relied upon regulation and contractual undertakings to generate private-sector investment in broadband infrastructure. For example, the 2006 Telecommunications Amendment Act (No 2) introduced local loop unbundling, enabling investment by competing operators on Telecom's network; and in 2007 Telecom undertook to roll out a nationwide fibre-to-the-node network to all communities with 500 or more lines by 2011. (See Figure 1 for an outline of the last decade's government developments in relation to broadband.)

Direct government funding of a nationwide UFB network represents a major deviation from the orthodox OECD policy preferences for private-sector funding of core telecommunications infrastructure. New Zealand's UFB is distinguished from the other notable government-funded network (Australia's) in that it involves both public and private finding by way of PPPs rather than full government funding and ownership.

PPPs in principle

Whilst 'public private interplays' (PPIs, the European version of PPPs) have become increasingly important in European infrastructure funding, they were rare in New Zealand until recently. PPPs are alternative means for public and private stakeholders to generate value by lowering risk and reducing uncertainty for private investment. In a well-structured PPP, the risks should be allocated between the parties in such a way that the party that can best bear the risk should also bear the responsibility. This responsibility is mostly defined in contractual agreements between the public and the private parties. If the risks are wrongly allocated, the incentive structure of the PPP is insufficient for the parties involved and the output of the PPP in terms of quantity and quality of service can be negatively affected.

PPPs in practice

In 2009 the New Zealand government and Crown Fibre Holdings Limited (CFH) established a limited company to manage the government-provided NZ$1.5 billion investment in the UFB initiative. The overall UFB scheme investments, including private investments, will be a total of around NZ$3 billion.

Through several different contractual relationships, CFH has invested NZ$929 million directly in Chorus: 50% of this comprises voting shares and 50% interest-free loans. It has also formed joint-venture 'local fibre companies' (LFCs) with three private companies (see Figure 2). CFH provides funding of the 'communal' infrastructure for an agreed locality; and class A voting shares are issued but no dividends paid. In return the companies fund the costs of connecting end users to the communal infrastructure, which leads to the issuing of class B non-voting 100% distribution shares. When an end user connects to the network, the partner firm refunds CFH for the costs of 'passing' that end user, and receives A shares in exchange.

Examination of the contractual and financial arrangements between CFH and the LFCs shows that a number of risks are well specified: these include statutory and political risks (for which CFH and different ministries are responsible); and design, construction,

time schedule, and operation risks (which are taken on by the LFC). The arrangements are not yet sufficiently specified for other risks (such as financial or technical). The contracts between Chorus and CFH have been more detailed with respect to anticipated (technical) risks, statutory or political risks, financial risks and residual-value risks.

However, the LFCs and Chorus remain exposed to demand and revenue risks, as connection take-up is occurring in a market where strong price-based competition from other infrastructures[2] may result in customers delaying fibre take-up or (given connection is essentially 'free' to the household) switching from fibre to other technologies.

Furthermore, at the wholesale level, the margins available to retailers (based upon 'equalised' retail prices for copper and fibre connections) provide few incentives for them to actively market fibre connections in preference to copper or their own infrastructures such as cable or wireless. This is especially problematic as the residential fixed-line broadband market is currently nearing saturation and, for most residential users, existing broadband connections provide quite satisfactory performance. Additional spending on fibre-connection marketing in order to induce customers to switch from an existing product that provides a similar margin will result in decreased retailer profits; so such marketing is unlikely to be a retail priority. Delays in fibre uptake are likely to be especially costly for Chorus because, unlike the LFCs, it has invested substantial capital in advance of any actual connection to end customers.

Figure 1: Main governmental developments affecting broadband development in New Zealand since 2001

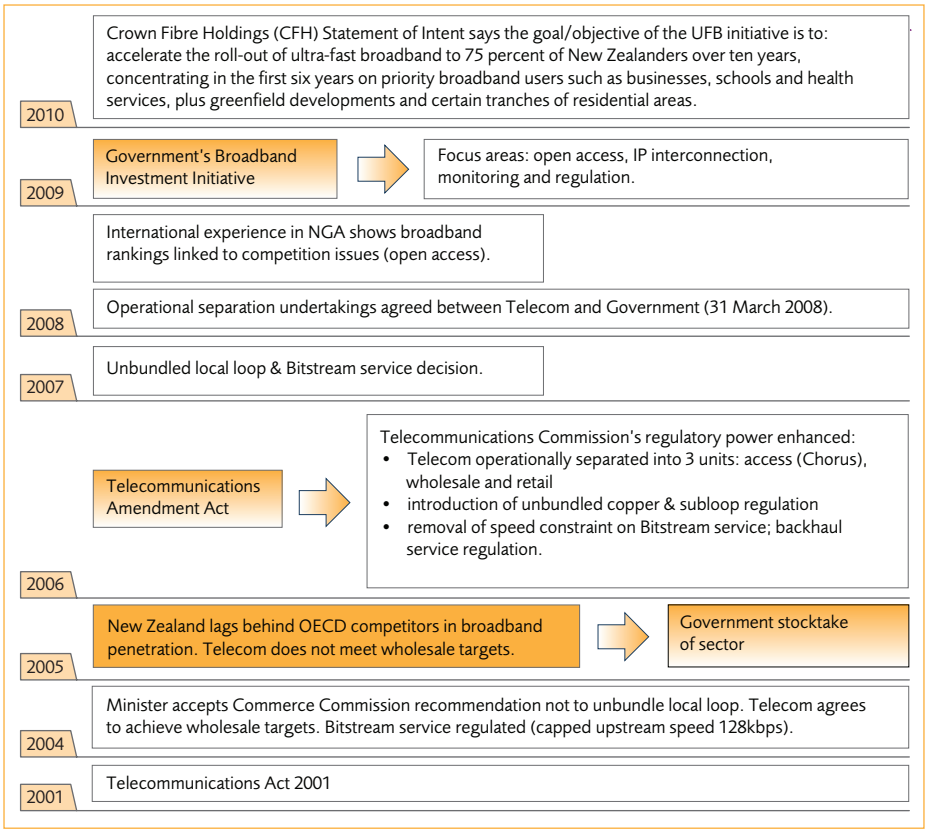
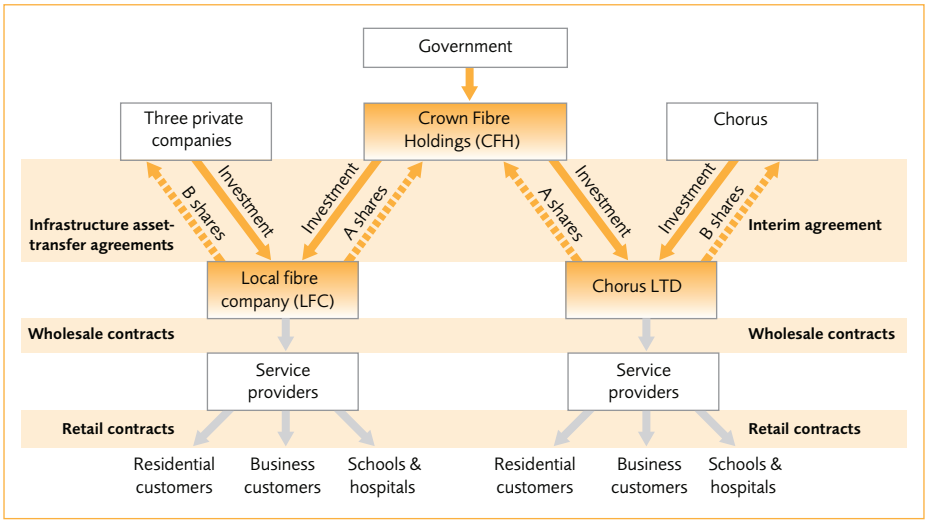


Figure 2: Contracting and control of UFB investment



Take-off troubles?

New Zealand has, after a period of slow growth of broadband, taken the opportunity to use its UFB initiative to foster 'next generation access' (NGA) growth. Although the initiative has been considered successful in terms of the amount of communal fibre laid, actual take up of connections is trailing behind expectations. In August 2012 the initiative had already exceeded its year-one rollout target by more than 6,000 and had made the fibre network available to more than 76,000 premises across New Zealand. But at the end of the first year only 1,233 users had been connected to the UFB, with 155 of these users being connected in the most recent quarter. These low uptake levels appear consistent with the risks identified regarding competition from other networks and the separation of marketing effort from fibre rollout. Furthermore, the current retail pricing structure makes it difficult for consumers to distinguish between fibre-based services and services based on bitstream access.

Whether the different forms of these PPPs can actually 'fly' is still an open question. Nonetheless, from a European perspective, the UFB initiative in New Zealand generates new insights into the factors facilitating NGA development under conditions of a nationwide government-driven programme and separated supply structure of fibre-based services.

1 Based on B Sadowski & B Howell (2012) 'Will they Fly? Different Forms of Public-Private Partnerships in New Zealand's UFB Initiative' (at www.iscr.org.nz/f778,21341/PPP_NZ_UFB_paper_B_Sadowski_B_Howell_TPRC_conf_sept_2012.pdf).

2 Such as wireless, or copper in areas where Chorus is not the UFB firm.

Bert Sadowski is an associate professor at Eindhoven University of Technology's School of Innovation Sciences, and was the 2012 S.T. Lee Fellow at ISCR. **Bronwyn Howell** is ISCR's General Manager.

Smart power *pricing ...* sometimes

'Smart' residential electricity meters capable of transmitting information about customers' usage in real time are expected to revolutionise the electricity industry worldwide: for example, they can allow retail prices to vary as generation costs change over the course of a day or a week. In a recent experiment Paul Thorsnes and his co-authors used newly-installed smart meters (and information transmitted to consumers) to investigate how New Zealand consumers might respond to variable electricity prices.

Time-varying ('dynamic') electricity prices are not new in New Zealand, even with conventional meters. Relatively low 'night' rates have been available to households who have installed a second meter supplying night-only power to selected appliances such as a water heater. Some retailers also vary prices seasonally, charging higher rates in winter when both demand and marginal production costs are relatively high; households can respond to the higher winter rates by installing insulation or by replacing electrical resistance heaters with a woodburner or heat pump.

Why should they vary?

Electricity prices vary over time for the usual reason: variation in production costs. Production costs change because demand varies over time, within seasons and also over the course of the day and week. The required capacity of the electricity supply system (generation, transmission and distribution) is determined by the quantity demanded at peak times. At all other times, some of this expensive capacity is idle. Smoothing the demand cycle lowers costs by reducing the investment in seldom-used peak capacity. Varying price according to demand provides financial incentives for customers to smooth their own demand cycles. And pricing generates the usual allocative efficiency: those who can most readily respond to prices respond most.[1]

Varying price relatively frequently, however, requires that millions of conventional meters be replaced with advanced meters, which is itself expensive. Some of this cost is recouped by eliminating expensive manual meter-readings. But it is less easy to estimate the potential impact of peak-load pricing on capacity requirements.

A variety of experiments with peak-load pricing have been conducted around the world. In most countries, peak summer demand determines the capacity of electricity supply. Businesses and households use electric air-conditioners to maintain comfortable indoor temperatures on hot summer afternoons. Raising afternoon prices on a daily basis, known as time-of-use (TOU) pricing, reduces the quantity demanded by between 3% and 6%. Though seemingly small, these reductions ease the strain on a system operating at near capacity. In the absence of time-varying prices, the occasional very hot afternoon can mean the quantity demanded rises to above capacity and this necessitates administrative allocations of the supply shortfall (such as rolling blackouts). Alternatively, relatively high 'critical peak pricing' (CPP) reduces the quantity demanded by more than 20% and provides considerable relief.[2]

Conditions differ in New Zealand, as peak demand occurs on cold winter evenings. Breezes and mild temperatures limit the need for cooling in summer, though widespread installation of heat pumps is encouraging more summer-time cooling. Winter temperatures are also relatively mild, but heating is required on most winter days and evenings to maintain comfortable and healthy indoor temperatures. Historically low electricity prices (attributable to abundant hydro-electricity generation) have encouraged winter heating that uses electricity. But growth in winter demand over time, combined with occasional low hydro-lake levels in winter, has led to investment in fossil-fuel generation that supplies peak demand at relatively high cost.

This raises the question of interest: what is the likely response of New Zealand households to higher peak and lower off-peak prices?

An experiment in deepest Auckland

As a first step towards answering this question, in the autumn of 2008 Mercury Energy[3] invited households in a suburban area of Auckland to participate in a one-year trial of TOU pricing. The invitations (via letter and follow-up telephone call) were accepted by 400 households.

The sample households, their houses and their electricity consumption varied considerably; but they were on average older than the New Zealand average, had higher incomes, and their houses were correspondingly larger and newer than average. The participants were recruited in this particular area because advanced meters had been installed for at least a year.

Each household's participation was voluntary. Mercury did not impose TOU pricing on any of its customers and a household could withdraw at any time. Information about each house and household was collected in June and July 2008, in interviews conducted before the start of the experiment. Each household received an information sheet with tips for using electricity efficiently. Most completed a follow-up survey in September 2012, after the experiment ended.

Each of the 400 households was assigned randomly to one of four experimental groups. One group received information only (there was no change to the households' rate plans). The three other groups had price differentials applied for peak and off-peak electricity use. The price differentials varied by group:

Group 1	Information only (no price differential)
Group 2	Low price differential (4c)
Group 3	Medium price differential (10c)
Group 4	High price differential (20c)

The peak period ran from 7:00am until 7:00pm on weekdays only; weekends and public holidays were treated as off-peak. As the unit price prior to the experiment varied somewhat across households, depending on their choice of pricing plan, half of each price differential was added to the original price during peak times and half subtracted during off-peak times. For example, a household in Group 2 paying 19c/kWh before the experiment would pay 17c off-peak and 21c peak during the experiment. This TOU pricing commenced on 1 August 2008 and continued for one year, ceasing on 31 July 2009.

Households in each of the groups received the same information about their electricity consumption: a simple bar chart printed on their monthly bill showing daily peak and off-peak consumption.

Louder than words

Data was collected consisting of daily observations of peak and off-peak electricity consumption for each of the participant households over both the year of the experiment and the year before the experiment. The same information was supplied for a sample of households who did not participate in the experiment. These households serve as a control group.

Using a 'difference-in-differences' analysis, the experimenters estimated the average difference within the year-to-year differences in household electricity consumption. This was measured during peak and off-peak periods; and the experimental groups' differences were compared with each other's and with the control group's. Comparison to a control group is important because conditions in 2008 differed from those in 2009. For example, the winter of 2009 was relatively cool in Auckland and inflows to hydro lakes were low in 2008. Not surprisingly, consumption was higher in the winter of 2009 than in 2008.

So what were the main findings?

There was no change in consumption patterns in spring, summer or autumn. For this reason, the remainder of the findings come from analysis of consumption patterns in winter. Specifically, we compare peak (and off-peak) electricity consumption on weekdays that had mean daily temperatures between 9.5 and 13 degrees Celsius in May, June and July 2009 with those in 2008.

There was noticeable change in winter consumption as a result of receiving power-use information. Group 1 (the information-only group) used on average about 7.5% less electricity than the control group. This was across both peak and off-peak times.

Peak and off-peak pricing has an effect in winter but only if the price differential is substantial. The households in Group 4, who experienced a roughly 50% increase in peak price, decreased their peak consumption by about 6% over that of Group 1. Conversely, they took advantage of lower off-peak prices to increase their consumption in the off-peak period by about 4.5%. The households who faced smaller price differentials (Groups 2 and 3) reduced their average consumption (across both peak and off-peak times) similarly to those in the information-only group (Group 1).

Changes in winter consumption varied with house and household characteristics. Not surprisingly, participants in houses built before insulation requirements were introduced in 1980 and those with electric water-heating showed a smaller percentage decrease in their consumption year-on-year. Those in bigger households used less electricity during peak times and those with a woodburner used less during off-peak times.

More than smart

Most households in the sample found ways to cut back on electricity consumption when they were given a little non-price inspiration (that is, participation in the experiment and more detailed information in their monthly bills). But it took a pretty big jump in price to motivate a significant additional peak-period decrease in consumption. This was despite the fact that nearly 75% of those who completed the post-experiment survey agreed that the price differential provided 'incentive to change time of use' and 60% disagreed that it was 'too much trouble to change'.

The results raise additional questions for future and on-going research. A big one, of course, is how well the results generalise to the larger population. Another is to what extent the response might grow, given a longer timeframe. And finally there's the question of how many (and what kinds of) households would choose a TOU pricing plan if retailers added it to their suite of pricing plans. Smart meters may provide information, but more research on this information is needed.

1 Varying price with demand is known as peak-load pricing. For a conceptual discussion see: M Crew, C Fernando & P Kleindorfer (1995) 'The Theory of Peak-Load Pricing: A Survey' *Journal of Regulatory Economics* 8(3) pp215-248.

2 For details see: A Faruqui and S Sergici (2010) 'Household Response to Dynamic Pricing of Electricity: A Survey of 15 Experiments' *Journal of Regulatory Economics* 38(2) pp193-225.

3 Mercury Energy is the retailing arm of gentailer Mighty River Power.

Paul Thorsnes is a lecturer in the Department of Economics at Otago University. This article was co-authored with Rob Lawson, John Williams and Eirikur Ragnarrson.

Good as Gold?

The euro 'crisis' has led to some speculation that Greece or Spain may exit the euro and possibly also repudiate their debt. Can legitimate governments renege on their responsibility to honour their debts? The US government did, in the 1930s. Nicholas Cross explains.

As part of its New Deal to combat the 1930s Great Depression, the US government radically reformed monetary policy by eliminating gold as a form of money. An important part of this was the nullification of 'gold clauses' (clauses specifying payment in gold) in private contracts and public bonds. The nullification represented a huge redistribution of wealth towards debtors, because as part of the same reforms the nominal price of gold was raised from $20.67 to $35 per troy ounce (thus revaluing gold and devaluing the dollar). This understandably created a furore. But not only were private contracts involved: the government itself was a significant debtor because of public bonds it had issued, and it was in effect repudiating its own debt.

Two key Supreme Court cases challenged the constitutionality of the government's decision: *Norman v. Baltimore & Ohio Railroad Co.*[1] in relation to private contracts; and *Perry v. United States*[2] in relation to public bonds. The resulting legal challenges were known as the 'gold clause cases' and raised two important questions. The first was whether defining a gold clause as a contract for payment of an amount of gold in money, as opposed to the payment of an amount of gold itself, was efficient. The second was whether restricting the government's ability to repudiate its own debt was efficient.

To understand the full implications of these questions, the role money played in the Great Depression must be appreciated.

When the money stopped

Modern economists believe that the severity of the Great Depression was compounded by a large decrease in the nominal money stock between 1929 and 1933. This decrease occurred for two reasons. Firstly the decline in GDP meant that many borrowers were unable to repay their loans, resulting in banks becoming insolvent. Secondly the climate of fear and uncertainty made many depositors rush to withdraw their funds (knowing that if they did not, they risked losing their deposits).

These bank failures led to a sharp fall in checkable deposits, lowering the money multiplier and therefore decreasing the nominal money stock. This was directly responsible for the deflation (wholesale declines in prices) of the early 1930s. When deflation occurs, individuals have an incentive to defer purchases of durable goods because they expect those goods to be cheaper in future. However, this behaviour reduces demand for goods; and this in turn forces employers to cut back production and lay off workers. In addition, wages do not always change in tandem with prices and so deflation caused a substantial increase in real wages, which decreased the number of workers businesses could afford to employ. This vicious cycle led to mass unemployment as aggregate demand spiralled downwards.

In hindsight, the solution appears obvious: expand the monetary base and so create compensatory inflationary pressure. However, because the value of money was tied to gold, the government was limited in its ability to do this.

Furthermore, the effort to create inflation would be blunted if existing and future contracts could be enforced with gold clauses. Individuals, fearing future debasement of the currency and distrustful of fiat money, could simply conduct their business in the market value of gold. As this form of money could not be controlled by the government, the plan to use monetary policy to stimulate the economy would be negated. Abandoning gold as a form of currency represented good policy as it better enabled the government to smooth business cycles by controlling money.

When Franklin Roosevelt became president in 1933, he immediately set about dismantling the role of gold in the US monetary system. The Emergency Banking Relief Act 1933 gave the Treasury Secretary the power to compel all citizens to sell their gold to the government, and this power was exercised in April 1934.[3] The Gold Reserve Act 1934 nullified contractual gold clauses[4] and (as mentioned earlier) increased the nominal dollar-price of gold.

Show me the .... gold?

The first question the Supreme Court had to decide in 1935 was whether gold clauses were contracts for payment of gold itself, or for the payment of money to the value of gold. There was conflicting authority on the point. Cases which had examined issues of legal tender[5] had held that Congress had the power to declare paper and gold currencies equal; other cases[6] had contradicted this view. This gave the court freedom to reach whatever conclusion it desired.[7]

Ultimately, in *Norman v. Baltimore & Ohio Railroad Co.*,[1] the Supreme Court found that gold clauses were a call for a payment of money. The effect of this decision was to bring gold clauses within the government's ability to regulate legal tender. It also had profound, largely beneficial, effects on the government's ability to develop monetary policy to combat the Great Depression.

So, sue us

It was now clear that the abolition of gold clauses in private contracts 'stood': a fully concluded private contract could not defeat Congressional power to make laws in the public interest. But in *Perry v. United States*[2] the ability of the government to abrogate its own contracts raised a more difficult (and constitutional) question, in that Section 4 of the Fourteenth Amendment to the United States Constitution says that '[t]he validity of the public debt of the United States ... shall not be questioned'.

In oral argument, it was accepted by both sides that this placed some limitation on the ability of Congress to repudiate its debts.[8] The bondholders argued that it applied to *any* form of repudiation. The government argued that it prevented only *total* repudiation (the implication being that it is constitutional to repay .001% of the bond) and that the form of repudiation occurring here was simply a consequence of exercising the power to redefine legal tender. On this point the majority opinion rebuked the government: Chief Justice Hughes declared that accepting the government's argument would make 'the credit of the United States an illusory pledge'.[9] However, in spite of this, the court found that the bondholders would not receive the gold value of their debt, partly because this would be a ruling that rendered them richer than 'ex ante', and also because the 1933 suspension of gold trading had made their losses hard to quantify.

The risks of reneging

There was a clear logic in trying to force Congress not to abrogate its own contracts. A government benefits from being able to borrow cheaply, and it can borrow cheaply because it's expected to fully honour its debts.

The price of a bond is determined in large part by the risk of buying that bond. The risk lies in the possibility of default or repudiation, and in bondholders' perceptions of that possibility. Their perceptions, in turn, are influenced by the credibility of the issuer when it promises to repay the bonds. The very ability of a government to break its promises reduces that credibility and imposes a higher borrowing cost, particularly at times when bondholders anticipate a debt crisis and when the political environment is sympathetic to a government willing to repudiate its debts (which could occur when bondholders are primarily foreigners or ultra-wealthy citizens). One would therefore expect the ability of a government to repudiate its debts to be self defeating, because of the effects to its reputation as a credible borrower. However, the impact this has on real-world bond prices would be difficult to measure: it is clear that countries with parliamentary supremacy as their ruling constitutional principle (for example, New Zealand or the UK) do have the legal ability to repudiate their debts, but separating the effect of this from the many other factors which affect bond prices would be almost impossible.

Lessons for the euro crisis?

Monetary policy plays an important role in smoothing business cycles, and the findings in the gold clause cases paved the way for modern monetary policy. Forming rules that restrict governmental law-making power is efficient. Although the US Supreme Court developed the gold standards law in a potentially inefficient way, it did so to pursue an urgent short-term priority. This area of law could provide insight into the current situation in Europe, should a country such as Greece or Spain decide to leave the euro-zone to fix their financial crisis.

1 *Norman v. Baltimore & Ohio Railroad Co*. 294 U.S. 240 (1935).

2 *Perry v. United States* 294 U.S. 330 (1935).

3 Executive Order 6102 (5 April 1934) criminalised the possession of monetary gold.

4 The long-term effect of these reforms has been to break the link between gold and money in the public perception. Even though Congress re-legalised gold clauses in 1977 (in response to inflation), they have not re-entered common usage in contracts.

5 *Knox v. Lee* 79 U.S. 457 (1871); *Parker v. Davis* 79 U.S. 457 (1871); *Juiliard v. Greenman* 110 U. S. 421 (1884).

6 *Bronson v. Rodes* 74 U.S. Wall. 229 (1868); *Trebilcock v. Wilson* 79 U.S. 687 (1870).

7 *Butler v. Horwitz* 74 U.S. 258 (1868) at 260. See also (1935) 'The Satisfaction of Gold Clause Obligations by Legal Tender Paper' *Fordham Law Review* 4(2) (available at http://ir.lawnet.fordham.edu/flr/vol4/iss2/6).

8 GN Magliocca (2012) 'The Gold Clause Cases and Constitutional Necessity' *Florida Law Review* (forthcoming).

9 *Perry v. United States* 294 U.S. 330 (1935) at 350.

Nicholas Cross is a law and economics student at Victoria University of Wellington.

a NEW professional REGULATOR on the block

On 1 July 2011 the accounting profession's long-established self-regulation of financial reporting, auditing and assurance standards came to an end. A newly created crown entity, the External Reporting Board, has assumed these duties. Carolyn Cordery looks at the board's responsibilities and at the new accounting framework whose rollout the board is overseeing.

Previously, the preparation of financial reporting standards and the preparation and issuance of auditing and assurance standards were carried out through the New Zealand Institute of Chartered Accountants, with the Accounting Standards Review Board (ASRB) issuing financial reporting standards. The External Reporting Board (XRB) replaces the ASRB. But its functions are broader and more strategic than the ASRB's.

The XRB sets the strategic direction for financial reporting and assurance standard setting, and oversees due process in its two standard-setting sub-boards: the New Zealand Accounting Standards Board (NZASB) and the New Zealand Auditing and Assurance Standards Board (NZAuASB). Membership of these three boards comes from a diverse range of experts in industry, the public sector, the not-for-profit sector, accounting and legal professionals, and academics. The XRB maintains a small staff at its Auckland and Wellington offices and an informative website (www.xrb.govt.nz).

The XRB's goal is to 'contribute to the creation of dynamic and trusted markets through the establishment of an accounting and assurance standards framework that: engenders confidence in New Zealand financial reporting; assists entities to compete internationally; and enhances entities' accountability to stakeholders'.

One size doesn't fit all

To achieve its goal, the XRB has established a new accounting standards framework, which was signed off by the Minister of Commerce in April 2012. The proposals are already being put into effect, although some must first wait for the new Financial Reporting Bill to be enacted.

The major change is the disestablishment of a 'sector-neutral' accounting standards regime. One set of financial-reporting standards is being issued for entities in the for-profit sector: these are based on International Financial Reporting Standards (IFRS). A second set of standards will be issued for public benefit entities (those in the public sector and the not-for-profit sector): these are based on International Public Sector Accounting Standards. Each set of standards will apply only to entities that are required to report.

Within each sector, different tiers are proposed based on size and public accountability. The Financial Reporting Bill states which entities must report and in which tier they should be: for example, reporters at the highest tier have public accountability (that is, they issue securities or act in a fiduciary capacity or have the coercive power to tax), are economically significant, and have separation of ownership and management.

An implication of the new regime is that, once the Financial Reporting Bill is passed, most small and medium-sized companies will have no obligations to prepare general purpose financial reports as they do currently under the Financial Reporting Act. This will result in a large reduction in their compliance costs.

Trust me, I'm your auditor

Changes to the auditing and assurance standards are not quite so dramatic, except perhaps in extent (the auditing standards developed by the New Zealand Institute of Chartered Accountants were applicable only to its members).

The Auditor Regulation Act 2011, which came into force on 1 July 2012, requires all auditors of securities' issuers to comply with the auditing and assurance standards issued by the XRB. These auditors must hold a licence; and audit firms that perform issuer audits must be registered. While the professional bodies in New Zealand may be able to register their members who comply with the requirements, the Financial Markets Authority (FMA) is responsible for the licensing of overseas auditors.

A listening organisation …

The XRB hit the ground running, issuing suites of accounting and auditing standards and putting into operation its new strategies. Despite the fast pace of change, the XRB also strives to be a 'listening organisation'. It has run a number of free public presentations, produced podcasts and encouraged submissions in any form. Its newly established External Reporting Advisory Panel (XRAP) is a further example of its intention to tap into reporting communities' networks in order to ensure it receives the best advice and feedback possible.

Carolyn Cordery is a research associate of ISCR and a senior lecturer at Victoria University's School of Accounting and Commercial Law. She is also a member of the New Zealand Accounting Standards Board but has provided this information in her personal capacity.