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IN THIS ISSUE

ELECTRIFYING REFORM

New Zealand is not alone in having reformed and re-reformed its electricity sector, and in grappling with questions of industry governance. While our electricity system is isolated from others, its reform has benefited from the thinking applied elsewhere – and early on it contributed to that thinking. But the direction of New Zealand's re-reforms is starting to appear increasingly isolated. Richard Meade argues that the recent course of reforms diverges from practice elsewhere, hinders private investment, and risks an inevitable reversion to state ownership and central planning.[1]

Politicians inheriting a legacy of centralised electricity systems regard these as ongoing sources of political vulnerability and legitimate instruments of policy. To constrain embarrassing electricity price spikes in times of short supply, wholesale electricity price caps are often introduced. To compensate for the resulting loss of investment signal and financial returns to peak plant investors, even more complex market arrangements are sometimes devised and imposed so that embarrassing blackouts can be averted.[2] In New Zealand, where industry has been accused of being slow to respond to government's policy imperatives, ownership reconfiguration has been imposed (such as the 1998 'Bradford reforms' that forced electricity-lines businesses to be owned separately from competitive activities). And governance reform has been dictated – such as the 2001 legislation that required centralised electricity governance and resulted in the formation of the Electricity Commission in September 2003.

The Kiwi way

But New Zealand has taken its own course, departing markedly from the path adopted elsewhere. Key sources of political discontent with New Zealand's earlier reforms centred around the pace of competition emerging in energy retailing, apparent supply insecurity during winters when hydro reserves were low, and a lack of coordination among industry participants. The Bradford reforms, as well as deemed customer load profiling, were imposed to resolve the former. But their contribution to increased customer contestability is perhaps as much to do with the rapid vertical integration of generation and retailing that they facilitated after the break-up of state-owned generator ECNZ into Genesis, Meridian and Mighty River Power. Such vertical integration arises in other electricity systems, like the 'model' reformed system in the US (the PJM Interconnection), and in Spain. But New Zealand was unusual in imposing the ownership separations that led to this integration, particularly since the affected energy/distribution companies were privately owned rather than state owned.

Rising wholesale power prices in times of tight supply are also not at all unique to New Zealand. The peak main-centre average daily price in the

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This article is based on Chapter 8 of *Alternating Currents or Counter-Revolution? Contemporary Electricity Reform in New Zealand* by Lewis Evans and Richard Meade, scheduled for publication by Victoria University Press in late 2005. Email ISCR, iscr@vuw.ac.nz, for details. Richard Meade will present the first of a series of seminars on New Zealand's contemporary electricity reforms at 6.00pm on 6 December in Rutherford House, ground floor, 23 Lambton Quay, Wellington.

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New Zealand wholesale electricity market was achieved on 25 July 2001, in the midst of the 2001 'winter power crisis'. At $418/MWh, it pales in comparison with the NZ$14,300/MWh achieved in the US midwest in summer 1998, when supply was tight and temperatures high. Yet an effective, partial dry-year price cap of $200/MWh has now been imposed in New Zealand, being the trigger price for reserve generation to be called upon when hydro reserves are low. This figure is considerably less than the $20,000/MWh estimate of the value of unserved energy recently incorporated in the test now applied for new grid investments,[3] implying some customers are estimated to value energy at 100 times the maximum dry-year price likely under the regulated reserve generation mechanism. It also falls well short of the A$10,000/MWh cap applied in the Australian National Electricity Market.

Back to the future

Concern about the lack of coordination apparent in New Zealand's reformed electricity system has spawned frequent calls for greater centralisation, although the previous experience of centralised control was clearly both unsatisfactory and expensive.[4] These calls arise despite industry's success in reaching multilateral agreement on the creation and governance of a wholesale electricity market – the New Zealand Electricity Market – without a need for legislation or regulation. Centralisation, however, is supposedly to improve sector performance, and to facilitate efficient investment where transmission and generation investments involve important interdependencies. Sometimes the calls are motivated by those pining for pre-reform arrangements where the electricity system was run by engineers with scant information on, let alone regard for, consumer preferences. But actual prices set in the New Zealand wholesale electricity market – including its dry-winter peak prices – have averaged between only 45% and 75% of 1991 forecasts made by the then centralised state-owned generator, ECNZ.[5] And electricity systems far more complex than those in New Zealand – for example, those in the US – have coordinated investment among separately owned generation and transmission companies without resorting to centralised state control.

The shift towards industry centralisation has clearly been intended to increase sector responsiveness to government policy imperatives. The Electricity Commission formed by the government in 2003 is now responsible for industry governance; it has limited independence from its Minister, and even less accountability to industry than under previous arrangements. Commissioners are appointed by the Minister, not by industry or consumers. The Commission must give effect to government policy statements on matters spanning all aspects of the electricity system for a range of objectives, and has powers to effectively manage aspects of the system (even down to the level of hydro spill).

New Zealand has ended up with predominant state ownership of the system – including 100% state ownership of transmission and 65% of all generation. It has explicit price controls on state-owned transmission, and also on typically customer-owned distribution. A partial dry-year price cap on wholesale electricity prices is now in place (glaringly low compared with overseas markets, and missing a compensating capacity mechanism), and 100% of all energy sold in New Zealand must now be dispatched via a centralised electricity market. Industry governance, after more than a decade of partial decentralisation, has been fully re-centralised under government control.

Would you invest here?

Ongoing government intervention in reformed electricity systems is not unusual and likely to continue. New Zealand faces challenges, however, if it wishes to persist with an electricity system in which private investors participate and risk their capital to ensure ongoing security of supply. It must reinvigorate (if not formalise) the compact that requires government to refrain from arbitrarily changing industry governance in ways that diminish the value of large, long-lived and irreversible investments. That compact was damaged with the Bradford reforms – and it appears even less workable now, with the Electricity Commission having received additional wide-ranging discretions in 2004. It is well known that investors invest sub-optimally when faced by the risk of post-investment expropriation. To suggest that credible commitment by government to regulatory restraint is necessary to encourage private electricity sector investments is therefore also well established. If such investment is desired to maintain security of supply, it is increasingly urgent.

But many snares confront private investors in New Zealand's electricity system. Uncertainty regarding how the Electricity Commission will exercise its powers has been identified as a key obstacle to electricity industry investment.[6] Wind-farm investors enjoying carbon-credit subsidies from government to encourage renewables-based generation have to consider that government provided their competitor, one of its state-owned generators, with an uncontested ad hoc subsidy (via an underwriting agreement) to invest in gas-based generation. It has been suggested that the government has accepted sub-commercial rates of return on its state-owned electricity generators;[7] the government has also warned industry that it will invest, if industry fails to do so. This diverts firms from competing in the market place and towards lobbying for political favour.

Such perverse incentives and investment risks tilt the future course of New Zealand's electricity system towards greater state ownership and control, and away from private involvement. When governments believe they are accountable for electricity sector outcomes, they reveal a presumption – not supported by international comparisons – that centralised state control is the only efficient way to coordinate network industries like electricity. Simultaneously, they risk implementing policies that make such control and accountability inevitable.

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

2 For a critique of the need for capacity mechanisms to achieve electricity supply security, see R Meade. 2005. 'Electricity Investment and Security of Supply in Liberalized Electricity Systems' in W Mielczarski (ed.) *Development of Electricity Markets*. Instytut Elektroenergetyki Politechniki Lodzkiej (also available through www.iscr.org.nz/navigation/research.html).

3 Section 8 of the Electricity Commission's Grid Investment Test, Schedule F4 to Section III of Part F of the Electricity Governance Rules.

4 B Galvin. 1985. *Review of Electricity Planning and Electricity Generation Costs.* The Treasury.

5 Evans and Meade, ibid.

6 PricewaterhouseCoopers. 2004. *Infrastructure Stocktake: Infrastructure Audit* (www.med.govt.nz.).

7 A Marsden, R Poskitt, and J Small. 2004. *Investment in the New Zealand Electricity Industry.* Auckland UniServices Limited. Auckland.

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capital ... taxed away

The 2005 budget announced plans for a new tax to be levied on the change in accrued value of foreign investments, irrespective of whether these gains are realised or not. Massey University's Lawrence Rose and Martin Young argue that this policy is likely to have some considerable costs.

Ever since the seminal work of Harry Markowitz, economists have understood and emphasised the importance of portfolio diversification – a concept formalising the simple notion that investors can obtain superior risk-adjusted returns by 'not putting all their eggs in one basket'. [1] In other words: returns on different investments are imperfectly correlated, so that low returns on some investments can be offset by high returns on others.

Although considerable diversification benefits are available from one's own domestic market, imperfect correlation between different markets means that further gains can be obtained by investing internationally. Even in times of crisis, when inter-country correlations typically increase, the benefits of international diversification remain. As a result, the optimal portfolio for any investor should include a significant offshore component.[2]

The old 'home bias'

But there are significant barriers to offshore investment. High transaction costs, lack of knowledge about foreign markets, and systems that discriminate in favour of local investors all contribute to a 'home bias' phenomenon. In these circumstances, the proposal to tax unrealised capital gains in individual offshore investments will, at the margin, dissuade investors from diversifying internationally and thus reduce the overall efficiency of New Zealand savings. Any future downturn in New Zealand capital markets will then be felt primarily by New Zealand residents whose returns are not cushioned by investments offshore.

Distortionary dynamic effects will also arise. For example: to the extent that a tax-induced inflow of funds into the New Zealand market pushes up current prices, there will be a fall in future returns – and investors will seek higher-yielding assets such as rental real estate and high-tech venture capital.

Investment decisions will also be distorted. The artificially high demand for New Zealand investments is likely to reduce the accuracy of market prices, so that investors relying on efficient capital-market pricing to value alternative investments will no longer be able to trust their decisionmaking processes and models. For example: New Zealand-based firms may find that their apparent cost of capital falls, thereby making previously unprofitable investments more desirable. But this will simply lead to an investment-fuelled 'bubble' that will ultimately produce many failures.

> The proposed tax change will make it much harder to retain immigrants who are already here, never mind attracting new ones.

A good way to discourage excellence

Distortions in savings and investment decisions run down New Zealand's stock of financial capital. But equally important, in the long run, is the effect of these distortions on our stock of human capital. New Zealand depends heavily on obtaining people skills through immigrants or returning expatriates – but the proposed tax change will make it much harder to retain foreigners who are already here, never mind attracting new ones. In particular, it has the potential to decimate the university sector as well as other areas that make significant use of highly paid immigrants.

Consider the case of an American who has been offered a job in New Zealand carrying a salary of NZ$100,000 (so his marginal tax rate is 39% and his average tax rate approximately 30%). During the course of his working life in the US, he has been able to invest US$500,000 (not an unrealistic assumption, given the increase in value of investments over the last twenty years in US capital markets). If, in one year, the New Zealand dollar dropped by 20% (its long-term average volatility) and the value of his investment portfolio increased by 5%, the American's resulting tax exposure would be equivalent to US$125,000. At an exchange rate of NZ$0.60:US$1, his New Zealand tax liability would be NZ$208,333 x 0.39 – that is, NZ$81,250. But after paying tax on his salary, he would have only about NZ$70,000 available to meet this liability and so would have to liquidate some of his savings just to pay the tax due.[3] In short, he would be expected to pay for the privilege of working in New Zealand. And his situation is by no means atypical.

One might argue that the American in our example should simply transfer his savings to New Zealand-domiciled investment vehicles. But not only would such a transfer be inefficient (for the diversification reasons discussed above); it may also be impossible, if the foreign savings are held in the form of a pension fund or other investments that are not easily liquidated.

Downhill all the way

A policy designed to lead the New Zealand population towards insular investment decisions is of very doubtful benefit. It encourages inefficient savings and investment decisions by New Zealand residents – and it discourages potential immigrants who hold significant offshore assets. It also contrasts with a number of other countries, such as Singapore, that actively encourage offshore investment by their citizens.

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1 Harry M. Markowitz. 1959. *Portfolio Selection*. John Wiley and Sons. New York.

2 For example: during the Asian crisis, wholly New Zealand-owned portfolios behaved worse than competing diversified portfolios. See: Thomas O Meyer and Lawrence C Rose. 2003. 'The Persistence of International Diversification Benefits Before and During the Asian Crisis' *Global Finance Journal* Vol 14 pp217-242.

3 The policy may limit the per-year tax payout to a percentage of the total portfolio value, but any tax liabilities must be carried forward for eventual payment.

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Changing ATTITUDES TO NETWORK PRICING regulation

Severe power outages across major industrialised countries have changed the attitudes of many governments and regulators to the pricing regulation of their electricity network businesses. Margaret Beardow looks at why, and what it means.

When price regulation was first introduced, the focus was simply on lower prices. Conventional wisdom held that network businesses were riddled with inefficiencies: removing the higher costs through the introduction of incentive-based pricing regimes would provide ongoing benefits to consumers. For the first decade of reform, falling real prices appeared to validate the theory.

But widespread power failures have demonstrated the weakness of this one-dimensional approach. Suddenly, reliability of supply has become as important as its price. In the regions beset by outages, the political fallout has reset the energy policy agenda. An inquiry by the House of Commons Trade and Industry Committee into UK power outages concluded 'the regulator's policy of both tightly limiting capital expenditure for replacement and continuing the pressure to reduce operational expenditure on maintenance was incompatible with the long term stability of the electricity network'.[1] The regulator took heed, increasing real capital expenditure allowances by 48% in 2005, in sharp contrast to the 13% real reduction imposed in its previous pricing determination.

Rising prices was not the expected outcome from industry reform. This begs the question 'how did we get here from there?' By examining the events in a number of countries, we have identified three consistent problems: an ageing asset base, a regulatory focus on consumers and lower prices, and lack of regulatory accountability.

What rolls out ... wears out

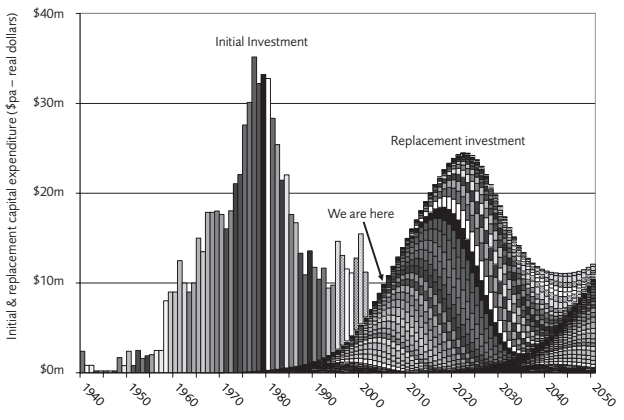
The ageing asset base presents a useful context for consideration of other factors. The rapid roll-out of electricity grids in the decades following World War II means that assets with an average life of around 50 years are now nearing the end of their useful life. The emerging replacement burden is substantial, although it is not well understood.

An investment and replacement cycle for a typical electricity distribution network is depicted in Figure 1. The first wave of asset investment began during the post-war economic expansion, and peaked during the 1970s. Replacement of the original equipment commenced in the 1980s and rose sharply after 2000, with a peak around 2020. This 'twin cycle' pattern is common across the whole range of network businesses; the only difference is timing of the initial roll-out.

The challenge posed by the ageing asset base is not simply that it requires significant capital expenditure. The real issue is the timing of that increase. Unfortunately, the need for increased expenditure has coincided with reductions in expenditure imposed by the newly established pricing regulators. The businesses found themselves between a rock and a hard place as the assets inexorably aged and replacement funds were not forthcoming. Replacing ageing assets cannot be avoided. Consumers can either pay small price increases as the system ages, or very large increases if the replacements are deferred until the integrity of the system fails. If price increases are deferred, consumers will not only face sharply higher prices – they will also suffer the cost and inconvenience of power disruptions.

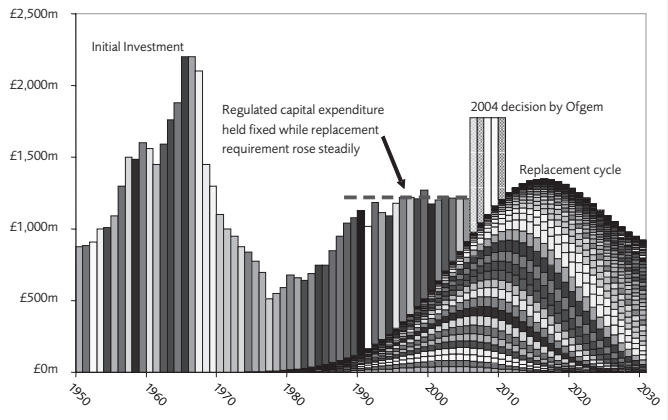
Figure 2 captures this inevitability. UK pricing regulation commenced in 1990 with the objective of reducing costs; and capital expenditure was held at a fixed level (see dotted line) over the next 15 years. But – unrecognised or unheeded – the asset base was now entering the replacement phase. Estimated replacement requirements rose from 10% of capital expenditure in 1990 to 70% by 2004. Evidence before the House of Commons Trade and Industry Committee suggests the required replacements were not made because most capital expenditure was directed towards network expansion to meet load growth. But the blackouts changed all that: regulated expenditure (to fund asset replacement) escalated by nearly 50% in 2005.

Figure 1: Asset investment and replacement cycles – New Zealand ($=2002)



Note: all dollar amounts expressed as constant 2002 dollars.

Figure 2: Asset investment and replacement cycles – United Kingdom (£=1999)



Note: all pounds sterling amounts expressed as constant 1999 pounds sterling.

Looking in the wrong direction

Incentive-based pricing (based on CPI-X) is a simple concept: each year the base price is escalated by an inflation factor, less an efficiency factor. The objective is to regulate price – not cost. The 'incentive' is provided by the opportunity for the business to retain any difference between the regulated price and the cost outcome.

But the CPI-X model implemented in Australia and the UK is really a cost-of-service model with a twist. Prices are determined by the cost of service (return of, and on, capital plus operating expenditure), less the efficiency factor. This degree of regulatory control may provide lower prices for consumers but it will also remove most of the incentive since, ex ante, it imposes reductions on operating and capital expenditures as well as on the efficiency factor. Concerns have now arisen at the disincentive this creates for investment.

In its review of the gas access regime in 2004, Australia's Productivity Commission noted this disincentive and recommended that a three-tier approach to price regulation be adopted: no price regulation if competition is possible; price monitoring where the gains from control are small; and price regulation only when all else fails.[2]

However, the warnings of the Commission may have come too late. In 2004 power outages occurred in Queensland, New South Wales, and Western Australia. Headlines such as 'Infrastructure blues start to take their toll', 'Bills must rise to fix state of disrepair', and 'Shocks to the system likely to go on' became commonplace. Attitudes changed swiftly; reliability has now become as important as price.

Governments have made it clear that expenditures on electricity networks must rise – and rise they certainly have. Table 1 lists the increases in regulated capital expenditure allowances in three Australian states. In Western Australia, the government pre-empted the decision of the regulator by doubling capital expenditure with funds made available from the state budget.

Table 1: Increases in regulated capital expenditure allowances – Australia

New South Wales (1999-2004)	110%
Queensland (1999-2004)	125%
South Australia (2000-2005)	68%

Note: Increases are from one 5-yearly pricing determination (eg 1999) to the next (eg 2004).

We will have to wait to see whether regulated expenditure allowances translate into increased investment.

Though expenditure allowances have risen, concerns remain. In a report to the Prime Minister, the Export Infrastructure Taskforce observed '...the risk today is that efficient investment will be delayed or even deterred by inappropriate policy settings'.[3]

These views are well founded. In the UK and in Victoria, Australia, it appears that allowing adequate capital expenditure is one thing; but getting the businesses to actually make the investment is another. Some clue to this lies in the relationship between regulatory pricing decisions and the value of the business. According to Standard & Poor's, UK network businesses generally trade at a discount to their regulated asset base. If this is the case, then it would not be commercially responsible for these businesses to undertake additional investment – even if that investment is for necessary replacements.

In Victoria, AGL (one of the network businesses) responded to the regulator's proposal to cut 15% off its network prices by writing down its regulated asset base by 20%. By any measure, this is a substantial loss for investors. It's also one that is unlikely to induce further investment.

With the benefit of hindsight, it seems obvious that the 'efficiency' gains and lower prices were little more than a transfer of maintenance and capital expenditures from the network businesses to the consumer. Regulated expenditure allowances may now be on the rise, but we will have to wait to see whether these increases translate into increased investment.

No power without responsibility

The most advanced assessment of regulatory accountability is that undertaken by the UK House of Lords Committee on the Constitution.[4] The core issue, according to the Committee, was the creation of independent regulators: this 'changed the machinery of government'.

Traditionally, the electricity sector had been subject to the control of, and answerable to, a government ministry. But the regulators that were established to assume responsibility for infrastructure services were independent and at arm's length from the minister. The Committee concluded that regulatory accountability could be improved only by allowing regulated entities the opportunity to have their objections to pricing determinations reviewed, on the merits of the case, by an independent tribunal.

Australia is also addressing this issue. The Commonwealth Ministerial Council on Energy, recognising that energy stakeholders are interested in appeals and review mechanisms, has recently established a Merits Review Working Group. A discussion paper on regulatory decisionmaking has recently been released. It addresses the role of a review scheme and looks at different types of possible review mechanisms including judicial review, and varying types of merits reviews.

To understand why there is such interest by the industry and its investors in a review process, we need look no further than the Australian Competition Tribunal findings[5] on the gas industry's appeals against pricing determinations by the Australian Competition and Consumer Commission (ACCC). For example, the Tribunal concluded that the ACCC had misinterpreted the access code, been unreasonable in its cost estimates, and also committed errors in principle. The Tribunal was quite blunt in a number of its criticisms. It referred to one approach by the ACCC as novel and idiosyncratic, while in another it noted that 'there was no logic or reason for the approach, and there is no material to suggest it has any support in the theory or practice of statistics'.

The debate about regulatory accountability and the rights of the regulated is in its early stages. But that it is taking place at all indicates a significant change in attitudes. When power outages occur, they represent a signal that all is not well with the infrastructure. Increasingly they are also being taken as a sign that all may not be well with the regulatory framework.

1 House of Commons Trade and Industry Committee. 2004. *Resilience of the National Electricity Network: Third Report of Session 2003-04 Volume 1*. London.

2 Productivity Commission. 2004. *Review of the Gas Access Regime*. Report No. 31. Canberra.

3 Exports and Infrastructure Taskforce. 2005. *Australia's Export Infrastructure: Report to the Prime Minister*. Canberra.

4 House of Lords Select Committee on the Constitution. 2004. *The Regulatory State: Ensuring its Accountability, Volume I Report*. London.

5 Australian Competition Tribunal. 2001-2004. *Application by East Australian Pipeline Limited* [2004]; *Application by GasNet Australia (Operations) Pty Ltd* [2003]; *Application by Epic Energy South Australia Pty Ltd* [2003]; *Duke Eastern Gas Pipeline Pty Ltd* [2001]. Canberra.

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CREATIVE DESTRUCTION and Productivity Growth

In issue 16, *Competition and Regulation Times* reported on John McMillan's efforts to evaluate the various market conditions that impinge on creative destruction in New Zealand. Now David Law, Nathan McLellan and Bob Buckle highlight the results of recent Treasury research[1] into the impact of creative destruction on aggregate productivity growth.[2]

A country's overall productivity performance is the outcome of a complex 'sorting' process of weeding out low-productivity firms and encouraging the birth and growth of high-productivity firms. From a microeconomic perspective, this process is similar to that required to prepare a successful international rugby team. Rugby selectors and coaches are involved in a selection process where over time they trial new players, drop poor-performing players, and develop techniques to improve the skills of incumbent players. The efficiency of their selection process is reflected in the performance of their team.

The development of a high-productivity economy involves a similar process. Economies that have more-efficient mechanisms for promoting and supporting high-productivity firms and for removing low-productivity firms will in general have higher aggregate productivity growth and therefore higher economic growth. This process, known as creative destruction, is one where resources are released from poor-performing firms through their contraction or death and are redirected to new firms and better-performing incumbent firms.[3] In modern market economies, the effectiveness of the process of creative destruction depends on the efficiency with which financial, labour and product markets reallocate finance, skills and other resources between firms.

We can evaluate the creative destruction process either by evaluating the efficiency of sorting mechanisms in the financial, labour and product markets or by directly measuring the contributions of entering, exiting and continuing firms to aggregate productivity growth. While Treasury applies both approaches in its work on productivity, we report here on recent Treasury research using the second approach.

Firm comings and goings

Aggregate labour productivity growth between any two consecutive years can be decomposed into contributions from entering, exiting and continuing firms. Continuing firms will contribute positively to labour productivity growth when they experience improvements in their labour productivity – or when the more productive of the continuing firms gain market share and the less-productive ones lose it. Entering firms will contribute positively to labour productivity growth when they have labour productivity that is above average. Exiting firms will contribute positively to labour productivity growth when they have labour productivity that is below average, since the exit of a below-average firm will increase the average level of labour productivity and release inputs to be used in other areas.

Figure 1 shows the contribution of continuing, entering and exiting firms to total labour productivity growth. Average labour productivity growth for all firms covered by this study (which excludes the agricultural sector) has been 1.8% over the period of analysis. This is represented by the bar labelled 'total', which is the sum of the contributions from entering, exiting and continuing firms. Continuing firms in general have added strongly to labour productivity growth over the period. The contribution to labour productivity growth from entering firms is negative. This is because, in their first year of operation, these firms tend to perform below the mean level of labour productivity. The contribution to labour productivity growth from exiting firms is positive: approximately 90% of exiting firms are below-average performers and therefore by exiting they raise average productivity of firms that continue to operate.

There is likely to be a great deal of heterogeneity across firms in terms of both production processes and outputs produced. One may argue that the results in Figure 1 derive from this heterogeneity rather than from genuine labour productivity differences between entering, exiting and continuing firms. But this seems very unlikely. Decompositions were also run on 117 narrowly defined industries where differences across firms' production processes and outputs are less marked. Most of these

Figure 1: Contributions of entering, existing and continuing firms to aggregate labour productivity growth 1995-2003

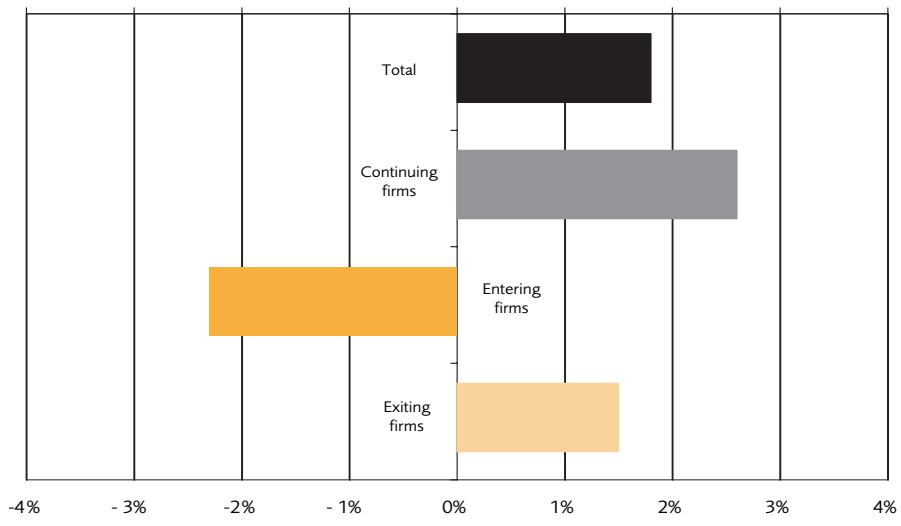
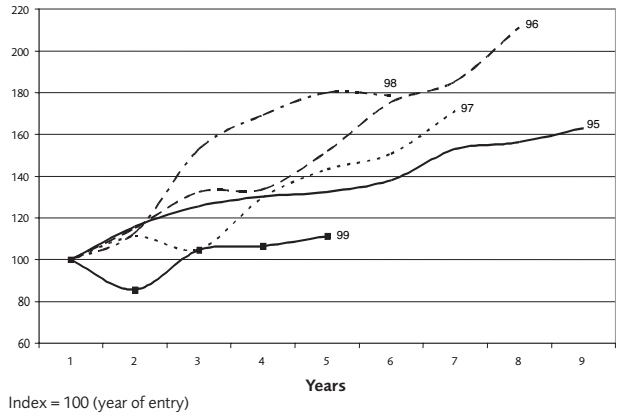
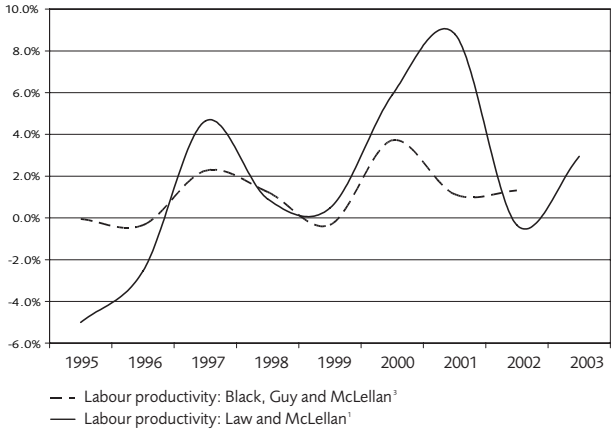


Figure 2: Labour productivity growth of entering firms



Index = 100 (year of entry)

Figure 3: Labour productivity growth comparison



decompositions looked very similar, with positive contributions to labour productivity growth coming from both continuing and exiting firms, and negative contributions coming from entering firms.

Figure 1, however, simply measures the contribution from entering and exiting firms for the first and last years of their lives respectively. Entering firms that survive beyond one year are classified as continuing firms in subsequent years. Although most entering firms make negative contributions to labour productivity growth in the first year of their existence, later in their lives they may begin to make positive contributions. This is not surprising. In the early stages of operation, new firms are likely to be building market share, learning how to operate most effectively, and increasing their scale of operations. Hence one might expect that, over time, new entrants will raise their labour productivity.

Young "bulls"

Figure 2 illustrates that this is typically the case. It shows the evolution of labour productivity for cohorts of firms that started up between 1995 and 1999 and survived through to 2003. These different groups of firms exhibit strong labour productivity growth in their early years. The average annual growth rate of labour productivity for each cohort is between 3% and 12%. Since entering firms become continuing firms in their second year of life and typically exhibit strong labour productivity growth, these young firms may actually contribute significantly to improving aggregate labour productivity.

This research can be viewed as a microeconomic counterpart to earlier work on aggregate and industry productivity also undertaken by Treasury (although sectoral coverage differs somewhat).[4] Figure 3 compares aggregate labour productivity growth rates from both pieces of research. The two series appear to be quite similar in a number of important respects. First, the trends are positive and have similar growth rates. Second, the timing of business-cycle fluctuations is very similar. The firm-based productivity research generates a more volatile labour productivity growth series. This is not unexpected because, in deriving each firm's labour productivity, output was approximated by sales and therefore does not account for the impact that changes in inventories have on smoothing fluctuations in output from year to year.

So ... how well are we doing?

The relationship between firm turnover and productivity in New Zealand revealed by this research is broadly similar to that found for other countries. Although data issues make it difficult to compare across countries, it appears that the relationship between firm turnover and productivity growth in New Zealand is closer to the US than to the European experience. In the US and New Zealand, entering firms initially subtract from labour productivity growth (this does not happen in a number of European countries such as the United Kingdom). The reason for this could be that the business environments in the US and New Zealand – with their lower costs associated with entry, exit and growth – are more conducive to experimentation by firms.

John McMillan's review concludes that New Zealand has plenty of creative destruction. But its aggregate productivity growth, while having improved since the early 1990s, remains below the OECD average growth rate. To rise up to and above OECD average productivity growth will require even stronger productivity growth by continuing firms, more enterprising new entrants, and perhaps still more creative destruction that will shift resources from low- to higher-productivity firms. To achieve this requires well functioning markets, a business environment with low costs of entry and exit, and incentives to innovate.

New Zealand's market mechanisms and creative destruction process may not rank with the best in the world and therefore be up to the quality of the All Black selection process – but they seem to be of a better quality than those applied by the recent Lions' selectors.

1 David Law and Nathan McLellan. 2005. *The contributions from firm entry, exit and continuation to labour productivity growth in New Zealand* Treasury Working Paper 05/01 (http://www.treasury.govt.nz/workingpapers/2005/wp05-01.asp).

2. In an earlier series of articles in *Competition and Regulation Times*, Nathan McLellan and Bob Buckle looked at the role of productivity growth in explaining cross-country differences in economic growth rates. See *Competition and Regulation Times* issue 11, August 2003 and issue 13, January 2004; (both available at http://www.iscr.org.nz/navigation/newsletter.html).

3 The term "creative destruction" is attributed Joseph Schumpeter. It can be viewed as a process of creative sorting.

4 Melleny Black, Melody Guy, and Nathan McLellan. 2003. *Productivity in New Zealand 1988-2002* Treasury Working Paper 03/06 (also published in *New Zealand Economic Papers* 37(1) June 2003).

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Take This Job and Hedge It:
human capital *and* portfolio theory

Why do investment professionals consistently offer advice that differs in systematic ways from that implied by portfolio theory? Are advisers ignorant of theory, or do they implicitly understand the importance of features that theory ignores? Glenn Boyle summarises some recent ISCR research that takes up these questions – and looks at human capital as the missing link.[1]

Two pieces of advice are commonly offered by investment professionals. First: compared with their more risk-tolerant counterparts, investors with a low appetite for risk should allocate a smaller proportion of their wealth to stocks with correspondingly more invested in both cash and bonds. Second: regardless of risk appetite, young investors with a long investment horizon should hold a greater proportion of their wealth in stocks than their older brethren do.

The rationale for these two pieces of advice seems straightforward. The 'risk-allocation' advice apparently captures the common-sense notion that risk-intolerant investors should shy away from risky assets like stocks and instead emphasise safer assets such as bonds and cash. The 'investment-horizon' advice is based on the widely held notion that stocks are less risky in the long run because losses in any one period are offset by gains in other periods. As a result, stocks offer a more attractive risk-return tradeoff to young investors, who can afford to hold them over a long time-period, than to investors with a more short-term focus.

But both pieces of advice sit uncomfortably with the lessons of modern portfolio theory (MPT), as developed in the Nobel prize-winning work of Markowitz, Tobin, and Samuelson.[2] In the MPT framework, investors arrive at their asset portfolio in two steps. First, they choose the portfolio of stocks and bonds that provides the greatest reward-risk ratio. Second, they choose the portfolio-cash mix that best suits their individual risk appetites; differences in risk appetite are accommodated by altering this mix, not by changing the makeup of the stocks-bonds portfolio.

Thus, in contrast to the risk-allocation advice, under MPT all investors hold the *same* ratio of stocks to bonds. Similarly with the investment-horizon advice: holding stocks over many periods exposes investors to potential losses of greater magnitude. For example, suppose stock returns are either 20% or -10% with equal probability. Then the maximum-possible loss over a one-year investment horizon is -10%; over a 10-year horizon it is approximately -100%. Standard MPT models suggest that the latter effect exactly offsets the risk-reduction benefit of offsetting returns over the long run, implying that the optimal allocation to stocks is independent of investment horizon.

That practice differs from theory is perhaps not all that surprising, since the messy nature of the real world often requires simple approximations to the complicated procedures advocated by theory. But what is puzzling here is that practice is *more* complex than theory: practitioners follow rules of thumb that incorporate investor risk-tolerance and age, when theory suggests that such adjustments are unnecessary.

> ... what is puzzling here is that practice is more complex than theory.

Missing link?

One possible explanation for this puzzle is that investment advisers are simply wrong. Another possibility is that popular investment advice intuitively incorporates factors that are missing from theory. For example, traditional MPT focuses solely on traded financial assets, but for many people their major asset is their human capital. And because slavery is illegal, investors cannot trade this asset in order to obtain their desired exposure to the risk-return tradeoff it offers. Instead, the best they can do is adjust their financial-asset portfolios to hedge the human-capital asset they must continue to hold. Such adjustments can potentially reconcile theory and practice.

To illustrate, suppose human capital returns are only weakly correlated with stock returns. In these circumstances stocks are an effective hedge against the risk of the non-tradable human capital, and so young investors with large quantities of human capital should allocate a significant portion of their financial wealth to stocks. As these investors age, thereby running down their human capital, the hedging need subsides and the optimal allocation to stocks falls, just as the investment-horizon advice advocates.

If stocks are also more highly correlated with human capital than with bonds, then the risk-allocation advice can be similarly justified. In this case, investors who become more worried about their overall risk exposure will move their financial wealth out of stocks (the poor human-capital hedge) into bonds (the good hedge) – which is exactly what the risk-allocation advice prescribes.

Human-capital considerations can therefore justify both pieces of investment advice, as long as the correlation between stock returns and human-capital returns is neither too high nor too low. In fact, across 11 developed countries for which data are available, the average correlation is approximately 0.01, comfortably between its allowable lower (-0.25) and upper (1.00) bounds. The same data also imply that ageing investors should substitute cash for both stocks *and* bonds and that investors with risky labour income should allocate less to stocks.

It appears that the nature of one's job is important to optimal asset allocation – and that popular investment advice recognises this importance.

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1 See: G Boyle and G Guthrie. 2005. 'Human capital and popular investment advice' *Review of Finance* 9 pp1-26 (an earlier version is available at www.iscr.org.nz).

2 H Markowitz. 1952. 'Portfolio selection' *Journal of Finance* 7 pp77-91; J Tobin. 1958. 'Liquidity preference as behavior towards risk' *Review of Economic Studies 25* pp65-86; P Samuelson. 1963. 'Risk and uncertainty: A fallacy of large numbers' *Scientia* 98 pp108-113.

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INSIDER TRADING curbed by LEGISLATION

It's well known that insider trading can result in financial market distortions and inefficiencies such as lack of investor confidence, reduced participation, and higher risk premiums demanded by those who continue to participate. These distortions and inefficiencies often appear intractable – especially so in New Zealand. But recent work by Aaron Gilbert, Alireza Tourani-Rad, and Tomasz Piotr Wisniewski suggests that the Securities Market Amendment Act 2002 is beginning to make a difference. The authors report on their research.

Commentators on the laws governing insider trading in New Zealand over the past decade and a half have largely ignored the distortionary effects of insider trading. Insiders may, for example, expropriate profits from small investors, resulting in a loss of confidence in the market by the investing community. Not only does this lead to lower market participation; those who remain in the market require higher risk premiums to compensate for the added risk of trading against an insider.

The neglect of such issues has been driven in no small part by the failure of 'anti-insider' enforcement – and a number of high-profile events that have reinforced the belief that insider trading is rife in the market. (Insider trading also seems to be profitable. New Zealand insider trades during the past 15 years earned profits that were not only significantly higher than those of ordinary New Zealand investors, but also higher than those earned by insiders in more tightly regulated markets.[1])

The Securities Market Amendment Act 2002 was a response to this situation. Coming into force on 1 December 2002 the Act required all corporate insiders, executives, directors, and substantial shareholders to disclose details of their transactions within five working days – and it allowed the Securities Commission to prosecute an insider.

Sufficient time has now elapsed to assess the impact of these changes on the New Zealand stockmarket.

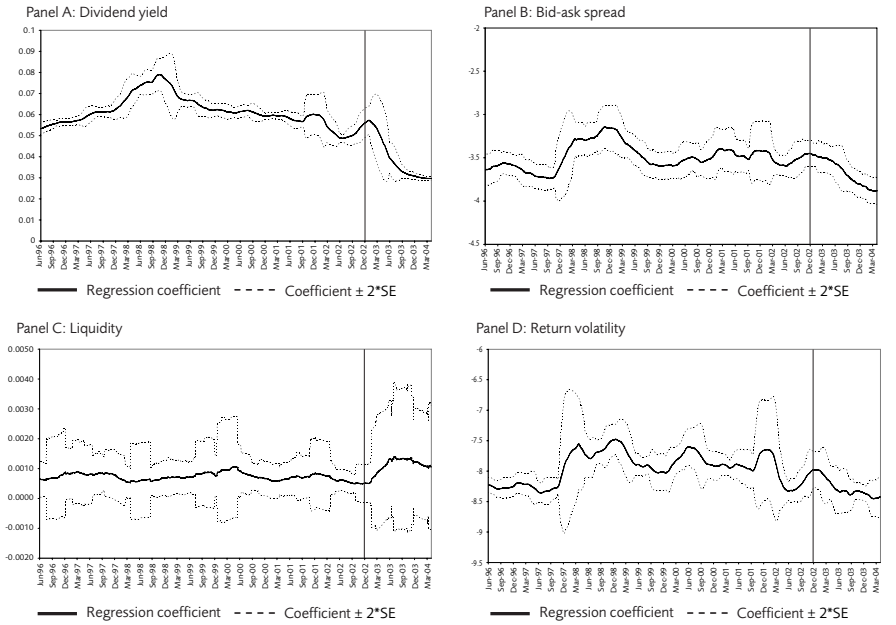
Insiders outed?

If the new law has been effective, then the risk of insider expropriation should have reduced: there should be lower bid-ask spreads, lower cost of capital and return volatility, and greater liquidity. To test these hypotheses, we collected data on the above variables for 85 companies that were listed on the NZX between January 1996 and March 2004 and compared their values across two sub-periods: pre-change (January 1996 to December 2001) and post-change (December 2002 to March 2004).

Empirical findings indicate that both economically and statistically significant changes occurred in the mean level of each variable between the pre- and post-change periods. Dividend yield (proxying for the cost of capital), bid-ask spreads and return volatility all declined from averages of 6.31%, 3.06%, and .036 to averages of 3.23%, 2.25%, and .02 after the introduction of the new legislation. Liquidity rose from an average of 0.08% of the outstanding market capitalisation traded daily to over 0.12%, representing a marked increase in the daily trading volume. This suggests that the changes observed are more than just the result of normal economic cycles.

The paper on which this article is based received the ISCR Best Paper Award at the 2005 New Zealand Finance Colloquium. The full paper is available as a pdf either through (www.iscr.org.nz/navigation/research.html) ("Impact of the Securities Market Amendment Act 2002 on Insider Trading") or through (www.aut.ac.nz/schools/business/business_research/publications/enterprise_and_innovation/papers.htm) (paper 14-2004 "Insiders and the Law: the Impact of Regulatory Change on Insider Trading").

Figure 1: 100-day moving average of market structure variables



Note: The *vertical axis* represents the moving average estimated over the previous 100 days for each variable averaged over 85 companies. The *dividend yield* is defined as the annualised dividend yield. The daily *bid-ask spread* is defined as the natural logarithm of the bid price minus the ask price divided by the midpoint of the spreads. The *liquidity* is defined as the dollar value of trading divided by the current market capitalisation. The *share volatility* is defined as the natural log of the variance in returns over the previous 30 days. The vertical line represents the date of the new legislation.

Zap!

Further evidence is provided by the results of the rolling regressions shown in Figure 1. The four graphs show the 100-day rolling-regression coefficient when each variable is regressed against a constant. There is a noticeable change happening around the introduction of the new law: an almost immediate decrease in the level of bid-ask spreads, dividend yields, and return volatility; and liquidity steadily starts to increase. These results seem to indicate a structural break occurring at the time the new law took effect, resulting in reduced insider trading and greater efficiency in the market.

Overall, these results are consistent with the view that the Securities Market Amendment Act 2002 has been effective in reducing the level of insider trading in the

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Want to Predict the Future? **Ask the Market!**

When a prediction about the outcome of some future event or decision is needed, the typical response is to conduct an opinion poll or to consult with expert analysts. But, as ISCR's Glenn Boyle and Steen Videbeck point out, it may be better to seek the market's opinion.[1]

In 1988 the US Commodity Futures Trading Commission gave permission for the University of Iowa to begin operating the Iowa Electronic Market (the IEM). This ushered in the world's first *prediction market* (sometimes called an information market).

Prediction markets are similar to standard derivatives markets in that they provide a mechanism for trading financial claims to future contingencies.[2] But they differ in that, first, they are more accessible to small investors and, second, they offer markets on a wider range of events – including politics, sports, weather, business, and entertainment.

Prediction markets have several purposes. Initially, they were designed to serve as teaching and research tools: they provided university students and staff with the opportunity to study a trading environment that is more realistic than the typical laboratory setting but without the scale, complexity, and noise of real-world markets. More recently, given the proven ability of markets to gather and assimilate dispersed information, interest has focused on the potential *forecasting* power of prediction markets.

Trading in prediction markets

The most common contract traded on prediction markets is one that yields a fixed payoff if (and only if) a certain event occurs. For example, suppose that in the lead-up to the general election there had been a market on who would be New Zealand's prime minister on 31 October 2005. Let's also suppose that three contracts were on offer – Helen Clarke, Don Brash, and Other – each of which would pay $1 if the corresponding individual became prime minister and zero otherwise. In this case, the price of each contract represents the market's estimate of the probability of each being prime minister on 31 October. Thus, if the Clarke contract traded at $0.51, this meant the market believed she had a 51% chance of winning the election.

Contracts that offer a variable payout provide different information. For example, suppose there had been a contract that paid $0.01 for every percentage point of parliamentary seats won by the National Party – that is, the payout would have been $0.20 if National won 20% of the seats, $0.50 if it won 50%, and so on. In this case, the contract price reveals the outcome expected by the market. If the price was $0.55, then the market expected National to win 55% of the seats.

Contracts can even be used to discover an entire probability distribution. For example, the price of a contract that paid $1 if the Green Party won at least 10 seats in parliament tells us

the market's estimate of the probability of that party winning at least 10 seats. A similar contract with a threshold of at least 20 seats reveals the market's estimate of the probability of the party winning at least 20 seats. By offering many such contracts we can learn the market's beliefs about the entire distribution.

Prediction markets ... as a teaching tool

Many university teachers around the world have used the IEM to help students learn about the mechanisms and complexities of financial markets, and to provide hands-on insight into aspects of finance theory. For example, pure securities and state prices are integral (but abstract) parts of modern asset-pricing theory that are made concrete by the fixed-price contracts traded in prediction markets.

The diverse events on which the contracts are written mean the usefulness of prediction markets as a pedagogical device is not simply limited to finance. Prediction markets are also extremely relevant for courses in accounting, macroeconomics, microeconomics, and political science. They encourage students to think about interrelationships between different subjects, thereby fostering an interdisciplinary approach that is helpful in understanding traditional financial markets.

... as a research resource

Prediction markets allow researchers access to data that are less artificial than those generated by laboratory markets; they also have a wider range of trader-specific information than is available in traditional financial markets. These desirable features have prompted studies of individual trader behaviour, psychological biases, and price dynamics.

Most studies, however, have focused on the forecasting power of these markets, particularly in comparison with more traditional approaches such as opinion polls and expert analysis. Overall, these studies suggest that prediction markets provide forecasts that are at least as accurate as the more traditional methods. One study calculates that the IEM political markets outperformed polls in 9 out of 15 national elections. Across all elections, the average poll error was 1.91% while the average market error was 1.49%. Another study considers the accuracy of prediction markets across a wider range of events, and concludes that these markets generally perform better than opinion polls and do at least as well as expert opinions and other standard barometers.

... as a policy instrument

The success of prediction markets in forecasting future outcomes has focused attention on their potential value as a policy tool.

Private sector firms have already begun to use these opportunities, via the establishment of internal prediction markets. For example, Siemens recently found that such a market predicted it would be unable to complete a software project by a particular date, while standard processes suggested the opposite. In this case, the market prediction turned out to be the correct one. At Hewlett-Packard, an internal prediction market proved to be a better forecaster of future sales than more traditional methods. More such applications seem likely in the future – prediction markets could play a significant role in gauging customer interest, determining organisational challenges, forecasting earnings, and exploiting potential markets.

In the government sector, the prices provided by prediction markets could be used to inform public policy across a range of issues, particularly in aiding assessment of initiatives that have high costs and uncertain benefits. For example, the potential uptake of a subsidised vaccination programme could be estimated using a prediction market. An innovative, and ultimately controversial, use of prediction markets for public-policy purposes surfaced in 2003 when the US Defense Advanced Research Projects Agency suggested the creation of a market specialising in various geopolitical contracts, with the aim of predicting the likelihood of a terrorist attack. However, the potential for terrorists to profit from such a market raised a furore and the proposal was dropped.

A New Zealand prediction market?

Whether it's used as a teaching tool, research resource, or policy instrument, a prediction market focusing on New Zealand events has obvious benefits. Students would have the opportunity to obtain first-hand experience of market operations, thereby facilitating their movement into the industry; New Zealand researchers would have ready access to data that would enable them to contribute to the body of knowledge in a topical and growing area of research; policymakers would obtain the advantages of market-based predictions about uncertain future events.

The establishment of a public prediction market in New Zealand could also raise awareness of the potential benefits of such markets in the New Zealand business community – which in turn could lead to the increased use of internal markets in New Zealand organisations, a development that has the potential for improved decisionmaking and increased productivity. However, establishing and running such a market is costly: it requires the creation and ongoing maintenance of a new trading platform. And, in a small market, there is only limited capacity to recoup many of these costs from participants. Corporate, educational and government support is likely to be essential.

1 For more details on information markets see: G Boyle and S Videbeck. 2005. *A primer in information markets* (www.iscr.org.nz/navigation/research.html); R Hahn. 2004. *Using information markets to improve policy* AEI-Brookings Joint Center for Regulatory Studies Working Paper 04-18; J Wolfer and E Zitzewitz. 2004. *Prediction Markets* Stanford Graduate School of Business Research Paper 1854.

2 Similar markets have subsequently been set up at the University of British Columbia and Vienna University of Technology. Outside the education sector, firms such as Trade Exchange Network (tradesports.com) and a joint venture between Goldman Sachs and Deutsche Bank (economicderivatives.com) have also appeared.

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ISCR intends to seek Securities Commission approval for the establishment of a New Zealand prediction market, with the aim of launching this market sometime in 2006.

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New Zealand market. The Act has also had a beneficial impact on market performance: transaction costs and risk premiums have fallen, while activity has gone up.

While the Securities Market Amendment Act 2002 appears to have fulfilled its goals, it remains to be seen whether the efficiency gains noted are permanent, whether they are sensitive to subsequent enforcement activity, and whether further changes are needed.

1 A Etebari, A Tourani-Rad, and A Gilbert. 2004. 'Disclosure regulation and the profitability of insider trading: Evidence from New Zealand' *Pacific-Basin Finance Journal* 12 pp479-502.

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MOTIVATING AGENT EFFORT IN A COMPETITIVE ENVIRONMENT

In the investment-fund, life-insurance and cellular-phone industries, sales agents' contracts include both commission payments for sales and clawbacks of those payments if the clients are not retained. Neil Quigley, Ignatius Horstmann and Frank Mathewson explain why – and they also show how a major shift in market conditions changed the structure of these contracts.[1]

Where agents are employed to sell term contracts, firms will incur costs of selling that are amortised over the expected life of the contract. For example, life insurance firms face up-front costs in creating, underwriting, and selling an insurance policy – and these costs are then recouped over the life of the policy. The problem for insurance firms is that the insurance contract does not bind a customer to continue the policy: it will lapse when the customer stops paying their premium. It is also not possible to recover (from the sales agents) the net costs imposed on the firm by sales activity that does not generate persistent clients. Insurance firms must therefore motivate agents to sell policies *and* to identify clients who are more likely to renew.

The motivation problem for the insurance company is complicated by the fact that, while agent effort in sales is observable immediately, agent effort in screening is only observable after a time lag. It would be possible to pay agents entirely on ex-post realisations, or to sell the residual claim on the contract to the agent; but this would require the agent to be able to access the capital market to fund their initial sales activities or purchase of the contract. Since access to the capital market is difficult for individuals with limited collateral, a requirement to fund initial sales effort or to purchase contracts would unduly restrict the ability of firms to recruit sales agents.

In a competitive environment, the solution to this motivation problem is for insurance firms to create a commission scheme that provides appropriate incentives to sell and to screen – and, in addition, to provide a capital-market function by making some 'up-front payments' to agents before all aspects of their effort are observable. Commissions induce sales effort, while penalties provide incentives for the agent to identify customers who will continue to pay premiums over the life of the policy. Thus, the equilibrium contract uses a combination of initial commissions and renewal commissions (which reward sales effort and provide up-front payments) and clawbacks of commission that has already been paid (which sanction failure to retain the customers).

From the late 1980s banks entered the life-insurance market in New Zealand. This changed the composition of the customer pool obtained by the traditional insurers, since the banks' lending business gave them an advantage in identifying customers who were more likely to renew insurance. This in turn meant that the agents of the traditional insurance companies faced a market in which fewer good prospects existed.

In this environment, the optimal contract for the traditional insurers will provide reduced incentives for random selling, stronger incentives for screening, and reduced penalties for lapses (to compensate for the lower portion of persistent customers available to traditional agents following bank entry). With a smaller pool of good customers from which 'traditional' agents can recruit, the marginal return on screening will increase, the marginal return on selling without screening will be reduced, and (all other things equal) there will be higher lapse rates for the policies sold by 'traditional' insurance agents.

And this indeed happened. Data on life-insurance lapse rates and agents' contracts before and after bank entry demonstrate that policies sold by banks had lower lapse rates *and* that lapse rates on policies sold by the 'traditional' life insurers increased after banks began to sell life insurance in New Zealand.

The entry of banks (with their superior screening technology for the identification of prospective purchasers of life insurance) resulted in the traditional life-insurance companies changing their contracts with sales agents so that both the commissions for initial sales and the clawbacks for policy lapses were smaller.

1 I J Horstmann, G F Mathewson and N C Quigley. 2005. 'Agency Contracts with Long Term Customer Relationships' *Journal of Labour Economics* 23(3) July 2005 pp589-608 (forthcoming). For more background information see also: I J Horstmann, G F Mathewson and N C Quigley. 1996. *Ensuring Competition: Bank Entry to the Insurance Industry*. C D Howe Institute. Toronto.

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