OUT TO PASTURE
Pastoral Leases in the 21st Century

The burgeoning local and international demand for New Zealand land is focusing attention on the potential conflicts arising from alternative uses of land – and on the optimal regimes for the use and management of these lands. ISCR's Lew Evans and Neil Quigley think it's time to pay more attention to covenants as a socially optimal way of providing for the multiple uses of land.

New Zealand's high country has value in commercial, recreational, and residential uses and in providing a habitat for native flora and fauna. Much of the high country is held by the Crown as lessor under approximately 300 pastoral leases with 33-year terms and the right for the lessee to renew in perpetuity. These leases commonly restrict the lessee to farming livestock subject to severe restrictions (for example on stocking, burning, and tillage), although permission for other uses can be negotiated. The viability and social value of alternative uses has increased with the growth of income, reductions in transport costs, and changes in consumer preferences. This is placing pressure on institutional arrangements designed historically for demands that were much more limited in intensity and scope.

Under the Crown Pastoral Land Act 1998 holders of pastoral leases can enter a 'review' process whereby they may, by agreement with the Crown,[1] obtain freehold title to part of the land with the residual land being retained by the Crown and placed in the conservation estate.[2] The lessee pays (receives from) the lessor any excess (deficit) in value between the two blocks of land.

A framework for multiple uses

From a public-policy perspective the objective of the provisions for freehold transfer should be the creation of property rights that provide the most efficient framework for the consideration of all current and future potential uses of the land. This framework will be such as to provide for the present value of social welfare to be maximised, including consideration of tangible and intangible benefits associated with different potential uses of the land.

Under the Crown Pastoral Land Act, the objectives of the voluntary transfer are:

- to promote the management of the land in a way that is ecologically sustainable

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- (subject to ecological sustainability) to enable land capable of economic use to be freed from management constraints implied by the lease
- to protect significant inherent values of the land by creating protective mechanisms or (preferably) by the restoration of land to the Crown in full and
- (subject to the previous points) to facilitate public access to and enjoyment of the land, and to facilitate freehold disposal of the land.

Change in the current land-tenure arrangements is desirable because the land has multiple non-mutually-exclusive uses but pastoral leases severely restrict both the range and intensity of permissible activities.

Multiple use of resources can provide substantial benefits to society where those uses are compatible to any extent. It is likely that the use of land for farming requires limitations on the extent and/or timing of access to the land for recreational purposes; *to page 2*

but it is also likely that the co-existence of these uses with some restrictions provides much larger social welfare than if only one activity was permitted. This is because the prohibition of either farming or recreational use of the land would result in a large loss in social welfare by comparison with the small losses associated with restrictions on the nature of one or both of these activities when multiple uses are permitted.

The transition to an alternative allocation of property rights for pastoral-leasehold property must be by negotiation, as provided under the Act, because any unilateral action embodied in legislation would represent a 'taking' of the property rights of existing lessees (which would have negative implications for investment across the whole economy).

Role of property rights

Property rights define the rights of use of an asset. Their clear specification improves national welfare and economic performance by providing a strong link between benefits and costs, and by conferring the confidence that enables stewardship and the making of long-term investments which maximise the present value of those rights.

To allow assets to be used to enhance national welfare to their fullest extent, the actual property rights specified should permit the full range of uses that might reasonably be contemplated with the relevant asset. Where this is not true, the social value of the land will be depressed. For example, under present legislation pastoral leaseholders have the right to occupy and use the land for livestock farming in perpetuity, and the value of the lease to the Crown is simply the capitalised value of the lease payments. If the land is valued much more highly in other uses, or even if there is the potential for land to be valued more highly for other (currently unknown) uses in the future, then the value of the lease will be less than the value of the land under a lease without restrictions.

However, the profitability to the government of a freehold transaction should not be confused with the government's role in providing the institutional environment for the constructive utilisation, management, and stewardship of the land. The financial rewards to the lessor's interest are separate from, and negligible in comparison with, the impact on social welfare of different allocations of property rights.

Division of property rights

Given the multiple potential uses of pastoral land, property rights should be allocated in a way that provides incentives for the optimal combination of uses to be permitted and developed. Property rights should also be allocated in a way that allows these activities to be undertaken on an efficient and sustainable basis which, in the absence of strong externalities, typically requires that the party with long-term use rights to the land be provided with the ability to make these choices.

Externalities can arise where the user of the land has incentives other than those that would promote the land's most efficient use. Examples would include:

i. actions that have irreversible effects
ii. intangible and tangible benefits to others reduced by the treatment of the land by its user
iii. access to other property, the conservation estate, or particular features.

Examples (i) and (ii) were probably important sources of the original terms of pastoral leases. Today these issues are addressed to a very considerable degree by the Resource Management Act 1991.[3] Additional surety can be provided by covenants of various sorts (including those with specified use rights) that are attached to freehold land. Example (iii) is not really an externality, but something that the Crown as owner may seek to specify.

Why, then, does the Crown seek to retain ownership of a portion of the land – and, if it does retain ownership, how should the division be made? It is not clear that the objective of the Crown should be to add to the 'conservation estate', which we interpret to mean land and vegetation retained in, or allowed to evolve to, its ecological original state (where this is possible). The conservation estate is the most restrictive form of land use (that is, it is the least permissive of additional uses); and thus, where there is any other use, it is the use that is the least likely to maximise social welfare.

Covenants: a better way

The potential to use covenants as an alternative to Crown ownership has not received sufficient attention. Covenants on leasehold or freehold rights are likely to provide higher social welfare than the placement of land in the conservation estate when:

• the costs of enforcing the covenants are outweighed by the benefits that would come from multiple use
and
• it is efficient for private landholders rather than the Crown to retain options about the future use of land that are not foreseeable now.

In other words, covenants are (necessarily) incomplete contracts; but placing land in the conservation estate is the optimal ownership solution only when the costs of this incompleteness outweigh the benefits of multiple use.

The costs of covenant negotiation, monitoring, and enforcement will generally be lower in local hands (where the most direct interest lies). The covenants will be negotiated as part of the bargain between the lessee and the lessor, and it is likely that they will be less costly than the negotiation of a large portion of land by the Crown would be. Covenants can be monitored and enforced by any party and, where their governance is linked to local interests, monitoring and enforcement is likely to be more cost-effective than it would be if done by a centralised agency.

Covenants offer considerable advantages over placement in the conservation estate, because the governance of the conservation estate is cooperative in nature and this implies uniformity of processes and policies across the country.

A FAR-FROM-RANDOM
Walk to Nobel Glory

On December 10th Welshman Clive W J Granger received the 2003 Nobel Prize for Economics (with Robert F. Engle). Kevin Counsell and Steen Videbeck explain the rebellious thinking of this down-to-earth economics professor.

Clive Granger received his PhD in Statistics from the University of Nottingham in 1959, which coincidentally was the same year that his future haunt, the University of California-San Diego (UCSD) was founded. After spending the initial part of his career teaching at the University of Nottingham, Granger joined the faculty at UCSD in 1974. Just one year later Robert Engle, his future Nobel co-winner, joined the faculty and, together with fellow econometrician Halbert White, they formed an econometrics dream team that propelled UCSD to become one of the top economics departments in the world. Still, life at UCSD wasn't all work and no play – a former doctoral student recalled that Granger loved to go boogie boarding in the afternoons.

So what did Granger do and why was it so revolutionary? Granger's Nobel prize-winning work deals with economic data in the form of time series – a sequence of observations taken over time. In particular, Granger considered the behaviour of random walks, which are examples of 'non-stationary' time series. The story of a drunk's walk is typically used to describe the unpredictable nature of a random walk: a drunk leaves the pub and staggers aimlessly with no clear direction and in an unpredictable manner.

Granger considered pairs or groups of random walks and developed a method to test if they are 'cointegrated'. A simple explanation of cointegration was developed by Michael Murray in 1994 from an adaptation of the drunk's walk, involving a drunk and her dog.[1] The drunk leaves the pub and wanders aimlessly. Her unleashed dog (although not drunk) also wanders aimlessly, by flitting from one strange scent to the next and trying to follow its mistress. So although the path of both the drunk and her dog are random walks, the distance between the two paths remains close together over the long term, and is in some sort of 'stationary' equilibrium. When some combination of two random walks[2] is stationary, the time series – the paths of the drunk and her dog in this example – are said to be cointegrated.

Cointegration is an important tool because it solves a difficult problem to do with non-stationary time series that have random-walk trends. The problem, first noted by Granger and his colleague Paul Newbold in 1974, is that standard tests often show two or more non-stationary time series to be related when they are not. This is particularly the case when the series drift in the same direction. For example, a standard test may show the random paths of the drunk and a stray dog to be related when in fact they are not (as the drunk and stray dog do not make an effort to stay close to each other in the same way as the drunk and her own dog do). By using a test for cointegration, however, we could easily tell that the paths of the drunk and the stray dog are not cointegrated – so that any supposed relationship is unlikely to be true.

This is particularly important in examining the relationships between economic variables whose trends are often random walks that may appear related even when they are not. For example, New Zealand GDP and the population of Timbuktu will probably both increase over time; but they are unlikely to be related and hence would not be cointegrated.

Granger's contributions to time-series economics extend beyond that of cointegration. Indeed, 10 books and 200 academic articles are testimony to the fact that he is no one-hit wonder. He is also well known for devising a test, bearing his name,[3] which is used to ascertain the causal relationship between two time series. To return to our example: if the drunk were to leave the pub and walk her dog on a leash, we might ask whether the path of the drunk causes the path of the dog (or perhaps vice versa). If, by knowing the path of the drunk, we could significantly improve our ability to predict the path of the dog, then the former is said to 'Granger-cause' the latter.

Granger, now retired, is spending his time focusing his research on what he calls 'more difficult problems'. He is a frequent visitor to New Zealand, a country that he and his wife love. In fact it was as a visiting scholar at the University of Canterbury that he heard of his greatest achievement – during a 3am phone call from Sweden that he originally thought was a hoax.

And how does one celebrate winning the biggest prize in economics and its accompanying one million dollars? Well, in a genuine Kiwi/Welsh way – by watching a rugby match (Canterbury vs. Auckland for the Ranfurly Shield). Unfortunately for Granger, his adopted Canterbury lost the match 40-31. Still, the weekend wasn't a complete write-off.

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1 M. Murray. 1994. 'A Drunk and her Dog: An Illustration of Cointegration and Error Correction' *The American Statistician* 48(1) pp37-39.

2 In this case, the difference between the two.

3 'Granger Causality'.

Kevin Counsell and Steen Videbeck are both Masters students in economics and research assistants at ISCR.

CALCULATING THE COST OF CAPITAL
A Revisionist's Appraisal

In determining the viability of any business investment, one of the most crucial factors is the cost of the capital used. Financial economists long ago devoted considerable time and energy to identifying and measuring the cost of capital, a process that resulted in a 30-year consensus. That consensus is now beginning to fall apart. Glenn Boyle, Professor of Finance at Otago University, explains why.

T he long-standing consensus on the identification and measurement of the cost of capital is based on three principles:

- First, a project's cost of capital is the expected return that would be required by investors if the project were currently available in financial markets.

- Second, this required return can be calculated as a weighted average of the expected returns required on the debt- and equity-financed portions of the project (the so-called Weighted Average Cost of Capital, or WACC).

- Third, the unobservable required return on equity can be estimated using the Capital Asset Pricing Model (CAPM).

More recently, however, this consensus has begun to unravel. Instead, an alternative view has emerged: that the WACC/CAPM framework described above systematically understates the true cost of capital – and that it does so because the CAPM ignores some important risks of investment.

ALLTEX DESIGN

Economical in its elegance

This is unpleasant medicine for many in the finance profession. The CAPM is a simple, elegant and intuitive model that can be applied to a multitude of tasks. Generations of academics, students, practitioners, and regulators have grown up on it. And, of course, it has the ultimate symbol of intellectual respectability – a Nobel prize. It is truly the Caesar of finance, an icon entitled to praise rather than burial.

But despite this status, it has become apparent that the CAPM is incomplete when it comes to estimating the cost of capital. This is largely due to its fundamental premise that the only risk which matters is *systematic* risk – the extent to which a project's returns covary with those of the market portfolio. Unsystematic risk (the risk that is specific to the project and

independent of general market movements) cannot command a premium because investors can eliminate it themselves by appropriately diversifying their portfolios.

One immediate consequence of ignoring unsystematic risk is that the cost of capital for any project is the same regardless of the firm that undertakes it. Another is that the cost of capital is independent of the volatility of a project's potential returns. Intuitively, I think, most people would have some difficulty with the proposition that a project which could wipe the firm out if it goes badly can be of the same (or even less) risk than another project which has no significant implications for the firm's financial health. Yet this is what the WACC/CAPM approach would have us believe.

To see where (and why) the CAPM goes

astray, we must first backtrack a little and recall exactly what it is that it is designed to do. The CAPM is a model that describes optimal asset choice and pricing in financial markets. As such, it seeks to answer the question:

What expected return is required by investors on $1 invested in the firm's shares?

But the question relevant to the determination of the cost of capital is slightly different. It is:

What expected return is required by investors on the specific purpose that the firm uses this dollar for?

If, as the CAPM asserts, systematic risk is all that matters, then these two questions have the same answer – WACC. If, on the other hand, project-specific risk is relevant for a firm's investment projects, then the answer to the second question will deviate from WACC. And there are two good reasons for believing that project-specific risk does indeed matter for investment projects.

Model meets real world

The first of these is simply that real-world market frictions such as asymmetric information, agency conflicts, and moral-hazard incentives impose additional costs and constraints on the raising of capital. When the firm uses the investor's dollar to begin a new project, it exposes the investor to future losses on that project. In the WACC/CAPM framework, this has no relevance since these losses can largely be diversified away and (more importantly) they have no effect on the firm's other valuable projects and opportunities because the funds needed to finance these assets are
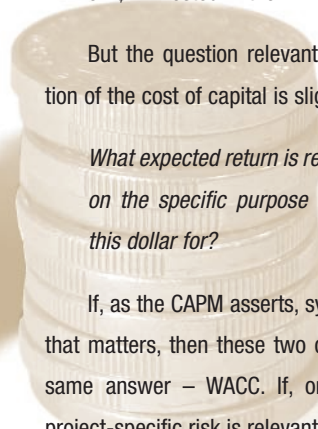
available in the same quantity and at the same cost as applied before the introduction of the new project.

However, as all businessmen know, unpleasant things start to happen when losses occur. In particular, capital markets subject to the frictions listed above become twitchy and less willing to provide further funds to the firm – thereby increasing the cost and availability of this funding. Yet without such funds, the firm may have to forego future valuable projects or shut down existing ones.

Thus, when the firm applies an investor's dollar to a specific purpose, it uses up not only that dollar but also the sacrificed value of other assets. As a result, investors require an expected return equal to WACC on both their $1 and the value of the other capital that they sacrifice. In other words, they expect to earn more than WACC on the $1 alone.

The second reason arises not because of constraints on the firm's ability to access capital markets, but rather because of constraints on its other resources. When a firm invests, it gives up the option to invest in the same project at some date in the future when conditions may be more favourable. Similarly, because firms usually have limited quantities of human, organisational, and physical capital, starting a new project today may require it to forego options to invest in other projects in the future. The more uncertainty there is about the firm's future prospects, the more valuable are these options, and hence the greater the potential sacrifice.

Because the loss of these options represents an additional cost of the project, investors require an expected return equal to WACC on *both* their $1 *and* the value of their foregone options. As a result, they again expect the project to offer an expected return greater than WACC on their $1 alone.

Counting the cost

These arguments can be summarised as follows. Project-specific risks expose a firm to constraints on its future investment activity and thus have negative implications for the value of its other investment opportunities. Consequently, a new project must be sufficiently profitable to cover not

only the direct cash costs of investment but also the indirect costs of potentially foregoing other investment opportunities. Equivalently, it must offer an expected return that exceeds WACC by an amount sufficient to compensate investors for these costs.

A simple example provides a concrete illustration of this point. Suppose a proposed new project costs $1 million in plant, equipment, and other direct costs of investment and that its WACC is estimated to be 10% per annum. Assuming the project lasts one year, it must offer an expected return of at least $1.1 million in order to be profitable. But suppose the project has specific risks that, if realised, will make it impossible for the firm to take advantage of a growth opportunity currently valued at $5 million by the firm's investors. Given a 20% probability of future investment being constrained in this way, embarking on the new project incurs not only direct costs of $1 million but also indirect costs of $1 million. So the total cost of investment in the project is not $1 million, but $2 million. Consequently, the project must offer an expected return of at least $2.2 million in order to be profitable. As a result, the expected return required on the direct cash costs ($1 million) is not 10%, but 120%!

Although this example is contrived, the project-specific increment to WACC can indeed be economically large. For plausible (and quite conservative) parameter values, the margin due to non-financial constraints has been estimated at approximately four percentage points; for many New Zealand firms, it may well be considerably higher. [1]

Three lessons can be learned from all this. First: the common, but widely criticised, practice among firms of adding an arbitrary margin to WACC may in fact approximate optimal behaviour. Second: regulators who rely rigidly on the WACC/CAPM framework are likely to induce under-investment in the industries they regulate. Third: business schools that ignore the effects of real-world frictions and dynamics run the risk of providing their students with an incomplete picture of the process by which projects should be evaluated.

Professor Glenn Boyle has been Professor of Finance at the University of Otago's School of Business since 1991, and is also currently Consulting Principal with LECG Asia-Pacific. He holds a PhD in finance from the University of Texas and an MA in economics from the University of Canterbury. Professor Boyle has advised The Treasury, the Reserve Bank, the Commerce Commission, and the World Bank; and he has published articles in a number of leading international finance and economics journals such as the *American Economic Review, Journal of Finance, Journal of Financial Economics, Journal of Financial and Quantitative Analysis, Journal of Money, Credit and Banking,* and *Journal of Political Economy*. His current research interests include real options theory, corporate governance and executive compensation, and the economics of popular investment advice.

1 See, for example, A Dixit and R Pindyck. 1994. Investment Under Uncertainty. Princeton University Press. The margin associated with financing constraints seems likely to be at least as large, but there is currently little consensus on how to accurately measure this.

COST-BENEFIT ANALYSIS
in Competition Law

In a range of prominent cases,[1] the Commerce Commission has evaluated the benefits and costs that certain of its actions would have for the New Zealand public. These evaluations are important to many decisions the Commission makes; so it's crucial for economic investment and growth that the cost-benefit analysis be done properly.[2] Lewis Evans, ISCR's Executive Director, explains why domestic and foreign firms should generally be treated the same in the Commission's cost-benefit analysis.

T he treatment of New Zealand and foreign consumers and producers in competition law's cost-benefit analysis needs to be consistent and to take long-term outcomes into account, if the economy's performance is not to suffer.

One particular issue is the weightings of importance given to the benefits and costs for domestic and foreign owners. Another (related) issue concerns the weighting of consumer and producer benefits and costs. For the purposes of this article, I presume an equal weighting of domestic consumers and producers, in part since this seems most likely to promote dynamic efficiency of the economy, and instead focus on other issues. Can or should consideration be given to markets (that is, consumers or producers) outside New Zealand, or to foreign ownership, in assessing public benefits and detriments under the Commerce Act? And, if they are to be considered, to what extent (if any) should different weights be applied?

How the law sees it

Section 3(1A) of the Act provides:

Every reference in this Act, except the reference in section 36A(1)(b) and (c) of this Act, to the term "market" is a reference to a market in New Zealand for goods or services

as well as other goods or services that, as a matter of fact and commercial common sense, are substitutable for them.

This definition indicates that markets within New Zealand are the primary concern when it comes to implementing the provisions of the Commerce Act. The focus is on New Zealand markets (consumers and producers) and does not differentiate between domestic- and foreign-owned firms. The provisions of the Commerce Act operate regardless of which firms are operating in the market and what ownership those firms have.

Section 4(1) of the Act provides:

This Act extends to the engaging in conduct outside New Zealand by any person resident or carrying on business in New Zealand to the extent that such conduct affects a market in New Zealand.

This clearly extends the coverage of the Act to conduct outside the borders of New Zealand (provided there is an impact on a market within New Zealand). Therefore a foreign-owned firm carrying on business in New Zealand would be subject to the Commerce Act – provided their conduct has an impact in a market within New Zealand.

Section 3A[3] of the Act provides that:

Where the Commission is required under this

Act to determine whether or not, or the extent to which, conduct will result, or will be likely to result, in a benefit to the public, the Commission shall have regard to any efficiencies that the Commission considers will result, or will be likely to result.

The Commerce Commission's publication *Guidelines to the analysis of public benefits and detriments*[4] specifies that the 'public' is the public of New Zealand and that benefits to foreigners are to be counted only to the extent that they also involve benefits to New Zealanders. The *Guidelines*, however, no longer accurately records the Commission's view and is currently being updated to reflect the changes in the Commerce Amendment Act 2001.[5]

The comments by the High Court in the Amps-A decision[6] may be taken as the leading authority on the legal position as to whether benefits to foreign firms should be considered and to what extent they should be discounted.

The High Court in that case stated:[7]

We reject any view that profits earned by overseas investment in this country are necessarily to be regarded as a drain on New Zealand. New Zealand seeks to be a member of a liberal multilateral trading and invest-ment community. Consistent with this stance, we observe that improvements in international efficiency create gains from trade and investment which, from a long-run perspective, benefit the New Zealand public.

And it went on:

On the other hand, if there are circumstances in which the exercise of market power gives rise to functionless monopoly rents, supra-normal profits that arise neither from cost savings nor innovation, and which accrue to

overseas shareholders, we think it right to regard these as exploitation of the New Zealand community and to be counted as a detriment to the public.

Implications for dynamic economic efficiency

Given that the public in Section 3A of the Act is the New Zealand public, is the court suggesting that the permissibility of a merger or commercial practice may differ according to whether or not the relevant firm is foreign-owned? That depends upon the interpretation of *functionless monopoly rents.*

If *functionless* refers to rents that have no implications for behaviour which will benefit the New Zealand public in the long term, then cost-benefit calculations offer only very limited possibilities of an appeal to discrimination on the grounds of ownership. Provided there are no regulatory barriers to entry, profits are the catalyst to competition, entry, and innovation – all of which enhance dynamic efficiency and economic growth. If this *function* of profit is admitted under competition law, there will be very few instances where ownership discrimination is applicable. Alternatively, if the rents are treated at each point in time as *functionless* and if their effect on competition investment and innovation is ignored, there will be many examples of efficiency computations that could be substantially affected by the court's caveat.

Even if profits were considered *functionless* there are a number of obvious direct issues that should be considered before discriminating between foreign and domestic owners. The direct issues include the fact that the New Zealand public may own some proportion of relevant foreign firms, and that these firms would generally pay some domestic tax on any surplus. Thus the differentiation between foreign and domestic firms is not necessarily a differentiation that represents where benefits and costs fall, and yet it is this incidence that is the basis of any differentiation.

It is unlikely that foreign producers and consumers need to be treated the same way. The tax and location-ownership issues differ between foreign ownership and consumption. Foreign consumers are much more passive than foreign investors in the determination of the dynamic

performance of the New Zealand economy. Because of this, it will generally not detract from New Zealand's dynamic economic performance to ignore benefits and costs that lie with foreign consumers – but this will not be the case for foreign investors.

> **"SINCE COMPETITION LAW IS A CONSTRAINT ON INSTITUTIONS OF TRADE AND ON TRANSACTIONS, ITS NEUTRAL APPLICATION IS REQUIRED IF THE AVAILABILITY, ENFORCE-ABILITY, AND UPTAKE OF CONTRACTS IS TO BE NEUTRAL BETWEEN DOMESTIC- AND FOREIGN-OWNED FIRMS."**

One law for all

Contracts are subject to competition law. Since competition law is a constraint on arrangements for trade and on transactions, its neutral application is required if the availability, enforceability, and uptake of contracts is to be neutral between domestic- and foreign-owned firms.

Indeed, the argument for the facilitation of dynamic economic efficiency is the same as the rationale for sanctity of contracts. Unless contracts are impartially enforced, transactions and investment will be affected. In particular, if

foreign-owned firms perceive that contracts are not enforceable in New Zealand because of the administration of competition law, then they will either not transact in New Zealand or they will write into contracts with New Zealand entities that the contracts are to be enforceable in other jurisdictions. To treat firms within the same (New Zealand) market differently – under competition and/or contract law – according to domestic or foreign ownership would hinder dynamic efficiency, because it would imply that existing foreign-owned firms in New Zealand would be discriminated against in administrative and legal decisions of commerce.

If firms were fully informed of the discrimina-tory policy before they entered, fewer foreign-owner firms would enter – so that competition and, concomitantly, the dynamic efficiency of New Zealand markets would be reduced. Where this inhibits the uptake and development of innova-tions, the loss in welfare would be very large indeed.

After contracts are signed, outcomes often occur that suggest some other arrangement would be more efficient. The argument for the enforcement of contracts as they are written is that enforcement limits opportunistic behaviour; it also enables long-term agreements that enhance dynamic efficiency. This is exactly the rationale for neutral treatment of domestic- and foreign-owned firms in cost-benefit tests under competi-tion law.

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1   For example the Pohokura joint-marketing authorisation, the Air New Zealand-Qantas application, and the 'local loop unbundling' evaluation.

2   More about the subject is contained in: Lewis Evans and Patrick Hughes. 2003. *Competition Policy in Small Distant Economies: Some Lessons from the Economics Literature* (www.iscr.org.nz/ navigation/research.html and www.treasury.govt.nz/workingpapers /2003/03-31.asp).

3   Inserted by Section 4 of the Commerce Amendment Act 1990.

4   First published in 1994 and revised in 1997.

5   The review of the Commerce Act in 1992 recommended that the Act be amended with a new section to the effect that: 'Benefits which accrue outside of New Zealand but which create gains from trade and invest-ment for New Zealand are regarded as benefits to the public.'. The amendment was not made.

6   *Telecom Corporation of New Zealand Limited v Commerce Commission* 1991 4 TCLR 473.

7   *Ibid* at 531.

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SKILL AND STAMINA WIN
the growth race at the OECD stadium

In terms of economic growth, the period from 1992 to 2002 is exceptional for New Zealand. It is the longest period since the 1960s in which New Zealand's average per-capita GDP growth matched the pace of the total OECD's per-capita GDP growth. The Treasury's Bob Buckle and Nathan McLellan began their examination of this phenomenon in the August issue of *Competition and Regulation Times*. Now they pick up the pace.

As we remarked in our August article,[1] raising living standards is like a long-distance race. Proper preparation is required to sustain and improve per-capita GDP growth and to keep pace with other countries – and economic reform seems to have improved New Zealand's preparation for the growth race at the OECD stadium.

From a growth accounting perspective, New Zealand's improved per-capita GDP growth performance reflects either higher growth in labour utilisation (average hours worked per head of the population) or higher labour productivity growth (output per hour worked), or a combination of the two. Labour productivity in turn is the outcome of the rate of growth of capital deepening (that is, the amount of capital available per hour worked) and multifactor productivity growth.[2] That is, growth is sourced both from factor accumulation (which arises from growth in labour utilisation and capital) and from productivity.

Figure 1 illustrates how labour utilisation, capital deepening, and multifactor productivity combine to determine per-capita GDP growth. Countries with low levels of labour utilisation (such as Poland and the Slovak Republic) have scope to increase per-capita GDP growth by increasing their growth in labour utilisation and by raising labour productivity growth.[3] Countries that already have high rates of labour utilisation (such as Iceland, Norway, and Switzerland) must rely more on raising labour productivity growth if they are to maintain their positions in the growth race. Labour productivity growth can arise from either capital deepening (that is, growth in the capital-labour ratio) or higher growth in multifactor productivity, or some combination of these.

To compete successfully, distance runners need both good technique and high stamina. Multifactor productivity is analogous to the level of skill or technique; the stocks of labour and capital utilised in production are analogous to the level of stamina; and increases in labour utilisation and capital deepening are analogous to raising the level of stamina. Productivity and factor accumulation (labour and capital input growth) complement each other in a manner similar to the way good technique and high stamina complement each other in a long-distance race.

Maintaining international competitiveness requires distance runners to keep abreast of new running and training techniques as well as to increase their levels of stamina at rates achieved by other competitors. Without training, technique and stamina will dissipate over time. Just as differences in technical development and the build-up of stamina differentiate between competing athletes, so also do differences in

> Nothing in this study argues that factor accumulation is unimportant in general or denies that it is critically important for some countries at specific junctures. TFP does not explain everything, everywhere, always. Rather the study shows that something else – besides factor accumulation – plays a prominent role in explaining differences in economic performance across countries.
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> *William Easterly and Ross Levine. 2001.*[7]

multifactor productivity growth and factor accumulation differentiate between per-capita GDP growth rates across countries. Although productivity growth is widely regarded as the key to raising per-capita GDP growth and living standards over the long term, over the medium term all three components (labour utilisation growth, capital deepening, and multifactor productivity growth) can and do play a crucial role in determining differences in per-capita GDP growth across countries.

Moreover, there may also be links between labour productivity growth and growth in labour utilisation. For example, some theoretical models of economic growth emphasise 'learning-by-doing' effects that boost skill development. To the extent that learning-by-doing affects skill development, changes in labour utilisation and employment duration will impact on labour productivity. Building stamina (that is, increasing labour and capital accumulation) may therefore also help to develop and refine running skill and technique.

Leading questions

Has New Zealand's improved performance in the OECD growth race been the consequence of

Figure 1: Contributions to GDP per-capita growth

GDP per-capita growth

Labour productivity growth (MFP growth + capital deepening) + Labour utilisation growth
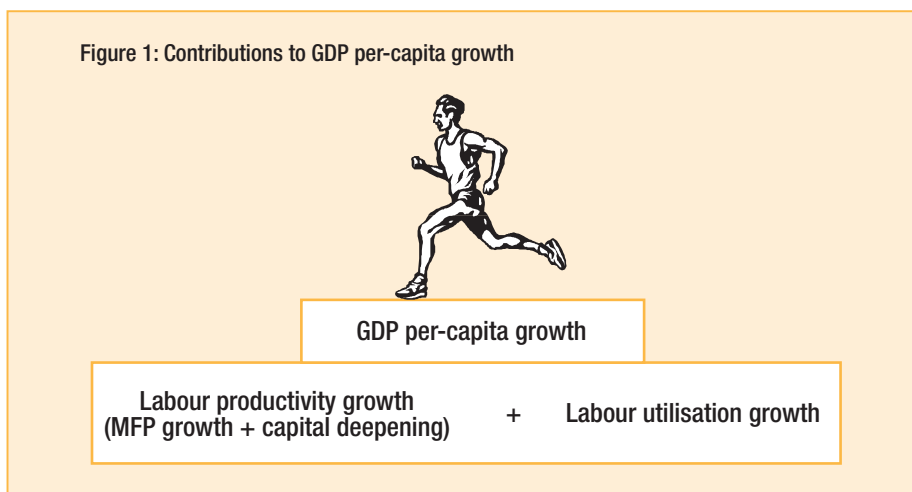
faster improvement of skill and technique or a consequence of faster build-up of stamina? And why did Australia continue to run faster than New Zealand? These questions can be answered by examining the growth rate of the components of the growth decomposition shown in Figure 1.

After falling in the late 1980s and early 1990s, New Zealand's labour utilisation rate grew relatively fast – both historically, and relative to most other OECD countries (including Australia). This performance is reflected in an unemployment rate that is currently below the rates prevailing in over half the OECD countries, and in a labour-force participation rate that is now above the OECD average (although for both genders it is still below levels prevailing in some OECD countries such as Iceland, Norway, and Switzerland). Labour productivity growth on the other hand has not shown the same improvement: it has remained around its historical growth rate, and below that for Australia. These characteristics are evident from Figures 2 and 3. They show New Zealand's and selected OECD countries' 11-year growth rates for labour utilisation and labour productivity. Labour productivity growth has remained broadly unchanged at around 1% per annum.

Why has labour productivity growth not improved? From Figure 1 it is clear that labour productivity growth is the outcome of two further components: multifactor productivity growth (which is synonymous with improvements in skill and technique) and the capital-labour ratio (the rate of capital accumulation relative to labour accumulation). If there is a bias toward growth in labour relative to the growth in capital, the capital-labour ratio will fall.

Recent work at Treasury comparing New Zealand and Australian productivity suggests that multifactor productivity growth has been similar in the part of the economy where productivity can be measured more reliably.[4] It also suggests that the reason for New Zealand's relatively slow labour productivity growth lies in relatively slow capital accumulation. IMF work also shows that a substantial amount of the difference in the level of per-capita GDP between Australia and New Zealand is because of New Zealand's lower capital-labour ratio.[5] That is, New Zealand is relatively capital-shallow compared with Australia. This observation is reinforced by preliminary estimates of capital accumulation across several OECD countries, which show New Zealand

lagging. Since at least the early 1970s – and with the exception of the early 1980s (the 'Think Big' era) and the mid 1990s – New Zealand's ratio of business investment to GDP has been lower than the OECD average.

Skill + stamina

New Zealand's improved performance in the growth race seems therefore to have come from both sustained skill development (in the form of multifactor productivity growth) and much improved stamina build-up (in the form of higher labour utilisation growth). But the stamina build-up from physical capital accumulation was relatively slow, as reflected in a very modest rise in the capital-labour ratio. Moreover, New Zealand's slower rate of physical capital accumulation appears to be an important reason for

Australia's keeping ahead of New Zealand in the growth race since the early 1990s (see Figure 4 on page 10).

There are several possible explanations for this difference. These explanations are not mutually exclusive. Some have no obvious government policy implications, while others may be more amenable to influence from policy.

New Zealand's lower rate of physical capital accumulation may reflect the optimal response of firms to the changing relative prices of labour and capital. There are two possible reasons why an optimal response may result in a lower rate of capital deepening from that observed in Australia.

First, changes in factor-market regulations (which affect the relative prices of labour and capital) may have changed firms' incentives to alter the mix of sourcing output

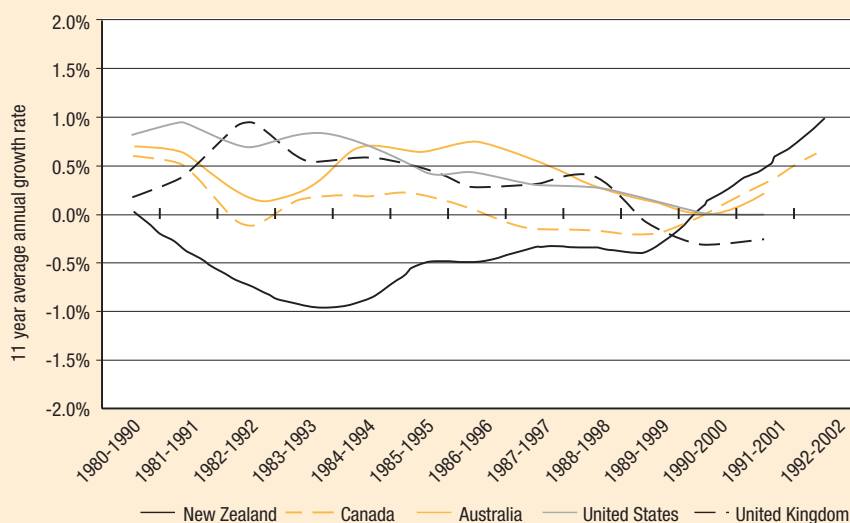Figure 2: Labour utilisation – New Zealand and selected countries

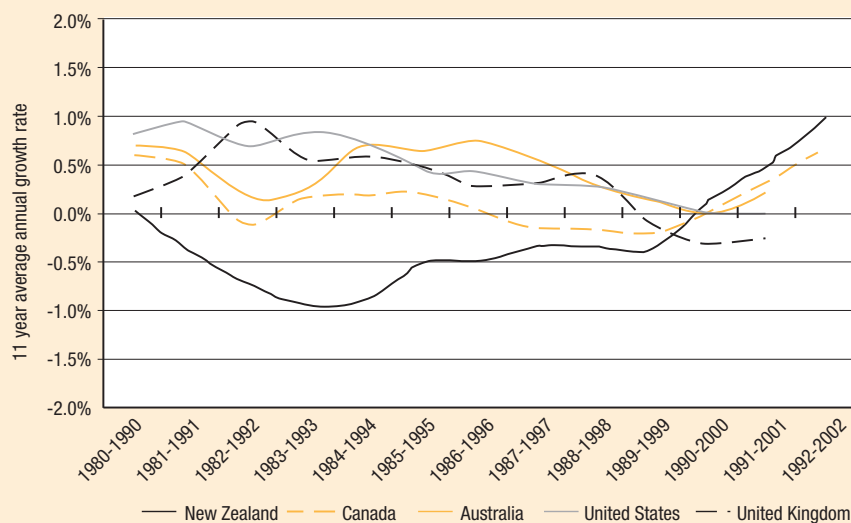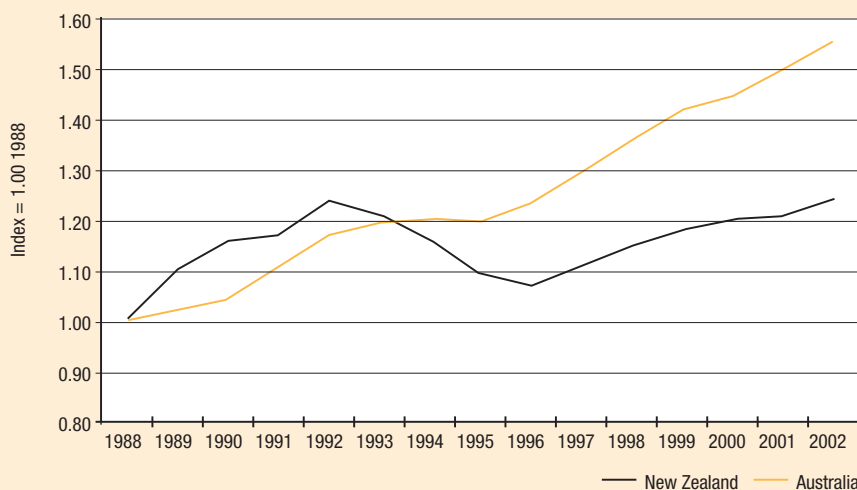Figure 2: Labour utilisation – New Zealand and selected countries

Figure 4: Capital labour ratio – New Zealand and Australia

growth – so that firms switched to employing more labour rather than investing more in physical capital. Differences in the timing of these regulatory changes are therefore a possible explanation for the differences in labour and physical capital accumulation in New Zealand and Australia over the last decade.

Second, the lower aggregate rate of capital deepening in New Zealand may be due to a different industrial structure. For example, the Australian economy has a larger mining and quarrying industry than New Zealand – and this, given the high degree of capital intensity in the mining and quarrying industry, may be a factor behind New Zealand's lower rate of physical capital accumulation. By contrast the service sector, which has become an increasingly important part of the New Zealand economy over the last decade, tends to be more labour intensive.[6]

A number of points follow from this. New Zealand's smaller domestic market may be a contributing factor. The size of New Zealand's domestic market might lower both the rate of return to capital investment and the rate of capital investment undertaken in New Zealand (compared with Australia and other economies). If the smallness of the domestic market lowers the rate of return on physical capital investment in New Zealand, then accessing overseas markets via exporting provides one potential way of raising the return on physical capital investment.

Differences in the user cost of capital, which is the cost of funding investment, may be a factor contributing to a lower rate of capital accumula-tion in New Zealand. The user cost of capital is affected by real interest rates, which tend to be higher in New Zealand compared with rates in Australia and the US, and by tax rates and rates of economic depreciation. Some of these factors are amenable to policy influence.

Australia and New Zealand are both charac-terised by a relatively high proportion of small firms. Hence, the finding from international research that smaller firms find it harder to raise external finance and are more likely than larger firms to have to rely on internal funds for capital investment does not seem to explain differences in rates of capital investment. However, this could be relevant to the extent that there are differences in the adequacy with which financial markets in the respective economies can meet the financial requirements of firms.

Finally, infrastructure investment is a component of capital deepening. If there has been a lower rate of infrastructure investment in New Zealand compared with Australia and other economies, this would influence the aggregate rate of capital accumulation relative to those economies.

Too close to call

As highlighted by Easterly and Levine,[7] countries' growth prospects appear to depend crucially on multifactor productivity growth. Developing a good running technique will be critical if New Zealand is to continue to perform well at the OECD stadium.

That New Zealand's multifactor productivity growth appears to have matched Australia's over the last decade and a half bodes well for New Zealand's future growth prospects. However, over the medium term, differences in rates of growth of labour utilisation and capital deepening can also crucially affect relative growth rates. While New Zealand has displayed impressive growth in labour utilisation since the early 1990s, for one reason or another it has not matched the rates of capital deepening in Australia and several other OECD countries. The reasons warrant deeper investigation.

Although this article draws on research from Treasury's growth programme, the views expressed are those of the authors and do not necessarily reflect the views of The Treasury. Some of this research has been published in Treasury Working Papers (which are available from www.treasury.govt.nz/workingpapers).

1   Bob Buckle and Nathan McLellan. 2003. 'The growth race at the OECD stadium' *Competition and Regulation Times* August 2003 Issue 11 pp1-2 and 12.

2   Multifactor productivity refers to the ability with which firms use a combination of inputs to produce outputs. It is typically measured as an index of output divided by the weighted sum of capital and labour indices (where the weights are determined by the relative importance of capital and labour in the production process). Multifactor productivity is therefore a more comprehensive measure of productivity than is labour productivity: since labour productivity is output divided by labour inputs, it is a partial measure only. Multifactor productivity is sometimes loosely referred to as total factor productivity (TFP), the term used by Easterly and Levine (2001). (For full Easterly and Levine reference, see footnote 7.)

3   Provided this can be done without adversely affecting other contributors to growth.

4   The industries excluded from these productivity measures are those where productivity cannot be meaningfully measured (usually because output is calculated using a constant-productivity assumption). In 2002 this sector of the Australian and New Zealand economies was approxi-mately 64% and 58% respectively of GDP. See Melleny Black, Melody Guy and Nathan McLellan. 2003. 'Productivity growth in *New Zealand: 1988 to 2002' New Zealand Economic Papers* 37(1) pp119-150.

5   International Monetary Fund (IMF). 2002. 'New Zealand: Selected Issues' *IMF Country Report* No. 02/72 (prepared by K. Kochhar, M. Cerisola, R. Cardarelli, and K. Ueda). Washington.

6   That the service sector has become an increasingly important part of the New Zealand economy was shown in Figure 3 and Figure 4 of our earlier article 'The Growth Race at the OECD Stadium' in *Competition and Regulation Times* August 2003.

7   William Easterly and Ross Levine. 2002. 'It's not factor accumulation: stylised facts and growth models' *The World Bank Economic Review* 15(2) pp177-219.

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been considered 'socially undesirable' if the analysis had included sunk costs.[3] Under a negligence regime GMO firms will want to undertake more of these projects, because they are more likely to be profitable for the firm (provided that the firm can avoid liability).

Substituting for information

Regulation operates in an environment of imperfect and asymmetric information. For example, GMO firms might have good information about the benefits of their project, but they might not be able to communicate this information to ERMA in a way that is credible. Because of this, regulators will have to make decisions based on limited information, and this means that they will sometimes ban desirable projects and let undesirable projects through.

Some of the information the regulators receive is signalled by the fact that the GMO firm wants to undertake the project, which indicates that expected benefits are at least large enough to make the project profitable. Because the benefits of a project must be higher for a project to be profitable under a strict liability regime (compared with what they have to be under a negligence regime), regulators know a project is more likely to be socially desirable if they observe that a GMO firm wants to run the project under strict liability. This means that regulators can afford to be less restrictive in the projects they approve under strict liability, and so will reject fewer desirable projects.

In other words, under strict liability ERMA is able to make better decisions about which projects it should approve because it receives better information about project benefits and so will make fewer errors.

Adjusting for bias

We should also consider the possibility that ERMA has some degree of bias in its analysis of projects. An argument could be made for a bias either way. ERMA staff are ex-researchers, and so may be overly sympathetic to researchers' perspectives. But, on the other hand, ERMA gains few benefits from a successful project but will

suffer from public outcry should an accident occur – and so may be overly conservative in approving projects.

If ERMA's information were perfect, then strict liability would be at least as good as negligence. A regulator biased against projects would allow only very beneficial projects to proceed (and these would be profitable for GMO firms regardless of liability). But regulators biased in favour of projects would allow some undesirable projects to proceed (and more of these would be profitable under negligence than under strict liability).

If we acknowledge that ERMA does not have perfect information, then a strict liability regime still comes out ahead. Strict liability *will* be better than negligence if regulators are biased in favour of projects; and it *could* be better than negligence if regulators are biased against projects.

The wider picture

These scenarios suggest that strict liability will lead to better social outcomes. However, there are some situations where negligence might perform better than strict liability.

Firms that undertake GMO projects do not receive all of the benefits from their products – government gains from taxes, society gains from consumer surplus, and other firms may gain if knowledge spillovers make future research easier. If these benefits are large enough, then a negligence regime might be better for society: there would be socially desirable projects that would be unprofitable for GMO firms to invest in, and there would be more of these under a strict liability regime than there would be under negligence. Regulators can prevent firms from undertaking undesirable projects, but they can't force firms into undertaking desirable projects that are unprofitable.

The possibility of bankruptcy also creates problems for strict liability. If an accident occurs and the subsequent cost of damage is greater than the GMO firm's assets, then it cannot be forced to pay the entire cost of the damage. Knowing this, firms will rationally choose to take a level of precaution that is less than efficient. This is a much more serious problem under a

strict liability regime. (Under a negligence regime, non-negligent firms are not liable for accident costs and so bankruptcy does not arise.)

So, what policy conclusions can be drawn?

Strict liability has an advantage over negligence because it will provide better incentives for firms to undertake only those projects that are desirable for society in aggregate. Unless there are considerable benefits, or a high probability of very serious accidents and consequent bankruptcies, then a strict liability regime will lead to better management of risks.

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1 A project is socially desirable if its expected benefits exceed both its precaution costs and its expected risk of accident.

2 The efficient level of precaution is one that minimises (the sum of) precaution costs and expected accident costs.

3 Having a regulatory regime where sunk costs were considered in project-approval decisions may not solve this problem – both because regulators may not have good information about the magnitude of sunk costs and because such a regime has its own static efficiency costs.

Stephen Hutton is a former Masters student in economics and research assistant at ISCR, currently studying for his PhD at the University of Maryland. This article draws on his Masters thesis, which examined the economic issues surrounding liability for GMOs – particularly the interplay between liability and regulation.

Covenants can be tailored to specific circumstances; and in this way they enlarge the set of permissible uses of the land. Not all covenants that protect and provide for management of the environment need to specify the conservation estate. This suggests that, from the nation's point of view, there is a strong argument that a minimal amount of land should be transferred to the conservation estate in the pastoral-lease reviews.

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1 The Commissioner of Crown Lands makes the decision on behalf of the Crown after public consultation during the process of evaluation.

2 The 'conservation estate' makes up 30% of New Zealand's land.

3 By its focus on the effects of actions, the Resource Management Act seeks to constrain development in ways that preserve the existing state.

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GENETICALLY MODIFIED LIABILITY

Now that the moratorium on genetically modified organisms (GMOs) has expired, the focus is shifting to risk management and to institutional systems – such as a liability regime – that can help manage GMO risks appropriately. Stephen Hutton notes that, under current law, GMOs will generally be governed by a negligence regime. And he asks: is this the best system?

G MOs may have the potential to cause accidents that inflict welfare costs on third parties – for example, through crop contamination or environmental damage. In an unregulated market, firms undertaking genetic modification activities ('GMO firms') would have insufficient incentive to take the costly precautions that reduce the likelihood or severity of accidents. As such firms receive most of the benefits from undertaking a project (through their profits) but do not bear the cost of external risk, they would also have incentives to undertake some projects that are not socially desirable.[1]

The economic purpose of a liability regime is to provide appropriate incentives so that parties take efficient levels of precaution[2] and adopt projects if and only if they are socially desirable. A project that is socially desirable, however, could turn out to cause a serious accident; and a project that is socially undesirable might cause no problems. So the best we can do is make decisions based on expected outcomes.

Two contenders for liability

The central issue in the liability debate is the difference between strict liability and negligence.

Under a *strict liability* regime, a GMO firm is held liable for all accident damage except for specific defences, such as deliberate sabotage or contributory negligence. Under a *negligence* regime, a firm is held liable only if it takes less precaution than that required by a given standard of care (which should be set at the efficient level of precaution). So activities will be more profitable for firms under a negligence regime than they would be under a strict liability regime.

The economic literature shows that parties will take efficient precaution levels under both regimes, though for different reasons. Under strict liability, GMO firms will bear the full costs of accidents – and so they choose an efficient precaution level that allows them to minimise their expected accident-liability costs. Under negligence, firms will choose an efficient precaution level because this allows them to *avoid* being held liable for accident costs.

GMO firms will undertake projects whenever benefits exceed their private costs. But a project is socially desirable only when benefits exceed its total costs – including the costs of accidents. Under a negligence regime, therefore, firms will have incentives to run some undesirable projects. This is because, by taking sufficient precautions to avoid liability, they will not bear the full cost of accidents. In other words, just because a project is profitable under negligence liability does not mean that it is socially desirable.

The real world

Under the Hazardous Substances and New Organisms Act, anyone in New Zealand wishing to release a GMO must first apply to the Environmental Risk Management Agency (ERMA). ERMA is required to examine each application; and to use an analysis of the benefits, costs, and risks involved to make a decision about allowing the applicant to proceed.

In a perfect world, ERMA would be able to refuse approval for projects if and only if they were socially undesirable – and so there could be efficient outcomes under either a negligence or a strict liability regime.

Unfortunately, real-world complications can change this result.

That sinking feeling

Firms must make large investments in research and development before a project gets to the stage of needing release-approval. This means that many of the costs of a GMO project are sunk by the time ERMA makes its approval decision.

Sunk costs are not considered in the cost-benefit analysis that determines whether the project should proceed. So there will be some 'socially desirable' projects that would have