



EcoNZ@Otago

21

JULY 2008

Eeny, meeny, miny, moe; Catch a patient by the toe; To whom should the treatments go?

FROM THE editor

Welcome to Issue 21 of *EcoNZ@Otago*!

As most readers know already, *EcoNZ@Otago* is a magazine about contemporary economic issues, published by the University of Otago's Department of Economics.

The contents of the previous 20 issues of *EcoNZ@Otago* are listed at the back of this issue, and single issues are available on request (our addresses are below).

If there are any economic issues that you would like examined in a future issue of *EcoNZ@Otago*, then please email your suggestions to econz@otago.ac.nz.

Alternatively you can write to *EcoNZ@Otago*, Department of Economics, University of Otago, PO Box 56, Dunedin.

The University has established a memorial fund to honour Sophie Kate Elliott (1985 – 2008), who completed an honours degree in economics in 2007. Please contact us if you wish to receive information on how to contribute to this fund.

Niven Winchester

Paul Hansen

phansen@business.otago.ac.nz

In every public health system in the world there are never enough so-called 'elective' (or non-emergency) services available for everyone who could potentially benefit from them. This article discusses how patients are prioritised for elective services in New Zealand,¹ and outlines a new process for creating 'points systems' developed in New Zealand that is now being exported to other countries.



Elective health services are ones for which patients are capable of waiting to be treated (in contrast to *emergency* services). Examples include hip and knee replacements, some kinds of heart surgery, cataract surgery, infertility treatments, plastic surgery, and so on. New Zealand's health system is a predominantly *public* system (in contrast to *private* or *social insurance* systems).² This means that the elective services available (and 'non-elective' services too) are funded from general taxation, so that patients are charged nothing when they are treated.

¹ For a discussion of prioritisation across the health system as a whole and an introduction to cost-utility analysis, see an earlier *EcoNZ@Otago* article, Devlin & Hansen (1999).

² Other countries with public health systems include: Australia, Canada, United Kingdom, Ireland, the Scandinavian countries, the former communist countries, and many so-called developing countries.

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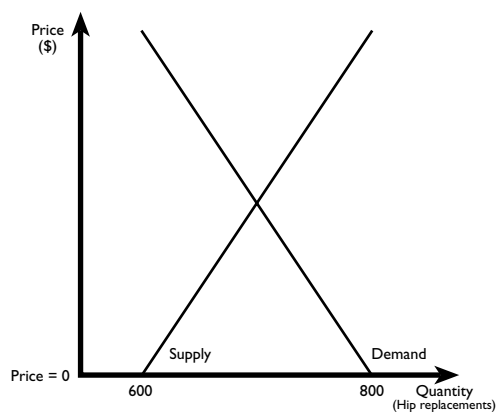
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This combination of elective services being 'free' to patients and patients being capable of waiting (albeit they would prefer not to) ensures there will always be more potential patients who could benefit from treatment (even if just a little) than there are elective services available. This phenomenon can be represented in the demand and supply diagram in Figure 1 (for the example of hip replacements). When hip replacements are free to patients (price = 0), the quantity demanded equals, say, 800 and the quantity supplied equals, say, 600, and so there is 'excess demand' of 200.

The dreaded R word!

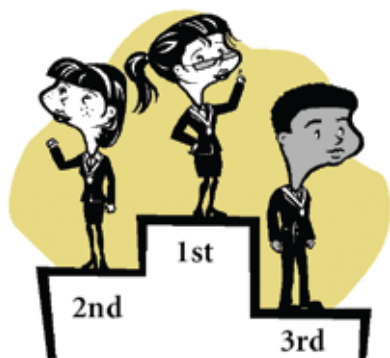
This excess demand means that the 600 hip replacements must be *rationed* amongst the 800 potential patients. In other (more genteel) words, 600 of these 800 potential patients must be *prioritised* to receive the 600 hip replacements (compared to the 200 potential patients who will miss out). Because these 'lucky' 600 patients cannot be treated all at once, their order of treatment must also be determined. If you were in charge, how would you go about making these prioritisation decisions?

Figure 1: Demand and supply for an elective service (e.g., hip replacements)



Who and in what order?

There are many possible approaches for prioritising patients in theory. At one extreme, for example, patients could be chosen arbitrarily or randomly. Doctors could treat patients they like, in any order. Or they could toss a coin: heads you get a hip replacement, tails you don't. Most people, however, would prefer prioritisation decisions to be made in a more consistent and impartial fashion, based on relevant information and an explicit and transparent process.



New Zealand's waiting lists were described in 1993 as being "a diverse mix of patient cases - placed and kept on the list for a number of different reasons, and with no agreed criteria for admission to the list." (Fraser et al., 1993). As a cardiologist quoted in Hadorn & Holmes (1997b) put it: "Manipulation by referring doctors, friends in high places, MP letters, or just persistent nagging, and just slight exaggeration of symptoms, is rampant, and the poor benign patient simply sits on the list and is leap frogged." And so a new approach, implicitly based on Multi-Criteria Decision Making (MCDM), was introduced to promote greater consistency and transparency.

MCDM and points systems

Multi-Criteria Decision Making is the name for methods for arriving at rankings of alternatives that are described on (multiple) criteria relevant to the decision being considered. MCDM is used in literally thousands of applications - e.g., from deciding who to admit to law school, to selecting immigrants, to thinking about where to hold the 2016 Olympic Games.

With respect to prioritising patients, MCDM involves arriving at a ranking based on explicit criteria - usually associated with patients' relative 'needs' and their 'capacities to benefit' from the treatment. Each criterion, comprising two or more levels, is worth a range of 'point values' (or 'weights') intended to reflect the relative importance of the criteria. These point values are commonly known as a 'points system' (see Figure 2 for an example). Each patient is 'scored' to get a 'total score', the sum of the patient's point values across the criteria. The ranking of patients' total scores determines who gets treated and in what order.

Figure 2: Points system for hip replacements (illustrative only)

Criteria	Points Score
Pain	
No pain	0
Intermittent activity-related pain	7
Regular pain with weight-bearing activity	15
Significant pain with activity & at rest	24
Dominates life & regularly interferes with sleep	31 <input type="checkbox"/>
Personal functional limitation due to orthopaedic condition	
No limitation	0
Mild limitation	4
Moderate limitation	13
Severe limitation	24 <input type="checkbox"/>
Potential benefit from surgery (for patient, dependents, etc)	
Small improvement likely	0
Moderate improvement likely	15
Return to near normal likely	27 <input type="checkbox"/>
Consequence of delay > 6 months	
Unlikely to deteriorate	0
Likely to deteriorate & result in increased disability	12
Likely to progress to major complications	18 <input type="checkbox"/>
Total Score = <input type="checkbox"/>	

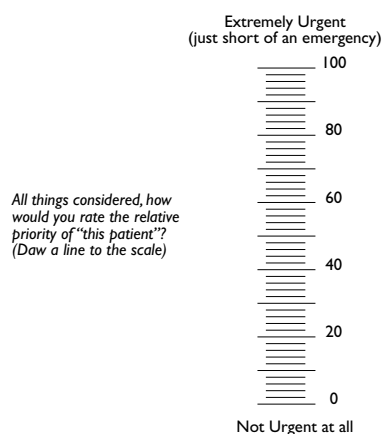
First in the world

On 1 July 1998 points systems, also referred to as ‘National Clinical Priority Assessment Criteria’ (CPAC), were formally adopted in the New Zealand public health system for at least seven elective services, including coronary artery bypass graft (CABG) surgery, cataract surgery, hip and knee replacements, and infertility treatments (Hadorn & Holmes, 1997a,b).

A few years later the public health systems of Canada’s western provinces followed New Zealand’s lead and introduced points systems for a similar range of services (Noseworthy et al., 2003). Points systems are also used in the UK, and their adoption across the UK’s National Health System has been debated (e.g., Derrett et al., 2002).

New Zealand’s and Canada’s points systems were created using ‘group consensus methods’, with their point values ‘fine tuned’ by having participating clinicians rate hypothetical patient descriptions on ‘visual analogue scales’ (VAS) with respect to urgency for treatment (e.g., see Figure 3). These VAS ratings were then ‘regressed’ (a common statistical technique) against the patients’ characteristics in terms of the points system’s criteria, with the point values derived from the regression coefficients.³

Figure 3: Visual analogue scale (where “this patient” would be appropriately described)



Unfortunately, not long after being introduced, several of New Zealand’s points systems were criticised for being essentially invalid and resulting in significant numbers of patients being mistakenly denied treatment (sometimes with fatal consequences).⁴ In 2004, following a review, the Ministry of Health launched a project to revise New Zealand’s points systems. Given the original points systems were widely considered to have been failures – and so too, by implication, were the methods used to create them – a new process for creating points systems was needed.

A new process for creating points systems

The process is fully supported by Internet-based software known as 1000Minds (available from the author or www.1000minds.com). Space limitations prevent the process from being fully explained here,⁵ but its key elements may be summarised as follows.

For each elective service concerned, the points system’s criteria (and their levels) – based on patients’ needs and capacities to benefit from treatment – are identified by a group of national clinical leaders. This is based on clinical evidence or, in its absence, the consensus of expert opinion, and also clinicians’ ethical values. Other stakeholders are also consulted, including patient groups, Māori representatives, the National Ethics Committee, the Health and Disability Commissioner, and District Health Boards.

Having identified a points system’s criteria, it is also important to specify the ‘right’ point values – reflecting the relative importance of the criteria. (If the points are wrong, then no matter how perfect the criteria, the ranking of patients will be inaccurate.) The 1000Minds software determines the point values by asking the participating clinicians a series of questions, involving tradeoffs between the criteria. An example is shown in Figure 4.

Analogous questions, all involving tradeoffs between the criteria, are repeated with different combinations of the criteria until sufficient information about the clinicians’ preferences (i.e., their pairwise rankings) has been collected. From the pairwise rankings, the software estimates the point values for the criteria.

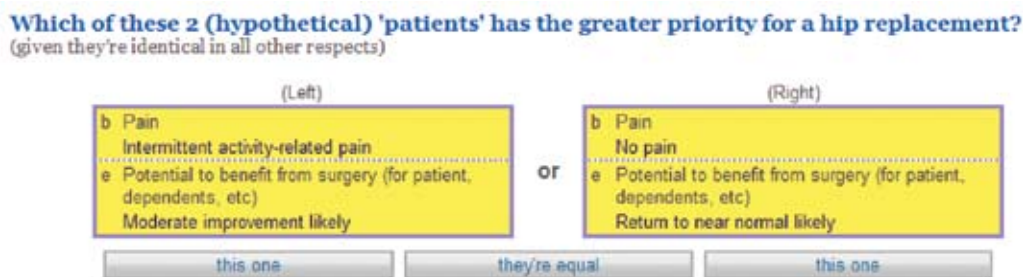


Figure 4: Example of a 1000Minds pairwise-ranking question

3 For example, if patients with the pain characteristic “Dominates life and regularly interferes with sleep” (see Figure 2) received consistently high VAS ratings, regression analysis will assign a relatively large number of points to this.
 4 References are available from the author.
 5 Details are available from the author.

An important advantage of this approach is that it's based on the simplest possible type of decision in the universe – pairwise ranking (as in Figure 4): i.e., choosing one alternative ('patient') from just two options. This is a 'natural' activity that everyone has experience of (see question 2 below). It is less cognitively demanding than VAS ratings (see Figure 3 again), as were used to create New Zealand's original points systems. This means that clinicians' answers to pairwise-ranking questions - and the point values derived from them - are likely to have greater validity and reliability.

Conclusion

Since 2004 the new process described here has been used to re-create New Zealand's points systems as well as to create entirely new ones. These points systems are being used throughout New Zealand. The process and software have won several national and international innovation awards, and are now being exported to Canada and other countries.

Some questions to think about

1. As discussed above, the criteria included in points systems for prioritising patients are based on patients' relative 'needs' and their 'capacities to benefit' from the treatment. What is the difference between these concepts in general terms? How are they related? Why are both concepts relevant for prioritising patients?
2. Pairwise ranking, as used by the 1000Minds software (see Figure 4), is an example of a 'choice-based method'; whereas VAS ratings, as used to create New Zealand's original points systems (see Figure 3), is an example of a 'scaling' method. According to Drummond et al. (2005, p. 145): 'The advantage of choice-based methods is that choosing, unlike scaling, is a natural human task at which we all have considerable experience, and furthermore it is observable and verifiable.' Do you agree? Why? / Why not?

Further reading

Gauld & Derrett (2000) discuss the development and implementation of New Zealand's points systems, and Derrett (2005) reviews the literature on them.

Useful websites

For more information about 1000Minds software, visit www.1000minds.com. The site includes an "education" section with non-technical information about Multi-Criteria Decision Making (MCDM) in general and points systems in particular.

An international survey of software for performing Decision Analysis, including MCDM, is available from www.lionhrtpub.com/orms/surveys/das/das.html.

Points systems are widely used internationally for decision making in most branches of medicine. Over 11,000 decision-making algorithms, many of which are points systems, are available from The Medical Algorithms Project via www.medal.org.

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The price of oil: Geology v Economics

John Parker

jparker@business.otago.ac.nz

Emeritus Professor Ian Lowe of Griffith University in Brisbane, while in New Zealand and about to tramp the Heaphy Track, found time to write an Opinion piece for the *Otago Daily Times (ODT)* entitled 'Geology will set future fuel options'. (19 March 2008). In it he sets out a robust denial of the views expressed in an article previously published in this magazine (Parker, 2008) and reprinted in the *ODT* (13 March 2008). Sadly his lack of basic economics limits his contribution. The 1987 Nobel Laureate Robert Solow points out that the main role of economists is to be 'intellectual sanitation workers'. The higher function of Economics is to help people know nonsense when they see it. The purpose of this article is to exercise that higher function and expose the nonsense written by Prof. Lowe.



Economic assessment

Before highlighting the shortcomings in Prof. Lowe's analysis, it is helpful to summarise the central arguments in my previous contribution. In Parker (2008), I suggested that oil is no different from any other marketed commodity. Sure it is of massive economic importance, but in principle it is like all other scarce extractive resources. If the market is able to function reasonably well, the price of oil will reflect the prevailing demand and supply. To add a point of clarification, the 'in ground' stock of oil is not the same as the current supply. The current supply is the amount offered for sale over a range of prices, now and in the near future. This should not be confused with the aggregate of discovered and undiscovered oil reserves in the world.

Continuing with the summary, a high price of oil fosters innovation and substitution. There is an array of latent or dormant technologies that are awaiting their time. Innovation also occurs within the oil industry and elsewhere. Parker (2008) lists some established and in development alternatives that are or will be available for powering motor vehicles. The events of the 1970s and early 1980s suggest that markets are capable of fostering substitution and technological change. There is no need to panic. Peak Oil does not mean that the price of oil will spiral ever upwards and then run out in the near future. The future price of oil, in the medium to long term, will be limited by the costs associated with substitute technologies. I finished with the comment that the market cannot do everything, especially if there is an unwanted

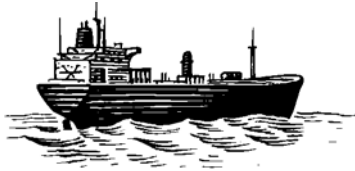
external effect. This is particularly relevant to carbon emissions and climate change.

Intellectual sanitation

So to begin the intellectual sanitation process on Prof. Lowe, the following are statements that are wrong in fact or logic. First, his statement that as an Economist I have assumed that markets will always solve resource problems is factually incorrect. Towards the end of my article, I quite deliberately pointed out that there are circumstances when markets do not cope. In particular I made reference to the negative external effects of oil consumption and its impact on climate change. I pointed out that under these circumstances markets will need considerable help to provide a solution.

Second, the statement attributed to me that Peak Oil is a delusion is wrong. In Parker (2008), I did not comment on the status of Peak Oil as fact or fiction. I merely cautioned against a simplistic interpretation to the effect that Peak Oil must mean ever increasing prices and oil running out in the near future. It is this price forecast that is the delusion. A tightening of the supply of oil, for whatever reason, does not automatically generate unrelenting price increases and a catastrophic depletion of reserves. One of the most powerful mechanisms in market led economies comes into play, namely induced technological change. Given time, innovations are developed and substitutes for oil appear. Hence an ever-continuing rise in the price of oil is by no means a foregone conclusion.

Third, his headline statement that “Geology will set future fuel options”, is a really spectacular piece of nonsense. It demonstrates a total lack of understanding of the role of technology in the production process. In reality geology sets the problem but technology offers the solution. Of course oil is found where it happens to be, but whether it is worth extracting is another matter. In this sense geology is subservient to economics, with technology a major determinant of profitability.



A New Zealand example will help clarify the point. Our own Tui oilfield, 50 kilometres off the coast of Taranaki, is producing oil for a cost of about US \$10 per barrel and selling it for approximately US \$90 per barrel. This wide margin has allowed a project payback of 4.5 months and a prospective internal rate of return of 47%. However this field would not have been economically viable without some very innovative technology. The geology is awkward with the oil-bearing sands only a few metres thick, lying approximately 3 kilometres below the sea bed. Horizontal drilling with a geo steering system to keep near the top of the oil bearing layer and an unmanned floating storage and offloading vessel, are just some of the many clever procedures that have made the venture successful. Without them the oil would have stayed where it is. Prof. Lowe’s headline should have read ‘Technology and human ingenuity will set future fuel options’.

Flaw debunking

Fourth, Prof. Lowe gives us some pseudo analysis in an attempt to debunk the notion that markets are capable of providing a solution to the oil shortage problem. He asserts that there are three fundamental flaws in the argument. The first is that higher fuel prices will have relatively little impact on demand in the short term. The second is that no willingness to pay will produce oil if it doesn’t exist. The third is that it will take decades to develop alternative fuels. Sadly for him, in the context of the present debate, all of his so-called fundamental flaws, are not flaws at all.

On the first so-called flaw, he gives convincing arguments for the lack of flexibility of consumers. Commuters are locked into using cars, especially where public transport or safe cycle routes do not exist. As a consequence “we grit our teeth, complain about the increasing price and pay it”. I entirely agree with him. Consumers’ responses to increasing prices, especially in the short term, are likely to be minimal. However I did not assert otherwise. The whole burden of my claim that markets will provide relief from ever increasing prices, lay on the supply side. Latent technology plus induced innovation were the instruments concerned. At no stage did I suggest that consumers were likely to be a significant part of that process.

On the second so-called flaw, Prof. Lowe’s statement that no willingness to pay will produce oil, if none exists, is simplistic nonsense. Oil fields vary greatly in their characteristics. An increase in the price of oil can and does have a big effect on their economic status. What were once marginal fields become worth developing. This effect can be reinforced especially when innovative technologies like horizontal drilling are employed. A reduced water cut, an improvement in the amount of oil that can be extracted and an extension of a field’s economic life, may result. The Tui oil field described above is an example where the economics have been transformed by clever technology and high oil prices. Innovation has made greater oil production possible, with high prices reinforcing the effect. Prof. Lowe seems to have no understanding of these mechanisms.

There is yet another reason why Prof. Lowe is hopelessly wrong in his comment that no willingness to pay will produce oil, if none exists. There are now technologies, admittedly in their infancy, that allow oil or its equivalent, to be manufactured rather than mined. The procedures, which are in the early stages of development, offer the promise of a supply of oil that is not limited by geology. A local example illustrates the point. A Nelson based firm, the Aquaflow Bionomic Corporation, claims to be nearing commercial production, using human feces as the feed stock, to make hydrocarbons. The development involves a conversion process that goes from algae via sewerage, to diesel, petroleum and aviation fuel. So why is this firm prepared to take the technological and commercial risk involved in bringing such a new process to market? The answer is simple: the powerful economic incentive provided by high oil prices.

The third flaw, that it will take decades to develop alternative fuels, is the sort of comment that needs bringing down to earth. Yes of course a complete shift to alternative fuels will take an appreciable period of time. However it is worth remembering that technological change is not some pure scientific process that goes along at its own independent pace. It is responsive to market forces and is capable of a swift response when the returns are sufficiently attractive. Human ingenuity guided by the price mechanism, is capable of effecting remarkable transformations. Prof. Lowe persistently ignores this dimension.

Agreement

Turning to the positive, Prof. Lowe does provide some useful information in his opinion piece. Also his comments on the necessity to develop better public transport, the need for lighter and more efficient cars, and a sustainable future based on cleaner and greener energy sources, with a stable population living in balance with natural resources, are entirely laudable. As a committed and active conservationist – yes it is possible for an economist to espouse the market and care for the environment – I agree with all these things. Where I do part company with him is in his contempt for Economics. As I hope I have demonstrated, his ignorance of the subject has resulted in a whole truck load of nonsense. He really should be more open minded to a subject of immense power and relevance.

In conclusion, two pithy aphorisms are appropriate. The first is reminiscent of the cartoon series the Flintstones, which quips that the Stone Age did not end because we ran out of stone. The same can be predicted for the current Oil Age. The second comes from Nobel Laureate Robert Solow again, who says, "It ain't the things you don't know that hurt you, it's the things you know, that ain't so."

Some questions to think about

1. Would you permit drilling for oil in the protected area of the Arctic Circle?
2. What is your prediction for the price of a barrel of oil in three years' time?
3. What is the future of the fuel cell motor car?

Further reading

Dyer (2008) discusses alternatives to oil. Potts (2008) discusses the current surge in oil prices.

Useful websites

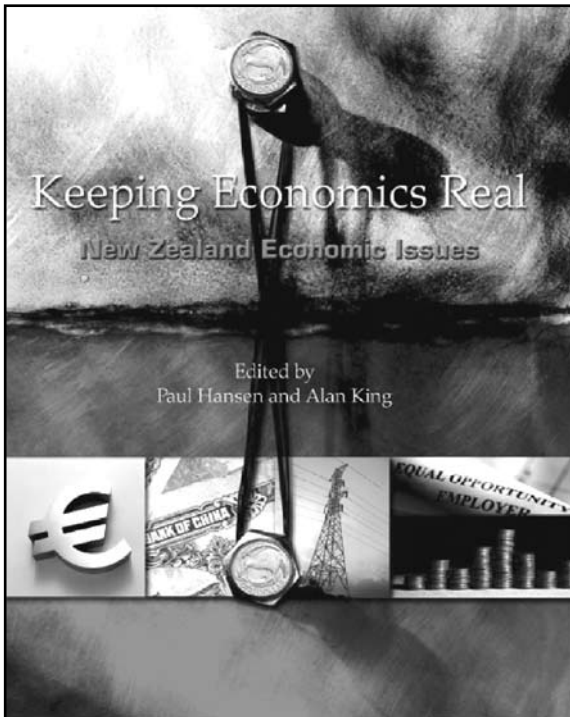
Peak Oil is discussed at www.peakoil.net.

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'The ultimate test': Is the decline of draws detrimental to the long form of cricket?

Liam Lenten*

l.lenten@latrobe.edu.au

The frequency of draws in Test Cricket has declined noticeably in the last 15 years. This has been brought about by changes in the style of the five-day game, coupled with several rule changes designed to expand the amount of time played. While many cricket fans (and administrators) believe this is good for the game, an opposing argument is forwarded here to balance the debate. This is one issue (of several) that administrators must address in order to ensure that the oldest and purest form of the game is able to continue to compete for consumer interest with shorter forms of the game in the future.



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Test Cricket in the 1980s

When I was watching cricket in the 1980s, while I was interested by Test Cricket, One-Day Internationals (ODIs) seemed to be a far more glamorous television option for a youngster who was also playing the game at junior level. There was no doubt that the game's purists were dismayed at the proliferation of ODIs at the relative expense of Tests. This proliferation was brought about mainly because the limited-overs format produced higher attendances and ratings, and thus (eventually) higher players' salaries.

This trend has continued unabated since then, as can be seen in Table 1. More recently, the invention and subsequent meteoric rise in popularity of the even shorter (so-called) 'Twenty20' form of the game will be even more worrying for the purists. As my own tastes matured since my childhood, I now find myself firmly in that camp, and proudly so.

Table 1: Number of ICC-Sanctioned Cricket Matches by Type, 1978-2007

(Not Counting Cancelled or Abandoned Matches)

Calendar Year	Tests	ODIs	Twenty20
1978	27	10	
1979	28	26	
1980	25	21	
1981	23	28	
1982	28	33	
1983	30	66	
1984	34	51	
1985	26	65	
1986	30	62	
1987	25	74	
1988	24	60	
1989	21	55	
1990	26	61	
1991	21	39	
1992	26	89	
1993	36	82	
1994	38	98	
1995	40	60	
1996	27	127	
1997	44	115	
1998	45	108	
1999	43	154	
2000	46	131	
2001	55	120	
2002	54	145	
2003	44	147	
2004	51	128	
2005	49	107	3
2006	46	160	9
2007	31	191	38

Source: <http://www.cricinfo.com/>

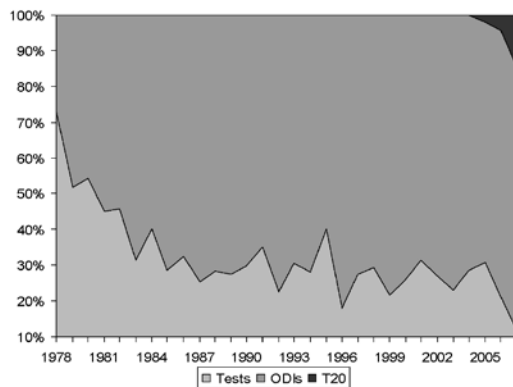
* Liam Lenten is a Senior Lecturer in Economics and Finance at La Trobe University in Melbourne. Liam visited the Department of Economics at the University of Otago in April 2008.

Competition between sports

As an unapologetic purist, I have recently found myself dismissing Twenty20 as ‘...cricket for people who don’t really like cricket’, and referring to its supporters as those with short attention spans. However, one has to analyse the reasons for Twenty20’s popularity to understand why there is an explosive growth in the number of international matches being scheduled (see Figure 1 or right column of Table 1). Once upon a time, sports administrators viewed their sport as highly differentiated from other sports and consequently assumed a degree of monopoly power. With the passage of time, as elite sport has become increasingly thought of as an ‘entertainment product’, they have realised that they are, in essence, competing with other sports for much of the same market, and have done their utmost to continually reform their sports to recruit and retain paying customers, whether at-the-gate or through other forms.

Now, this is completely rational behaviour, but changes in cricket are very rarely made with purists in mind, since they are a captive market. Rather, changes are made to attract people from non-traditional cricket-loving demographic groups – these are mainly the groups to which Twenty20 is targeted. Administrators and players cannot be blamed for ‘riding the wave’ of this surge in demand that the shortest form of the game has brought. However, it may be time to consider possibilities to make Test Cricket more attractive and competitive (without compromising its integrity), so that this 130-year old institution can continue to survive well into the future.

Figure 1: All matches played by type (100% stacked)



‘Sexy’ Test Cricket

One of the characteristics of Test Cricket in the 1980s that non-enthusiasts found hard to swallow was the relatively high proportion of matches that finished in draws (a test is drawn if it is not completed within the five-day period), often associated with negative, defensive play. An annual time-series representation of the percentage of Test matches by calendar year that finished in draws is shown in Figure 2. A second (bold) line indicates the underlying trend in the data, which is estimated using a Hodrick & Prescott (1997) filter. As can be seen, roughly 45% of all Tests played during the 1980s finished in draws – a level that even the purists would have admitted at the time needed redressing.

The response by cricket’s administrators, the International Cricket Council (ICC) and various national governing bodies of the Test playing nations, was conclusive. Rule changes were introduced progressively, designed to extend the total number of overs played in tests, including minimum overs (per day) rules, making up for time lost due to rain or bad light, and even using light towers (if available) if natural light was insufficient.

However, other forces were also at work during the 1990s – the growing volume of ODIs was finally beginning to have a material effect on the way Test Cricket was played. Run rates were increasing, and tactics were becoming more attacking. This effect gathered even more pace from around 1995 when ODIs themselves became more attacking, with more runs being scored in each ODI.¹ I attribute the latter to the success of Sri Lanka at that time, and the promptness with which other teams adopted their style.

Figure 2: Percent of all matches played finishing in a draw (thin line) and trend (bold line)



These changes have, in essence, slowly changed Test Cricket into something that slightly more resembles ODIs than used to be the case, in order to make it ‘sexier’. As an aside, this concept has not lost pace, as recently there has even been talk about the possibility of night tests (see the cartoon at the beginning of this article). In any event, the trendline in Figure 2 suggests that the decline in the number of draws may have finally plateaued, at just under 25%.

Uncertainty of outcome and demand

In sports economics, the much discussed ‘uncertainty of outcome’ hypothesis suggests that fans want to see an even contest; not that they want to see their team lose, rather they want to know that there is some chance that their team will lose. Hence, we should observe higher levels of demand for Test Cricket when there is some uncertainty as to the result. Unfortunately, in recent years, the underperformance of Test minnows Bangladesh and the once reasonably competitive Zimbabwe, along with the serial dominance of Australia, have produced a higher number of one-sided contests.

The sports economics literature is abundant with research papers testing the ‘uncertainty of outcome’ hypothesis, with the majority of work finding favourable evidence of its significance. With cricket’s many endearing idiosyncrasies,

¹ Admittedly, there are a large number of other factors determining the incidence of Test draws not considered here, such as climate change and improvements in grounds-keeping technology.

it is a pity that such work on cricket is so scarce, though Hyndes & Smith (1994) is a notable exception. These authors examine uncertainty of outcome within a Test match on one hand versus uncertainty within the Test series on the other hand.

With little change to average total scores in Tests, but with more overs and more runs being scored off each over, the consequence has been a larger number of tests being completed within four days, and a larger increase still in those finishing within three days. The problem here (*apart* from the obvious significant lost attendance and television revenues) is that the vast majority of Tests that finish so early are highly predictable – the contest is one-sided from early on in the game. Furthermore, in Tests that go well into the fifth day where one team is dominating, there is still an uncertainty of outcome prevailing by virtue of the other team attempting to ‘hang on’ for a draw. Unlike in the 1980s, very few matches look certain to be draws at the end of the fourth day (i.e., boring contests).

Should we go ‘back to the future’?

While I do not advocate that the optimal probability of a draw should be close to 50%, as it was throughout much of the 1980s, perhaps it would be nice to see a figure somewhat higher than what we observe today. One school of thought suggests that the ideal scenario is one in which both teams (ignoring home advantage) each have a one-third chance of winning the match, while there is a one-third chance of a draw.

Nevertheless, one option available to the ICC that I would favour personally is to adjust the 15-overs-per-hour rule, extending the six hours of play by up to an extra 30 minutes if 90 overs have not been bowled in a day. The rule was introduced initially to prevent teams from deliberate slow over rates. However, the rule has actually done more merely to extend the day’s play than to lift over rates, as drinks breaks, injuries, etc. mean that a team can easily fall below 15-overs-per-hour even when trying to maintain the over rate (third-umpire decision delays do not help, either). To test this, I looked at over rates in the 96 Tests played between October 2005 and January 2008, and selected only those Tests with no rain or bad light delays, nor an innings change on the *first* day (in theory, 90 overs should be bowled in games in the filtered sample). A total of 39 Tests met this criteria, but 90 overs were bowled on just 20 (about half) of the sample, even with the allowance for an extra 30 minutes of play. Furthermore, more than 90 overs (91) were bowled on only one occasion. The average overs bowled on the first day in the other 19 Tests was 86.4, providing evidence imposing the 15-over rule is far less effective than the introduction of a financial penalty would be, which the ICC has stated repeatedly they are loathe to do.

In essence, perhaps 14 overs (84 per day) would be a more realistic *minimum* target over rate, especially when one has been watching cricket all day and has had enough, yet feels compelled to watch until the official end of the day’s play.

Conclusions

Tests that finish in the final session of the fifth day are absorbing, and under the current status quo, there are not enough Tests going into the fifth day.² I do not, however, suggest that the ideal Test Cricket match is one that finishes in a draw. Given the recent development of competitive forces against the orthodoxy arising from the Indian Premier League (IPL), this is a critical issue facing the ICC, as Test Cricket will find it continually more difficult to fight for survival in the increasingly crowded match calendar against shorter forms of the game.

Some questions to think about

1. If shorter forms of cricket have become more popular than Tests, why might changing the rules to make Tests less resemble ODIs be advisable?
2. Despite the consensus among players that they view Test Cricket as the ultimate form of the sport (and despite being paid well by average worker standards), at what salary (if any) will they be willing to sign with a break-away competition in which Tests are not played at all?

Further reading

While the current volume of work on cricket is thin, a very nice ‘general’ commentary regarding economic influences on cricket can be found in Preston (2006). Meanwhile, Bhattacharya & Smyth (2003) estimate the demand for cricket matches in Australia. The authors find that ‘match-specific’ factors (such as uncertainty of outcome) have more influence than general economic factors (such as price and income) in determining demand.

Useful websites

The match archive for all three forms of the game at: www.cricinfo.com/db/ARCHIVE/ is a most useful starting point. Try not to get hooked!

Certain cricket weblog sites have more of a reputation for economic analysis than others. I suggest ‘The Corridor’ at: www.cricket.mailliw.com/, or for economics talk on all sports generally, try ‘The Sports Economist’ at: www.thesportseconomist.com/, though cricket does not get as much of a run as does baseball, basketball, etc.

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2 For example, my all-time favourite memory of Test Cricket from an Australian perspective is actually just managing to hold out for a draw against New Zealand at home, December 1987 in Melbourne.

Crime, political uncertainty and stock market returns in Colombia*

Arlene Garces-Ozanne (aozanne@business.otago.ac.nz)
and Maria Estela Varua (m.varua@uws.edu.au)

There has been a global proliferation in crime, terrorism and corruption in recent decades. The relationship between this so-called 'unholy trinity' and economic performance has been the subject of a large number of investigations.¹ A quick survey of country data on crime and terrorism indicates that poor and developing countries tend to have a higher incidence of crime, terrorism and corruption. This article examines whether organised crime activities and political uncertainty affect stock market returns and volatility in Colombia. This is an interesting country to investigate as Colombian per capita murder and kidnapping rates are amongst the highest in the world.

The Colombian connection

Colombia's economy is slowly recovering from its deepest recession in recorded history in 1999. Unfortunately, however, violent guerrilla war, paramilitary activities, and drug trafficking activities continue to create political and economic uncertainty. In 2002, the people of Colombia elected Alvaro Uribe Velez as their president hoping that his government would challenge organised crime groups. These groups include the main leftist guerrilla group known as FARC (Fuerzas Armadas Revolucionarias de Colombia, or Colombian Revolutionary Army) and right-wing paramilitary groups. The latter were formed as a reaction against guerrilla attacks and kidnapping. True to his campaign promises, President Uribe took a decidedly more aggressive stance against the country's guerrilla groups and imposed numerous taxes to help fund the country's military. Alvaro Uribe Velez was re-elected in 2006 for another four years.

The re-election of Uribe was a result of major government programmes targeting national security and economic growth initiated in his first term of office. Colombia continues to grow under Uribe's leadership due to austere government budgets, focused efforts to reduce public debt, an export-oriented growth strategy, an improved security situation and high commodity prices. However, economic challenges awaiting the president include the need to reform the pension system, reduce high unemployment, and achieve congressional passage for fiscal transfer reform. International and domestic financial analysts also note with concern the growing central government deficit, which hovers at around 5% of GDP. Nonetheless, the government's economic policy and democratic security strategy have created a growing sense of confidence in the economy, particularly within the business sector.

Determinants of stock market performance

Our study uses data on daily stock market returns from July 2001, the date the current Colombian Securities Exchange (or stock market) was created, to October 2006. The study period includes two presidential elections, one in 2002

and the other in 2006. Our quantitative analysis examines the degree to which performance of the Colombian stock market is influenced by the performance of global stocks, political uncertainty, crime and day of the week effects.

We use the General Index of Colombian Stocks to measure the performance of the Colombian stock market and approximate the performance of global stocks using Standard and Poor's index of stock prices for 500 firms, which represents a cross-section of US industries (S&P500). As we expect the value of Colombian stocks to, in general, react to changes in the value of global stocks, our analysis relates the current value of Colombian stocks to the S&P500 series from the previous (trading) day.

We specify variables to capture the influence of an impending election, which is associated with an increase in political uncertainty, and the influence of the completion of a recent election, which is associated with a decrease in political uncertainty. We calculate the crime rate in Colombia as the sum of daily registered general events and daily registered extortion events (e.g., a kidnapping where a ransom is demanded) taken from the National Fund for the Defence of Individual Freedom. As with the case of global stock market returns, we expect investors to react to changes in the crime rate, so we relate the current value of Colombian stocks to the crime rate for the previous day.

Colombian stock market activity is, in general, lower than normal on Tuesdays and higher than normal on Fridays. We allow deviations from normal trading activity to influence Colombian stock market prices by including variables to capture Tuesday and Friday effects respectively.

Modelling results

Results from estimating the relationship between the average value of Colombian stocks and the variables above are summarised in Table 1. The chosen statistical method determines the influence of a particular variable on the Colombian stock market when the other effects are controlled for.² This allows the impact of a particular variable to be isolated. The results reveal that an increase in

*This article is a condensed version of Laverde et al. (2008).

¹ See, for example, Becker & Murphy (2001), Kutan & Perez (2002) and Abadie & Gardeazabal (2005).

² Specifically, the relationship between the variables of interest is estimated using an ARCH(1,1) model.

Table 1: The influence of variables on Colombian stock market returns

Variable	Influence on Colombian stocks (all else being equal)
S&P500 from previous day	A 10% increase in the S&P500 in the previous day increases the value of Colombian stocks by 0.7%.
Crime rate from previous day	A 10% increase in the crime rate reduces the value of Colombian stocks by 0.006%.
Political uncertainty	The value of Colombian stocks decreases by 0.004% in the lead up to an election.
Tuesday effect	The value of Colombian stocks decreases by 0.002% on Tuesdays.
Friday effect	The value of Colombian stocks increases by 0.002% on Fridays.

the S&P500 index in the previous day has a positive effect on Colombian stock market returns. However, a 10% increase in the S&P500 index only increases the average value of Colombian stocks by around 0.7%. This indicates that global stock market returns have a small influence on Colombian stocks.

As expected, an increase in crime reduces the average value of Colombian stocks. Specifically, a 10% increase in the crime rate reduces the value of Colombian stocks by 0.006%. Likewise, political uncertainty has a negative impact on the Colombian stock market, with stock market returns decreasing as an election approaches. The results also suggest that the impact of political uncertainty in the lead-up to an election is reversed around eight days following an election.

Finally, variables capturing the Tuesday and Friday effects reveal that, after controlling for other factors, the average value of Colombian stocks is around 0.002% lower on Tuesdays and around 0.002% higher on Fridays. These results could be partly due to investors being uncertain regarding the external market (S&P500) early in the week, which creates uncertainty about the Colombian stock market. In contrast, by the end of the week investors have more information on the external market and are therefore more confident acting in the domestic stock market.

Conclusions

Political uncertainty and crime rates are statistically important determinants of stock market returns in Colombia. Political uncertainty diminishes market activity indicating that the uncertainty associated with presidential elections brings about not only a decline in trading volume but stock market returns as well. Quick restoration of political stability may contribute to economic growth in the long run as evidence indicates that financial market development is a key factor in achieving stable long-run economic growth (Demirgüç-Kunt & Levine, 1996). Likewise, the findings indicate that stock market activity and returns in Colombia partly depend on the crime rate. The results suggest that policy makers need to establish convincing evidence of reconciliation with guerrilla and paramilitary groups in order to lessen the incidence of violent crime and, consequently, negative effects on stock market returns.

Some questions to think about

1. How does crime affect economic decisions?
2. In what ways would criminal activities affect economic growth?
3. What are the social and economic costs of crime? Is there an optimal level of crime?

Further reading

Ehrlich & Liu (2006) provide an overview of the economics of crime.

Useful websites

A concise overview of the economics of crime is available at www.econlib.org/Library/Enc/Crime.html.

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Commentary on the New Zealand economy

Alan King

aking@business.otago.ac.nz

	Mar 2008	Dec 2007	Sep 2007	Jun 2007	Mar 2007
GDP (real, annual growth rate, %)	2.9	3.1	2.7	2.1	1.6
Consumption (real, annual growth rate, %)	3.4	4.1	4.0	3.7	3.3
Investment (real, annual growth rate, %)	7.8	6.3	6.1	0.7	-4.8
Employment: full-time (000s)	1657	1686	1657	1670	1668
Employment: part-time (000s)	483	489	491	485	477
Unemployment (% of labour force)	3.7	3.6	3.5	3.4	3.6
Consumer Price Inflation (annual rate, %)	3.4	3.2	1.8	2.0	2.5
Food Price Inflation (annual rate, %)	5.1	4.4	3.3	4.1	4.0
Producer Price Inflation (outputs, annual rate, %)	6.1	4.0	2.1	1.5	3.1
Producer Price Inflation (inputs, annual rate, %)	7.4	3.4	1.7	1.2	2.7
Salary and Wage Rates (annual growth rate, %)	3.4	3.3	3.1	3.1	3.2
Narrow Money Supply (M1, annual growth rate, %)	2.4	1.2	-0.5	-2.0	3.4
Broad Money Supply (M3, annual growth rate, %)	6.4	7.4	9.5	10.9	12.8
Interest rates (90-day bank bills, %)	8.91	8.90	8.81	8.32	7.88
Exchange rate (TWI, June 1979 = 100)	71.6	71.6	68.3	73.6	68.6
Exports (fob, \$m, year to date)	38,139	36,562	34,596	34,939	35,306
Imports (cif, \$m, year to date)	42,668	41,869	40,878	41,165	41,082
Exports (volume, June 2002 [not seas. adj.] = 1000)	1119	1160	1052	1048	1052
Imports (volume, June 2002 [not seas. adj.] = 1000)	1645	1661	1583	1579	1535
Terms of Trade (June 2002 = 1000)	1243	1194	1163	1122	1117
Current Account Balance (% of GDP, year to date)	-7.8	-7.9	-8.3	-8.1	-8.2

Sources: Statistics New Zealand (www.stats.govt.nz), Reserve Bank of New Zealand (www.rbnz.govt.nz)

Recent developments in (and the short-term prospects for) the New Zealand economy can be summed up under the headings of dairy, drought and diesel (well, more accurately, oil, but that doesn't start with a "d").

The strengthening terms of trade reflects, of course, the dairy boom. Although international dairy spot prices have eased back significantly from their September 2007 peak, they are still 60% above their 2006 average. As actual dairy export prices are now 60% above their 2006 average, Fonterra's contract prices would seem to have caught up with the spot market and so further gains in the terms of trade series are unlikely. If anything, a partial reversal could be expected in the June quarter following the recent surge in oil prices.

The relative strength in export volumes over the last two quarters is also largely dairy-related (though the start of production at the Tui oilfield has helped as well). The recent gains are likely, however, to be somewhat short-lived. Dairy production has been particularly badly hit by the drought. Milk powder, cheese and butter export volumes – which eased back in March – should fall more sharply in June. With import volumes remaining generally strong, the net effect is that the narrowing of the trade deficit, which began in September, has now stalled.

As well as crimping agricultural production (and GDP in the March quarter), the drought has also left hydro lakes unusually low. The result has been greater dependence on the high-marginal-cost thermal power stations, causing electricity spot prices to rise. This, together with dairy prices, has been responsible for the strong lift in producer price inflation.

The hydro lakes are unlikely to recover sufficiently over the winter months to bring spot prices down in a hurry, so there is a good chance of future increases in retail electricity prices adding to the existing pressure on the CPI from food and fuel. The RBNZ currently expects inflation to peak at 4.7% in September and has indicated that interest rates could ease soon after, providing the spike in international commodity prices does not feed into higher wage and nontradable goods inflation. Hence, homeowners may get some relief on their mortgage if they accept a real pay cut, but they won't if they don't. Household budgets are going to be under pressure for some time to come.

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EcoNZ@Otago

Department of Economics

University of Otago

PO Box 56

Dunedin

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