Motu Economic and Public Policy Research

Motu
RESEARCH UPDATE

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Historical Land Use Patterns: Learning about Rural Land Use Change

Suzi Kerr and Alex Olssen

Rural land use is a major determinant of both economic and environmental outcomes in New Zealand. According to the Ministry of Agriculture and Forestry, total export revenue from agriculture, seafood, and forestry accounted for 71% of total merchandise export revenue in the year ending June 2011.[1] In 2009 agriculture was responsible for 46.5% of New Zealand's total greenhouse gas emissions (including land use, land-use change and forestry).[2] Because of this, land use is a potential target for policy instruments that look to change New Zealand's environmental outcomes; for example, New Zealand's Emissions Trading Scheme allows certain land owners to earn carbon credits (New Zealand Units) for growing forests on their land and this makes forestry relatively more attractive.

How quickly can we expect land use change to occur in response to policies that alter the economic returns of different land uses? In the mid-1980s, New Zealand performed a "natural experiment" that provides some suggestive evidence on this question by reducing the economic returns to sheep and beef farming (and dairy farming) through large cut-backs to agricultural subsidies. Figure 1 shows the time series for a volume-weighted, subsidy-adjusted, composite sheep and beef export unit value as well as the share of rural land used for sheep and beef farming. Despite the large drop in sheep-beef export unit values in the mid-1980s, the sheep-beef land share doesn't decline noticeably until the mid-1990s. This suggests that land use may change slowly even in response to large changes in economic returns. However, theoretically, land use depends on relative returns. Moreover, our graphical analysis necessarily does not take into account other changes in the economy during this period. Further research was needed.

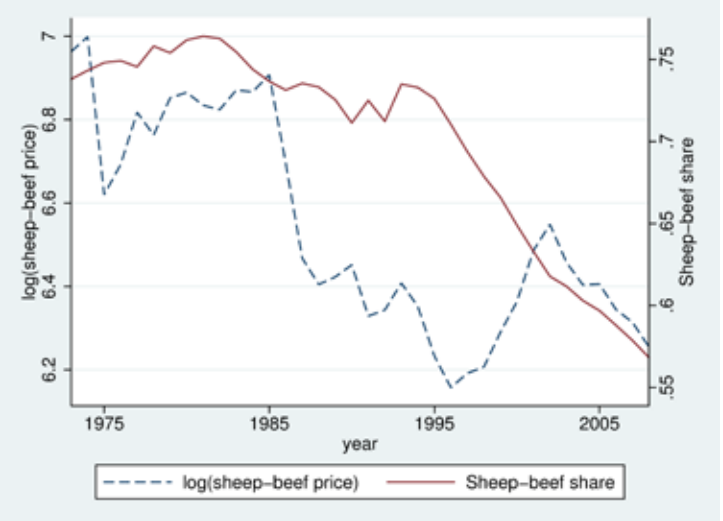

Figure 1: Sheep-beef land use and prices, 1974–2008

Notes. The sheep-beef price is a composite export unit value; we take a volume-weighted average of sheep meat, beef meat, and wool export unit values (2007 Harmonised System classification groups HS0201–HS0202, HS020410–HS020443, and HS5101 respectively). This composite export value is adjusted to reflect the impact of agricultural subsidies.

Sources. Export unit values are calculated from Overseas Trade Merchandise data, obtained from Statistics New Zealand. Land shares are calculated using Agricultural Production Survey data, augmented by Beef and Lamb (formerly Meat and Wool Economic Service), and including extrapolation based on animal numbers prior to 1980.

To investigate further, recent work by Suzi Kerr and Alex Olssen at Motu has looked at how land use in New Zealand has responded to changing economic returns, with an emphasis on the dynamics.[3] We estimated a dynamic econometric model of land use, to see how land shares responded to changing export prices and unit values between 1972 and 2005.[4] Consistent with recent work by Richard Hornbeck,[5] an assistant professor at Harvard, our estimates suggest that land use responds

1 http://www.maf.govt.nz/agriculture/statistics-forecasting/international-trade.aspx
2 Ministry for the Environment. 2011. "New Zealand's Greenhouse Gas Inventory 1990–2009."
3 Kerr, Suzi, and Alex Olssen. 2012. "Gradual Land-use Change in New Zealand: Results from a Dynamic Econometric Model," *Motu Working Paper* 12-06.
4 We exclude the years from 2006 to 2008 because we are concerned that land use change over this period was responding to expected ETS-related policy change more than anything else; in order for a model of past land use change to be informative of future land use change we need the responses to the underlying factors in the model to have remained constant.
5 Hornbeck, Richard. Forthcoming. "The Enduring Impact of the American Dust Bowl: Short- and Long-run Adjustments to Environmental Catastrophe," *American Economic Review*.

In this issue

NIDEA Workshops

Motu has been involved in hosting two recent workshops held at the National Institute of Demographic and Economic Research. These workshops, "Population Ageing and the Labour Market" and the "Economic Benefits of Immigration and Population Diversity" saw international and local researchers and analysts meet to discuss current research.

Water Quality Workshop

Motu recently hosted a public symposium, "Markets and Water Quality," to mark the conclusion of significant work under our nutrient trading and water quality programme. Held at Te Papa, the symposium was a chance for policy professionals, students and scientists to familiarise themselves with up-to-date research and information around preserving and restoring New Zealand's water quality. More information about the programme, including videos of the presentations, are available on the Motu website, www.motu.org.nz/research/detail/nutrient_trading.

New Fellow Receives Award

Motu's newest Fellow, Isabelle Sin, received the RBNZ-NZESG Award in Econometrics. Presented by the Reserve Bank and the New Zealand Econometric Study Group, the award is given each year to a young econometrician presenting at the NZESG annual meeting. Isabelle received the award for her paper "Book Translations as Idea Flows: The Effects of Communism on the Diffusion of Knowledge," an aspect of which is explored in her article in this newsletter.

Graduate Intern

In June Motu will welcome Boon-Ling Yeo, a PhD student at UC Davis. She will spend several months working with Suzi Kerr. Boon-Ling received the National Science Foundation's Pacific Rim Advanced Graduate Research Fellowship to travel to New Zealand.

rather slowly to changing economic returns. Figure 2 shows the result of a simulated experiment. The top panel shows the difference in the predicted share of land in dairy between two scenarios, with and without a permanent increase in price. The simulation shows that the dairy land share increases in response to a permanent increase in milk solids prices. In our model it takes just over 2 years for 50% of the long-run adjustment to occur. It takes more than 6 years before 75% of the adjustment occurs. The bottom panel of Figure 2 shows the results of the same experiment for the forestry land share in response to an increase in export log unit values. A comparison of the two panels shows that forestry responds even more slowly to a permanent one standard deviation change in its own price than dairy; this could be because forestry returns are not realised for 30 years, and investment in forestry is not easily reversible. These make the option value of delaying afforestation larger.

If our estimates of the responsiveness of land use to changing economic returns hold in the future, then there are two major policy implications. First, it may take some time for any land-use change to occur as a result of policies that change the economic returns to different land use. Second, if policymakers force rapid land-use change, this is likely to be highly costly and may be politically infeasible.

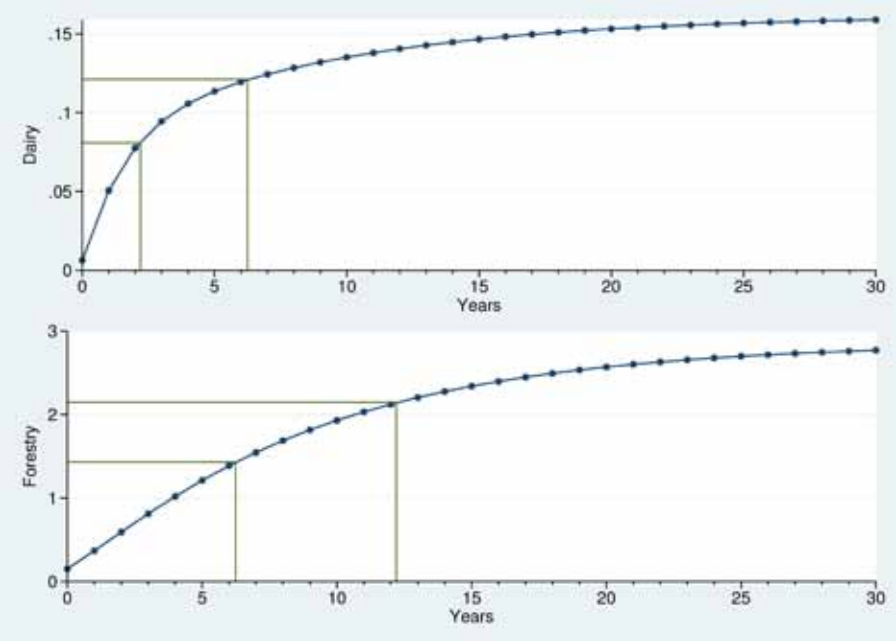

Figure 2: Response of land use to own-price changes

Notes. Each panel plots the response to a land share when its own commodity price is increased by 1 standard deviation. The response is calculated from two different scenarios. In the first scenario we hold all regressors constant at their 2005 levels and project land shares using the coefficients reported in Table 3 of Kerr and Olssen (2012). The second scenario is the same as the first, except we increase the own commodity price by one standard deviation, calculated over the years 1974–2005. The response is the difference between the second and the first scenarios. The first green line shows 50 percent of the long-run adjustment and the second green line shows 75 percent of the long-run adjustment.

This research was funded by the Ministry for Science and Innovation under Motu's grant, "Integrated Economics of Climate Change". Full results will be available as a working paper from Motu's website, www.motu.org.nz/publications/working-papers. More information about Motu's work on climate change can be viewed at www.motu.org.nz/research/group/climate_change.

Director's letter

The article in this newsletter on rural land use change, drawn from some of Motu's work for the Land Use in Rural New Zealand model (LURNZ), reinforces to me the value of coherent programmes of research centred on a particular theme. A programme of research undertaken over several years may consist of many smaller projects, but when these individual pieces of research are framed within an overall programme they are likely to lead to a much more useful body of knowledge being created.

The value of programmes of research can also extend much further beyond the usefulness of the specific research findings.

A major programme of research, such as the Coordination and Cooperation for Effective Climate Policy Design and Implementation programme funded by MAF and led by Motu over three years, has demonstrated the benefits of building up a stronger network of researchers across several disciplines. This programme has researched the impacts of an Emissions Trading System on patterns of land use. It is helping understand not only the nature of any direct impacts but also ways in which such impacts might be mitigated. The combined expertise associated with such a programme generates much greater value than would a fragmented approach across a series of discrete, smaller research projects.

This programme has also given Motu the confidence and stability to employ top research analysts. These analysts were all top graduates from NZ universities. These young researchers will move on to undertake PhDs at top overseas universities or move into jobs in the public sector (one has already joined MPI). Under some of our longer research programmes we have also formed dialogue groups, comprised of a wide range of participants with interests in the relevant topics, such as the present AgDialogue group comprised of farmers, iwi representatives, researchers and policymakers. Dialogue groups like these have a dual benefit. They enable research to be informed by practical understandings, like the possible real-world responses of farmers to changes in carbon prices and environmental policy. They also allow decisionmakers to be more aware of research into the subject, such as the different models of land use that Motu, Landcare and others have developed and the insights from these models.

My views on the importance of coherent programmes of research have been reinforced by observing the increasing extent to which current research funding is coming in small amounts from different sources. Three years ago 70% of Motu's funding was drawn from long-term (three to four year) contracts. These long-term projects enabled a stronger focus on key research areas such as homeownership, Trans-Tasman migration, inequality, infrastructure, water quality regulation and the effects of primary healthcare reform. They provided many of the wider benefits I described above.

Today Motu still attracts as much research funding as it did three years ago. But increasingly this is centred on smaller projects with, at best, loose connections to each other. It has been interesting to read the New Zealand Productivity Commission's recent report on Housing Affordability and see how they have drawn insights from a considerable amount of research into housing in New Zealand undertaken over the past ten or more years – including work done by Motu. Reports such as this provide a very useful synthesis of the evidence base – and they also highlight the cumulative value of research undertaken over a decade ago on issues of considerable importance to New Zealand's future.

New Zealand faces some big challenges over the next few decades. We will do better if future policy decisions are informed by research that is high quality, relevant and contributing to coherent bodies of knowledge. This is not an argument for more money, but for better value from the same money: a more strategic focus on the commissioning of research on critical areas of long term importance to public policy, and finding better ways of co-ordinating effort across a number of organisations with an interest in such research and bringing New Zealand's best researchers together to contribute their expertise to such key issues.

Howard Fancy
Director

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The International Diffusion of Knowledge

New Motu Fellow Isabelle Sin researches the spread of ideas from nation to nation.

Even a brief contemplation of the sweep of human history will inevitably lead us to agreement with Mokyr's (2002) claim that "the central phenomenon of the modern age is that as an aggregate we know more." Increases in human knowledge are central to modern economic growth. Technological ideas, which we may think of as ways to combine raw materials to make finished products, are inarguably important and have received considerable attention in the economics literature. However, a much broader set of ideas is likely to matter for economic growth and development. Important non-technological ideas vary widely, and include institutions, policies, rules and processes. For example, the patent system and research universities are non-technological ideas that improve welfare by increasing research above the level that would occur in competitive equilibrium; having a consistent set of road rules obeyed (largely) by everyone is a welfare-improving idea, as are the road rules themselves; democracy is another idea. Unfortunately non-technological ideas have been relatively neglected in the economics literature, perhaps because, compared with technological ideas, they remain a vague concept and one that is even more difficult to measure empirically.

Arguably the most important property of ideas for growth is their non-rivalry, that is, the technological characteristic that the use of an idea by one party in no way limits its simultaneous use by others. This non-rivalry means that an idea need be created only once, and then it can benefit not only its creators, but, barring legal limitations, also any number of other parties, both domestically and internationally.

This potential to share ideas internationally both has important implications and raises some challenging questions. When we focus on technological ideas, because that's where most of the data are, we notice that most research and development occurs in relatively few industrialised countries. For instance, the G-7 countries (France, Germany, Italy, Japan, UK, USA, and Canada) accounted for 84% of world research and development spending in 1995, compared with only 64% of world GDP. As a consequence of this uneven distribution, foreign sources of technology account for over 90% of domestic productivity growth in most countries (Keller, 2004). That is, a country's growth is likely to be more closely related to how well it accesses foreign ideas than how successfully it creates its own ideas. However, this is not to say domestic research is unimportant. In fact, a country benefits much more from inventions created at home than those created abroad. Furthermore, domestic research is widely thought to be an important determinant of how well a country is able to absorb foreign ideas.

If all countries fully absorbed all foreign ideas, we would expect them to converge to the productivity of the world leader. However, while there have been growth miracles such as Hong Kong, Singapore and South Korea, many countries languish with no signs of converging to American productivity levels. This raises questions about the mechanisms by which ideas diffuse internationally, and why some countries are so much more successful at adopting foreign ideas than others.

A number of mechanisms for international idea diffusion have been proposed by the theoretical economics literature. For instance, trade may transfer ideas embodied in traded goods, or through close firm interactions; foreign direct investment may aid the diffusion of ideas into a country from the multinational parent company through its domestic affiliate; and skilled immigrants and visitors bring not only their labour, but also ideas that may be shared with others at their destination. Ideas may also be transmitted via written material such as books, articles and academic papers, by radio and television, and of course by the internet. Some convincing empirical studies have indeed

demonstrated some of these flows have significant productivity effects in some circumstances (for example, Keller and Yeaple, 2009 find significant spillovers from foreign direct investment in the USA), but the relationships are not universal. Some countries appear to do everything right, but still benefit little from foreign ideas.

Why some countries are more successful than others at adopting foreign ideas therefore remains an open question. Determinants of the "absorptive capacity" of a country (or indeed a firm) include level of education, the amount of domestic research and development, and the institutions in place, especially those that affect the incentives or ability of domestic parties to adopt foreign ideas, but are likely to include many other factors besides.

For her doctoral dissertation, completed recently at Stanford University, Motu fellow Isabelle Sin used a new empirical measure of international idea flows, book translations, to study some of the factors that affect the international diffusion of codified ideas. Book translations are a pure measure of idea flows between linguistic groups that capture a broad range of types of idea.

To study how distance affects translation flows between countries, she estimated a "gravity" model of translations, in which translation flows between two countries depend on the economic sizes of the countries and the distance between them. Despite translations having zero transportation costs, she found that translations decrease significantly with physical distance, with a 3 to 5% decrease in translations for every 10% increase in distance in the 1990s; however, distance inhibited translations even more in the past. Surprisingly, the effect of distance on translations is larger for sciences than for the arts, suggesting that distance inhibits the flow even of more "useful knowledge". Translations decrease in distance especially in less developed countries, suggesting countries with more to gain from adopting foreign ideas are less able to access them. She then augmented the gravity model to include measures of linguistic, religious, and cultural distance. These were all shown to reduce translations, but together they account for only a quarter of the relationship between translations and physical distance. She also found translations occur significantly faster between geographically closer countries, suggesting the relative importance of supply-side frictions in the flow of ideas.

In joint work with Ran Abramitzky, Isabelle Sin then studied how the collapse of the Communist regime in Eastern Europe at the close of the 1980s affected

the international diffusion of ideas. They showed that while translations between Communist languages decreased by two thirds with the collapse, Western-to-former Communist translations increased by a factor of seven and reached Western levels. Convergence was full in economically-beneficial fields such as sciences and only partial in culturally-beneficial fields such as history. The effects were larger for more Western-oriented countries. These findings demonstrate the effect of institutions on the international diffusion of knowledge and show the importance of preferences in determining the type of ideas that diffuse into a country.

In future work, Sin hopes to expand her research on the international diffusion of ideas and explore possible ways for New Zealand to increase the extent to which it takes advantage of foreign advances in knowledge. She also plans to study the diffusion of ideas within New Zealand, such as between universities and industry, and as carried by workers between different firms.

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More Motu Publications

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Environmental Regulation

Kerr, Suzi, and Adam Millard-Ball. 2012. "Cooperation to Reduce Developing Country Emissions," *Motu Working Paper* 12-03.

Without effective developing country participation in climate mitigation it will be impossible to meet global concentration and climate change targets. However, developing countries are unwilling and, in many cases, unable to bear the mitigation cost alone. They need huge transfers of resources – financial, knowledge, technology, and capability – from industrialised countries. In this paper, we evaluate instruments that can induce such resource transfers, including tradable credits, mitigation funds and results-based agreements. We identify key constraints that affect the efficiency and political potential of different instruments, including two-sided private information leading to adverse selection, moral hazard and challenging negotiations; incomplete contracts leading to under-investment; and high levels of uncertainty about emissions paths and mitigation potential. We consider evidence on the poor performance of current approaches to funding developing country mitigation – primarily purchasing offsets through the Clean Development Mechanism – and explore to what extent other approaches can address problems with offsets. We emphasise the wide spectrum of situations in developing countries and suggest that solutions also need to be differentiated and that no one policy will suffice: some policies will be complements, while others are substitutes. We conclude by identifying research needs and proposing a straw man to broaden the range of "contracting" options considered.

Economic Geography

Coleman, Andrew. 2012. "The Effect of Transport Infrastructure on Home Production Activity: Evidence from Rural New York, 1825–1845," *Motu Working Paper* 12-01.

This paper examines the home production activities of newly formed and long established households in rural New York over a twenty year period after the Erie Canal was built. It shows that newly established households had lower home production activities than long established households resident in the same area, conditional on the size, age, and land-owning characteristics of the households. Thus some of the decline in aggregate production was due to the arrival of new, differently behaving households, rather than changing behaviour of established households. However, long established households eventually copied their new neighbours, reducing their home production activities to similar levels.

Labour and Population Economics

Stillman, Steven, Trinh Le, John Gibson, Dean Hyslop, and David C. Maré. 2012. "The Relationship between Individual Labour Market Outcomes, Household Income and Expenditure, and Inequality and Poverty in New Zealand from 1983 to 2003," *Motu Working Paper* 12-02.

This paper investigates the relationship between individual labour market outcomes, household income and expenditure, and inequality and poverty in New Zealand using detailed data from the 1983/84 – 2003/04 Household Economic Survey (HES). We begin by discussing and summarising measures of income and expenditure calculated from the HES. We next examine the relationship between individual labour market outcomes, and household income and expenditure for households with different characteristics. In particular, we focus on how this relationship varies over the life cycle and over time. This analysis is then extended to examine inequality in labour market outcomes, household income and household expenditure. In the last section, we examine the determinants of the levels and changes in poverty in New Zealand using both expenditure and income data. We also apply a newly developed methodology for combining income and expenditure data to produce poverty indicators.

Fabling, Richard, and David C. Maré. 2012. "Cyclical Labour Market Adjustment in New Zealand: The Response of Firms to the Global Financial Crisis and its Implications for Workers," *Motu Working Paper* 12-04.

This paper examines the dynamics of employment adjustment in New Zealand, focusing on the response of firms to the 2008/09 Global Financial Crisis. We use data from Statistics New Zealand's prototype Longitudinal Business Database (LBD) to examine firms' employment responses to output shocks before and after the crisis, and to investigate variations in job and worker flows. We discuss the resilience of the NZ labour market to economic shocks, and the possible role of labour market policy settings. Finally, we discuss preliminary findings on the differential impact of labour market adjustment on workers – by earnings level, age, gender, and tenure – and outline potential further work along these lines. Our analysis of firm microdata highlights three key features of New Zealand labour market adjustment to the 2008/09 crisis. First, there was considerable heterogeneity across firms, both before and after the crisis, in the size of output shocks that firms faced, the amount of employment adjustment in response to any given output shock, and in the size of worker flows given the firm's employment adjustment. Second, the crisis not only moved the distribution of output shocks faced by firms, but also altered the relationship between output shocks and changes in job and worker flows and employment. Third, the impact of the observed firm-level dynamics had an uneven impact on workers, with greater employment losses for low wage workers, young workers, and workers with low job tenure.

Other Recent Publications

Kerr, Suzi, Duncan C. Smeaton, Tim Cox and Robin Dynes. 2011. "Relationships between Farm Productivity, Profitability, N Leaching and GHG Emissions: A Modelling Approach," *Proceedings of the New Zealand Grassland Association* 73, pp. 57–62.

Lundquist, Carolyn J., Doug Ramsay, Rob Bell, Andrew Swales and Suzi Kerr. 2011. "Predicted Impacts of Climate Change on New Zealand's Biodiversity," *Pacific Conservation Biology*, 13:3, pp. 179–91

Saunders, Caroline, Hugh McDonald and Tim Driver. 2011. "Enhancing Value for New Zealand Farmers by Improving the Value Chain," *Research Report No.* 324, Lincoln University, Christchurch.

Denne, Tim and Steven Bond-Smith. 2011. "Impacts of the NZ Insulation Fund on Industry and Employment," *Report to Ministry of Economic Development*, MED, Wellington.

Grimes, Arthur, Chris Young, Richard Arnold, Tim Denne, Philippa Howden-Chapman, Nicholas Preval and Lucy Telfar-Barnard. 2011. "Warming Up New Zealand: Impacts of the New Zealand Insulation Fund on Metered Household Energy Use," *Report to Ministry of Economic Development*, MED, Wellington.

Grimes, Arthur, Tim Denne, Philippa Howden-Chapman, Richard Arnold, Lucy Telfar-Barnard, Nicholas Preval and Chris Young. 2011. "Cost Benefit Analysis of the Warm Up New Zealand: Heat Smart Programme," *Report to Ministry of Economic Development*, MED, Wellington.

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Grimes, Arthur, and Chris Young. 2011. "Spatial Effects of 'Mill' Closures: Does Distance Matter?" *Australasian Journal of Regional Science* 17:2, pp. 262–97.

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Research in Progress

Learn more about Motu's current research at www.motu.org.nz/about

Environmental Regulation

Suzi Kerr leads two projects relating to environmental markets. "The Integrated Economics of Climate Change" combines practical policy design with longer term integrated model development. Significant work under this project includes the continued use and development of Motu's Land Use in Rural New Zealand (LURNZ) modelling effort, designed to assess the impact of policies intended to alter land use decisions in rural areas. "Markets and Water Quality" is a multi-disciplinary joint project aimed at developing a nutrient trading market for the Lake Rotorua catchment. The environment team is also involved in a major project, "Coordination and Cooperation for Effective Climate Policy Design and Implementation", which aims to provide empirical evidence and a clear conceptual framework for boosting cooperation in the application of New Zealand's Emissions Trading Scheme to agriculture, while facilitating the coordination required for the rapid uptake of new adaptation and mitigation technology.

Homeownership and Housing

Arthur Grimes is leading two new housing programmes. The first, funded by the Kelliher Foundation, asks "How do Commodity Prices Affect Rural Community Outcomes?" Potential extensions of this work could examine the impacts of climate changes and water quality policy on rural community outcomes. The second new project, funded by the Department of Building and Housing, builds on earlier work by Arthur and Andrew Aitken (a former Motu RA) to construct a New Zealand Housing Market Model. It will use up-to-date and improved data and will model determinants of residential land prices and residential rents.

Economic Geography

The infrastructure programme continues under Arthur Grimes with conceptual work on the role of real options considerations for major transport projects. Dave Maré has worked with Motu affiliate Jacques Poot from the University of Waikato and former Motu intern Ruth Pinkerton to examine residential location patterns of immigrants in Auckland. Andrew and Dave are also developing a theoretical model to analyse how the demand to use natural amenities such as beaches, and constructed amenities such as swimming pools, affect prices and location patterns in cities. The model is designed to reflect aspects of Auckland's price and residential location patterns that were uncovered in Andrew and Dave's empirical work.

Labour and Population Economics

New Motu Fellow Isabelle Sin will work with former Senior Fellow Steve Stillman on a project investigating the geographical mobility of Māori in New Zealand. In particular, they are interested in how Māori ties to the traditional lands of their iwi and their social ties to other iwi members affect their mobility between labour market areas. Dave and Richard are working with Dean Hyslop to complete a study examining the link between firm productivity and the skill composition within firms. Dave and Richard are also analysing firm-level changes in employment hiring and separations, and in firm start-ups and closures. Dave is working with the Department of Labour on labour market performance. Richard, Arthur and Dave are looking at the effect of human resource management changes on workers, and testing whether these effects differ by gender.

Macroeconomics and Finance

Arthur has begun new work with Robert MacCulloch and Les Oxley analysing the validity and robustness of national measures of wellbeing and sustainability. Richard is working with Lynda Sanderson (Treasury) to better understand the relationship between exchange rate volatility and export performance. Richard and Dave are working on improving the method for measuring firm-level productivity.

Isabelle is extending work from her doctoral dissertation, which proposes book translations as a new measure of the international flow of ideas, and uses this measure to study how factors such as institutions, physical distance, and cultural differences affect the spread of ideas between countries.

Public Policy Seminars

The Motu Public Policy Seminar series provides a forum for informed debate on important public policy issues. Through the series, we aim to make the latest economic research more accessible to inform policy debates in New Zealand. Our seminars are accessible to a wide audience, and are attended by people from diverse backgrounds who want to stay informed on economic, social and public policy research. The seminars are presented by the Motu Senior Fellows and Affiliates, as well as other top visiting academics from within New Zealand or around the world. These seminars are free to the public, and there is no need to register to attend.

Since the last newsletter, we have hosted five Public Policy Seminars. Motu's Dr Andrew Coleman presented his ongoing work "Saving a Super Scheme: The Economics of PAYGO and SAYGO Retirement Schemes in New Zealand." Here for the Intergovernmental Panel on Climate Change week in Wellington, Professor Thomas Sterner of the University of Gothenburg then presented "Global and Local Fairness in Climate Policy," and Professor Ross Cullen of Lincoln University with Assistant Professor Kathy Baylis of the University of Illinois presented "Do Our Conservation Programmes Work? Economic Evaluation of Biodiversity Projects". Having hosted the Water Quality Symposium in Wellington, Motu's Dr Suzi Kerr then followed this up in Auckland, presenting "Managing Water Quality Using Markets". Professor Norman Gemmell of Victoria University then presented "Taxpayers' Behavioural Responses and the 'Laffer Effect'". Coming up in Wellington on May 9 and Auckland on May 10, Arthur Grimes and Professor Philippa Howden-Chapman are presenting on healthy housing issues, including results of an evaluation of the impact of the Warm Up New Zealand: Heat Smart programme on health and energy use outcomes. See http://www.motu.org.nz/events for more details.

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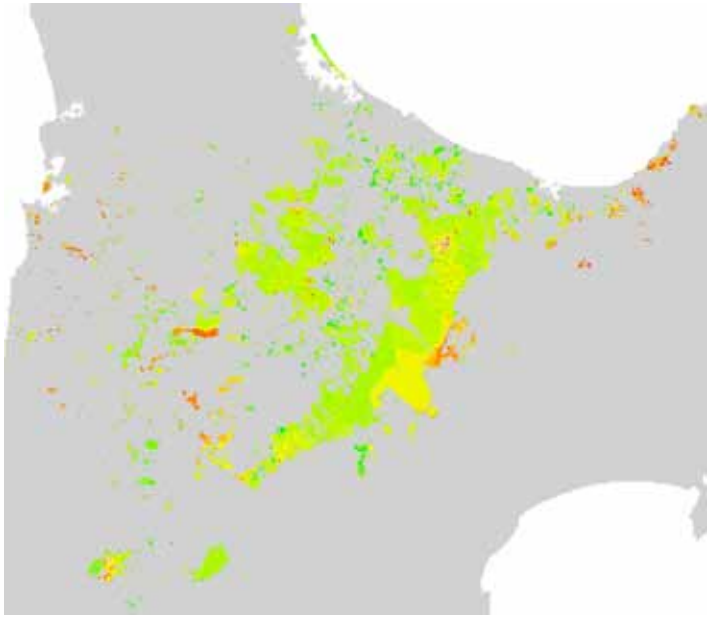
Creating a Forest Profit Dataset

Expected returns to rural production matter for land use choices, but there is a lack of publicly-available, spatially- and temporally-explicit data on the expected returns to forestry in New Zealand.

Expected returns to different land uses are the central component in standard models of land use decision making. Furthermore, as environmental concerns become more important for policymakers, quantification of the responsiveness of land use and land values to changing economic returns becomes more important. Motu has developed a new dataset that estimates expected forest returns from 1980 to 2008.[1] This data is available to the research community, consistent with Motu's goal of enhancing research capability in New Zealand. We illustrate here some aspects of this new dataset.

We estimate the expected net present value (NPV) for a plot of land newly-planted for the whole of New Zealand at a 25-hectare resolution; for a description of the data sources and methodology please see Olssen et al., 2012. The estimates are expectations in the sense that they use data available at the time of planting on output prices and input costs for their calculations; in the economic literature this is known as adaptive expectations and it is consistent with the practice of forest land managers, according to biennial surveys by Bruce Manley at the University of Canterbury.[2]

The figure shows the spatial richness of the dataset that we have developed; graphs of expected profits over time can be found in the paper. It shows the estimated NPV if newly planted in 2008, calculated using an 8 percent discount rate, for each 25 hectare parcel of land that was in plantation forest in 2008. The estimated expected NPV per hectare is close to $0 (base year 2008) for the orange and red pixels, around $500 for the yellow pixels, and more than $1000 for the green pixels; forestry prices were low in 2008. The mean expected NPV for the whole Wood Supply Region is $1134; the Land Expectation Value is $1283, which despite some differences in data is very close to the forestry Land Expectation Value estimated using a 12-quarter average price prior to 2008 by Manley and Maclaren, 2010.[3]



NPV of new forestry on forest land in 2008

Notes. The graph shows estimates of the expected NPV per hectare on 25 hectare parcels of forest, in the Central North Island Wood Supply Region (WSR) in 2008. NPV per hectare is close to $0 for red and orange pixels, around $500 for yellow pixels, and more than $1000 for green pixels. We have suppressed parcels with negative expected NPV. There are very few parcels with negative expected NPV, and they made it difficult to provide a smooth gradient over parcels with differing expected NPV.

This dataset will be useful for looking at questions relating to expected forest profits, land use, and changes in land values. In future work, we hope to incorporate more spatially detailed data on forest productivity. Documentation and download information for the dataset are available from www.motu.org.nz/building-capacity/dataset/forest_profits.

1 Olssen, Alex, Wei Zhang, Suzi Kerr, and David Evison. 2012. "A Forest-Profit Expectations Dataset, 1990–2008," *Motu Working Paper* 12-07, Motu Economic and Public Policy Research, Wellington.
2 Bruce Manley has published a series of papers on these surveys. The most recent is Manley, Bruce. 2010. "Discount Rates Used for Forest Valuation - Results of 2009 Survey," *New Zealand Journal of Forestry* 54:4, pp. 19–23.
3 Manley, Bruce, and Piers Maclaren. 2010. "Potential Impact of Carbon Trading on Forest Management in New Zealand", *Forest Policy and Economics*.