

## MOTU RESEARCH UPDATE - ISSUE 25 - DECEMBER 2015

### The relationship between household characteristics and greenhouse gas emissions from consumption

By Corey Allan and Suzi Kerr

Households are usually unaware of the full environmental impact of the goods and services they buy. The production of these goods requires energy, and energy production results in CO<sub>2</sub> emissions. Production may also involve a chemical reaction that is another source of greenhouse gas emissions (GHGs) e.g. methane produced by livestock. We calculate the amount of GHGs created in producing the goods and services we all consume, and ask the question “Are New Zealand households becoming greener?”

Are kiwis more green?  
Just a tiny bit, but then  
there’s much more to do.

Food, housing utilities, and transport account for 82 percent of the emissions for the average household. These categories are also emissions intensive, meaning that more emissions result from producing an extra unit of these goods. Only 20 per cent of emissions from food are energy emissions, emissions from the burning of fossil fuels. The other 80 per cent of emissions are methane from livestock and nitrous oxide mostly from animal urine. Household energy (electricity, gas, solid fuels) accounts for the bulk of emissions from household utilities, while petrol and diesel are the most important sources of emissions from transport.

The relative importance of the different categories changes with a household’s income. For poorer households, food and household utilities are the most important emissions sources. Household utilities are a smaller fraction of a household’s emissions for wealthier households, for whom transport emissions are the most significant emissions category. This occurs because wealthier households are more able to use transport for leisure activities, such as going away for a long weekend. Wealthier households also do more international travel.

There is a lot of variation across otherwise similar households. Households have some control over their emissions and can influence them by choosing different goods and services. The most emitting households at each level of income had nearly twice the emissions of the least emitting households.

The differences within income groups are mainly driven by differences in transport choices. The richer most emitting households fly internationally more often. Regardless of income, the households that emit the most drive more often. There is also some difference in diet, with the higher emitting households eating more meat and dairy than the least emitting.

On average, the main factors that determine a household’s emissions are its expenditure and the number of people in the household. A 10 per cent increase in household expenditure leads to a 7 per cent increase in emissions. As households get wealthier, they tend to spend more money on services, which are less emissions-intensive. This is why a 10 per cent increase in expenditure generates a less than 10 per cent increase in emissions.

Emissions from household energy do not increase much with expenditure. This makes sense – richer people do not use a lot more electricity as there tends to be a baseload amount used in cooking, bathing, heating, and lighting for all households. Transport emissions, on the other hand, are very responsive to increases in expenditure. This is especially true for personal air travel.

Increasing household size, while keeping expenditure per adult constant, does not reduce emissions per adult. A 2 adult household with \$50,000 in total expenditure has the same total emissions per adult as a 4 adult household with \$100,000. Emissions per adult from household energy does decrease, but this is offset by an increase in transport emissions per adult.

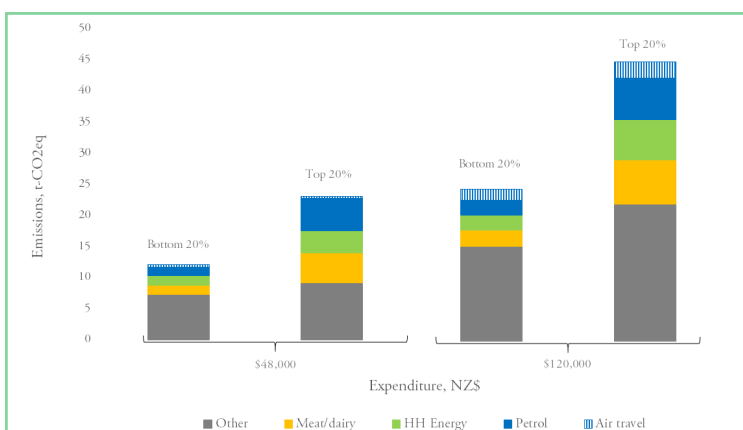
After controlling for household characteristics, an average household’s emissions were 4.6 per cent lower in 2012 than in 2006. This represents a reduction of about 1 tonne of carbon dioxide equivalent (t-CO<sub>2</sub>eq) for a two person household with \$80,000 of expenditure.

This fall is in part due to the fall in emissions from household energy (down 10 percent between the two surveys). This result is consistent with the observed decline in total residential electricity consumption since 2006. Using an estimate of how much household electricity demand responds to changes in prices, roughly half of the decrease is consistent with a price response by households. The remainder is consistent with general improvements in energy efficiency. Interestingly, there was no such reduction for petrol and diesel emissions, despite a similar price increase between the surveys.

While household emissions have fallen on average, the size of the decline does depend on the type of household. The decrease was smaller for wealthier households.

This article is a condensed version of “[Are we turning a brighter shade of green? The relationship between household characteristics and greenhouse gas emissions from consumption in New Zealand](#)” Motu Working Paper 15-06 by Corey Allan, Suzi Kerr and Campbell Will.

Figure 1: Variation in Household Emissions



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## Director's Letter

Public policy in a democracy is built on a complex base of political forces, judgment and ideology. However, I believe firmly that understanding the facts and analysing the economic forces at work can make a difference in ensuring that policy will work for the long-run wellbeing of New Zealand. To ensure good policy and a favourable result for the country as a whole, it is vital for research to be freely available and widely debated.

Because of Motu's commitment to independence and transparency, our policy of consistently publishing all of our findings without fear or favour occasionally provokes the ire of our clients. However this requirement is clear in all Motu's contracts and a major element of our constitution and mission. Motu holds a strong position in ensuring scientific, economic research is at the heart of decision-making.

Over the last year, Motu cemented its position as New Zealand's pre-eminent economics and public policy research organisation with the appointment of Dean Hyslop, one of NZ's top economists as a Senior Fellow. We also helped lead the creation of Te Pūnaha Matatini, a new Centre of Research Excellence (CoRE) focused on the characterisation and analysis of complex systems and networks. In addition we have significantly "upped our game" in terms of communicating our work to the wider world, with the launch of a newly restructured website. As a partial reflection of these efforts, we were a finalist in the Dominion Post Gold Awards.

In 2015, Motu's wide range of projects included:

"New Zealand's Low-Emissions Future", a two-year programme funded by the Aotearoa Foundation, part of the Robertson Foundation in New York. This programme includes research, stakeholder dialogue and capacity building in understanding the effectiveness and consequences of different private actions and policy instruments for mitigating greenhouse gas emissions in New Zealand and around the globe.

A research partnership between Motu and the Productivity Hub (the Treasury; the Ministry of Business, Innovation and Employment; Statistics NZ; and the Productivity Commission). This two-year programme for research and capability building focuses on expanding the use of the microeconomic data held by Statistics NZ to study patterns and causes of productivity in New Zealand firms and has already resulted in papers by myself, Trinh Le, Dave Maré and Dean Hyslop.

Taking Suzi Kerr's significant work on emissions trading schemes in New Zealand to a new level, Motu is undertaking a new project, funded by the World Bank. Motu will lead a team of international collaborators in constructing a new manual for less-developed countries that wish to develop emissions trading systems.

Arthur Grimes continues his closely followed work on the factors affecting the supply and demand for housing in New Zealand, and on the measurement and determinants of "well-being" as a broader and more appropriate goal of public policy than income.

I am working with MBIE to apply the lessons from my studies of the processes of research grant evaluation to improve the effectiveness and efficiency of the government's research funding.

Policy Fellow Anne-Marie Brook is working with international human rights experts to begin the design of a global index of human rights.

We also produced 20 papers showing detailed economic policy work on topics as diverse as the change in risk after a major disaster, water quality policy, indigenous belief systems and wellbeing, and an examination of scientific research funding in New Zealand.



Adam B Jaffe, Director and Senior Fellow

## Motu Developments

### New Senior Fellow

Dean Hyslop accepted a Senior Fellow position at Motu and has been with us since March 2015. Dean's research interests are in labour markets and applied econometrics and he is researching the importance of skills in workers' wages and firm performance in New Zealand. Dean was Professor of Econometrics at Victoria University until starting at Motu. Prior to this he was a Senior Researcher at the Department of Labour, and a Principal Advisor in The Treasury. Before joining The Treasury, he was an Assistant Professor at the University of California, Los Angeles (UCLA).

He has held visiting research fellow positions in the Center for Labor Economics at UC Berkeley, and at the University of Melbourne, and the FH Gruen Visiting Professor in the Research School in Economics at the Australian National University. He has a PhD from Princeton University. Dean won the prestigious Frisch Medal in 2008 for his work on estimating the effects of a time-limited earnings subsidy for welfare-leavers alongside David Card.

### Awards and Recognition

Motu is the top-ranked economics organisation in New Zealand. It is in the top ten global economic think tanks, according to the Research Papers in Economics (RePEc) website, which ranks all economists and economic research organisations in the world based on the quantity and quality of their research publications. Motu's five senior fellows are placed in the top thirty economists in New Zealand and Adam Jaffe is listed as the top economist in Oceania (which includes Australia).

Motu was a finalist in the Supporting Gold category (services and infrastructure) of The Wellington Gold Awards, which honour successful Wellington-based businesses. We were up against an interesting bunch of other firms:

- Datacom NZ (4000 staff worldwide – who won both this category and the overall award)
- Le Cordon Blue NZ Institute (has over 50 schools in 20 countries)
- Uprise Digital (runs digital campaigns for advertising firms)
- WELTEC School of Construction (150 courses and 9000 students)

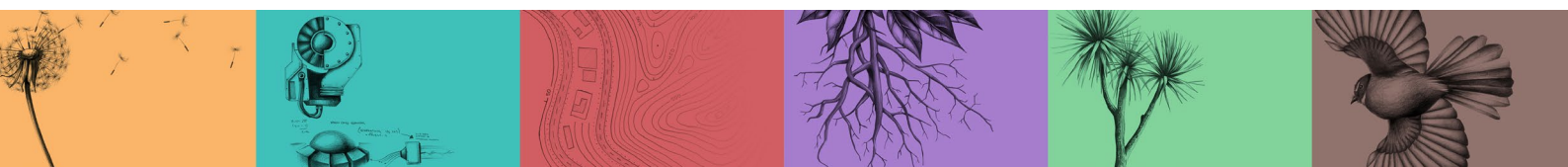
Corey Allan, one of Motu's research analysts recently won the Australian Agricultural and Resource Economics Society's Heading West Award. He will present his research at the 2016 AARES Conference in Canberra.

### New Marsden Funding

New Zealand has the highest skilled emigration rate in the OECD at 24%, yet our understanding of the forces driving our skilled graduates overseas is limited. Isabelle Sin, one of Motu's fellows has been awarded Marsden Funding for a three year investigation into recent tertiary graduates and their domestic and international migration. The research will examine whether financial incentives provided by the government reduce brain drain, and how migration decisions and the ability of graduates to move to job opportunities are affected by their wealth.

Izi is an expert in international flows of knowledge and will work on the project with Associate Professor Ran Abramitzky of Stanford University, where she received her PhD in 2011.

The research is aimed at improving understanding of the drivers of skilled migration decisions, in order to provide policymakers with reliable evidence on which to base migration and education policies in NZ.



## Performance Evaluation of Research Programmes: The Marsden Fund

By Adam Jaffe

Governments grant funding to advance human knowledge, but there is little systematic evidence as to the effectiveness of funding mechanisms. Funding organizations evaluate proposals, and attempt to award funds to those they judge most likely to be successful, which introduces selection bias into any evaluation of the subsequent success of researchers. Further, there is little empirical evidence as to the effectiveness of these selection mechanisms, which themselves consume public resources and researcher time.

In our recent paper, we measure the effect of funding receipt from the New Zealand Marsden Fund while controlling statistically for selection bias. We also test the efficacy of the selection process itself, using a unique dataset of funded and unfunded proposals that includes the evaluation scores assigned to all proposals.

The Marsden Fund was established in 1994 to support New Zealand scholarly research (including mathematical, physical, biological, and social sciences, and humanities) on a competitive basis. It funds blue-skies research on an unrestricted national basis. In 2013, NZD 67.9 million (approx USD 45 million) was allocated in research grants through the Marsden Fund. In a typical year, the Marsden Fund receives approximately 1000 proposals, and funds fewer than 10%. The government delegates the administration of the programme to the Royal Society of New Zealand (RSNZ).

The RSNZ appoints assessment panels of between 5 and 10 members and allocates a budget to each panel. The panels are rather broad in coverage; for example “Physical Sciences and Engineering” and “Biomedical Sciences.”

There are two types of Marsden Fund grant. The standard grant is for any research team, and can run for up to three years. The maximum budget has been in the order of NZD 300,000 per year. Applicants within 7 years of their PhD award have the option to apply for a “Fast-Start” (“FS”) grant, which is limited to NZD 100,000 per year. FS proposals are ranked against other FS applicants rather than the general pool. Each panel decides how to allocate its budget for FS and standard grants.

The Marsden Fund uses a 2-stage review procedure, under which 60-80% of the initial proposals are rejected before the remainder are evaluated in more detail. We focus on 2nd-stage proposals, which represent approximately the best 25% of the proposals. Each panel chooses a cut-off that ensures successful proposals fit within the allocated budget.

To compare the scholarly performance of researchers, we used Scopus to collect the proposal participants’ publications, and all of the citations to those publications, for 1996-2012. Increasing publications and citations is not the explicit goal of the programme, and in individual cases these metrics vary for idiosyncratic reasons. We assume that if the stated goals to “Enhance the quality of research” and “Support the advancement of knowledge” are being met, that publication and citations rates for funded researchers would be higher than they would otherwise have been. Note that we make no attempt to identify publications specifically connected to the funded research: we are capturing the effect of the Fund on researchers’ overall scholarly performance.

Intrinsic publication/citation rates and the fraction of these metrics captured by Scopus vary over time and across disciplines. Our estimation methods allow for this, normalizing citation counts by year and discipline and calculating the proportional effect of funding on the base performance.

We compare researchers’ performance through two distinct but related lenses. First, we look at the overall cumulative performance of the research team, before and after submitting a Marsden proposal. Second, we take all of the New Zealand-based researchers and look at each individual’s yearly

research output, looking for an effect of having received a Marsden grant in the previous five years.

Basic results indicate that funding is associated with an increase in publications of about 6% and citations about 12% relative to what would have been predicted based on previous performance. The coefficient on previous performance is approximately 0.75, indicating that there is significant persistence in success but with some regression to the mean. When looking at the full model, the treatment effect associated with funding is increased to 15% for publications and 26% for citations. FS teams are associated with about 16% greater research output (controlling for pre-proposal performance), consistent with these younger investigators being, on average, on a steeper upward output trajectory than other researchers. However, FS applicants receive no different effect from funding, though the effect of FS per dollar is higher but not statistically significant.

We expect that the post-proposal performance of a given cohort might be increased if a member receives a Marsden grant from a different proposal at some future time. The results confirm that teams with one or more members who received funding in some subsequent funding round received about 17% more publications and 35% more citations than those that did not. The surprising result is that the coefficient on scaled rank is negative. This means that, all else equal, proposal teams that were highly ranked by the RSNZ panels actually performed worse than those that were ranked lower.

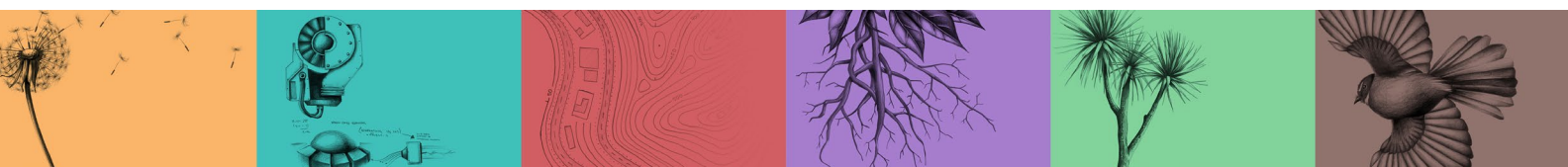
When looking at results for the individual-year model including all New-Zealand based researchers the results are qualitatively similar to the team results, but the estimated funding effects are smaller: publications are increased by about 3.4% for each contract received, and citations 5.6% per year for five years. The effect of panel rank is now negative but insignificant in publications but positive and insignificant for citations. Professional age has a small but statistically significant independent effect, with older researchers producing slightly fewer papers but receiving slightly more citations, after controlling for other effects.

Compared to an unfunded researcher, a researcher receiving a single grant benefits from an immediate boost of almost 6%, which rises to about 8% after 5 years and then gradually fades away. A researcher who gets an initial grant, and then another grant five years later would enjoy an increase in citations that peaks at about 14% before fading away (assuming no further funding).

We find that funding increases citations more than it increases publications, suggesting that funding allows more research output that has a greater impact. We believe that the estimated team effect of 6-15% for publications and 12-26% for citations may be more indicative of the true average treatment effect than the estimated individual effects, because the individual-year model is subject to an attenuation bias because we do not know which researchers on a given grant might have been most affected. Finally, we find no evidence that second-round Marsden panels effectively distinguish relative likely success, after controlling for other observables. It seems likely that once the worst proposals are screened out in the first round, it is very difficult effectively to differentiate among the broad multidisciplinary range of proposals assigned to each panel.

We should fund research.  
But trying to choose the best  
doesn’t work too well.

This article is a condensed version of [\*“The effect of public funding on research output: the New Zealand Marsden Fund”\*](#) Motu Working Paper 15-12 by Jason Gush, Adam Jaffe, Victoria Larsen, and Athene Laws.



## Firm Productivity Growth and Skill

By Dean Hyslop

Myself, Dave Maré and Richard Fabling recently published a working paper that uses firm-level data to investigate the productivity of New Zealand firms: “Firm productivity growth and skill”.

This paper is part of the Productivity Hub’s Longitudinal Business Data Research Partnership with Motu and is designed to give New Zealand an evidence base for lifting its poor productivity track record. The paper describes firm productivity using Statistics New Zealand’s Longitudinal Business Database (LBD).

Quals are increasing.  
Job growth draws in new workers,  
but they are less skilled.

The LBD is a world-leading, integrated microdata set covering most New Zealand firms. Having access to firm-level data provides researchers with a degree of resolution that isn’t possible with aggregate data. This greatly enhances the range of questions that can be investigated and opens up a wealth of policy-relevant research into the economic forces influencing firm productivity. Maré, Hyslop and Fabling combined this dataset with estimates of worker skill derived from linked employer-employee data in Statistics New Zealand’s Integrated Data Infrastructure (IDI).

The measure of worker quality – which is derived from earnings data – reflects the bundle of skills, qualifications and experience of individual workers. As such, it picks up a broader range of worker attributes beyond qualifications. Based on this measure, there was a cyclical decline in the average labour quality of the New Zealand work force of 1.8% from 2001-2012 due to the increased employment of low-skilled workers. The fall was particularly pronounced in the business cycle upswing that preceded the Global Financial Crisis that began in 2008.

The figure above shows the strength of skill dilution, and illustrates how closely it follows changes in the employment rate. For example, there was a net 3.0% decline in average skill during the business cycle upswing from 2001 until the global financial crisis (GFC) struck in 2008, followed by a 1.4% increase during the sharp contraction over the next two years, and a further mild 0.2% decline over the final two years of the sample period.

This dilution of the average quality of New Zealand workers reflects the net result of two opposing forces. First, average skills increased due to ageing (ie, greater experience) and rising qualifications. For example, the share of tertiary qualified workers grew from 15% to 25% while the share of workers with no qualifications fell from 19% to 14% between 2001 and 2013.

Secondly, the large number of new workers who came into the labour market had, on average, lower skill than existing workers. This led to a cyclical dilution in worker quality that offset the improvement in qualifications and experience. Adjusted for compositional changes, labour input in NZ grew by 13.3% from 2001 to 2012, as opposed to 15% in unadjusted terms.

Slower growth in quality-adjusted labour input translates into faster growth in multi-factor productivity (mfp). Specifically, mfp growth adjusted for changes in worker quality increased by an average of 0.24% per year compared to 0.14% per year for the unadjusted measure.

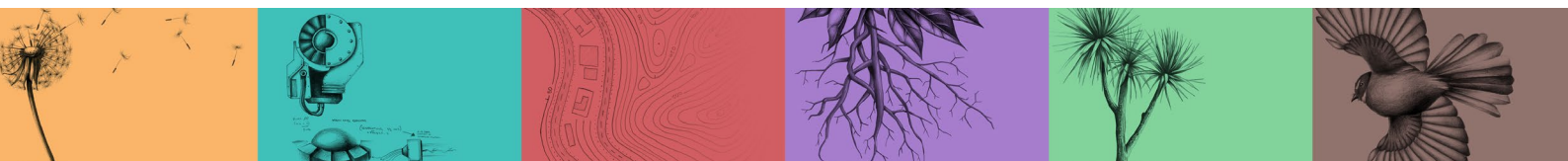
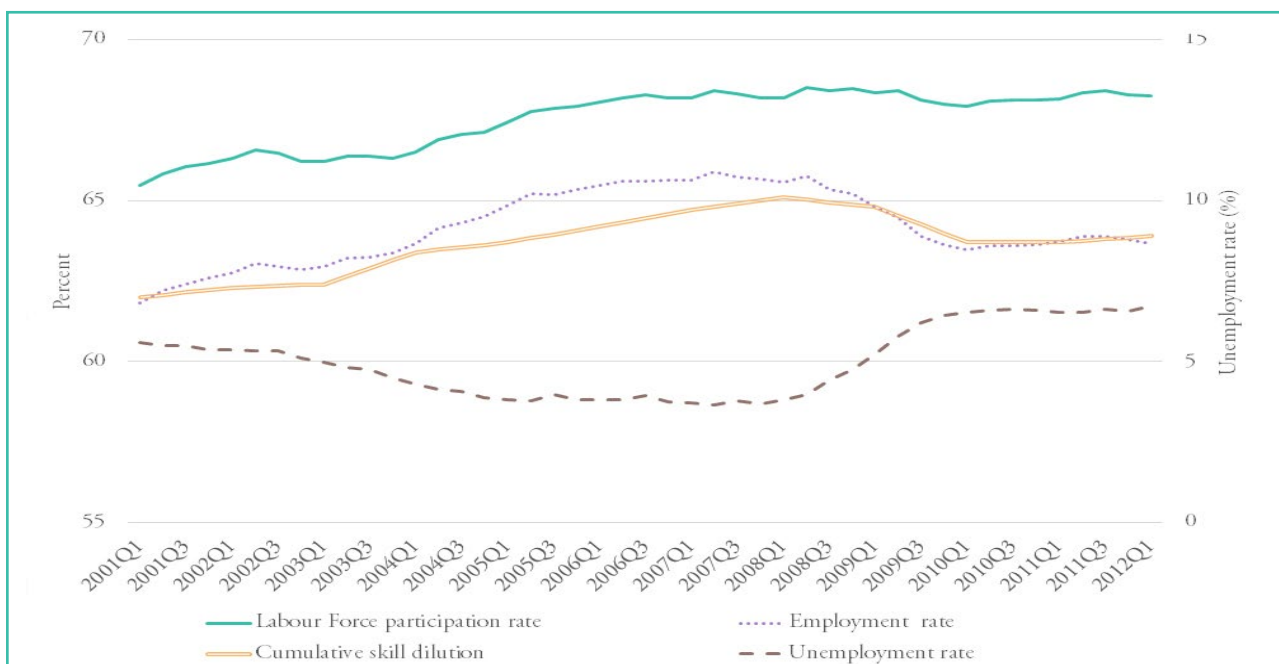
Looking at the effect of changes in skill on mfp growth over the sample period, skill adjustment is almost entirely accounted for by changing skill composition within continuing firms that operate throughout the period. This implies that the cyclical changes in skill composition, and hence skill-adjusted impacts on mfp, occur mainly for continuing firms.

Overall, skill adjustment provides an improved view of cyclical labour market and productivity change, but the impact is not large enough to account for much of New Zealand’s relatively weak productivity growth since 2001.

The two technical papers, “Production function estimation using New Zealand’s Longitudinal Business Database”; and “Addressing the absence of hours information in linked employer-employee data” show how the researchers generate a consistent productivity dataset across a large number of New Zealand firms.

This dataset includes firms of all sizes, including sole-proprietor firms that do not have any employees. The industry coverage of firms in the dataset is also extremely broad, covering the primary, manufacturing and services sectors. This contrasts to firm-level datasets in other countries that often cover only large firms in the manufacturing sector.

This article is a condensed version of “*Firm productivity growth and skill*” Motu Working Paper 15-18 by David C Maré, Dean R Hyslop and Richard Fabling.





## Our People

### Comings and Goings

As mentioned above, Dean Hyslop began as a Senior Fellow in March 2015. Richard Fabling resigned as a Motu Senior Fellow in June, but continues to work with us on a project basis.

One of Motu's crucial roles is to expand this country's economic and policy capability through the employment of up-and-coming research analysts and summer interns, all of whom are very impressive and intelligent young people. This year two of Motu's research analysts have left for further PhD studies – Athene Laws to Cambridge University and Sean Hyland to Chicago. Anna Robinson also left Motu and is now working in development for the Ministry of Foreign Affairs and Trade. In 2015, the research analyst team was joined by Nathan Chappell and Edmund Lou. Kate Preston and Wilbur Townsend will begin as research analysts in March 2016.

We have significantly restructured our communications with the launch of a new website and the appointment of Ceridwyn Roberts as Communications Director, replacing our previous Publications Advisor, Tui Head. Early in 2016, we will also bid farewell to Lynette Campbell our Accounts Assistant and welcome Clare O'Connor as her replacement.

### Staff List

Director and Senior Fellow: Adam B. Jaffe

Senior Fellows: Arthur Grimes, David C. Maré, Dean R. Hyslop, Suzi Kerr

Fellows: Anne-Marie Brooke, Catherine Leining, Isabelle Sin, Levente Timar, Trinh Le

Research Analysts: Corey Allan, Edmund Lou, Eyal Apatov, Nathan Chappell, Judd Ormsby

Support Staff: Grant Coppersmith, Ceridwyn Roberts, Lynette Campbell, Maxine Watene

Board of Trustees: John Hay, Chair, Adam B. Jaffe, Arthur Grimes, Bruce Wills, Horiana Irwin-Easthope, Peter O'Shea, Stephen Goldson

Affiliates: Adolf Stroombergen, Andrew Coleman, Deborah Cobb-Clark, Grant Scobie, Jacques Poot, James Sanchirico, John McDermott, Les Oxley, Lew Evans, Lynda Sanderson, Malathi Velamuri, Philip McCann, Richard Fabling, Richard Newell, Robert MacCulloch, Sholeh Maani, Steve Stillman, Tim Maloney, Viv Hall

## Public Policy Seminars

Motu's 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.

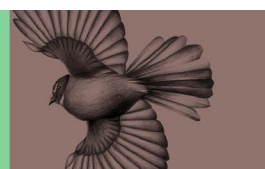
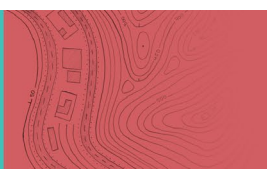
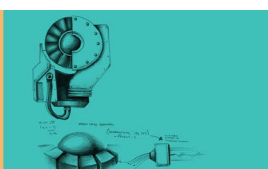
Our seminars are accessible to a wide audience, and are attended by people from diverse backgrounds who want to stay informed on economic, social and public policy research.

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 a number of Public Policy Seminars. Presentation material from these seminars, including slides and audio recordings, is available online at <http://motu.nz/resources/public-policy-seminars/past-public-policy-seminars/>.

### Subscribe!

To receive email invitations to Motu seminars, sign up at <http://motu.nz/newsletter/>.



## Motu Publications

To see more of our publications, including journal articles, presentations alongside our working papers and notes, please visit <http://motu.nz/find-publications/>.

### Environment and Resources

[“Predicting harvestability of existing \*Pinus radiata\* stands: 2013-2030 projections of stumpage profits from pre-90 and post-89 forests”](#) - Motu Working Paper 15-16 Thirkettle, Matt and Suzi Kerr. 2015.

[“Methane and Metrics: From global climate policy to the NZ farm”](#) - Motu Working Paper 15-11 Dorner, Zachary and Suzi Kerr. 2015.  
*Recent modelling has shown that an effective global climate policy for agriculture would help NZ economically, as effective global mitigation for agriculture will lower the global costs of limiting warming to 2 degrees. It will also raise commodity prices for dairy and meat, which provides benefits for our farmers. In this paper we extend this modelling to evaluate the impact of global climate policy scenarios on NZ farmers.*

[“Nitrogen Trading in Lake Taupo: An Analysis and Evaluation of an Innovative Water Management Policy”](#) - Motu Working Paper 15-07 Duhon, Madeline, Hugh McDonald and Suzi Kerr. 2015.  
*This paper provides an overview and early evaluation of the Lake Taupo nitrogen cap and trade programme, established as part of Waikato Regional Council’s 2011 Regional Plan Variation Five. The policy establishes a catchment-wide cap on nitrogen losses by allocating farmers individual nitrogen discharge allowances and allowing those farmers flexibility to trade allowances amongst themselves and to sell allowances to a public fund while remaining within the overall catchment cap. The Taupo trading scheme is the world’s first agricultural non-point-source water-quality cap and trade scheme.*

[“Are we turning a brighter shade of green? The relationship between household characteristics and greenhouse gas emissions from consumption in New Zealand”](#) - Motu Working Paper 15-06 Allan, Corey, Suzi Kerr and Campbell Will. 2015.  
*Emissions from the consumption by individual households may be falling, but due to the rise in New Zealand’s population, the amount of greenhouse gases entering the atmosphere from kiwi households’ overall consumption are increasing. One aim of this research is to help ordinary Kiwis identify their biggest opportunities to reduce climate change.*

[“The Taupo Nitrogen Market: The World’s Only Diffuse Source Trading Programme”](#) - Motu Note #20 Kerr, Suzi, Suzie Greenhalgh and Geoff Simmons. 2015.

[“From Fact to Act: New Zealanders’ Beliefs and Actions on Climate Change”](#) - Motu Note #19 Leining, Catherine and Scott White. 2015.

[“Not a Problem, Someone Else’s Problem, My Problem or Our Opportunity? Shifting Attitudes and Behaviour on Mitigating Climate Change”](#) - Motu Note #18 Leining, Catherine. 2015.

[“A Few Lessons for Climate Change Action from the Literature on Cooperation and Behavioural Economics”](#) - Motu Note #17 Ormsby, Judd and Suzi Kerr. 2015.

[“New Zealand’s Journey toward a Low-Emission Future: Today’s Climate Change Landscape”](#) - Motu Note #16 Leining, Catherine. 2015.

### Urban and Regional Economics

[“Before a Fall: Impacts of Earthquake Regulation and Building Codes on the Commercial Market”](#) - Motu Working Paper 15-19 Timar, Levente, Arthur Grimes and Richard Fabling. 2015.

*We find that in the CBD, the price discount that accompanies an official earthquake-prone declaration averages 45% whereas there is no observable discount on buildings that are subsequently declared earthquake-prone. Consistent with our theoretical model that anticipates forced sale of some officially declared earthquake-prone buildings, the probability of sale of officially declared earthquake-prone buildings rose markedly after the Christchurch earthquakes.*

[“Impacts of Planning Rules, Regulations, Uncertainty and Delay on Residential Property Development”](#) - Motu Working Paper 15-02 Grimes, Arthur, Ian Mitchell. 2015.

*Dwelling prices are determined in the long run by the total costs of a development, where costs include regulatory costs, including costs of delay and uncertainty. We outline a conceptual framework for the development process and then develop a real options model of housing development that indicates more formally how regulatory policies and regulatory practices affect development decisions. We apply these insights to the design of a survey of property developers active in the Auckland market, with an emphasis on the “affordable” part of the market.*

### Population and Labour

[“Residential Assimilation of Immigrants: A Cohort Approach”](#) - Motu Working Paper 15-20 Maré David C., Ruth M. Pinkerton and Jacques Poot. 2015.

*We find evidence of residential assimilation, whereby immigrants become less spatially concentrated in the years following arrival. Overall concentration has nevertheless been increasing over time, with successive cohorts entering with higher levels of initial concentration. By examining the spatial location patterns of arrival cohorts, we show that entering cohorts are attracted to the current rather than initial locations occupied by the previous cohort of their compatriots. Despite differences across cohorts and over time, there is nevertheless a high degree of stability in the ‘residential footprint’ of different immigrant groups within Auckland.*

[“Economic Liberalisation and the Mobility of Minority Groups: Evidence for Māori in New Zealand”](#) - Motu Working Paper 15-03 Sin, Isabelle, Steven Stillman. 2015.

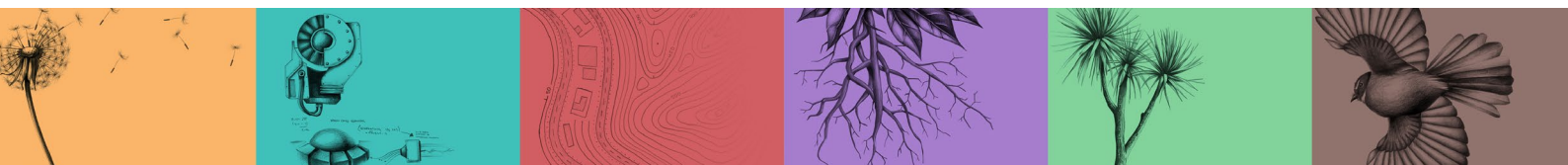
*In contrast to the anecdotal evidence, we find that Māori are more mobile on average than similar Europeans. However, Māori who live in areas with strong networks of their iwi are slightly less mobile than Europeans. The difference between Māori who live locally to their iwi and those who do not is even more pronounced when we consider responsiveness to local labour market shocks. Non-local Māori are considerably more responsive to changes in economic opportunities than are Europeans, whereas local Māori are almost entirely unresponsive.*



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## Motu Publications cont'd

To see more of our publications, including journal articles, presentations alongside our working papers and notes, please visit <http://motu.nz/find-publications/>.

### Productivity and Innovation

“[Firm Productivity Growth and Skill](#)” - Motu Working Paper 15-18 Maré David C., Dean R. Hyslop and Richard Fabling, 2015.

“[Addressing the absence of hours information in linked employer-employee data](#)” - Motu Working Paper 15-17 Fabling, Richard and David C. Maré. 2015.

“[Production function estimation using New Zealand's Longitudinal Business Database](#)” - Motu Working Paper 15-15 Fabling, Richard and David C. Maré. 2015.

“[Agricultural Productivity in New Zealand: First estimates from the Longitudinal Business Database](#)” - Motu Working Paper 15-13 Apatov, Eyal, Richard Fabling, Adam Jaffe, Michele Morris and Matt Thirkettle. 2015.

*In this study, we estimate the drivers of revenue and productivity in two key agricultural industries – dairy and sheep/beef. Together these account for about two-thirds of New Zealand's agricultural exports.*

“[The effect of public funding on research output: The New Zealand Marsden Fund](#)” - Motu Working Paper 15-12: Laws, Athene, Jason Gush, Victoria Larsen and Adam B Jaffe. 2015.

*This research measures the effect of funding receipt from the New Zealand Marsden Fund using a unique dataset of funded and unfunded proposals that includes the evaluation scores assigned to all proposals. We find that Marsden Funding does increase the scientific output of the funded researchers, but that there is no evidence that the final selection process is able to meaningfully predict the likely success of different proposals.*

“[The impact of R&D subsidy of innovation: a study of New Zealand firms](#)” - Motu Working Paper 15-08 Jaffe, Adam and Trinh Le. 2015.

*We find that receipt of an R&D grant significantly increases the probability that a firm in the manufacturing and service sectors applies for a patent during 2005–2009, but no positive impact is found on the probability of applying for a trademark. Using only firms that participated in the Business Operation Survey, we find that receiving a grant almost doubles the probability that a firm introduces new goods and services to the world while its effects on process innovation and any product innovation are relatively much weaker. Moreover, there is little evidence that grant receipt has differential effects between small to medium (<50 employees) and larger firms.*

“[Are Patent Fees Effective at Weeding Out Low-Quality Patents?](#)” - Motu Working Paper 15-01 De Rassenfosse, Gaétan, and Adam B. Jaffe. 2015. *The study analyzes the effect of the Patent Law Amendment Act of 1982, which resulted in a substantial increase in patenting fees at the U.S. Patent and Trademark Office, on patent quality. Results from a series of difference-in-differences regressions suggest that the increase in fees led to a weeding out of low-quality patents. However, the fee elasticity of quality decreased with the size of the patent portfolio held by applicants.*

“[A Framework for Evaluating the Beneficial Impacts of Publicly Funded Research](#)” - Motu Note #15 Jaffe, Adam B.

### Wellbeing and macroeconomics

“[Indigenous Belief in a Just World: New Zealand Maori and other Ethnicities Compared](#)” - Motu Working Paper 15-14 Grimes, Arthur, Robert MacCulloch and Fraser McKay. 2015.

“[Relative Income and Subjective Wellbeing: Intra-national and International Comparisons by Settlement and Country Type](#)” - Motu Working Paper 15-10 Grimes, Arthur and Marc Reinhardt. 2015.

*Much of the work on the Easterlin Paradox ignores three important aspects, including whether: people also compare themselves to citizens in other countries; there is a difference between residents in differently sized settlements within a country; and if there is a difference between residents in immobile societies versus countries with higher degrees of mobility. Our research incorporates each of these aspects and shows that an individual country that lifts their national per capita income relative to others also raises average life satisfaction.*

“[A New Cross-Country Measure of Material Wellbeing and Inequality: Methodology, Construction and Results](#)” - Motu Working Paper 15-09 Grimes, Arthur and Sean Hyland. 2015.

*This paper advances a new framework for defining a country's material wellbeing based on the distribution of consumer durables, building on the recent material wellbeing literature that calls for an increased focus on both the level and the distribution of consumption and wealth.*

“[Exchange rate fluctuations and the margins of exports](#)” - Motu Working Paper 15-05 Fabling, Richard and Lynda Sanderson. 2015.

*To isolate the impact of the exchange rate, as opposed to contemporaneous (and related) fluctuations in New Zealand's economic performance or overseas market characteristics, we focus on bilateral export relationships at the firm level and control for both time-invariant country characteristics and changes in aggregate economic conditions. We examine two key margins of export adjustment – the probability of exporting (the extensive margin) and the average value of exports per firm (the intensive margin) – and distinguish between impacts on market incumbents and new or potential entrants. Finally, we specifically take account of the potential for interaction between the level and volatility of the exchange rate to affect exporting, as implied by theories of exchange rate hysteresis.*

“[The impact of tax changes on the short-run investment behaviour of New Zealand firms](#)” - Motu Working Paper 15-04 Fabling, Richard, Richard Kneller and Lynda Sanderson. 2015.

*Adjustments to personal tax rates and fiscal depreciation allowances provide a direct lever through which government policy can affect the cost of capital faced by firms. The effect of these tax adjustments differs across firms according to their asset structure, providing both inter-temporal and inter-firm variation in UCCs and enabling an assessment of the short-run impact of UCC changes on investment behaviour. This analysis shows that while tax-induced changes in the UCC have significantly affected investment behaviour among some firms, the aggregate impacts are likely to have been negligible as the industries in which investment impacts are observed make a very small contribution to aggregate investment.*

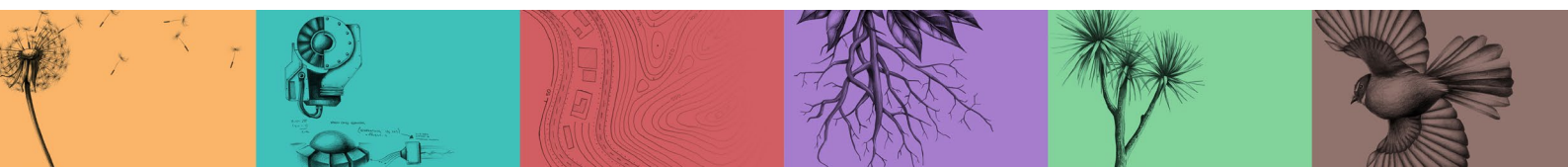
“[The Material Wellbeing of New Zealand Households](#)” - Motu Note #21 Grimes, Arthur and Sean Hyland. 2015.

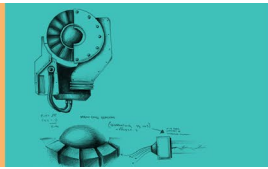


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## Beliefs, Indigeneity and Economic Outcomes

By Arthur Grimes

Striking differences in economic outcomes exist within New Zealand for Māori relative to the non-Māori population. I recently undertook research with Robert MacCulloch of the University of Auckland and Fraser McKay (now at Mercer) – a team comprising both Māori and non-Māori researchers. Our findings suggest that there is a large overlap of beliefs across Māori and non-Māori within New Zealand. On average, however, Māori beliefs are more aligned with giving importance to collectivism, non-materialism, the environment and kinship ties, relative to non-Māori.

A large body of research (that we cite in our study) indicates that these types of beliefs that are more common amongst Māori are correlated with less successful employment and income outcomes within capitalist economies. Our findings that Māori beliefs are more aligned with collectivism, non-materialism and kinship ties, compared to non-Māori, may explain why Māori enterprises tend to be built more on a stakeholder, than a shareholder, approach. The extent to which these institutions will improve overall Māori well-being depends not only on income generation but also on non-economic factors, such as environmental and kinship outcomes.

We cannot say whether the determinants of Māori beliefs that are less favourable to capitalism pre-date the colonisation experience, or are related to historical injustices and grievances, or are related to more recent experiences of discrimination. Whatever the cause, the international literature that has examined the effects of beliefs on economic performance suggests that some of the economic gap between Māori and non-Māori economic outcomes may be attributed to cultural differences in values and beliefs.

The main source of our data is the World Values Survey. We use data from the 1998, 2004 and 2011 surveys. This survey measures a variety of beliefs (positive statements about how the world works) and values (normative statements on how the world should work). We study beliefs that are economically relevant, and also select a set of supplementary non-economic beliefs, some of which may indirectly affect economic outcomes. We compare the beliefs of those people who identify themselves as Māori with those who do not. Of the full sample used in this research, 7.7% identify as being Māori.

It is possible that observed differences in beliefs may not be caused by ethnicity, but instead by some other variable that is correlated with ethnicity. For example, if Māori are more highly represented in lower income and education groups, or have higher rates of unemployment, then their different beliefs (when compared to non-Māori) may be driven by these kinds of factors, and not by ethnicity per se. Our results hold, even after controlling for income, work status, sex, age, and education level.

After controlling for these factors, Māori are 18% more likely to respond that people in need have been treated unfairly, compared to non-Māori. As people get richer they are less likely to believe that treatment is unfair, with the top quintile being 15% less likely to share this belief than people in the bottom quintile. By contrast, the unemployed are 23% more likely to support the idea that the poor are being treated unfairly. After controlling for other factors, we find that Māori are 30% more likely than non-Māori to respond that the Government is doing “too little” for those in need.

Māori have strong environmental beliefs and tend to value tradition over technology. Relative to non-Māori, they are also more inclined to respect authority figures regardless of their qualities and faults. 63% of Māori believe environmental protection should be prioritised, even at the cost of economic growth and jobs, compared to 45% of non-Māori. There is a clear difference between the sexes, with 69% of Māori women stating a stronger preference in favour of environmental protection compared to 56% of Māori men. After controlling for income, work status, sex, age and education level, Māori are 9% more likely than non-Māori to respond that protecting the environment should be given top priority even at the cost of economic growth. There is also strong support for emphasizing the environment by those with a university education. These individuals are 22% more likely to give the environment priority, compared to those who have not completed high school.

We benchmark our results against a comparison of black and non-black Americans to test whether there may be an indigenous component of economic belief that is separate from beliefs associated with economic disadvantage.

Like Māori, black Americans are significantly more likely (than non-blacks) to support the belief that people live in need because society has treated them unfairly and also that the government is doing too little to help those in poverty. However, black Americans are significantly less likely to believe that the environment should be given top priority than non-blacks, whereas Māori hold the opposite belief compared to non-Māori. This may reflect the fact that Māori are indigenous to New Zealand whereas black Americans trace their roots to a different continent. Thus indigeneity may be an important determinant of beliefs that is distinctly separate from the influence of economic disadvantage.

In summation, this paper analyses whether certain beliefs and values differ systematically between Māori and non-Māori, while recognising that there is not a uniform culture for either group. Many of the beliefs and values we examine have been linked to the adoption of particular individual actions (such as undertaking further education) that may affect economic outcomes.

This finding is also reflected in the recent ANZ Barometer Māori Business Key Insights Report. It found the top reason for Māori to be in business was “to help others”, whereas for Non-Māori businesspeople “making money” was the highest rated motivation to be in business.

The difference in beliefs between Māori and non-Māori has relevance for crafting institutions across New Zealand. Creating a common set of rules for the whole population becomes more difficult when beliefs differ. This is especially true as research shows there is greater adherence to rules when affected parties are included in their drafting. This suggests that special efforts to engage Māori in political and regulatory processes (such as formal requirements for consultation with Māori in resource management matters) are warranted.

The research presented here is still exploratory. It could be useful to undertake further research to develop a deeper understanding of the role of history, culture, and institutions in the economic development outcomes of all New Zealanders, reflecting the diversity of beliefs and values within the country.

This article is a condensed version of “*Indigenous Belief in a Just World: New Zealand Maori and other Ethnicities Compared*” - Motu Working Paper 15-14 by Arthur Grimes, Robert MacCulloch and Fraser McKay.