MOTU RESEARCH UPDATE - ISSUE 27 - NOVEMBER 2017

Gender Pay Gap

Women in New Zealand are paid less than men, and the difference can't be justified by women being less productive. Our study found that women are paid 16% less on average for making a contribution of the same value to their employer.

We used wage data and productivity data from the whole of New Zealand to look at the reasons for the gender wage gap. We found that sexism (where employers prefer to hire or promote men rather than women, are more likely to reject equally qualified women, or offer women less) is likely to be the most important driver of the gender wage gap. This is opposed to women working in low-paying industries or firms, being less productive, or being less successful at bargaining.

Less pay for same contribution

In our examination of the whole economy, we found that women are over-represented in low-paying industries such as food and beverage services and aged care, but that this explains only 7% of the entire gender wage gap. If you add the fact that women also tend to work in low-paying firms, we can say that 12% of the overall gender wage gap is due to the particular industries and firms where women work.

Our study then looked at productivity and wages of men and women in private for-profit firms with at least five employees. We looked directly at how the output of similar firms varies with the gender mix of the employees, and used this to infer the relative value male and female employees add to their firms. When comparing men and women in the same industry, we found they were statistically indistinguishable in how much value they added to their firms. Yet, for work of the same value the average woman in the private for-profit sector was paid only 84 cents for every $1 paid to the average man.

There was no evidence of a wage-productivity gap between young men and women, but a gap opened with age. There was a 16% gap for women aged 25-39, a 21% gap for those aged 40-54, and a 49% gap for older women.

It's not just a trick of the statistics

Next we explored the potential causes of the gender wage gap. We found no statistically significant differences between men and women's productivity on average in the private for-profit sector, however in some industries the productivity of men and women did differ. One possibility is that employers could stereotype women as being less productive than men, and pay them commensurately with their value only once they had had a chance to demonstrate their productivity. This is known as statistical discrimination. If statistical discrimination were driving the unexplained gender wage gap, women with more labour market experience or more years with the same employer, and thus more opportunity to demonstrate their productivity, would be paid similarly to equally productive men.

Our research shows women in their first year with their employer are not paid significantly less than equally productive men in their first year. However, in their second and subsequent years women are paid over 20% less. Similarly, the unexplained gap is greater among older age groups. That is, women who have had the chance to demonstrate their worth to their employers nevertheless face a larger wage-productivity gap. This is the opposite to what we'd expect under statistical discrimination, which suggests that the gender wage-productivity gap is primarily driven by something else.

Other factors driving the gender wage gap

If women are less confident than men at bargaining with their employers for higher wages, women may end up getting paid less to do the same work, even if employers are not prejudiced against female employees. Bargaining is expected to be more important when the labour market is tight and prospective employees have better alternatives if they turn down a job. The intuition is that when the labour market is tight, workers need to be offered higher wages in order to not walk away from the job, so firms are hurt more in this situation if they post vacancies with fixed wages than if they post vacancies with negotiable wages. If gender differences in bargaining were the main driver of the gender wage-productivity gap we would expect this gap to be larger in industries and during periods of time when firms have more difficulty hiring.

In contrast, taste discrimination is cheaper to firms when hiring is easy, because after turning down a woman candidate they have little time to wait before the next qualified candidate comes along. Thus, under taste discrimination we expect more discrimination when hiring is easy, whereas if bargaining differences are most important we expect more discrimination when hiring is hard. Within industry-years with low competition and high-skilled workers, we find more discrimination when hiring is easy, which is more consistent with taste discrimination.

We found the gender wage-productivity gap was particularly marked in a few industries. For example in finance and insurance, transport equipment manufacturing, telecommunications, water and air transport, and electricity the gap was over 40%. These are all sectors that have the potential for monopoly-created profits and have low competition.

When we looked systematically at how the gap varied across industries and time periods that differed in terms of worker skill level, firm competition and difficulty hiring, we found a large gap where workers are highly skilled and firms face low competition. Within such industries, the gap is larger when firms find it easy to hire skilled workers. This suggests that sexism is likely to be more important.

Our research shows the main problem is not that women work in low-paying industries or are less productive than men. It's likely to be sexism, including preferential recruitment of men and lower offers for equally qualified women. We are encouraged by the ability to use this kind of analysis to better understand other workplace discrimination. The methodology should be very useful in examining wage gaps of all kinds. We hope, in the future, to look at differences by characteristics such as immigration status, ethnicity and family status.

ISSN 1175-0206

Director's Letter

The Board and staff at Motu believe that understanding the facts and analysing the economic forces at work can help ensure that policy will work for the long-run wellbeing of New Zealand.

In the past year, Motu has increased its staff capability. We have welcomed a new Motu Research Fellow, David Fleming, who is already making a big contribution to New Zealand policy discussions around agricultural economics. David is a Chilean economist who has been working in Australia, and he and his family are an excellent addition to the Motu Whānau.

Over the last year, Motu has undertaken an exciting range of important projects. The following examples illustrate their breadth and depth:

- Shaping New Zealand's Low-Emission Future, a project to help inform climate change policymaking and private-sector actions, and significantly benefit New Zealand's longer-term development.
- An analysis of the gender wage gap in New Zealand that gained considerable attention nationally and internationally by investigating the differing roles of sorting, productivity, bargaining and discrimination.
- Work on two National Science Challenges: Building Better Homes, Towns and Cities (which aims to co-create innovative research that helps transform people's dwellings into homes and communities that are hospitable, productive and protective) and Deep South (which aims to enable New Zealanders to adapt, manage risk, and thrive in a changing climate).
- Finishing work for the Productivity Hub (Treasury; the Ministry of Business, Innovation and Employment; Statistics NZ; and the Productivity Commission) that focused on expanding the use of the microeconomic data held by Statistics NZ to study patterns and causes of productivity in New Zealand firms.
- Ongoing work with Te Pūnaha Matatini, a Centre of Research Excellence focused on the characterisation and analysis of complex systems and networks.

Alongside this kind of high-quality research, Motu has created a new group of supporters to aid us in building New Zealand capacity for economic analysis. The Motu Hapū is a group of prominent economists and policy thinkers committed to supporting and extending Motu's capability-building activities, please get in touch or visit http://motu.nz/donate/ if this is something you are interesting in joining.

The launch of the Motu Hapū comes at a bittersweet time for me personally, as I have decided to leave Motu and New Zealand to return to my native Boston in 2018. It has been a fabulous four-and-a-half years. My wife and I have loved living in Wellington, and I have seen Motu go from strength to strength: joining in the creation of Te Pūnaha Matatini; adding a new Senior Fellow, a new Fellow, and new Board members; and significantly increasing our presence in the media and public debates. This success reflects the talent and dedication of the Motu staff. I am constantly amazed at how this jewel of an organisation outshines bigger groups. It has been an honour and a privilege for me to be part of this journey. Now, however, it is time for me to hand the baton to a new Director, with whom I look forward to working as I remain an active member of the Motu community.

Adam B. Jaffe, Director and Senior Fellow

Motu Developments

Adam Jaffe is stepping down as Director and Senior Fellow at the end of 2017. He will continue his association with us in some ongoing work, but we will miss his presence very much.

In addition, Motu is sad to farewell John Hay and Horiana Irwin-East-hope from the Motu Economic and Public Policy Research Board. John's service, as Chair of the Board for the last six years and a Board member for several years prior, will be especially missed.

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.

In 2017, Motu was rated tenth in the world for climate change work internationally and second for think tanks outside of Europe and North America in the standardised Think Tank Rankings by the International Center for Climate Governance.

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 Publications

Motu is committed to making the results of its research on key issues facing New Zealand accessible to public and private decision-makers and the general public. Subscriptions to our two publication series, the Motu Working Paper Series and Motu Notes, are both available free from our website, www.motu.nz. You can also sign up to receive all our work in a particular research area.

You can also sign up for events and our newsletters: Motu News (bimonthly) and Motu Research Update (annual). If you like shorter, more regular updates, you may prefer Motu News; if you want more substantive and less frequent updates, you will prefer Motu Research Update.

We also have a biannual bulletin designed to inform policy analysts and researchers of upcoming research and analysis.

SUBSCRIBE HERE.

Are qualifications or job choice more important for recent graduates?

Having a reliable supply of high-quality technical skills helps the economy become more productive and innovative in order to better compete in global markets. There are ongoing debates about the right quantity and mix of science, technology, engineering and maths (STEM) skills, and about whether non-STEM skills deliver similar benefits.

This paper focuses on the early-career employment and earnings dynamics of young graduates from both STEM and non-STEM disciplines. We focus on two key questions. First, we examine the extent to which different graduates 'upgrade' their jobs and find a good match for their skills and training in the six years after graduation. Second, we estimate how their relative wages and productivity contributions vary early in their careers.

Data and methods

This study uses Statistics New Zealand's Integrated Data Infrastructure, an integrated data environment with longitudinal microdata about individuals, households and firms.

When analysing the upgrading of jobs, we looked at all tertiary qualifications gained during 2003–2006 that required at least half a year to complete, by people 30 years or younger, including both international and domestic students. We then follow these cohorts over six years as they enter the job market, looking at the following groups separately:

- high STEM graduates: with a bachelor degree or above in a STEM field;
- high non-STEM graduates: with a bachelor degree or above in a non-STEM field;
- low STEM graduates: who have a sub-bachelor qualification in a STEM field; and
- low non-STEM graduates: who have a sub-bachelor qualification in a non-STEM field.

Our analysis cannot observe students who train overseas, the career outcomes of New Zealand graduates who travel overseas, or graduates who are self-employed or work in the informal sector.

We estimate, using regression methods, how productivity and wage bills vary across different firms within industries, and relate this to the skill composition of their workforces. It should be noted that the productivity estimates compare firms within the same industry, and will therefore not reflect possible economy-wide influences.

Upgrading of jobs

New Zealand's skilled graduates are very mobile. Many go overseas; in the sixth year after graduation more than 20% of low-STEM graduates are overseas and 40% of high-STEM and high-non-STEM graduates have left New Zealand. The average high-STEM graduate changes jobs 2.9 times in their first six years after graduation. This is low compared with other groups of recent graduates. The average non-STEM graduate with less than a Bachelor's degree starts 3.9 different jobs.

High-STEM graduates experience relatively rapid earnings growth despite their relatively low number of job changes. High-STEM graduates not only have the highest median earnings rate in the first year after graduation ($45,000), they also have the strongest growth in median earnings over their first six years post-graduation (49%). Among graduates with less than a Bachelor's degree, STEM and non-STEM graduates have similar starting rates ($33,000) but earnings grow more strongly for STEM graduates (49%) than for non-STEM graduates (36%).

All graduate groups move, in their first six years after graduation, to firms that generally pay more to all employees, with about half of the gains made between the first and second year of employment. The gains over six years are highest for STEM graduates. For all graduate groups, Auckland has a higher share of graduates 6 years after graduation than the share that studied in Auckland. This reallocation is weakest for low non-STEM graduates

Productivity-wage gaps for graduates

The relative productivity of recent high STEM graduates (72% of base-group productivity) is lower than their estimated relative wage, though the difference is not statistically different from zero. In contrast, the productive contribution of recent high non-STEM graduates (165%) is 34 percentage points (ppt) higher than their relative wage. All relative values are worked out from the base group, which includes workers who did not graduate from study in the last six years.

The estimates for older (3-6 years post-graduation) graduates with a Bachelor's degree or above show a marked rise in both relative wages and relative productivity contributions compared with more recent graduates. For high STEM graduates, relative wages more than double, and rise well above those of the base category (224%), accompanied by a slightly smaller increase in relative productivity (177%). Together these estimates imply that the wages of older high STEM graduates are 26ppt higher than their productivity contribution. In contrast, the relative wages of high non-STEM graduates grow less slowly than their relative productivity, magnifying the degree to which their relative productivity (281%) exceeds their relative wage (165%). Three to six years after graduation, wages for this group are 41ppt lower than their productivity contribution.

The relative wage and productivity contributions of sub-degree graduates are consistently lower than the contributions of degree graduates. Sub-degree graduates in larger firms are estimated to contribute no more than the base category to productivity initially. For sub-degree STEM graduates 3-6 years after graduation, both wages and productivity have risen to about the same as that of the base group, with a relatively small (12ppt) wage deficit. The estimated relative productivity of low non-STEM graduates remains close to zero even 3-6 years after graduation, although wages increase to around 67% of the base group.

A gap between relative wage and relative productivity could reflect a range of labour market factors, including discrimination or longer term contracts.

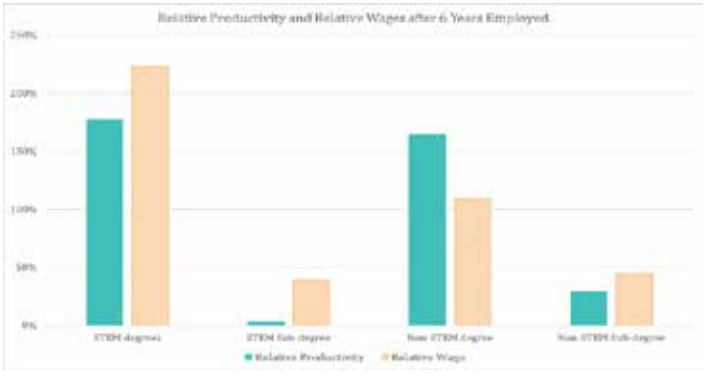
Conclusions

Recent graduates tend to have relatively high starting wages in the first year or two after graduation. They also tend to move into higher paying firms and industries and larger firms, as their careers progress. STEM graduates with a Bachelor's degree or above change jobs less than other graduate groups, but are more likely to end up in high paying industries, high paying firms within industries, and larger firms.

Degree-qualified graduates become markedly more productive between the first three years after graduation and the subsequent three years. Relative wages more than double for STEM graduates, and rise by around 50% for non-STEM graduates.

The relative wage paid to high STEM graduates is around 25ppt higher than their contribution to productivity. In contrast, high non-STEM graduates are estimated to make a higher relative contribution to productivity, and their relative wage is lower than their relative productivity by around 34 to 41ppt. In larger firms, there is not such a gap between wages and productivity contributions of high STEM graduates.

The analysis of job upgrading and wage-productivity gaps suggest that the level of qualification tells us more about graduate outcomes than the field of study. The broad comparison of STEM fields with non-STEM fields almost certainly conceals considerable variation within each group.



Driving a Low-Emission Transformation in New Zealand

Despite the US withdrawal from the 2015 Paris Agreement on climate change, other countries, including NZ, remain committed to cutting their greenhouse gas emissions. In our report, we explore how NZ, a trailblazer for emissions trading, might drive a low-emission transformation, both at home and overseas.

Emitting greenhouse gases is a lot like overflowing a bathtub. Even a slow trickle will eventually flood the room. The Paris Agreement gives all countries a common destination: net zero emissions during the second half of the century. It is also an acknowledgement that the world has only a short time to turn the tide on emissions and limit global temperature rise to below two degrees. The sooner we turn down the tap, the more time we have for developing solutions.

NZ's 2030 commitment is to reduce emissions 30% below 2005 levels (11% below 1990). In 2015, our emissions (excluding forestry) were 24% above 1990 levels. The government projects a gap of 235 million tonnes between what has been pledged and what NZ will actually emit in the period from 2021 to 2030. Reducing emissions rapidly enough within NZ to achieve our Paris commitment could be extremely expensive, and even at a cost of NZ$300 per tonne, the target could not be met through domestic action alone.

International emission reductions help bridge the gap. NZ could turn off its own greenhouse gas tap while supporting other countries to do the same.

In the past, NZ relied heavily on the global Kyoto carbon market and purchased international emission reductions using the NZ Emissions Trading Scheme (ETS). Some ETS firms bought low-cost overseas Kyoto units of questionable integrity while domestic emissions continued to rise. In 2015, NZ pulled out of the Kyoto carbon market and its ETS is now a domestic-only system.

Under the Paris Agreement, carbon markets have changed in three important ways:

- Currently, international emission reductions can be traded only from government to government. It is no longer possible for NZ ETS participants to buy international units directly from the market.
- International emission reductions sold as offsets to other countries will have to be additional to the seller's own Paris target.
- Countries have flexibility to trade international emission reductions through arrangements outside of the central UN mechanism which is at an early stage of development.

What does this mean for NZ? First, we cannot and must not rely on international markets to set our future domestic emission price. Second, as both taxpayers and responsible global citizens, we need to decide where to fund emission reductions. Most mitigation opportunities are in developing countries. The benefits of investing in lower-cost reductions overseas need to be weighed against the costs of deferring strategic investment in NZ's own low-emission transformation. Third, we need an effective mechanism to direct NZ's contribution to mitigation overseas.

In collaboration with others, Motu researchers are prototyping a new approach, a 'climate team': a large-scale, results-based agreement among governments with funding committed in advance. For example, NZ could partner with other investors – such as Australia, South Korea or Norway – to pool funding at a scale that provides incentives for a country with a developing or emerging economy – such as Colombia or Chile – to trasnform beyond its Paris target. These countries could then create a more favourable environment for low-emission investment – including by NZ companies.

So far, NZ has been moving at speed but in the wrong direction. Gross emissions (excluding forestry) are projected to climb 29% above 1990 gross emission levels by 2030 under current measures. This is a far cry from our 2030 Paris target of net emissions of 30% below 2005 gross emission levels (11% below 1990).

The NZ ETS has an important role to play in achieving a successful low-emission domestic economy, but it needs to be properly equipped.

Unlike other financial markets, the purpose of an ETS market is more than price discovery, resource allocation and liquidity. It is designed to create a change in behaviour to reduce emissions. Prices are driven by current policy decisions, emission reduction opportunities, and expectations about future decisions and opportunities.

NZ ETS participants have faced unnecessarily high uncertainty on how to invest. They need clear near-term signals for unit supply and cost and predictable processes for longer-term decision making.

Five changes to make the emissions trading work

- Introducing a cap (fixed limit) on NZ ETS units sold or freely allocated by the government will define supply and help the market to set an efficient price. In the past, the NZ ETS borrowed the global Kyoto cap, which essentially allowed unlimited domestic supply. The Kyoto cap is no longer available and we have committed to reducing domestic emissions.
- Establishing a price band will provide a minimum and maximum emission price limit, set by government. A price floor helps to ensure a minimum return on low-emission investment and a price ceiling will safeguard against extreme upside price shocks. When the floor and ceiling are far apart, the market has latitude when setting the price. The closer they are, the more the government manages the price. The price band will be implemented at auction and replace the current fixed-price option set at NZ$25 per tonne.
- Fixing both the cap and the price band for five years and extending them by one year each year will provide short-term certainty. The government will also need to set indicative trajectories for caps and price bands for a further 10 years in alignment with its decarbonisation objectives. This will help inform long-term decisions.
- Given the technical complexity of the ETS, we recommend that an independent body be tasked with advising government on ETS supply and price settings. Ultimately however, decisions on caps and price bands are political and therefore should be taken by government, with transparency and public accountability.
- The era of top-down carbon markets, unlimited unit supply and rising domestic emissions has ended. Right now, only governments can purchase international emissions reductions. In the longer term, ETS participants may also be able to do so. However, international reductions enter New Zealand in future the quantity must be limited and displace other supply under the cap to avoid devaluing domestic investment and disrupting NZ's progress toward decarbonisation. All international emission reductions applied toward New Zealand's targets must be quality assured to manage risks with environmental integrity.

These adjustments can be achieved through practical legislative amendments and regulation. There is merit in implementing these changes as soon as possible so that transformational change can begin.

Setting the ambition of domestic ETS caps and price bands can be politically challenging. That is why NZ skipped this step the first time around and borrowed the Kyoto ones instead.

Under the Paris Agreement, NZ needs to establish a resilient policy architecture with cross-party support that offers predictable processes to guide future political decision making. It's time for us to forge our own pathway to a thriving low-emission society.

The supporting paper for this article was funded by the Aotearoa Foundation and informed by participants in Motu's ETS Dialogue. The content does not necessarily represent the views of or endorsement by ETS Dialogue participants, their organisation or the funder.

Our People

Comings and Goings

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. In 2017, the research analyst team was joined by Sally Owen and Hannah Tuahine and we farewelled Wilbur Townsend to a position at Stanford University. We have also had several local and international interns spend time at Motu.

Early in 2017, Motu welcomed David Fleming, as a Research Fellow, specialising in Agricultural Economics. Trinh Le, a Fellow at Motu since 2014, has now returned from maternity leave.

Early in 2017, we bid farewell to Clare O'Connor, our Accounts Assistant, and welcomed first Michelle Lee, then Pela Arathimos 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, David Fleming, Isabelle Sin, Levente Timar, Trinh Le

Research Analysts: Edmund Lou, Hannah Tuahine Kate Preston, Nathan Chappell, Sally Owen

Support Staff: Grant Coppersmith, Ceridwyn Roberts, Maxine Watene, Pela Arathimos

Board of Trustees: Bruce Wills (Chair), Adam B. Jaffe, David C. Maré, Jo Wills, Lesley Haines, Paul Reynolds, 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 Motu Senior Fellows and Affiliates, as well as other top visiting academics from 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, 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 presentations, please visit http://motu.nz/find-publications/.

Population and Labour

"What drives the gender wage gap? Examining the roles of sorting, productivity differences, and discrimination." Motu Working Paper 17-15 Sin et al. 2017.
Sorting by gender at either the industry or firm level explains less than 20% of the overall wage gap. Gender differences in productivity within firms also explain little of the difference. The relationships between the gender wage-productivity gap and both age and tenure are inconsistent with statistical discrimination being an important explanatory factor for the remaining differences. We find evidence that is consistent with taste discrimination being important for explaining the overall gender wage gap.

'The longer term impacts of job displacement on labour market outcomes.' Motu Working Paper 17-12 Hyslop et al. 2017.
This paper analyses the longer term impacts of involuntary job loss of workers subsequent employment, earnings, and income support in New Zealand. It uses data from SoFIE to identify job displacements, matched to administrative data from the IDI, to facilitate at least five years of post-displacement observations. We estimate that experiencing a job displacement substantially affected workers employment, earnings and income over the following five years.

'More pensioners, less income inequality?' Motu Working Paper 17-02 Alimi et al. 2017.
This paper examines the effects of population ageing on spatial-temporal changes in the distribution of personal income to better understand urban area-level income inequality. Because metropolitan areas are ageing slower, the inequality-reducing effect of ageing has been less in these areas. However, this urban-size differential-ageing effect on inequality growth has been relatively small compared with the faster growth in intra-age group inequality in the metropolitan areas.

'Employment misclassification in survey and administrative reports.' Motu Working Paper 16-19 Hyslop & Townsend. 2016.
This paper analyses measurement error in the classification of employment. We show that the true employment rate and time-invariant error rates can be identified, given access to two measures of employment with independent errors. Allowing for errors in both sources substantially affects estimated employment rates.

'Earnings dynamics and measurement error in matched survey and administrative data.' Motu Working Paper 16-18 Hyslop & Townsend. 2016.
This paper analyses the measurement error and earnings dynamics of two sources of individuals' annual earnings from SOFIE and administrative LEED earnings reported in the IDI.

Urban and Regional Economics

"Valuing Sunshine"Motu Working Paper 17-13 Fleming et al. 2017.
Using over 5,000 observations on house sales in Wellington, New Zealand, we derive the willingness to pay for an extra daily hour of sun, on average, across the year. We find that each extra daily hour of sunlight exposure is associated with a 2.4% increase in house sale price.

'Housing, the "great income tax experiment", and the intergenerational consequences of the lease.' Motu Working Paper 17-09 Coleman. 2017.
Since 1989, tax distortions have provided incentives that led to significant increases in house prices and the average size of new dwellings; reduced owner-occupier rates; and led to a worsening of the overseas net asset position.

'The effect of fibre broadband on student learning.' Motu Working Paper 17-03 Grimes & Townsend. 2017.
We estimate the impact of ultra-fast broadband on schools' academic performance using a difference-in-difference study of a new fibre broadband network. We show that fibre broadband increases primary schools' passing rates in standardised assessments by roughly one percentage point.

'Picking up speed: does ultrafast broadband increase firm productivity?' Motu Working Paper 16-22 Fabling & Grimes. 2016.
Using an IV strategy based on proximity to schools, we find that the average effect of UFB adoption on employment and productivity is insignificantly different from zero, even for firms in industries where we might expect the returns to be relatively high. Conversely, we find that firms making concurrent investments in organisational capital specifically for the purpose of getting more from their ICTs appear to experience higher productivity growth, at least in first-difference specifications.

Productivity and Innovation

'Productivity and the allocation of skills.' Motu Working Paper 17-04 Maré et al. 2017.
We study how graduates with different skills fare in the labour market in the six years after studying. We then estimate joint production function and wage equations to see how the skill composition of a firm's employees correlates with productivity, and compare this with how the skill composition correlates with its wage bill.

'Urban productivity estimation with heterogeneous prices and labour.'Motu Working Paper 16-21 Maré. 2016.
This study estimates differences in productivity across New Zealand urban areas, with a focus on the size of Auckland's productivity premium. The methods used in the paper overcome some of the biases that arise in standard approaches to spatial productivity estimation. The study also investigates industry differences in spatial productivity patterns.

'Intangible investment and firm performance.' Motu Working Paper 16-14 Chappell & Jaffe. 2016.
We study the inter-relationships among firm characteristics, intangible investment and firm performance. While we cannot estimate a causal model, the evidence suggests that intangible investment is associated with firm strategies related to growth and possibly to 'soft' performance objectives, but not to productivity or profitability.

Wellbeing and Macroeconomics

"Political systems, social welfare policies, income security and unemployment." Motu Working Paper 17-14 MacCulloch. 2017.
Focusses on the question of how formal institutions, like those governing the level of freedom, the regulatory state, political parties and the generosity of the welfare state, affect self-reported well-being.

'Migration and gender: who gains and in which ways?' Motu Working Paper 17-08 Preston & Grimes. 2017.
We explore whether migration is followed by a change in subjective wellbeing, and how this experience differs by individuals of different gender and relationship-status. These results are compared to wage differences following migration. We further analyse how outcomes differ according to the motivation for moving, including motivations for moving of both partners in a couple relationship.

Motu Publications cont'd

To see more of our publications, including presentations, please visit http://motu.nz/find-publications/.

'Wages, wellbeing and location: slaving away in Sydney or cruising on the Gold Coast.' Motu Working Paper 17-07 Grimes et al. 2017.
We analyse the relationships between subjective wellbeing, wages and internal migration. Our study addresses whether people make (revealed preference) location decisions based on SWB and/or wage prospects. Our theory and results show that migration decisions are considered within a life-cycle context. The estimated pronounced upturn in SWB for migrants substantiates the usefulness of SWB both as a concept for policy-makers to target and for researchers to incorporate in their studies.

Environment and Agriculture

'Climate Change and Stormwater and Wastewater Systems' Motu Note 29, White, et al. 2017
This discussion paper provides an overview of our current knowledge, and outlines priority research areas to help adapt our stormwater and wastewater systems for a changing climate.

'An effective NZ ETS: clear price signals to guide low-emission investment.' Motu Note 28 Kerr et al. 2017.
This document presents an integrated proposal for managing unit supply and prices in the NZ ETS in a way that generates more predictable price signals to guide domestic decarbonisation.

'Including forestry in an emissions trading scheme: lessons from New Zealand.' Motu Working Paper 17-11 Carver et al. 2017.
This paper describes the policy changes to the NZ ETS since 2008 that directly affect forestry; assesses the effectiveness of the scheme; explores who is benefiting from it; and outlines issues facing forestry in the NZ ETS moving forward.

'Insurance, housing and climate adaptation: current knowledge and future research.' Motu Note 27 Storey et al. 2017.
This note discusses how insurance will adapt to a changing climate. New Zealand's current insurance institutions are surveyed; these are sufficiently unusual to limit the applicability of the international literature. Issues with the provision of climate-sensitive insurance – particularly with its pricing – are discussed, as are relationships between insurance markets and financial markets. Possible policy responses are suggested. The note concludes by proposing high-priority questions for future research.

'Modelling the potential impact of New Zealand's freshwater reforms on land-based greenhouse gas emissions.' Motu Working Paper 17-10 Daigneault et al. 2017.
This report is the first national assessment of the indirect impacts of The National Policy Statement for Freshwater Management. Emissions benefits through the freshwater reforms could potentially result in significant savings for New Zealand by starting the transition to low emissions in the agricultural sector and helping to achieve New Zealand's overall climate goals. For farmers, changes in land use and management to meet water quality targets will reduce their potential future exposure to needs to reduce GHG emissions.

'Evolution of the New Zealand Emissions Trading Scheme: linking.' Motu Working Paper 17-06 Leining et al. 2017.
This paper examines New Zealand's experience with linking and de-linking its ETS to capture lessons that could be of value to policy makers. It finds the considerable opportunities to a small ETS market from linking can be negated if risks are not managed strategically. It also highlights challenges of negotiating bilateral linking agreements.

'Evolution of the NZ ETS: sectoral coverage and points of obligation.' Motu Working Paper 17-05 Leining et al. 2017.
To help inform future ETS policy making in New Zealand and internationally, this paper provides a conceptual foundation for design decisions on ETS coverage and points of obligation, and explores the history of and rationale for the specific design choices that have been made in this regard in New Zealand.

'Facilitating carbon offsets from native forests.' Motu Working Paper 17-01 Carver & Kerr. 2017.
This note aims to help firms looking to offset their GHG emissions. Emissions reductions from native forestry sequestration are already recognised in the NZ ETS and it is 'shovel ready' to generate native forest offsets.

'New offset options for New Zealand.' Motu Note 25 Meduna. 2017.
This report synthesises the current state of scientific knowledge around the issues associated with three innovative carbon reduction or removal options in a New Zealand context: soil carbon, marine carbon, and carbon capture and storage.

'Barriers to adoption of no-cost options for mitigation of agricultural emissions: a typology.' Motu Note 24 Jaffe. 2017.
This typology is intended as background for assessing the existence and significance of barriers to adoption of no-cost mitigation options in agriculture. Its purpose is to identify and categorise possible or potential barriers that might exist, based either on theoretical considerations or analogies to barriers observed in other contexts.

'Who's going green? Decomposing the change in household consumption emissions 2006–2012.'Motu Working Paper 16-20 Allan & Kerr. 2016.
We update the analysis of Allan et al. (2015) and re-examine whether New Zealand households have become greener consumers using newly available data. We confirm many of our previous findings: that emissions increase less than proportionately with expenditure, and that there is significant variation in expenditure elasticities across consumption categories. The majority of the change is a result of changes in household behaviour rather than a change in household characteristics.

'Cows, sheep and science: a scientific perspective on biological emissions from agriculture.' Motu Working Paper 16-17 Hollis et al. 2016.
The report summarises current and emerging options, and discusses methods to calculate methane and nitrous oxide emissions at the paddock, farm, regional and national scale. Finally, the report considers metrics used for comparison between gases, focusing on Global Warming Potential and Global Temperature change Potential.

'Agricultural emissions mitigation in New Zealand: answers to questions from the Parliamentary Commissioner for the Environment.' Motu Working Paper 16-16 Kerr. 2016.
This paper explores how New Zealand should address agricultural greenhouse gas emissions: methane and nitrous oxide. The report focuses on the role of mitigating biological agricultural emissions, and how New Zealand could most cost-effectively mitigate its own emissions and contribute to the mitigation of agricultural emissions abroad.

'Yield to change: modelling the land-use response to climate-driven changes in pasture production.' Motu Working Paper 16-15 Timar. 2016.
In contrast to most economic drivers of land-use change, climate-related drivers display substantial geographic variation. This paper uses a discrete choice model to estimate the relationship between pasture yields and rural land use.

'The New Zealand Emissions Trading Scheme de-link from Kyoto: impacts on banking and prices.' Motu Working Paper 16-13 Kerr et al. 2016.
The NZ ETS presents an opportunity to compare the theory of linked emissions trading with practice. We find that prices within the NZ ETS behaved as theory would predict.

Do A Country's Policies and Actions Sustainably Increase its Wellbeing?

Dr Arthur Grimes recently completed an overarching study that tests the adequacy and robustness of the indicators of national wellbeing and sustainability for answering the fundamental question: "Are a country's policies and actions sustainably increasing its wellbeing?"

Wellbeing and inequality

Measures of NZ performance for 2005 and earlier included indicators of objective and subjective wellbeing, looking at both means and distributions. The measures showed consistent indications of NZ as a highly unequal society relative to other advanced countries.

Looking at a new theoretically-driven measure of objective wellbeing (the Material Wellbeing Index), NZ ranked third out of 23 "early OECD" countries that had available data. However, inequality in the distribution of household possessions showed NZ to be highly unequal, at 18th out of the 23 countries.

The difference between NZ's ranking on per capita GNI and the Material Wellbeing Index raises the question of whether an income-based measure or a consumption-based measure is a better indicator of wellbeing. Data from the NZ General Social Survey shows a consumption-based measure completely dominates an income-based measure as a predictor of individuals' subjective wellbeing. This is the case for high, mid and low income-earners and consumers; across region-types; and for Pākehā, Māori, Pasifika and Asian respondents.

At a national level, the Material Wellbeing Index metric explained certain cross-country aggregate wellbeing outcomes better than did conventional national income measures. The Index also out-performed national income in explaining average (self-reported) health status across countries.

Easterlin paradox

Within developed countries, people do not improve their subjective wellbeing when all intra-country incomes rise by the same degree. However, residents do experience a rise in their subjective wellbeing when their national income rises relative to those of other countries.

Income redistribution policies may raise average wellbeing in a country. However, if redistribution policies reduce average incomes relative to other countries, then these policies would have a negative impact on national subjective wellbeing. Redistribution as a tool therefore has nuanced impacts that may partially counter-balance each other.

Ethnicity and wellbeing

In New Zealand, ethnicity is one factor strongly associated with inequality. Objective and subjective measures of wellbeing for Māori generally fall below those of European and other non-Māori ethnicities (except perhaps those from the Pacific Islands). There are statistically significant differences in the distributions of Māori beliefs and values relative to those of other New Zealanders, reflecting the different cultures. In particular, Māori (on average) place a greater emphasis on environmental outcomes relative to economic growth outcomes than do Pākehā.

The work on Pākehā and Māori beliefs and values is important in highlighting the need for research to differentiate between objectives that may be perceived differently across ethnicities. This has implications for how we choose aggregate measures of wellbeing, given that the weights placed on different outcomes are likely to be culturally dependent. It also has implications for economic and other outcomes. International literature shows that certain beliefs and values are at least associated with – and may be causally linked to – certain economic outcomes. If this is the case, and if (as the research indicates) Māori beliefs and values tend to be more akin to those shown in international studies to be associated with poorer material economic outcomes, then this raises questions as to how choices can be made that are consistent both with Māori beliefs and values and with high economic achievement amongst Māori. This is a challenging issue that those addressing Māori outcomes will need to consider in order to bring about culturally-appropriate solutions to economic under-achievement of many Māori.

Migration and wellbeing

In an examination of country real incomes and subjective wellbeing using 50 years of data, clear evidence emerged that both are important in determining migration flows across developed countries.

A study of within-country (inter-regional) migration shows that both incomes and subjective wellbeing are important determinants of where people choose to live and migrate. Detailed data shows most groups within society benefit in subjective wellbeing terms when they migrate within Australia, even though there is much less evidence that their incomes improve after migration. Low incomes and poor employment prospects increase the likelihood that people will move from their existing location. A follow-up paper shows that subjective wellbeing and wage outcomes for migrants within Australia differ markedly, on average, by gender.

Together, these migration tests indicate that policy-makers should concentrate on both making their region high-income and a nice place to live, as both aspects are important drawcards for prospective and current residents. At a methodological level, measures of subjective wellbeing have real predictive content and are worthy candidates for policy-makers to target (along with incomes and other objectives) when deciding policy.

Wellbeing and policy implications

Governments may face a trade-off between raising domestic incomes and raising domestic subjective wellbeing. This is faced explicitly when setting fiscal policy. A strong body of prior literature shows that certain ('distortionary') taxes such as income taxes have a negative effect on GDP growth relative to the effects of ('non-distortionary') taxes such as GST. Yet governments still use income taxes, and they normally raise more revenue through such distortionary taxes than through non-distortionary taxes. A reason for this paradoxical behaviour lies in the subjective wellbeing impacts of the taxes. On average, non-distortionary taxes harm subjective wellbeing to a greater extent than do distortionary taxes so governments curb their use of non-distortionary taxes in favour of distortionary taxes, relative to the growth maximizing tax combination. Similar, but less stark, contrasts between growth-maximising and wellbeing-maximising policies are shown to exist also for government expenditure categories.

Consistent with the common observation that taxes such as GST tend to be regressive (i.e. hurt the poor more than the rich) whereas income taxes are designed to be progressive, the research finds that the subjective wellbeing of poorer individuals is hurt more by non-distortionary taxes and the contrary is the case for richer individuals.

Conclusion

The results of this wellbeing research should prove to be useful. The fiscal-related research has direct implications for understanding the trade-offs across different types of taxation and government expenditure. The inter-country wellbeing results demonstrate that policy-makers must continue to work to improve average per capita incomes if they are to protect or enhance their citizens' wellbeing. Finally, issues of relativities and inequality demonstrate that governments need to pay attention to the degree of inequality present within a country if they are concerned with the subjective wellbeing of their citizens.

For more in-depth explanation and research see the wellbeing section of the Motu website.

Motu Research Update is the newsletter of Motu Economic and Public Policy Research Trust
Level 1, 97 Cuba Street, PO Box 24390, Wellington 6042, New Zealand
Phone: 64 4 939 4250 Fax: 64 4 9394251

Web: motu.nz
Email: info@motu.org.nz
Twitter: @moturesearch