FROM THE EDITORS

This is a special birthday issue of *EcoNZ@Otago* – as the University of Otago celebrates its 150th birthday this year. Happy Sesquicentenary!!! Economics was one of the first subjects taught at Otago – by Duncan MacGregor, one of Otago's first three professors appointed in 1871. As well as being an economics professor, MacGregor was trained as a surgeon, and was the first person at Dunedin Hospital to apply Joseph Lister's revolutionary methods of antiseptic surgery. Otago's first student in 1871, who studied Political Economy (as Economics was known in those days) under Prof MacGregor, was Robert Stout, who went on to be NZ's Prime Minister from 1884 to 1887. Right from our earliest beginnings 150 years ago, the staff and students of Otago's Department of Economics have been interested in the 'real' world. That admirable tradition is continued by the articles in this issue of *EcoNZ@Otago*.

MURAT ÜNGÖR, PAUL HANSEN
Department of Economics
University of Otago
Dunedin 9054

IN THIS ISSUE

Electric or petrol/diesel? Which car would you choose?

William Ogden & Paul Thorsnes
ogdwi517@student.otago.ac.nz, paul.thorsnes@otago.ac.nz

You have probably heard of the Nissan Leaf (left), which runs on electricity supplied by a large battery. Like the Nissan Pulsar (right) and other similar hatchbacks, many of the Nissan Leafs on NZ roads are second-hand from Japan. Leafs look and drive much like petrol or diesel-powered hatchbacks. A big difference, however, is that driving a Leaf in NZ contributes less to global warming than driving the same distance in an otherwise similar petrol-powered car.

FOSSILISED FUELING

Petrol and diesel are extracted from oil, which was formed from plankton growing tens or hundreds of millions of years ago in warm shallow seas. This plankton, like other plants, used the energy in sunlight to harvest carbon from carbon dioxide (CO_2) gas in the atmosphere via photosynthesis.[1] Oil, like firewood, consists of a lot of flammable carbon, but the carbon in oil (and natural gas and coal) is often termed 'fossil' carbon as it was extracted from the atmosphere very long ago.

Burning fossil fuels increases the concentration of CO_2 in the atmosphere. Since 1960, for example, that concentration has increased by more than 25%. CO_2 is a potent 'greenhouse gas': even though it appears invisible to us, it captures heat and emits some of it back toward the earth, thereby warming the planet. While we humans have been enriching ourselves by powering the industrial revolution with fossil energy, we have inadvertently started to warm earth's climate.

Global warming is already causing significant changes: higher sea levels, more extreme weather, changes in local climates and corresponding changes in natural ecosystems. Changes like these can be very costly to our economic, social and natural systems: e.g. many people live in low-lying areas near the sea, our housing and infrastructure are not built to withstand weather extremes, and agricultural production systems are tuned to local environmental conditions.

At this stage it seems imperative to reduce CO_2 emissions from fossil carbon. One way is to wean ourselves off oil as an energy source. We would, of course, like to do that at the least cost possible, perhaps by developing a neat technology that fits with

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1   For more information, see https://energyeducation.ca/encyclopedia/Oil_formation.

our current lifestyles. Enter the battery-electric car, known more generally as a battery-electric vehicle.

BEVs VERSUS ICVs

There is a variety of battery-electric vehicles (BEVs) available in NZ. However, sales of internal-combustion vehicles (ICVs) – both new and second-hand imports – are much higher than sales of BEVs.[2] The Ministry of Transport reports that in 2018 only 2.51% of new registrations of second-hand cars and 0.96% of new-car registrations were BEVs.

Part of the explanation for this low take-up of BEVs is that most are hatchbacks, which is a popular style, but many car buyers are looking for something else. Even so, take-up seems slow. Why?

The answer must be that, despite their similar appearance, BEVs differ from ICVs. Indeed, each type of drive system has its advantages and disadvantages:

- **Upfront purchase cost.** BEVs are more expensive to buy than otherwise similar ICVs mainly because their large batteries are expensive. For example, 2014 Nissan Leafs advertised on Autotrader cost about $7,000 more on average than similar 2014 Nissan Pulsars.

- **Running cost.** BEVs are less expensive to run. The battery can be recharged at home. Monitoring of BEVs by NZ researchers at 'Flip-the-fleet' indicate efficiency of about 6.75 km per kilowatt hour (kwh) of electricity.[3] The 1.8 litre Pulsar gets about 15 km per litre of petrol. Assuming 20¢ per kwh of electricity and $2 per litre of petrol, driving the Leaf currently costs about $3 per 100km and the Pulsar more than four times as much at about $13.33.[4]

- **Greenhouse-gas emissions.** BEVs reduce NZ GHG emissions because less than 20% of the electricity generated in NZ is from using fossil fuels.[5]

- **Travel distance between re-fuelling.** Most BEVs have less range then ICVs, less than 200 km relative to more than 500 km between refuelling.

- **Time required to refuel/recharge.** BEVs take longer to recharge: overnight at home or at a public fast-charge station in 30-60 minutes.

- **Maintenance cost.** BEVs require less maintenance because their drive systems are simpler than ICV systems.

- **Confidence the vehicle will work as advertised.** Car buyers may have less confidence in BEVs because BEVs are still novel and unfamiliar.

- **Cost of a one-off major repair.** BEVs most likely have relatively reliable mechanical systems, but the cost and availability of battery replacement is an issue.

A SURVEY OF POTENTIAL CAR BUYERS

Which of the above disadvantages of BEVs relative to ICVs discourage New Zealanders from going electric? Which advantages of BEVs are most attractive? To find out, we invited 300 Dunedin home owners, randomly selected from public records, to complete an on-line survey. Ninety households completed the survey.

The survey, known as a stated-choice survey, presents each participant with a series of choices, each involving two hypothetical cars where one car is better on one attribute and worse on another attribute than the other car. To choose one of the cars, the participant has to make a trade-off between the two attributes considered. Combining all of these choices allows the survey software, called 1000minds (www.1000minds.com), to quantify the relative strength of preference the householder has for each attribute. Participants also answered questions about themselves and their household.

The characteristics of our participants vary in line with what we would expect if a random sample had been drawn from the population instead. It is possible that the survey attracted people who were more interested in the subject. Indeed, a relatively large proportion of participants had recently purchased a car or planned to buy one soon.

Table 1 reports sample-average results. The left-hand column lists the attributes. The number in parentheses is the base, i.e. worst possible level of that attribute. The "Level" column lists the levels of each attribute in increasing order of desirability for that attribute.

Table 1. Relative strength of preference for attributes: mean, minimum and maximum values

Attribute	Level	Mean	Min	Max
Purchase price (base: $30,000)	$25,000	5.5	0.5	17.6
	$20,000	10.4	1.5	27.8
	$15,000	**16.9**	2.3	40.5
Fuel cost per 100 km (base: $20)	$10	9.1	1.5	17.5
	$3	**17.7**	5.8	37.4
Hours of city driving (base: 2.5 hours)	3.5 hours	5.2	0.5	18.7
	10 hours	**5.9**	1.0	19.2
Time to refuel/recharge on drive from Dunedin to Queenstown (base: 60 minutes)	30 min	8.7	0.4	28.6
	0 min	**9.4**	0.9	29.2
CO2 emissions/year (base: 2 tonnes)	0.4 tonnes CO_2	**13.0**	0.4	32.2
Annual maintenance cost (base: $750)	$350	8.8	1.4	23.0
	$100	**15.6**	3.9	36.6
Confident works as advertised (base: 80% confident)	>95% confident	**8.1**	0.5	23.2
One-off major repair cost (base: $10,000)	$7,000	5.5	1.0	15.9
	$4,000	**13.6**	3.9	33.1

2   For models available in NZ: https://driveelectric.org.nz/individuals/ev-models-and-where-to-buy.
3   Flip the Fleet website: https://flipthefleet.org.
4   However, the relative running cost of BEVs is likely to increase in the future, as BEV drivers do not currently pay the road user charge. Current government policy indicates that road user charges will be introduced when the stock of BEVs reaches 2% of the light vehicle fleet.
5   Producing a BEV, however, generates relatively more GHGs: GHGs emitted over a BEV's entire life cycle from production to disposable are about 40% of petrol cars; see www.energywise.govt.nz/on-the-road/electric-vehicles.

Consider the first attribute in Table 1: purchase price. Most second-hand BEVs and comparable ICVs sell in the range of $15,000-$30,000. The base value is $30,000 because the other prices listed in the Level column are lower and therefore more desirable, all else the same.

A hypothetical car that has the base value of all attributes has an overall value of 0. The "Mean" column reports the increase in strength of preference (SoP) for each level of each attribute averaged across all 90 participants. The numbers in bold, corresponding to the best level of each attribute, sum to 100.

As expected, preferences work both for and against BEVs. Raising purchase price from $15,000 to $30,000, holding all else the same, reduces the mean SoP for the car by 16.9 out of 100 points. Having to spend time charging while traveling put off these households who are also keen to avoid a one-off cost the size of a new battery. Off-setting these negatives are strong preferences for the low running costs BEVs offer, and for reducing CO_2 emissions.

NOBODY'S AVERAGE ...

The last two columns in Table 1 show the minimum and maximum values of relative SoP across all participants in the sample. The rather large differences between the min and max suggest considerable heterogeneity in preferences across the 90 participants. Not surprisingly, these people vary in relative strength of preference for cars.

We can investigate this variation by looking for 'market segments': groups of people with similar patterns in the distribution of relative SoP across attributes. Table 2 shows results from using a standard computer clustering routine called 'k-means', where k refers to the number of clusters.

To keep things simple, we clustered only on the relative strength of preference for the best level of each attribute. For example, $15,000 is the lowest (best) purchase price included in the survey. The "Mean" column reproduces from Table 1 the mean relative strength of preference for the corresponding attribute across all 90 participants.

We experimented with 2, 3, 4, 5 and 6 clusters. Given the number of clusters chosen by the researcher, the clustering routine works by systematically allocating each participant to the cluster with others who have the most similar pattern in their relative strength of preferences. We report the 4-cluster solution because it seems the most interesting.

The numbers in the four columns on the right show by how much the average strength of preference for each attribute differs in the cluster from the overall sample mean. To see how to interpret the numbers, consider those for Cluster 1. SoP for a low purchase price is 12.5 points higher in this cluster than for the sample as a whole; the people in Cluster 1 are unusually keen to avoid a large upfront expenditure on a car.

Because all SoP values sum to 100, all the differences from the mean for each cluster must sum to zero; if the participants in the cluster put more than average weight on one attribute, they must put less weight than average on others. So, the sum of the numbers in red off-sets the sum of the numbers in black.

If the participants in this survey are reasonably representative of NZ home owners, what does this mean for demand for BEVs?

The householders in Cluster 3 appear the **most** likely to be interested in a BEV: they are especially keen to reduce GHG emissions and like the lower running cost of BEVs. They are relatively less bothered about longer re-charge times while travelling and are less concerned about the as-yet unknown aspects of EV ownership. This is the smallest cluster but still important at 17% of the sample.

The householders in Cluster 4 also have preferences favourable to BEVs. They are the least put off by a higher purchase price but are also the least attracted to low running costs. They are relatively concerned about CO_2 emissions. However, people in this cluster need to be convinced that BEVs will work as advertised. Demand in this large segment could grow as BEVs prove themselves.

Preferences in Cluster 2 seem less conducive to purchasing a BEV. They are distinguished by relatively strong concern about recharging times and indicate less concern about GHG emissions. They like low running costs but are sensitive to high purchase prices. It seems that technological improvements are required to reduce purchase prices and reduce charging times.

Table 2. Estimates of 'segments' in the market for hatchback attributes

Attribute	Level	Mean	Cluster difference from mean			
			1	2	3	4
Purchase price	$15,000	16.9	**12.5**	−0.2	−0.5	−5.6
Running cost/100 km	$3	17.7	0.4	3.4	3.4	−3.5
Hours of city driving	10	5.8	−1.0	−1.1	−0.9	1.8
Minutes to refuel	0	9.4	−3.9	**7.7**	−5.4	−1
Tonnes of CO2 emissions	0.4	13.0	−7.2	−5.5	**11.7**	2.5
Maintenance cost	$100	15.6	1.7	0.2	−3.4	0.3
Confidence works as advertised	>95%	8.1	−4.6	−4.1	−3.3	**6.3**
One-off major repair	$4,000	13.5	2.1	−0.4	−1.6	−0.8
Number of participants		90	18	21	15	36
% participants		100%	20%	23%	17%	40%

The householders in Cluster 1 appear the **least** likely to be interested in a BEV: costs are their big concern. They, as the others, like low running and maintenance costs but are very keen to avoid the corresponding high purchase price. They also express the least concern for reducing CO_2 emissions.

POLICY IMPLICATIONS

So much for the marketing research … What might these results imply for public policy?

The NZ government has committed to reduce GHG emissions by 5% below 1990 levels by 2020 and by 50% by 2050. Toward these ends, it has adopted a target of 64,000 BEVs by 2021.

Probably the policy most helpful for meeting this target has been to exclude BEVs from the road user charge (RUC), which saves a significant $6.70 per 100 km in running costs. The government also funds information campaigns, supports and helps coordinate the roll-out of public charging infrastructure and has provided authority to make bylaws that give BEVs access to special vehicle lanes, such as bus lanes.[6]

WHAT NEXT?

Given NZ's commitment to reducing GHG emissions, should more be done? For example, some other countries subsidise BEV purchases, give BEVs access to restricted lanes and subsidise BEV parking. In contrast, the key advantage in NZ, BEVs' exemption from the RUC, is due to expire when BEVs reaches 2% of the NZ fleet.

Perhaps purchase prices in NZ will fall as suppliers continue to improve BEV technology. Supporting public infrastructure will continue to develop with government assistance. And specialty service providers will appear as BEV numbers and demand increases. But will this be enough?

QUESTIONS TO THINK ABOUT

1. Do you prefer a battery-electric vehicle (BEV) or an internal-combustion vehicle (ICV)? Why? Which of the attributes discussed in the article and represented in Table 1 are most important to you?

2. Do you think the price of BEVs should be subsidised by the government? Why or why not?

3. What other policies could be used by the government to encourage people to switch from ICVs to BEVs?

USEFUL WEBSITES

Flip the Fleet: https://flipthefleet.org

Drive Electric: https://driveelectric.org.nz

EECA Energywise, Electric Vehicles: www.energywise.govt.nz/on-the-road/electric-vehicles

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6   Learn more about BEVs and NZ government policy here: www.transport.govt.nz/multi-modal/climatechange/electric-vehicles.

Population ageing, global warming and the Sinbad Century[7]

Andrew Coleman
andrew.coleman@otago.ac.nz

Gather around and listen to a story! It's a tale, that if told better, might be worthy of Scheherazade herself … It involves life and death, great threats and missed opportunities, difficult problems and difficult solutions, and an ending that could be happy or sad. It might even be the story of the 21st Century – the Sinbad Century.

THE DEATH OF DEATH

The story begins with the greatest success story of the last 200 years: the decline of death. Globally, average life expectancy at birth has increased from just 20-30 years in 1800 to 70 now.

This increase in life expectancy is not just due to reduced infant mortality, for age-specific death rates have fallen at all ages. One measure of this is life expectancy at age 20, which has increased from 55 in most pre-industrial countries to 85 in most rich countries.

Another measure is the additional life expectancy conditional on reaching 65 years. This is still increasing: in England, where the big increase in life expectancy first took place, male life expectancy conditional on reaching 65 years has increased from 14 extra years in 1988 to 18 extra years now, and female life expectancy has increased from an extra 18 years to an extra 21 years over the same period. Similar improvements are occurring in Japan, where life expectancy at birth should soon be 90, the highest in the world.[8]

The decline of death has led to a huge increase in the world's population, from 1 billion in 1800 to 7.5 billion today. In recent years,

Scheherazade

Source: https://commons.wikimedia.org/wiki/File:Scheherazade.tif

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7   This article is a shortened version of a paper presented to the Hugo Group CEO Retreat, Millbrook Estate, Queenstown, in August 2018.
8   The demographic data are largely sourced from He et al. (2016) and the United Nations (2017). Additional NZ and Australia data are from Statistics New Zealand and the Australian Bureau of Statistics.

the fastest increase in the population occurred among those over 65 years old. When the world population reached 7 billion in 2012, 570 million people (or 8% of the population) were over 65. By 2030 there will be 1 billion people over 65. In 2050 the number will increase to 1.5 billion, or 16% of the world's estimated 9.5 billion people.

NZ's population is not ageing particularly quickly, due to rapid inward migration. Currently 15% of NZ's population, or 750,000 people are over 65. By 2050 this fraction should increase to 24-26%, depending on migration. This fraction will be slightly higher than Australia and similar to the US, but lower than most of Europe and East Asia.

THE DEATH OF BIRTH AND THE SINBAD CENTURY

Population ageing also reflects the decline of birth. If all countries had birth rates at long-run replacement levels (2.1 babies per woman), and if all countries had developed-country age-specific mortality rates, approximately 25% of people would be aged over 65.

Countries such as Japan that had a very short baby boom in the 1950s followed by decades of fertility rates lower than 2.1 will not only have very large fractions of old people but they will also have declining populations because of the low birth rate. Indeed, Japan is only expected to have 100 million people in 2050, down from 125 million now, and South Korea, Germany and Russia are all expected to lose 10% of their populations by then. Even China is likely to have 60 million fewer people by 2050.

Current trends mean birth rates in most countries should be equal to or lower than replacement levels by 2050. There are three major exceptions: most countries in Africa, the Middle East, and parts of South Asia, particularly Bangladesh and Pakistan.

Even though Africa will have many more older people, in 2050 it will still have a young and expanding population because of a very high fertility rate, at around 4.4 births per women. Africa's population should increase from 1.1 billion now to 2.4 billion in 2050, accounting for more than half of the world's projected increase.

Nigeria may be as populous as the US by 2050; Ethiopia may increase from 100 million to 230 million; Tanzania and Uganda from 50 million to nearly 115 million; and even Mozambique will more than double to 60 million. The agricultural and medical advances that see the number of old people in Africa sharply increase will not create a significantly ageing population in Africa in our lifetimes, because of the high birth rates.

Given these population trends, it seems reasonable to describe our century as the *Sinbad* Century – because what should be the last great human population increase is centred around the Indian Ocean.

POPULATION AGEING AND ECONOMICS

Economists focus on the following four population ageing issues.[9]

(1) What happens to the number of people working in the economy as a fraction of the population?

(2) What happens to health care and long-term care costs?

(3) What happens to savings and the supply of capital, and how will this affect the productivity of workers?

(4) What happens to government finances, particularly the costs of pensions and health care?

The rest of this article is about the last two issues. Globally, the big story is whether capital assets can be accumulated by ageing countries and sent to the workers in the Sinbad countries, to raise their productivity levels. If this can be achieved, it will help both young and old have prosperous futures. What's more, it may be the key to solving global warming.

CAPITAL INVESTMENT AND GLOBAL WARMING

The interplay of declining birth rates and declining death rates that causes population ageing can also create a temporary saving bonus. When workers increase their savings as they approach older age, there can be a large increase in the supply of capital resources.

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9   For a discussion of these issues, see, for example, Bloom et al. (2015) or Lee and Mason (2010).

Sinbad Century countries

Source: www.yourchildlearns.com/online-atlas/indian-ocean-map.htm

This phenomenon was very noticeable in countries that passed through their demographic transitions in fast motion: countries such as Japan, the Asian tigers and now China all had large increases in saving ratios and current account surpluses. These savings can be valuable. Properly invested, they can enhance the productivity of the workforce and allow the substitution of capital for the slowly diminishing size of the labour pool as the population ages.

When the savings of people approaching older ages are invested in the education of the young, in machinery and infrastructure, and in firms' research programmes, there is considerable potential to ease some of the cost pressures associated with ageing. Japan has specialised in this; a lot of their private savings are directed towards machines that reduce the number of carers needed to look after older people.

The savings associated with population ageing may be the solution to the world's most awkward issue. The burgeoning populations of the Sinbad countries are the poorest on earth. Naturally these countries want to develop, but this has always taken vast quantities of capital and energy, and in the past this has always meant coal, gas, or oil – and CO_2 (see Ayres and Warr, 2009).

So, how do we let half of the world's population develop without massively increasing the amount of CO_2 in the atmosphere?

There may be a way. Technological breakthroughs in renewable energy and storage technologies mean the lifetime costs of renewable electricity are now competitive with gas-fired electricity and cheaper than coal (Heal, 2018). This means Sinbad countries could develop without a massive increase in carbon usage.

One of the difficulties, however, is that renewable electricity has much higher up-front costs than carbon-based electricity, even though it has much lower ongoing costs. It is expensive to build renewable energy plants, an expense most developing countries will struggle to meet because they are capital poor.

Even though it is cheaper in the long run to build renewable-energy than coal-fired generators, this won't happen because the capital doesn't exist in these countries now. It could exist if capital were transferred from currently rich countries, whose ageing populations wish to accumulate capital for their retirements. Recycling this capital from ageing countries to young countries to enable green development is possibly the greatest opportunity of our time.

There are two major constraints. The first is ensuring the recipient countries have the appropriate political and institutional structures that encourage investment without expropriation. This is no small task. No one wants to invest in an undeveloped country if they believe the country is too corrupt to operate properly, or is likely to take the proceeds of their investment.

The second constraint is to ensure the potential population ageing dividend – the savings of middle-aged people planning to retire – is productively invested.

RETIREMENT SAVINGS AND TAX

Here there are two problems: (1) tax, and (2) the design of retirement saving programmes. The tax issue is conceptually straightforward, but very important in NZ.

To take advantage of the demographic saving bonus, savings need to be productively invested. This means the tax system shouldn't artificially encourage investment in one sector or another (unless it is to solve some externality problem such as pollution).

Investment opportunities should be equally taxed – or equally not taxed. Unfortunately, NZ does this particularly poorly; more than most rich OECD countries, NZ has a tax regime that encourages investment in housing and property rather than other assets.

The problem is not really the way NZ owner-occupied housing is taxed, for it is taxed in a similar fashion to many other countries (Coleman, 2017). The problem is the way other assets, particularly retirement savings accounts, are taxed.

EET VERSUS TTE

Without getting into the technical details here, most OECD countries tax dedicated savings accounts in an *Exempt-Exempt-Taxed* (EET) basis: money placed in the account is not taxed when it is earned and deposited in the account, the returns are not taxed as they accumulate, but the whole sum is taxed when it is withdrawn in retirement.

The EET system provides a broadly similar approach to the way housing is taxed, because neither the return to assets nor the return to housing (the rent you save by owning your own house) are taxed. Consequently, there is no artificial incentive to invest in housing.

In contrast, NZ taxes retirement savings on a *Tax-Tax-Exempt* (TTE) basis: money earned is taxed before it is deposited in the account, the returns are taxed as they accumulate, but the whole sum is exempt from tax when it is withdrawn in retirement.

The TTE system significantly raises the tax paid on retirement savings and provides an incentive to invest in housing. It is not a policy designed to finance green-energy technologies around the world. From a global perspective it is fortunate that NZ's approach to the taxation of retirement savings has not been copied by any other countries.

PAYGO VERSUS SAYGO

The second problem is the design of government retirement savings schemes. The structure of these schemes makes a big difference to the way capital resources are accumulated because some schemes, such as New Zealand Superannuation, do not accumulate capital at all.

NZ Superannuation is primarily funded on a *pay-as-you-go* (PAYGO) basis, which means tax is collected from one group of people and given to over-65 year olds. No money is saved; no investments are made.

The alternative approach is to fund NZ Superannuation or other retirement schemes on a save-as-you-go (SAYGO) basis, in which the taxes are collected and saved and invested and used to pay pensions in the future. SAYGO financing can lead to a significant accumulation of assets, as we observe from the private sector. The NZ Superannuation Fund is a step in this direction.

YUP, *r > g* … SO WHAT?

This is not the place to discuss all of the differences between PAYGO and SAYGO pension schemes, even though this is the most important fiscal topic facing young New Zealanders. The economics was worked out more than 60 years ago by several high profile economists including Nobel prize winners Paul Samuelson (in 1970),[10] Edmund Phelps (2006)[11] and Peter Diamond (2010).[12,13]

Suffice it to say that when the returns to capital investments (r) exceed the growth rate of the economy (g) – i.e. $r > g$ – it is more efficient to accumulate savings and capital to finance old age

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10   Samuelson won "for the scientific work through which he has developed static and dynamic economic theory and actively contributed to raising the level of analysis in economic science."
11   Phelps won "for his analysis of intertemporal trade-offs in macroeconomic policy."
12   Diamond won with Dale Mortensen and Christopher Pissarides "for their analysis of markets with search frictions."
13   Their work is explained in the context of NZ's retirement saving schemes in Coleman (2014).

rather than use a PAYGO transfer system. This is why private pay-as-you-go finance systems, where you provide your parents with their retirement incomes and get your own retirement incomes from your children, have fallen out of favour in the western world.

However, PAYGO systems are widely used by governments – not because they are efficient, but because once you have adopted them you can't get out of them without one generation being hurt. Politicians are reluctant to reduce the benefits to middle-aged and older voters, and so they continue the PAYGO system.

Unfortunately, this pushes the inefficiency of the system on to current and future generations of young people. All those taxes that could have been saved and used to invest in green technologies or other investments are simply passed to older people and spent.

WHAT'S THE DIFFERENCE?

Economists like to describe the difference between an efficient way of doing things and an inefficient way of doing them as an opportunity cost. The opportunity cost of having a PAYGO pension scheme depends on '$r - g$', i.e. the difference between the rate of return to capital investments and the growth rate of the economy.

This difference ($r - g$) is a big number, especially when the population growth rate, a part of 'g', is falling. NZ currently collects $13 billion in taxes each year to pay for NZ Superannuation. To a first approximation, only half of this sum would be necessary to pay the pensions of future generations if it were invested. And all of this sum would be available to finance investment.

SOMEONE'S GOTTA PAY

It would be great if we could simply make the transition to a more efficient SAYGO system and take advantage of the ageing saving bonus. But we can't.

We could make the transition by cutting transfers to currently older people and investing the taxes instead. But the income distribution implications of this don't bear considering.

Alternatively, we could make currently working-age people pay taxes to pay current pensions and then pay more taxes or privately save to pay for their own retirements. Their children would thank them – as would all future generations – but the "double-pay" generation would be worse off than under the current system.

Unfortunately, there is no way around this. And there lies the political paralysis that prevents reform. The easiest way would be to make everyone a bit worse off now to make everyone better off in the future by increasing taxes and saving the extra in the NZ Superannuation Fund, but even this step has yet to garner consensus political support.

THE SINBAD CENTURY AND THE LAND OF OZ

The coming Sinbad Century is big news for Australia. Australia is the richest English-speaking country on the Indian Ocean; the new Sinbad cities should be built with minerals from Western Australia or minerals dug up by Australian mining companies; and it might be the destination of choice for young Sinbad citizens.

If things go well, Australia's focus is likely to move towards the Indian Ocean, where the population is rapidly increasing, where there is surplus labour relative to the rest of the world, and where the demand for capital will be high. Perth may well be the Los Angeles of the 21st Century, a sun-blessed eye on the Indian Ocean, a city expected to have nearly 5 million people by 2050.

Of course, things might not go well in the Sinbad countries: young and restless populations, poor democratic traditions and weak political institutions, and an uncertain and volatile climate may produce other outcomes. Either way, birth-rate and death-rate

dynamics will make Australia and especially Perth increasingly important and increasingly less interested in the globally irrelevant country to their south-east.

How young New Zealanders and NZ firms respond to the burgeoning opportunities to the west is one of the key issues facing NZ in the next 50 years. The echo of Horace Greely, "Go west young man", may yet be the rallying call for young NZ men and women of the 21st Century.

HOW WILL THIS TALE END?

We can be pretty sure that the decline of death and the decline of birth will lead to a realignment of the world's population centre towards the Indian Ocean – the Sinbad Century countries. We can be pretty sure these countries will want to use a lot more energy, and that there will be scope for this energy to be primarily renewable.

What we can't be sure about is whether the world will find a way to finance these investments by recycling the savings of middle-aged countries into the energy plants of young countries. And, locally, we can't be confident that NZ will reform its tax and retirement systems to better participate in this process.

Fortunately, however, the future belongs to the young. And they, much more than the old, have an incentive to undertake these reforms.

QUESTIONS TO THINK ABOUT

1. Scheherazade is mentioned and pictured at the beginning of the article. Who is she? And who is Sinbad?

2. Does taxing retirement savings inflates the price of houses?

3. Are New Zealanders looking forward to a longer and healthier retirement?

4. Why does a reduction in the birth rate cause population ageing?

5. Is it likely that a Government managed fund can earn a return that is greater than the economic growth rate?

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Why more Kiwis are not effective altruists

Stephen Knowles
stephen.knowles@otago.ac.nz

If you want to achieve the most good from a charitable donation, what type of charity should you support? Influential books by Peter Singer (2015) and Will MacAskill (2015) have argued that people who care most about their donation's effectiveness – known as 'effective altruists' – should donate to charities fighting poverty in developing countries overseas. In contrast, most New Zealanders, like their counterparts in other wealthy countries, prefer to donate to charities that spend the money in their own country. This article analyses two possible reasons for why it might be that New Zealanders favour domestic charities, in spite of more 'bang for your buck' when the money goes to poor people overseas.[14]

MORE BANG FOR YOUR BUCK

Because there is so much need in developing countries, it is possible to improve peoples' lives at reasonably low cost. For example, $1000 spent on distributing anti-malaria bed nets in Africa could generate 10 additional (quality-adjusted) years of life (MacAskill, 2015). Or $1000 spent on deworming children in developing countries will lead to 139 years of additional schooling, as well as the obvious health benefits. This sort of value for money cannot be achieved when spending the same amount of money in NZ.

WHO NEW ZEALANDERS DONATE TO

Only 9% of donations in NZ go to international development charities such as World Vision and Oxfam. A recent *EcoNZ@Otago* article (Knowles and Sullivan, 2016) explored whether this was because there are fewer international development charities than domestic charities.

In that research, people were invited to take part in an online survey and told that if they completed it $10 would be given to either World Vision (a charity helping families in need in poor countries overseas) or the Salvation Army (a charity helping families in need in NZ): 72% of people chose the Salvation Army.

The current article discusses a follow-up research project which aims to shed more light on why more New Zealanders prefer charities with a domestic focus, rather than helping people in need overseas.

TWO HYPOTHESES

The research project tested two possible reasons (hypotheses) for why international development charities receive a small share of donations. The first is that many people are not that worried about how effective a donation is; they are more interested in other factors like where the money is spent (preferring it to be spent close to home).

The second hypothesis is that people do care about the effectiveness of donations, but they are not aware, or do not believe, that there is greater bang for their buck when the money is spent on projects in poor countries overseas.

The first hypothesis was tested using a discrete choice experiment (DCE) implemented using 1000minds software (www.1000minds.com). We wanted to find out how much importance (or weight) people attach to: (1) the effectiveness of a donation, (2) the need of the recipients, and (3) where the money is spent. These three characteristics (and levels within each characteristic) are summarised in Table 1.

Table 1: Characteristics included in the DCE

Decision criteria and levels (3 each)
Where the donation will be used:
• In a country far away from New Zealand
• In a country close to New Zealand (e.g. in the Pacific region)
• In New Zealand
Expected benefit to recipients of NZ$100 donation:
• Low
• Medium
• High
Need of the recipients:
• Low
• Medium
• High

WHAT DO PEOPLE CARE ABOUT MOST?

The DCE took the form of an online survey. Each participant was asked to imagine they were donating to a charity. They were asked to make a series of choices between two hypothetical charities defined in terms of two of the three characteristics at a time and asked which charity they would prefer to donate to. An example of such a choice is shown in Figure 1.

Answering this question involves a trade-off: would you rather give to a charity where the need of recipients is *low* and the expected benefit *high* (the charity shown on the left of Figure 1) or a charity where the need of recipients is *medium* and the expected benefit *medium* (the charity shown on the right of Figure 1)? Each participant had to answer approximately 11 questions like this with different combinations of the three characteristics each time.

*Figure 1: Example of a pairwise-ranking question*

The 1000minds software takes advantage of the transitivity principle to minimise the number of trade-off questions each participant has to answer; i.e. if someone ranks Charity A ahead of Charity B, and Charity B ahead of Charity C, this means Charity A is also preferred to Charity C.

Based on each individual participant's answers, the software calculates what are known as 'part-worth utilities' for each of the characteristics, representing their relative importance (or 'weight') to the participant with respect to choosing charities to donate to. These individual part-worth utilities can be used to calculate the average weights across all individuals.

The average relative importance of the characteristics for participants is shown in Figure 2. As can be seen, the average weight for geographical distance (where the money will be spent) is higher than the average weights for the other two characteristics.

Figure 2: Charity Characteristics and their relative importance to study participants on average

Charity Characteristics

31 — Effectiveness
32 — Recipient Need
36 — Geographical Distance
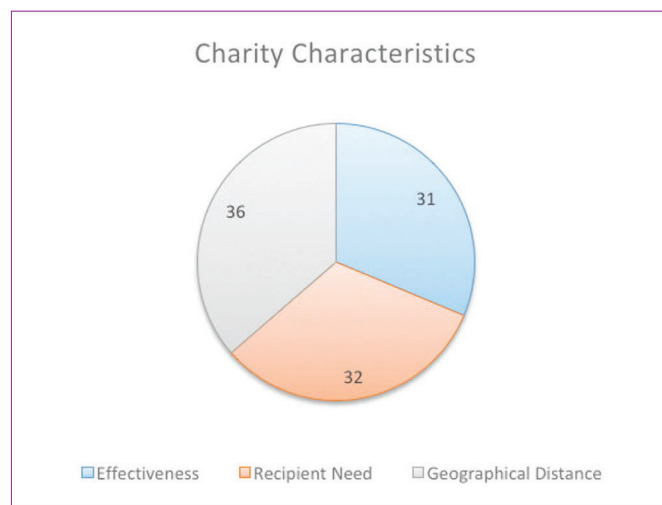
Another way of thinking about the results is to ask how many people ranked each of the characteristics as most important. For 51.7% of participants, where the donation will be spent (preferring it be spent closer to home) was the most important characteristic. Only 23.6% rated effectiveness as the most important attribute. This provides support for the first hypothesis: most people don't regard a donation's effectiveness as being the most important characteristic when deciding which charities to support.

WHERE WOULD A DONATION DO THE MOST GOOD?

We also asked participants whether they thought a $100 donation to charity would do the most good: In NZ or a poor country overseas? A similar percentage answered NZ (44.4%) as answered a poor country overseas (44.0%), with 11.6% saying they were not sure. These results support the second hypothesis: many people are not aware, or do not believe, that a donation is more effective overseas.

HOW MANY EFFECTIVE ALTRUISTS WERE THERE?

At the end of the survey, people were asked to choose which of two charities they would like us to donate $2,000 to: World Vision (who help families in need in poor countries overseas) or the Salvation Army (who help families in need in NZ)? Most participants (70.9%) voted for the money to go to the Salvation Army, 18.0% for World Vision, with the remaining 11.1% choosing neither charity.

Of the 1232 people who completed the survey, only 168 placed the most weight on 'effectiveness' in the DCE *and* thought a donation would be the most effective in a poor country overseas. These are the people who we might expect to be effective altruists and vote for the $2000 donation to go to World Vision. However, only 67 of the 168 chose World Vision. So, of the people whose preferences and beliefs suggested they would be effective altruists, less than half actually behaved as effective altruists when it came to making a charitable donation.

CONCLUSION

Effective altruists believe that donations should go to international development charities instead of domestic charities. However, international development charities receive a small share of total donations in NZ. Our research suggests this may be because people are not aware that a donation can achieve more when directed at poor people overseas, and that many people prefer the money is spent in NZ.

QUESTIONS TO THINK ABOUT

1. Can you think of other reasons why people might prefer to give to the Salvation Army than World Vision, other than those suggested in this article?

2. Which of the three characteristics considered in this research (effectiveness, recipient need and where the donation is spent) are most important to you? Why?

USEFUL WEB SITES

The research discussed in this article was presented as part of Stephen Knowles' Inaugural Professorial Lecture in October 2018, which can be found online at www.youtube.com/watch?v=c6VzpcOGjCM.

For more information on the effective altruism movement, see www.thelifeyoucansave.org and www.effectivealtruism.com.

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Reflections from the 2018 WAMS-LAEF in Queenstown

Murat Üngör
murat.ungor@otago.ac.nz

Otago's Department of Economics proudly hosted the 2018 WAMS-LAEF in Queenstown on 28-30 November 2018. WAMS-LAEF stands for the Workshop of the Australasian Macroeconomics Society (WAMS) in conjunction with one-day workshop organised by the University of California at Santa Barbara's Laboratory for Aggregate Economics and Finance (LAEF). WAMS-LAEF was a great event! This article discusses some of the main highlights (not least the mountain views!).

WAMS-LAEF

The annual Workshop of the Australasian Macroeconomics Society (WAMS) is managed by the Australasian Macroeconomics Society, a registered not-for-profit society. Run by a group of research-active macroeconomists from academia and public policy,[15] WAMS is open to all areas of macroeconomics.

WAMS has a long history, beginning with the first Australasian Macroeconomics Workshop (AMW) in 1996. In 2014, the AMW joined forces with the Workshop on Macroeconomic Dynamics (which grew out of the Australian National University in 2006) to form what is the WAMS today.

WAMS again included a one-day workshop organised by the University of California at Santa Barbara's Laboratory for Aggregate Economics and Finance (LAEF).[16]

The organisers of WAMS-LAEF invited research papers from any field of macroeconomics, theoretical or applied. More than 100 submissions from all over the world were received, resulting in approximately 40 registered attendees, including from institutions in Australia, Canada, Czech Republic, Germany, Italy, UK and US. NZ was also well represented, with attendees from most universities as well as the Reserve Bank of New Zealand and the New Zealand Treasury.

The local organising committee comprised Alfred Haug, Murat Üngör and Dennis Wesselbaum, all from Otago's Department of Economics. Deputy Vice-Chancellor (Research and Enterprise) Richard Blaikie welcomed attendees at the opening reception, emphasising the University of Otago's strength and success in research.

Given the range of papers delivered, it is not possible to review them all here.[17] Keynote speeches were given by Harald Uhlig (The University of Chicago, NBER, CEPR), Nobel Laureate Finn Kydland (UCSB, NBER, LAEF) and Robert Shimer (The University of Chicago, NBER, IZA).

"SOME SIMPLE BITCOIN ECONOMICS"

Christie Smith (Reserve Bank of New Zealand) introduced the first keynote speaker, Harald Uhlig, whose research interests are in macroeconomics, financial markets and Bayesian econometrics, and the intersection of these three areas.[18] Prof Uhlig presented his work, "Some simple bitcoin economics", co-written with Linda Schilling (École Polytechnique – CREST).

Recent innovations have made it feasible to transfer private digital currency without the intervention of banks. Cryptocurrencies, in particular Bitcoin, have received a large amount of attention in the news. The price of Bitcoin has been highly volatile – even spectacular/terrifying! For example, on 17 December 2017, the price of bitcoin on CoinMarketCap, a cryptocurrency exchange, neared US$20,000; since then, the price has fallen dramatically.

These developments have given rise to a number of questions from the public and policy-makers alike. How do Bitcoin prices evolve? What are the consequences for monetary policy? Prof Uhlig's talk shed light on some of these questions, using a model framework (Schilling and Uhlig, 2018).

"POLITICS IN THE WORLD ECONOMY"

Benoît Julien (President of the WAMS) introduced Finn Kydland,[19] who, with Edward Prescott, received the 2004 Economics Nobel Prize "for their contributions to dynamic macroeconomics: the time consistency of economic policy and the driving forces behind business cycles." Prof Kydland's talk was entitled "Politics in the world economy".

Since the time of Adam Smith (or perhaps earlier), economists have asked: Why do some countries grow faster than others? This question can be extended in many ways: Will the Chinese economy surpass the U.S. economy? Following the recent worldwide recession, what country, or group of countries, will emerge as the engine of world economic growth?

15 www.ausmacro.com.
16 The Laboratory for Aggregate Economics and Finance (LAEF) was established in July 2005 to address important questions on growth and fluctuations in national, or aggregate, economies (http://laef.ucsb.edu/index.html).
17 The programme is available at www.ausmacro.com/WAMS2018/program.
18 http://home.uchicago.edu/huhlig/cv_uhlig.html.
19 www.finnkydland.com.

Prof Kydland addresses such questions based on his recent research with colleagues. For example, both Chile and Mexico experienced severe economic crises in the early 1980s, but Chile recovered much faster than Mexico. Kydland discussed such cases and compared differences in how economic reforms were implemented across countries.

"HIGH WAGE WORKERS WORK FOR HIGH WAGE FIRMS"

Peter Rupert (University of California, Santa Barbara) introduced the final keynote speaker, Robert Shimer,[20] whose research is about labour markets and macroeconomics, mostly focused on search frictions but also exploring the mismatch between workers' human capital and locations and jobs' skill requirements and locations. His paper, co-written with Katarìna Borovičková (New York University), was entitled "High wage workers work for high wage firms".

There is sorting everywhere in the economy. For example, higher income households reside in distinct neighbourhoods and send their children to different schools than low income households. The one place where it has been hard to find evidence of sorting is in the labour market. Borovičková and Shimer (2017) develop a new approach to measuring the correlation between the types of matched workers and firms.

A GREAT SUCCESS!

The meeting was an enjoyable and productive affair. The organisers received very positive feedback on the programme, the organisation of the meeting and the helpful and stimulating discussions.

USEFUL WEBSITE

2018 WAMS-LAEF: http://wams2018.ausmacro.com.

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Schilling, L., Uhlig, H. (2018), "Some simple Bitcoin economics", *NBER Working Paper* No. 24483.

20   https://sites.google.com/site/robertshimer.

Harald Uhlig talked about the economics of Bitcoin

Nobel laureate Finn Kydland talked about economic growth and politics

Robert Shimer talked about high wage workers and firms

Commentary on the New Zealand economy

Alan King
alan.king@otago.ac.nz

	Sep 2018	Jun 2018	Mar 2018	Mar 2017	Mar 2016
GDP (real, annual growth, %)	2.6	3.2	3.0	3.1	3.9
Consumption (real, annual growth, %)	2.6	3.3	3.0	5.3	3.6
Investment (real, annual growth, %)	7.3	10.3	6.7	3.8	6.9
Persons Employed (full- and part-time, 000s)	2663	2633	2618	2539	2402
Unemployment (% of labour force)	3.9	4.4	4.4	4.9	5.2
Net Migration (year to date)	62,733	64,995	67,984	71,932	67,619
Consumer Price Inflation (annual rate, %)	1.9	1.5	1.1	2.2	0.4
Food Price Inflation (annual rate, %)	0.2	0.7	0.6	1.6	−0.4
Producer Price Inflation (outputs, annual rate, %)	3.6	3.1	3.5	4.1	0.1
Producer Price Inflation (inputs, annual rate, %)	4.0	3.7	4.2	4.2	−0.9
Salary and Wage Rates (annual growth, %)	1.8	1.9	1.8	1.6	1.6
90-day Bank Bill Rate (% p.a.)	1.90	2.01	1.93	1.98	2.43
10-year Govt Bond Rate (% p.a.)	2.60	2.90	2.89	3.28	3.02
2030 Inflation-Indexed Bond Rate (% p.a.)	1.35	1.61	1.74	2.11	2.13
Lending to Households (annual growth, % [1])	5.9	5.9	5.9	8.7	7.4
Real Exchange Rate (end of period [2])	70.5	72.0	73.3	75.5	71.0
Exports (volume, annual growth, %)	3.3	1.8	4.0	−2.4	−1.3
Imports (volume, annual growth, %)	8.6	9.2	11.0	6.7	1.3
Terms of Trade (June 2002 = 1000)	1444	1449	1443	1417	1331
Merchandise Trade Balance ($m, year to date)	−5,188	−4,206	−3,468	−3,709	−3,765
Visitor Arrivals (annual growth, %)	3.6	3.8	7.8	8.9	10.4
Current Account Balance (% of GDP, year to date)	−3.6	−3.3	−3.0	−2.6	−2.6

[1] Housing and consumer loans made by registered banks and non-bank lending institutions. [2] Trade-weighted index (average value over March 1985-March 2005 = 62.2).
Sources: Statistics New Zealand (www.stats.govt.nz), Reserve Bank of New Zealand (www.rbnz.govt.nz).

After surprising on the upside in the June quarter of last year and then surprising on the downside in the September quarter, the NZ economy has finished 2018 confirming the original viewpoint expressed by many that it was slowly going off the boil.

This is not to say, however, that we are now on the verge of a recession or that the economy is not "doing well". The current situation is a case of an economy that is close to its full-capacity point with production growing at a rate that is just keeping pace with growth in the economy's capacity to produce. A faster rate of growth would actually be problematic as that would feed inflationary pressure and ultimately force the Reserve Bank to substantially raise interest rates in an effort to slow the economy down.

The close proximity of the full-capacity point is most obviously illustrated by the recent fall in the unemployment rate. Despite rapid population growth (driven by the high rate of net immigration) and a notable rise in the fraction of the population actively participating in the labour market, the unemployment rate is now finally below 4%. The current rate is the lowest seen since the first half of 2008 – i.e. *before* the Global Financial Crisis.

Clearly then, the road back to full employment had been a very long one. However, this slightly obscures the fact that employment growth over recent years has been very strong. There are literally half a million more people employed now than was the case at the beginning of 2008. Almost all of these extra jobs are full-time ones, which has lifted the ratio of full-timers to part-timers in the workforce by 11%.

Bearing in mind that the construction sector's output (which accounts for roughly half of total investment spending) was largely flat throughout 2018, investment in plant, machinery and transport equipment has been rising steadily. This should help to maintain growth in the country's productive capacity. Hence, providing 2019 has no nasty externally-generated surprises in store (which can never be ruled out), NZ seems set for slow but steady growth over the coming year.