

A MAGAZINE ABOUT CONTEMPORARY ECONOMIC ISSUES FOR EVERYONE

FROM THE EDITOR

People's choices depend crucially on their preferences, attitudes and personal characteristics. For economists, understanding these is paramount. In this issue of *EcoNZ*@ *Otago* we look at which characteristics of 'developing' countries matter most to people thinking about making charitable donations. We also look at university students' attitudes; are they overly-optimistic about the marks they expect to earn? We identify which features of solar power generation people in Dunedin find most appealing. Finally, we explore what people's use of EFTPOS cards can tell us about New Zealand's economic performance. As usual, *Highlights* – short commentaries on economic issues – accompany selected articles.

Previous issues of *EcoNZ@Otago* are available online at www.business.otago.ac.nz/econ/econz. For enquiries, or to recommend topics for future issues, please contact us at the address below. The Department of Economics at Otago University is now on Facebook. Search for us at www. facebook.com and get connected!

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Charitable giving: How recipientcountry characteristics influence donors' behaviour

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Imagine you are going to give \$20 to a charity, such as World Vision or UNICEF, that helps disadvantaged people in countries with standards of living well below New Zealand's. There are dozens of countries like this; most are in Africa, Asia, Latin America and the Pacific Islands. If your donation could go to one country only, which would you choose? A country with low average incomes, such as Niger, or one with high child mortality, such as Mali? Would you rather support a country with close ties to New Zealand, such as Samoa or the Cook Islands? Are there other things that matter to you more?

Determining which recipient-country characteristics matter most to potential donors (like you, perhaps!) would help charitable organisations to focus their marketing efforts on particular countries (or country 'types') to increase donations. These organisations could also better justify their funding decisions to stakeholders. At the national level, governments could discover whether or not their current aid allocations reflect the preferences of their citizens and alter their spending priorities if need be. Identifying what these important characteristics are is not very easy; however, it can be done.



CHARITY RESEARCH BEGINS AT HOME

Whenever you need to know something about a group of people, asking them is often a good place to start. A survey conducted at the University of Otago last year investigated the preferences of potential donors (university students). The survey attempted to identify the relative importance of the main characteristics exhibited by prospective recipients ('developing' countries who would receive the donations). Based on a review of the relevant literature (e.g. Feeny and Clarke, 2007) and discussions with senior staff at World Vision, the country-level characteristics included in the study were: average income per person; ties to New Zealand, e.g. geographical, political, historical; level of hunger and malnutrition; quality of infrastructure (schools, roads, water, electricity supply, etc); and rate of child mortality. These five characteristics and their levels of severity (from low to high) are reported in Table 1.

Table 1 - Country characteristics and levels within each characteristic

Characteristic
Hunger and malnutrition:
Low (most people aren't hungry)
Medium (some starvation)
High (lots of starvation)
Child mortality (under age 5):
Relatively low (0-49 deaths per 1000 children)
Medium (50-99 deaths per 1000 children)
High (100+ deaths per 1000 children)
Quality of infrastructure (schools, roads, electricity supply, etc):
Poor
Very poor
Extremely poor
Average income per person:
Poor (\$4-\$8 per day)
Very poor (\$1-\$3 per day)
Extremely poor (<\$1 per day)
Ties to New Zealand, e.g. geographical, political, historical:
None / low
Some

Nearly 700 Otago students completed an online survey to discover the relative importance (or 'weight') of each attribute – both to each participant individually and on average for the group as a whole. The survey was created and administered using 1000Minds software (www.1000minds.com) and is based on a well-established methodology



for analysing people's preferences known as a'Discrete Choice Experiment' (McFadden, 1974) or 'Conjoint Analysis' (Green and Srinivasan, 1978).

To encourage the students to take the survey seriously, they were told that 200 of them would be selected at random and \$20, or \$4000 in total, would be given on their behalf to World Vision to spend in the country most closely matching the student's preferences as revealed in the survey. Participants were also asked about their past experiences of giving money or time to charities: 81% reported doing so at least once every six months. This is reassuring because a potential drawback of using university students in the study is that, having relatively low incomes, they might have been expected to have had little experience donating money to charity. Everyone who participated also received a ticket in a lottery to win a \$1000 cash prize, which they were given the opportunity of keeping themselves or donating to World Vision (of whom 26% did so).

EENY, MEENY MINY MOE

The online survey asked each participant to imagine they were giving money to a 'developing' country. They were offered, repeatedly, a choice between two hypothetical countries defined in terms of two of the five characteristics at a time and asked which country they would prefer to donate to. A screenshot from the survey appears in Figure I. As you can see, answering this question requires confronting a trade-off: between extreme poverty ('country' on the right) or ties to New Zealand ('country' on the left). Each participant had to answer approximately 20 questions like this with different combinations of the five characteristics each time, taking about 5 to 10 minutes in total.

Thanks to the main algorithm at the heart of the 1000Minds software,³ the effect of answering these 20 questions is that each participant ends up having pairwise compared and ranked, either explicitly or implicitly, every possible combination of the two or three levels on the five criteria (see Table I again). This is achieved by the software's application of the 'transitivity' principle. If a person ranks hypothetical country A ahead of country B and also B ahead of country C, then, logically (by transitivity), A must be ranked ahead of C – and so the software would not ask a question pertaining to this third pairwise ranking.

Based on each participant's individual 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 countries to donate money to. These individual part-worth utilities can also be aggregated across all participants by simply calculating their mean values, representing the characteristics' relative importance to the group as a whole.



Figure 2 - Country characteristics and their relative importance to study participants on average



SO, WHAT DO POTENTIAL DONORS CARE ABOUT MOST?

The relative importance of the characteristics for all participants on average is shown in Figure 2. As you can see, the most important characteristic is *hunger and malnutrition* (a weight of 28%) followed by *child mortality* (24%), *quality of infrastructure* (21%), *income per capita* (18%), and, last (and yes, least!) of all, *ties to NZ* (9%).

Another way of thinking about the numbers reported in Figure 2 is to express the weights as ratios of each other, representing the relative importance of one characteristic to another. Thus, *hunger and malnutrition* is, on average, 3.1 times more important than *ties to NZ* (=28%/9%) and 1.6 times more important than *average income per person* (=28%/18%); and so on.

The software also reveals which characteristic was considered most important for each participant individually. For 44% of participants, *hunger* and malnutrition is most important, followed by child mortality (27%), quality of infrastructure (15%), income per capita (10%) and ties to NZ (9%). These individual results are consistent with the average results in Figure 2.

FEED PEOPLE AND SAVE CHILDREN FIRST OF ALL

The study found that most participants would prefer that aid money goes to countries with high rates of hunger and malnutrition and child mortality respectively, rather than to low-income countries per se. Of course, many countries with low incomes also have the highest rates of hunger, malnutrition and child mortality, but not always. Ties between the donor and recipient countries was the least important of the five characteristics considered in our study, suggesting that potential donors are more concerned with 'need' than with geo-political or historical considerations. The quality of a country's infrastructure (schools, roads, water, electricity supply, etc.) is also relatively unimportant to potential donors. Our results suggest that international aid charities ought to focus their marketing efforts – as most do – on emphasising hunger, malnutrition and child mortality rather than other things.

AND THE WINNER IS?

Of the 15 countries supported by World Vision New Zealand, and for which we had data for all five country characteristics, Niger was the top-ranked country for 88% of participants based on their individual utilities – and so 88% of the \$4000 (\$3520) that we promised to be given on behalf of participants went to Niger. Niger stands out because it is maximally rated for all attributes except *ties to New Zealand* (which for most participants is relatively unimportant). The remainder of the money went to Timor Leste (\$261), Bangladesh (\$205) and Cambodia (\$17), as they were each ranked first by 6.5%, 5.1% and 0.4% of participants respectively.

Note that these results do not mean that participants would opt for almost all aid money to go to a *single* country. The study was designed to reveal which country characteristics people deem most important; hence a single country best fitting those attributes was identified. It could well be that participants, if given the option (which they were not), would have liked their \$20 to be spread over more than one country. Fear not though – many charities like World Vision give people the option of donating to more general funds. Once the funds are allocated across countries, knowing what donors care about the most can help charities decide how these general funds should be distributed.

QUESTIONS TO CONSIDER

- 1. How adequate, in your opinion, are the characteristics used for capturing what people consider when thinking about which countries to donate money to (see Table I)? Should any other characteristics be included (in your opinion)?
- 2. Based on your own personal preferences, which of the five criteria included in the study is the most important? Which is the least important?
- 3. How would you answer the question posed in Figure 1?

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² Reserve Bank of New Zealand. This article is based on Nikki's research for her Honours degree (supervised by her co-authors here and Paul Thorsnes). A discussion paper is also available; see Hansen, Kergozou, Knowles and Thorsnes (2013).

 ³ Details about the algorithm, known as the PAPRIKA method, are available from Wikipedia (2013b) and Hansen & Ombler (2008).
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If you had a single 2-dollar coin to use in a vending machine where everything costs \$2, what item would you select? Surely, the item you want the most! It's only *rational* for people to spend the limited money, time and energy they have on getting what they really like. For economists (who study how people allocate limited resources amongst alternative uses), *preferences* play a supreme role in decision-making. Evaluating preferences for packets of crisps over candy bars seems harmless enough. But do people have preferences over *all* things ... including their own children?

Suppose you could only have a single child. Which would you prefer, a boy or a girl? In 1941, a Gallup poll asked a sample of Americans just that. 38% preferred a boy compared to 24% who preferred a girl (the rest were indifferent). This 14-point difference may have been larger if it weren't for America's experiences with women's suffrage in the 19th and early 20th centuries. Surely, the feminist and gender equality movements in the 1960s-1990s would have closed the gap by now and put more respondents into the 'indifferent' group. However, when the poll was conducted again in 2011 the preference for boys had increased to 40% relative to 28% preferring girls. Male respondents were the driving force behind this trend (49% of men say 'boy' and only 22% say 'girl' whereas 31% of women say 'boy' and 33% say 'girl').

particularly alarming. But, when these preferences actively influence a person's behaviour, the wellbeing of others can be dramatically reduced. In a 2008 article published in The Review of Economic Studies, Gordon Dahl and Enrico Moretti identify how gender preferences affect the lives of mothers and children. Fathers are 3.1% less likely to live with their children if their first-born is a girl. This means approximately 52,000 first-born daughters (and all their siblings) could have had resident fathers in the United States had they been born a boy. These results are driven by the marriage status of mothers. Women with first-born daughters are more by the end of their pregnancy, and are more likely to be divorced. When parents divorce, fathers are more likely to get custody of sons than daughters. Without a resident father, households tend to have lower income (by approximately 50%), higher poverty rates (by approximately 34%) and lower educational attainment for all resident children (independent of gender).

Dahl and Moretti note that their findings can be explained by factors other than a "we want sons" preference. For example, lack of a male role model is thought to be more harmful for boys than for girls. Alternatively, boys are subject to more health and behavioural problems than girls. Both of these may encourage fathers to establish and stay in intact households. Dahl and Moretti also mention that boys are less expensive to raise than girls, thus budget-constrained fathers may feel less able to care for daughters and do not pursue custody after divorce. These other explanations are evaluated by inspecting fertility decisions. The alternative motives should have little impact on whether or not a woman has additional children after a first-born daughter. If preference for boys is a strong factor; however, then women with a first-born daughter should be more likely to have additional children in the hope of having a boy. The authors find that, on average across their sample, families with first-born daughters are 0.3% larger than families with first-born sons. Not only does this result indicate the presence of a "we want sons" preference, it implies that up to 5500 more births per year in the US are due to parents with first-born girls trying for a boy.

Gender preferences differ from country to country (see Hank (2007) for a review). Several studies, many of which measure how the sex of existing children affects the probability of having an additional child, find a strong preference for boys in China, Korea, Vietnam and India. In Indian provinces, for example, son preference can increase fertility rates by up to 25%! In Colombia, Lithuania and Portugal, there is a slight preference for girls over boys. In France and Poland, no gender preference seems to appear while in Austria, Belgium, Hungary, Italy and Spain there is preference for gender balance (those with either two girls or two boys are equally likely to have a third child). An Australian study by Gray and Evans (2004) finds that younger parents are more likely to have a third child if they have two girls versus a girl and a boy, but parents with two boys are not. Although this may indicate a preference for sons in Australia, another possible hypothesis is suggested: perhaps parents that already have two sons opt to not try for a daughter because they *don't want to risk having a third son*. Research into the implications of child gender preferences is on-going. Oh boy!

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Figure 1 – Gallup Poll of Child Gender Preference, United States, 2011

Source: Newport (2011)

Expectations versus reality

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There is an increasing number of students belonging to Generation Y ('Gen Y') who have an elevated view of their abilities and what they can achieve. Many believe that they are above-average and have unrealistic expectations of their future success. Now there is nothing wrong with being optimistic and overconfident, but having high expectations is one thing and actually doing something to achieve your goals is another. Do students adjust their expectations when the opportunity presents itself? Do they take action when new information about themselves and their environment is revealed? Trying to fix unrealistic beliefs and improve student performance is fruitless otherwise.

HARDER THAN IT LOOKS!

Studies have shown that increases in positive self-views have not been accompanied by increases in self-competence. Behaviour like this is explained in terms of "optimism (and wishful thinking) and overconfidence" - the tendency to be optimistic, not only about the future but also about one's abilities (Thaler and Sunstein, 2009). A classic example that Thaler and Sunstein cite involves an MBA class on decision-making at the University of Chicago. More than half of the students said that they expected to be in the top 20% of the class, and less than 5% expected their performance to be below the median. Naturally however, only 20% will be in the top 20%, and much more than 5% will be below the median! A rather large number of students will perform worse than they expect; confident, but ultimately false, predictions about achievement are being made. This can be dangerous for students who choose to limit their study time based on perceived future success. To improve learning outcomes, a student's expectation of their own performance should be as accurate as possible (that way, they spend the right amount of time studying). However, will optimistic students choose to alter their behaviour when faced with reality?

ARE OUR STUDENTS TOO OPTIMISTIC?

We surveyed 196 students in a first-year Principles of Economics class (course code: BSNS 104) at the University of Otago to investigate how closely they resemble *Homo Economicus* (Latin for 'Economic Man' - rational individuals who alter their behaviour optimally when they receive new information). The students completed two online surveys about their expectations and attitudes about the course; the first survey was administered in the first week of the course and the second after a mid-semester test.

Students are indeed optimistic. As shown in Table I, at the beginning of the semester more than half of the surveyed students (60%) expected to receive a grade within the 'A' range (A-, A or A+) and **no** student expected to fail the course. To put these statistics in perspective, 23%



of students received a grade within the 'A' range and 24% failed in the last five years that BSNS104 has run. In reality, approximately 19% of the 196 surveyed students actually received a grade in the 'A' range and almost 16% failed the course. After having received their results from the mid-semester test, as well as having passed the mid-point of the course, you would think that students would know more about the overall rigour of the material and their own performance. And yet students were still optimistic with very little change in their grade expectations: 57% still expected to be in 'A' range.

We explored whether any specific factors affect students' grade expectations. We first identified a profile for a 'typical first-year student' based on the survey participants (see Figure 1). We found that this student is 70% more likely to expect an 'A' over a 'B', and only 0.01% more likely to expect a 'C' over a 'B'.

Grade	lst survey Initial expected grade		2nd survey Mid-semester expected grade		Actual grade	
A	117	60%		57%	38	19%
В	70	36%	70	36%	74	38%
С	9	5%	15	8%	53	27%
Fail	0	0%	0	0%	31	16%

Table 1 – Expected grades versus actual grades

Notes: Columns may not sum to 100% due to rounding.

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Figure 1 – Our typical first-year student



- » New Zealand female, 16-20 years old.
- » Lives in a hall of residence.
- Has attended university for at least one semester and has studied economics before.
- Considers economics 'fairly easy' and does not plan to continue studying economics.
- Intends to spend 4-7 hours per week studying economics and considers lectures and tutorials to be 'very important' and readings to be 'somewhat important'.

When we explored how factors like race, study habits, living situation and course perspectives affect a student's grade expectations, we found that Asian students and students who plan to study more than 8 hours per week are *more* likely to expect an 'A' relative to a 'B'. These results are not surprising. Research has shown that Asian students generally have higher educational expectations (Brand et al., 1987; Goyette and Xie, 1999; Louie, 2004). Asian students, particularly those with demonstrated academic ability, often come from favourable socioeconomic backgrounds and are culturally expected to do well. In terms of hours of study, students who are prepared to work harder obviously expect to reap greater rewards.

On the other hand, students who live in flats or in their family home (as opposed to a residence hall) are *less* likely to expect an 'A' relative to a 'B'. Usually, students living in a hall of residence have a more conducive learning environment than students who live elsewhere. Most halls of residence provide tutorials for large first-year courses. Senior student residents often act as mentors to first-year students, helping to answer questions, giving advice and directing students towards other helpful resources. Students who do not live in halls of residence may realise they do not have the same access to these additional resources and thus have lower performance expectations.

KIDDING YOURSELF

How accurate are student expectations? We found that our typical student has a 33% probability of receiving a grade one level below their initial expected grade, a 50% probability of receiving a grade two levels below their expected grade, and 0% probability of receiving a grade one level higher than initially expected. These results are consistent with over-optimism. Only two factors significantly distinguished those students who received the same grade as initially expected from those students who did not: prior university experience and 'other' ethnicity. A student with no prior university experience (holding other characteristics constant) is 0.3 times less likely to receive one grade level below their expected grade and 0.05 times less likely to receive

two grade levels below their expected grade. This may reflect the more conservative expectations of students who have not been to university before. With respect to ethnicity, a student who is not of New Zealand European, Māori or Asian descent (i.e. who instead is American, European, African, Pacific Islander, etc.) is 6.6 times more likely to receive a grade that is two levels below what they originally expected. Differences between countries in university education characteristics (e.g. teaching styles, grading requirements, etc.) may help explain this result.

STILL KIDDING YOURSELF

As mentioned, the survey showed that students do not seem to significantly alter their initial grade expectations after the course has started. A large proportion still believed they would get a high mark during the second survey. It is possible this result happens because students **do** respond to information and adjust their actions accordingly. The actions they choose give them reasons to expect a good outcome. For example, a student who finds the course slightly harder than anticipated may study harder. They still expect an 'A', but now this expectation is backed by the added efforts they are putting in. This is what educators want to happen. To test this hypothesis, we compared the differences (in means) between the first and second surveys with respect to hours of study and student perceptions about the importance of lectures, tutorials and course readings (see Table 2).

Student behaviour has indeed changed between the times of the two surveys, but not in the direction we may have expected (hoped!). The number of students who thought that lectures were 'very important' or 'important', for example, decreased from 190 in the first survey to 116 in the second survey. The number of planned study hours also decreased as did the perceived importance of readings and tutorials. Students still expect a high grade mid-way through the course, but this hope is not based on increased effort – in fact, they now seem to be even more optimistic than before!

Table 2 – Attitudes and expectations about the course

Attitudes/ expectations	lst survey		2nd survey		
Planned hours of study per week					
Less than 4 hours	11	6%	86	44%	
4-7 hours	80	41%	90	46%	
8-10 hours	86	44%	18	9%	
Over 10 hours	19	10%	2	1%	
How important are lectures?					
They're not	0	0%	46	24%	
Somewhat	6	3%	34	17%	
Important	51	27%	29	15%	
Very important	139	71%	87	44%	
How important are tutorials?					
They're not	1	1%	46	24%	
Somewhat	6	3%	27	14%	
Important	46	24%	25	13%	
Very important	143	73%	98	50%	
How important are the readings?					
They're not	3	2%	54	28%	
Somewhat	31	16%	67	34%	
Important	87	44%	33	17%	
Very important	75	38%	42	21%	

Notes: Columns may not sum to 100% due to rounding.

LEARNING BY DOING?

Initially, students have a limited set of signals from which to base their grade expectations: most of the surveyed students are in their first year at university and many have not studied economics before. It is therefore difficult for them to know what to expect in terms of lectures, course structure and assessments. We find that when faced with this uncertainty, most students tend to be over-optimistic. By mid-semester, however, we assume that students have settled into university life (e.g. attended lectures, completed assessments and sat tests). As rational individuals (i.e. *Homo Economicus*), we hypothesised that students would adjust their initial optimistic grade expectations or change their behaviour in order to achieve an outcome that was similar to their expectations. Instead, however, students seemed inclined to put in less effort and yet their expectations remained unrealistically high. Despite being faced with reality, what students *want* is still not what they get.

A possible explanation for this result might be found within attribution theory (Heider, 1958) where 'self-delusion' occurs as a result of biased processing of signals about oneself. When processing a negative personal event, a person might blame the event on someone or something else rather than taking responsibility themselves (despite the signals available). Comments made by students on teaching evaluations support this theory; for example: "there was not enough time to complete the test", "the test was different from previous years", and "basic points were not explained properly". Our results also support the 'Gen Y' argument – young people are often very confident in their abilities but are not so realistic when it comes to their expectations.

Ultimately, we do not know what further changes in behaviour and attitudes may have occurred (if any) after the mid-semester test which might have influenced students' final grades. To avoid student disappointment and poor teaching evaluations, however, it may be prudent for lecturers to clearly set out course requirements and workload estimations at the beginning of the semester. Also, the change in attitudes of students indicates that it may be worthwhile reconsidering the course design. Gen Y students need to be provided with the opportunity to interact with the subject matter in alternative forms (oral, visual and hands-on explanation of material), and consistent feedback is necessary if students are to attribute their poor performance to their own shortcomings rather than to other factors (Twenge, 2009). Students who are prepared to do the 'hard yards' are more likely to do well and, in turn, will be more satisfied with their education.

QUESTIONS TO CONSIDER

- 1. Do you think you are overly optimistic, but still a Homo Economicus?
- 2. Think about your own goals. Are your expectations realistic? What are you prepared to do to meet your goals?

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HIGHLIGHTS PRESSING YOUR LUCK PART I – FROM RUSSIA WITH LOVE



Suppose you could take a gamble that had a 1% chance of paying you \$5000 and a 99% chance of paying you nothing. Would you play? What is the highest price you'd be willing to pay to take the gamble? Economists are interested in how people handle situations like this because many of the decisions that people make involve uncertain outcomes. The odds of a good result and the cost of participation affect which gambles we take and how often we roll the dice.

The first step in understanding how people treat risk is to think about the expected value of a gamble. The expected value (EV) of any lottery with N distinct prizes is computed by multiplying the value of each prize (v_n) by the probability of winning the prize (p_n) and then summing across all N possible prizes: $EV = v_1 \times p_1 + v_2 \times p_2 + ... + v_N \times p_N$. In the example above, there are only two prizes (\$5000 and \$0) so the expected value of the gamble is easy to derive: $EV = $5000 \times 0.01 + $0 \times 0.99 = 50 . This means that if you played the game a great many times, your average winnings (total winnings divided by number of plays) would be \$50 per play. If the game had an entry fee, you could fork over up to \$49.99 per play and you'd still come out ahead (as long as you play enough).

However, people are often unwilling to pay an entry fee to take part in a risky game that is even remotely close to its expected value. A famous example known as the "St. Petersburg paradox" illustrates this. Imagine that you are traveling through Russia and come across a market stall where the following gamble is on offer: "A coin is tossed until heads appears. If heads appears on the first toss, the player wins 2 roubles (7.5¢) and the game ends. If tails appears, the payout doubles to 4 roubles (15¢) and the coin is tossed again. The game continues in this fashion: if a heads appears, the game ends and the player is paid; if not, the payout doubles and the coin is tossed again. The price to play this

game is 10,000 roubles (about \$375) per try." Would you play? Most people say "no way!" almost immediately – the entry fee seems far too high. But before we decide for sure, let's actually compute the gamble's expected value and compare it to the gamble's price. Knowing that the probability a coin lands on heads (or tails) is 1/2, we can calculate the payouts along with their probabilities (see Table 1).

Theoretically, a coin can be tossed indefinitely and never land on heads. As a result, there are infinitely many potential prizes on offer at the start of the game (N = infinity, so Table I will go on forever). Notice that the payout from a large number of tosses is quite substantial, but the likelihood of getting this payout is minute. According to our earlier formula, $EV = v_1 \times p_1 + v_2 \times p_2 + v_3 \times p_3 \dots = I$ rouble + I rouble come out ahead if you play long enough. Therefore everyone should play at the piddly fee of 10,000 roubles.

So why are people so hesitant? One reason is that marginal (incremental) increases in wealth mean less as you get richer (one rouble means more to a poor man than a rich one). Think of the 'payout' not as roubles themselves, but as happiness or utility (U) from money. Suppose this happiness can be measured using this simple formula: $U = (\# \text{ roubles})^{1/2}$. (Note that you receive 1.4 units in extra happiness if you go from 0 roubles to 2 roubles, but you only get 0.1 units of extra happiness if you go from 100 roubles to 102 roubles; the happiness you get from 2 extra roubles depends on how wealthy you already are.) Substituting this formula into our EV equation and re-computing expected value (in this case, called *expected utility*) we get 2.4 units of happiness from the gamble, which is much less than what is sacrificed for the 10,000-roubles entry fee (10,000 ^{1/2} = 100 units of happiness).

There are other reasons why people won't want to play the St. Petersburg game. Expectations about the liquidity of the person running the game influences the decision to play. Suppose after inspecting the stall owner you come to believe that the most he's good for is around 65,500 roubles (about \$2500). As such, you deduce the maximum number of coin flips for which you'd win and *actually be paid* is 16. The expected value of the St. Petersburg game with 16 maximum tosses is just 16 roubles, far below the 10,000 rouble entry fee. Also, people tend to round down very small numbers. For example, the probability of reaching 20 tosses is 0.0000095 – virtually 0. If people round the probability of winning beyond round 20 down to nil, the estimated value of the game tops out at 20 roubles which, again, is far below the entry fee. Unless people believe the expected benefit is much greater than the cost to play, they just won't press their luck.

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Toss # (n)	Winning Combination (H = heads,T = tails)	Probability of Winning Combination (p _n)	Payout (v _n)	v _n x p _n
I.	Н	1/2	2 roubles	2 roubles \times (1/2) = 1 rouble
2	T-H	$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$	4 roubles	4 roubles \times (1/4) = 1 rouble
3	Т-Т-Н	$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$	8 roubles	8 roubles \times (1/8) = 1 rouble
4	Т-Т-Т-Н	$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$	16 roubles	$ 6 \text{ roubles} \times (/ 6) = \text{ rouble}$
5	Т-Т-Т-Т-Н	1/2 × 1/2 × 1/2 × 1/2 × 1/2 = 1/32	32 roubles	32 roubles \times (1/32) = 1 rouble
6	Т-Т-Т-Т-Т-Н	$y_2 \times y_2 \times y_2 \times y_2 \times y_2 \times y_2 \times y_2 = 1/64$	64 roubles	64 roubles \times (1/64) = 1 rouble

Table 1 – Payouts and probabilities from the St. Petersburg game

Harvesting solar energy in sunny Dunedin

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The sunshine hitting Earth in one hour exceeds all the energy used by humankind in a year (Morton, 2006). You might not think that Dunedin is the best place to harvest solar energy, but Dunedin receives 30% more sunshine than German cities at the international forefront of household electricity generation using photovoltaic panels. Identifying the attributes of rooftop photovoltaic systems that Dunedinites value the most will be useful for understanding their behaviour, and perhaps influencing it.



LET THE SUNSHINE IN

For an average house in Dunedin, covering the north side of the roof with photovoltaic² (PV) panels would generate around 10,000 kWh³ of electricity per year – roughly the amount an average household uses in a year. Rooftop energy is like a field of ripe grain waiting for harvest.

But of course we need the right equipment to do the harvesting. PV technology, which has been around for decades, has been getting better (i.e. more efficient at converting sunshine into electricity) and, more importantly, much cheaper. Prices have been dropping by 20% per year on average over the last four years (Sankowski, 2013) thanks largely to Chinese manufacturers vastly increasing production.

Although PV systems account for only a small proportion of total electricity generation, PV capacity worldwide surpassed 100 GW in 2012 with 31GW added in that year. PV technology was also the largest source of growth in electricity generation worldwide in 2011 and 2012 (European Photovoltaic Industry Assocation, 2013), suggesting that even greater investment in PV can be expected in the future.

Notable examples of relatively large-scale PV in New Zealand include Auckland airport and the Genesis Energy Schoolgen programme⁴. In 2008 Auckland Airport installed 51 kWp⁵ of PV with an expected output of 62 MWh per year (New Zealand Ministry of Economic Development, 2009). Since 2006 Genesis Energy has been running a programme in which they install 2 kW PV systems at schools at no cost; so far about 50 schools around the country are involved.

Does PV make sense for households? There are a number of issues to consider. First, PV technology needs to be cost-competitive with conventional methods of generating, transmitting, distributing and retailing electricity. This has already happened in many places in Australia and some in New Zealand. Last year, the Tokelau Islands became the first place in the world to be able to rely on solar power to meet the country's electricity needs (Astaiza, 2012).

But there are other issues. The sun shines during the day and days are longest in the summer. Households also demand electricity during the night and in the winter. We need to be able to store electricity (e.g. with batteries) and/or access additional electricity when energy from the sun is insufficient. Furthermore, PV changes to some extent a homeowner's relationship with the electricity retailer. Moreover, we have to be concerned about how well PV systems work and the impacts that they have on the house and its value.

FUN IN THE SUN

The objective of the research reported in this article is to discover how Dunedin home owners value the various aspects of rooftop PV systems when they think about using them to power their homes. What is it about rooftop PV systems that people care most about? What is the relative importance of these various 'attributes'? And how do home owners vary in what they like and dislike about PV?

We investigate these issues by implementing a form of 'Discrete Choice Experiment' (McFadden, 1973).⁶ In this case, the experiment comes in the form of a survey that presents respondents with a series of choices, each of which requires the respondent to trade-off one attribute of a hypothetical PV system for another attribute.

The following seven attributes of rooftop PV systems were included in the discrete choice experiment:

- 1. Upfront cost. With prices starting at around \$6000 for a small system and up to more than \$20,000 for a larger system (and even more to go off-grid completely), this is one of the most important considerations when thinking about rooftop PV systems.
- 2. Average monthly savings/earnings as measured in dollar savings per month. This captures the overall return on the PV investment.
- 3. *Contract period.* Depending on the ownership option or electricity plan chosen by households, there could potentially be as much as a 10-year contract period locking-in the household with a particular retailer or PV supplier.
- 4. How the PV system impacts the look of the house. Different systems have different visual impacts. For example, people can either install standard solar PV panels or have built a less-obvious PV system integrated into roofing material.
- 5. Confidence that the system will work as advertised. This attribute represents the importance of reliability and potential maintenance costs over the lifetime of the rooftop PV system.
- 6. *Impact on the time-of-use of appliances.* It might be better to bring forward use of appliances to when the sun is shining instead of exporting excess electricity to the grid. This attribute concerns when people do certain activities in their home.
- 7. *Impact on house price.* The rooftop PV system may increase the value of the house. Someone who is planning on moving within, say, a decade might care a lot about the resulting appreciation, whereas someone who doesn't plan on moving is less likely to.

The discrete choice experiment was implemented using 1000Minds software (www.1000minds.com, Hansen & Ombler, 2008).⁷ The 1000Minds software elicits information about participants' preferences by asking them to make a series of pairwise choices over alternative hypothetical rooftop PV systems such as illustrated in Figure 1.

The 132 Dunedin home-owners who participated answered an average of 29 pairwise-ranking questions, which typically took about 10 minutes in total. To encourage people to participate, they were

offered a reward: \$10 'in the hand' or a 10% chance of winning \$100 (participants were split roughly 50-50 in the choice of reward). Just over 50% of the homeowners invited to participate chose to do so. Not surprisingly, these participants tended to be more highly educated than the population, but demographic characteristics were otherwise reasonably representative.

HERE COMES THE SUN!

From the discrete choices each respondent makes, the 1000Minds software generates numerical estimates of the satisfaction, or 'utility', the respondent places on each level of each attribute relative to each of the other attributes. Table I shows the averages of these values across all respondents. Note that the estimates for each respondent have been scaled so that the values associated with the best level of each attribute sum to $100.^{8}$

We can use the numbers in the table to illustrate how they were generated. Go back to Figure I, in which a survey respondent compares levels of two attributes. The numbers in Table I indicate that the levels on the left-hand side contribute 9.7 + 13.4 = 23.1 units of relative satisfaction, while the levels on the right contribute only 17.7 + 0 = 17.7 units. This suggests that respondents prefer (i.e., get more satisfaction from) the left-hand combination. For a particular respondent, the estimates over all of the levels of all of the attributes are those that would lead the respondent to make the approximately 29 discrete choices (mentioned earlier) he or she actually made.

Next, we can interpret the estimates in the table. There are seven attributes, so if respondents on average value moving from the worst to the best levels of each attribute equally, then the estimated values on these best levels would all be about 100/7 = 14.3.

Avoiding a relatively large \$22,500 upfront cost clearly exceeds this value with 26.7 units of relative satisfaction. On the other end of the spectrum, respondents express relatively little concern about whether they recover the value of their investment upon sale of their house. However, this small valuation (6.2) reflects the small difference in the magnitudes of the levels of that attribute (recovering 50% of the initial investment versus 75% or more). The utility values clearly have to be interpreted with reference to how the levels of each attribute have been defined.

Looking down the list of attributes in the table, participants are relatively keen to avoid locking in to a long 10-year contract with their electricity retailer (a value of 17 units). But the figures indicate less reticence to locking in to a shorter three-year contract (17.0 - 11.3 = 5.7 unit). Participants also value being confident that the system will work as expected, and that it won't negatively impact the look of their house.

Table I - PV attributes and levels and their relative importance to survey participants on average

Attributes	Units of relative satisfaction (means)
Upfront cost (equipment & installation)	
\$22,500	0
\$15,000	9.7
\$7500	17.7
\$0	26.7
Average reduction in monthly electricity bill	
\$25	0
\$75	8.4
\$150	14.9
The system fits with look of the house	
Somewhat poorly (looks odd/requires alterations	s) 0
Well	13.4
Contract period (lock-in) with one electricity retailer	
10 years	0
3 years	11.3
No contract period	17.0
Confidence the system will work as advertised	
Somewhat unsure (about 70% certain)	0
Very confident (95-100% certain)	11.3
Impact on when electric appliances are used	
Some impact (better when the sun is shining)	0
No impact (use them any time)	10.4
House market value increases by	
About 50% of the cost of installing the system	0
At least 75% of the cost of installing the system	6.2

We can use the values of the levels of upfront cost to put an average dollar value on any of the other attributes. For example, avoiding a long-term contract has about the same value (17 units) as not spending \$15,000 (26.7 - 9.7 = 17). This suggests that respondents, on average, are willing to pay up to \$15,000 to avoid a 10-year contract, which, frankly, seems high. As described below, some participants reacted strongly to the prospect of a 10-year contract.

Figure 1 – Example of a question from the survey



Next, consider the relative value of saving \$150 rather than \$25 per month in electricity charges (15 units). Interpolation of the utility values associated with upfront cost indicates that avoiding an upfront cost of about \$13,000 also provides a value of 15. This implies that, on average, householders require about a 12% return on investment from PV, which seems a healthy but plausible return.

CHOOSE YOUR SUNGLASSES

To investigate the variation in preferences across homeowners, the 132 participants can be 'clustered' or segmented into 3 distinct groups of remarkably similar size. This segmenting is done using a partitions-based technique called 'K-means clustering' which sorts the sample into groups based on their preferences as revealed in the choice experiment. There is no requirement that the groups are of similar size. Figure 2 shows the average relative strength of preference for each attribute relative to the others for each group.

Each cluster has its own story. The homeowners in Cluster I care a lot about upfront cost. People in this group, which represents about a third of respondents, would most likely require a significant subsidy to invest in PV, or may respond to a PV rental rather than purchase scheme.

Those in Cluster 2 are somewhat less concerned about upfront costs, but care relatively strongly about avoiding a long-term contract with a particular retailer. This suggests that these households might prefer to purchase their PV system outright and maintain their freedom to switch retailers. They are also somewhat keen to avoid adjusting the times they use electricity, so they are likely to want to remain connected to the grid, unless very good battery systems become available.

People in Cluster 3 care more generally about how well the system performs. This suggests flexibility: they may be willing to consider a variety of options for PV.

Figure 2 – PV characteristics and their relative importance to clustered survey participants



The clustering reveals what we so often see in consumer products: variation in preferences across households. The implication is that any one-size-fits-all policy to promote PV is unlikely to gain much traction. Instead, broad uptake of rooftop PV is likely to require PV packages with a variety of options.

QUESTIONS TO CONSIDER

- How might widespread adoption of PV affect electricity prices? What if electric vehicles are introduced and gain traction at around the same time?
- 2. The amount of sun that falls on rooftops varies widely across Dunedin due to variation in topography (e.g. north-facing hillsides versus valley floors). Is it fair that some people might benefit strongly from a sunny location?
- 3. How might PV, if it's effective, affect house prices?

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2 Information about photovoltaics is available from Wikipedia (2013).

7 This is the same software and underlying methodology as was applied in the first article of the magazine.

³ A kilowatt hour (kWh) is a unit of energy that is widely used for measuring electricity generation and consumption. An appliance (e.g. a heater) rated at 1000 watts (1 kW) running for one hour uses 1 kWh of energy. An 80-watt light bulb consumes 0.08 kWh of energy per hour.

⁴ More on the Schoolgen programme can be found at www.schoolgen.co.nz.

⁵ The kWp, or 'kilowatt peak', of a solar panel is the maximum (peak) amount of energy it generates under perfect laboratory conditions (according to the manufacturer). The actual performance depends on how much light the panel receives which depends on its geographical location and how it is installed (e.g. angle toward the sun, etc.).

⁶ A Discrete Choice Experiment is also known as a 'Conjoint Analysis' (Green and Srinivasan, 1978).

⁸ This scaling does not imply that every respondent gets the same satisfaction moving from the PV system with the worst set of attributes to that with the best. We might find that some people would get a lot more satisfaction than others if we could find a way to measure absolute levels of satisfaction. The re-scaling does allow us to compare how respondents vary in how they value each attribute relative to the others.

HIGHLIGHTS PRESSING YOUR LUCK PART 2 – NO DEAL



We can determine how people feel about risk by seeing what it takes for them to walk away from a gamble. Consider these two games:

- Game A: A 0.1% chance of paying you \$1,000,000 and a 99.9% chance of paying you \$0.
- Game B: A 50% chance of paying you \$2000 and a 50% chance of paying you \$0.

Suppose you were playing game A, but before the outcome is determined you were offered \$500 to quit. Would you take it? What if you were playing game B? Would you accept \$500 to stop then? Most reasonable people would take the \$500 to stop game A thinking that the chances of winning the big prize are just too remote. They may carry on with the second gamble because the odds of winning are really rather good. However, both gambles have the same expected value of \$1000 (see Highlights: Pressing Your Luck Part I in this issue) which is *larger* than the \$500 sure-thing! The greater the risk, the more people are willing to walk away with a low certain payment (in this example, that's game A). This is referred to as *risk aversion*.

Television gives economists the perfect opportunity to test whether people actively exhibit this type of 'risk-hating' behaviour. In the game show, *Deal or No Deal*, contestants are asked to open 26 briefcases containing money prizes (in the Australian version, prizes range from 50¢ to \$200,000). Players select one briefcase to set aside and, over the course of nine possible rounds, select briefcases to remove. Six cases are removed in the first round, five in the second, four in the third, and so on until round 6 when cases are removed one at a time. By round 9 only two briefcases remain (the one set aside and one that has been in play). At the end of each round, the contestant is offered a lump sum payment to stop the game. The value of this payment depends, in part, on the remaining cases in play. If round 9 is reached, the player wins the prize in the isolated briefcase. By recording the value of the remaining prizes at the end of any round and evaluating the value how people are responding to different levels of risk.

As it turns out, players do not consistently dislike risk. Contestants who experience bad luck and have eliminated high-value prizes in early rounds tend to say "no deal" to lump-sum payments that are *greater* than the expected value of continuing with the game. Interestingly, contestants with good luck who have eliminated low-value prizes do the same! It appears that players who either have big losses or great successes want to try and win the highest remaining prize despite the risk (i.e. are 'risk-lovers'). The past experiences (or 'path') of a player affects how they react to risk during the rest of the game.

Winning a prize is one thing ... losing a prize is something else. To see this, consider these two games:

- **Game C:** You start the game with \$500. The game has a 50% chance of you losing all \$500 and a 50% chance of you losing \$0. Before the outcome is determined, you are given the option of paying \$200 to stop the game.
- **Game D:** You start the game with \$0. The game has a 50% chance of you winning \$0 and a 50% chance of you winning \$500. Before the outcome is determined, you are given the option of being paid \$300 with certainty.

What would you do in game C? Would you pay \$200 stop the game? Most people would not and opt to carry on hoping luck is in their favour. What about game D? Would you accept \$300 and walk away? Most people would grab the cash and not press their luck. But here's the rub: Games C and D are identical gambles! There's a 50% chance of walking away with \$500 and a 50% chance of going home empty handed. In both, the risk can be avoided and the player can leave with \$300. The only difference between the games is how they are *framed*: in D you are winning, in C you are losing. If choosing the sure thing over the risky gamble is less likely in game C than in game D, then framing matters.

Hypothetical scenarios like the one above are nice to consider, but do people really hate losing more than they hate risk in real life? The Australian version of *Deal or No Deal* gives economists the data needed to investigate this question. Occasionally at the end of a game, contestants are offered an opportunity to sacrifice their winnings (incur a sure loss) to take another risk. In a 'Chance' round, where they accepted a deal when only two cases remained, they can give up their winnings for a 50-50 lottery between the two remaining prizes. In a 'SuperCase' round, they can swap their winnings for a lottery where they can win one of eight possible prizes. Studies analysing these rounds show that contestants are less willing to incur a potential loss then they are to make a potential gain of similar value. In other words, "What have I got to lose?" proves to be a more important question than "What can I gain?" in an uncertain world.

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What do EFTPOS data reveal about the state of the New Zealand economy?

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The volume of EFTPOS transactions in New Zealand is often reported in the media as a measure of our economic performance. Surprisingly, what such data can tell us about the state of the economy has received relatively little *academic* attention to date. Recent research at the University of Otago investigated the extent to which Electronic Card Transactions data convey useful information about overall economic activity.



How do you prefer to pay for the things you buy? Chances are that you often use some form of electronic card (debit or credit). They seem to be more convenient these days then carrying around large sums of cash or a bulky cheque book. New Zealand is a world leader in the use of electronic-funds-transfer-at-point-of-sale (EFTPOS) technology (Hughes 2006). RBNZ (2012) estimates that, on average, each adult in New Zealand has two debit cards and uses each card 200 times per year. (In contrast, Australians use their debit cards only 52 times per year [CPSS Redbook, 2012]). In 2012, for example, 1.2 billion transactions, worth more than \$66 billion (75% of total final consumption expenditures), were administered by New Zealand's EFTPOS network. Spending data can be collected from this network in real time, enabling policy-makers and researchers to access complete and accurate spending information in a timely manner.

HOLE-IN-THE-WALL GANG

New Zealand's EFTPOS system began nationwide operation in 1989. There are two EFTPOS providers, Paymark Ltd and EFTPOS NZ Ltd, both of which are owned by the major trading banks. These two companies process all EFTPOS transactions made on both debit and credit cards. The system generates vast amounts of data about when and where money is spent. Statistics New Zealand collects and releases these Electronic Card Transactions (ECT) data as national time-series. Information about the total value of spending using debit and credit cards through the EFTPOS network, the total number of transactions, the average value of each transaction and the average amount spent per person is available. These data include transactions where a card is presented at the point of sale and purchases from New Zealand-based merchants made with a card via another means, such as the internet. ECT data also includes spending by foreigners in New Zealand, but not spending by New Zealanders overseas.

ECT data have several important advantages over other macroeconomic time-series data. Earlier estimates of retail or consumer spending relied on survey data collected from households. Due to the cost of administering such surveys, it was not feasible to collect all relevant information for a given time period. Also, several survey-based series, such as the Retail Trade Survey (RTS), are subject to revisions as new data surface over time. The ECT data avoid these issues because they represent a census of *all* card transactions passing through the EFTPOS network. As all transactions are captured there is no need for later revisions.

Another key advantage of ECT data is timeliness of release. ECT data are released two weeks after the end of the reference period (i.e. month, quarter or year). In contrast, RTS data are usually released six weeks after the end of the reference period.² This means ECT data for January *and* February are available by the time the RTS data for January appear.

FOLLOW THE LEADER

Research conducted at the University of Otago last year investigated the extent to which ECT data can provide information about the state of the New Zealand economy. Simple, bivariate statistical methods were used to examine the extent to which ECT data are synchronised with other important macroeconomic aggregates, such as gross domestic product (GDP) and consumer spending, which are representative of the overall state of the economy. The objective was to examine the degree of co-movement between ECT data and GDP and consumer spending data respectively and, in particular, whether or not ECT data could serve as a 'leading indicator' for the business cycle (short-term fluctuations in GDP).

Leading indicators are data series that change direction before total spending in the economy does – in effect, indicating where the economy is heading before GDP is observed. For example, if the growth in ECT spending declines before GDP growth begins to decline, then EFTPOS transactions could serve as a leading indicator for New Zealand's business cycle.

We would expect that movements in EFTPOS transactions are closely correlated with movements in both GDP and consumption spending as both of the latter arise as a result of transactions made through some means of payment, including electronic card spending. To test the strength of cyclical co-movements and timing relationships between the series, the natural log of each series was put through several business-cycle statistical filters.

These filters³ are designed to extract information about business-cycle fluctuations from the raw data. Technically speaking, the resulting cyclical series are interpreted as the percentage deviation of the series from its trend value. Positive values indicate the series is above trend (i.e. growing faster than trend), and negative values indicate the series is below trend (growing slower). Figure 1 shows how the three series for EFTPOS spending – total spending and debit and credit card spending respectively – have fluctuated relative to their trends over the period 2002-12.



One notable feature of Figure I is the difference in the three series' volatility. Debit card spending has much lower volatility than credit card spending. This could be due to what people use their debit cards and credit cards for. If debit cards are used for relatively 'automatic' or habitual spending (e.g. a morning coffee) and credit cards are used for bigger discretionary purchases (e.g. a new TV), we would expect credit card spending to be more volatile, as expenditure on big-ticket items is more sensitive to the state of the economy.⁴

Figure 2 shows the business-cycle movements of total card spending and GDP in real terms (i.e. stripped of the effects of inflation). Movements in real GDP are closely mirrored by movements in total card spending. Particularly evident is the peak above trend that occurred at the end of 2007, just before the impacts of the local recessions and the Global Financial Crisis in 2008. We can also see the gradual recovery of both GDP and total card spending after 2008. The correlation between movements in GDP and total card spending is 0.67, which is relatively high (perfect correlation = 1). This correlation indicates that card spending does, in fact, contain relevant information about the state of the economy that can be used to evaluate macroeconomic performance. Looking at the timing of the peaks and troughs in the series, we see that total card spending peaks at approximately the same time as GDP. Card spending may not be a leading indicator, but because it is released so much earlier than GDP data, it can provide information about the state of the economy, allowing policy makers to react quickly.

Figure 3 shows the business cycle movements of the total value of card spending and real consumption spending. The relationship between card spending and consumption is even stronger than the relationship between card spending and real GDP (the correlation is 0.78). We can see that the two series follow each other very closely, especially after 2006. As with real GDP, card spending data may be useful for evaluating the state of consumption spending in the economy. Card spending actually tends to lag consumption spending slightly, meaning that card spending moves after consumption spending moves. However, there are differences in the lead/lag relationship when we look at debit card and credit card spending separately. Debit card spending tends to lead both GDP and consumption.

MACROECONOMIC PERFORMANCE ON DEMAND

Debit and credit card spending is strongly related to both real GDP and consumption spending. This means that ECT data convey useful information about the state of the New Zealand economy. Compared to other data sources, ECT data are released quickly. Thus, policymakers need not wait several weeks to make informed decisions or to forecast the current and future state of the economy. ECT data makes faster responses to economic conditions possible, potentially improving the quality of macroeconomic policy-making in New Zealand.

QUESTIONS TO CONSIDER

- 1. What do you think accounts for the large drop in card spending in the fourth quarter of 2010 and the first quarter of 2011?
- 2. Why might this sort of event cause a larger drop in the card spending statistics than in the consumption statistics?
- 3. What are some other possible examples of real-time data that could be used to provide insight into macroeconomic performance?
- 4. Can you think of any reasons why debit card and credit card spending might have different lead/lag relationships with GDP and consumption?

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I Motu Economic and Public Policy Research. This article is based on Corey's research for his Master's degree in the Department of Economics, University of Otago. His thesis is available for viewing at otago.ourarchive.ac.nz/handle/10523/3900.

² In 2011, the RTS changed from a monthly survey to a quarterly survey. The ECT statistics are now the only monthly indicator of consumer spending in New Zealand.

³ The filters are the Hodrick-Prescott filter (Hodrick & Prescott, 1997), the Christiano-Fitzgerald band-pass filter (Christiano & Fitzgerald, 2003) and the band-pass version of the Hodrick-Prescott filter (Artis, 2003).

⁴ For more information about how people choose their means of payment, see Klee (2008), Mann (2011) and Arango et al. (2011).



HIGHLIGHTS

LA FEMME ÉCONOMIQUE

Economic models typically portray agents as being rational, independent, self-interested individuals who allocate their limited resources in an optimal way. These agents are not born into a world littered with stereotypes and false beliefs, nor are they forced to adhere to tradition or cultural norms. Economists often use agents of this type (so-called *Homo Economicus*) in their models not because they feel this representation is accurate, but rather because it is convenient: a tractable solution that can be empirically tested is procured relatively easily from mathematical frameworks containing Homo Economicus. This convenience is accompanied by harsh criticism; detractors have condemned the use of such unrealistic agents and have attacked mainstream economic theory on many fronts.

The criticisms posed by feminist economists, who were particularly active in the 1990s, centre around the gender-related properties of Homo Economicus. They argue that gender roles are a social construct and that these roles influence the decisions that people make. Homo Economicus is oblivious to these norms and is inclined to adopt malecentric behaviours more often than not. As a result, the predictions made by models featuring these agents are not reliable.

For example, one of the most important economic activities that people engage in is supplying their labour. Historically, men have had more success at selling labour in formal labour markets ('success' meaning more occupational opportunities and higher wages) whereas women have focused on informal production (or home production, such as child rearing, household management, etc.). Homo Economicus typically adopts the male role of selling labour to purchase manufactured goods in economic models. This brings the activities of the formal labour market to the forefont and makes home production seem secondary or inconsequential. Although research on home production has increased in recent years, the formal labour market is still the dominant source of employment in most economic models with material wealth being of central import.

Women, finding their place is no longer exclusively in the home in modern times, have entered the formal labour market in increasing numbers only to find discrimination waiting for them. Female workers tend to earn lower wages than their male counterparts for the same tasks and can be limited in how far they can progress within an industry (the so-called *glass ceiling*). Discrimination is a temporary abnormality in a world populated by Homo Economicus. A firm that persistently chooses to hire a male worker over a more productive female worker will eventually be driven out of business by less biased, and thus more efficient, competitors. Feminists argue that such biases are a part of a social organisation where women are assigned less value than men. As such, discrimination may lessen as cultures evolve but will not dissappear as quickly as mainstream models would suggest.

Back at home, an important task traditionally assigned to women is caring for dependents, particularly children and the elderly. Homo Economicus is born fully developed and does not experience old age in the presence of others, hence there is no need to allow for a notion of dependence. Real people spend a significant part of their life depending on someone else and invest significantly in caring for others, but these activities are lost on Homo Economicus. Feminist economists also argue that there is more to the production and maintenance of humans than can be captured by models where autonomous agents work for wages to spend on consumption. More time spent working (for both men and women) to earn income means less time is spent caring for family and friends. The quality of care that is provided to dependents diminishes and personal connections to others weaken. These effects result in lower productivity and worse health or social outcomes for future workers; a cost omitted in many models featuring a goods-obsessed Homo Economicus.

In reaction to the shortcomings of the detatched, self-satisfying Homo Economicus, feminist influences inspire the call for a new sort of economic agent; one who is connected to others and who acknowledges the influence of norms and gender roles on decisionmaking. Since the 1990s, progress has been made on addressing feminist criticisms of mainstream economic theory but research is on-going ... an economist's work is never done.

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Commentary on the New Zealand economy

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	Mar 2013	Dec 2012	Sep 2012	Jun 2012	Mar 2012
GDP (real, annual growth rate, %)	2.5	2.7	2.5	2.4	1.9
Consumption (real, annual growth rate, %)	1.8	2.0	2.1	2.5	2.3
Investment (real, annual growth rate, %)	4.5	8.0	4.5	7.4	7.2
Employment: full-time (000s)	1740	1709	1699	1713	1700
Employment: part-time (000s)	494	487	517	513	527
Unemployment (% of labour force)	6.2	6.8	7.3	6.8	6.7
Consumer Price Inflation (annual rate, %)	0.9	0.9	0.8	1.0	1.6
Food Price Inflation (annual rate, %)	0.1	-0.5	-0.9	-0.4	0.6
Producer Price Inflation (outputs, annual rate, %)	0.1	-0.8	-0.6	0.5	1.6
Producer Price Inflation (inputs, annual rate, %)	0.0	-0.5	0.3	1.9	2.3
Salary and Wage Rates (annual growth rate, %)	1.8	1.8	1.9	2.0	2.0
Narrow Money Supply (M1, annual growth rate, %)	9.7	7.0	5.2	7.3	4.4
Broad Money Supply (M3, annual growth rate, %)	7.0	6.0	6.6	5.9	5.1
Interest rates (90-day bank bills, %)	2.64	2.65	2.64	2.61	2.74
Exchange rate (TWI, June 1979 = 100)	76.1	74.3	72.8	70.9	73.0
Exports (fob, \$m, year to date)	46,182	46,064	46,748	46,688	47,468
Imports (cif, \$m, year to date)	46,708	47,219	47,640	47,451	47,201
Exports (volume, seas. adj.)	1308	1296	1310	1191	1198
Imports (volume, seas. adj.)	1727	1691	1720	1710	1740
Terms of Trade (June 2002 = 1000)	1204	1154	1170	1209	1240
Current Account Balance (% of GDP, year to date)	-4.8	-5.0	-4.7	-4.8	-4.4

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

New Zealand passed a major milestone at the start of this year. In the March quarter, the value of real per capita income finally surpassed its previous, pre-Global Financial Crisis, peak (reached in the December quarter of 2007). (The specific income measure to achieve this milestone is real gross national disposable income, which measures the purchasing power of the income accruing to New Zealand residents from both domestic and foreign sources. The per capita version of the real GDP series reported in the above table was still slightly below its pre-GFC peak in the March quarter, but should overtake it at some point this year.)

Five-and-half years is an unusually long time for New Zealand to recover from a recession. By comparison, it took about two years for the ground lost in terms of per capita income to be regained following the 1991 and 1998 recessions. The difference on this occasion is simply that the initial shock to the economy was larger and its impact broader than was the case in the other two recessions. Also, because so many of our overseas markets were also affected by the crisis – and more seriously affected in many cases, which caused their currencies to depreciate against ours – New Zealand firms facing weak demand at home had few options available to them to take up the slack. In contrast, New Zealand's recovery from both the 1991 recession (which had been largely sparked by a significant tightening of fiscal policy) and the 1998 recession (that followed the Asian Financial Crisis, which hit the tourism sector in particular) was assisted by a significant depreciation of the dollar, together with reasonably favourable economic conditions in the rest of the world.

The slow rate of recovery is likely to continue for the time being. The Canterbury rebuild, growing consumer confidence and the generally favourable terms-of-trade should all underpin a continuation of the recovery, but ongoing fiscal restraint, the strong dollar, the after-effects of last summer's drought on stock numbers (and hence agricultural production) and tepid growth abroad should keep the rate of GDP growth near recent levels for the time being. A consequence of this is that inflationary pressures – outside of the construction sector – should remain relatively benign, but the unemployment rate is also likely to continue to fall only slowly over coming quarters.