



COMPETITION & REGULATION TIMES

IN THIS ISSUE

March 2014

ISSUE 43

1 ISCR

Research
Agenda for
2014

3 Changes
within the
ISCR

4 Managing
Manipulation
of Electricity
Markets

6 Urban
Equilibrium

8 The Quick
and the
Illiquid



Members of ISCR are:

- Contact Energy Ltd
- Fonterra Co-operative Group Ltd
- Meridian Energy
- Powerco Ltd
- Victoria University of Wellington

ISCR research is based on three areas: banking and finance, network industries (electricity and telecommunications), and resource management. Within these areas, we're interested in how markets function, how markets are regulated, how firms and industries structure themselves, and how organisations govern themselves.

In 2013, the ISCR focused its attention on the electricity industry. We hosted a sequence of speakers, including S.T. Lee fellow Jim Bushnell, who spoke about the past, present, and potential future state of the electricity industry. In 2014, we're switching gears, and putting the banking industry under the microscope. At the same time, we're continuing to work in our other core areas, such as electricity and dairy markets.

Banking

Banking has been an important area for many regulators following the Global Financial Crisis, which demonstrated, quite graphically in many countries,

how interconnected and potentially vulnerable the industry is. Through our work this year, we're hoping to shed some light on what makes for good regulation of the area.

Our S.T. Lee Fellow for 2014 will be Jon Garfinkel from the University of Iowa. Jon's expertise lies in the areas of banking and corporate finance. He has done work on the effect of bank lending on borrowing firm performance, and more recently on the effect of political partisanship on industry performance (see CRT issue 38, 2012). We look forward to Jon's visit in late July.

In tandem with our work with Jon, we'll also be looking at two

important topics in banking. The first is Macroprudential policy: a popular international tool for handling banking regulation. We'll be taking an interest in the effect of mandated loan to value ratios and balance sheet ratios for banks. What effects might we see on firm and borrower behaviour? To what extent is regulatory oversight important when banks face discipline from their own bond holders and deposit holders?

Our second topic concerns the measurement of bank profitability and efficiency. Unlike many industries, the banking sector is dominated by institutions that are often owned

to page 2

from page 1

by overseas firms (as in New Zealand) or are privately owned (as is often the case in Europe). Banks are also peculiar compared to other firms, given that they have (and hold) a lot of debt, making their equity appear tiny compared to the other parts of their balance sheets. Gauging how well a bank is performing often requires one to resort to examining accounting measures, rather than being able to cut to the chase by looking at share price returns. Findings from past studies are often distorted by the model assumptions. Our work will try to set the record straight, and hopefully lead to more informed measures of bank efficiency and profitability.

Dairy

In the past, the ISCR has researched how spectrum auctions work (see CRT issues 38 and 41). Spectrum auctions are one example of a "multi-unit" auction: one in which many items are sold at the same time. Another example of a multi-unit auction is the Global Dairy Trade (GDT) auction that takes place to sell dairy products to international bidders. The GDT auctions sell whole fat milk powder, skim milk powder, and anhydrous milk fat (AMF).

At present, the auctions are separate affairs. If you want to buy whole milk powder and I want to buy skim milk powder, we don't have much to do with each other. However, since AMF is a bi-product of making skim milk, the buyers are all ultimately competing for a common product: milk. Put another way, the skim milk powder you are buying is depriving my auction of more whole milk powder. If the auctioneer realises that there's a big demand for one product, it might be optimal to change the quantities of each product being produced. And if the auction participants realise that the auctioneer can change the quantities on the fly, they might bid with that in mind.

Solving for the best way to bid in such

an auction is a challenging problem in game theory, and one with real world applications.

Network Industries

Our focus this year in electricity is building on our work examining the MainPower region in New Zealand (recently presented at the Applied and Theoretical Economics symposium last December). We're now trying to increase our understanding of the two sides of the electricity retail market. On the one hand, we're interested in the behaviour of gentailers (electricity generators who are also retailers): how do they manage their electricity price risk through their portfolio of retail customers? How do these positions change over time? This work is going to continue our work with Jim Bushnell, who's commenting later in this issue on the effects of complex derivatives on US energy markets.

On the other hand, we're going to be looking at how retail customers choose an electricity provider. What makes the customers tick? Do they respond to price cuts? Who switches a lot, and who stays put?

One topic that received a lot of attention last year was the use of single buyer models for electricity. As noted in Frank Wolak's article (see CRT issue 42), single buyer models are quite popular in Latin America. Interestingly, Brazil has made a transition between a model very similar to our existing electricity market and a single buyer model. We're planning to work with Gabriel Fiuza, ISCR Research Associate and electricity expert (see CRT issue 37) to examine how the change in market structure has affected Brazilian electricity prices, which may shed light on the pros and cons of the single buyer model.

We're also taking an interest in how regulated industries have been operating and capital expenditure levels set. This is a thorny issue, if regulated profits are linked to their capital base, firms may be tempted to "gold plate the taps" to maximise the prices they can

charge. But if a regulator sets the cap on their expenditure too low, we may throw the baby out with the bathwater, forcing shoddy, unreliable infrastructure on the market. It's a tough line to walk, and one that many regulators overseas also have to tread. This project will compare New Zealand's processes with international practice, and see how we measure up.

Transportation

We've been working over the last year, extending our econometric work on how people make commuting decisions to look at how they make the big choice of where to live. This year, we're hoping to finish our work on Wellington, looking at how these decisions interact with house prices. It's a tricky issue that many of us face: how do you trade off high downtown house prices with increasingly expensive commuting costs? And conversely, how do our preferences for access to amenities like schools, parks, and shopping work their way through into house prices. The answer to these questions has a big impact on urban planning, road network planning, and real estate markets.

Relevance of research programme

At the end of 2014, the High Court released a 657 page judgment, which may not have made everyone's summer reading list. In Wellington International Airport Ltd & Ors v. Commerce Commission [2013] NZHC, the High Court determined various challenges against the Commerce Commission's December 2010 input methodologies largely in the Commission's favour.

Input methodologies are the regulatory rules that underpin the *price-quality path regulation* and *information disclosure regulation* that apply to electricity lines, gas pipelines, and certain airport services. In reaching its determinations, the court repeatedly emphasised the need for appellants to produce empirical evidence to support their

to page 3

ISCR Competition & Regulation Times is the newsletter of the New Zealand Institute for the Study of Competition and Regulation, PO Box 600, Wellington, New Zealand. Ph: +64 4 463 5562, e-mail: iscr@vuw.ac.nz, website: www.iscr.org.nz

The ISCR editorial team for this issue was Toby Daghli, Bronwyn Howell and Pam Ritchie.

The views expressed in **ISCR Competition & Regulation Times** are the views and responsibility of the contributing authors.

ISSN 1175-2912 (print) ISSN 1178-6809 (online)

from page 2

arguments for alternative approaches to those advocated by the Commission.

Consultation timeframes rarely enable new research to be commissioned. This suggests that as we move into ever increasing levels of regulation, the need for evidence-based research is never more relevant. This is what ISCR was set up to provide for the benefit of regulators and those subject to regulation.

Summer Scholarship recipients

ISCR has a proud history of supporting up and coming young scholars, and this year has been no exception. This summer, we've had the pleasure of working with two talented summer scholars.

In this issue of CRT, they're each talking a bit about their work. Jamie Hatch was funded by the New Zealand Stock Exchange to look at liquidity issues for small New Zealand firms, while Oliver Robertson was funded by the Ministry of Transport to look at uses of transportation modelling for the Ministry's research agenda.

As we begin 2014, ISCR would like to thank two departing corporate members: Westpac (who have been a member since 2003) and Telecom (who have been a member since 1997). Their significant financial contributions over this time have been key enablers of our varied research and education programme. We have also appreciated the contribution

their employees have made to the governance of the Institute, helping us keep in touch with the issues that matter.

The ISCR is always excited to welcome new members, so if you would like to be a part of leading the Institute going forward, we'd be delighted to hear from you.



C Southey
Chair



T Daghish
Research Director

Changes within the ISCR



Bronwyn Howell

This year sees Bronwyn Howell returning part time to the School of Management at VUW.

Bronwyn stepped in as Acting Director of the Institute in 2009 when Glenn Boyle stepped down as Executive Director. From 2011 to 2013, she worked as General Manager sharing responsibility for ISCR's management with the Research Director. We are grateful for

Bronwyn's contribution to ISCR's research, education, and communication activities over the years.

During her time as General Manager, Bronwyn has worked extensively on telecommunications, medical policy, and industrial organisation. Bronwyn has also had a strong presence internationally. In particular, in 2013, she was honoured by being invited to give the Tullock lecture at George Mason University. During 2010, she organised the very successful International Telecommunications Society Asia-Pacific regional conference. Moving forward, Bronwyn has been engaged by the American Enterprise Institute to write for them on telecommunications issues.

Bronwyn's presence has bolstered the ISCR education programme. She will continue to offer her successful Economics for Managers and Policymakers that has been an important part of the ISCR's outreach, along with her regular offerings of MBA economics through the School of Management.

Although Bronwyn will not be working full time at the ISCR in 2014, she will continue to be actively involved in the communication and

education side of the ISCR, and will be working with us on several research projects, including the capital and operational expenditure project.

This year sees two Trustees retiring: Anton Nannestad from Telecom and Dominic Stephens from Westpac. We would like to take this opportunity to thank them for the strategic guidance they have provided to ISCR.

We also welcome a new Executive Assistant to the Institute this year. Pam Ritchie started at the Institute in January, having previously worked at the Jessie Hetherington Centre for Educational Research. Pam will be assisting us to move forward into a productive 2014.

We have moved premises

The ISCR is now located on the fourth floor in the West Wing of the Wellington Railway Station building. We are still part of Victoria University. Follow the signs from the lifts.



Managing Manipulation of Electricity Markets

James Bushnell examines the response of regulators in the United States to apparent abuses by a newly influential segment of the industry: Banks.

During 2013, the primary US national energy regulatory agency, the Federal Energy Regulatory Commission (FERC), has displayed a new determination to prosecute and seek reparations from both large and small traders for allegedly taking advantage of the complexity of power markets in order to manipulate market outcomes. Notable cases have been brought against Barclays, Deutsche, and JP Morgan Chase.

Understanding what is occurring requires a primer on the nature of electricity markets and regulatory processes.

First, trading is an integral part of both regulated and unregulated electricity markets. It's just not practical (nor efficient) to assume that each electricity company is going to be in a position to meet its own customers' needs

(especially cost) without any interaction or exchange with other electric companies trying to do the exact same thing. Even during the period of full regulation in the 1980s, there was heavy trading between regulated, government owned, and unregulated power companies. During this period, many utilities decided that often it did not make sense for them to build and operate generation themselves. Instead, they contracted with firms that specialised in power plant operations, and usually did so more efficiently than the previously regulated firms.

Second, designing electricity markets (and their deregulation) is a complex undertaking. At the crux is how prices are set. Tension has always existed between the desire to accommodate the technical and engineering

complexities of power production and the desire for relatively simple and transparent ways to set market prices. About 15 years ago, there was a robust debate about how to price transmission congestion in power markets. One side argued for a "simple" solution that set similar prices over large regional zones but at the same time ignored the costs of congestion within those zones. The other side argued that by not pricing all the congestion, the markets would be vulnerable to excess demand on some paths and strategic abuse of the resulting ad hoc means of dealing with congestion.

In much of the world (outside of Australia and Europe) the zonal pricing approach has been replaced by a more comprehensive (and computationally intensive) form of locational marginal pricing. This transition has played out in several US markets over the last half-decade. However, at the same time that more transmission constraints were added to the

pricing algorithms, so too were many other aspects of power production. Elements such as minimum run times and fixed start-up costs were added to the computations, and the system operator now solves complex mixed-integer problems to derive the least-cost production orders. These least-cost solutions, however, are not based upon actual physical attributes, but rather upon bid parameters submitted by the owners of the generation units.

Third, increasingly complex algorithms have created opportunities for informed market participants to act strategically by manipulating the parameters. This poses a particular problem for regulators, as it does not fit with the conventional "market power" problems in which a firm with a dominant market share charges higher prices because there is no-one else to buy from. With market power, usually everyone in the market knows who has it and what they can do with it. Thus anti-trust strategies usually focus on preventing firms from acquiring a dominant position in the first place.

By contrast, manipulation strategies usually depend upon some information advantage: knowledge of loopholes in the market rules or of changing positions that are not known to the rest of the market.

The New Market Manipulation

In the case of JP Morgan and the California (as well as Midwestern) Independent System Operator (ISO) market, the vulnerability that was exploited was the process for "bid-cost recovery," known more generally as a "make-whole payment."

Make-whole payments are intended to compensate inflexible generation units that may get stuck in a costly position as a consequence of helping the market to satisfy demand for a small number of peak hours. An example would be a plant that gets switched on to help meet demand in one hour but cannot (or says it cannot) be turned off very quickly. Because it is not flexible, that plant may end up still operating (at a loss) even after the price crashes again. Make-whole payments are supposed to allow plants to recover these costs if market revenues are not sufficient, to avoid discouraging them from participating during the hours when they are really needed.

But as the Morgan case has demonstrated, there are lots of ways strategic firms can twist the good intentions of a market operator. By

overstating their costs, or their inflexibility, while at the same time "forcing" themselves into the market through low energy price bids (or simply running the plant in a way the operator does not expect), plants can grab lots of revenue from these payments.

Make-whole payments become necessary when "sell" offers in a market include unusual (e.g. non-linear) costs and constraints, such as a minimum run time. There is no single price solution to a market like this. A plant may "win" a sell offer, only to discover that not all of its costs are covered by its market revenue from selling energy. That's where a payment to recover all the costs (e.g. make the sell whole) comes in.

In ordinary markets, for example where a firm says it will sell 10 MW for \$50 a MW, if its offer is accepted it gets \$500. If it turns out that because of fixed costs, or just inefficiency, it actually cost the firm \$750 to generate that 10 MW, that's the firm's problem. In many electricity markets today, the central operator takes on that problem and tries to find the "best" solution for everyone.

The problem is that the "best" solution when everyone is telling the truth about their costs and capabilities can be very different to the solution when firms are strategically bidding those parameters. There is a real risk that by attempting to accommodate increasingly complicated operating parameters within the market-clearing software, system operators are exposing themselves (and their customers) to sophisticated new strategies that can produce large payment swings in unexpected ways.

What Costs Should We Model?

Accommodating complexity into price-setting algorithms seemed like a natural evolution to the market for the computer scientists and engineers engaged in incorporating transmission constraints into the same software. Power plants have to operate within real limits and constraints just like transmission grids do. Plants cannot just ramp up and down instantly. They cannot shut down and start up again right away. It was assumed that working these kinds of costs into the pricing would lead to more "feasible" solutions that more effectively reflect reality.

The problem with this logic is that these costs, unlike transmission congestion, are all "internal" to the owners of a plant. The fact that a price solution coming out of a computer program did not explicitly model them did not

mean that the costs were not represented in the prices. It's just that they were the problem of the plant owners who had to figure out how best to operate their plants to meet the sales orders being produced by the market.

So it begs the question of why they were incorporated in the price-setting algorithms in the first place? Within US ISOs, there is a strong belief that coordinating complex power production costs increases efficiency. Making electricity is complicated, and costs do not look like a nice upward sloping line, but the same is also true for many other industries. Refining gasoline is complicated. Running an airline network is complicated. However, we do not run a single optimisation programme that simultaneously tries to clear the market and solve everyone's production schedule for them. These markets run the way power markets in the US used to. If a generator had a sale it could not meet, it bought replacement power out of a spot market. If a plant ended up running in a way that lost money over the course of a day, it would change its offer price the next day so that it did not happen again.

The debate over market complexity is essentially over in the US, with national labs dedicating super computers to developing ever-more sophisticated market algorithms. In Europe, New Zealand, and Australia, it has yet to really begin.

What are the Costs of Complexity?

In the meantime, in the US the FERC has had to confront the fact that the conventional competition policy tools of an anti-trust authority do not really do much to combat the types of strategies making headlines during 2013. They have responded by exercising their relatively broad authority to label strategies as manipulative if they do not pass the smell test. They can then order refunds and penalties that totalled around 900 Million dollars during 2013. It remains to be seen whether a newly aggressive regulator will successfully tamp down abuses, or simply represent another complicated cost of doing business in the US power industry.

James Bushnell is an associate professor of economics at the University of California at Davis and the 2013 ISCR S.T. Lee Fellow.



Urban Equilibrium

When central and local governments are called upon to evaluate the costs and benefits of large infrastructure investment projects, they must rely upon models that simplify the complex, dynamic and adaptive realities of the economic, social and political systems into which the infrastructure will be deployed. Oliver Robertson explores the merits of different modelling approaches used to evaluate large-scale transportation investments.

Transportation infrastructure projects are often expensive, forming a significant part of central and local government budgets. When making decisions about where to improve the transport network, cost benefit analyses provide an important stop/go signal. But what are the relevant costs and benefits to include? An important factor not always considered in the evaluation of transportation projects is the effect on the residential housing market equilibrium.

Consider, for example, a decision to improve a bus service from a particular suburb to the downtown office area. Obviously, this will impact commute times to and from the neighbourhood: bus commuters will find the journey easier, and the route will be less congested for drivers if the improvement attracts more commuters to public transport. A significant improvement to the public transport network, such as a dedicated bus corridor, can substantially affect the numbers travelling on public transport and potentially lead to a greater number of trips overall.

However, as the neighbourhood served by the buses grows more popular, house prices will increase, and as these prices increase, the neighbourhood will become less attractive to commuters who do not work downtown. The improved bus service gradually changes the make-up of the people in the community surrounding the bus route. A salient example of this second order effect is the Auckland Harbour Bridge. Initially, the bridge was conceived as a way to improve access for existing commuters to obviate driving around the harbour. However, once the bridge was built, suburbs boomed on the North Shore

and it became a rapid growth area of the city. Figure 1 shows how Wellington prices have evolved. Note the heightened prices in regions easily accessed from downtown.

Since most infrastructure is commissioned by the public sector, social outcomes may be an important part of their preferences, contributing to the costs or benefits of the project. Diversity of neighbourhoods may be seen to be a good thing, encouraging urban sprawl a negative. Improving transport links for a low-income area without a greater understanding of the knock-on effects may eventually price houses well out of reach of the current community. Changes may also lead to private gains and losses as property prices change and placement of private infrastructure becomes obsolete. In America, the concept of a "dead mall" (a shopping centre whose customer base has moved, leaving lacklustre patronage and untenanted stores) exemplifies this phenomenon.

This concept of equilibrium is a complicated one for analysts tasked with weighing the benefits of a particular project. Looking at current data (such as data provided by the New Zealand Household Travel Survey) provides an indication of who will be directly affected by the project. However, only by extrapolating the optimal behaviour of individuals in response to the changed network can analysts and decision-makers begin to guess at the new equilibrium that the city will move towards.

Nonetheless, models must be developed that take account of the impending changes. They generally take two forms. One group of models, which includes the "Delta" model (that underpins the Auckland transportation

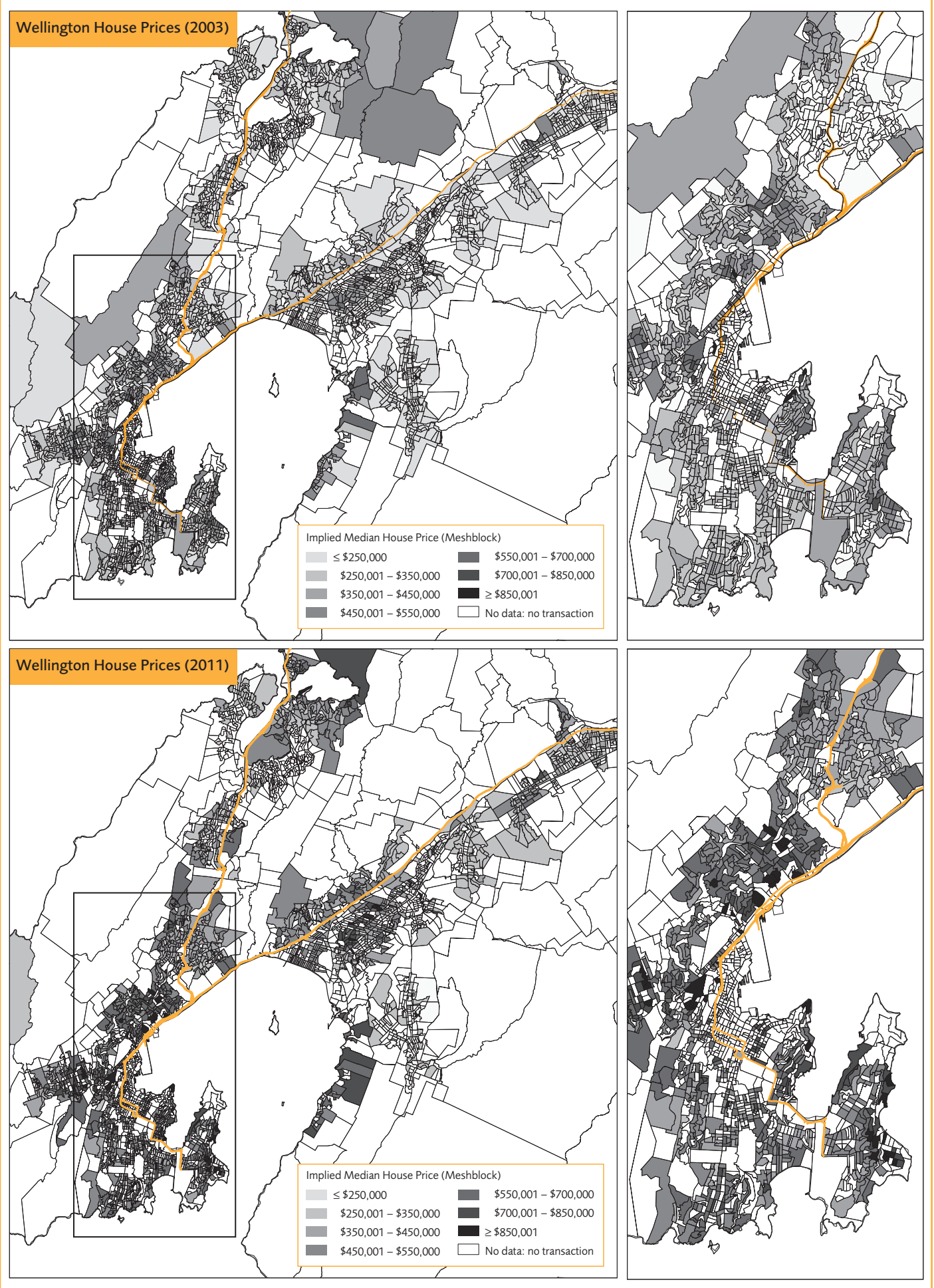
model), uses demographic information about neighbourhood make-up to try to establish who will live where, and what amenities they respond to: a "top-down" approach. Other models, such as the ISCR's SET (Spatial Econometric Transportation) model for the Greater Wellington Region, or those of Chandra Bhat in the US, show urban behaviour using a "bottom-up" approach.

As is often the case, top-down modelling captures the behaviour of the entire population, but often starves a researcher of the richness of individual level data. In contrast, bottom-up modelling allows exploration of the minutiae of household decisions, but requires extrapolating from the behaviour of a subset of people to explain an entire city/region.

The stakes are not small, as illustrated in Wellington with the proposed building of the Transmission Gully road system, providing an additional access route from the downtown core to the residentially desirable Kapiti Coast. How will the new road affect house prices in Paraparaumu? Will there be a mass exodus of families from Wellington City? Will house prices fall in Lower Hutt? Many of these questions have important implications for ratepayers, property investors, and civic authorities. Models from both groups enable analysts to provide insights.

Oliver Robertson was a Summer Scholarship student at the ISCR during the summer of 2013-2014. His scholarship was co-funded by Ministry of Transport and VUW. He is currently working as a Research Assistant for the ISCR.

Figure 1: Wellington House Prices 2003 and 2011



The Quick and the ILLIQUID

Liquidity (the ability to convert an asset readily into cash) is an important property of financial securities. When we want to buy something, we need cash to buy it then and there; when we sell something, we want to be rid of it quickly. It's always possible to hold a 'fire sale' (if you offer something for free, you'll find a buyer pretty quickly) but generally that's not a path to financial success. Jamie Hatch explores how this affects the New Zealand Stock Exchange (NZX).

Quantifying liquidity is a rather difficult proposition. We can recognise its presence, or its absence, but ranking securities by liquidity can be a more challenging proposition. However, several measures developed in the academic literature offer useful yardsticks for how easily one can move money into or out of a particular stock or bond:

Bid-Ask Spread: Looking at the gap between the price one can sell a stock at versus the (higher) price one can buy a stock at gives us an idea about the cost of entering and exiting the market.

Roll's Measure: If stock prices bounce back and forth between wide bid-ask spreads, all other things being equal, we might expect to see negative correlation in stock prices when a stock is less liquid.

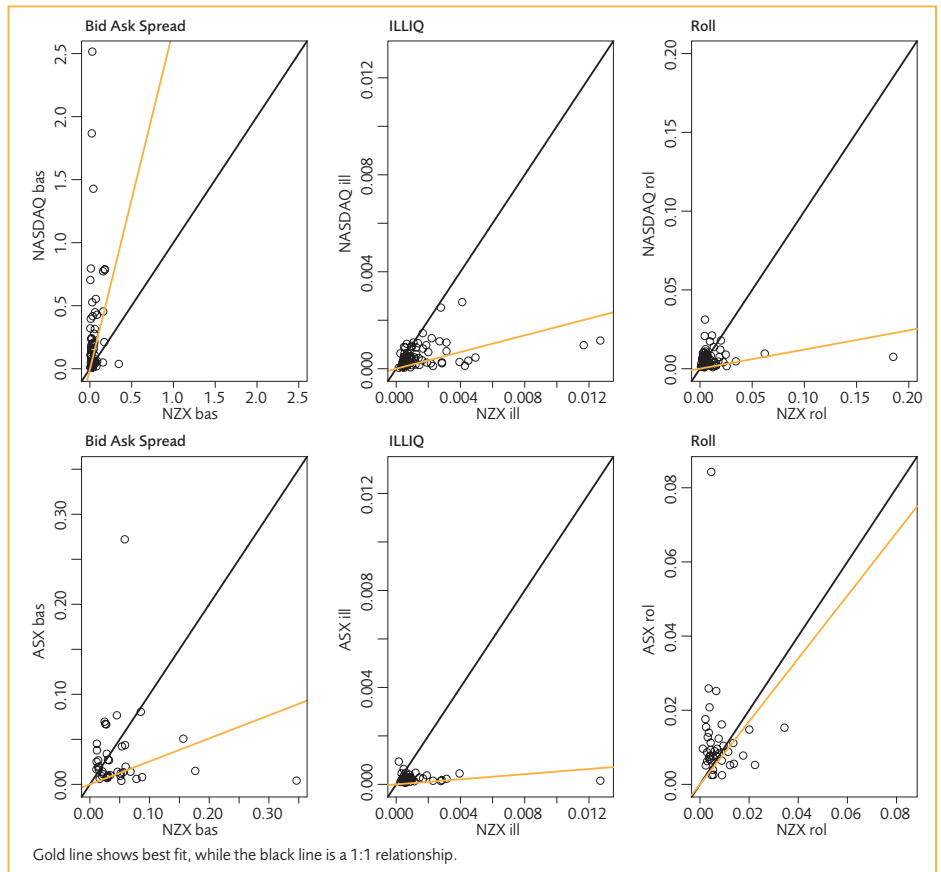
ILLIQ: By looking at the extent to which large buy (sell) orders cause positive (negative) shocks to stock prices, we can get an idea of how traders move the market as they rebalance their portfolios.

Like most markets, the NZX faces liquidity problems for its smaller companies. When the number of shareholders is small, finding a buyer or seller for a particular share can be challenging. Lack of liquidity is seen as a negative feature by investors. If investors do not like this, the shares will be worth less, and with less valuable shares it's harder for a small firm to raise capital. But are problems worse in New Zealand than overseas? And if so, what (if anything) can (or should) we do about it?

Let's compare the data for a set of small firms from the NZX with a matching set from the ASX and from the NASDAQ markets (in Australia and the US, respectively). Sorting the firms by capitalisation and then plotting the bid-ask spreads for these two comparisons reveals a mixed picture (Figure 1).

New Zealand shares have a lower bid-ask spread when compared to the shares on the NASDAQ, yet have a larger bid-ask spread when compared to shares on the ASX. The reason behind the NASDAQ's larger spread is likely due to the use of market makers who make their profit from the size of the spread on shares. It is also likely due to the NASDAQ firms having share prices in general around ten

Figure 1: Bid ask Spread, Roll's measure, and Illiq for the NASDAQ and ASX, compared to NZX



Gold line shows best fit, while the black line is a 1:1 relationship.

times larger than NZX firms. The Roll and ILLIQ measures are larger on the NZX than on both the ASX and on the NASDAQ. These larger values show that liquidity is lower (worse) on the NZX than on the other international markets.

But what can be done to increase liquidity? One possible solution is improving information in the market. Since small companies do not attract as much media coverage as large firms, small investors fear that they may be taken for a ride by insiders when they trade shares in small firms. Paying analysts to provide coverage of a share may help level the playing field.

Examining a set of eight small NZ firms that recently gained analyst coverage (and carefully controlling for the fact that they were also growing in size over the period), we find that analyst coverage significantly improves the bid-ask spread and trade frequency measures at the 99% confidence level. The turnover indicator measure is also improved at the 90% confidence level. The ILLIQ and Roll measures, however, do not have a statistically significant improvement due to the introduction of analyst

coverage. Based upon the improvements, the empirical analysis has shown that the use of analyst coverage by small capped firms leads to an increase in their liquidity.

Of course, paying an analyst to cover a small firm is an expensive proposition, and one that a small firm may balk at. As with many things in economics, we face a trade-off, and sometimes the cost is worth the pay-off, and other times it is not. However, as noted by Keynes¹, "Of the maxims of orthodox finance, none, surely, is more antisocial than the fetish of liquidity, the doctrine that is a positive virtue on the part of investment institutions to concentrate their resources on the holding of 'liquid' securities."

¹ J M Keynes, *The General Theory of Employment, Interest and Money*, 1936, Palgrave Macmillan, UK.

Jamie Hatch was a Summer Scholarship student at the ISCR during the summer of 2013-2014. His scholarship was co-funded by VUW and NZX.