

Use of hedonic regression for quality adjustment at Statistics New Zealand

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Geneva, May 2014

UNECE CPI meeting 2014

Outline

- ⊙ Used cars
- ⊙ Rental survey
- ⊙ Consumer electronics scanner data
- ⊙ Supermarket scanner data
- ⊙ Online data

Used cars

- ⊙ Hedonics used since 2001, updated model in 2011
- ⊙ Approx 3500 prices each quarter from sample of used car dealers
- ⊙ Initially used an estimation cell method – inefficient and wasted a lot of data

Used cars (2)

⊙ 2001 introduced time-dummy hedonic index

⊙ Linear hedonic model

$$P_c = \sum_k \beta_k C_{kc} + \sum_t \delta_t D_{ct} + \varepsilon_c$$

⊙ K characteristics:

- town of purchase (15 categories)
- make and model (47)
- age (years)
- size of engine (cc rating)
- odometer reading (km)

⊙ Rolling 8 quarters estimation, splice on last quarter

Used cars (3)

- ⊙ Updated in 2011

$$\ln P_e = \sum_k \beta_k C_{ke} + \sum_t \delta_t D_{et} + \varepsilon_e$$

- ⊙ Logged price

- ⊙ More detailed make and model (47 -> 96)

- ⊙ Added squared terms for age and cc rating

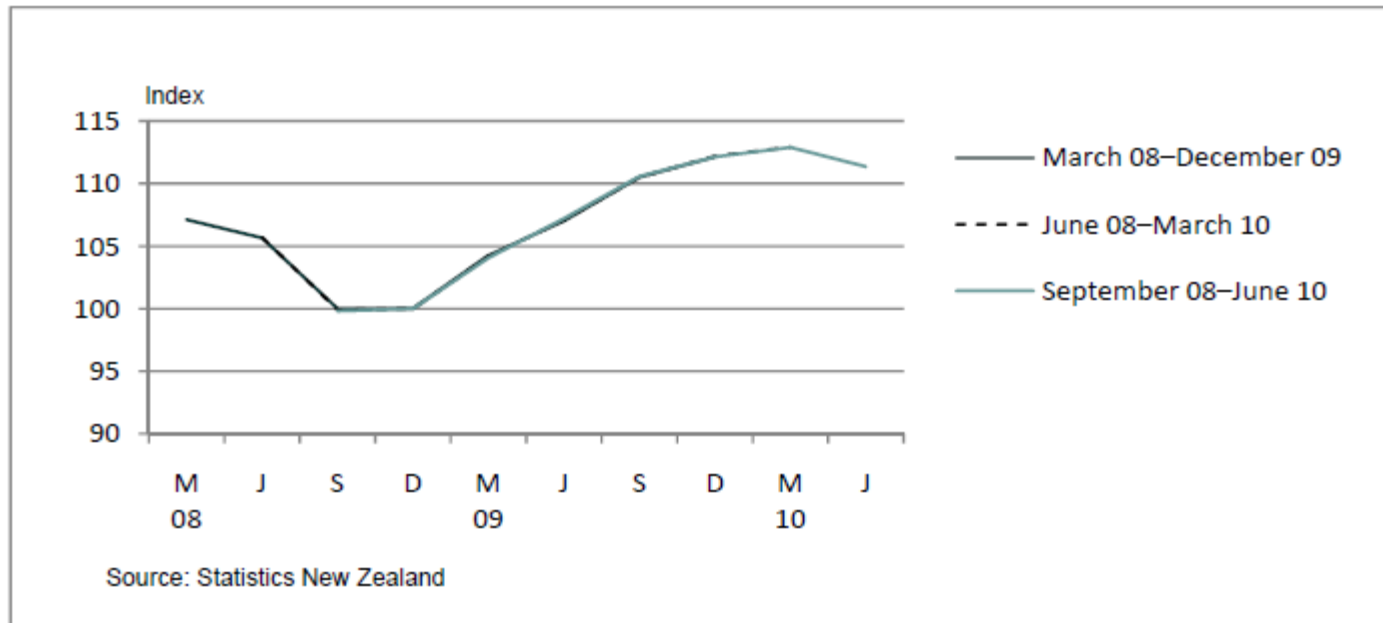
- ⊙ Added car dealer identifiers (approx 300)

Used cars (4)

R-squared statistics for log-linear hedonic models using the old and new sets of explanatory variables		
Region	Old set of explanatory variables	New set of explanatory variables
Auckland	0.76	0.82
Wellington	0.77	0.81
Other North Island	0.80	0.83
Christchurch	0.77	0.81
Other South Island	0.77	0.80

Used cars (5)

Successive eight-quarter hedonic indexes for used cars at the New Zealand level



Note: Base: Dec 2008 quarter (=100)

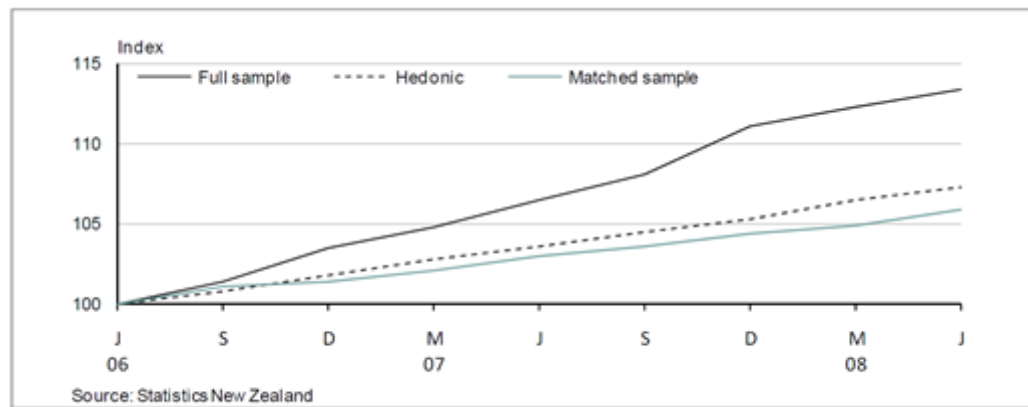
Rental index

- ⊙ Longitudinal (quarterly) survey of landlords of approx 2,800 rental dwellings
- ⊙ Updated quarter from bond data for new tenancies
- ⊙ Average rents within strata based on bedroom # and region
- ⊙ Matched-sample approach to hold quality constant
- ⊙ Concern about bias due to missing implicit rent increases at start of tenancies

Rental index (2)

- ⊙ Hedonic index to benchmark performance of matched-sample index
- ⊙ Not enough characteristics for hedonic model
- ⊙ Fixed effects – ie rental dwelling-specific intercepts (controls for time-invariant characteristics)
- ⊙ 2 obs needed – retrospective index

Rental index (3)



Note: Base: June 2006 quarter (=100)

- ⊙ Matched-sample bias not large
- ⊙ Potential for reducing sample-size if hedonic estimation adopted in production

Rental index (4)

- ⊙ Validity of fixed-effects approach questioned
- ⊙ Extended result of Aizcorbe et al (2003) to show the (implicitly imputed) price movement for a newly rented dwelling is the movement from the average of the quality adjusted rents for 'continuing' rental dwellings in previous quarter to the quality adjusted rent of new dwelling
- ⊙ Won't control for time-varying characteristics of rental dwellings (aging, renovation)

Consumer electronics scanner data

- ⊙ Scanner data from market research company GfK for 12 products (monthly, full set of characteristics)
- ⊙ Implementing from Sept 2014 quarter
- ⊙ de Haan's ITRYGEKS method (imputation Tornqvist RYGEKS) - RYGEKS averaging based on bilateral time-dummy hedonic indexes

Consumer electronics scanner data (2)

- ⊙ Flat panel TVs
- ⊙ Laptops
- ⊙ Tablets
- ⊙ Smartphones
- ⊙ Desktop computers
- ⊙ Heat pumps
- ⊙ Digital still cameras
- ⊙ Audio systems
- ⊙ DVD players and recorders
- ⊙ Set-top boxes
- ⊙ Memory cards
- ⊙ Multi-function devices.

Supermarket scanner data

- ⊙ Still negotiating data
- ⊙ Initially may only get data for specifications in basket (and info to help select replacements)
- ⊙ Aiming for full-coverage
- ⊙ No characteristics, likely to use fixed-effects window-splice (FEWS) index

Online data

- ⊙ Investigating potential / methodologies (FEWS index)
- ⊙ Initial analysis on 15 months Billion Prices Project daily data for consumer electronics
- ⊙ Research agreement with PriceStats – supply of online data for range of NZ retailers