

# Examining Patterns in and Drivers of Rural Land Values

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# Motivation

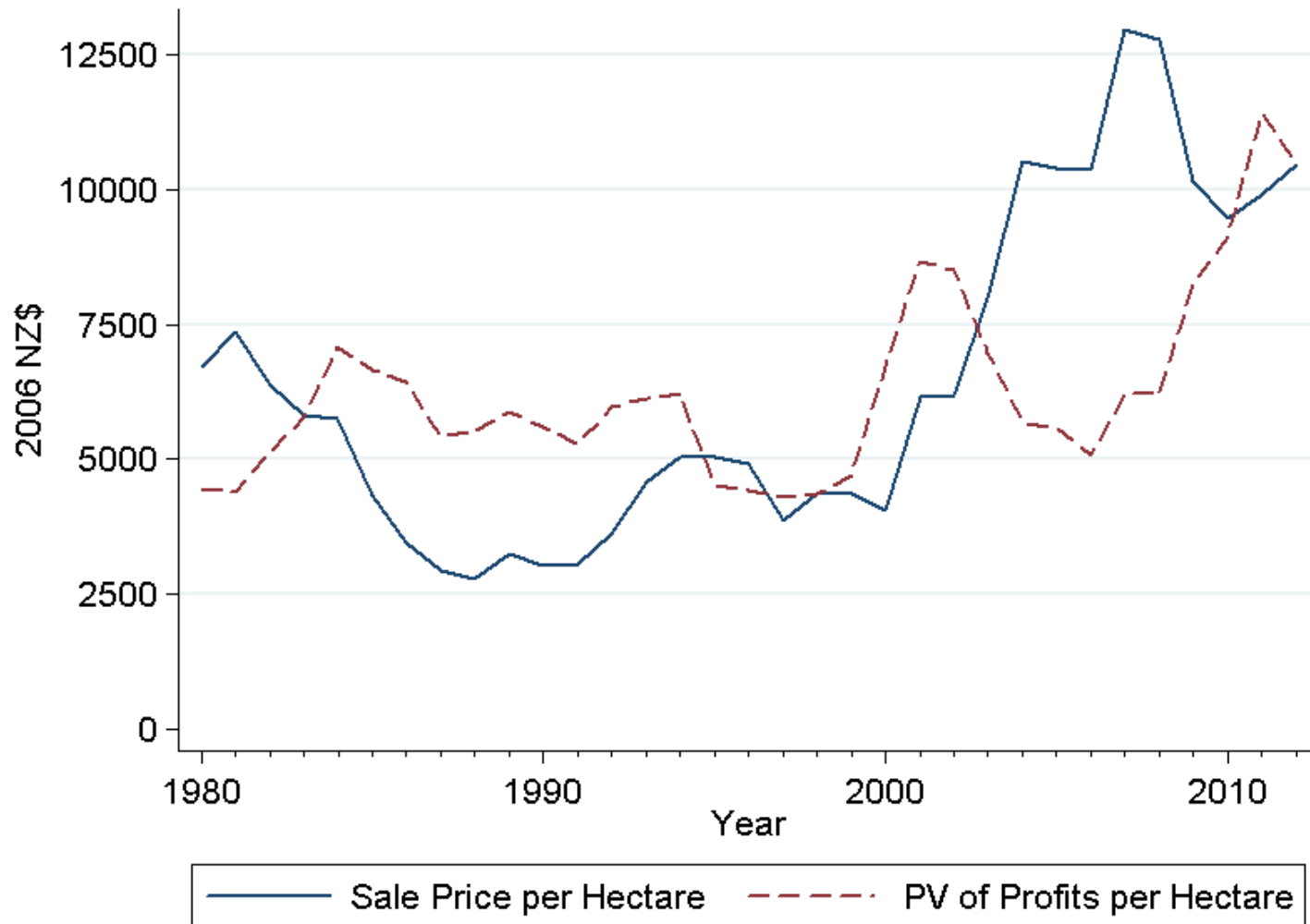
Rural land is a key input into agricultural production and a key source of wealth in New Zealand

Relatively little known about the drivers of rural land values in New Zealand



# Motivation

Rural sale price per hectare and present value of profits per hectare  
(5% real discount rate)



# Conceptual Framework

$$LV_{ijt} = \sum_{s=0}^{\infty} \frac{E\pi_{ij^*,t+s}}{(1+r)^s}$$

where

$$\pi_{ijt} = p_{jt}Q_{ijt} - c_{ijt}(Q_{ijt})$$

and

$$j_t^* = \operatorname{argmax}_j \left\{ \sum_{s=0}^{\infty} \frac{E\pi_{ij^*,t+s}}{(1+r)^s} : j \in \{D, SB, F, C, H\} \mid E_t(\mathbf{P}, \mathbf{A}) \right\}, \forall t$$

# Conceptual Framework

Farmland is more than an input to agricultural production

Amenity value of farmland

$$LV_{ijt} = \sum_{s=0}^{\infty} \frac{E\pi_{ij^*,t+s} + V(M_{ij^*,t+s})}{(1+r)^s}$$

# Conceptual Framework

Farmland also has an option value – the option to convert to a non-agricultural land use in the future

$$LV_{ijt} = \sum_{s=0}^c \frac{E\pi_{ij^*,t+s} + V(M_{ij^*,t+s})}{(1+r)^s} + \sum_{s=c}^{\infty} \frac{R_{iU,t+s}}{(1+r)^s}$$

# Empirical Strategy

Estimate long-run equilibrium relationship between present value of expected profits and land values

$$\log Value\ ha_t = \beta_0 + \beta_1 \log PV EProfit_t + \beta_2 Trend + \epsilon_t$$

We observe current profits – conceptual framework emphasises long-run expected profitability

# Empirical Strategy

$$PV EProfits_t = PV \widehat{Profits}_t + \eta_t$$

Problem: even assuming prices follow a random walk and ignoring productivity trends, our measure of expected profits contains measurement error because of, for example, droughts

Solution: IV estimation strategy, using global agricultural commodity prices as an instrument for profits.



# Data

## QVNZ Data

### Sales

- 1980-2012
- Total sale price, land area sold, number of sales by MB/year/QV use category
- Variable of interest – average sale price per hectare

### Valuations

- 1989-2012
- Total capital value, land area assessed, number of assessments by MB/year/QV use category
- Used to check representativeness of sales data
- Weights derived from land area assessed

# Data

## Profit data – Beef and Lamb NZ and MPI Monitor Farm Reports

- Dairy and sheep/beef economic farm surplus
- Assume a form of adaptive expectations

## Commodity prices from Kerr and Olssen (2012)

- Unit export prices for dairy, meat/wool
- Adjusted for removal of agricultural subsidies
- Create a trade weighted agricultural commodity price index



# Results

	OLS	IV	IV
$\log PV PROFITS_t$	0.222 (0.207)	1.256*** (0.406)	
$\log PV PROFITS_{t,1982}$			1.096*** (0.283)
<i>Trend</i>	0.037*** (0.0086)	0.024** (0.011)	0.037*** (0.007)
<i>Constant</i>	-51.33*** (16.9)	-50.566*** (19.2)	-74.68*** (13.9)
<i>T</i>	31	31	31
$R^2$	0.583	-	-
<i>EG</i> $\tau$ -stat	-3.584 <sup>+</sup>	-3.752*	-4.211**

# Effects of macro conditions on land values

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$\frac{\textit{impaired assets}}{\textit{gross lending}}_t$	-0.061*** (0.018)
<i>Constant</i>	0.101 (0.102)
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<i>T</i>	23
<i>R</i> <sup>2</sup>	0.145

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Notes: The left hand side variable in the above regression is the residuals from the regressions column 2 of the previous slide. Robust standard errors are in parentheses. \*\*\* indicates statistical significance at the 1% level.

Low levels of credit availability reduce option value and may affect current profitability

# Conclusions

Strong long-run relationship between profits and land values – close to 1.

No sign of long-term irrationality in market for rural land

There are periods when the value of rural land is higher than implied by profitability:

- when credit is easily available so land use change is more rapid, and
- the economy is doing well in general so may reflect higher amenity and option values

