

# Competitive Implications of Land Ownership Institutions – Using Oligopoly Theory to Estimate the Impact of the Native Land Act's Ten Owner Rule

**Richard Meade**

Cognitus Economic Insight & Auckland University of Technology  
richard.meade@cognitus.co.nz

NZAE Annual Conference, Auckland University of Technology

29 June 2018

# Introduction

- Can economic theory and evidence be used to assess counterfactuals in which certain historical breaches of the Treaty of Waitangi are assumed not to have occurred?
  - Relevant for assessing economic losses in judicial contexts;
  - E.g. when applying the “but for” test – comparing a claimant’s position “with” and “without” the relevant breaches.
- More specifically, can certain Treaty breaches:
  - Be modelled using accepted economic tools; and
  - Losses estimated using fairly scant historical data?

# Introduction (cont'd)

- *Particular example of Treaty breach* – “10 owner rule” introduced under section 23 of the Native Lands Act 1865:
  - No more than ten individual owners’ names could be recorded on the title of formerly collectively-owned land;
  - Yet those owners were able to sell their interests without the approval of other tribe members;
  - Seen as a major driver of unwanted land “alienations” (i.e. sales) by Maori in the late 19th century.

## Introduction (cont'd)

- *Case study of such a breach* – rapid and relatively uncontrolled alienation of tribal lands by Gisborne iwi (i.e. tribe) Te Aitanga a Mahaki (Mahaki):
  - Author was commissioned by Mahaki to assess the iwi's historical economic losses; and
  - Boast (2008, p. 687) highlights the tenurial/institutional problems that developed around Poverty Bay, “leading to the area developing an unenviable national reputation as a place where practically everything had gone wrong.”

# Introduction – Contributions

- I use industrial organisation theory to model economic outcomes under both “individualised” (i.e. status quo) land sales induced by the 10 owner rule, and “collectivised” (i.e. counterfactual) land sales:
  - Collectivised sales are akin to *monopoly* land sales;
  - Individualised land sales – under the ten owner rule – are akin to *oligopoly* land sales (with 10 sellers).

# Introduction – Contributions (cont'd)

- I show that differences in economic outcomes – i.e. profit-maximising quantity of land sold, realised price, and maximised profits – can be expressed in terms of just two parameters:
  - The number of individualised sellers – capped by law at 10; and
  - The price elasticity of demand for land (PED, or  $\epsilon$ ) – which I estimate for Mahaki using 1891 land auction data.
- Specifically, I estimate that under collectivised land sales, Mahaki would have:
  - Enjoyed prices up to 5.5 times higher, sold up to 87% less land, and made land sale profits up to 7.1 times higher.

## Motivation – Control and Alienation

- In 1997, Professor Alan Ward published a series of reports for the Waitangi Tribunal identifying common threads among the c. 650 historical Treaty claims that had been lodged since 1985, stating (*Waitangi Tribunal Rangahaua Whanui Series*, Vol. I, p. 6):

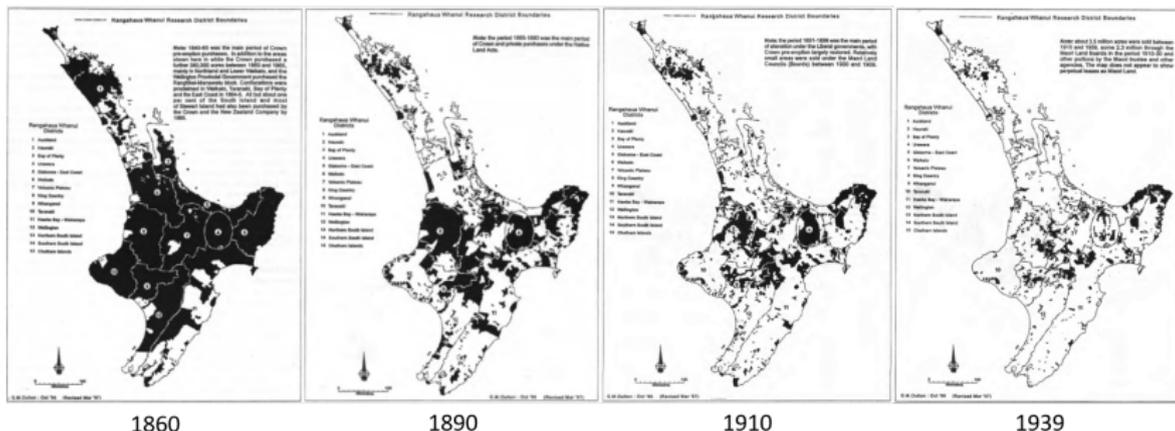
*“If there is any one main thread through the Maori attitude to settlement, it is that, whenever Maori were able to exercise collective control over land alienation ... land sales slowed markedly or stopped.”*

## Motivation – Control and Alienation (cont'd)

- However (pp 6-7):

*“[S]ettlers, with the Crown ...responded by finding ways to overcome ... [collective] control in order to extinguish Maori customary title ... In the Native Land Acts of 1862 and 1865, settler governments forged their most effective instrument: the conversion of customary title to a form of title by which each individual named as an owner could sell his or her individual interest. ... By the purchase of [such 'individualised'] interests and progressive partitioning of blocks, the Crown and private settlers acquired the bulk of Maori land in the North Island.”*

# Motivation – Control and Alienation (cont'd)



Adapted from Ward, A., 1997, *Waitangi Tribunal Rangahaua Whanui Series, Vol. I*, pp xviii-xxii.

## Motivation – the Mahaki Experience

- The various Treaty breaches experienced by Mahaki and other Turanga (i.e. Gisborne/Poverty Bay) iwi are summarised in Waitangi Tribunal (2004) (the *Turanga Report*), e.g. p. 536:

*“The effect on the ground in Turanga of [the land tenure system and its administration by the Native Land Court] was that within 30 years, 70 per cent of the Maori land base had been sold at knock-down prices.”*

- Title “individualisation” was a key driver of excessive sales at unduly low prices – with the stated aim of the underlying policy being (p. 432):

*“[T]he extinction of the native communal ownership, and the substitution of titles known to the law in lieu thereof.”*

## Motivation – the Mahaki Experience (cont'd)

- Individualisation created a form of prisoner's dilemma:

*“[I]n the context of the competition for land between Maori, it was better to get on the front foot and apply for title than to be an objector to someone else's claim” (p. 417)*

*“Maori queued up at the door of the court to have their lands investigated. Some were willing participants, but some were not. The unwilling ones had no real alternative because . . . [t]o refuse to join the queue was to risk losing everything.” (p. 420)*

*“[T]he procedure of the [Native Land Court] has snapped the faggot-band, and has left the separate sticks to be broken one by one.” (p. 530, quoting Justice Richmond's 1873 inquiry into Maori landlessness).*

# Question

- So, if individualisation reduced coordination and resulted in excessive land sales at unduly low prices, to what extent would collective/coordinated land sales:
  - Improve prices;
  - Reduce sale quantities – and hence increase *retained* land quantities (with higher prices for such retained lands); and
  - Increase land sale profits?
- I estimate the impact of collectivised/counterfactual land sales – *relative* to individualised/actual sales under the ten owner rule – using the tools of industrial organisation.

# Setup

- Mahaki's profit function from land sales is assumed to be:

$$\Pi(p) = q(p)(p - c)$$

- Here,  $p$  is land price,  $q(p)$  is land sale quantity, and  $c$  is a constant unit marginal cost of “producing” (i.e. selling) land.
- From standard profit-maximising behaviour, we know any “firm” (i.e. land seller) with market power chooses  $p$  such that price-cost margin is the inverse of the elasticity of its *residual* demand ( $\eta$ ):

$$L \equiv \frac{p - c}{p} = -\frac{1}{\eta}$$

## Setup – Elasticity of Residual and Market Demand

- Using standard industrial organisation theory, if  $D(p)$  is market demand (with PED  $\varepsilon$ ),  $D_r(p)$  is *residual* demand (with PED  $\eta$ ), and  $S_0(p)$  is the supply of other “firms” (i.e. land sellers, with PES  $\eta_0$ ):

$$D_r(p) = D(p) - S_0(p)$$

- Assuming  $n$  symmetric sellers, and that  $\eta_0 \approx 0$  (i.e. short-run land supply is sticky), by differentiating and rearranging we can show that  $\eta \approx n\varepsilon$ .
- Hence, price-cost margin for a profit-maximising individual land-seller re-writes as:

$$L \equiv \frac{p - c}{p} = -\frac{1}{n\varepsilon}$$

## Results – Relative Land Sale Prices

- Simple arrangement of the preceding gives us the profit-maximising land sale price:

$$p^*(\varepsilon, n, c) = \frac{n\varepsilon c}{n\varepsilon + 1}$$

- Hence, *relative* profit-maximising price under collectivised (i.e. monopoly/counterfactual) and individualised (i.e. oligopoly/actual) land sales is:

$$\frac{p_M^*(\varepsilon, 1, c)}{p_{O(n)}^*(\varepsilon, n, c)} = \frac{n\varepsilon + 1}{(\varepsilon + 1)n}$$

## Results – Relative Land Sale Quantities

- Assuming iso-elastic demand  $q(p) = ap^\varepsilon$ , we can use  $p^*$  to find profit-maximising land sales quantity:

$$q^*(p^*) = a \left( \frac{n\varepsilon c}{n\varepsilon + 1} \right)^\varepsilon$$

- Hence the ratio of monopoly profit-maximising quantity ( $q_M^*(p^*)$ ) to  $n$ -seller oligopoly profit-maximising total quantity ( $q_{O(n)}^*(p^*)$ ) is:

$$\frac{q_M^*(p^*)}{q_{O(n)}^*(p^*)} = n^{-\varepsilon} \left( \frac{n\varepsilon + 1}{\varepsilon + 1} \right)^\varepsilon \quad (\perp c)$$

- Thus, proportionately extra *retained* land is  $1 - \frac{q_M^*(p^*)}{q_{O(n)}^*(p^*)}$ .

## Results – Relative Land Sale Profits

- The maximised profit of (symmetric) *individual* seller  $i$  writes as:

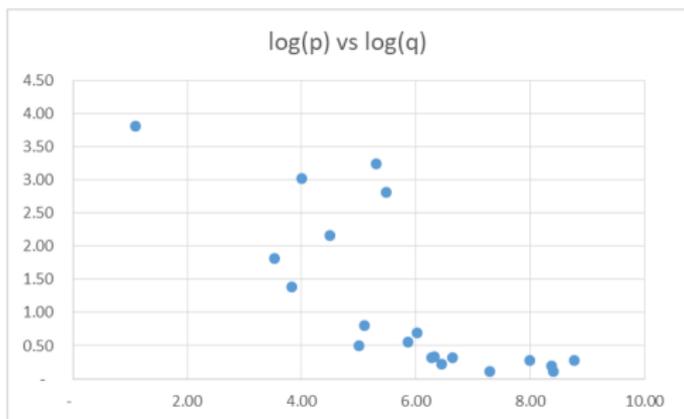
$$\Pi^*(p^*) = \begin{cases} q_M^*(p^*(.))(p^*(\varepsilon, 1, c) - c) & \text{Monopoly case } (n = 1) \\ \frac{1}{n} q_{O(n)}^*(p^*(.))(p^*(\varepsilon, n, c) - c) & \text{Oligopoly case } (n > 1). \end{cases}$$

- Using  $q^*(.)$  and  $p^*(.)$  from above, we find relative *total* profits to be:

$$\frac{\Pi_M^*(p^*(\varepsilon, 1, c))}{n \times \Pi_{O(n),i}^*(p^*(\varepsilon, n, c))} = n^{-\varepsilon} \left( \frac{n\varepsilon + 1}{\varepsilon + 1} \right)^{\varepsilon+1} \quad (\perp c)$$

- So, relative (i.e. counterfactual vs actual) prices, quantities and profits depend only on  $n$  ( $= 10$  under the ten owner rule), and  $\varepsilon$  (which I estimate ...)

## Estimated PED



- Using 1891 mortgagee sale data from Murton (2001), I use OLS to estimate iso-elastic demand (with  $\hat{\beta} \equiv \hat{\varepsilon}$ ):

$$\log(q) = \alpha + \beta \log(p) + u \quad \rightarrow \quad \hat{\varepsilon} = \begin{cases} -1.2 & \text{Full sample} \\ -1.9 & \text{Excluding "outliers"}. \end{cases}$$

# Counterfactual Price, Quantity and Profit

- Using  $\hat{\varepsilon}$ , and assuming  $n = 10$  under the ten owner rule, counterfactual (i.e. monopoly) land sale *price*, relative to actual (i.e. ten-seller oligopoly) price, is:

$$\frac{p_M^*}{p_{O(10)}^*} = \begin{cases} 5.5 & \text{with } \hat{\varepsilon} = -1.2 \\ 2 & \text{with } \hat{\varepsilon} = -1.9 \end{cases}$$

- Relative land sale *quantity* is (noting that proportionately extra land retained is complement thereof):

$$\frac{q_M^*}{q_{O(10)}^*} = \begin{cases} 13\% & \text{with } \hat{\varepsilon} = -1.2 \\ 27\% & \text{with } \hat{\varepsilon} = -1.9 \end{cases}$$

# Counterfactual Price, Quantity and Profit (cont'd)

- Finally, relative land sale profits are:

$$\frac{\Pi_M^*}{n \times \Pi_{O(10),i}^*} = \begin{cases} 7.1 & \text{with } \hat{\varepsilon} = -1.2 \\ 5.4 & \text{with } \hat{\varepsilon} = -1.9 \end{cases}$$

# Conclusions

- Oligopoly theory provides a well-established framework for conceptualising how collectivised Maori land sales would have changed key outcomes experienced under individualised sales.
- At the price of assuming *profit-maximising behaviour*, *symmetric sellers*, *common unit marginal costs*, and *iso-elastic demand*, plausible counterfactuals can be generated for land sale price, quantity and profit:
  - Focusing on *relative* outcomes avoids the need to estimate  $c$ ; and
  - Focusing on the ten owner rule fixes  $n$  (and also supports symmetry).
- Hence, to generate results, we only need to estimate information about land demand (i.e. PED).

## Conclusions (cont'd)

- For Mahaki, relative to actual outcomes under the ten owner rule, I estimate that counterfactual/collectivised land sale:
  - *Price* would have been up to 5.5 times higher;
  - *Quantity* would have been up to 87% lower (with those retained lands worth more); and
  - *Profit* up to 7.1 times as great.
- Results are conservative in effectively assuming *simultaneous* – rather than *Stackelberg* – sales in the actual:
  - Historical evidence suggests some sellers benefitted themselves and prejudiced others by selling first; and
  - Oligopoly theory (e.g. Anderson and Engers (1992)) suggests even worse overall outcomes for Stackelberg sellers;
  - Future work ...

\*\*\*