
Land Value Uplift Effects from an Incremental Transport Network Upgrade

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Disclaimer

The research associated with this presentation was conducted in my own time, and in fulfilment of post-graduate studies at the University of Auckland.

Any errors or omissions are my own, and any views expressed do not constitute policy positions of the NZ Transport Agency.



Research Aims

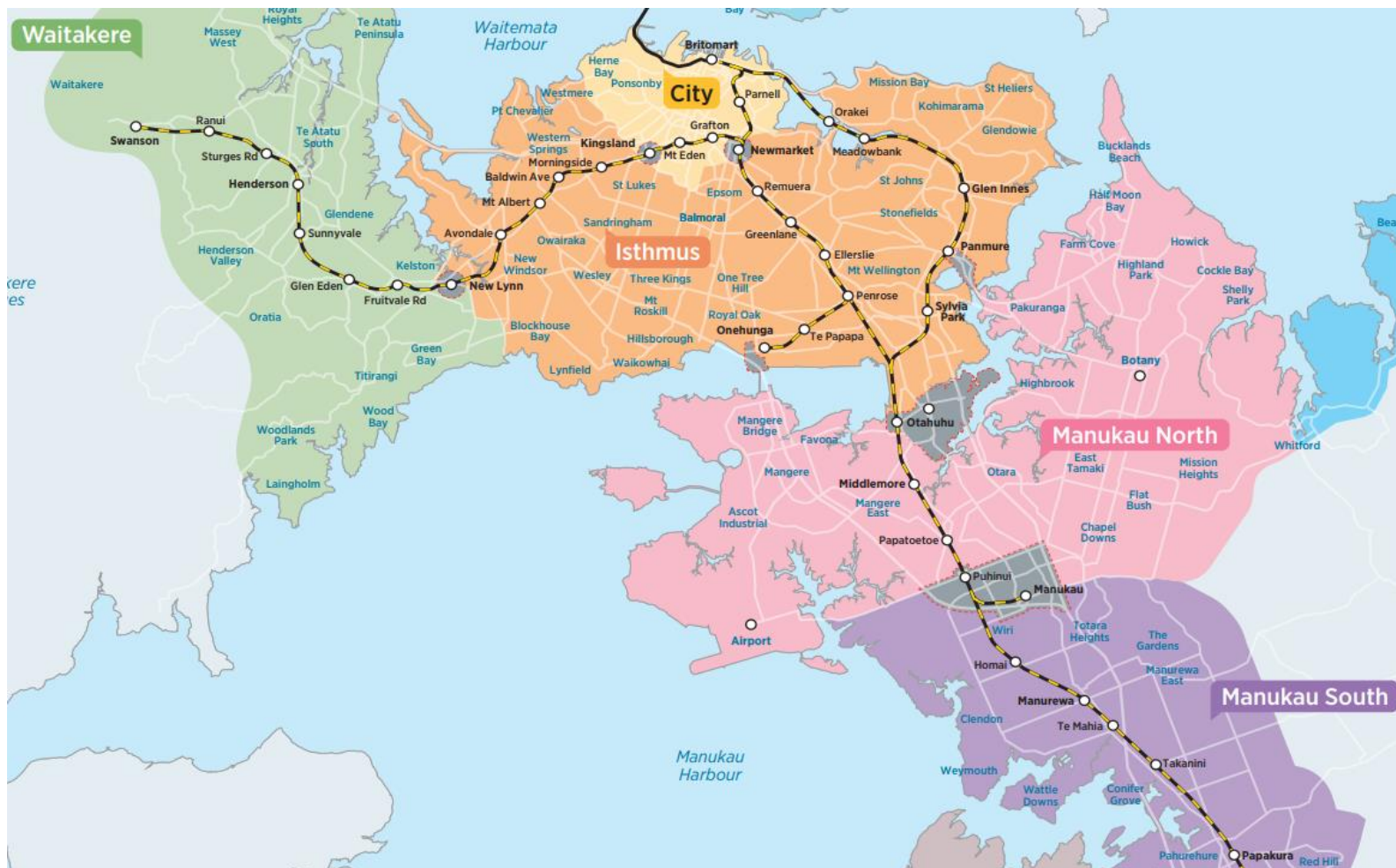
Primary:

- Estimate the land value uplift effects of electrification of Auckland's rail network.

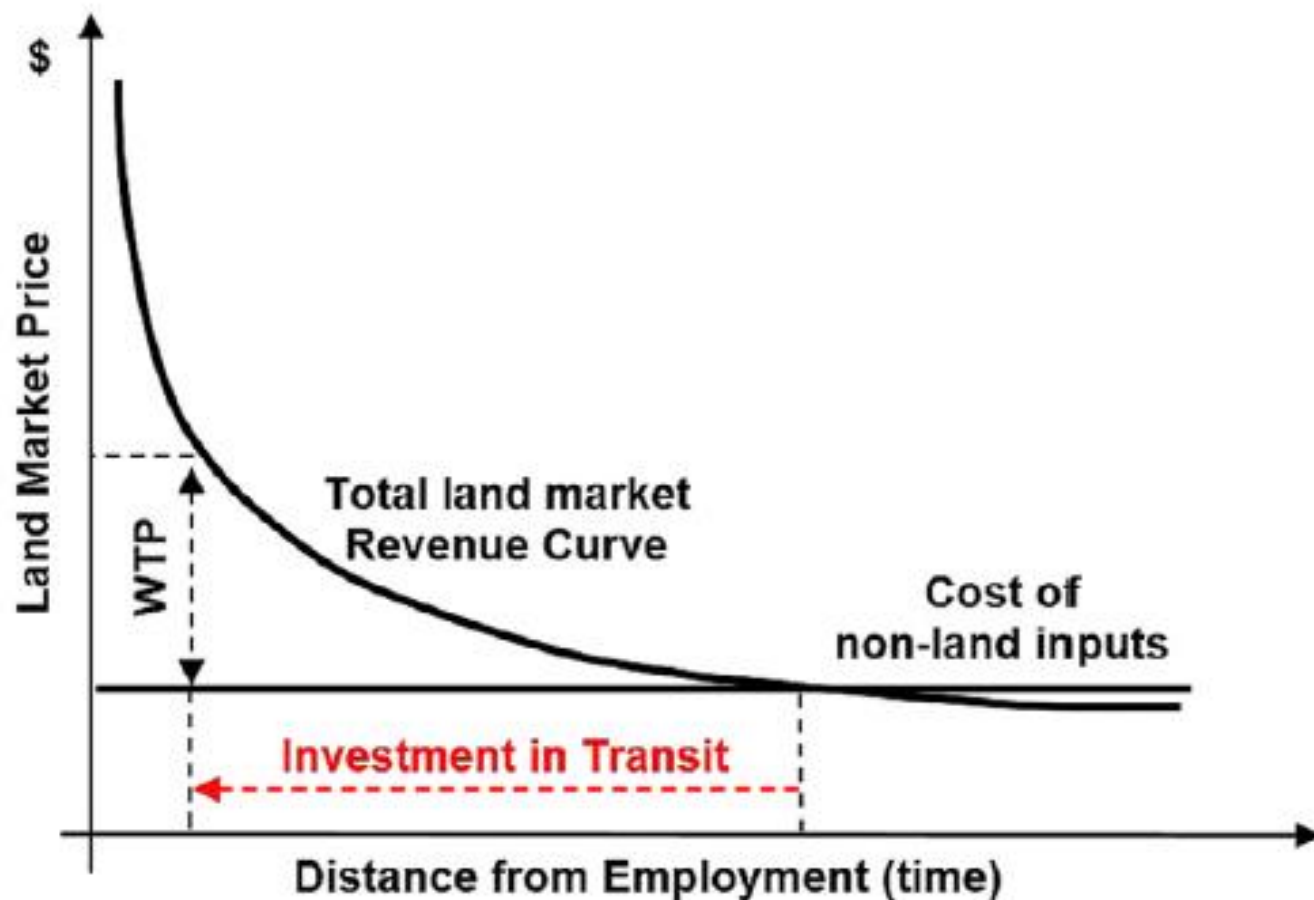
Secondary:

- Develop a hedonic regression model that is:
 - Simple
 - Estimated on land value
 - Based on observed characteristics of properties
 - Robust to missing data

Auckland's Electrified Rail Network



Theory: Bid Rent Curve



(McIntosh, Trubka, & Newman, 2013)

Model

- Panel data, difference-in-difference estimation with random effects

In *Residual Land Value*_{it} = $\alpha_i + \beta \text{Station Dummy}_{it} + \gamma \text{Property Attributes}_{it} + \varepsilon_{it}$

- Land value estimation

$$\text{Residual Land Value}_{it} = \text{Gross Sale Price}_{it} - IV_{it-n} * \frac{\text{RBNZ House Price Index}_t}{\text{RBNZ House Price Index}_{t-n}}$$

Data Highlights

Property IQ house sales data made available to the University of Auckland

3686

Observations

898

Houses in a suburb with an upgrade station

47

0–400m catchment

124

400–800m catchment

352

800–1600m catchment

Main Results

Dependent Variable:
In Residual Land Value

| | Aggregate | Catchments |
|----------------|-------------------------------|-------------------------------|
| Suburb | 0.3924*** (0.0164) | |
| 0-400m | | 0.3949*** (0.4081) |
| 400-800m | | 0.4081*** (0.0423) |
| 800-1600m | | 0.3720*** (0.0261) |
| Land Area | 0.7754*** (0.1738) | 0.7329*** (0.1772) |
| Floor Area | 0.0051*** (0.0002) | 0.0051*** (0.0002) |
| Vacant Land | 1.0489*** (0.0547) | 1.0047*** (0.0557) |
| Multiple Units | -0.1206*** (0.0313) | -0.1463*** (0.0313) |
| Building Age | 0.0108*** (0.0004) | 0.0109*** (0.0004) |
| Water View | 0.2705*** (0.0445) | 0.2405*** (0.0446) |
| Observations | 3686 | 3686 |
| R-Squared | 0.414; 0.444; 0.435 | 0.315; 0.465; 0.429 |

* = significant at 5% level
 ** = significant at 1% level
 *** = significant at 0.1% level

Robustness to Missing Data

Dependent Variable:
In Residual Land Value

| | Preferred | Omitted Observations |
|------------------|-------------------------------|-------------------------------|
| Suburb | 0.3924*** (0.0164) | 0.4084*** (0.0189) |
| Land Area | 0.7754*** (0.1738) | 0.4309* (0.1818) |
| Floor Area | 0.0051*** (0.0002) | 0.0043*** (0.0002) |
| Vacant Land | 1.0489*** (0.0547) | 0.9054*** (0.0540) |
| Multiple Units | -0.1206*** (0.0313) | -0.1781*** (0.0322) |
| Building Age | 0.0108*** (0.0004) | 0.0103*** (0.0004) |
| Water View | 0.2705*** (0.0445) | 0.2601*** (0.0467) |
| Houses in Suburb | 898 | 568 |
| Observations | 3686 | 2598 |
| R-Squared | 0.414; 0.444; 0.435 | 0.443; 0.423; 0.417 |

* = significant at 5% level
 ** = significant at 1% level
 *** = significant at 0.1% level

Sensitivity to Distance Decay

Dependent Variable:
In Residual Land Value

| | Preferred | Omitted Observations |
|------------------|-------------------------------|-------------------------------|
| Suburb | 0.3924*** (0.0164) | 0.3573*** (0.0276) |
| Land Area | 0.7754*** (0.1738) | 0.6506** (0.1871) |
| Floor Area | 0.0051*** (0.0002) | 0.0041*** (0.0002) |
| Vacant Land | 1.0489*** (0.0547) | 0.9130*** (0.0810) |
| Multiple Units | -0.1206*** (0.0313) | -0.1250*** (0.0338) |
| Building Age | 0.0108*** (0.0004) | 0.0067*** (0.0007) |
| Water View | 0.2705*** (0.0445) | 0.1865** (0.0611) |
| Houses in Suburb | 898 | 304 |
| Observations | 3686 | 1508 |
| R-Squared | 0.414; 0.444; 0.435 | 0.396; 0.313; 0.317 |

* = significant at 5% level
 ** = significant at 1% level
 *** = significant at 0.1% level



Caveats and Limitations

- Small sample size
- Omitted variable bias
- Missing interaction terms
- No long-term trend
- Staged operations on network
- Log-log specification sensitive to missing data for some variables
- Unexpected improvement and land effects



Conclusions and Next Steps

Conclusions:

- Significant uplift effect (scale to be confirmed)
- Incremental upgrade as important as new infrastructure
- People value improved services
- Rapid ex-post appraisal, without using GIS tools, appears feasible

Next steps:

- Estimate full model from 2006 capturing;
 - Announcement of electrification
 - Contract award
 - Early works
 - Other network upgrades
- Reconfirm research conclusions and compare results with prior studies