Transport investment and housing development

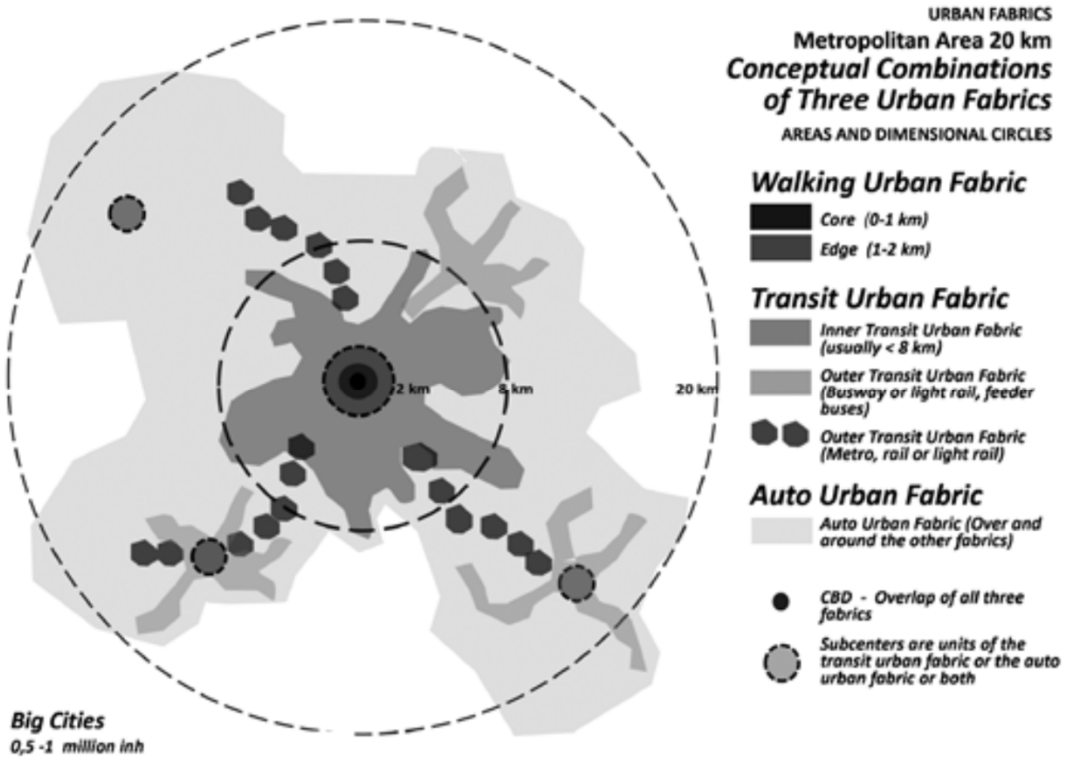
Peter Nunns

Engineering NZ - Transportation Group conference
Christchurch, March 2020

Thank you!

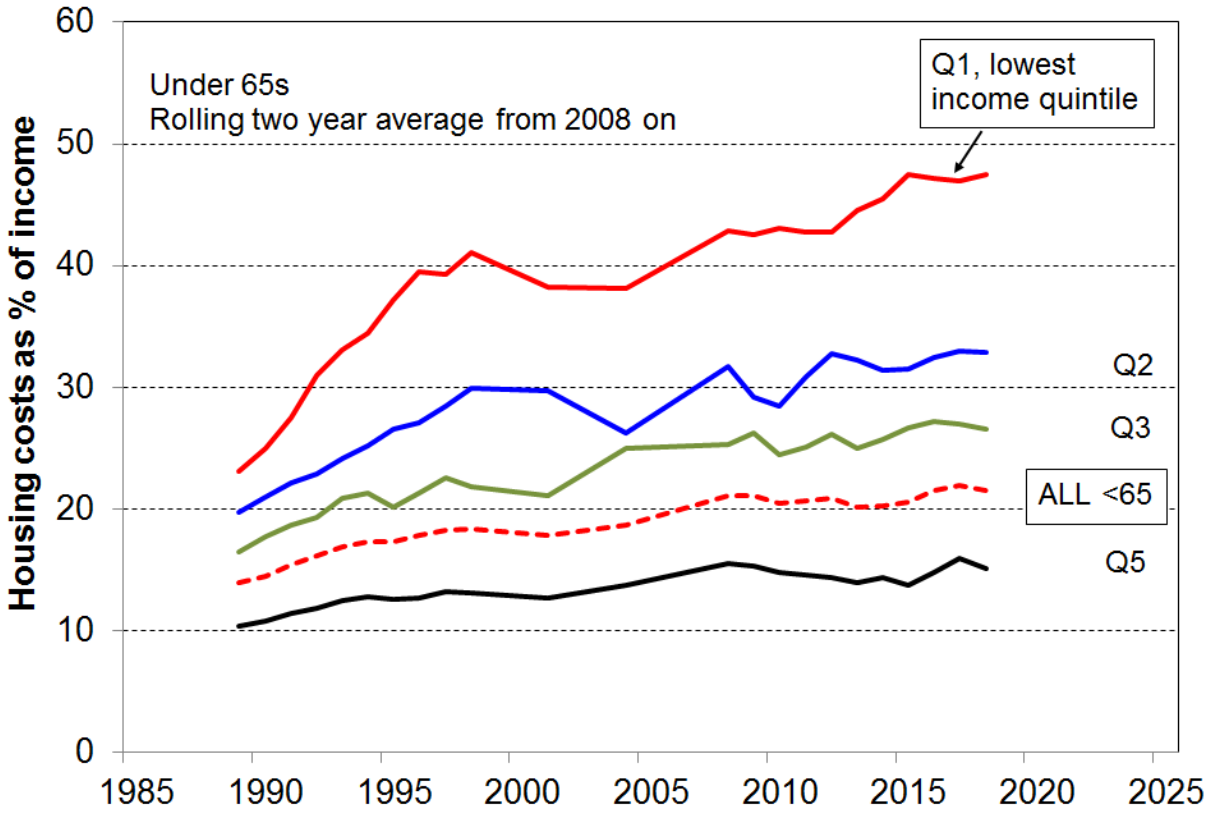
This research project would not be possible without funding assistance from ENZ-TG

Transport and the shape of our cities



Source: Newman, Kosonen and Kenworthy. 2016.

Housing and equity



Changes in housing costs as a share of income for low-income and high-income households

Source: Perry. 2019. *Household incomes in New Zealand: Trends in indicators of inequality and hardship 1982 to 2018*. Ministry of Social Development

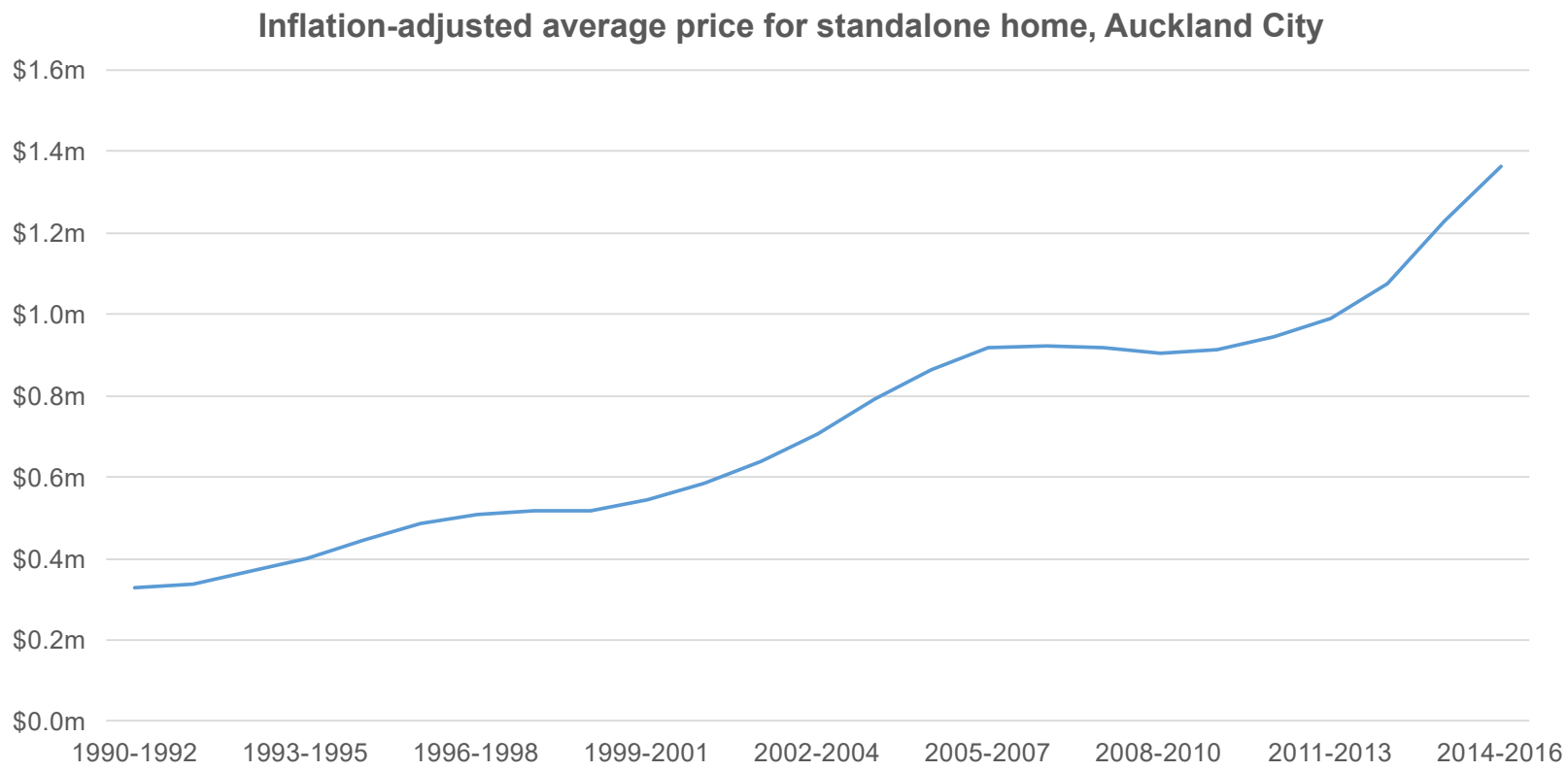
Plan for this talk

1. Why housing development is weird
2. How transport can affect housing development
3. Modelling impacts on housing development

Why housing development is weird

- **Barriers to building new housing are pervasive**
- **The resulting scarcity of housing drives prices above where they ‘should’ be**

Empirical evidence on house price distortions



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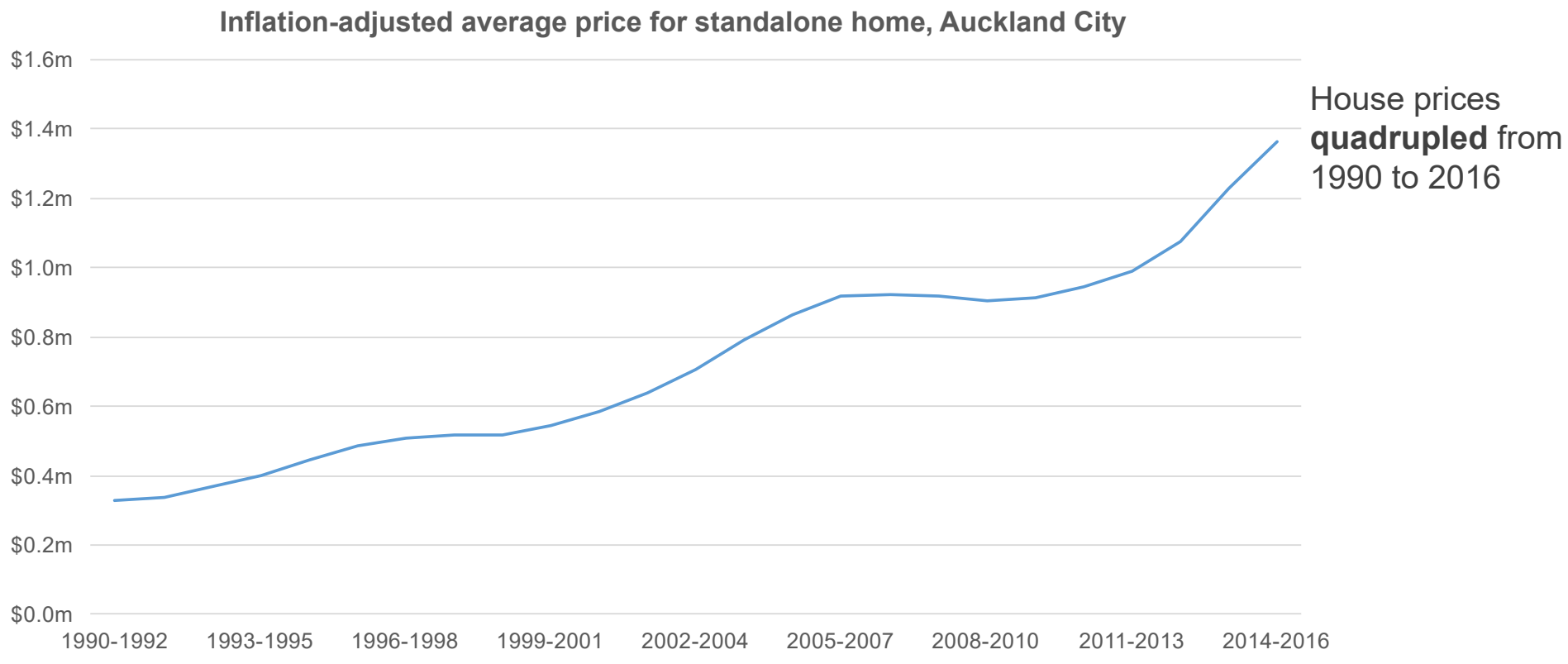

Source: Nunns. 2018. *The causes and economic consequences of rising regional house prices*. UofA Centre for Applied Research in Economics WP 003.

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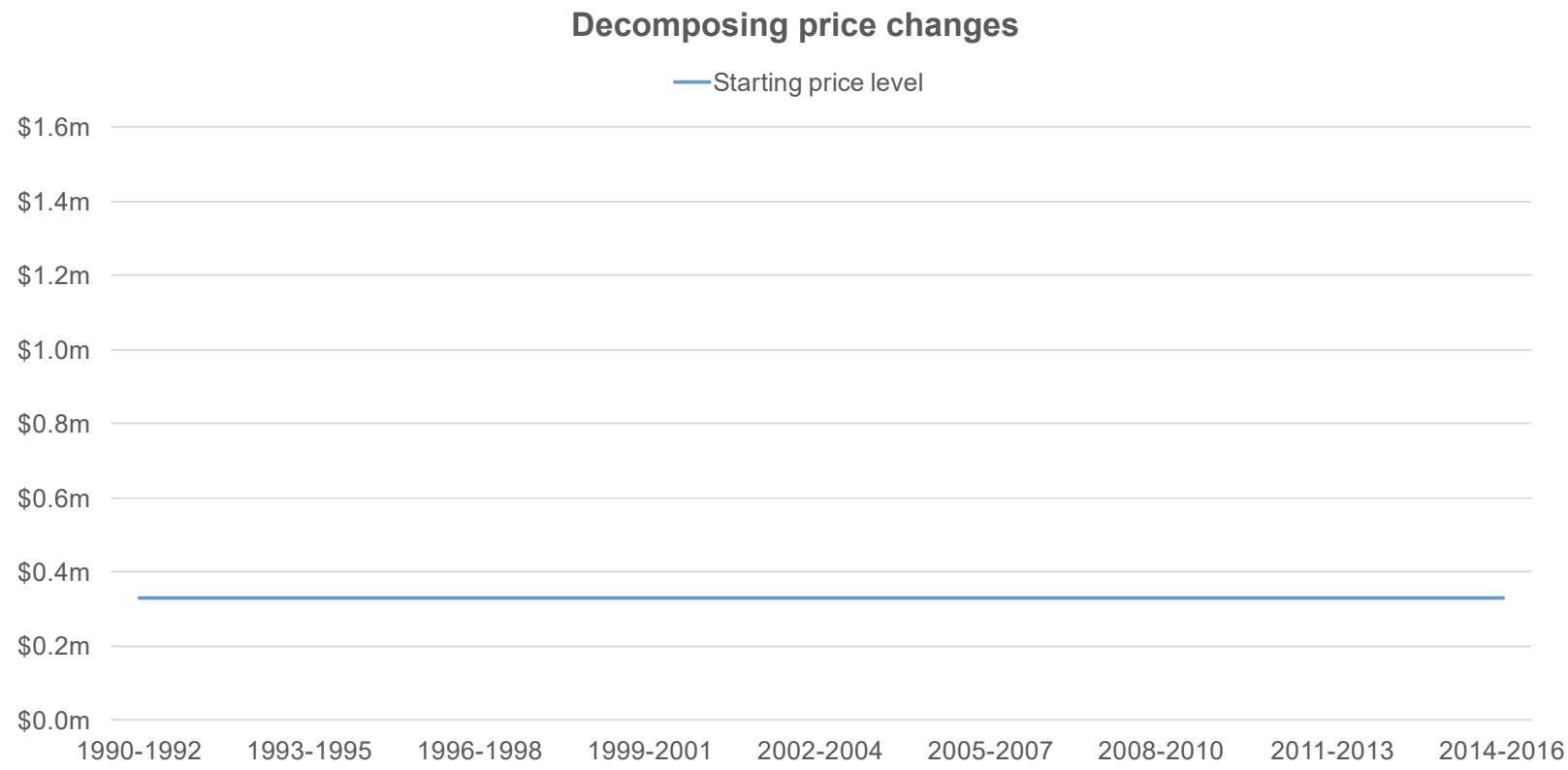

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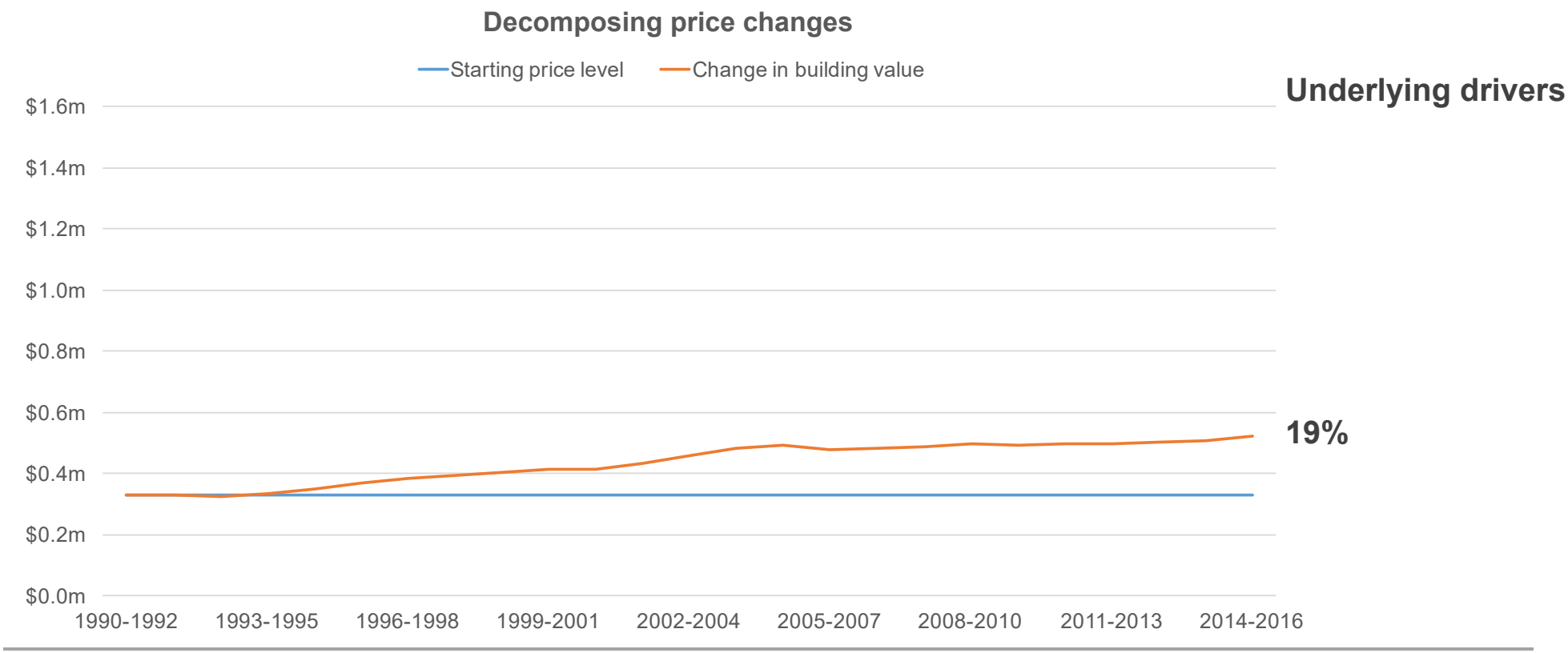

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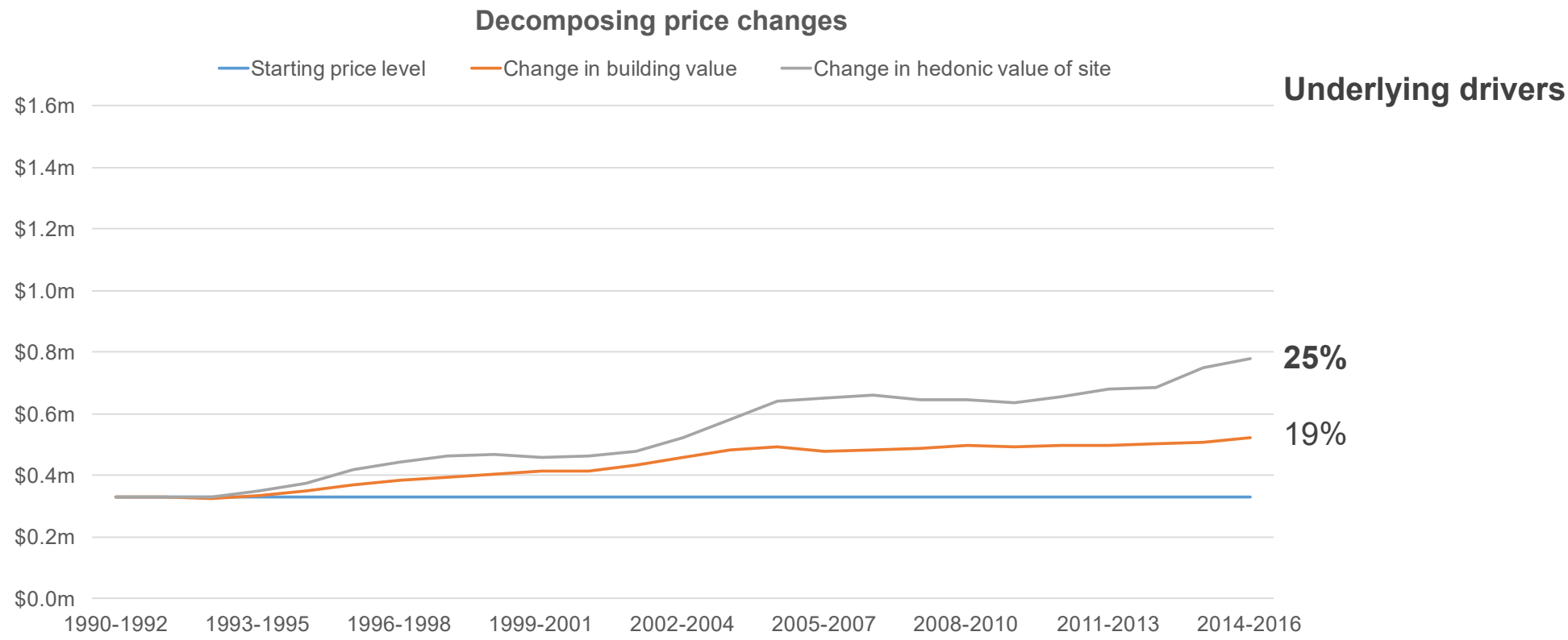

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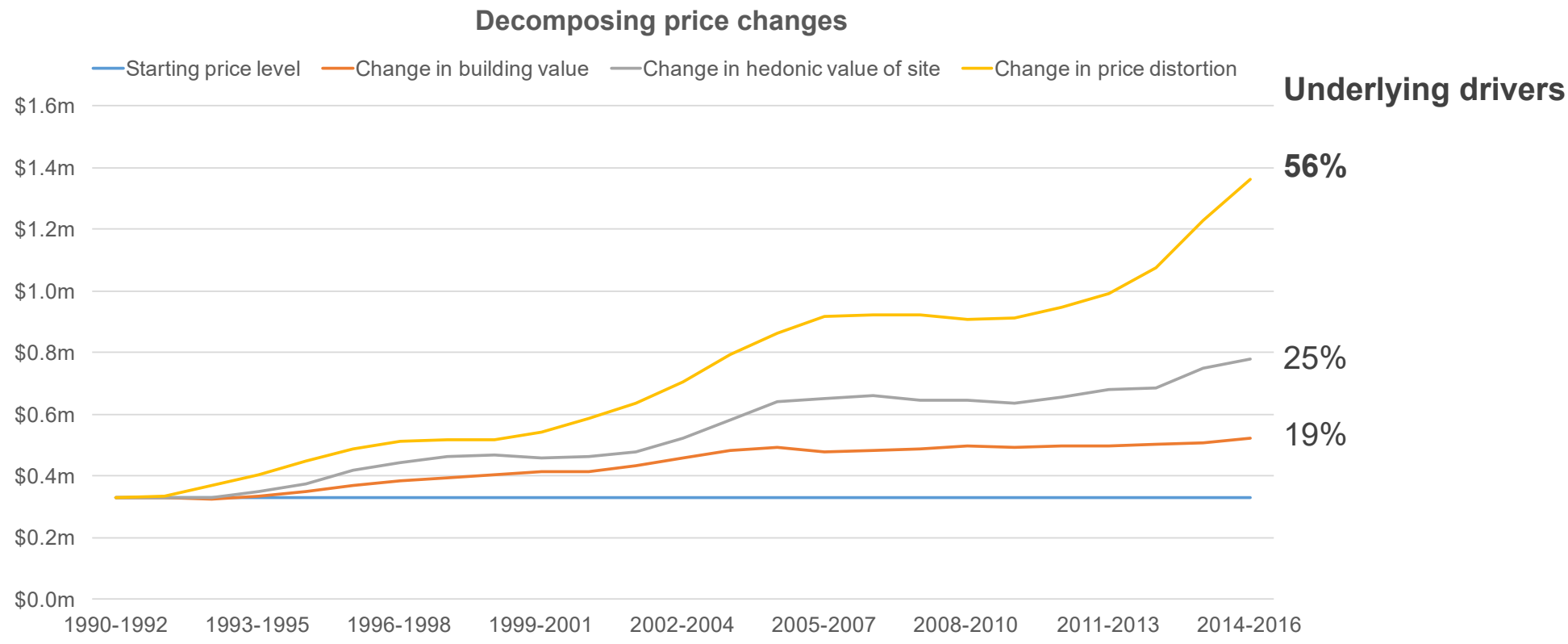

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Many frictions to housing development

- **Location, location, location**

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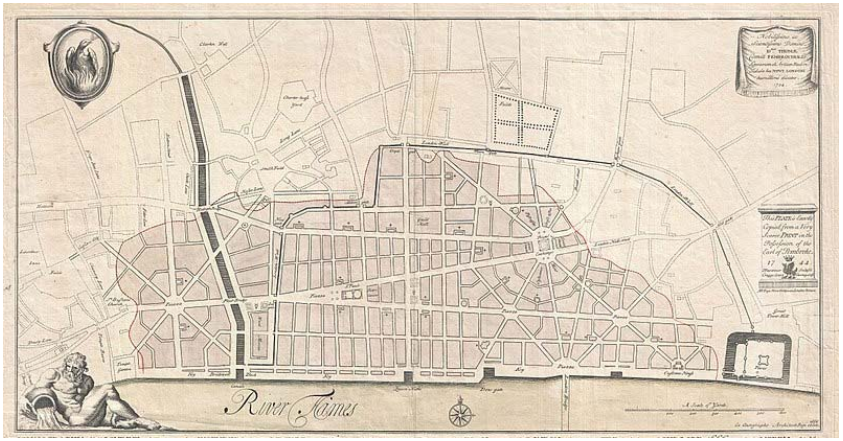
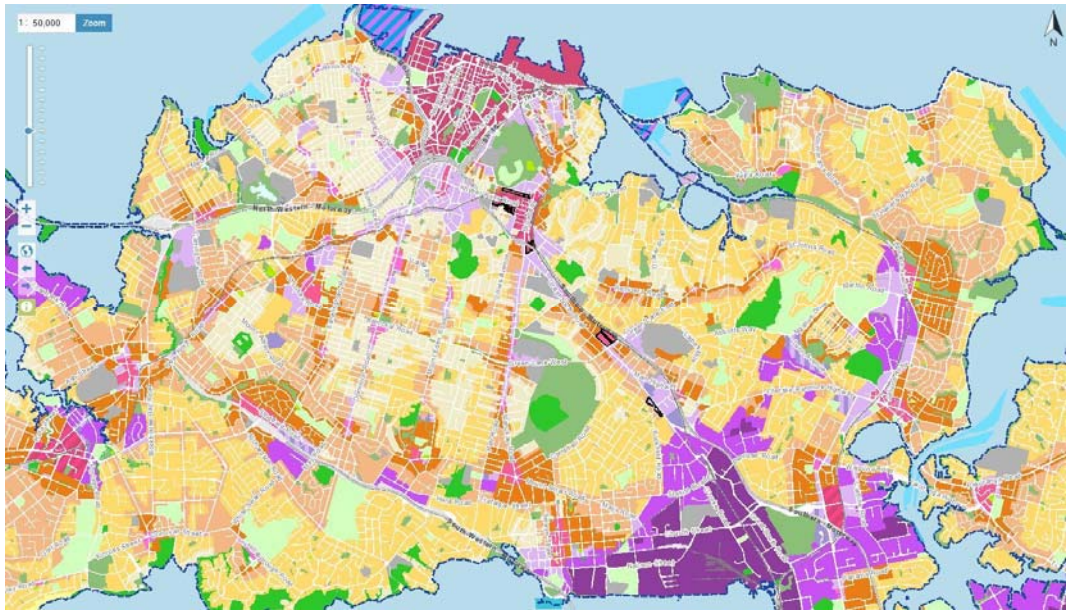
Many frictions to housing development

- **Subdivision is persistent and housing is durable**



Many frictions to housing development

- **Land use regulations limit what can be built**



How transport can affect housing development

- **Demand-side effects:** More people want to live in newly accessible places

- **Supply-side effects:** Transport overcomes barriers to competition in housing development markets

Demand-side effects

Outcomes:

1. Improved transport access raises local prices

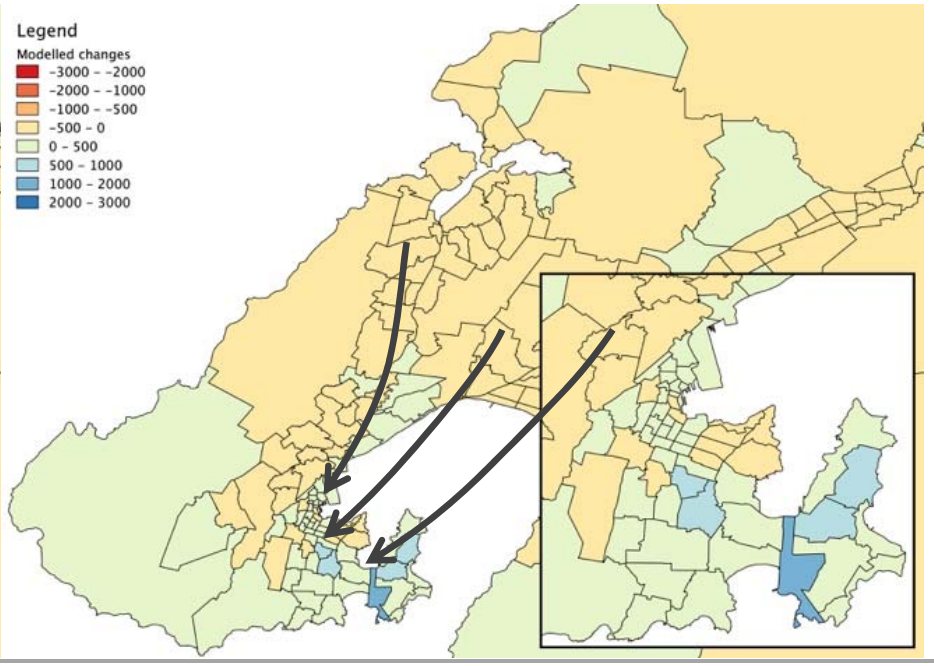
2. Citywide prices only fall if transport projects disperse growth to lower-density areas

Most analysis focuses on demand-side effects

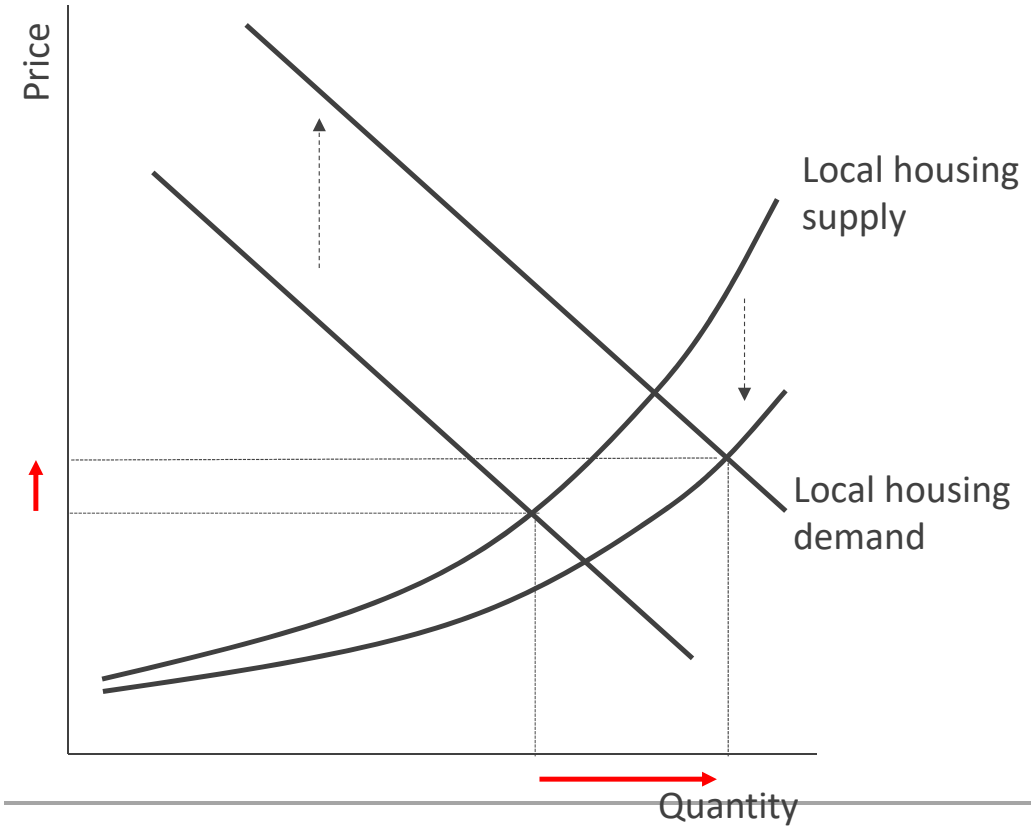
Predicted change in distribution of growth

Population location

Employment location



Supply-side effects



Outcomes:

1. Improved transport access could lower local prices

2. Citywide prices may fall due to increased competition in land markets

Mechanisms for supply-side effects

- **Improved transport access makes alternative sites more substitutable, reducing local market power**

- **Transport projects unlock rezoning that increases housing capacity**

Modelling impacts on housing development

Local housing demand

$$N_{jk} = \exp(\beta GC_{jk} + \gamma \ln(P_j) + W_k + e_j + \varepsilon_{jk})$$

Local housing supply

$$P_j = C_j \frac{H_j}{K_j}^{\psi}$$

Housing markets clear

$$N_j = \sum_k N_{jk} = H_j$$

Fixed city population

$$\sum_{j,k} N_{jk} = \bar{N}$$

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Impact of longer travel times on location choice (negative)

Impact of higher house prices on location choice (negative)

Local housing supply

$$P_j = C_j \frac{H_j^{\psi}}{K_j}$$

Impact of increased density or tighter zoning on housing supply cost (positive)

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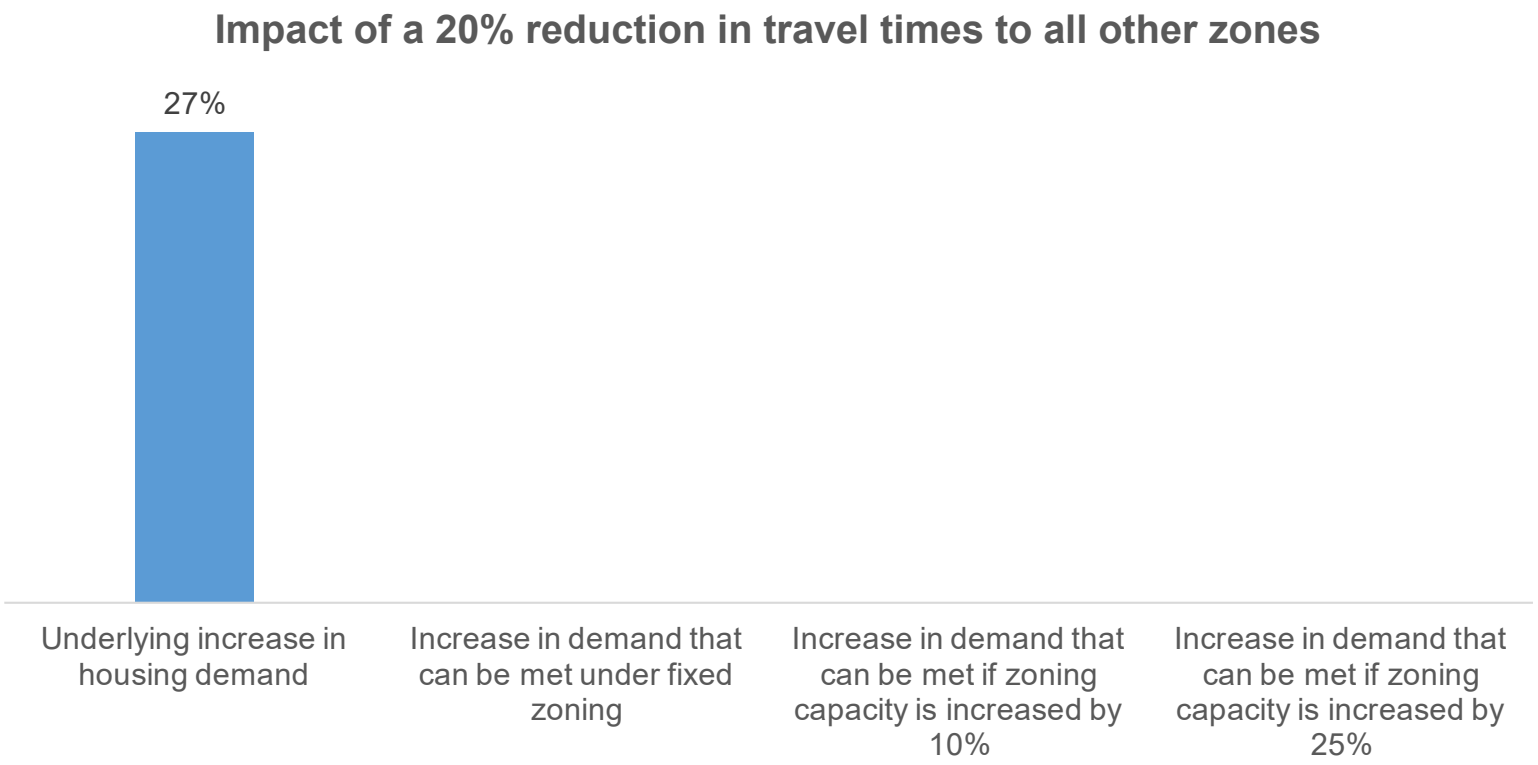
Current parameter estimates

Parameter	Estimate	First-order interpretation
Impact of longer travel times on location choice (β)	**-0.12**	A 10% decrease in travel times to all other locations will increase local housing demand by 1.2% x average starting travel time
Impact of higher house prices on location choice (γ)	**-4.35**	A 10% increase in local house prices will decrease local housing demand by over 40%
Impact of increased density or tighter zoning on housing supply cost (ψ)	**0.69** *(alt estimate: 0.24)*	House prices must rise by 6.9% to accommodate a 10% increase in density, unless zoning is relaxed

Some simple simulations



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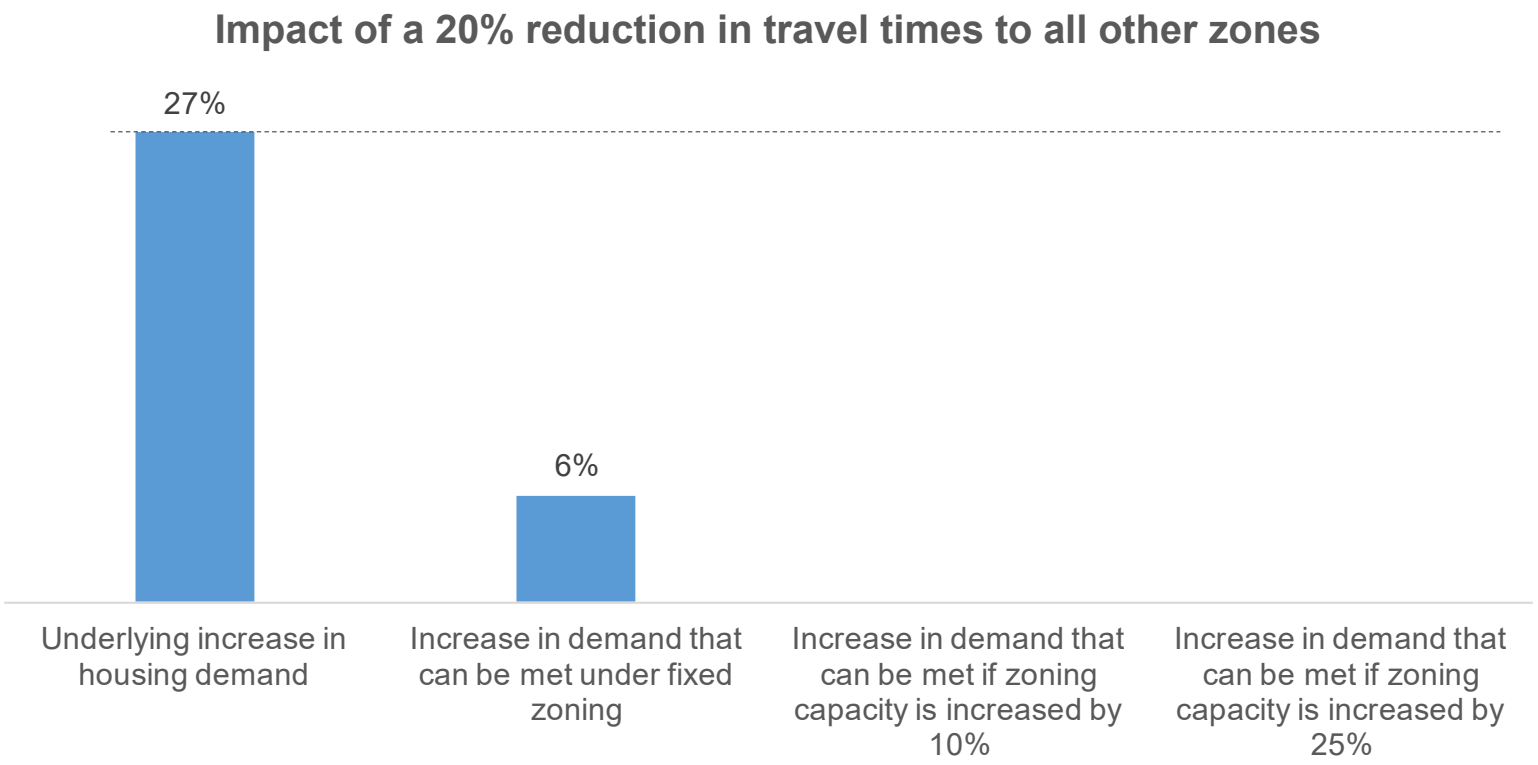

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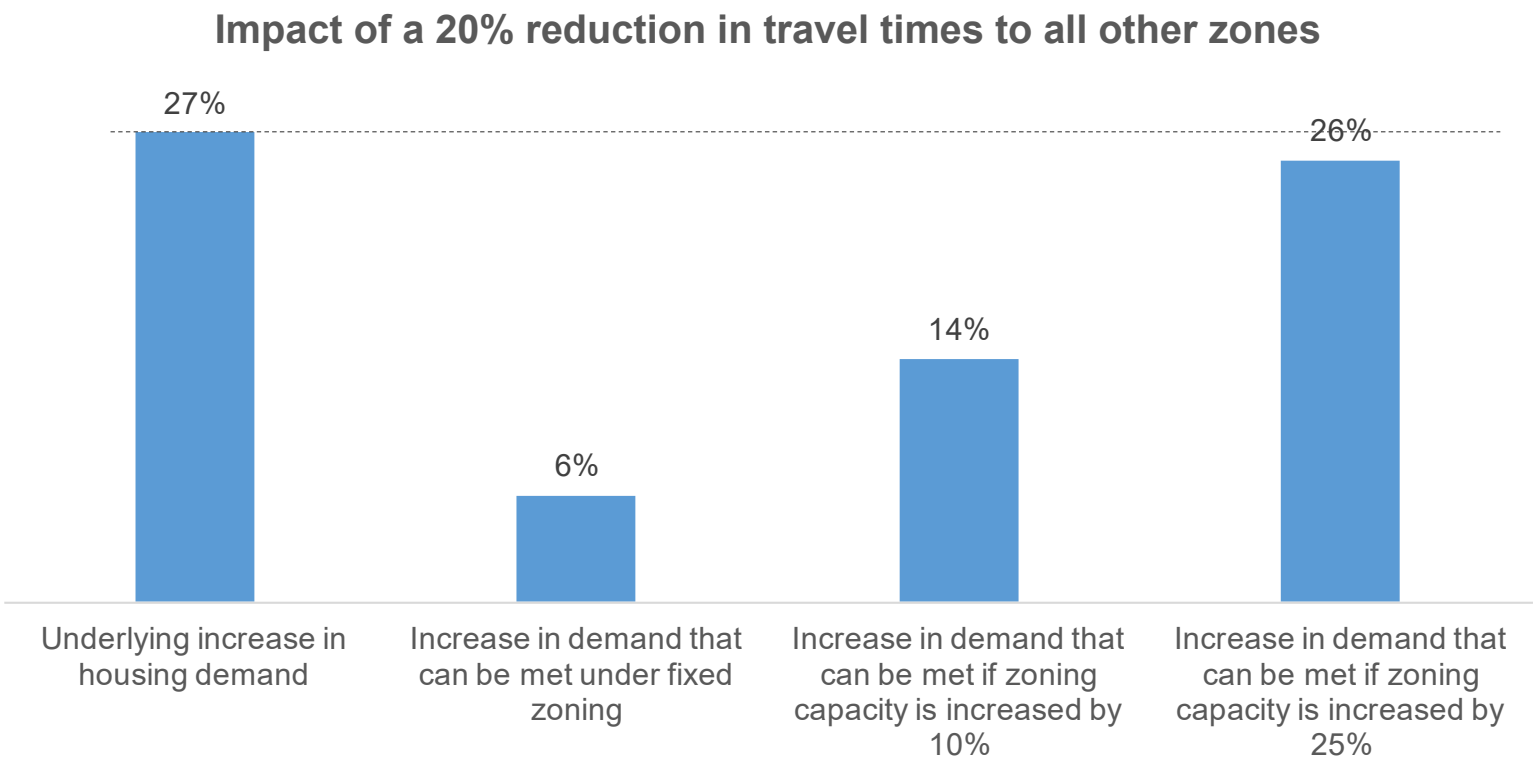

Concluding thoughts

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1. Housing supply dynamics are important for predicting the land use impacts of transport projects

2. Transport projects can generate additional housing development benefits by overcoming barriers to supply

3. These dynamics can be captured in relatively simple models

   … but estimating model parameters is challenging!

Questions?

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with grateful thanks to ENZ-TG for funding assistance