Zoning and housing supply: empirics in search of a theory

Tim Helm, Prosper Australia
Cameron Murray, Fresh Economic Thinking
Australian Conference of Economists (ACE), Sydney, 8 July 2025

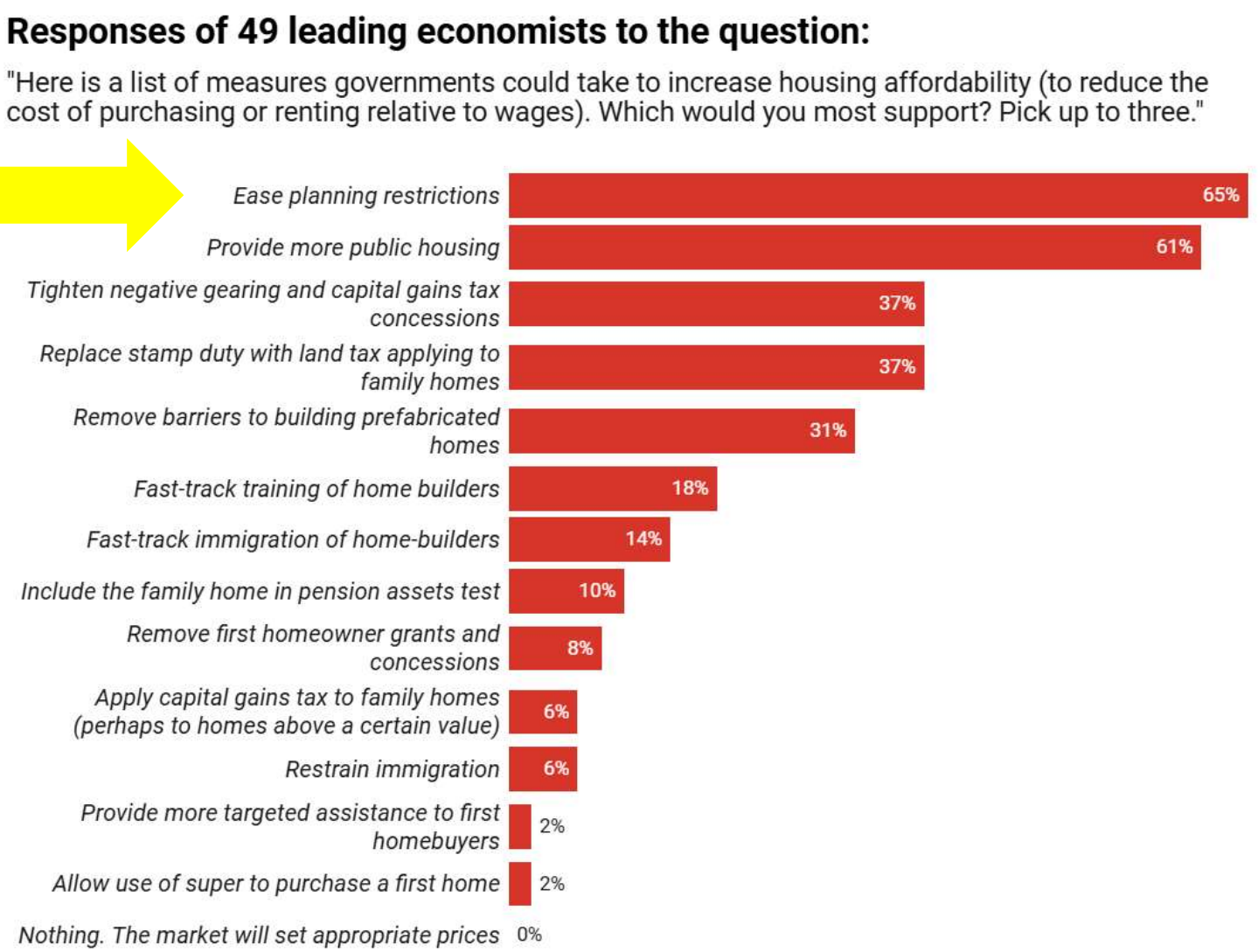
prosper australia this land is your land

Fresh Economic Thinking

Context

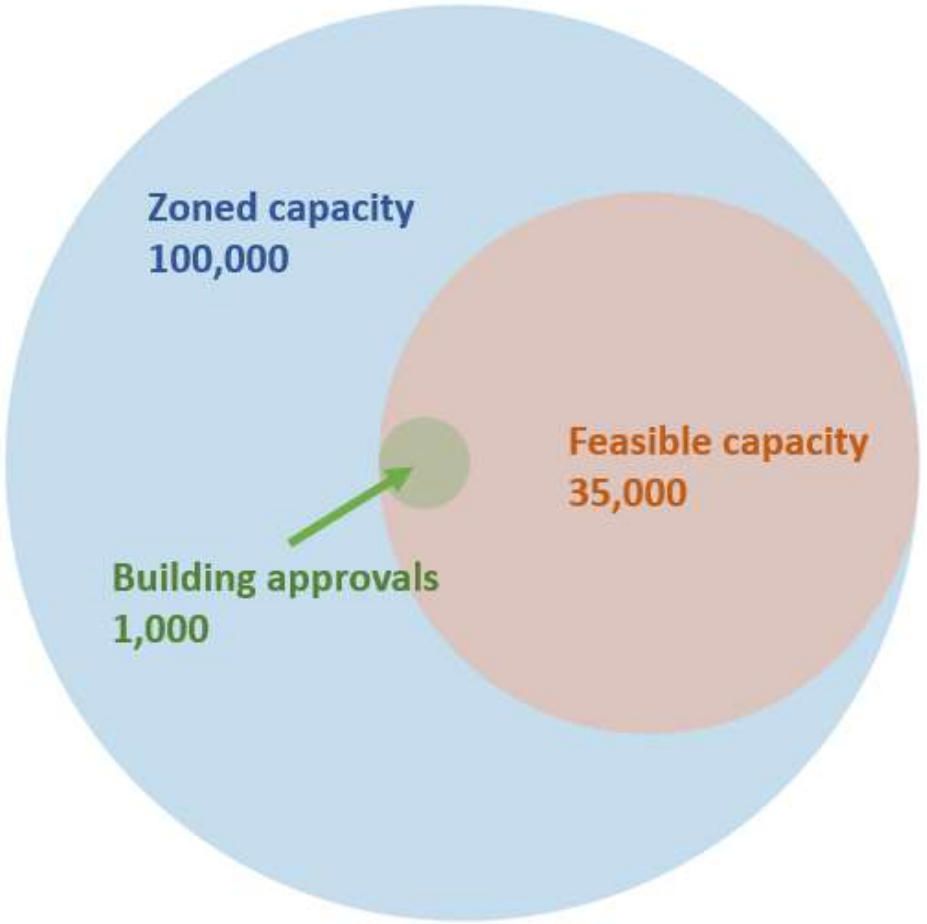
Why do we believe this?

What's our shared theory of housing supply and the effect of regulation?



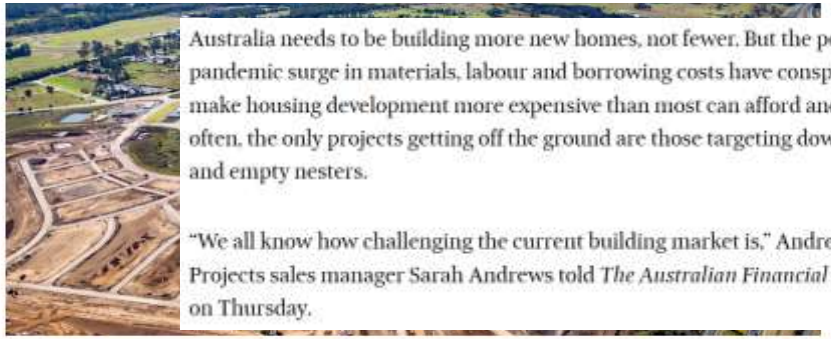
Why is most feasible development capacity not developed?

Wellington in 2022



Why is land priced so that buying to build is unprofitable?

More than 35,000 apartments and townhouses approved for development are sitting unbuilt in western Sydney, an area expected to absorb more than half the NSW forecast population growth to 2041, industry research shows.



Australia needs to be building more new homes, not fewer. But the post-pandemic surge in materials, labour and borrowing costs have conspired to make housing development more expensive than most can afford and all too often, the only projects getting off the ground are those targeting downsizers and empty nesters.

"We all know how challenging the current building market is," Andrews Projects sales manager Sarah Andrews told *The Australian Financial Review* on Thursday.

Vacant blocks in Menangle Park in western Sydney. Photo: Ray White

At the current run rate, new supply is likely to fall 400,000 homes short of that target.

The gridlock is due not to land-banking but high costs, according to developers and property analysts.

Increased material and construction costs, land prices, finance fees and more competition for a limited number of qualified trades are all contributing to the hold-up.

"A bunch of them are in distress. They're not viable and it's cost of delivery, an increase in building costs, the number of taxes, charges, levies – they're not financially viable."

But tough conditions are putting all but the most lucrative of projects on ice as developers can't make them stack up. KPMG analysis that the *Financial Review* published last month shows about 30,000 new homes have been approved in Sydney but not started.

This is why new housing isn't getting built

All the talk is about the planning process, zoning and development approvals. But projects won't go ahead if they don't stack up.

Robert Harley
Contributor

Oct 30, 2024 - 5.25pm

Many proposals, particularly in the middle ring suburbs that have the good transport connections and community amenities, and which the planners and politicians are keen to repopulate, simply don't work.

Land price, plus construction costs, plus development charges, and finance on extended project schedules, well exceed the prices that mortgage-challenged buyers can pay.

High costs choke supply of new homes: property experts

High interest rates and construction costs are choking off the supply of new housing, adding pressure to rents, squeezing first home buyers out of the market and putting the national target of 1.2 million new homes over five years out of reach, property experts say.

Dr Fotheringham said the reason approvals may be low was because builders already have land that has been approved for development and were waiting to build on it.

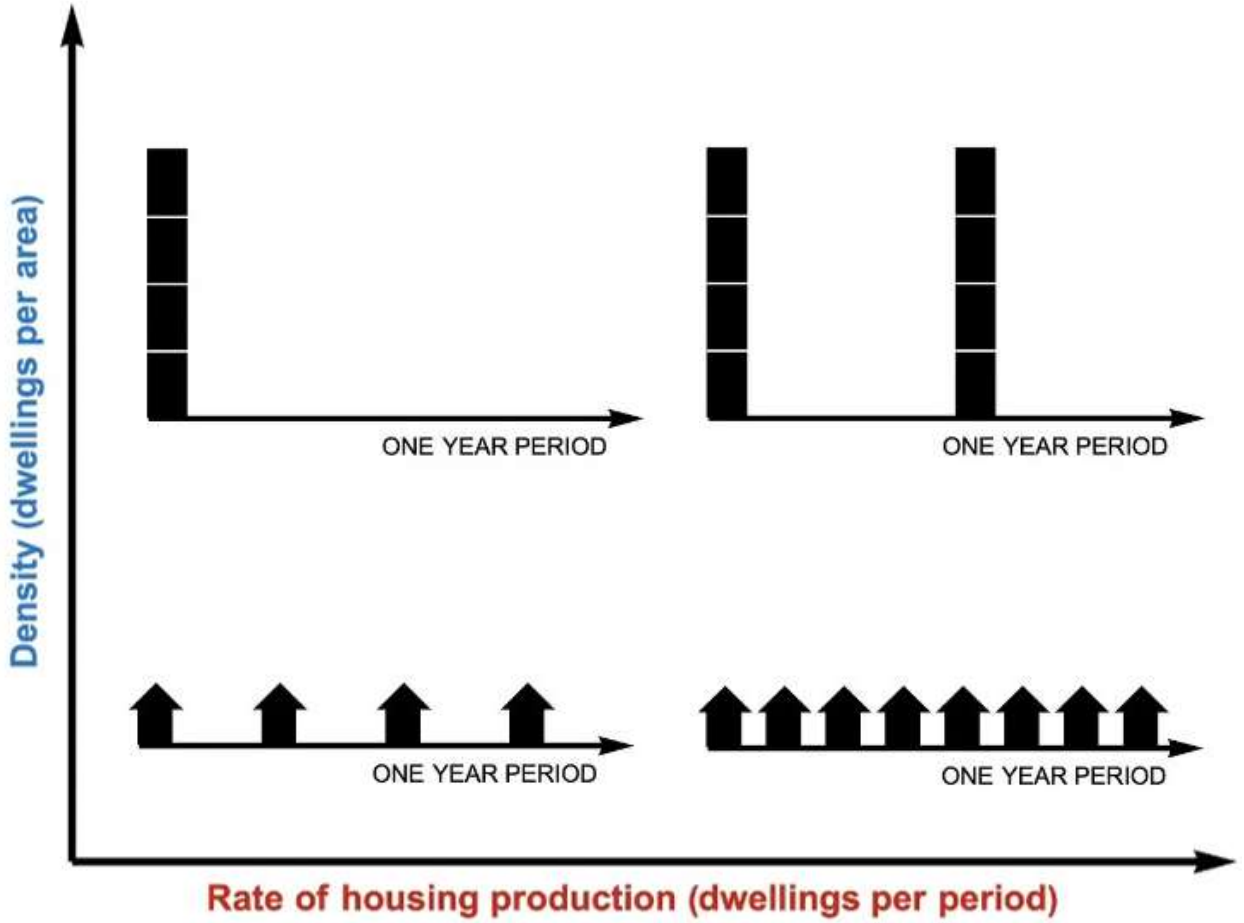
"For some of those properties, the feasibility of that development is not what it was when they first purchased the land because costs have gone up," he said.

"That can mean the need to go back for a new approval for a higher value development on that site."

Construction body says Australia will struggle to build 1.2 million new homes if building approvals don't improve

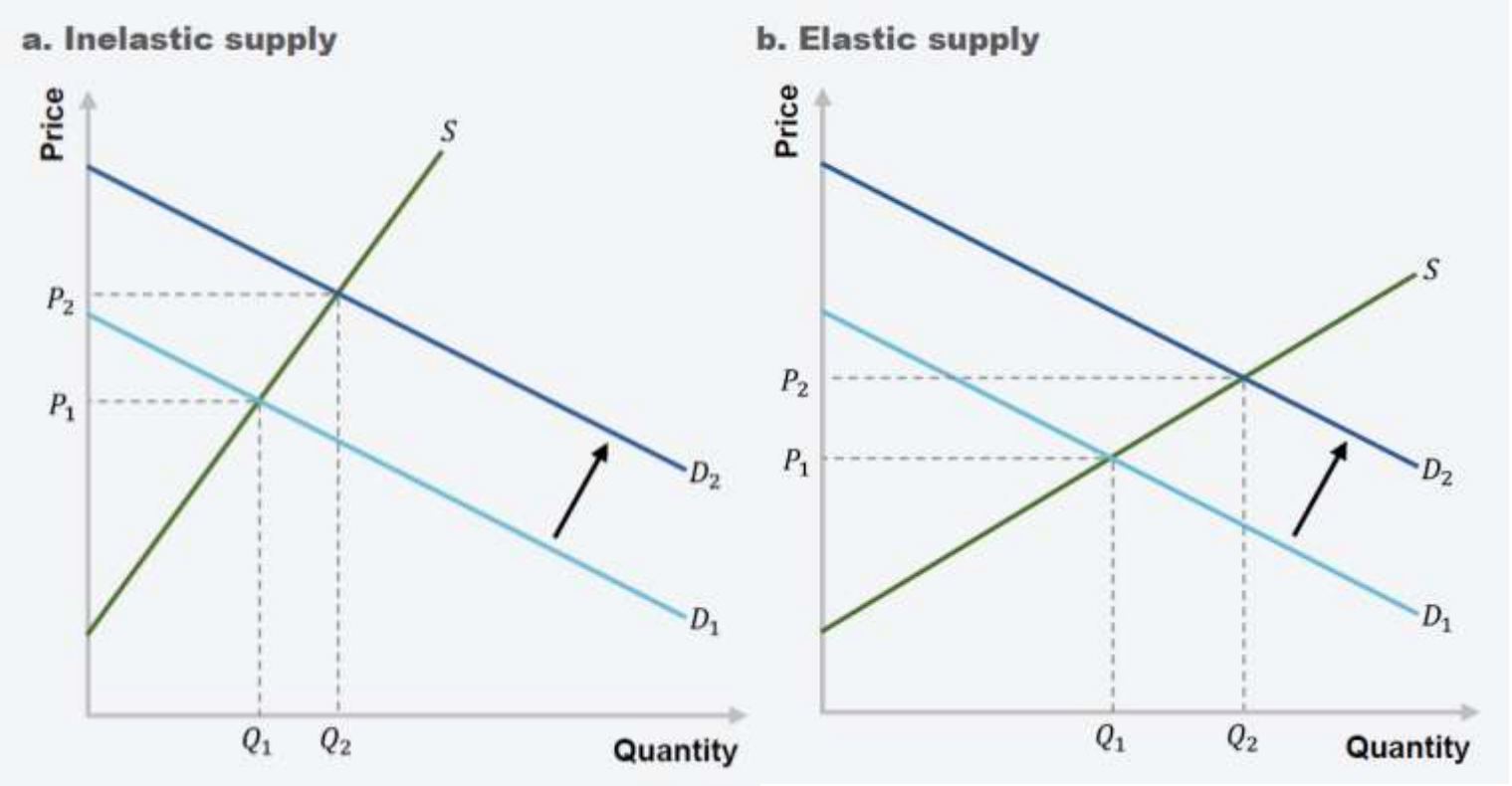
First: zoned density is not market supply!

- Zoning regulates housing per area (**density**)
- Market regulates housing per time period (**supply**)
- **Supply** = **Density** x **Area Developed**
- Density constraints don't constrain supply, because most sites feasible to develop are landbanked



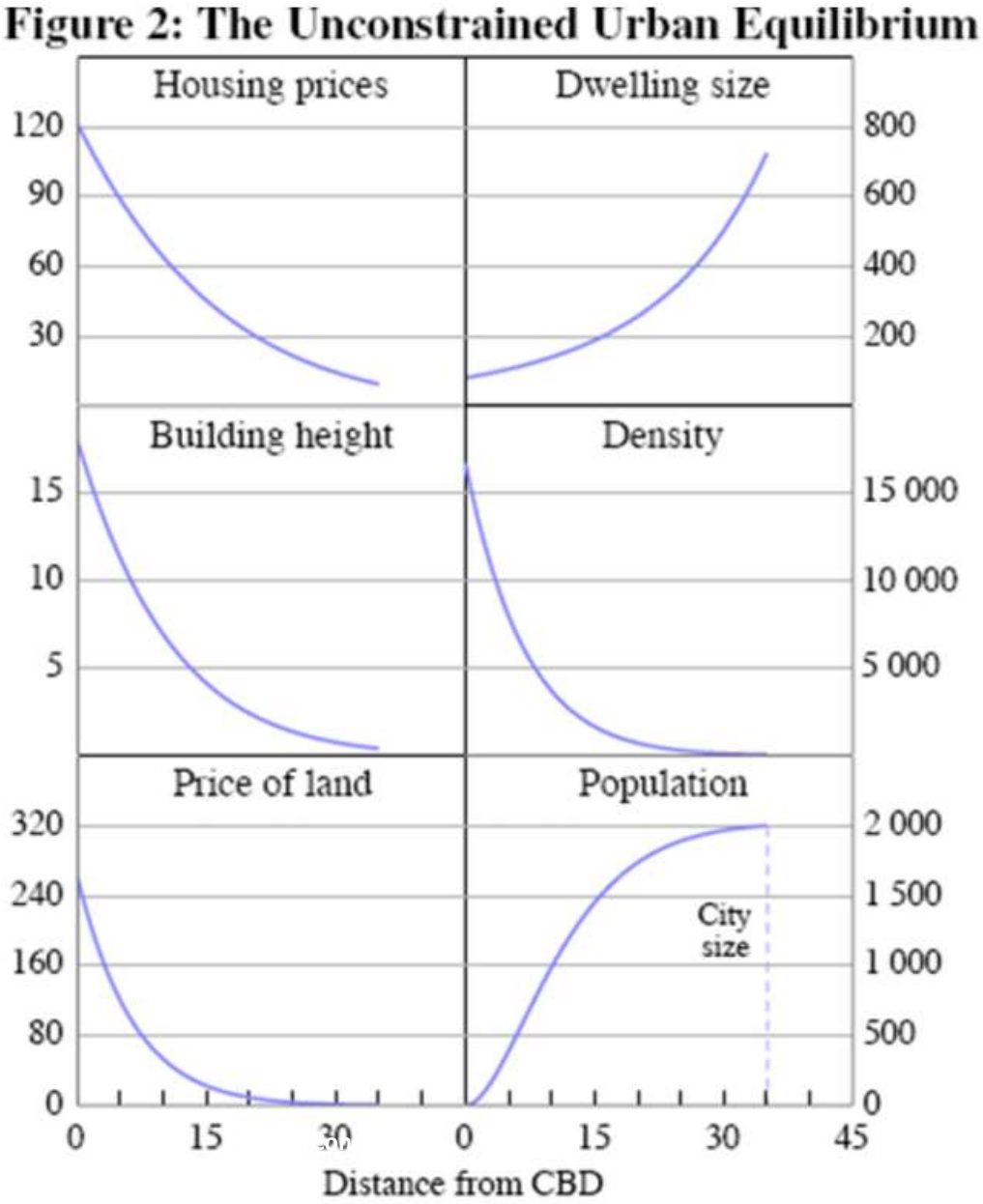
1. Static supply-demand model

- *"Houses are built because people are willing to build them"*
- Not an explanatory theory
- Policy reasoning is ad hoc



2. Urban spatial model (AMM)

- *"Houses are built to the optimal density for the location"*
- No development in this model
- A theory of density, not supply



3. Static investment (Tobin's *q*) theory

- *"Houses are built when prices exceed input costs"*
- Supply as myopic arbitrage between 3 prices:
  - House
  - Construction
  - Land
- Can't explain land prices – so can't explain supply
- An accounting identity, not a causal theory
- Need a joint theory of land price and supply

q-theory: invest when
House > Construction + Land

+

Residual Land Value (RLV) pricing:
Land = House – Construction

=

Empty theory: invest when
House > House ?!

4. Dynamic investment theory

- *"Houses are built when it's more profitable than landbanking"*
- **Supply:** invest when returns to development > returns to delay
  - Central role for landbanking: supply begins when speculation ends
- **Land price =** present value of RLV at optimal time to develop (> current RLV)
- Real options (timing choice) models:
  - Time development to maximise present value of future returns (i.e. balance sheet value)
  - Optimal timing equates return on developing and waiting
  - Equilibrium absorption rate sees undeveloped land value grow at market rate of interest
  - Land priced as the value of the option to build
  - Hotelling (1931), Titman (1985), Guthrie (2010), Murray (2020), Guthrie (2024)

Does upzoning boost supply? Not in economic theory

- Upzoning increases present *and* future profit – no systematic change to "develop vs delay", so doesn't bring forward development
- **Titman (1985):** restrictive zoning can discourage speculation on higher-density development becoming profitable later:

Zoning	Optimal now (PV)	Optimal later (PV)	Action
Low density	2 storeys (**$$**)	2 storeys ($)	Develop
High density	2 storeys ($$)	4 storeys (**$$$**)	Delay

- **Guthrie (2024):** models joint density/timing choice and finds ambiguous zoning effects that depend on parameters

Is regulation like a ‘tax’ that raises house prices? No

- Growing literature claiming land prices exceed ‘underlying’ (free market) costs and can be decomposed into good (cost) and bad (profit) bits

Method	Land should cost:	Why?
Glaeser & Gyourko (2018)	25% of construction cost	Rule of thumb from asking builders
NZ Government (2017)	<33% of house price	Median multiples during the old days
Glaeser & Gyourko (2003)	Price of marginal sqm	Unspecified arbitrage process: relocate marginal land? Reshuffle houses to free up new lots?
NZ Treasury and others	Farmland price	Differences in land-use rights should be worthless; deregulate until no-one wants more

- Issues:
  - **Ad hoc:** supposed free-market prices not grounded in theory
  - **Wrong cost:** the true (opportunity) cost of using land for housing is the value of delay = land price
- There’s no underlying cost of land – there’s just a price, which is 100% economic rent

Is land a monopoly in the large? Yes – ownership selects for patience and maximum joint profit

<u>How to survive as a fish:</u>

1. Stay close to other fish
2. Turn when other fish turn

→ maximises joint and individual survival

<u>How to thrive as a landowner:</u>

1. If land price > development profit, sell or hold
2. Otherwise, develop

→ maximises joint and individual land rent

Zoning and housing supply: empirics in search of a theory

Tim Helm, Prosper Australia
Cameron Murray, Fresh Economic Thinking
Australian Conference of Economists (ACE), Sydney, 8 July 2025

prosper australia this land is your land

Fresh Economic Thinking

NSW Productivity Commission (2024)

About 1,500 new apartment buildings were built in Sydney between 2017 and 2022.[1] These buildings averaged seven storeys and contained ten dwellings per storey (NSW Productivity Commission, 2023a). If instead we had permitted modestly denser development — for example, if apartments had averaged ten storeys instead of seven — then an extra 45,000 homes could have been provided, all without using any extra land and with minimal effect on neighbourhood character.

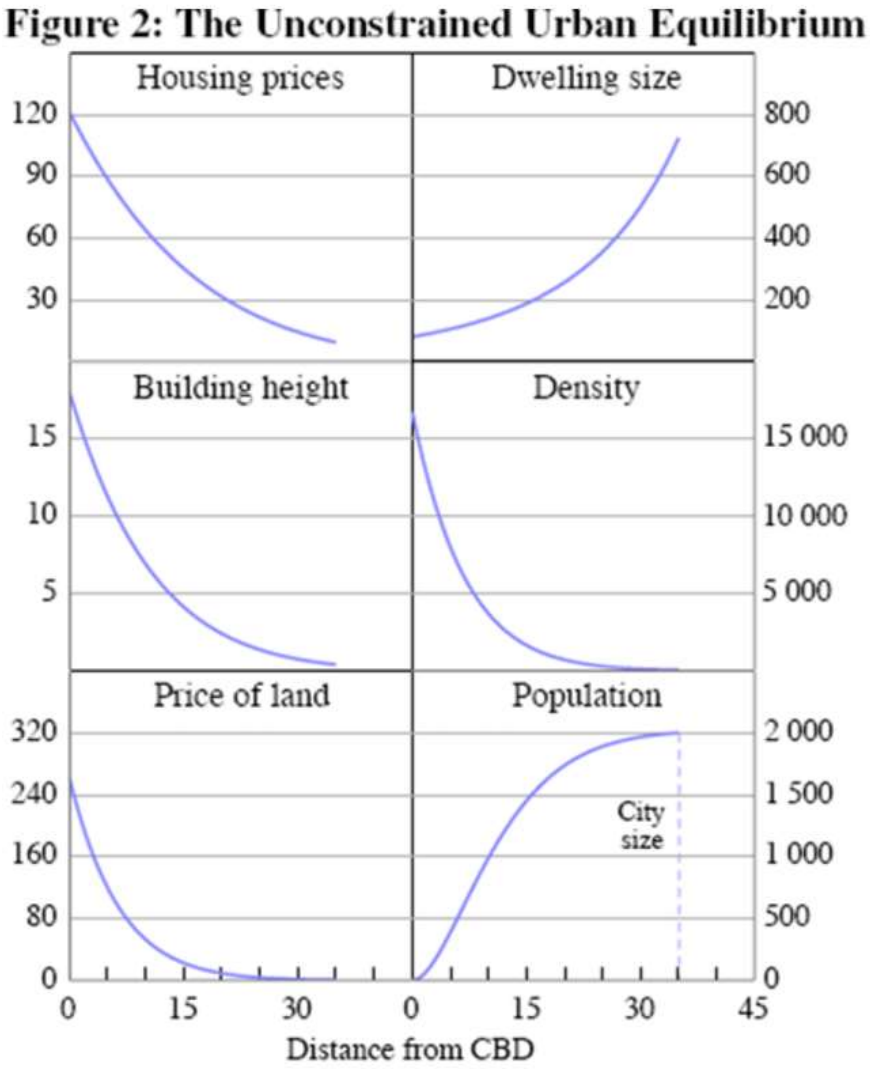
The additional 45,000 units would represent a little over two per cent increase in Sydney's private dwelling stock.[2] Typical rules-of-thumb suggest this extra supply would have lowered apartment prices and rents by 5.5 per cent, all else being equal (Saunders & Tulip, 2019). In dollar terms, this is a saving of about $35 a week in rent on the median apartment – or $1,800 a year. For a median-income earner, this is equivalent to a 2.75 per cent increase in their real purchasing power, similar to a typical year's wage rise.[3]

Most feasible development capacity is not developed

- **Feasible:** change of use adds more value net of cost than existing use
- Feasible → actual per year (examples):
  - Australian greenfields: 3.4%
  - South-East Queensland greenfields: 2.5%
  - South-East Queensland apartments: <5%
  - Auckland: 2%
  - Wellington: 3%
- **Landbanking:** a site feasible to develop is not developed.

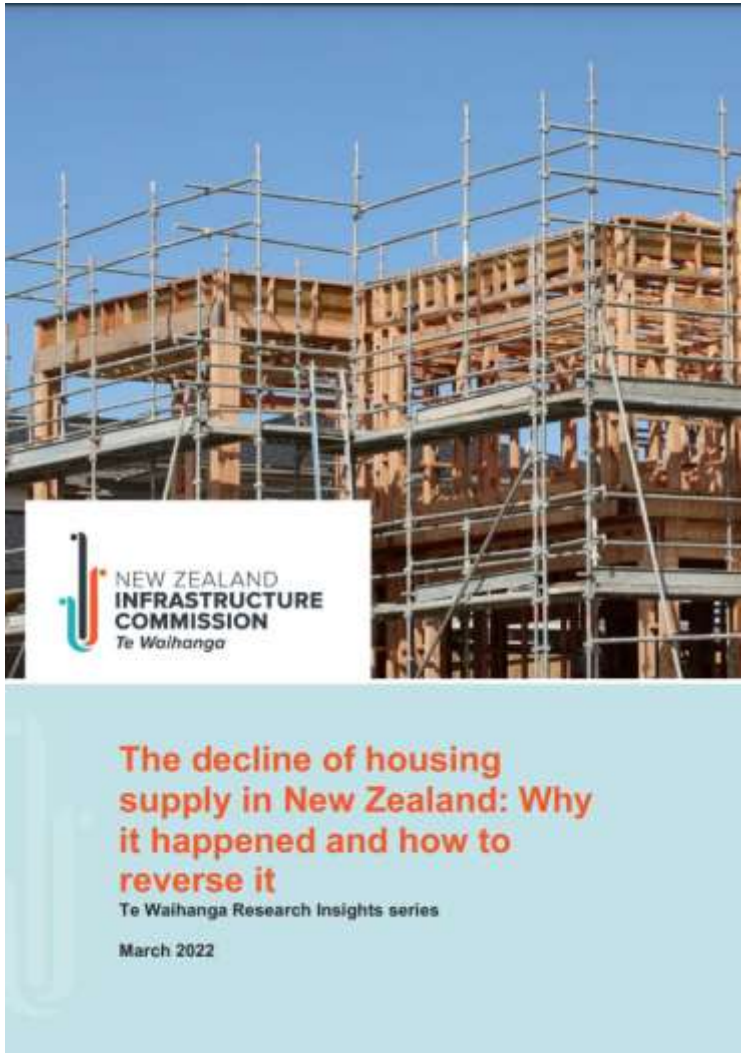
Alonso-Muth-Mills density model irrelevant to supply

- Base case
  - Fix population
  - Spread over the city area
  - Assume land fully developed
  - Estimate density and price
- Comparative statics
  - Change a parameter (e.g. zoning)
  - Assume housing stock perfectly malleable
  - Assume population perfectly immobile
  - Re-estimate density and price



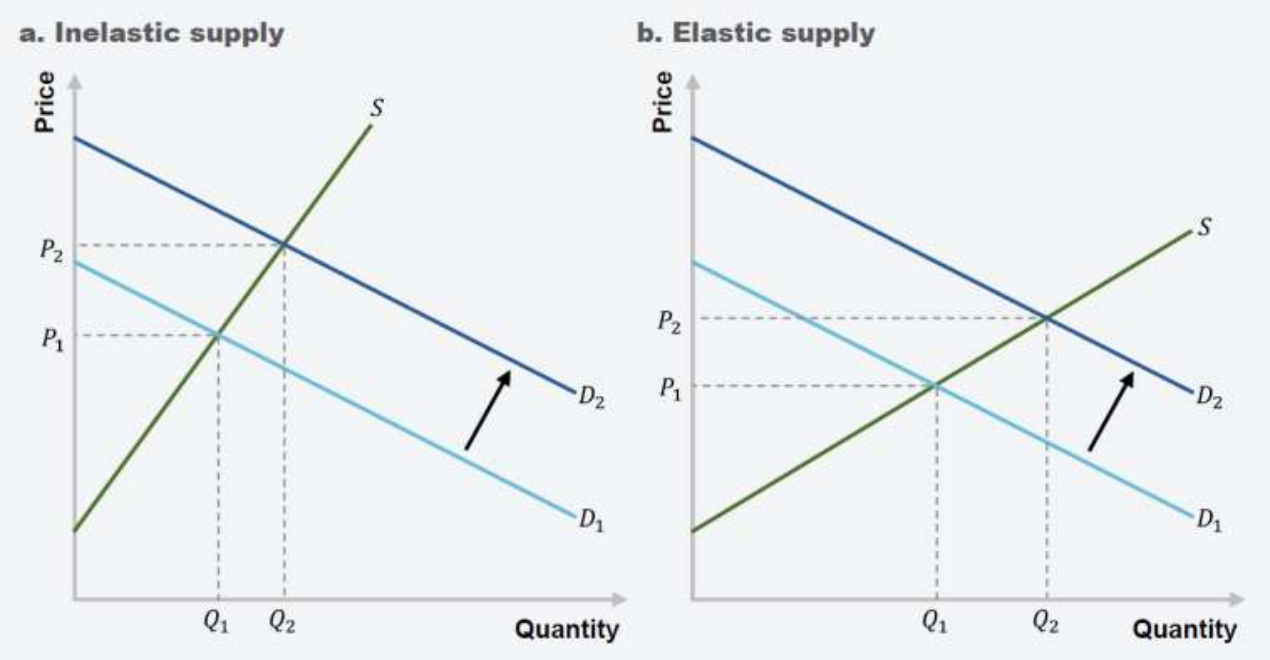
Alonso-Muth-Mills density model irrelevant to supply

"If we had not downzoned central Auckland in the 1970s… then housing would now be more abundant and house prices would be lower… Auckland housing prices would be roughly half as high as they were in 2018"



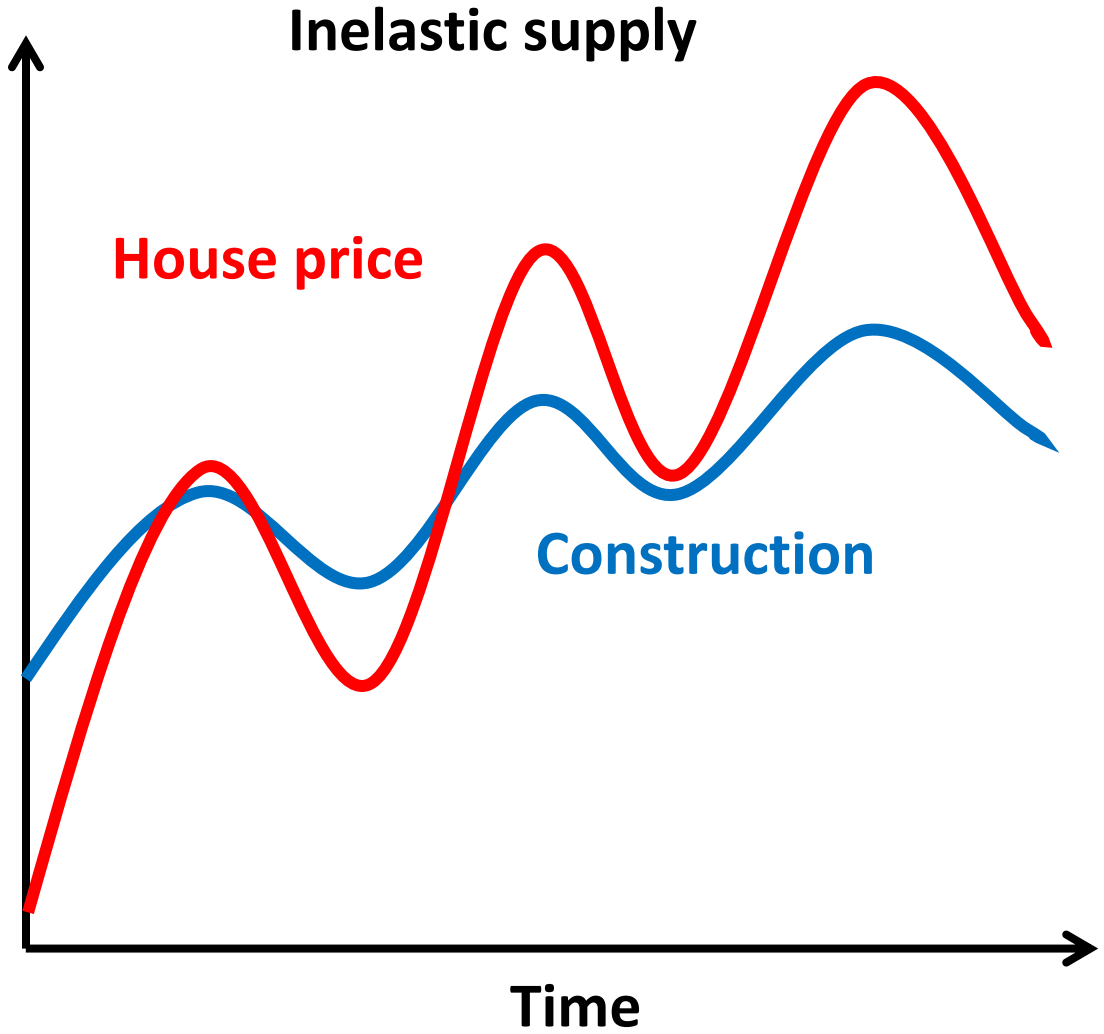
1. Static supply-demand: ad hoc reasoning (PC 2022)

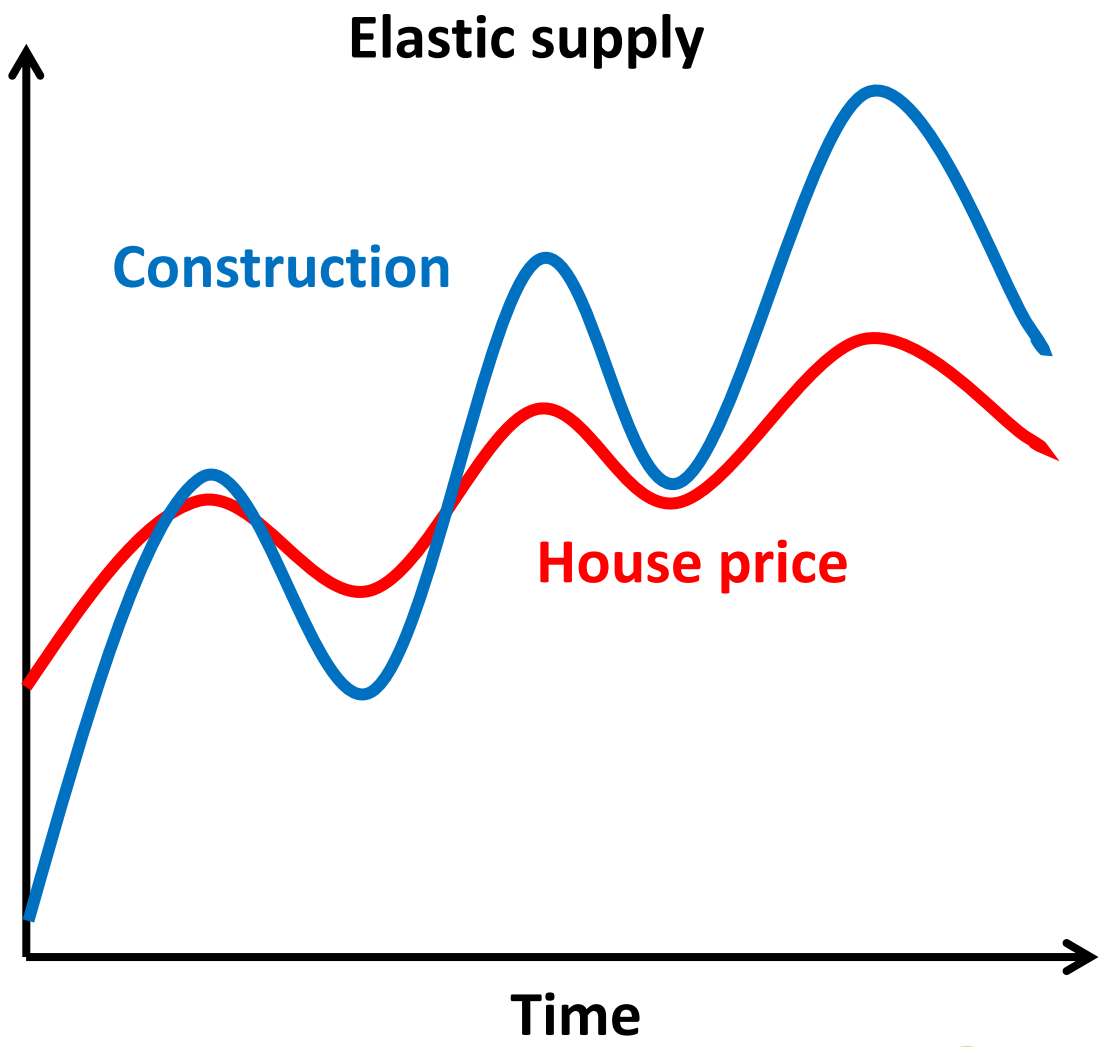
- *"Zoning restrictions that limit higher density housing … cap the number of dwellings that can occupy that space.*
- *If these caps are binding (in other words, if developers would like to build more housing than the restrictions allow)… an inadequate amount of housing is supplied."*



→ Fallacy of composition: conflates effect on site (density) with effect on market (supply)

Do we even want more elastic supply?





Auckland: Six academic papers and their limitations

Tim Helm and Cameron Murray

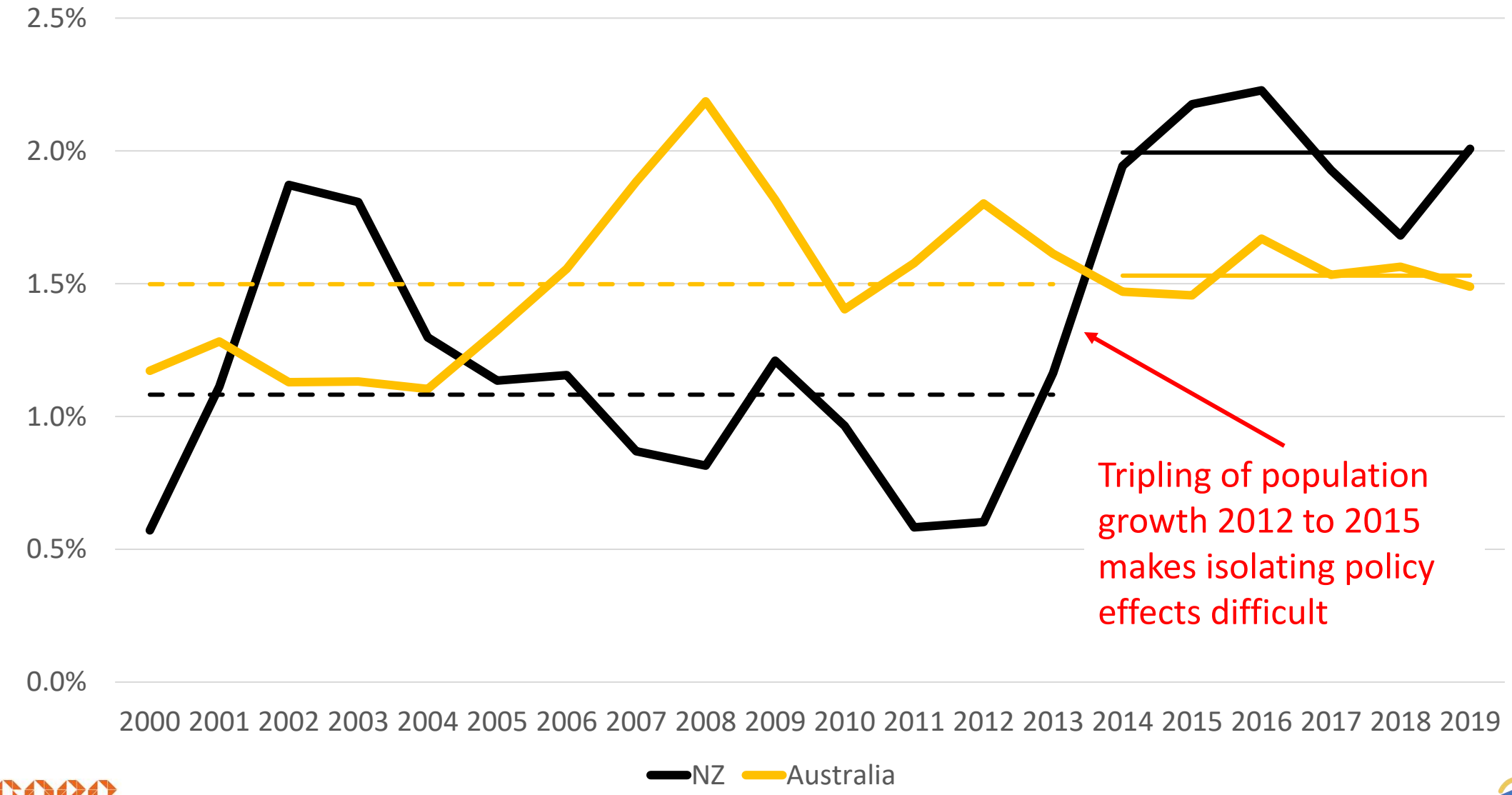
prosper australia this land is your land

Fresh Economic Thinking

Auckland Unitary Plan (2016)

- Major city-shaping change:
  - 75% of city upzoned
  - Tripled zoned capacity: 37 → 107 years supply
  - Attached housing share 44% → 69%
  - Average new dwelling -46 sqm (24%) smaller vs -28 sqm (15%) for rest of NZ
  - Construction boom, and rent growth slower than rest of NZ
- ***Mission accomplished for affordable housing?***
- Why it's technically hard to study:
  - No clear theory
  - Low-quality stats
  - Smaller new dwellings
  - Major population boom

NZ's population boom 2014→2019

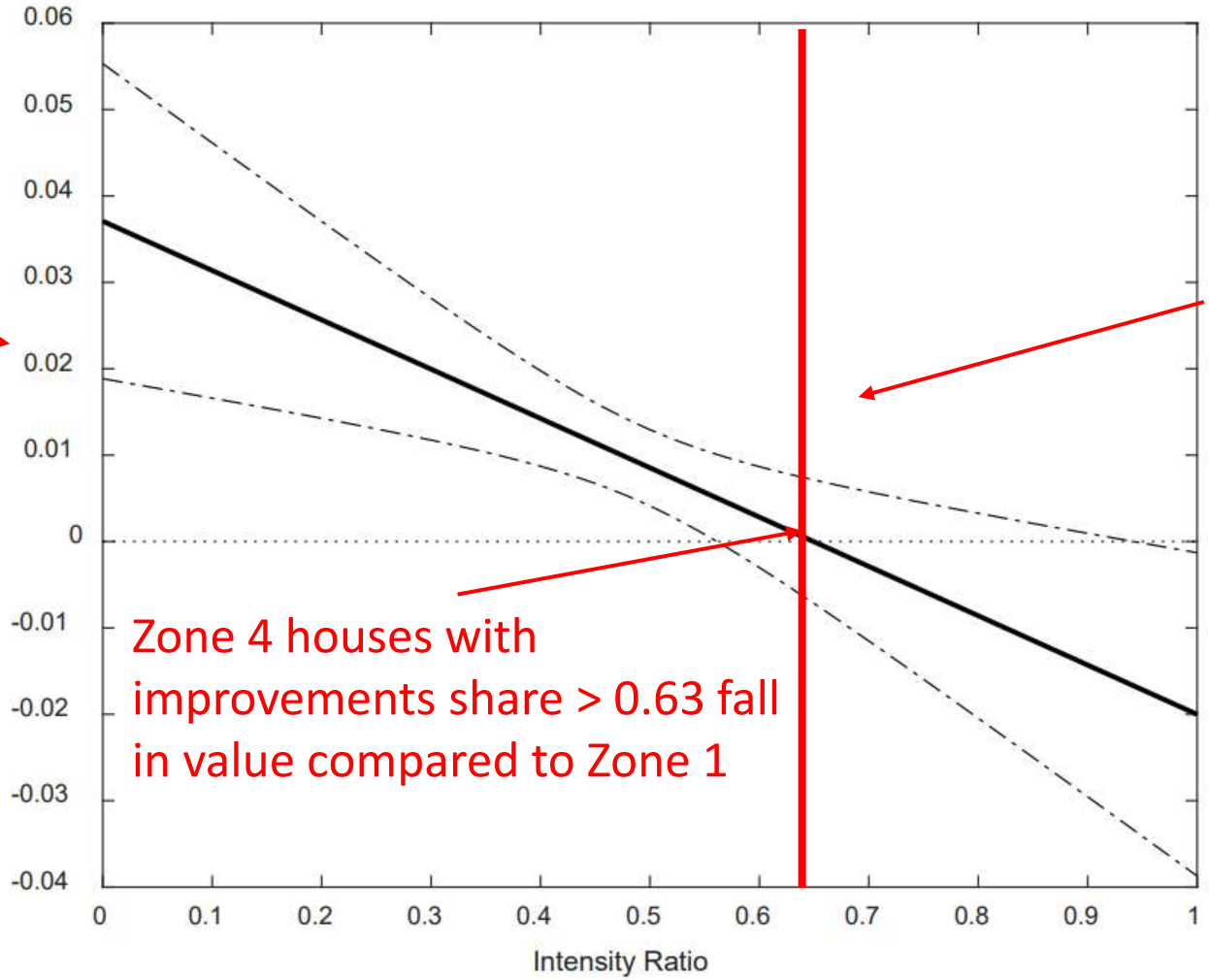


1. Did upzoning reduce house prices? (2021)

- Greenaway-McGrevy, R., Pacheco, G., & Sorensen, K. (2021). The effect of upzoning on house prices and redevelopment premiums in Auckland, New Zealand. *Urban studies*, 58(5), 959-976
- **Method:** repeat-sales comparison of upzoned vs non-upzoned areas
- **Finding:** *"intensively developed properties decrease in value relative to similar dwellings that were not upzoned, showing that the large-scale upzoning had an immediate depreciative effect on pre-existing intensive housing."*
- **Issues:** extremely misleading – because there's no data in the relevant range:
  - **99%** of upzoned houses appreciate (by an average +6% vs non-upzoned)
  - Only **1%** of upzoned houses depreciate (by an average -1% vs non-upzoned)
  - Non-upzoned houses appreciated **+67%** over the 6-year study period

1. Did upzoning reduce house prices? (2021)

Average annual price growth compared to Zone 1 (not upzoned)



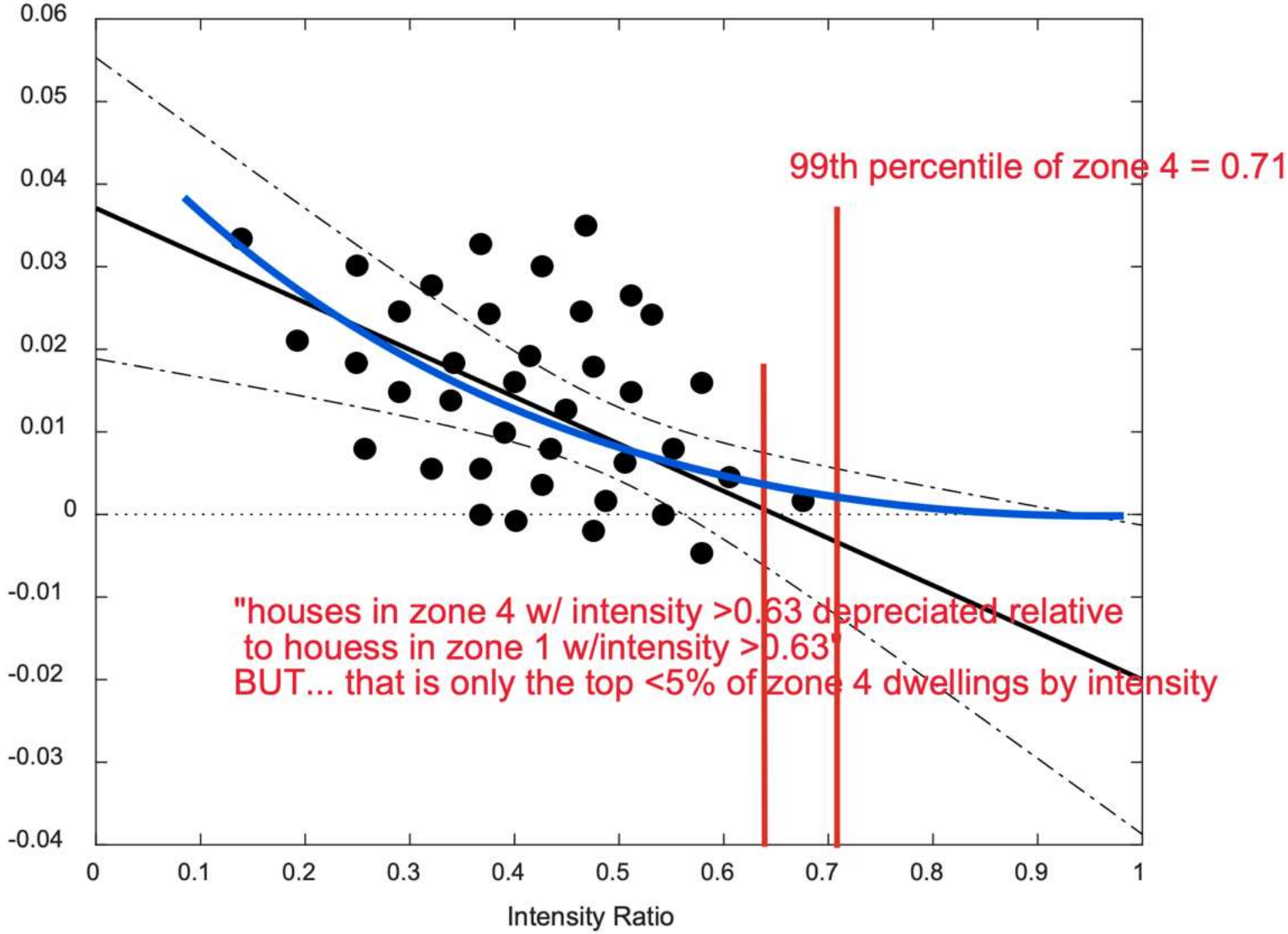
Zone 4 houses with improvements share > 0.63 fall in value compared to Zone 1

0.63 cutoff = 96th percentile

Only 4% of Zone 4 houses to the right of this line.

Average decline vs Zone 1 = 0.3% p.a. (=2% over 6 years)

Terrace Housing and Apartments (Zone 4)

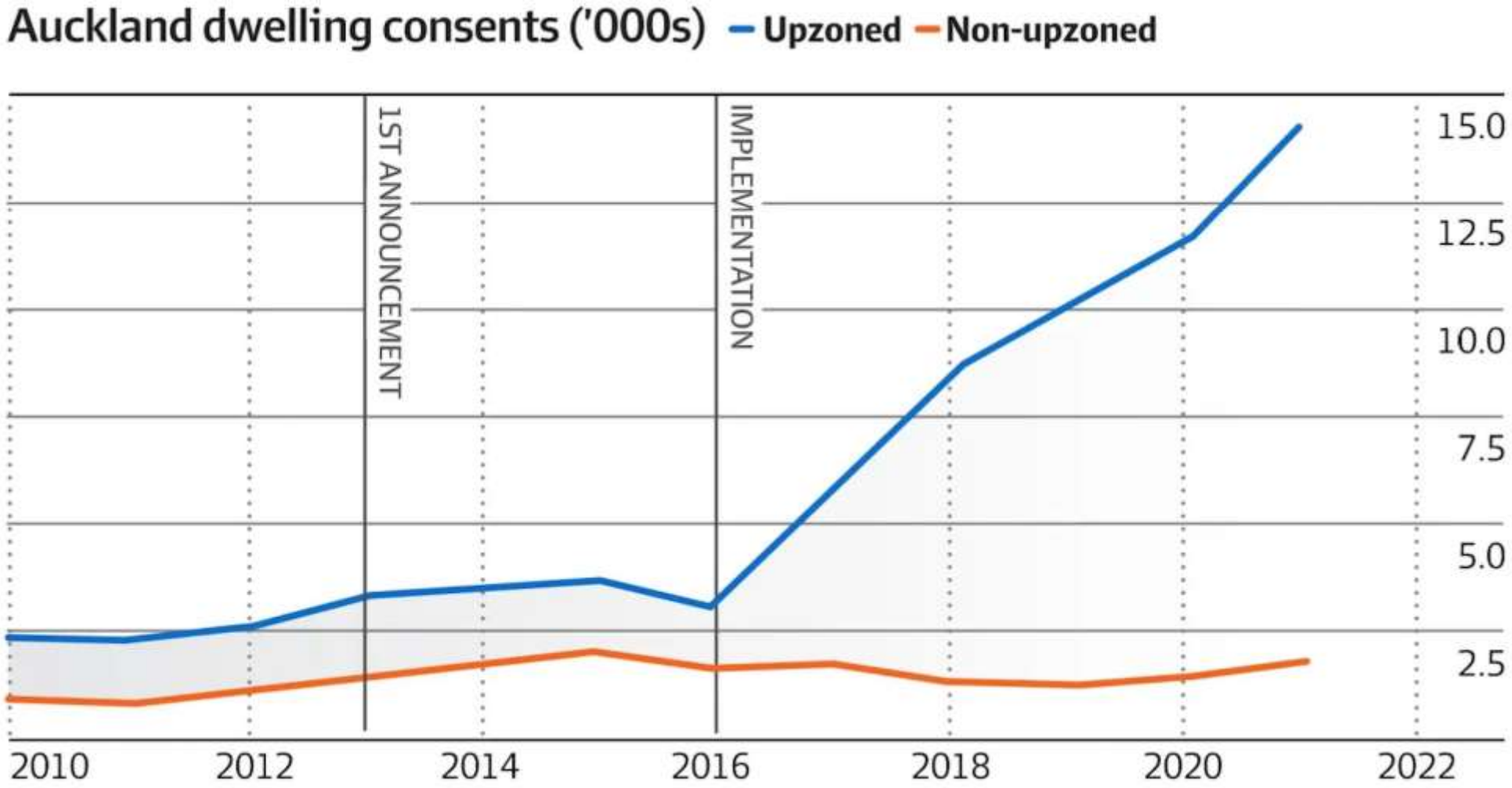


Terrace Housing and Apartments (Zone 4)

2. Did upzoning increase construction? (2023a)

- Greenaway-McGrevy, R., & Phillips, P. C. (2023). The impact of upzoning on housing construction in Auckland. *Journal of Urban Economics*, 136.
  - Plus Greenaway-McGrevy, R. (2023). The impact of upzoning on housing construction in Auckland: Update and extended results (Working Paper)
- **Method:** compare upzoned area consents to non-upzoned areas then adjust for estimated spillovers (=substitution between areas/types)
- **Finding:** *"21,808 additional dwellings were permitted over the five years following the zoning reform, corresponding to approximately 4.11% of the dwelling stock of the Auckland region"* [25% of permits 2016-2021]
- **Issues:**
  1. biased sample creates fake structural break
  2. counterfactual = straight line extrapolation despite cycle
  3. consents ≠ construction

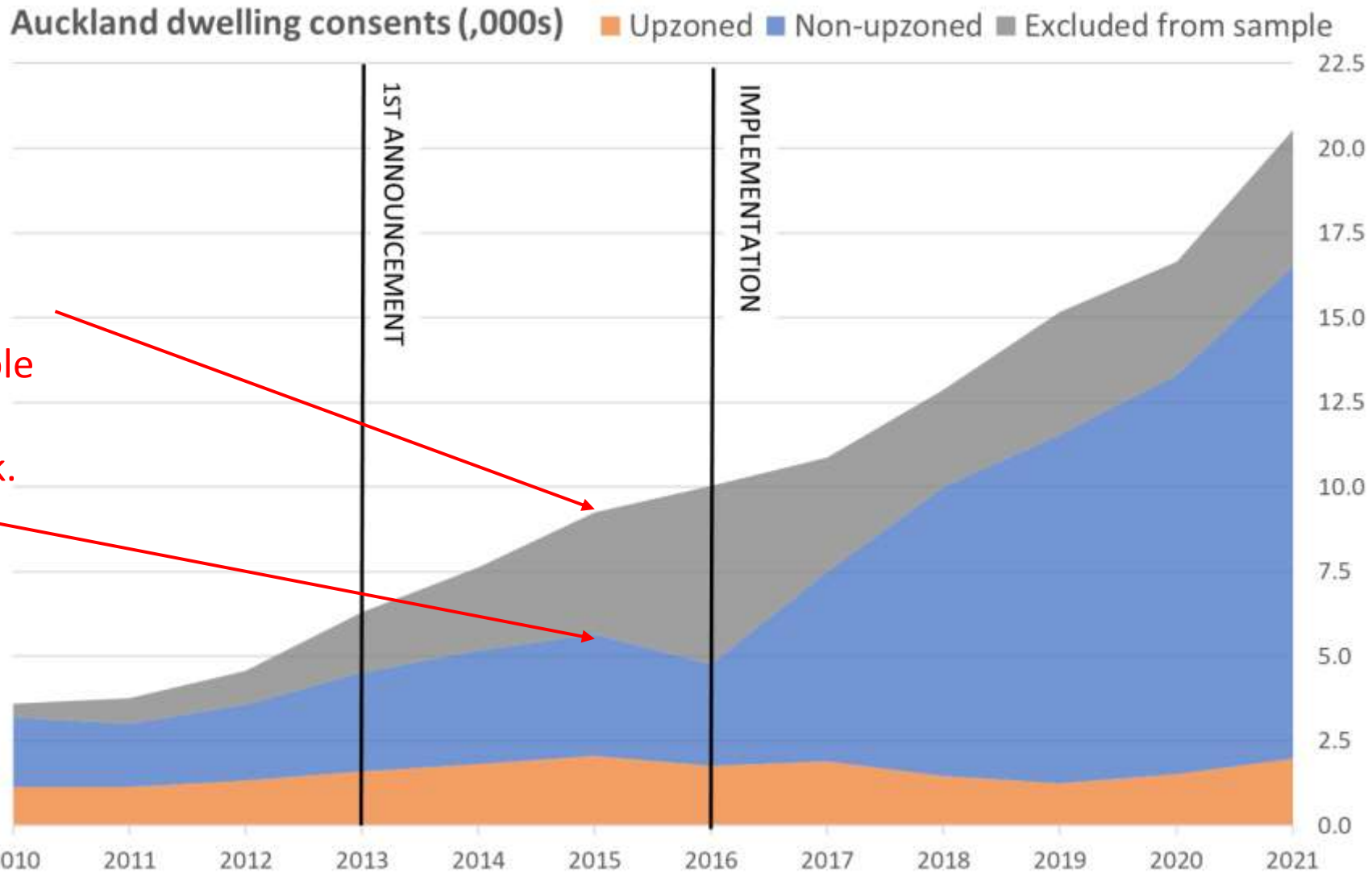
2. Did upzoning increase construction? (2023a)



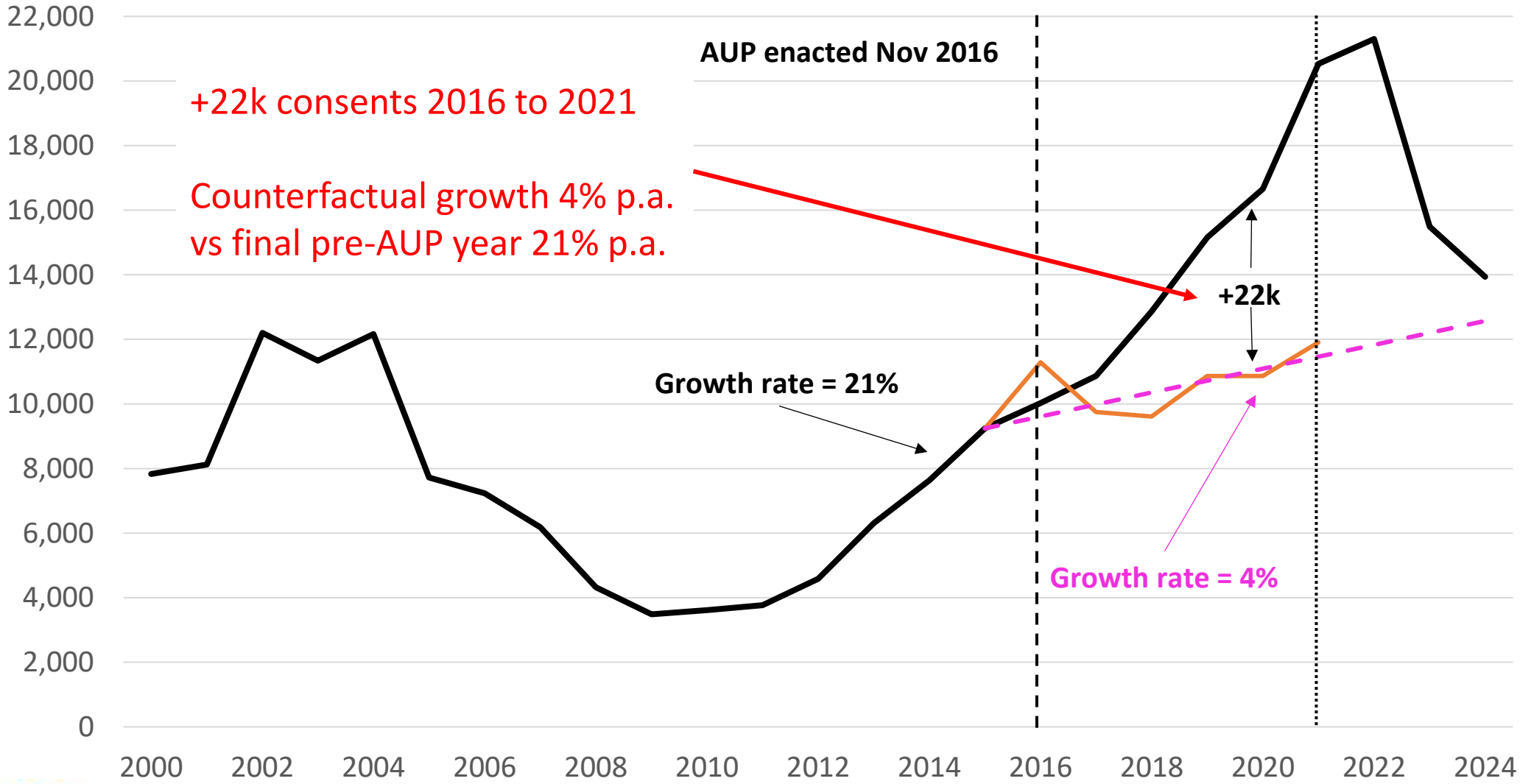
2. Did upzoning increase construction? (2023a)

The full dataset shows steady growth.

The study sample shows a structural break.



2. Did upzoning increase construction? (2023a)

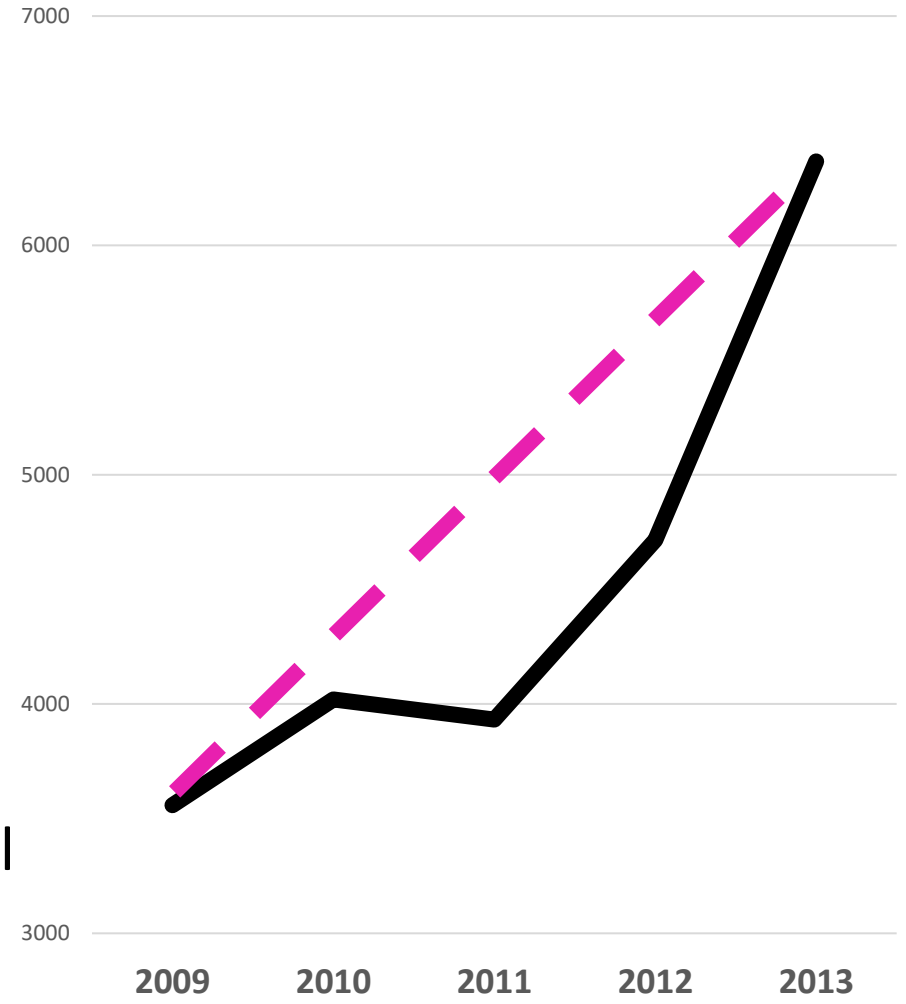


prosper australia this land is your land

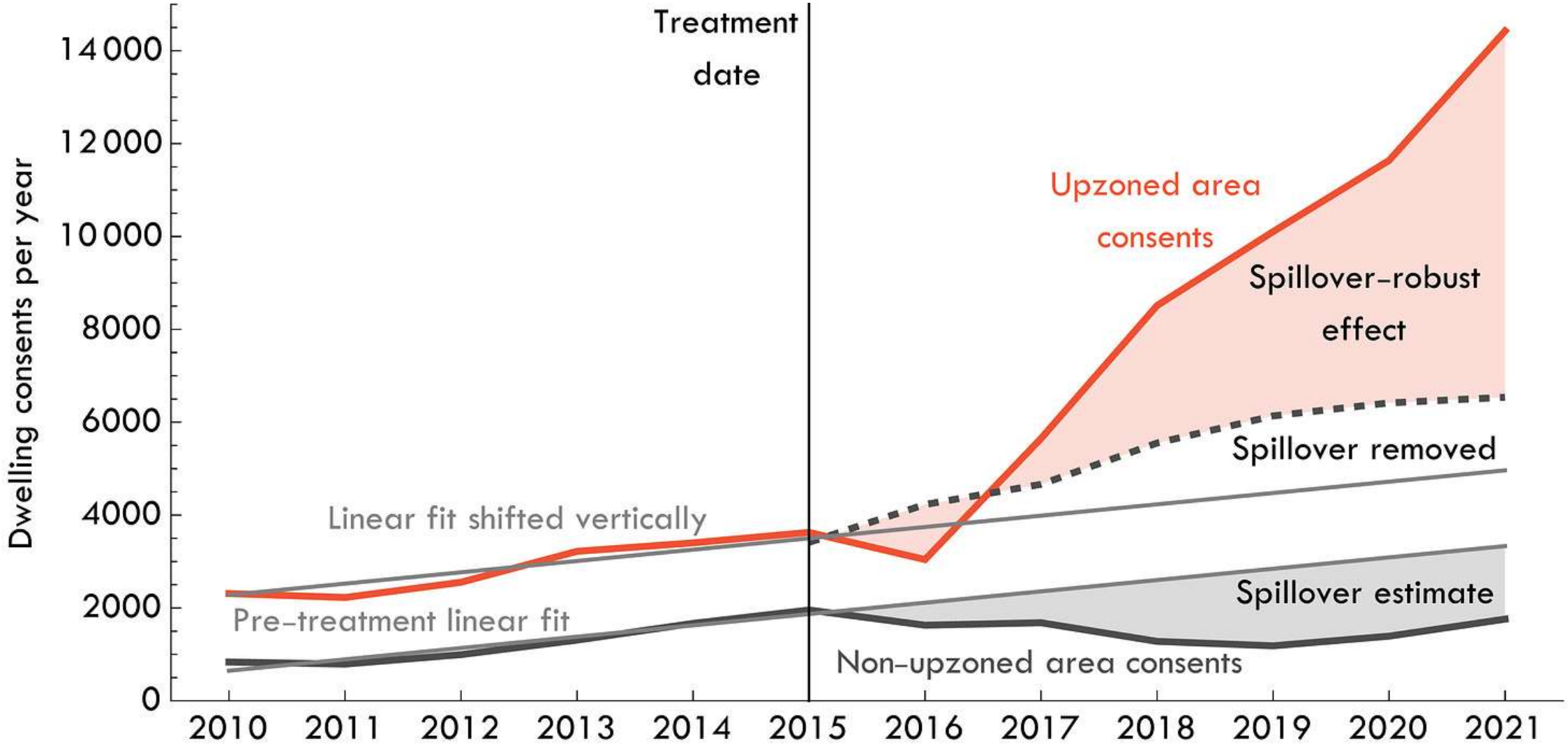
Fresh Economic Thinking

2. Did upzoning increase construction? (2023a)

- **Other issues (for another day):**
- Consents ≠ completions ≠ net additions:
  - Extended lags during post-AUP boom
- Extension paper: *"cumulative spillover adjusted treatment effects correspond to an additional 27,101 permits, or 5.11% of the dwelling stock."*
  - Full sample with treatment date = 2013
  - Same linear extrapolation
  - Fails "parallel trends" condition for D-i-D analysis
- Significance result meaningless:
  - Treatment > control even when extrapolating control at 4x pre-AUP trend
  - Just cyclical growth: 41 of 67 NZ TAs pass this test



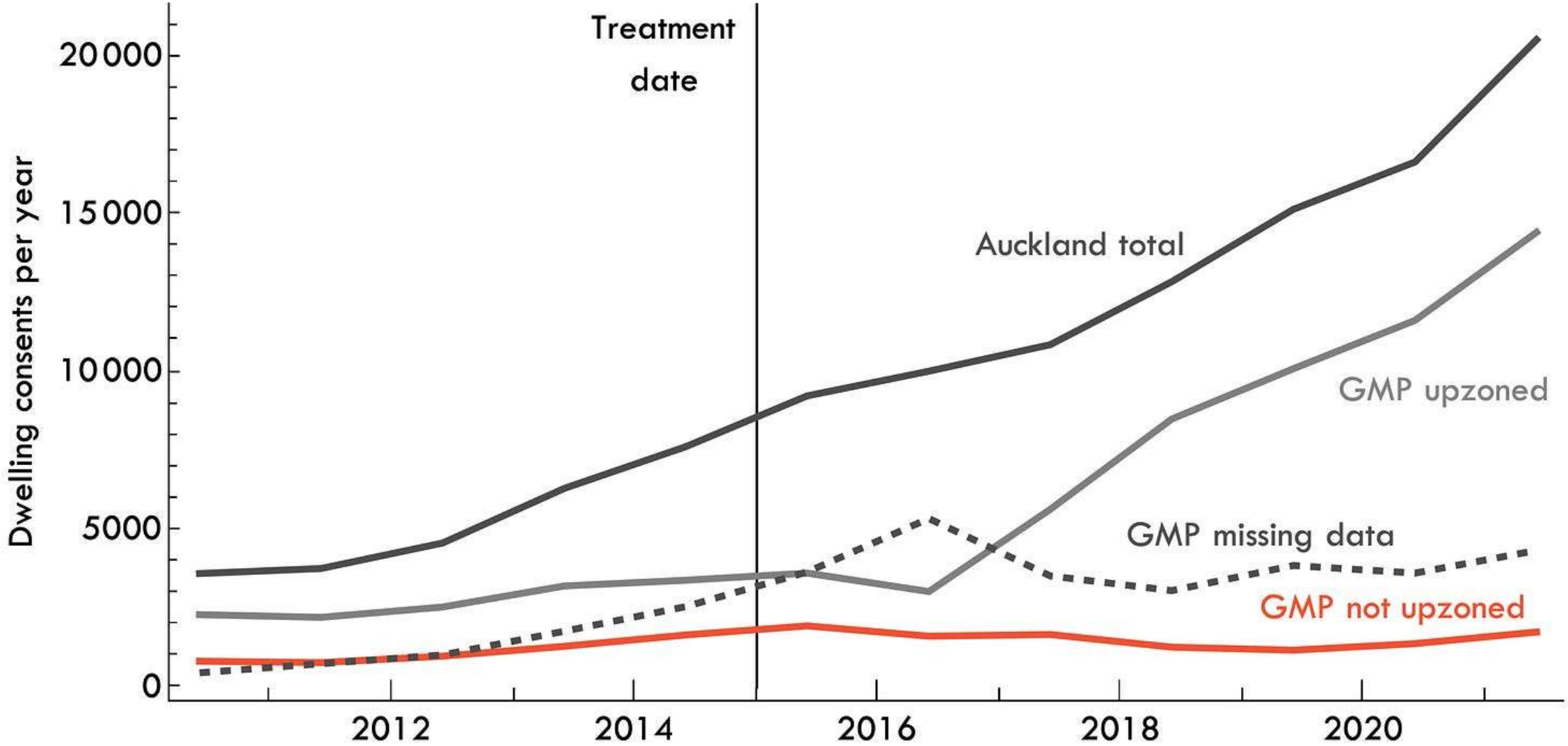
2. Did upzoning increase construction? (2023a)



prosper australia | this land is your land

Fresh Economic Thinking

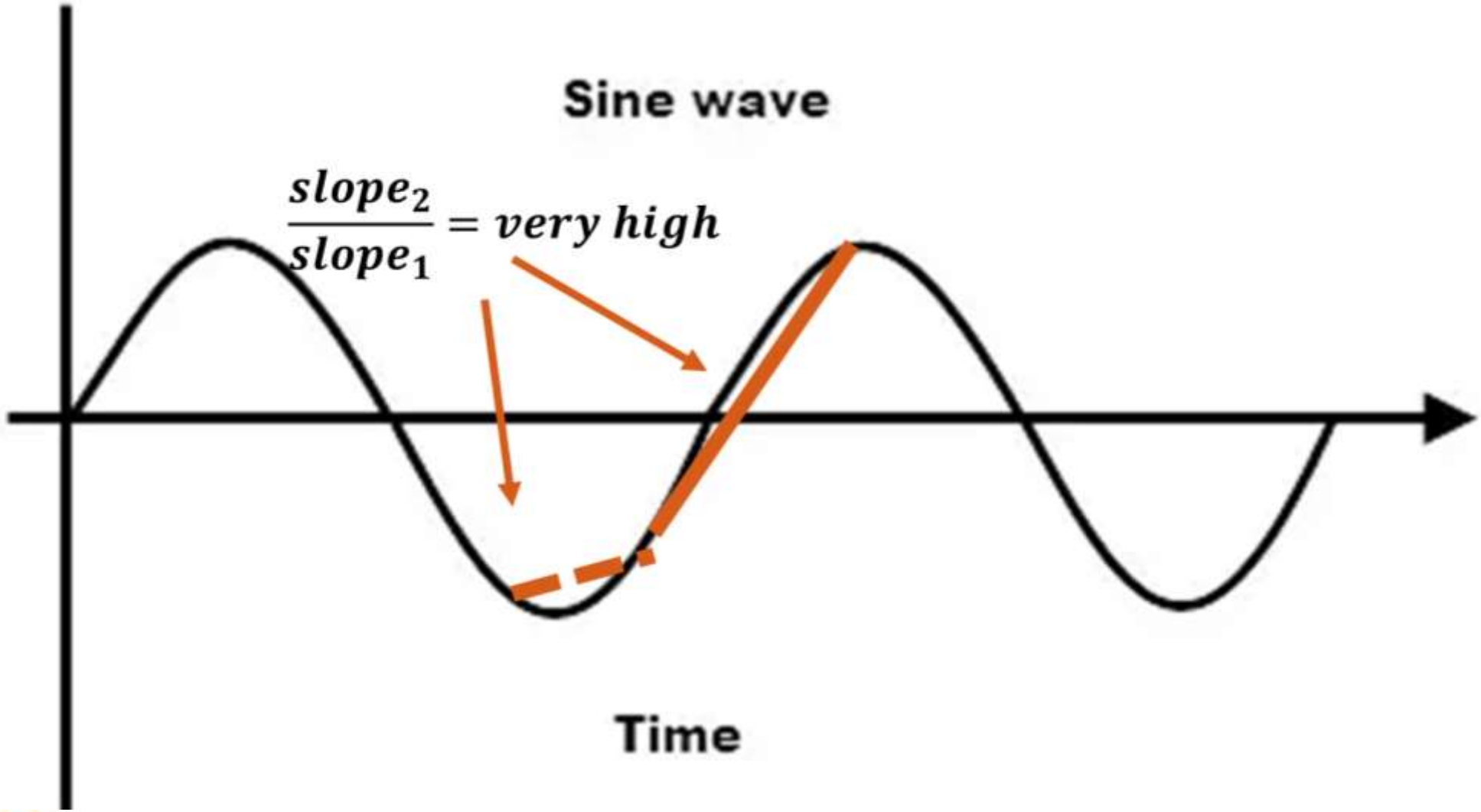
2. Did upzoning increase construction? (2023a)



prosper australia | this land is your land

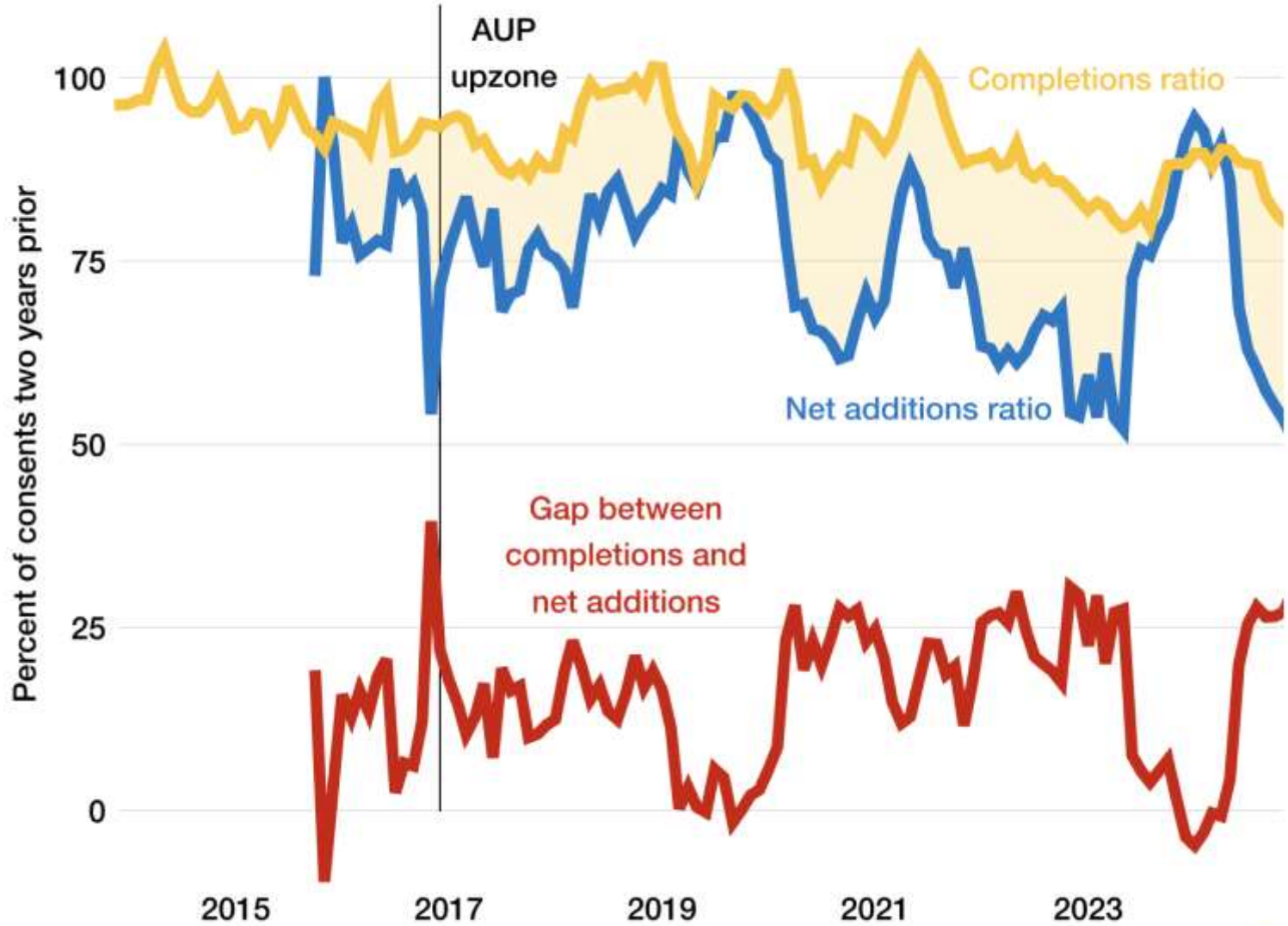
Fresh Economic Thinking

2. Did upzoning increase construction? (2023a)



Auckland dwelling completions and net additions relative to consents

There's been a rising gap between completions and net additions



Sources: EMI Electricity Authority, StatsNZ, Auckland Council

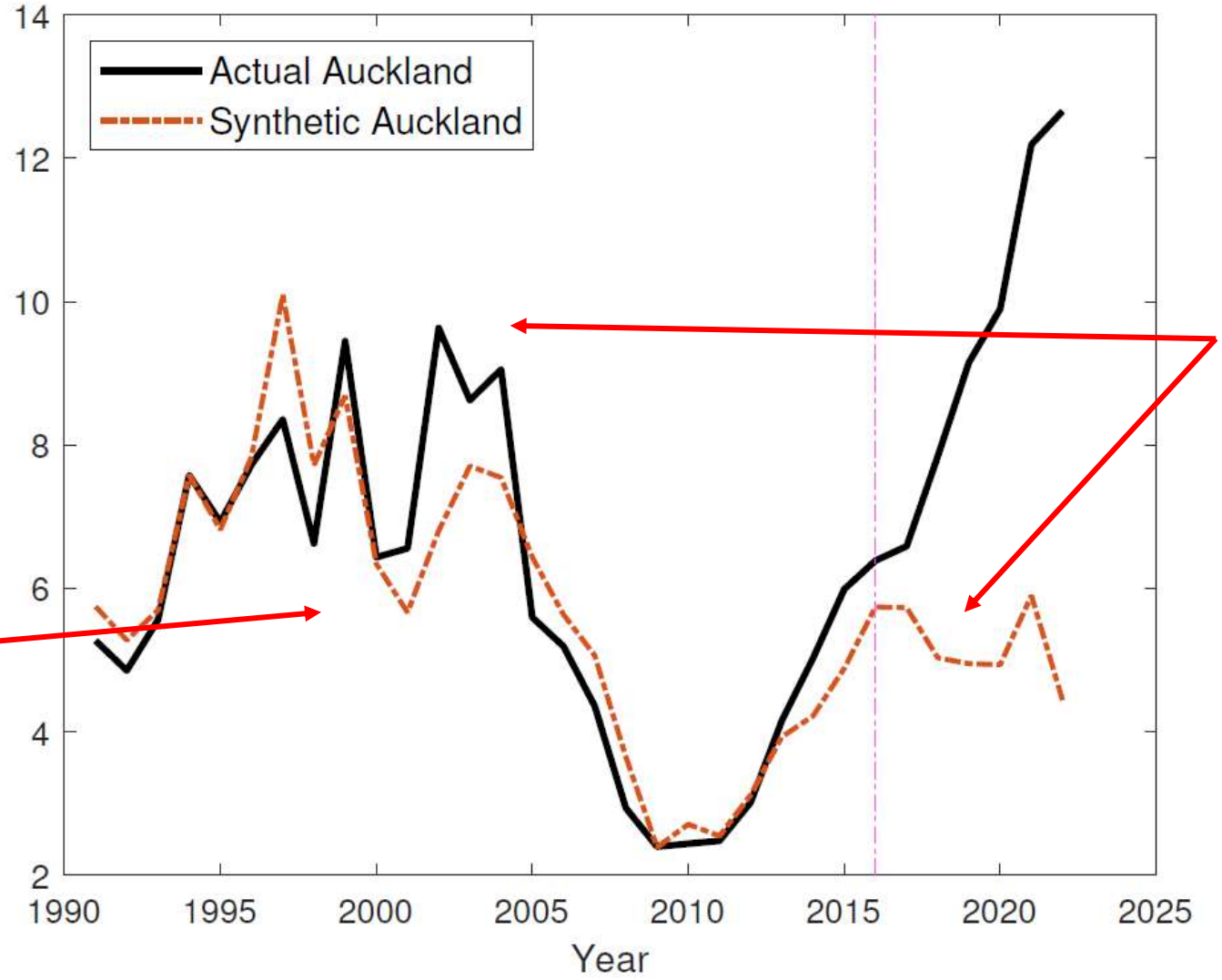
freshconomicthinking.com

3. Did upzoning increase construction? (2023b)

- Greenaway-McGrevy, R. (2023). Can zoning reform increase housing construction? Evidence from Auckland. (Working Paper)
- **Method:** compare Auckland to 'synthetic control' fitted to pre-AUP trends
- **Finding:** *"Six years on from the reform, cumulative permits issued exceed those of the synthetic control by approximately 43,500 – forty-five percent of the 97,000 permits issued in Auckland since 2016."*
- **Issues:** unrealistic counterfactual at odds with past experience and theory – though underlying methodological issues still unclear

3. Did upzoning increase construction? (2023b)

Figure 5: Synthetic and actual permits per thousand residents



Synthetic control ≈ 50-80% Tauranga + Kapiti (across multiple specifications)

Population growth rate 2014 to 2019 was 30% faster than during the 2001 to 2004 boom.

But counterfactual permits per capita are 50% lower.

prosper australia | this land is your land

Fresh Economic Thinking

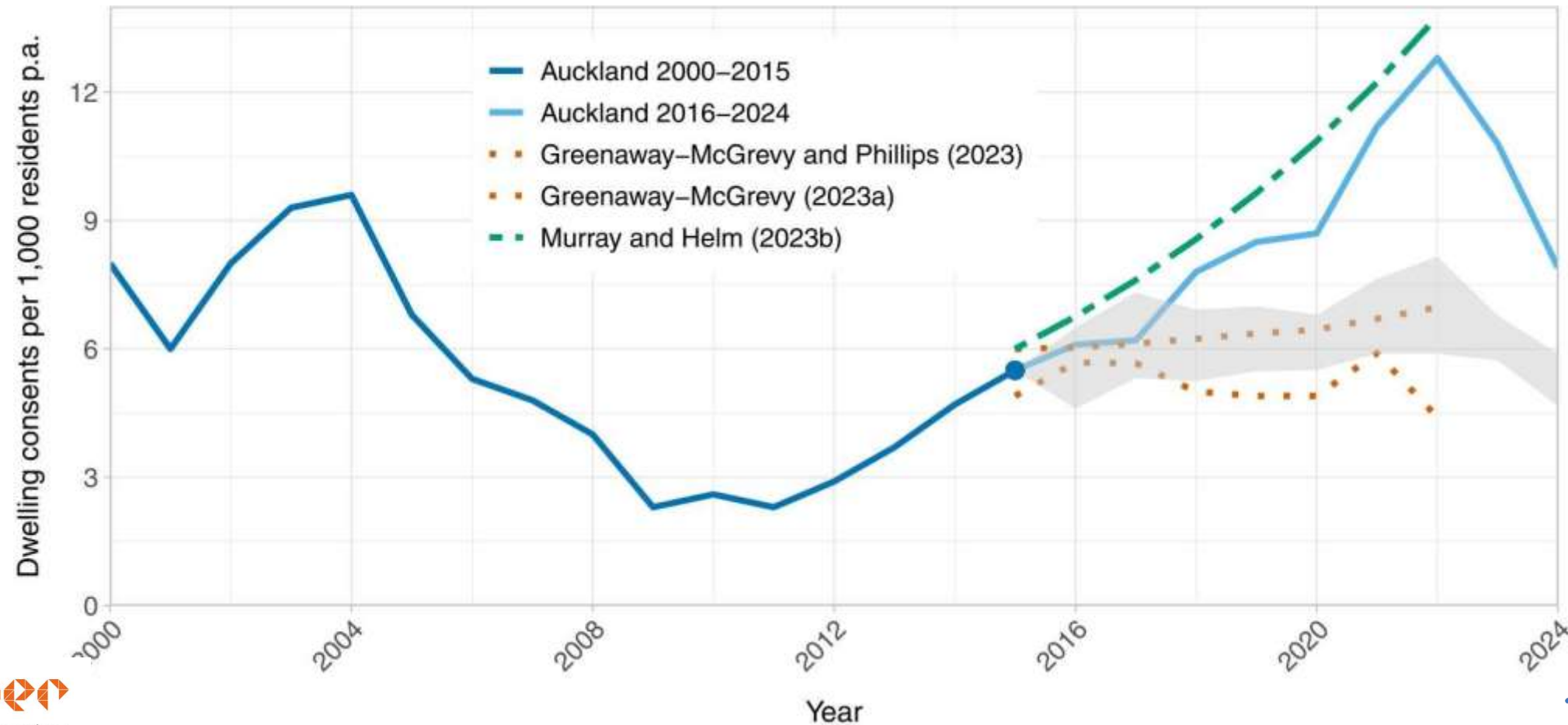
Dispelling myths: Reviewing the evidence on zoning reforms in Auckland ☆

Stuart Donovan [a b], Matthew Maltman [c]

ELSEVIER

Land Use Policy

Volume 151, April 2025, 107498

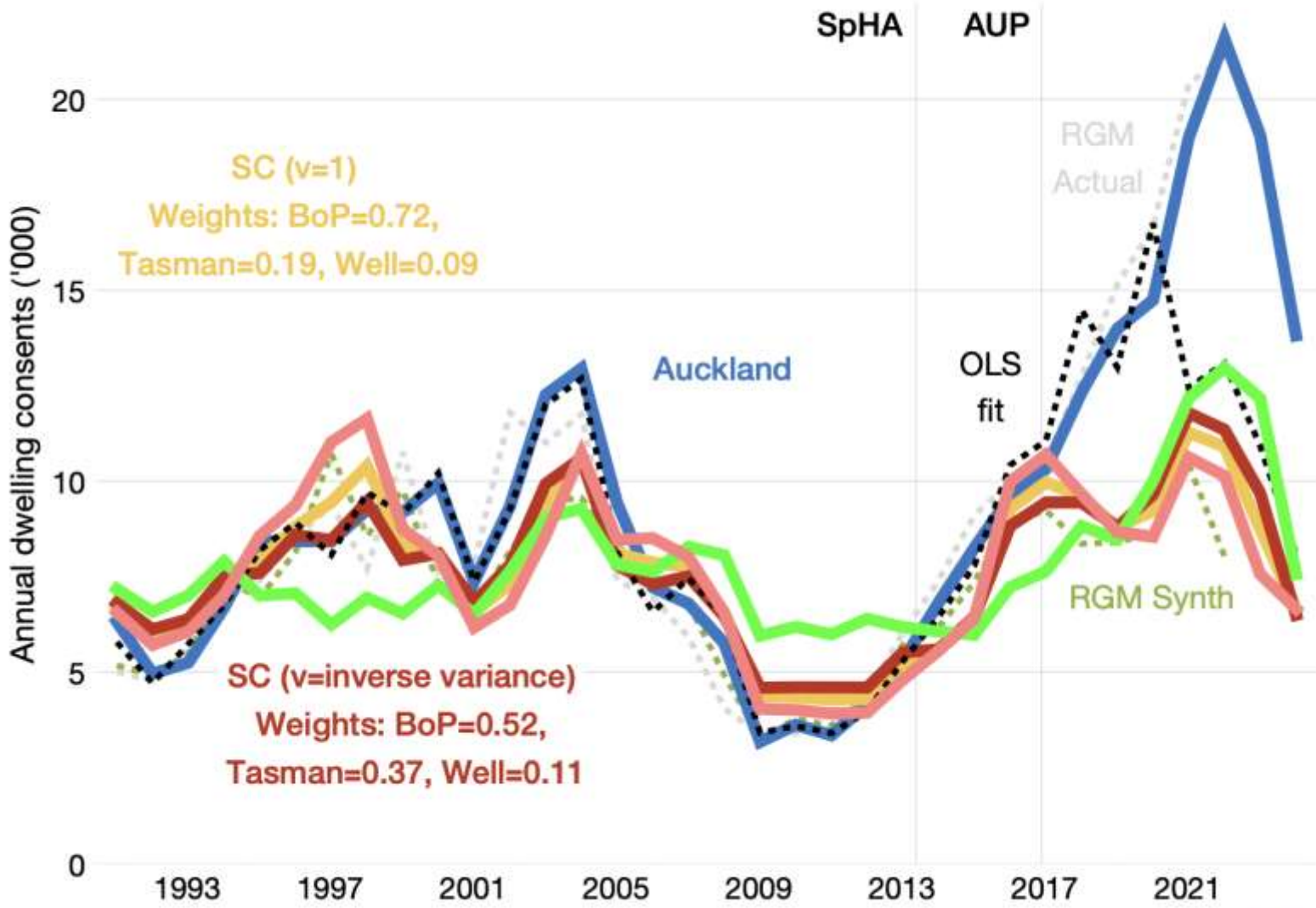


prosper australia this land is your land

Fresh Economic Thinking

Synthetic control for Auckland dwelling consents

Using log-transformed and demeaned region donors FYs from 91

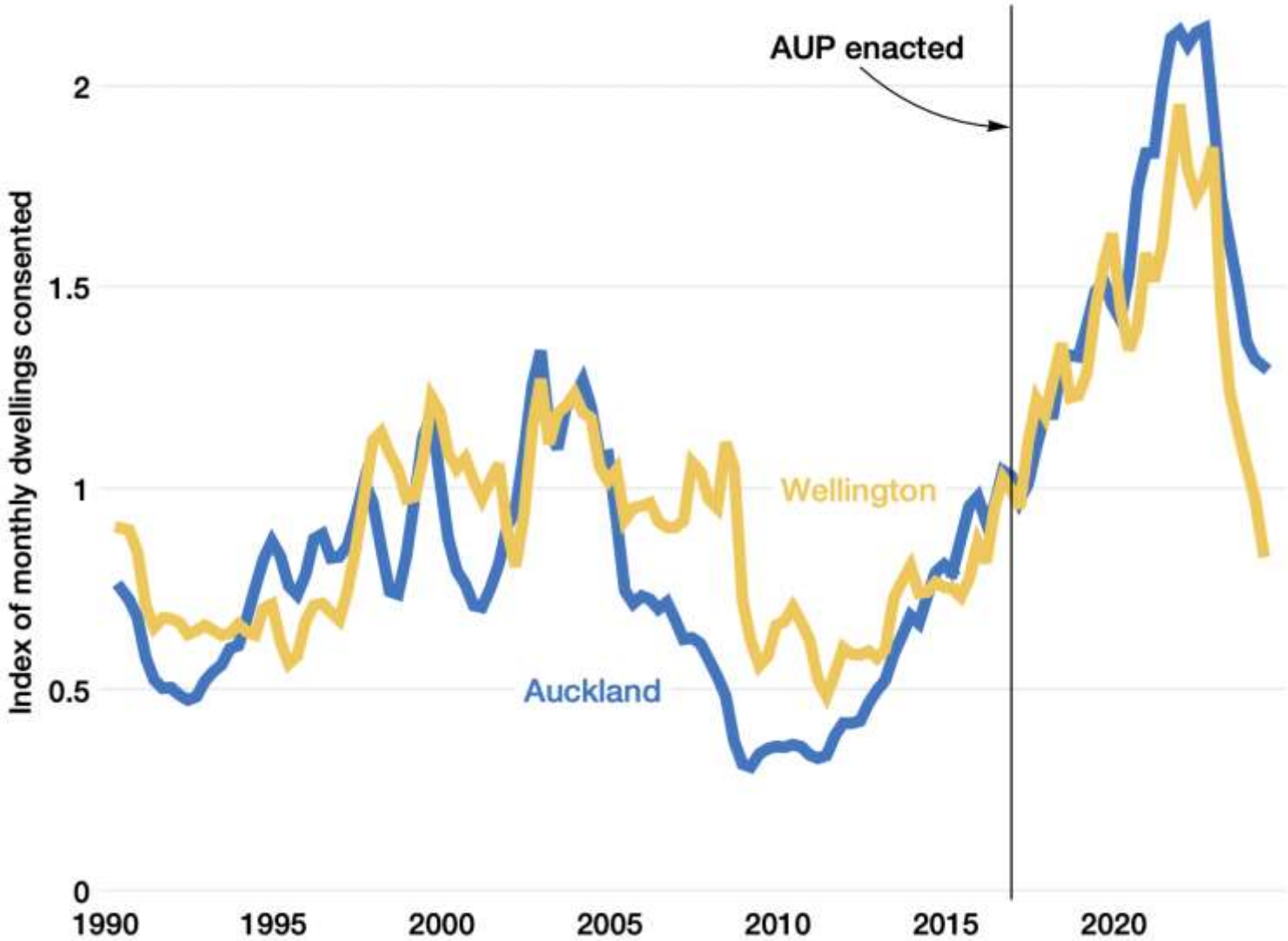


Source: Data from StatsNZ Building consents issued: July 2024

fresheconomicthinking.com

Comparison of Auckland and Wellington region dwelling constents

Matched at Dec 2016 levels



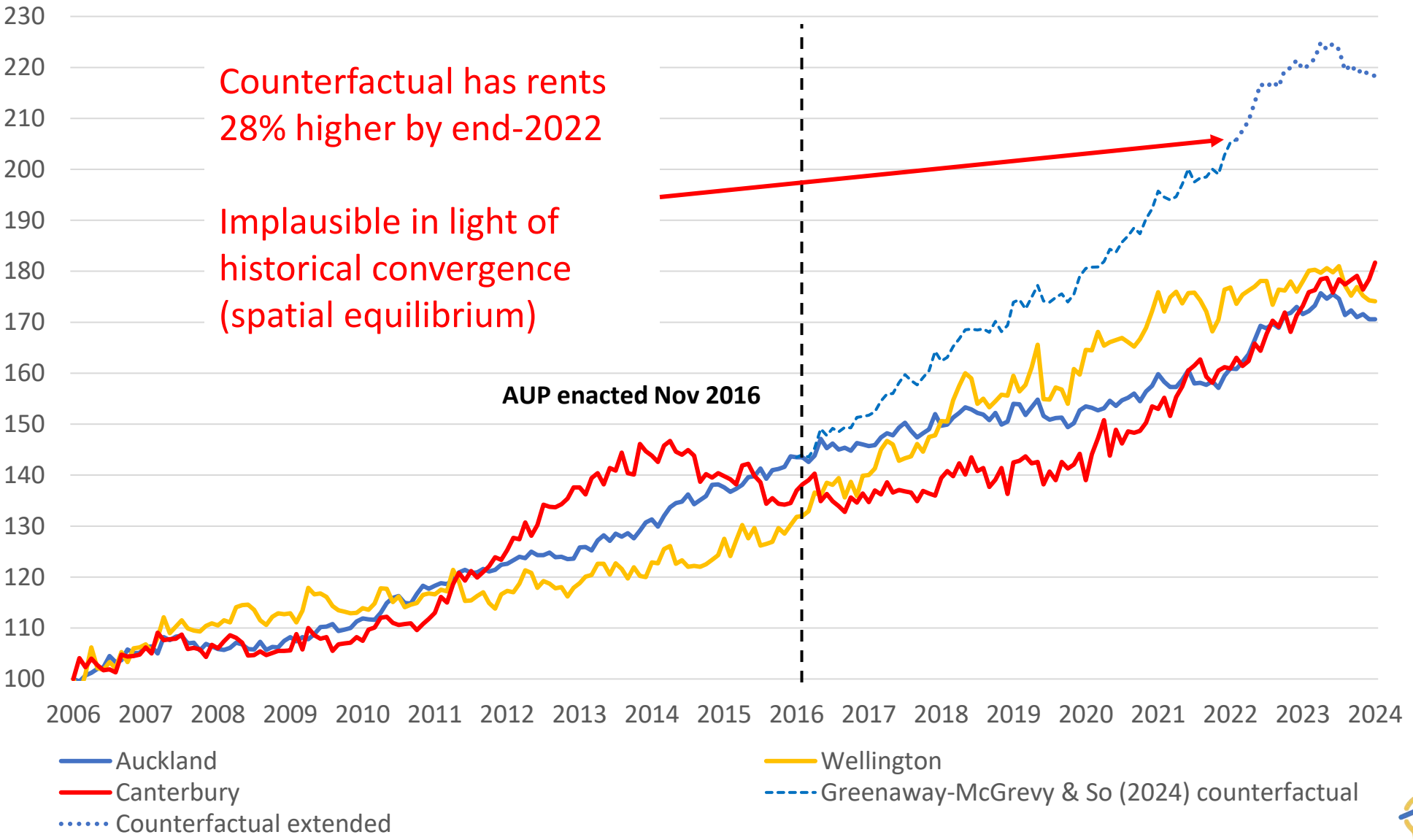
Souce: Stats NZ Building Constents Issued, Dec 2023

freshеconomicthinking.com

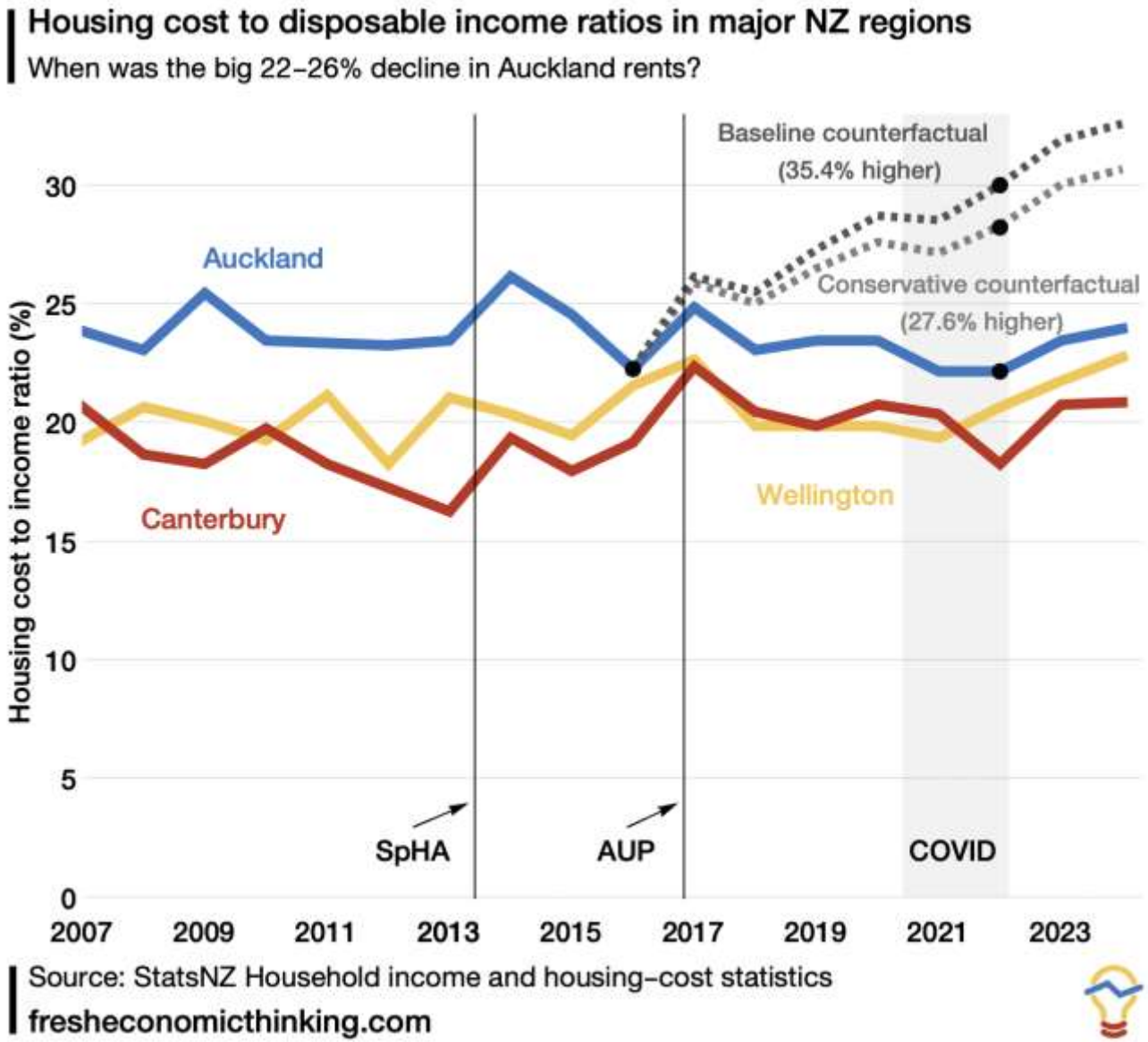
4. Did upzoning reduce rents? (2024)

- Greenaway-McGrevy, R., & So, Y. (2023). Can zoning reform reduce housing costs? Evidence from rents in Auckland. (Working Paper)
- **Method:** compare Auckland to 'synthetic control' fitted to pre-AUP trends
- **Finding:** *"Six years on from the reform, the synthetic control from our preferred empirical specification implies that rents would be approximately 28% higher under the counterfactual."*
- **Issues:** unrealistic counterfactual given historical convergence between NZ cities, spatial equilibrium theory, and housing cost data

4. Did upzoning reduce rents? (2024)



4. Did upzoning reduce rents? (2024)



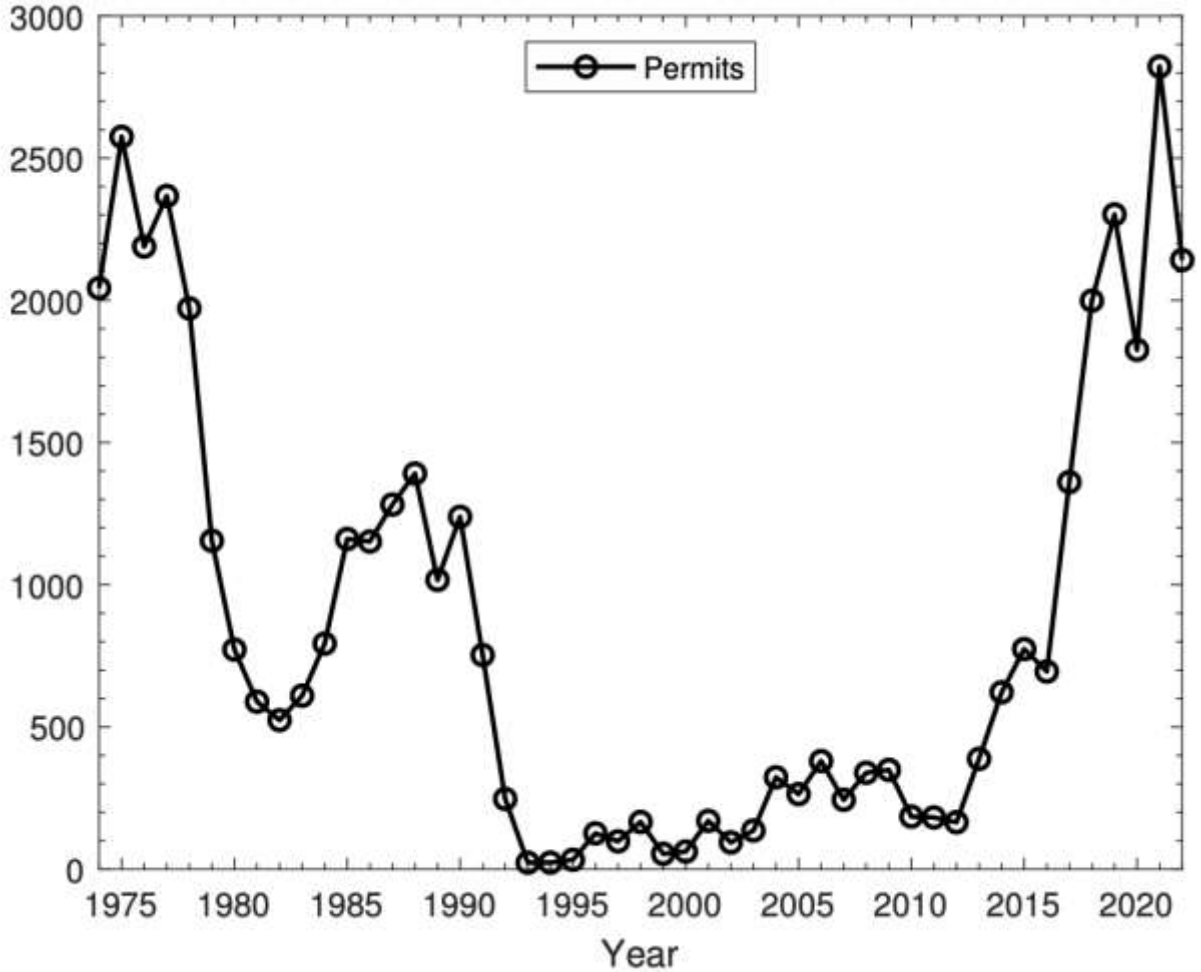
5. Did upzoning lead to more public housing? (2025)

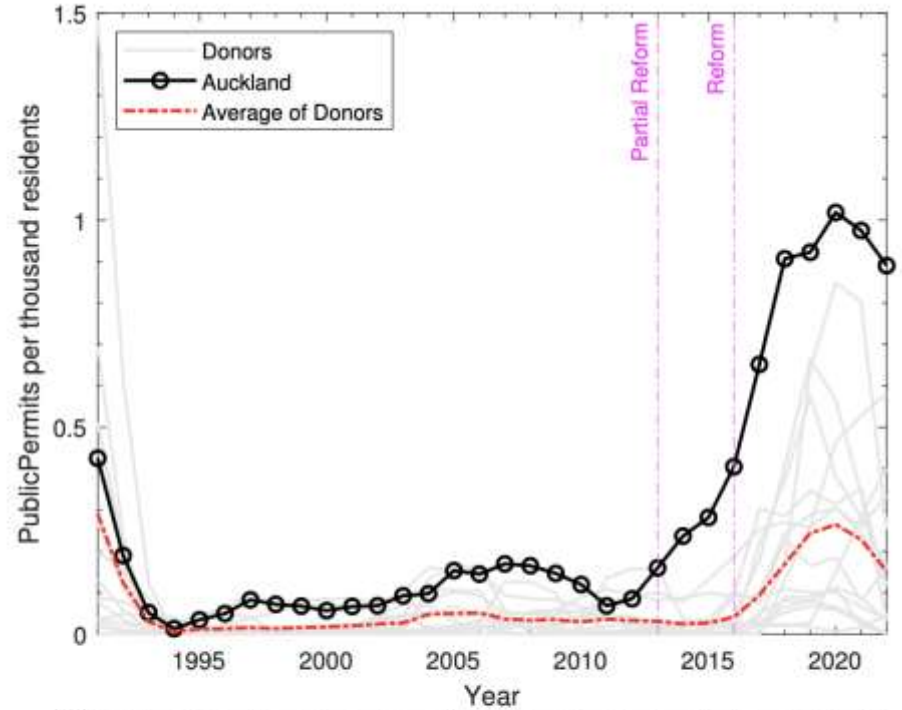
- Greenaway-McGrevy, R. (2025). Zoning reform and state-developed housing in Auckland. *New Zealand Economic Papers*.
- **Method:** synthetic control on public housing
- **Finding:** *"A synthetic control for Auckland indicates that the reform generated a near threefold increase in state-built dwellings…7,032 permits are attributed to the policy"* [66% of total public housing permits]
- **Issues:** bizarre way to do political science, other policy causes ignored, implausible that upzoning reduced costs

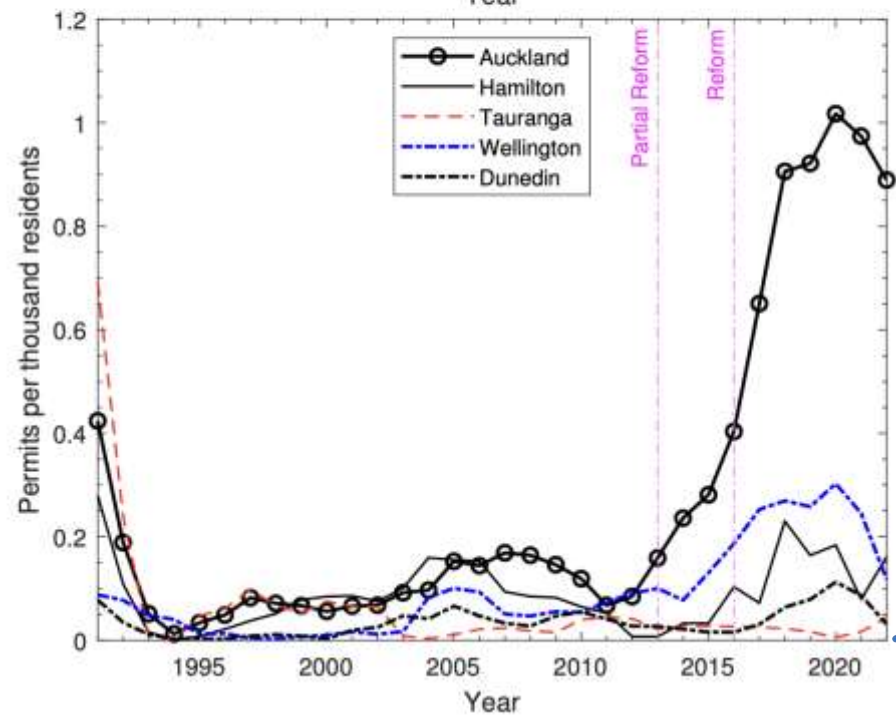
5. Did upzoning lead to more public housing? (2025)

- Kiwibuild and Auckland Housing Programme launched 2016/17
- From 2017 to 2025 **+9,500** public homes in Auckland (+21k NZ-wide)
- **74%** were due to upzoning?!
- Upzoning was favourable to all owners of upzoned property (public & private)
- Public housing agency supported AUP and found it useful, but might not when new sites must be purchased

This year also saw the launch of our Auckland Housing Programme, through which we are building a pipeline of projects to deliver 24,300 new homes on our existing land holdings over a 10-year period. This is the largest residential build programme to be undertaken in New Zealand for many decades, and will be fully funded by Housing New Zealand.







prosper australia this land is your land

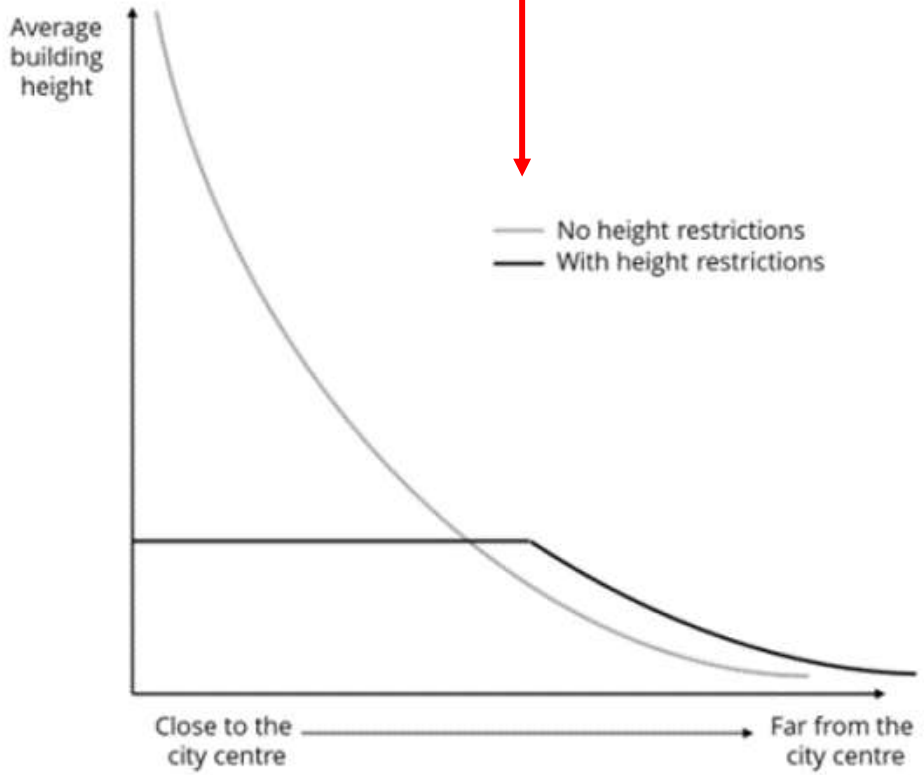
Fresh Economic Thinking

6. How will the AUP change prices in the long run? (2025)

- Greenaway-McGrevy, R. (2025). Evaluating the long-run effects of zoning reform on urban development. *Regional Science and Urban Economics*.
- **Method:** model of urban density (AMM), with AUP land price changes used to predict long run quantity and house price change
- **Finding:** *"…an approximate 23.7% increase in floorspace. … this supply increase implies that dwelling prices would be 15.1 to 26.9% higher under the counterfactual of no upzoning"*
- **Issues:** prediction pretending at evaluation, density model not suitable to predict supply, model assumptions unrealistic (zero migration)

6. How will the AUP change prices in the long run? (2025)

AMM equilibrium: all zoned and feasible capacity is built out (by assumption)



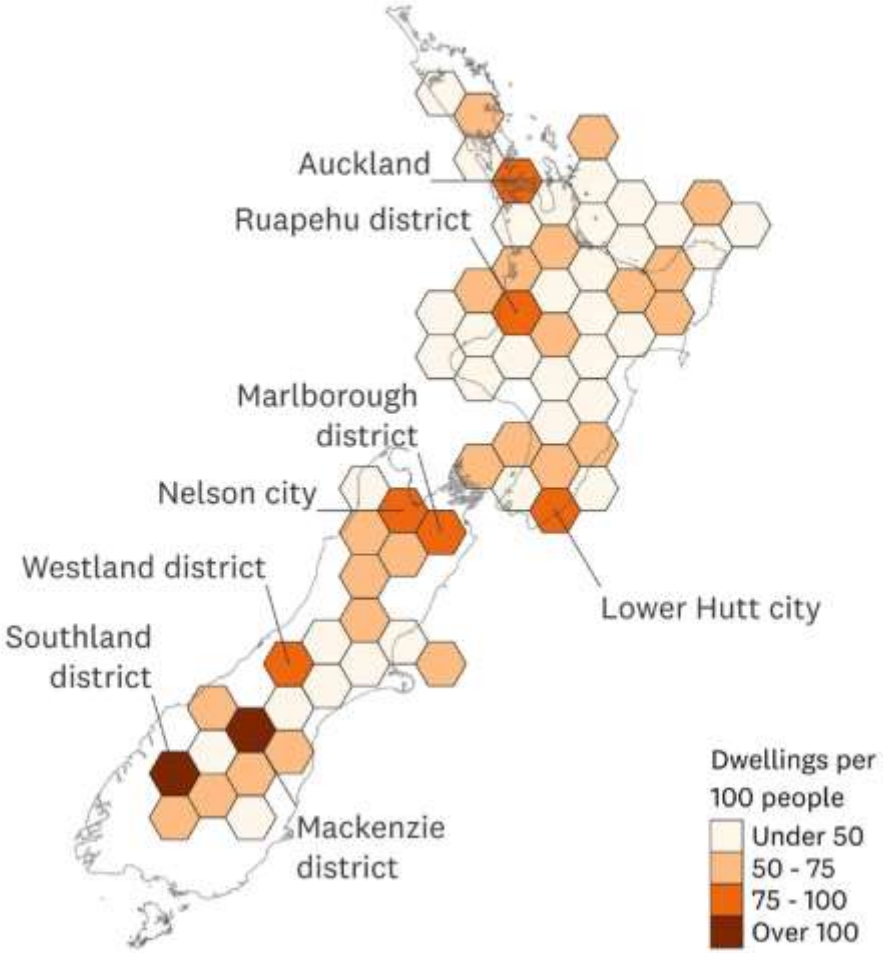
- Develops a theoretical framework for assessing effect of zoning reform on urban development.
- Applies method to evaluate a widespread zoning reform in Auckland, New Zealand.
- Upzoning generated an approximate 24% increase in long-run floorspace supply.
- Supply generates a 15 to 27% fall in house prices under plausible range of demand elasticities.

All these outcomes are model simulations yet to eventuate!

BONUS: Auckland Council Chief Economist (2024)

- Blick and Stewart (2024). 2023 Census confirms Auckland gains more new homes. Auckland Council, June.
- **Method:** compare change in population vs dwellings
- **Finding:** *"Among the authorities identified as 'Tier 1' urban areas in the NPS-UD, Auckland and Lower Hutt had the highest ratios. Both have benefited from increased flexibility through changes to their land use policies"*
- **Issues:** non-upzoned Wellington wiped from the map and the leaderboard, many global cities out-perform Auckland

Figure 4: Ratio of dwelling growth over population growth by territorial authority, 2018 to 2023

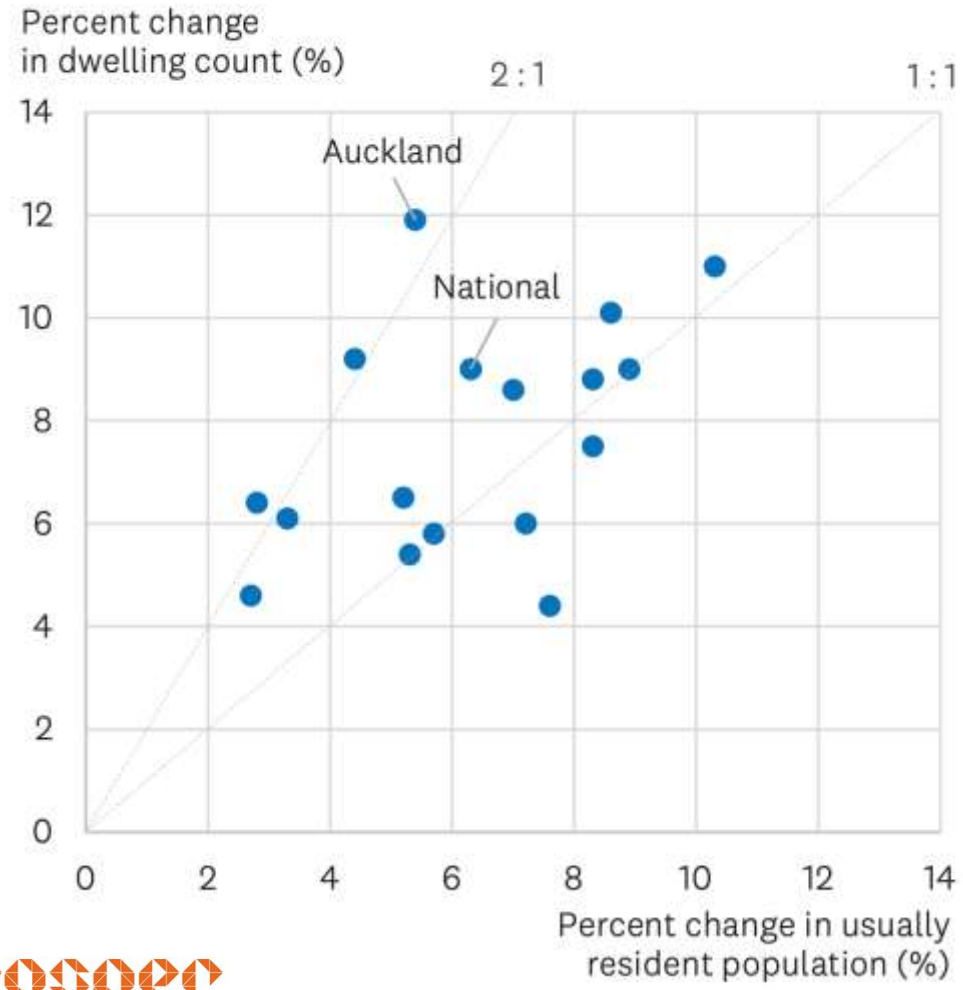


prosper australia | this land is your land

Fresh Economic Thinking

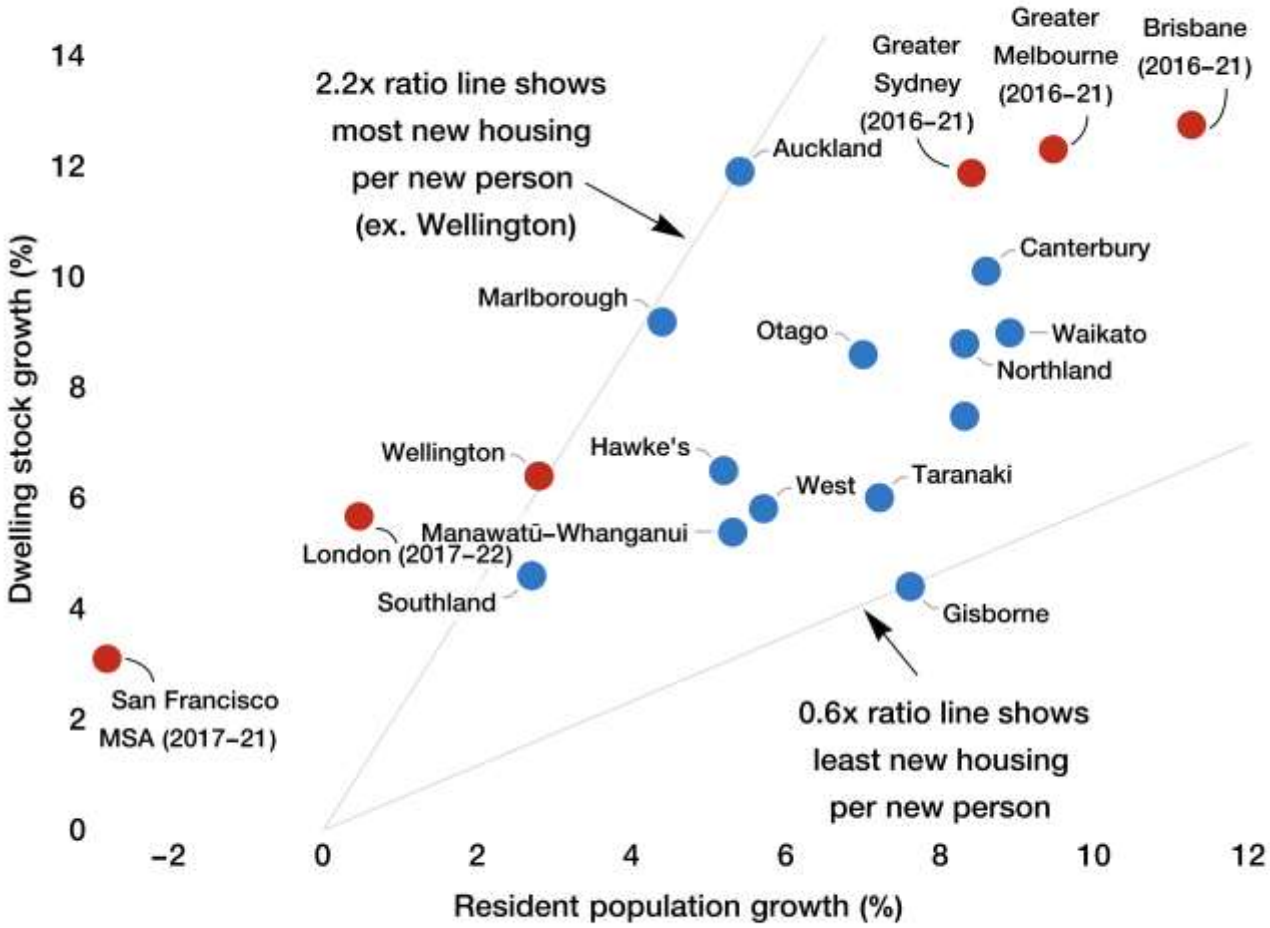
BONUS: Auckland Council Chief Economist (2024)

Figure 3: Change in census population and dwelling counts by region, 2018 to 2023



New Zealand 2018–23 resident and dwelling stock growth rates

Including Wellington Region plus other global cities



Source: StatsNZ 2023 Census national and subnational URP counts

freshEconomicThinking.com

prosper australia | this land is your land

Fresh Economic Thinking

Thank you

Tim Helm and Cameron Murray

prosper australia this land is your land

Fresh Economic Thinking