

# **Dynamic Urban Economics**

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# Summary

## ► Contribution: Welcome to a new age of urban economics

- Dynamic urban model (DUM) that features heterogenous welfare effects by
  - time vs. no transition path in static QUM
  - groups housing tenure vs. all renters in QUM
  - locations vs. no spatial incidence in QUM

## ► Highlights:

- Too many to list...
- Also, you will / have to read and see for yourself anyways...

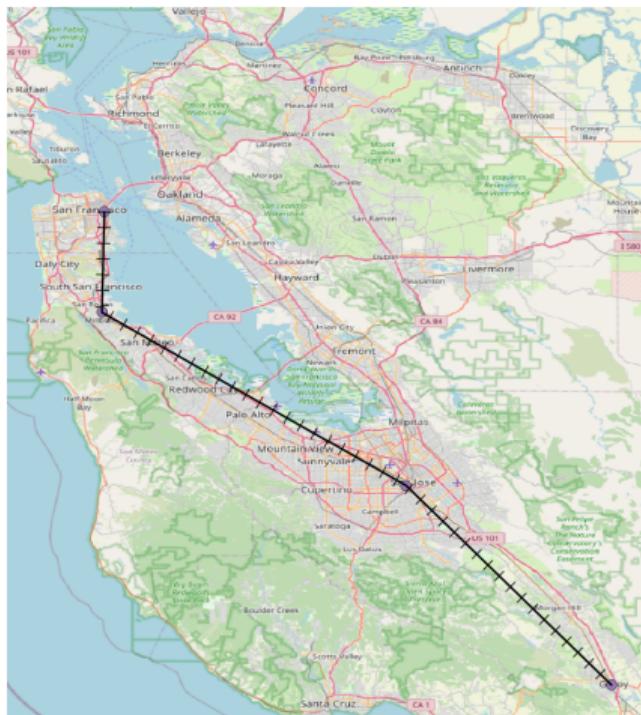
## ► Improvements:

- At this stage, not for me to decide or to suggest...

**Q: How does the new world of urban economics compare to the old?**

# HSR Case Study: Setup and Findings

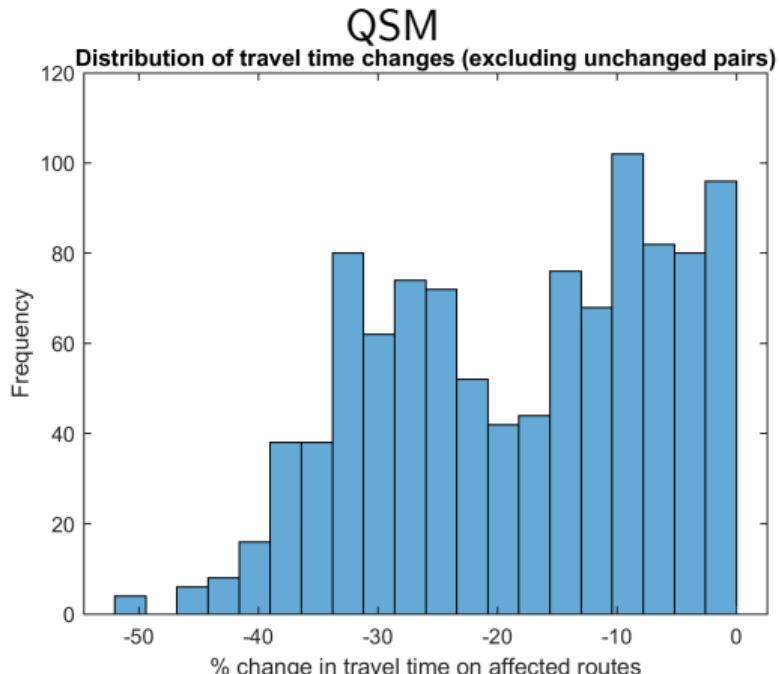
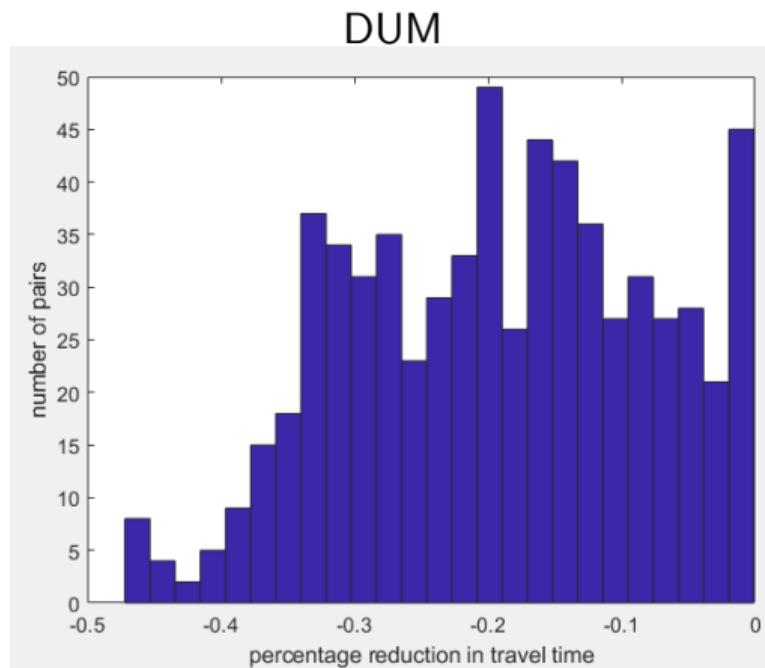
- ▶ Four new **HSR stations integrated into Bay Area** commuting network.
  - ▶ Improves accessibility, reshapes residence-workplace patterns.
  - ▶ Adjustment gradual—multi-decade reallocation.
  - ▶ Gains concentrated near stations; heterogeneous across tenure and age
  - ▶ Welfare gain: 0.45% (closed—"city" case)
- ▶ How do the welfare effects in the DUM **compare to the static QSM?**
  - ▶ Compare our new toy with what we have!
  - ▶ Let's do the analysis in the MRRH model!



# Simulating the HSR in the MRRH model

- ▶ Download data from AABPL-toolkit (prime locations) [▶ AABPL-toolkit](#)
  - ▶ San Francisco and San Jose metro areas
- ▶ Run GRID-toolkit to aggregate downloaded data to any grid you like (squares or hexagons) [Example](#) [▶ GRID-toolkit](#)
  - ▶ We will do 15x15 km and 2x2 km squares
- ▶ Use TT MATRIX-toolkit to compute bilateral travel times for grids [▶ TT MATRIX-toolkit](#)
  - ▶ Choose on-HSR and off-HSR speeds and compute travel times with and without HSR
- ▶ Read grid data and travel time matrices in MRRH-toolkit and simulate HSR
  - ▶ Quantify the model (all automatic)
  - ▶ Define relative change in commuting times as the forcing variable and simulate
  - ▶ Simulate and inspect results (welfare, maps of changes, etc.) [▶ GRID version of MRRH-toolkit](#)

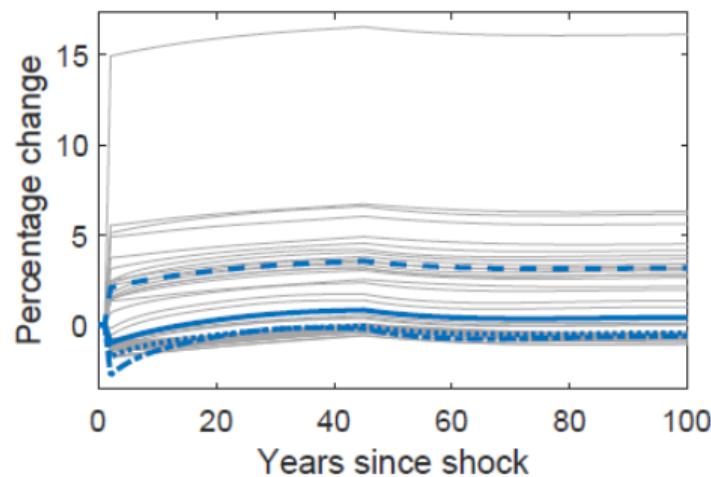
# Change in travel times (15x15 km grid)



# Simulated HSR, DUM vs. QSM 15x15 km grid: Employment

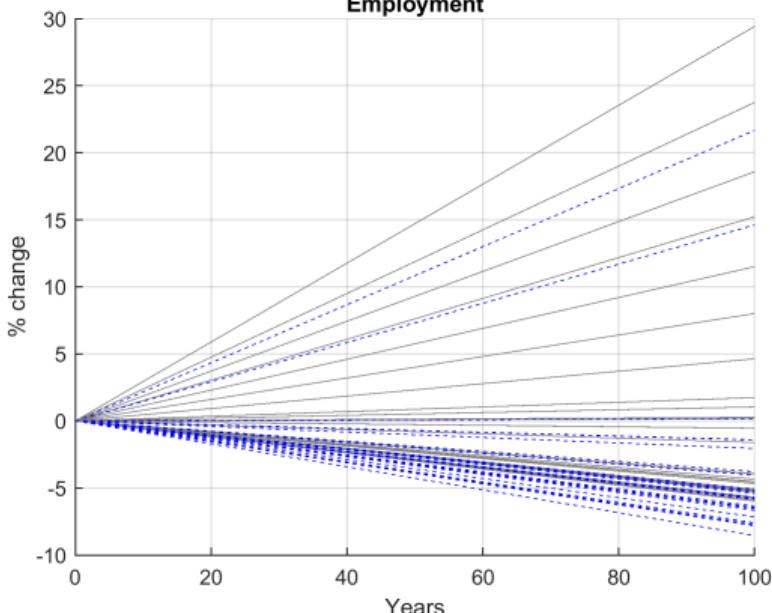
DUM

Panel B: Jobs



Welfare effect: +0.45% (closed- "city")

QSM  
Employment

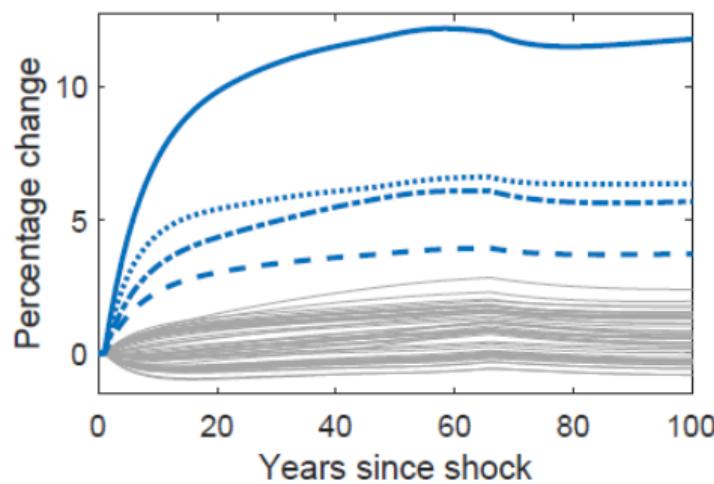


Welfare effect: +1.54%

# Simulated HSR, DUM vs. QSM 15x15 km grid: Population

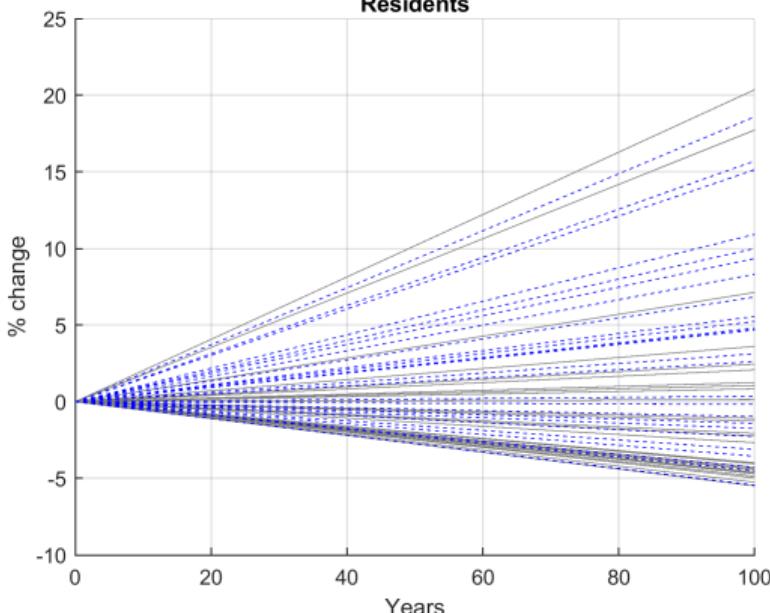
DUM

Panel A: Residents



Welfare effect: +0.45% (closed- "city")

QSM  
Residents

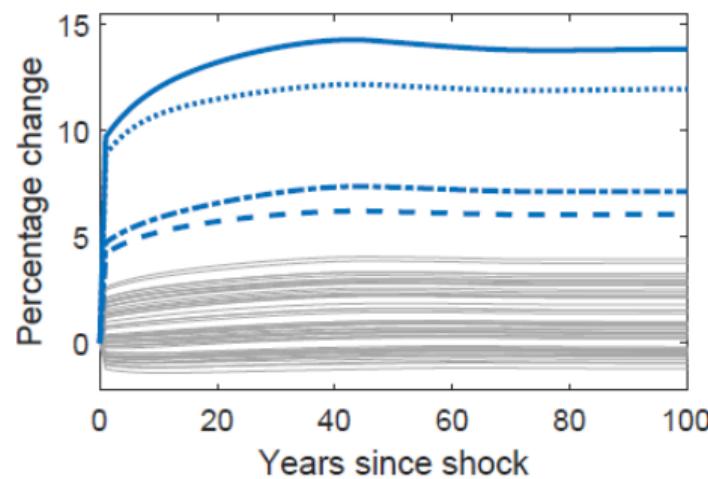


Welfare effect: +1.54%

# Simulated HSR, DUM vs. QSM 15x15 km grid: Rent

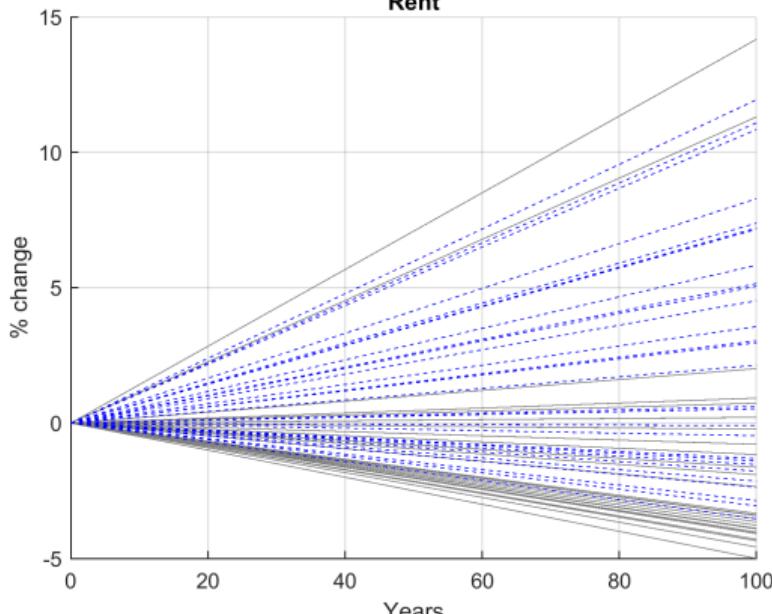
DUM

Panel D: Resid. price



Welfare effect: +0.54% (closed- "city")

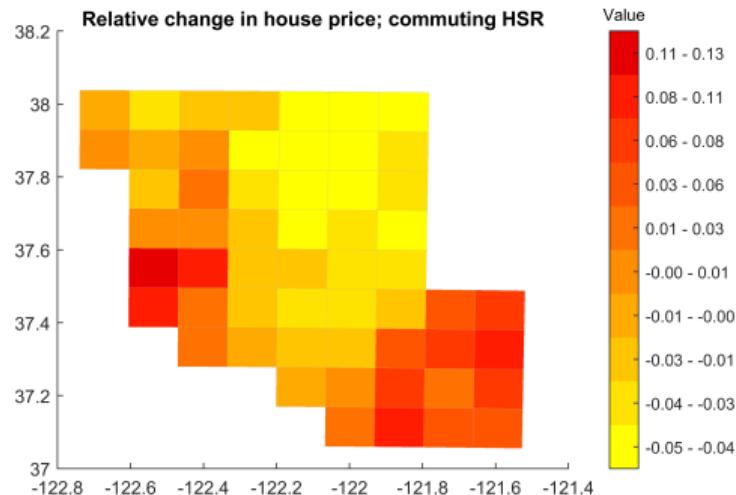
QSM  
Rent



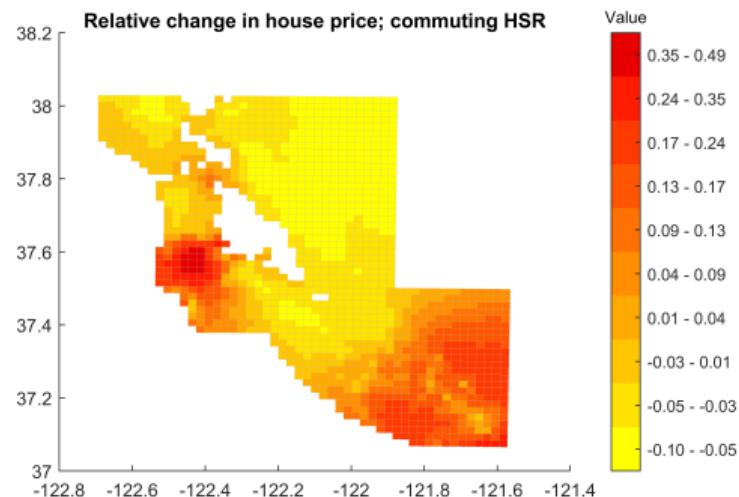
Welfare effect: +1.54%

# QSM 15x15 km grid vs. QSM 2x2 km grid

QSM 15x15 km grid



QSM 2x2 km grid



Welfare effect: +1.54%

Welfare effect: +2.77%

## QSM 15x15 km grid vs. QSM 2x2 km grid

- ▶ Welfare effect substantially larger with a smaller grid
  - ▶ A variant of the **MAUP** (modifiable areal unit problem)
  - ▶ A coarse grid makes it harder to capture fine-grained accessibility gains
- ▶ Is it feasible to quantify and simulate the model truly micro-geographically?
  - ▶ 2x2 km grid has 1,460 locations vs. 55 in DUM (183 for NY).
  - ▶ "Thousands" of bilaterals  $\neq$  "millions" of bilaterals
  - ▶ Getting rid of workplace as a state variable helps, but is it enough?
- ▶ Is there a **role for the static model when micro-geography matters?**

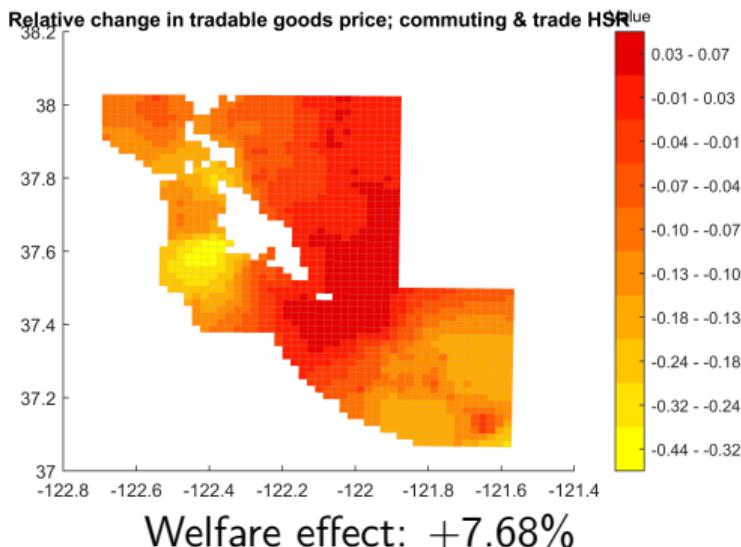
# What's next I (estimation)

- ▶ **DUM gives lower welfare estimates, does it?**
  - ▶ The same shock to a primitive should trigger a smaller response than in SQUM
- ▶ **But what if we consider estimation?**
  - ▶ At some point we will want to estimate parameters from quasi-experimental variation, e.g. a HSR shock
  - ▶ We **rationalize observed variation in endogenous outcomes** through the lens of a quant model (GMM or indirect inference)
  - ▶ QUM assumes we observe long-run transition  $\Rightarrow$  small change in forcing primitive
  - ▶ **DUM understands that just part of the transition is completed  $\Rightarrow$  larger change in forcing primitive**
- ▶ **If we infer the change in primitive from the shock**
  - ▶ **Not so clear** which model will deliver the larger welfare effect...

## What's next II (tradable goods)

- ▶ Careful
  - ▶ HSR unlikely to affect trade cost in ways that are proportionate to travel time reductions!
  - ▶ Closed region does not make sense when modelling trade!
  - ▶ Welfare effect will shrink as we increase the study area and model model trade effect realistically
- ▶ This is just to make a point...

QSM: HSR used for commuting & trade



Someone will have to write a DSM w commuting and frictional trade...

# Takeaways

- ▶ **Agenda for the new age of urban economics**
  - ▶ Go through the obvious QSM applications where spatial incidence matters
    - ▶ Structural transformaiton, upzoning, transport, gentrification, place-based policies, etc.
  - ▶ Structural estimation
    - ▶ Use GMM or indirect inference to recover primitives from changes over time in DUM-consistent ways
  - ▶ Add frictional trade
- ▶ **Please, give us a DUM toolkit!**

Download from [www.ahlfeldt.com](http://www.ahlfeldt.com) → presentations → Slides: Discussion

# Grid

[Back](#)

## Employment

