

Dynamic Urban Economics

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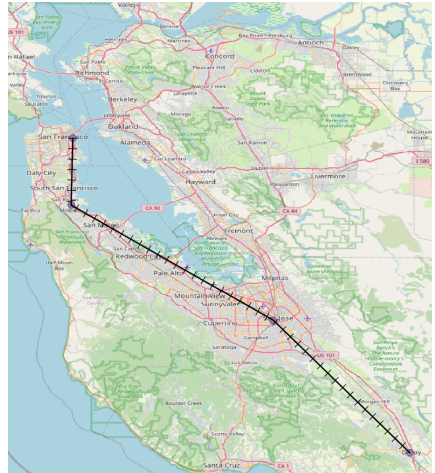
Summary

- ▶ **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

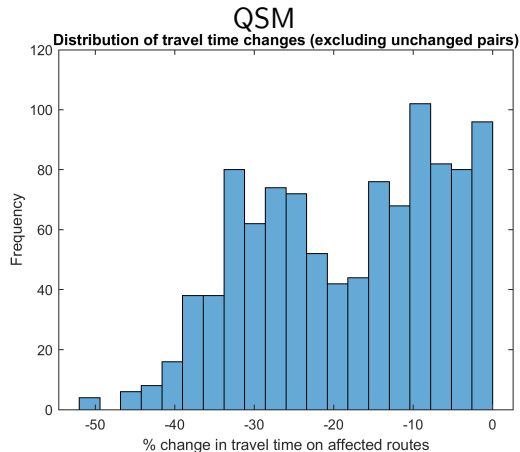
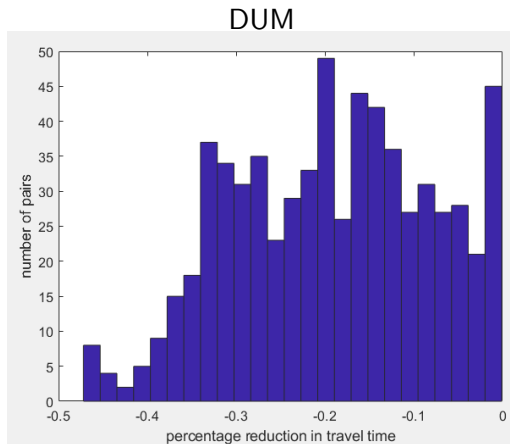
- ▶ Four new **HSR stations integrated into Bay Area** commuting network.
 - ▶ Improves accessibility, reshapes residence-workplace patterns.
 - ▶ Adjustment gradual—multi-decade reallocation.
 - ▶ Gains concentrated near stations; heterogeneous across tenure and age
 - ▶ Welfare gain: 0.45% (closed-"city" 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!



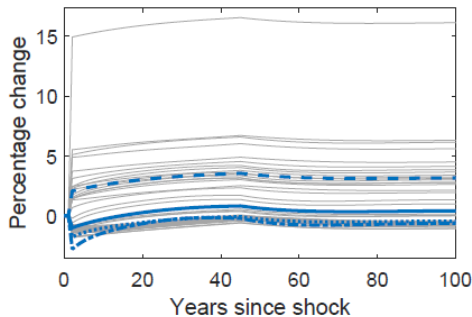
Simulating the HSR in the MRRH model

- ▶ 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 TTMATRIX-toolkit to compute bilateral travel times for grids ▶ TTMATRIX-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

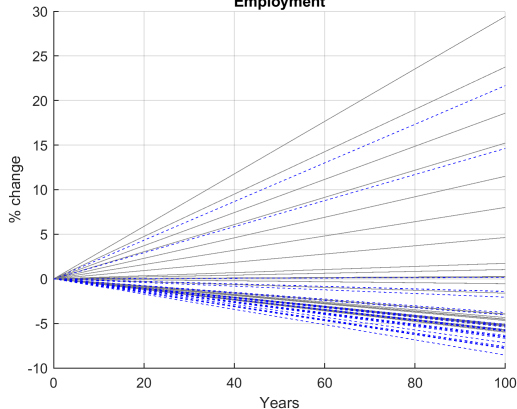
Change in travel times (15x15 km grid)



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

DUM
Panel B: Jobs

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

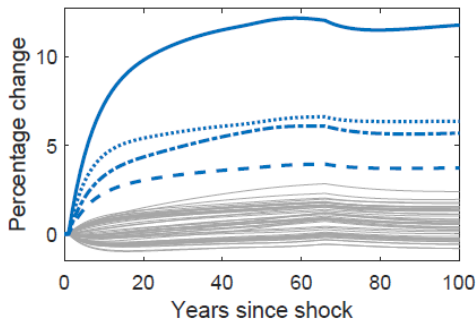
QSM
Employment

Welfare effect: +1.54%

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

DUM

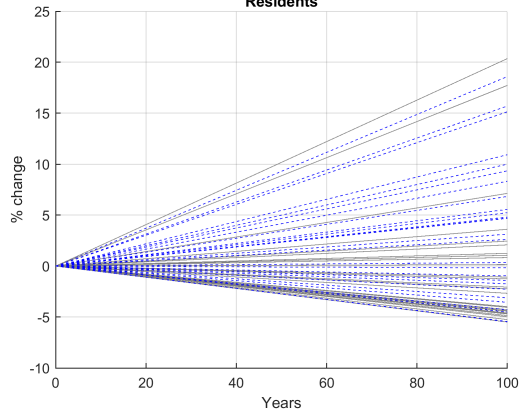
Panel A: Residents



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

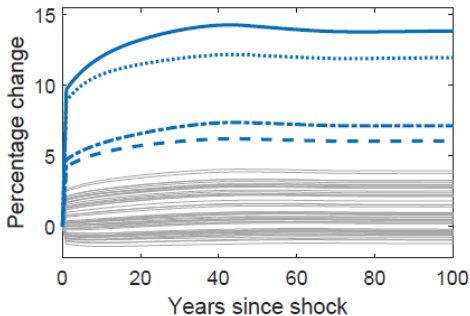
QSM

Residents

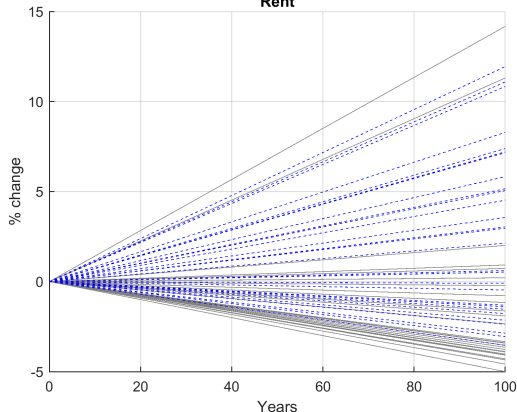


Welfare effect: +1.54%

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

DUM
Panel D: Resid. price

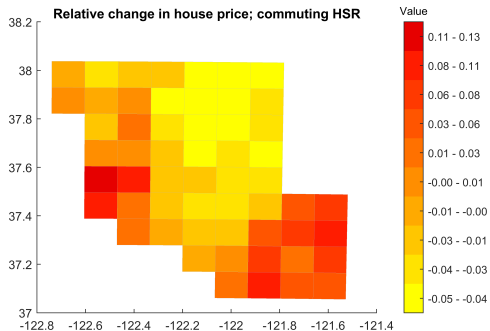
Welfare effect: +0.54% (closed-"city")

QSM
Rent

Welfare effect: +1.54%

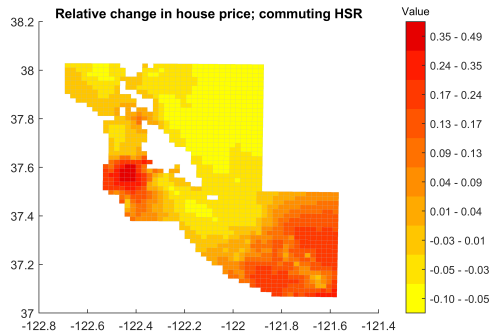
QSM 15x15 km grid vs. QSM 2x2 km grid

QSM 15x15 km grid



Welfare effect: +1.54%

QSM 2x2 km grid



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?**

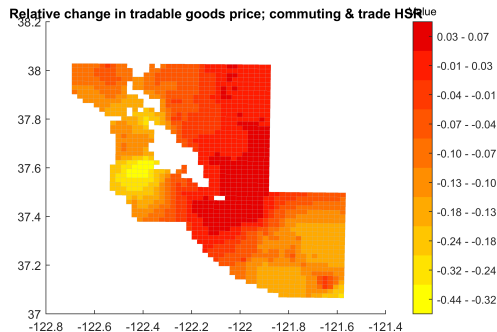
What's next I (estimation)

- ▶ **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 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 transformation, 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!**

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Grid

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