Dynamic Urban Economics

Brian Greaney, Andrii Parkhomenko, and Stijn Van Nieuwerburgh

Discussion by Gabriel Ahlfeldt, Humboldt University
CURE Conference, London School of Economics

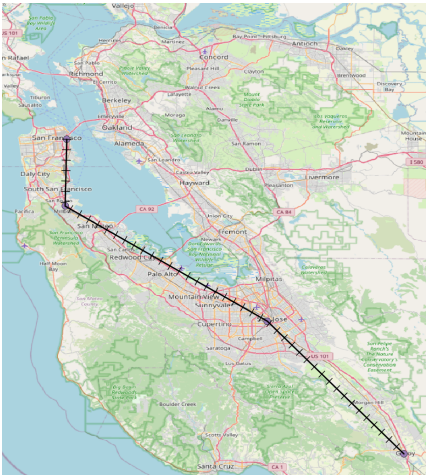
Summary

- **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!

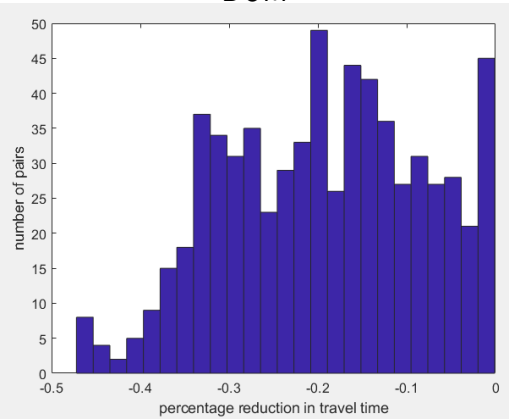


Simulating the HSR in the MRRH model

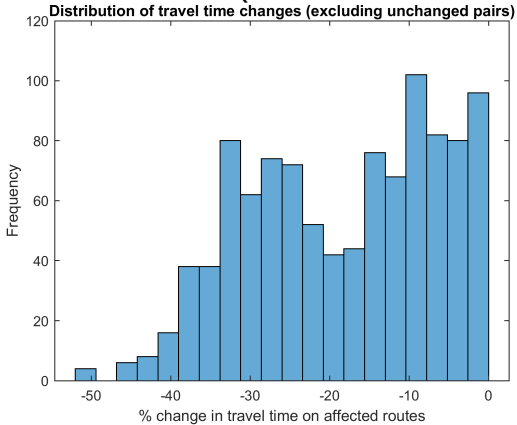
- Download data from `AABPL-toolkit` (prime locations) ▸ AABPL-toolkit
  - San Francisco and San Jose metro areas
- Run `GRID-toolkit` to aggregate downloaded data to any grid you like (squares or hexagons) Example ▸ GRID-toolkit
  - We will do 15x15 km and 2x2 km squares
- Use `TTMATRIX-toolkit` to 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 `MMRH-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)

DUM

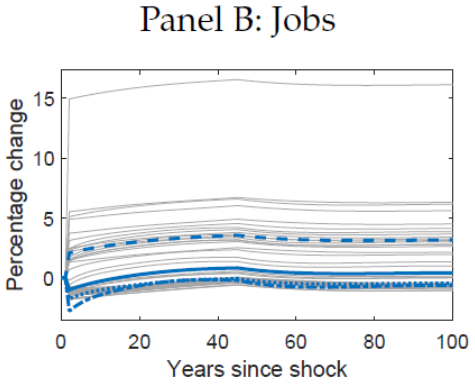


QSM



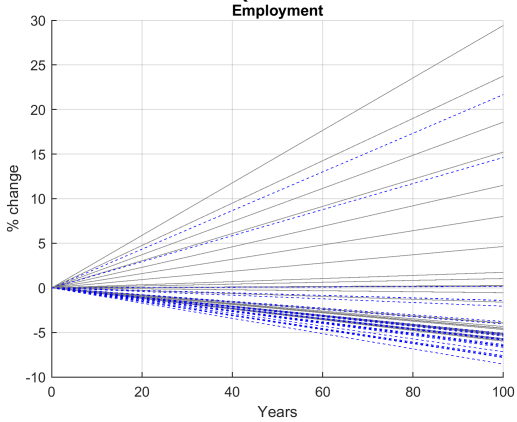
Simulated HSR, DUM vs. QSM 15x15 km grid: Employment

DUM



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

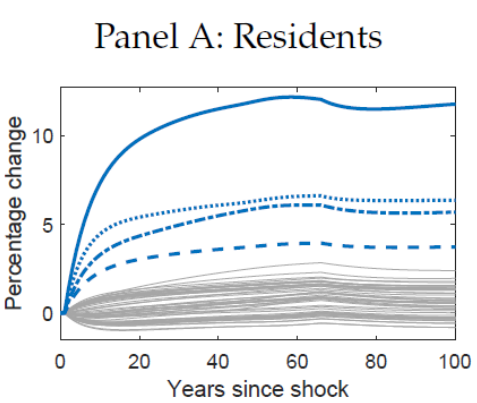
QSM



Welfare effect: +1.54%

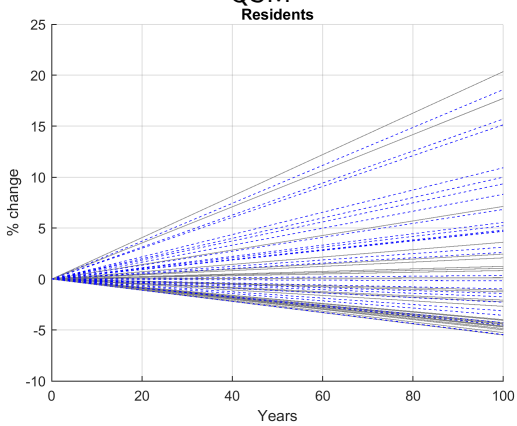
Simulated HSR, DUM vs. QSM 15x15 km grid: Population

DUM



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

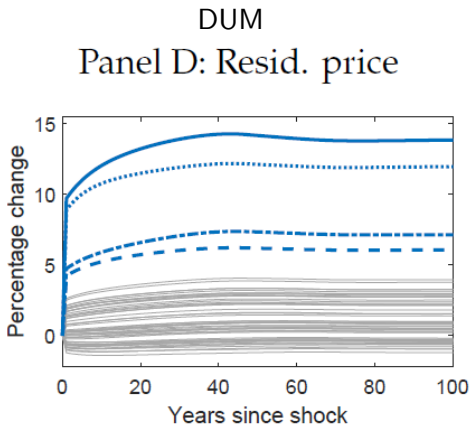
QSM



Welfare effect: +1.54%

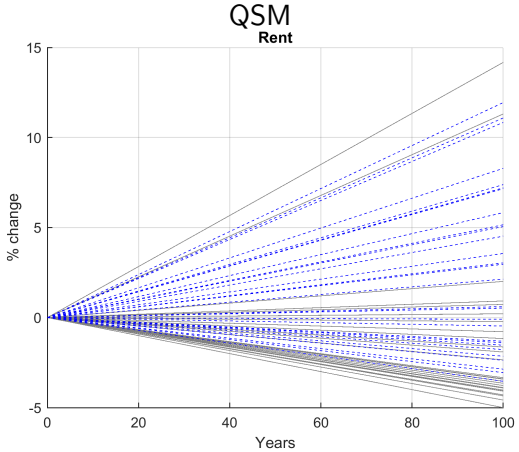
Simulated HSR, DUM vs. QSM 15x15 km grid: Rent

DUM



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

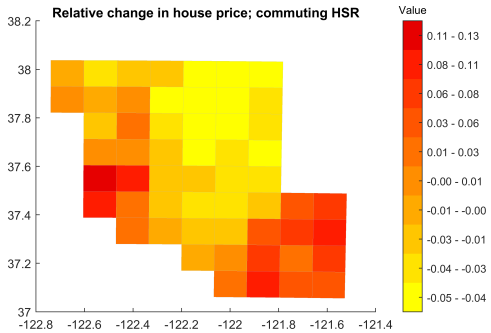
QSM



Welfare effect: +1.54%

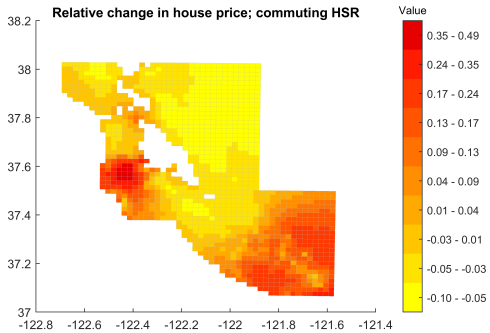
QSM 15x15 km grid vs. QSM 2x2 km grid

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**?

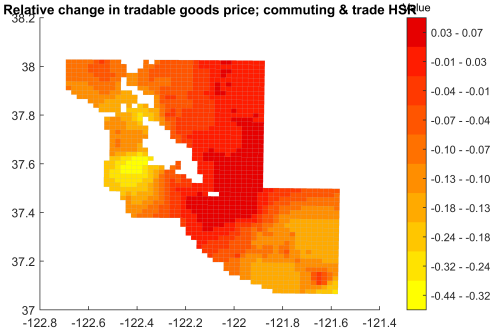
What's next I (estimation)

- **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 if 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 unlike 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



Welfare effect: +7.68%

Someone should write a DSM w frictional commuting, migration, and trade...

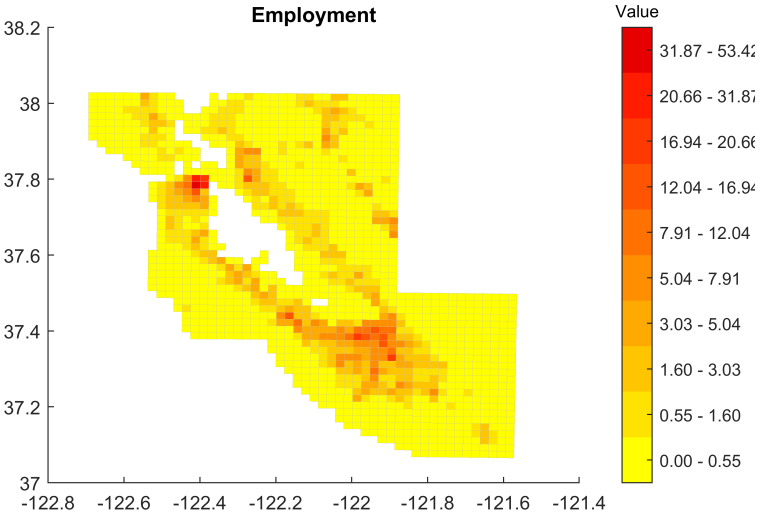
Takeaways

- **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 via www.ahlfeldt.com → presentations → current discussions

Grid

Back


Employment
Value
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37.6
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-122
-121.8
-121.6
-121.4
31.87 - 53.42
20.66 - 31.87
16.94 - 20.66
12.04 - 16.94
7.91 - 12.04
5.04 - 7.91
3.03 - 5.04
1.60 - 3.03
0.55 - 1.60
0.00 - 0.55