

Travel Speed in U.S. Cities: Insights from Google Maps and NHTS Data

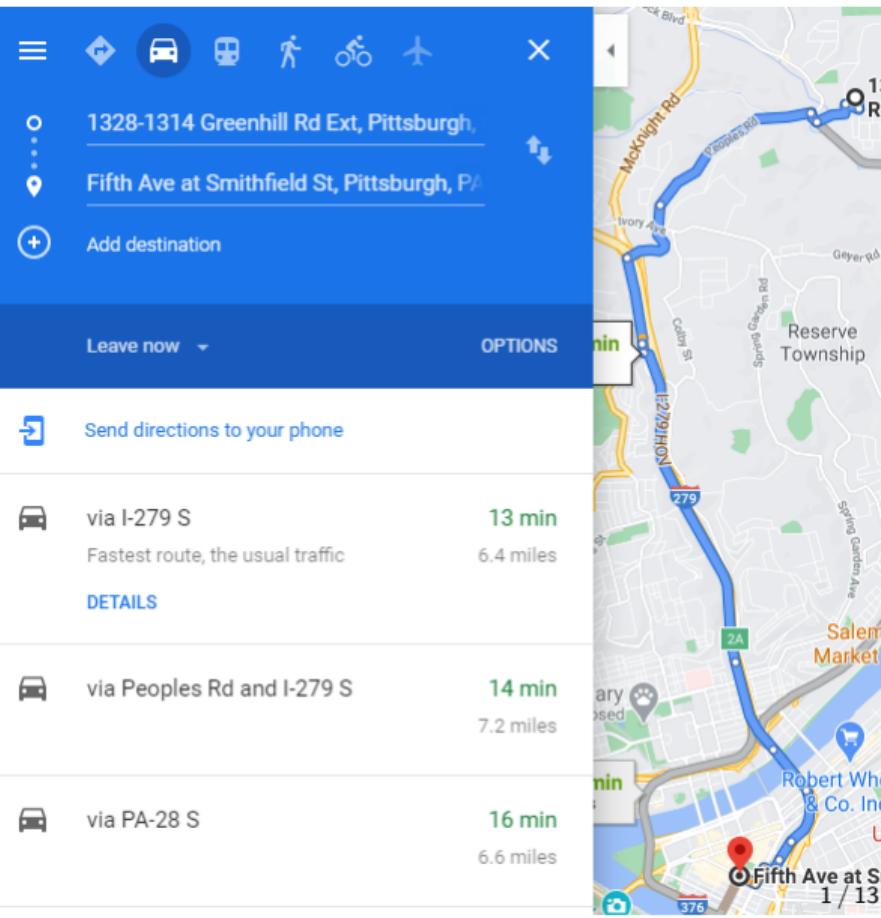
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Google Maps data

Hundreds of millions of driving trip simulations on Google Maps (GM)

- continuously since 2019
- all 2017 NHTS trips covering 275 metro areas
- plus 2m+ generated trips in 139 US cities



What we do with it

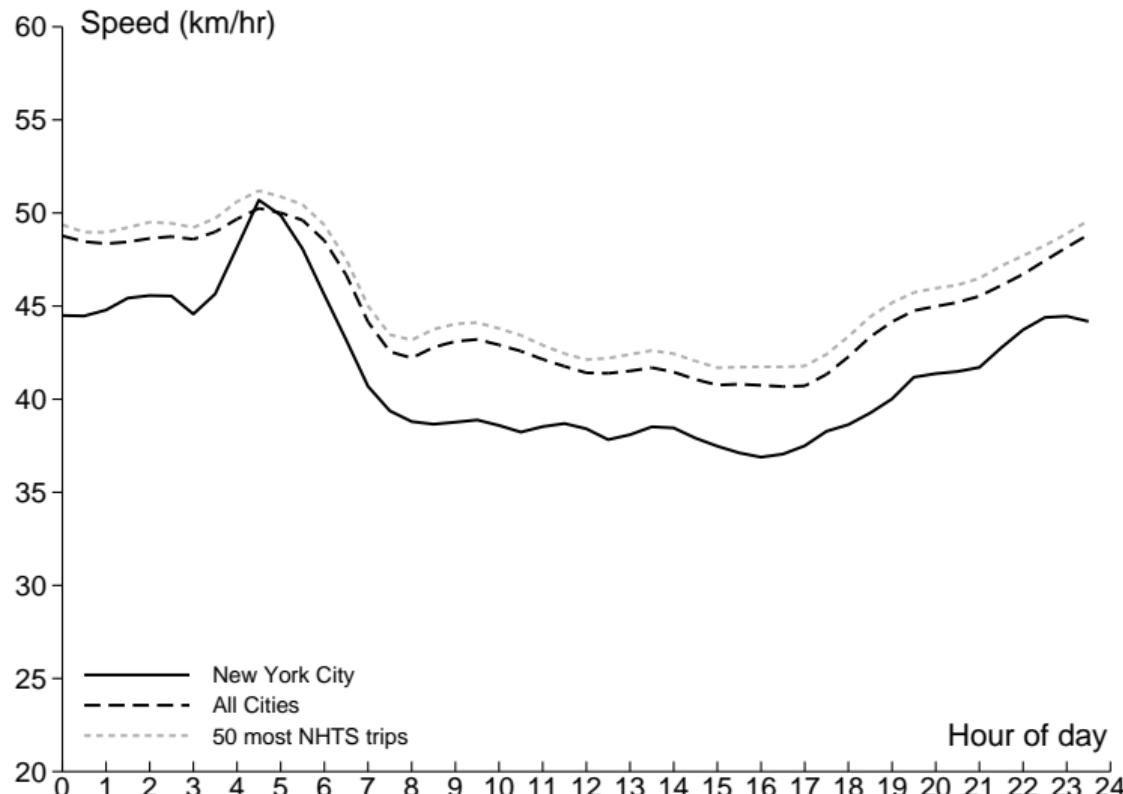
We observe variation in travel times, speeds and routes:

- ① for the same trips on different days and hours of the day e.g. to measure road congestion.
- ② across space e.g. to compare speeds across cities.
- ③ on unobserved trips e.g. to study travel choices.
- ④ across years e.g. to study implications of work from home.

We are generating a comprehensive database of historical trip data - very cheaply!

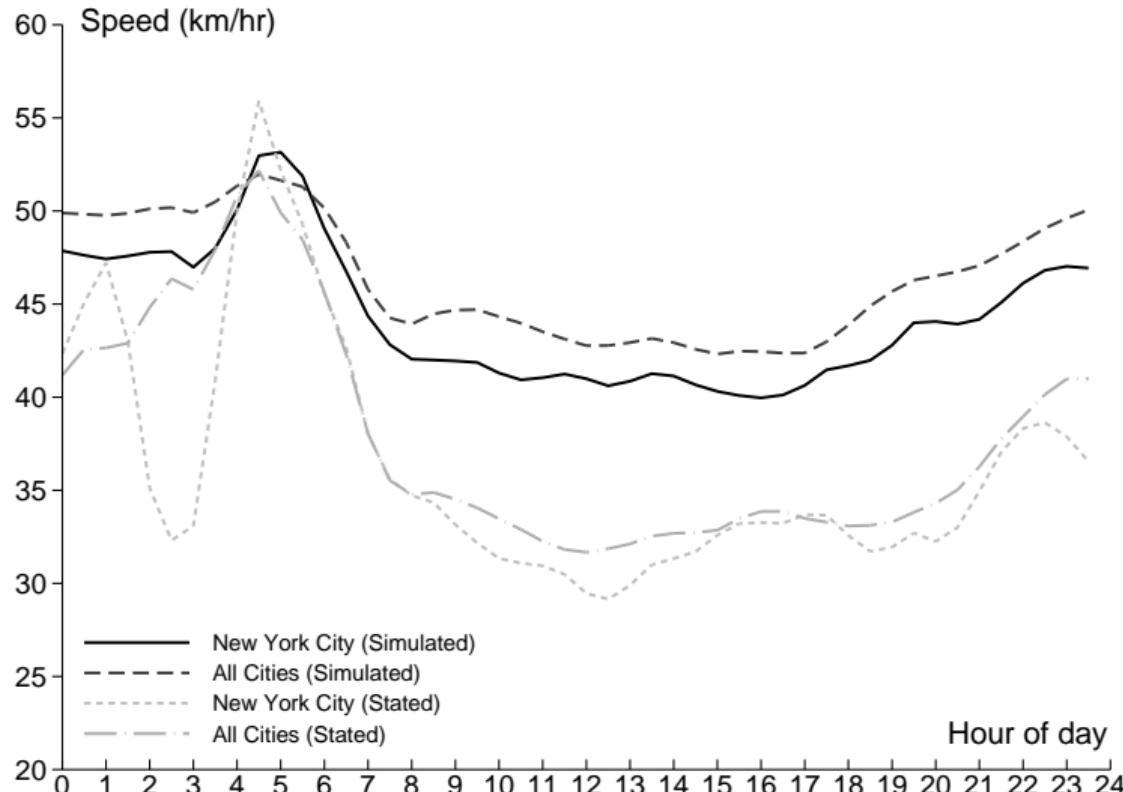
Tracking speeds as well as congestion

From over 25 million GM simulations of 593,929 NHTS trips:



Tracking speeds as well as congestion

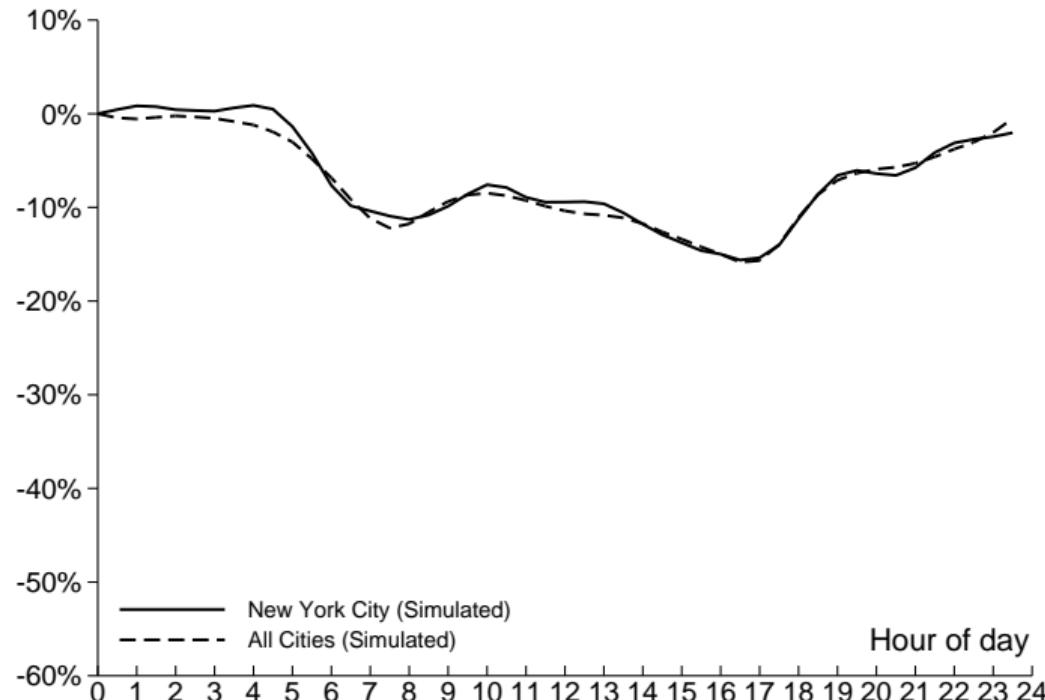
Over 25 million GM trip simulations vs 593,929 NHTS trip reports:



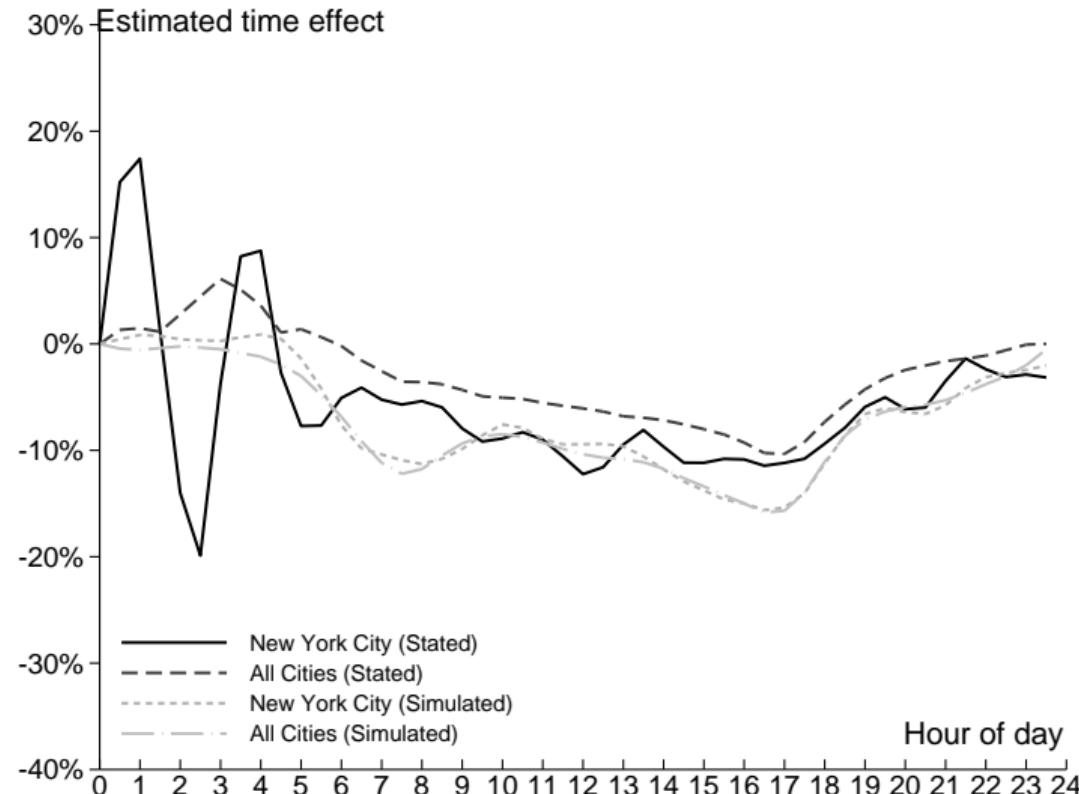
Comparing speeds across cities and time

- Problem: Determinants of trip speed vary systematically across time of day and cities, e.g. trip distance, distance to the center, etc.
- Solution (Couture et al., 2018, Akbar et al., 2023): Price index methodology
 - ▶ Each trip is a 'good'.
 - ▶ Speed is the (inverse) price of a trip in units of time.
 - ▶ Use a comparable basket of trips in each city.

Comparing speed indices across time of day



Comparing speed indices across time of day



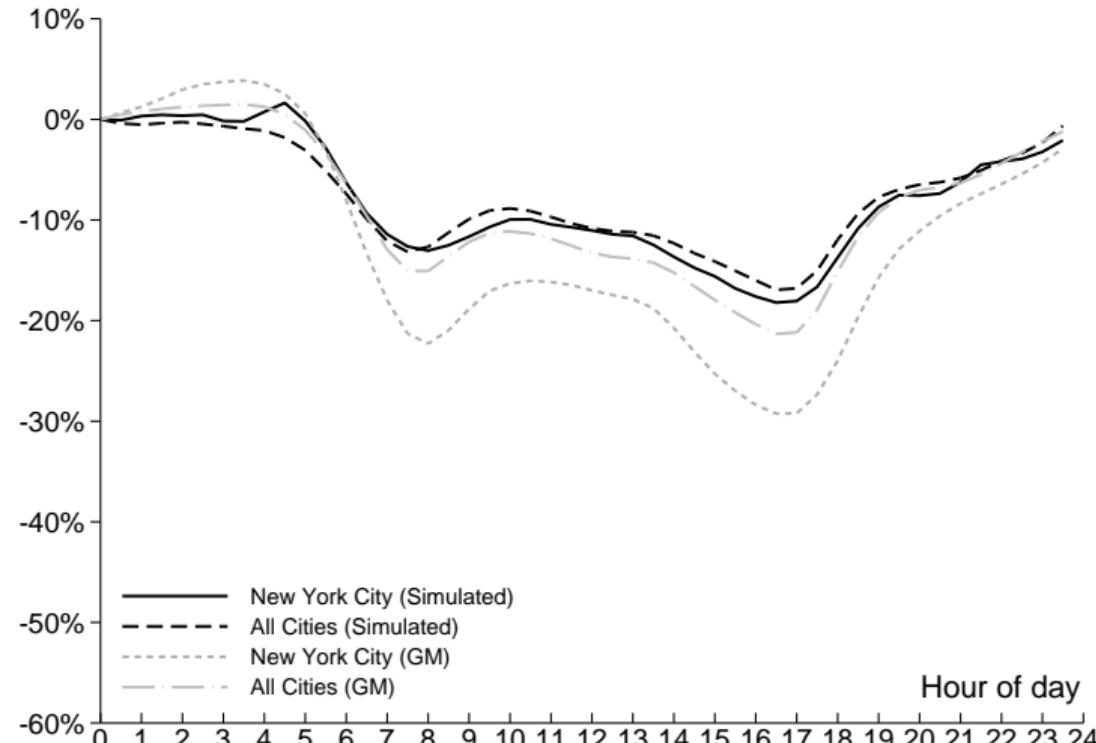
Observed NHTS trips vs Generated random trips

Does the NHTS trip sample adequately capture speed variation within cities?

Compare to a sample of >2 million randomly generated trips:

- More targeted coverage of 'built-up' areas of cities
- Different trip design strategies: mimic trip distance and departure time distribution in the NHTS, monocentric trips to and from city centers, trips to 'school', 'restaurant', etc..
- Hundreds of millions of trip simulations on GM

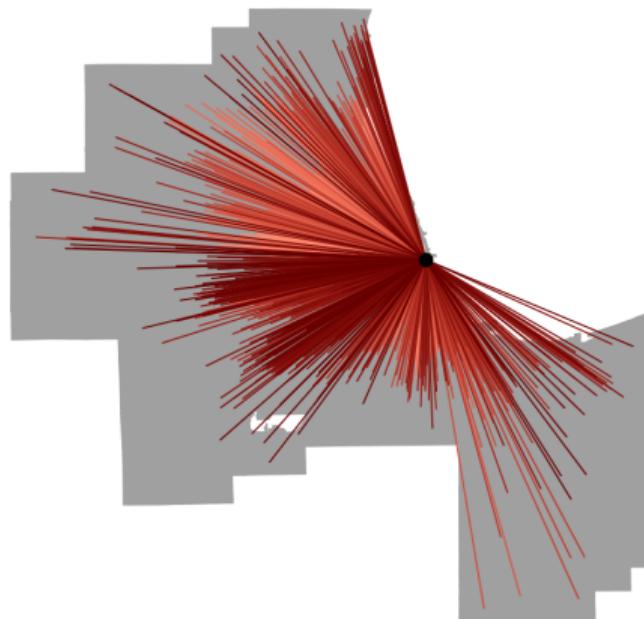
Simulated NHTS trips vs generated trips



The trips not taken

driving speeds on alternate commutes

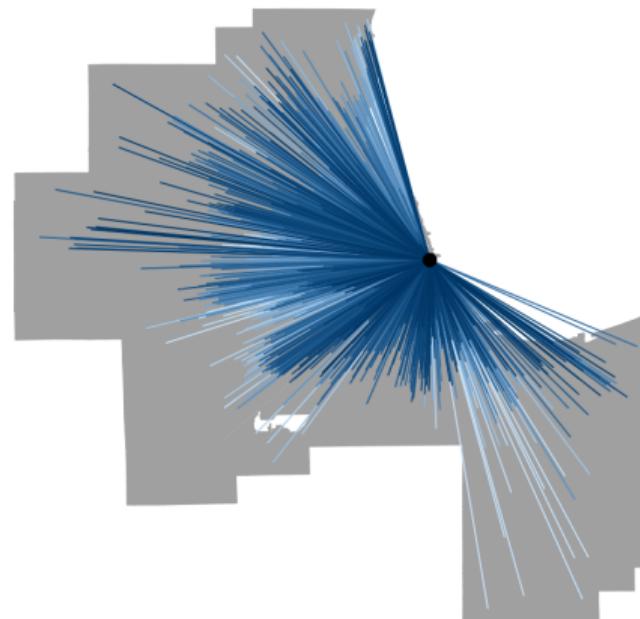
Chicago-Naperville-Elgin, IL-IN-WI



to a given work location
(darker shade = higher travel speed)

transit speeds on alternate commutes

Chicago-Naperville-Elgin, IL-IN-WI



to a given work location
(darker shade = higher travel speed)

from Akbar (2022)

To summarize:

We observe variation in travel times, speeds and routes:

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- ③ on unobserved trips e.g. to study travel choices.
- ④ **across years e.g. to study implications of work from home.**

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Caveats

- Reported travel times measure something different from travel times on the road.
- We still need know what real trips look like.

Lots of scope for combining survey and simulated data in more effective ways!

References

Akbar, Prottoy A.. 2022. "Who benefits from faster public transit?" Working Paper.

Akbar, Prottoy A., Victor Couture, Gilles Duranton, and Adam Storeygard. 2023. "Mobility and congestion in urban India." *American Economic Review* 113(4):1083-1111.

Couture, Victor, Gilles Duranton, and Matthew A. Turner et al. 2018. "Speed." *Review of Economics and Statistics* 100(4):725-739.