NIPH
Norwegian Institute of Public Health

Effects of travel time on Healthcare Utilization

Evidence from Norway

Work in progress - very preliminary and incomplete

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Distance Decay Association

- People who live far away from health services, utilize the services less than those who live close-by
- Travel time could be one reason for geographic variation in utilization of health services
  - With associated over- or under-utilization, and excessive costs or deteriorated health

Policy Question:

Will further centralization of services reduce utilization?

- Centralization is widely discussed for several reasons
  - reduce costs of operating the services
  - improve quality of treatment by higher volume
  - reduce prospects in emergency situations
  - reduce patients' satisfaction (longer travel distance)

How can we credibly answer the policy question empirically?

- Reverse causality problem: Not travel distance that causes utilization, but patients' needs of health services that determine travel distance?
  - The patients in need of services may have moved close to them
  - The services may have moved closer to the needy patients switch to nearby services
- If reverse causality, the distance decay association is **not** informative of the effect on utilization of centralizing services
- Randomized controlled trials infeasible
  - Randomly distribute location of inhabitants across the country
  - Randomly distribute location of health services across the country

We use changes in travel time from new bridges, tunnels and roads

- We do **not** compare travel time across individuals (cross-section), but use changes over time for the same individual
- We do **not** use variation from inhabitants moving closer to the provider
- We do **not** use variation from the inhabitant switching to a nearby provider
- We only use variation over time for each inhabitant from changes in travel time by road
  - Panel model with fixed effects for geographic location of the inhabitant and geographic location of the provider
- We try to mimic an experiment where road investments were randomly distributed across the inhabitants
  - I.e. effect on utilization from i) change in travel time to provider, **or** ii) any other impacts on utilization from the improvement in roads associated with change in travel time to provider

Norwegian context - GP

- Universal, high-quality health care system covering all important services and all residents
  - Funded through general taxes
  - Low or no out-of-pocket payments
  - Legal right to necessary services for everyone
  - Virtually no private alternatives
- Every Norwegian resident is assigned one (and only one) GP at every point in time
  - Free to change GP twice a year

Data

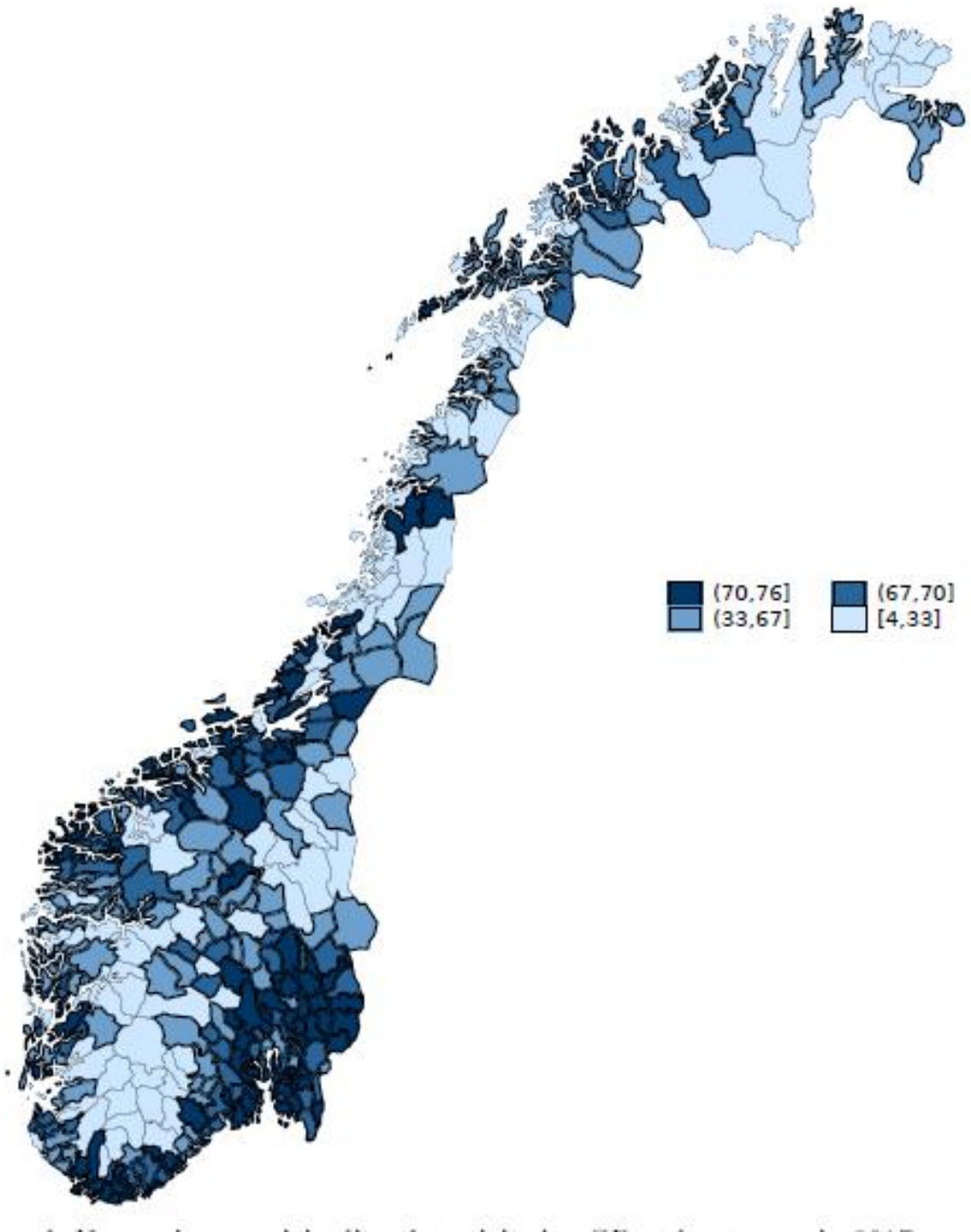
- We have individual level registry data 2010 - 2017 for every Norwegian resident
  - All consultations in primary and out-patient specialist health services, including GP (all reimbursements/fee-for-service to the GP/specialist)
  - Unique ID of every resident and ID of his/her assigned GP
  - Exact geographic location of every resident and every GP office
  - Rich array of demographic and socioeconomic variables for every resident
    - Typically include controls for individual's age, sex, education, income, municipality, etc.
- Maps of all roads (with speed limits) in Norway 2010, 2013-2017
- We calculate travel time (minutes) by car from the home of every resident to the office of the resident's GP annually

Some summary statistics

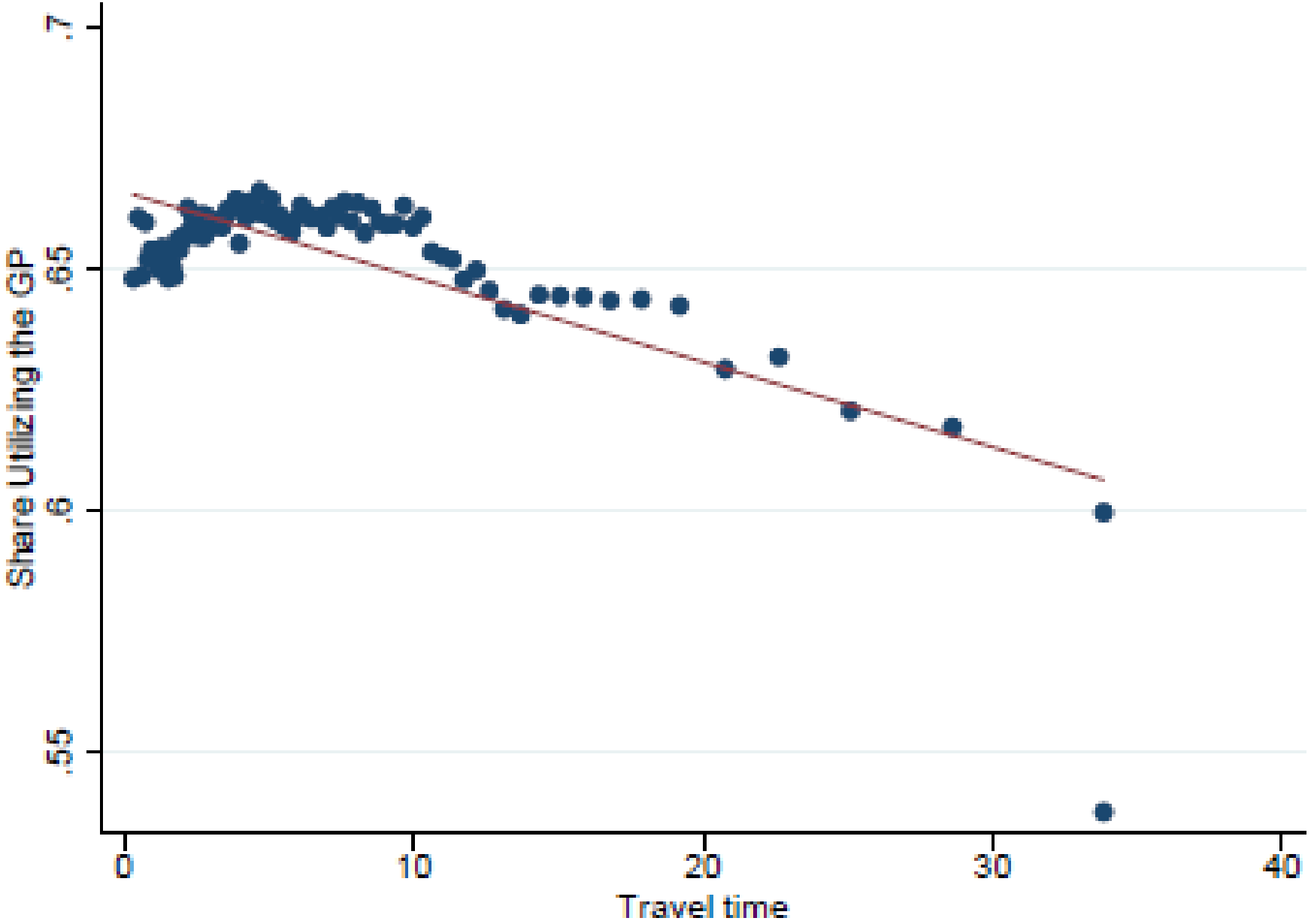
- ≈ 5 million inhabitants
- ≈ 38.8 million person-year observations 2010-2017
- Mean number of GP-visits for all inhabitants ≈ 2.2 per year
- ≈ 66 percent of the inhabitants had at least one visit per year
- Mean travel time from home to GP ≈ 8 minutes (median ≈ 5, p90 ≈ 20)

Geographic variation in utilization of GP-services

- Pecent of the residents in each Norwegian municipality visiting the GP in 2017
- By quantile of the 427 municipalities
  - Q1 is 33 percent
  - Q3 is 70 percent



Cross-section: Distance decay association



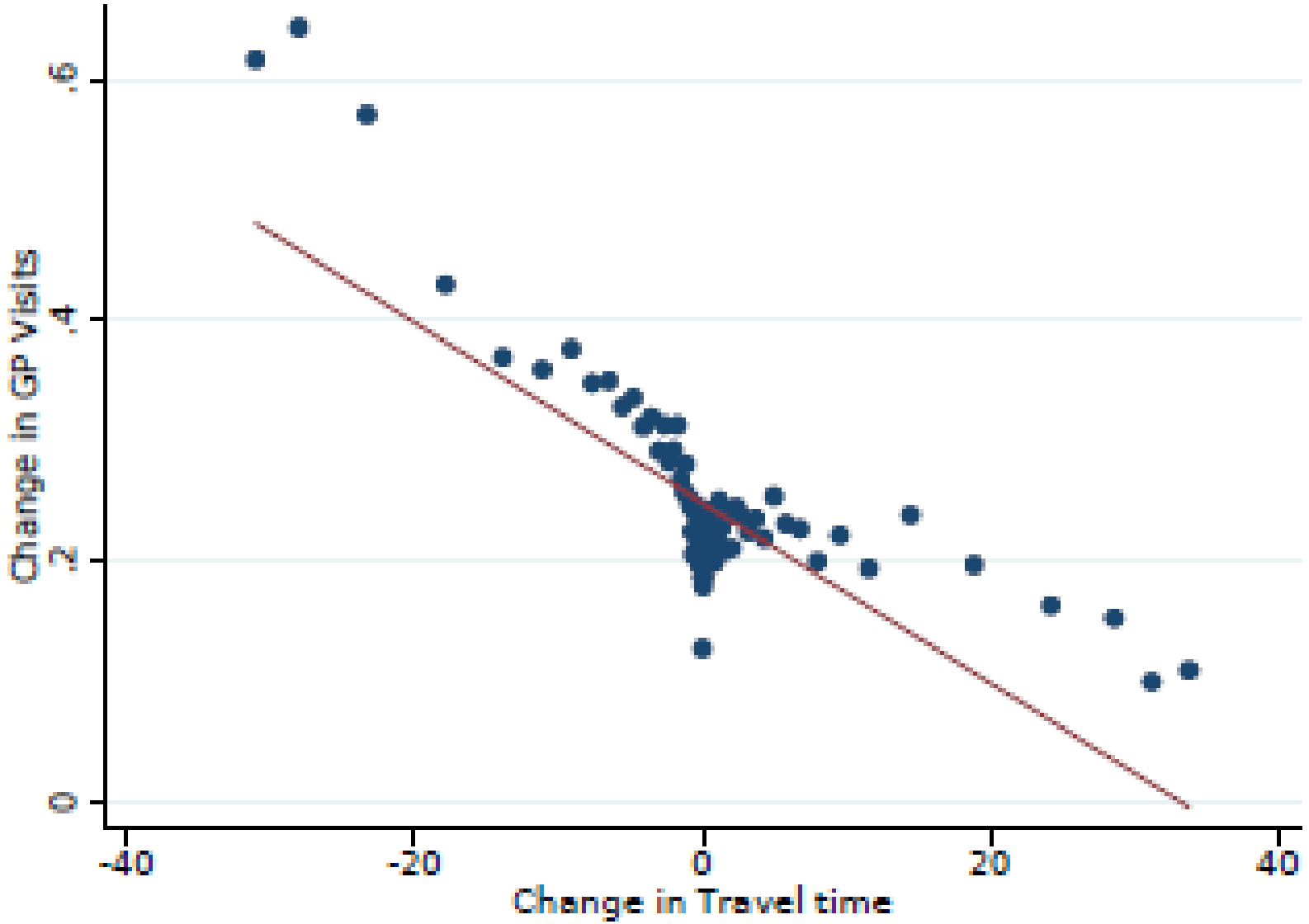
Distance decay association in Norway

- Cannot be given a causal interpretation, and if still done, it would imply that:

➢ A 10 minute increase in travel time would

  - Decrease the share of the population visiting the GP in a year by 0.03 percentage points, or 4 percent – or 200 000 inhabitants
  - Decrease the mean number of visits by 0.1, or 5 percent – or 500 000 visits per year

Visits over time for same individual: Change in visits to GP 2010-2017 when travel time changes 2010-2017



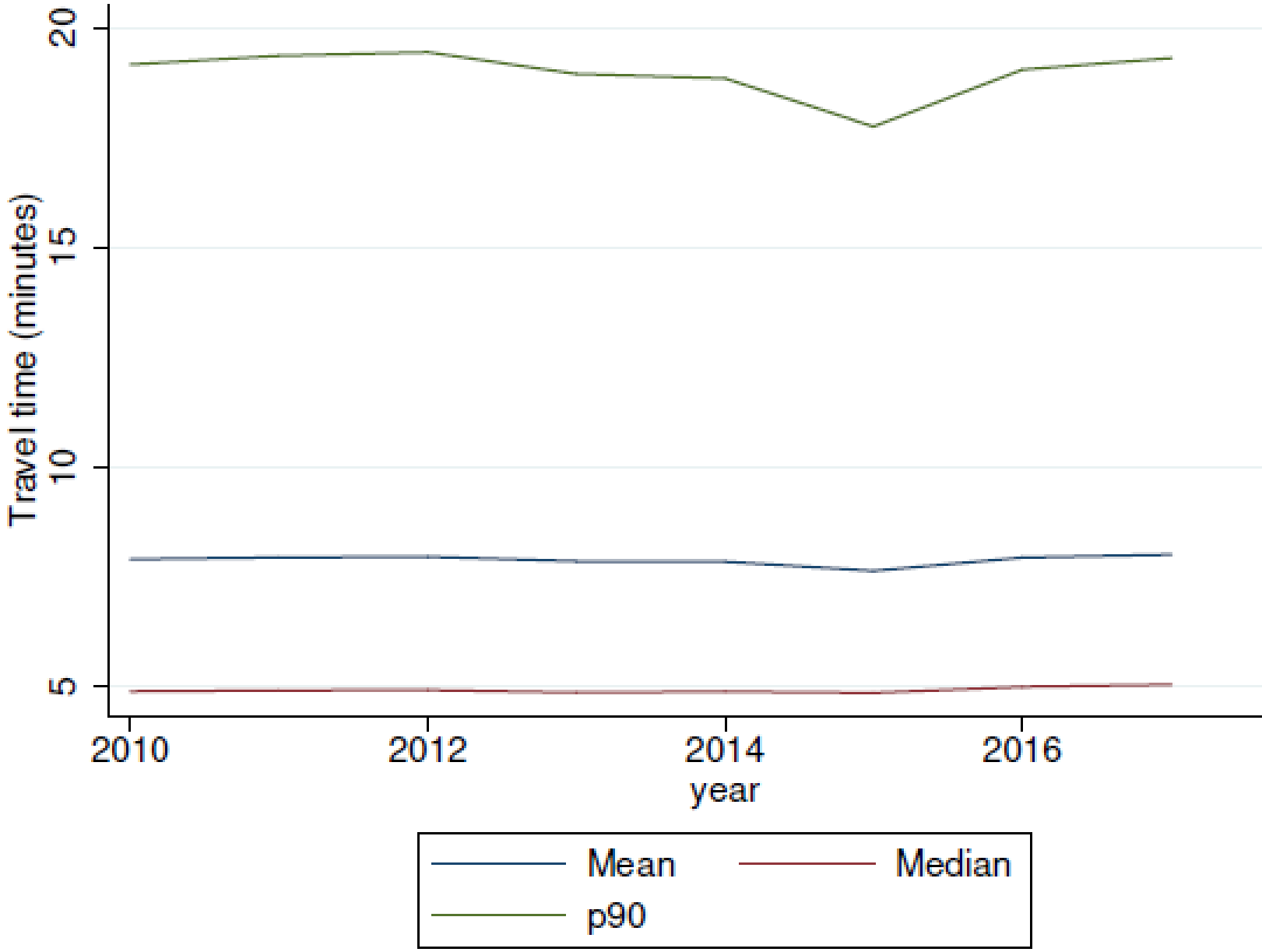
Main effect estimates – using variation in changes in roads only

- The distance decay association dissolves in the general population when we use variation from changes in roads
  - Effect estimates are >15 times smaller than the association, and statistically insignificant
- But for people on disability pension and with long initial travel time (>15 minutes), the drop is smaller and the estimate remains significant
- As expected, we also find that longer travel time to GP
  - Increases the use of electronic consultations
  - Increases the use of other specialist (out-patient) consultations

Discussion

- The distance decay association vastly overstates any causal effect of travel time on utilization
- Our effect estimates suggest that further centralization of GP-services is unlikely to affect utilization for the general population
- But it may affect utilization of some vulnerable groups
  - Centralization might deteriorate health in some groups unless these groups already over-utilize or compensatory means can be implemented (targeting)?
- How to improve and extend our preliminary analyses?
  - Look at vulnerable groups - gender/age, consultation by type (pregnant women, sick leave certificate, diagnoses)?
  - Effects of travel time on health outcomes (mortality, other?)?
  - Other suggestions?

Travel time in minutes by car



Travel time to each inhabitant's assigned GP in each Norwegian municipality

- By quantile of the 426 municipalities in 2017
  - Q1 is 8 minutes
  - Q3 is 12 minutes