

AGENCY FOR HEALTHCARE RESEARCH AND QUALITY

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Linking the MEPS-IC to Administrative Records: A New Approach to Inferring Establishment Links

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The Medical Expenditure Panel Survey – Insurance Component (MEPS-IC)

- A survey of 40,000 business establishments
  - Approximately a 70% response rate
- Uses the Business Register as its survey frame
- Questions focus on health insurance and employment
  - Insurance offer rate, take-up rate, plan characteristics
- Would benefit from more data on workforce characteristics and parent firm characteristics
  - Employee demographics, marital status, household income
  - Benefit decisions may take place at the parent firm level
- Decennial Census, IRS Form 1040, and IRS W2 records include the desired information!

Central Data Linkage Challenge

- MEPS-IC data is at the establishment level
- IRS Form 1040 and W2 records do not contain establishment identifiers
  - W2s include EINs, but these do not uniquely identify establishments
  - Practical data issues can also yield situations where establishments have workers split across multiple EINs
- No solved training set of workers matched to establishments among multi-establishment firms

Solution Overview

- Establishment data: identity of parent firm, employment, payroll, and location
  - Information comes from Business Register and MEPS-IC
- Worker data: firm of employment, pay, location
  - From IRS W2s, 1040s, Decennial Census, RCF
- Use identity of parent firm to link establishment to all employees of its parent firm
  - This solves the match for single-establishment firms
- Search for the subset of the parent firm's workforce that best matches the establishment
  - Prioritize matching on total employment and payroll
  - Secondarily, prefer workers closer to the establishment

Pre-Match Preparation

- Match establishments to parent firms in the BR
  - Resolve verified single-establishment firms
- Identify employees of parent firms in W2 records using EINs
- Prepare employment and payroll targets reflecting number of W2s expected for each establishment and total payroll across them
  - Point-in-time (PIT) employment is captured by the MEPS-IC and the BR, but W2s reflect over-the-year (OTY) emp.
  - Derive OTY emp. targets using LASSO trained on single establishment firm data as a function of PIT employment, industry, and other characteristics
  - Payroll targets require only mild cleaning of BR information

Two Cases, Two Approaches

- Case 1: One Establishment from a Multi-Establishment Firm
  - Conceptually more complex solution method
  - Less computationally intensive solution method
- Case 2: Multiple Establishments from a Multi-Establishment Firm
  - Conceptually simpler solution method
  - More computationally intensive solution method
- Let's start with Case 2

Case 2: Multiple Establishments from a Multi-Establishment Firm

- Multiple establishments drawing from the same pool of parent-firm workers
  - Each establishment needs a targeted number of workers
  - Each establishment needs a targeted payroll total
  - Each worker can work only at one establishment
  - Not all workers need to be assigned to an establishment
- Begin by provisionally assigning each establishment its targeted number of workers
  - Initial assignments can be arbitrary
  - I loosely aim to minimize commute distances when forming initial assignments by giving each establishment the workers closer to it than any other establishment

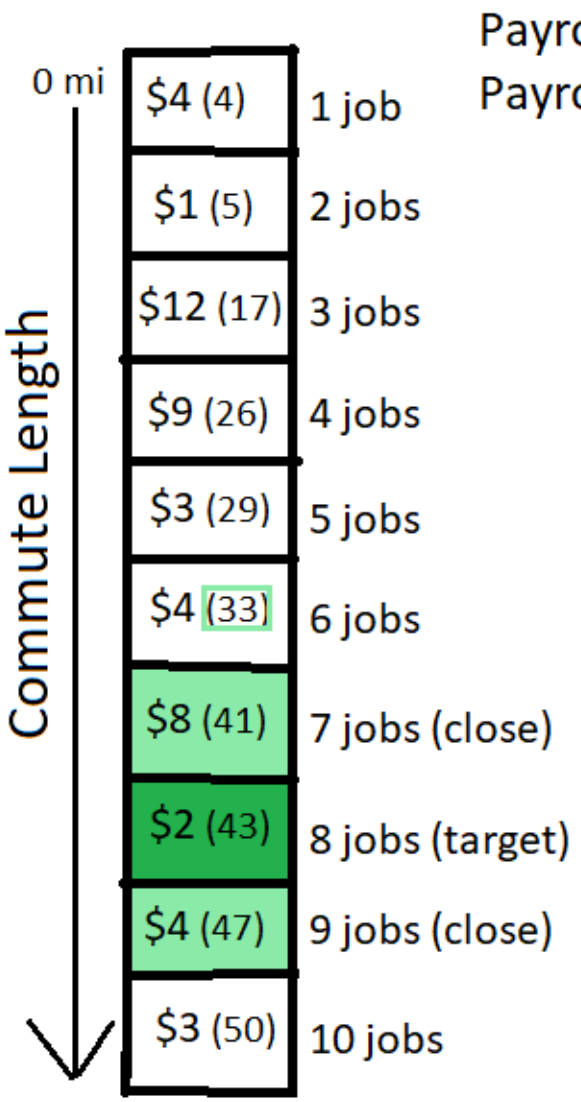
Case 2: Iterated Trading

- Iterate through establishments, allowing them to trade workers with other establishments and the pool of unassigned workers
  - Iterate until all estabs. have employment and payroll totals close to their targets
  - Failing that, stop after an immense number of trades have been completed
  - Caution: this can be very computationally intensive!
- Trades with other establishments
  - Trade must push both establishments closer to their payroll targets
  - Trade must not excessively increase estab. average commute distances
    - Threshold for permissible increase rises with the number of completed trading cycles
  - Exact trade made is chosen at random from the set of admissible trades
- Trades with the unassigned worker pool
  - Same conditions on trades for the establishment
  - All trades are admissible from the perspective of the unassigned worker pool
- Donations to and from the unassigned worker pool are also permitted
  - Donations may not push worker counts too far from estab. employment targets
  - Donations not allowed before completion of earliest rounds of trading

Case 1: One Establishment from a Multi-Establishment Firm

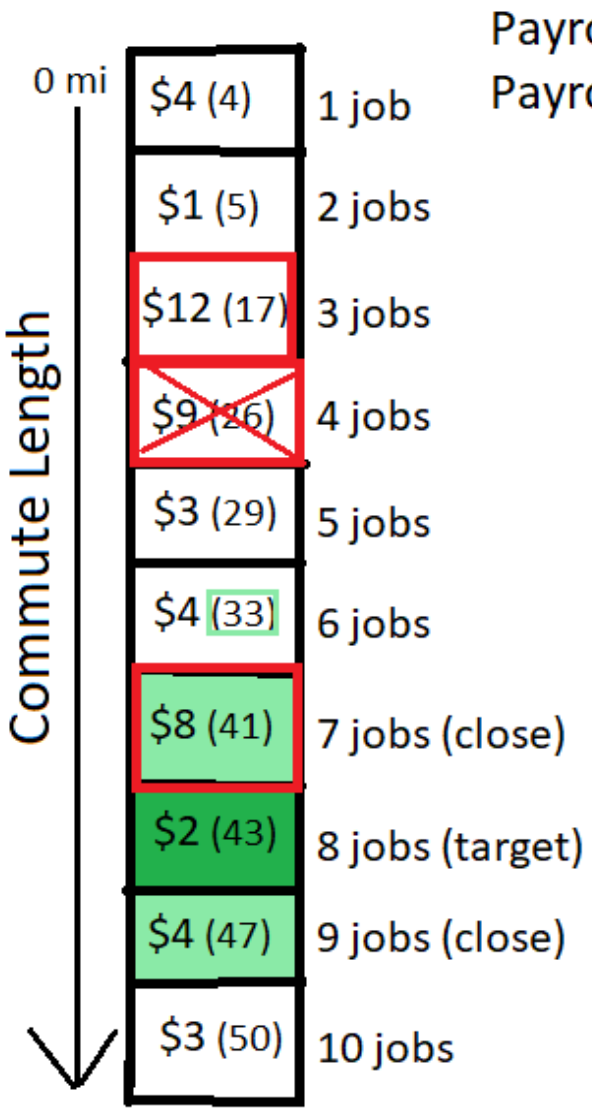
- Only one establishment and a pool of unassigned workers to consider
- We can aim for something more efficient than iterated trading
  - More precisely, we *must* do so for the solution to be feasible given many establishments fall into this case
- Note: the approach shown on the following slides is a simplification: additional efficiency gain tricks were used in practice
  - e.g. solution feasibility checks, batch processing of workers, etc.

Solution: One Establishment from a Multi-Establishment Firm



- Array workers in order of increasing distance from the establishment
- Calculate the running sum of payroll from worker 1 to each worker
- Check if the running sum of payroll is close to the payroll target for some worker *n* where *n* is close to the employment target
- If yes, choose one such *n* and assign workers 1 to *n* to the establishment

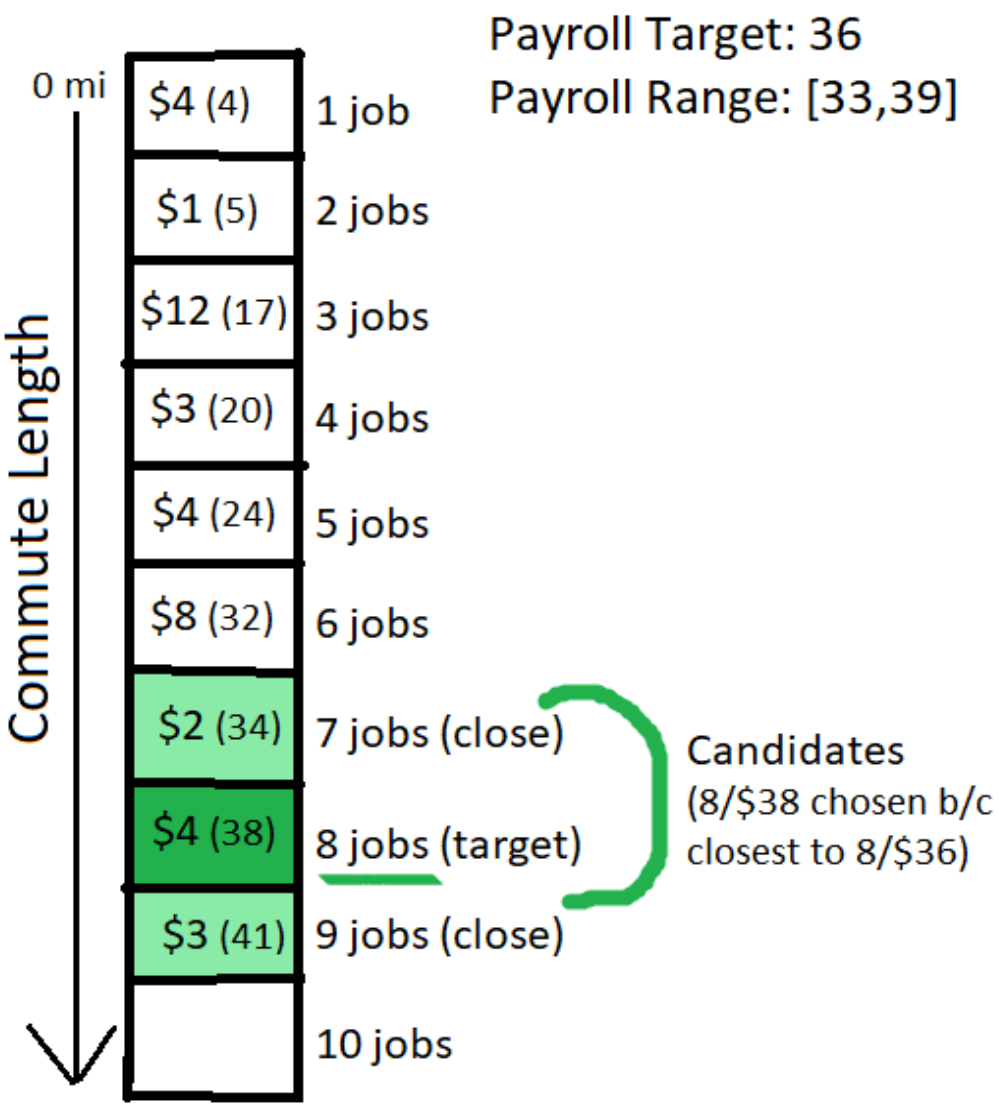
Solution: One Establishment from a Multi-Establishment Firm



Payroll Target: 36
Payroll Range: [33,39]

- If the running sum of payroll it too high, eject a high pay worker from the array
- If the running sum is too low, eject a low pay worker

Solution: One Establishment from a Multi-Establishment Firm



- Iterate until an admissible ordering is found, i.e. an ordering where there is some *n* close to the employment target with a running sum of payroll near the payroll target
- Use a penalty function to make the exact choice among admissible options

Solution: Final Steps

- Establishments have been matched to the set of workers they employ over-the-year
  - This is useful, but not the same employment concept as in the MEPS-IC and most other business surveys
- Construct weights that can be used to characterize the set of workers employed at the establishment at a given point-in-time
  - Conceptually, the weights should be the share of the year for which a given person was employed at the establishment
  - Develop weights using information about who is employed by the same firm in prior and future years, plus pay levels
- Check on completed matches and impose minimum match quality standards

Does it Work?

- 93% of establishments successfully match
  - Many match failures actually occur at the parent firm to W2s level
- Matched payroll and worker counts are generally close to their targets (within 5%)
  - This is true when considering the mean and median establishment with employment weights, and the median establishment in general
  - The mean establishment without employment weights sometimes deviates more due to sensitivity to very small establishments
- Implied turnover rate (OTY matched emp. / surveyed PIT emp.) also close to QWI-style turnover rate (derived from comparing tax records across years)
  - Turnover rates similarly close at the establishment-level and the parent firm-level

Does it Work?

- Minimal gap in match performance between single- and multi-establishment firms
- Tax-derived worker income distributions comparable to those in the American Community Survey after application of PIT weights
  - Mean 1040 Total Money Income within $2000 of mean ACS Total Family Income
  - Mean W2 pay within $2000 of mean ACS individual Wage and Salary Income
- Commute distance distribution similar to that in National Household Travel Survey benchmarks after trimming extreme commutes
  - Extreme commutes likely reflect measurement error

Discussion

- We develop a new approach for linking establishments to workers in tax data
- Our approach has a number of benefits:
  - Does not require hand linking a training set of workers within multi-establishment firms
  - Preserves information about relationship between workers: a given establishment might support only 1 highly paid manager along with other lower pay workers
  - Most common failure mode consists of assigning establishments a worker from the same firm, at the same level of pay, in a similar location to the worker that should have been assigned
  - Performance comparable to procedures used by other data programs
- Key limitation of the approach: computational intensity makes scaling to very large samples difficult
- Data currently spans 2005-2020: how will extending the data past 2020 work, given increased rates of work-from-home may affect importance of geographic location?

Conclusion: The MEPS-ICAR

- Final Data Product: The MEPS-IC with Administrative Records (MEPS-ICAR)
  - Spans 2005-2020 exclusive of 2007
  - Includes MEPS-IC establishment survey data linked to IRS W2 and 1040 Records + Decennial Census Records
- For more details on the linkage and on what data the MEPS-ICAR includes, see CES Working Paper Number CES-22-29
  - https://www.census.gov/library/working-papers/2022/adrm/CES-WP-22-29.html
  - Also published as MEPS Methodology Report 35
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