The Effect of Working from Home on the Agglomeration Economies of Cities: Evidence from Advertised Wages

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1The views expressed here are those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Dallas or the Federal Reserve System.
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- Knowledge spillovers (interaction);
- Input-output linkages; Professional and business network (interaction).
WFH and Agglomeration Effect of Cities

- Productivity and wages are higher in larger cities and dense areas than in smaller cities and rural areas—agglomeration economies.
  - Knowledge spillovers (interaction);
  - Input-output linkages; Professional and business network (interaction).
- The effect of working from home (WFH) on the agglomeration economies of cities and the aggregate productivity implications.
  - **Pros:** Reduce commuting, better workers’ well-being, higher productivity for some jobs, and better labor allocation ()?
  - **Cons:** Reduce workplace interactions—core building block of agglomeration economies.
Before and After WFH Adoption

▶ Before WFH:
  ▶ Work locations and residential locations are **bundled**.
  ▶ Key mechanisms:
    ▶ Large cities benefit from productivity spillovers from workers’ physical concentration.
    ▶ High-productivity large cities constrained by limited housing supply (high rent).

▶ After WFH became widespread:
  ▶ Work locations and residential locations are **decoupled**.
  ▶ Key mechanisms:
    ▶ Large cities lose productivity due to reduction of onsite workers (↓ aggregate productivity).
    ▶ High-productivity large cities gain access to a larger labor pool beyond their local housing supply constraint (↑ aggregate productivity).
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Labor Market in Large Cities: High WFH Adoption During COVID-19
Labor Market in Large Cities: Low WFH Adoption During COVID-19
Data

- Burning Glass Technologies (now called Lightcast).
  - Jobs posted on online job boards.
  - Subsample contains wage information.
  - Date, geography (county), employers, NAICS, SOC.
  - Detailed skill requirements.

- Quarterly Census of Employment and Wages (QCEW): Number of jobs by industry based on firms’ locations.

- Measuring WFH prevalence:
  - American Community Survey (ACS)
  - O*NET
  - American Time Use Survey (ATUS)
Empirical Evidence: ↓ Urban Wage Premium for High-WFH Jobs
Robustness to Alternative Explanations

- Bad WFH definitions?
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- ↓ Commuting time in large cities → ↓ Compensating differentials?
Empirical Evidence: Employment Growth (2019-2022) (Food Services)

San Francisco-Oakland-Hayward, CA
San Jose-Sunnyvale-Santa Clara, CA
Seattle-Tacoma-Bellevue, WA
Orlando-Kissimmee-Sanford, FL
New York-Newark-Jersey City, NY-NJ-PA-
Kansas City, MO-KS
Denver-Aurora-Lakewood, CO
Salt Lake City, UT
Nashville-Davidson--Murfreesboro
Dallas-Fort Worth-Arlington, TX
Austin-Round Rock, TX
Boise City, ID

Change in Ln Employment
Additional Evidence: Decompose the ↓ UWP

- Decline in wage premium in large cities (urban wage premium) among the high-WFH jobs:
  - The returns to *some* skills likely declined in large cities relative to small cities
  - Identifying *which* skills → reveals the driver of the ↓ UWP.

- Skills conducive to interactive activities (e.g., building relationship, marketing, and customer support) ↓ UWP → Less occurrence of productive interactive activities in larger cities → Weakened agglomeration economies.

- Skills complementing remote technologies (e.g., information technology) ↓ UWP → Influx of labor supply to large-city firms.
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### Top Drivers of the UWP (2019 to 2022/2023)

<table>
<thead>
<tr>
<th>Skill</th>
<th>( \pi )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications</td>
<td>22.5%</td>
</tr>
<tr>
<td>Information Technology</td>
<td>22.2%</td>
</tr>
<tr>
<td>Customer and Client Support</td>
<td>21.4%</td>
</tr>
<tr>
<td>Building Relationship</td>
<td>16.1%</td>
</tr>
<tr>
<td>Administration</td>
<td>15.9%</td>
</tr>
<tr>
<td>Marketing and Public Relations</td>
<td>14.1%</td>
</tr>
<tr>
<td>Business Management</td>
<td>11.6%</td>
</tr>
<tr>
<td>Maintenance, Repair, and Installation</td>
<td>6.6%</td>
</tr>
<tr>
<td>Physical Abilities</td>
<td>4.6%</td>
</tr>
<tr>
<td>Human Resources</td>
<td>3.1%</td>
</tr>
<tr>
<td>Creativity</td>
<td>2.9%</td>
</tr>
<tr>
<td>Engineering</td>
<td>2.3%</td>
</tr>
<tr>
<td>Decision Making</td>
<td>2.2%</td>
</tr>
<tr>
<td>Personal Care and Services</td>
<td>2.1%</td>
</tr>
<tr>
<td>Education and Training</td>
<td>1.8%</td>
</tr>
<tr>
<td>Media and Writing</td>
<td>0.8%</td>
</tr>
<tr>
<td>Design</td>
<td>0.6%</td>
</tr>
<tr>
<td>Public Safety and National Security</td>
<td>0.5%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.2%</td>
</tr>
<tr>
<td>Economics, Policy, and Social Studies</td>
<td>0.1%</td>
</tr>
<tr>
<td>Energy and Utilities</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Takeaways

▶ WFH weakened agglomeration economies of large cities
▶ WFH also expands labor pool to more productive cities
▶ The weakening of agglomeration effect outweights the effect of labor pool expansion over 2020-2022
  ▶ May be the reverse over the long run with hybrid models
▶ Caveats:
  ▶ Hybrid model
  ▶ Robust and spontaneous person-to-person interactions made feasible on virtual platforms.