

From National Trends to Local Mobility: A Multi-Scale Visualization of U.S. Job Transitions During the COVID-19 Era

Github link: <https://github.com/ucfnlih/INFSCI-2415-Final-Wendi-Li.git>

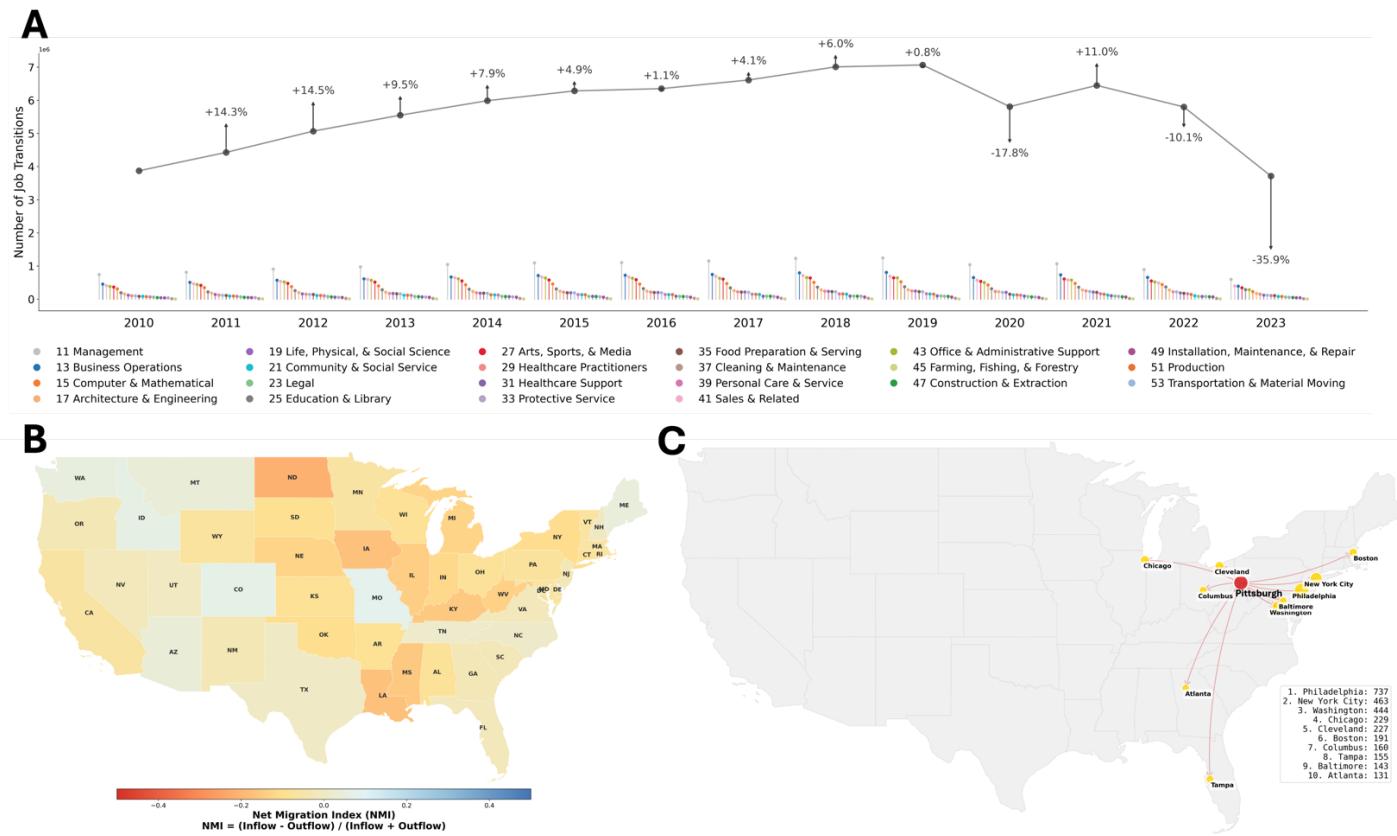


Figure 1 (A) Yearly Job Transitions by Occupation Categories from 2010 to 2023. (B) Interstate Job Mobility: Net Migration Index by State in 2020. (C) Job Migration from Pittsburgh Metropolitan Area in 2020.

(i) Legend

1. Panel A

This chart displays the number and trends of job transitions across different occupation categories from 2010 to 2023.

- Line Chart:**
 - Y-axis: Represents the "Number of Job Transitions," in millions. X-axis: Represents the year, from 2010 to 2023.
 - Data Points: Each point represents the total sum of job transitions for all occupation categories in that year.
 - Percentage Labels: The percentage above or below each data point indicates the annual growth or decline rate of the total number of job transitions compared to the previous year.

- Bar Chart Groups:**

- Below each year, there is a set of micro bar charts detailing the distribution of job transitions by occupation category for that year. Each colored bar represents a specific occupation category, and its height indicates the number of job transitions for that category.
- **Color to Occupation Category Legend:** The legend at the bottom of the chart details the specific occupation category represented by each color.

2. Panel B

This map illustrates the Net Migration Index (NMI) of job transitions across U.S. states during 2022. The index measures the relative balance between job transition inflows and outflows for each state and is defined as:

- **Color Scale:**
Blue shades indicate states with higher net inflow of job transitions (i.e., more workers moving into the state); Red shades indicate states with higher net outflow, and Neutral tones represent states with relatively balanced flows.
- **Color Bar:**
The legend at the bottom indicates the numeric range of NMI values across states, allowing direct comparison of relative gains and losses.

3. Panel C

This figure visualizes the top ten metropolitan areas receiving workers from Pittsburgh in 2020, based on interstate job transition flows.

- **Destination Nodes:**
Each yellow dot represents a metropolitan area that received workers originating from Pittsburgh. The size of each dot is proportional to the number of job transitions, allowing quick visual comparison of destination popularity.
- **Origin Node:**
Pittsburgh is shown as a large red node, representing the origin point for all transitions in this visualization.
- **Flow Arrows:**
Curved red arrows indicate the direction and relative volume of job transitions from Pittsburgh to each destination. Thicker or more visually prominent flows correspond to larger transition counts.
- **Ranked Legend:**
The accompanying list enumerates the top ten destinations and their corresponding transition counts, providing exact numeric values to complement the map-based visual scaling.

(ii) Findings

- **Long-Term Growth Followed by Extreme Volatility:** The total number of job transitions grew steadily from 2010 to a peak in 2019. The period since has been marked by extreme volatility, with a sharp pandemic-related decline in 2020 (-10.8%), a strong recovery to a new peak in 2021 (+11.8%), and an unprecedented drop in 2023 (Panel A).

- **Consistent High-Fluidity in Key Occupations Despite Market Swings:** While the overall number of job transitions fell sharply by -25.4% in 2023, the decline was broad-based across all sectors. Throughout the entire 14-year period, including this recent downturn, categories such as Management, Business Operations, and Computer & Mathematical consistently accounted for the largest shares of job transitions (Panel A).
- **Regional Imbalances in Worker Flows:** Many Midwestern and Southern states show negative NMI values (net outflow), while only a small number of states register net inflows, indicating uneven post-pandemic labor redistribution (Panel B).
- **Strong Outflows Toward Major East Coast Hubs:** The largest shares of Pittsburgh's outbound job transitions move to metropolitan areas such as Philadelphia, New York City, and Washington, D.C., reflecting deep structural ties within the Northeast corridor (Panel C).

(iii) Data and Method

Data: Detailed LinkedIn-based resume data from Revelio Labs

Method: Applying statistical summarization and geospatial visualization (Matplotlib, GeoPandas) to map temporal trends and mobility flows across occupations and regions.

(iv) Significance statement on why the figures are important

Panel A shows a sharp nationwide decline in job transitions in 2020, marking a major disruption to the long-term upward trend. Consistent with this pattern, the U.S. Bureau of Labor Statistics reports that the COVID-19 pandemic caused unprecedented labor market losses and historic spikes in unemployment (Bureau of Labor Statistics, 2021). Given this shock, it is important to further examine how worker mobility shifted across regions.

Panel B therefore evaluates state-level net migration imbalances in 2020 to identify which areas experienced acute worker outflows versus inflows during the pandemic. To complement this broader perspective, Panel C focuses on one metropolitan area—Pittsburgh—as an example to illustrate how outbound mobility corridors concentrated toward specific destinations. Together, these visualizations highlight how COVID-19 reshaped the geography of U.S. labor mobility and reveal regional differences in resilience and recovery.

Reference

Bureau of Labor Statistics. (2021). *The employment situation — December 2020*.

https://www.bls.gov/news.release/archives/empsit_01082021.pdf

Dingel, J. I., & Neiman, B. (2020). *How many jobs can be done at home?* Journal of Public Economics, 189, 104235.