

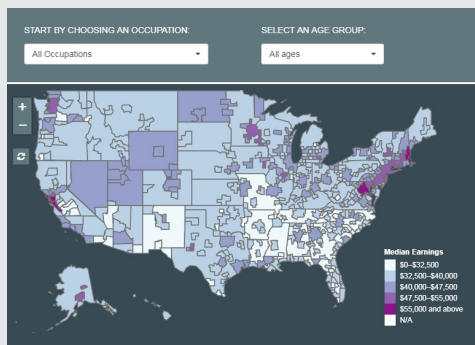
# Where Work Pays

## How Does Where You Live Matter for Your Earnings?

Lauren Bauer, Audrey Breitwieser, Ryan Nunn, and Jay Shambaugh

TECHNICAL APPENDIX – INTERACTIVE & REPORT

JULY 2018



## Where Work Pays

### Occupations and Earnings across the United States

This [interactive feature](#) allows users to see the distribution of annual earnings across the United States for a given occupation and age group, adjusting for cost of living and taxes. Users can compare wages by metropolitan and nonmetropolitan area, or by state.

THE HAMILTON PROJECT Advancing Opportunity, Prosperity, and Growth

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DISCUSSION DOCUMENT – HAMILTON PROJECT INTERACTIVE FEATURE

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Educational and occupational choices matter for your earnings, but where you work matters, too. [Findings](#) suggest that people often move to find work or accept a job, but that there are many other factors that play a role in where a person chooses to relocate. Cost of living, including housing costs and taxes, as well as a cluster of other factors collectively identified as an [amenity](#), all contribute to a choice about where to live. [Results](#) show that workers often relocate for pleasure, rather than for low crime and proximity to cultural attractions.

Over the past few years, The Hamilton Project has shared research with leads to help workers—and particularly young adults, from college graduates to recent graduates—make decisions regarding their education and careers. These web-based research reports also help illustrate workings of the labor market and their implications for educational investments, which in turn are vital for promoting broadly shared economic growth.

In our newest research feature, [Where Work Pays, Occupations and Earnings across the United States](#), users can see how typical earnings in occupations vary across metropolitan (metro) and nonmetropolitan (nonmetro) areas in the United States. They can also see how earnings by occupation change when adjusted for age, cost of living, and state and federal income taxes.<sup>1</sup>

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## Where Work Pays

### How Does Where You Live Matter for Your Earnings?

Educational and occupational choices matter for your earnings, but where you work matters, too. Employment opportunities and wages in some occupations vary substantially from state to state, county to county, and city to city. One location might be a great place to earn a living as a nurse but not as a construction worker (e.g., New Orleans, Louisiana), while a different location might be the opposite (e.g., Utica, New York). In this [economic analysis](#) we look at some of the ways that typical earnings in an occupation—and the value of those earnings after adjusting for taxes and cost of living—vary across the United States. We also examine some of the reasons why places have such different labor markets.

## Data Sources

Occupation-wage-location data: U.S. Census Bureau's American Community Survey 2016 5-Year File provided by [IPUMS USA](#) (Ruggles et al. 2017).

Tax data: National Bureau of Economic Research's [Taxsim27](#) (Feenberg and Coutts 1993).

Cost of living data: Bureau of Economic Analysis' Regional Price Parities (RPP), [RPP2 - Regional Price Parities by MSA and state portion](#).

## Location

The American Community Survey reports the PUMA (Public Use Microdata Area) that each individual lives in. There are 2,351 PUMAs in the U.S. (50 states and the District of Columbia). PUMAs in this analysis are based on the 2010 census. Because of the minimum population requirement (100,000 people), PUMAs change with each census based on increasing and decreasing populations.

IPUMS has created a crosswalk between PUMAs and metropolitan statistical areas (MSAs) that denotes what percent of a given PUMA is in a given MSA. We use this crosswalk to group PUMAs into metropolitan areas and state non-metropolitan areas. An individual is characterized as living in a **MSA** if they live in a PUMA that is more than 50% in that MSA. They are classified as living in a **state non-metropolitan area** if they live in a PUMA that is less than 50% in *any* metropolitan area. All states except for Delaware, New Jersey, and Rhode Island (and the District of Columbia) have non-metropolitan areas.

There are 381 total metropolitan statistical areas (Enid, OK, became an MSA in 2015, but is not recorded in the crosswalk from IPUMS). There are 373 MSAs included in our dataset; 8 metro areas are excluded because there are no PUMAs that are 50% or more in that MSA. These are:

- Carson City, NV
- Corvallis, OR
- Danville, IL
- Grants Pass, OR
- Jonesboro, AR
- Lewiston, ID-WA
- Midland, MI
- Weirton-Steubenville, WV-OH.

For more documentation on IPUMS crosswalk and PUMAs versus MSAs, see IPUMS USA variable documentation for [MET2013](#) and [METRO](#).

Four metropolitan areas had respondents from that area and from different regions. The authors have categorized those areas as being in the following regions, and therefore some respondents have their region variable overridden:

- Cincinnati, OH-KY-IN: Midwest
- Louisville/Jefferson County, KY-IN: South
- Philadelphia-Camden-Wilmington, PA-NJ-DE-MD: Northeast
- Wheeling, WV-OH: South
- Youngstown-Warren-Boardman, OH-PA: Midwest

## Occupation

1990 U.S. Census occupation classifications were used in order to use IPUMS larger categories for the [OCC1990](#) variable are used in the interactive (e.g., "Health Diagnosing Occupations" is a category which contains physicians, dentists, veterinarians, optometrists, podiatrists, and "Other health and therapy").

## Sample restrictions

Observations were excluded from the sample for a small set of reasons:

- Individuals younger than 25 years old or older than 64 years old are excluded ("All ages" refers to 25-64).
- People with zero or missing annual income are not included, and workers who usually worked less than 30 hours in a week are not included. No restrictions on number of weeks worked in a year are imposed.
- Those people who live in the 9 PUMAs that are less than 50% in a *given* MSA but more than 50% in *any* MSA are excluded from the sample. For example, the PUMA "North Texas Regional Planning Commission (Outside Wichita County) & Wise County PUMA" is 13% in Wichita Falls, TX, 39% in Dallas-Fort Worth-Arlington, TX, and 48% in Texas (non-metropolitan). It cannot be classified as "state non-metropolitan" because the majority lies in a metro area, but it also cannot be attributed to a given MSA since no MSA has more than a majority of the population.
- For a given occupation-age-location cell to populate, it must have at least 30 observations.

## Cost of living data

Cost-of-living data come from the Bureau of Economic Analysis Regional Price Parities (RPP), [RPP2 - Regional Price Parities by MSA and state portion](#). This data includes cost-of-living adjustments for states overall, metropolitan areas, and state non-metropolitan portions. The “RPP of All items” is used for the year 2016. The inverse (100/X) of the price parity is used for a cost-of-living adjustment multiplier for income.

From the [Bureau of Economic Analysis](#):

“**Regional Price Parities.** The RPPs are calculated using price quotes for a wide array of items from the CPI, which are aggregated into broader expenditure categories (such as food, transportation or education). Data on rents are obtained separately from the Census Bureau’s American Community Survey (ACS). The expenditure weights for each category are constructed using CPI expenditure weights, BEA’s personal consumption expenditures, and ACS rents expenditures.

“The broader categories and the data on rents are combined with the expenditure weights using a multilateral aggregation method that expresses a region’s price level relative to the U.S.

“For example, if the RPP for area A is 120 and for area B is 90, then on average, prices are 20 percent higher and 10 percent lower than the U.S. average for A and B, respectively. If the personal income for area A is \$12,000 and for area B is \$9,000, then RPP-adjusted incomes are \$10,000 (or  $\$12,000/1.20$ ) and \$10,000 (or  $\$9,000/0.90$ ), respectively. In other words, the purchasing power of the two incomes is equivalent when adjusted by their respective RPPs.”

## Tax data

Tax data come from the National Bureau of Economic Research’s [Taxesim27](#) ([Feenberg and Coutts 1993](#)). The simulation runs for the 2018 tax year and incorporates the Tax Cuts and Jobs Act of 2017. Tax data run for a single filer with no dependents. For more documentation of tax calculations, see [Taxesim27](#).

## Interactive Chart

The interactive chart was built using the [Shiny](#) package from RStudio. The app relies on a variety of other R packages, available for free to the R users community. These packages include:

- [Leaflet](#) (interactive mapping)
- [dplyr](#) (data manipulation)
- [plotly](#) (interactive plots)
- [htmlwidgets](#) (JavaScript visualization libraries)
- [shinyWidgets](#) (custom inputs for apps)
- [shinycssloaders](#) (CSS loading animations)
- [shinyBS](#) (bootstrap components for Shiny apps)
- [data.table](#) (fast subsetting of tables)



BROOKINGS

*The Hamilton Project* seeks to advance America’s promise of opportunity, prosperity, and growth. We believe that today’s increasingly competitive global economy demands public policy ideas commensurate with the challenges of the 21st Century. The Project’s economic strategy reflects a judgment that long-term prosperity is best achieved by fostering economic growth and broad participation in that growth, by enhancing individual economic security, and by embracing a role for effective government in making needed public investments.

Our strategy calls for combining public investment, a secure social safety net, and fiscal discipline. In that framework, the Project puts forward innovative proposals from leading economic thinkers — based on credible evidence and experience, not ideology or doctrine — to introduce new and effective policy options into the national debate.

The Project is named after Alexander Hamilton, the nation’s first Treasury Secretary, who laid the foundation for the modern American economy. Hamilton stood for sound fiscal policy, believed that broad-based opportunity for advancement would drive American economic growth, and recognized that “prudent aids and encouragements on the part of government” are necessary to enhance and guide market forces. The guiding principles of the Project remain consistent with these views.

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