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Place-Based Labor Market Inequality

Douglas Webber, Isabella Agnes, Jessica Liu, and Erin Troland¹

Abstract

This paper presents an overview of how various labor market indicators differ across geography. While many indicators are often discussed in terms of national aggregates, such discussions obscure the large degree of variation that exists across localities. We primarily use counties as a geographic unit, and document both structural differences that persist over time as well as differences in the past two business cycles. The racial composition of communities plays a large role in explaining geographic differences in labor market indicators, in some cases even more so than income. We specifically focus on the importance of labor market tightness in the general economic development of counties and in the recovery from the pandemic recession. We find substantial heterogeneity in the degree of labor market tightness across counties, as measured by the vacancy rate using job postings from Lightcast, and moreover find a close connection between this rate and county income growth. Finally, we show how the distribution of labor market tightness evolved over the course of the pandemic.

¹ Federal Reserve Board of Governors. This economic research represents the views of the authors and does not indicate concurrence either by other members of the Board's staff or by the Board of Governors

1. Introduction

Ensuring that there are broad economic opportunities for individuals nationwide is one of the most important issues in the country today. This paper focuses on documenting the magnitude and trends of place-based differences in labor market outcomes, which can affect individual's potential for economic advancement.

Inequality across localities (as opposed to individuals) is important because it often represents structural impediments to upward economic mobility. Especially since the implicit (e.g. family/social networks) and explicit costs of moving can limit geographic mobility, where an individual is born can play a prominent role in the opportunities they have throughout life.² Moreover, even for those who do relocate, the effect of living in a disadvantaged community can persist throughout one's life.³ For instance, children growing up in lower poverty areas have higher earnings, college attendance, better credit outcomes, and are more likely to live in lower poverty areas themselves (Chetty, Hendren, & Katz, 2016; Chetty & Hendren, 2018; Chetty, Hendren, Kline, Saez, & Turner, 2014; Rothwell & Massey, 2014; Baum-Snow, Hartley, & Lee, 2019; Brown & Mazewski, 2015). The drivers and causes of a given region's economic outcomes are a complex function of past demographic, social, and policy decisions (Logan, Hardy, and Parman, 2021).

In this paper, we examine place-based inequality in standard labor market indicators. Across virtually every measure of labor market health, the differences between lower- and higher-income counties are large and persistent. A particularly stark illustration of these

² Austin, Glaeser, and Summers (2018) has also documented a marked decline in mobility across counties in recent decades.

³ While past work on place-based inequality has generally found a positive transmission mechanism between place and individual outcomes (e.g. "better" local outcomes lead to better individual outcomes), it is important to note that this is not always the case. Diamond and Moretti (2021) conclude that low-income workers in high-income areas are at potentially the biggest disadvantage of any group.

differences is the period of lockdowns during the onset of the pandemic recession. All counties saw substantial declines in economic activity. Among counties in the top half of the income distribution, measures of labor market activity dropped to unprecedentedly low levels for these communities.⁴ However, the labor markets in these higher-income counties at the nadir of the pandemic business cycle was merely the pre-pandemic status quo for lower-income communities.

While we find that there is a large and persistent amount of labor market inequality across communities, the recovery from the pandemic recession does indicate some modest reductions in these gaps. There is a striking difference in how low-income labor markets fared over recent business cycles. Following the Great Recession, low-income communities fell even further behind high-income communities, while the aftermath of the pandemic recession saw modest reductions in place-based labor market inequality. However, these gains among the lowest-income counties were not shared equally. Lower-income counties with a majority of non-white residents experienced substantially higher unemployment rates than low-income majority-white counties.

One of the most important narratives in the recovery from the pandemic was the unprecedented level of tightness in the labor market. In a “tight” labor market the demand for workers is high, and this high level of competition can lead to significant wage gains (particularly among workers who are able/willing to switch jobs). This paper documents this tightness using data on job postings. While most analyses focus on a national level of labor market competition, such as the ratio of job vacancies to unemployed workers, we show that

⁴ Specific measures examined include the Employment-to-population ratio (EPOP) and labor force participation rate (LFP).

there is large variation in tightness across counties, and that this variation is a key determinant of income growth.

2. Data and Methodology

This paper examines the evolution of labor market indicators during the pandemic and recovery across counties of different income levels and examines county-level labor market tightness by calculating county-level natural rates of unemployment. First, we use county to proxy for one's local community/labor market, and aggregate counties into three distinct groups based on the distribution of median household income across counties in a given year: Bottom Income Quartile, Second Income Quartile, and Top Half.⁵ These groupings are population-weighted, so, for example, 25 percent of the population mechanically lives in counties designated as belonging to the Bottom Income Quartile.⁶ This is an important distinction because low-income counties are more likely to be rural and have smaller populations.

There are inherent tradeoffs based on choices that must be made in any place-based analysis. Figure 1 below shows how the income groups break down geographically. There is a high degree of clustering, made even more noteworthy by the fact that the counties in the Top Half (shaded blue) represent 50 percent of the population. This strongly reinforces the point that higher-income localities are disproportionately located in large cities, a feature which we will see

⁵ A detailed description of all technical aspects of the county income group classification can be found in Troland et al (2025). Using a larger geographic unit of analysis such as state allows for the use of more (and higher frequency) data sources, but comes at the cost of assigning the same geography to individuals in vastly different circumstances. The notion that the "optimal" geographic unit is the most narrow one is not necessarily true for all contexts. For instance, the optimal unit in this paper would match what workers' consider to be their local labor market. This is certainly bigger than a Census tract or zip code, but nonetheless could be smaller than a county in some areas. The use of county as the unit of analysis makes the most sense when considering data availability, as many key labor market indicators are unavailable at a more narrow geographic level.

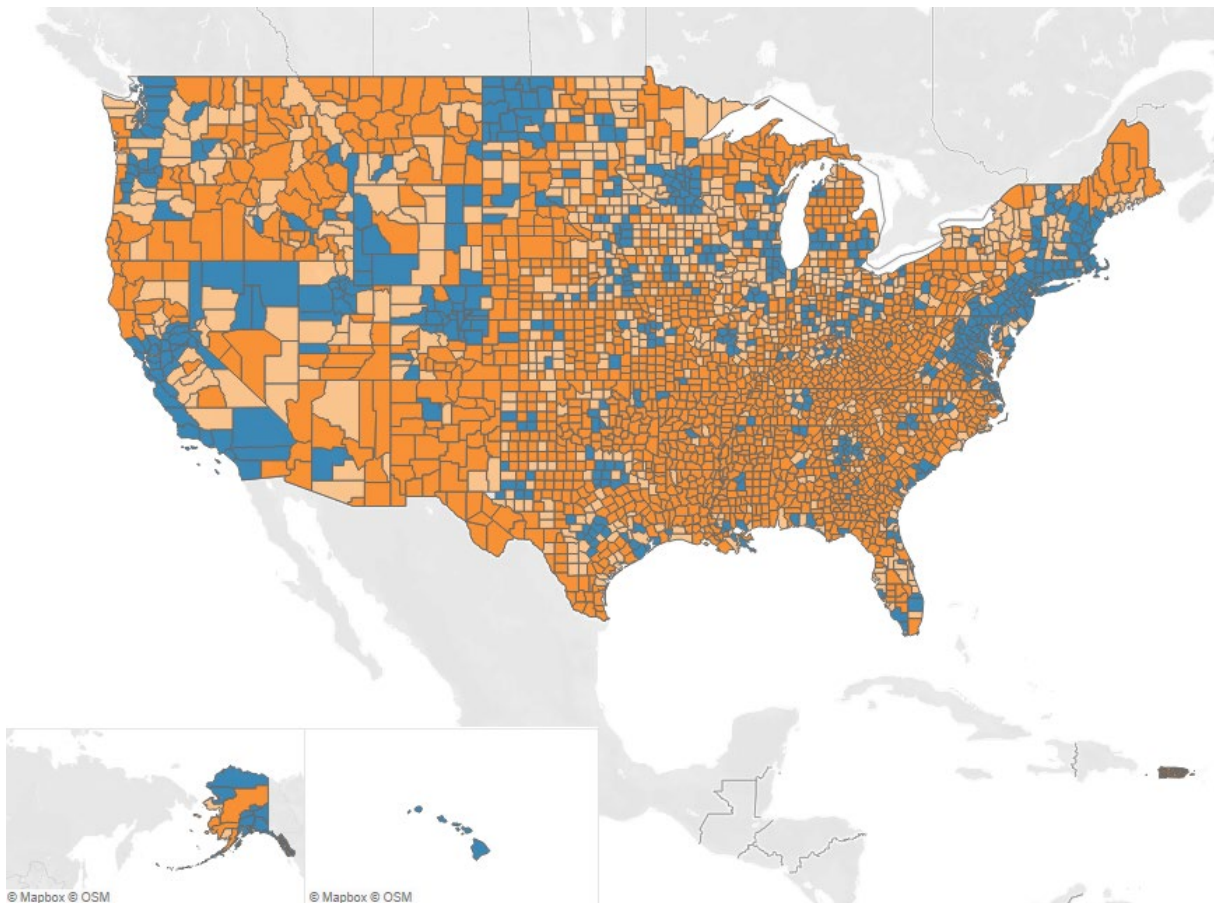
⁶ A county's assignment to an income category is updated annually to incorporate changes in either income or population. Despite this dynamic classification, there is relatively little movement across income groupings. More detailed information on this is given in Troland et al (2025).

repeated across other labor market indicators. Although the income groupings in this paper do not adjust for differences in cost of living across counties, all conclusions in this paper are robust to adjusting for local cost-of-living differences using the Regional Price Parity (RPP) index.⁷

Figure 1:

Map of Counties by Income Classification, Income Definition in 2021

Bottom Income Quartile: Orange, Second Income Quartile: Light Orange, Top Half: Blue



Data Source: 2021 income groups are based on the 2016-2020 5-year American Community Survey (ACS). Notes: All Puerto Rican municipalities are in the Bottom Income Quartile. County map file from Tableau.

⁷ For more information on the methodology for constructing income groups, please refer to Troland et al (2025).

Next, we use proprietary data on job postings to develop county-level measures of the natural rate of unemployment. The natural rate of unemployment is the point at which there are no upward or downward pressures on price inflation apart from those stemming from underlying inflation or arising from supply shocks.⁸ This theoretically optimal point, often referred to as u^* , is not directly observable or knowable in advance and can only be retrospectively estimated. One straightforward way to estimate u^* with the county-level data available to us comes from the recent work of Michaillat and Saez (2022), which derives u^* as equal to the square root of the product of the unemployment and vacancy rates (e.g. $\sqrt{uv}$). This will be useful as a county-level measure of labor market tightness for two reasons: 1) a national measure obscures potentially large dispersion across all labor markets, and 2) we can identify characteristics of counties which experienced disproportionately tight/slack labor markets during the recovery from the pandemic.

There are five primary datasets used in this paper. The five-year American Community Survey, along with intercensal/postcensal population estimates are each produced by the U.S. Census Bureau, and are used to classify counties based on where their median household income falls in the distribution. Employment statistics such as county-level labor force and unemployment levels are obtained from the Local Area Unemployment Statistics (LAUS) produced by the Bureau of Labor Statistics. County-level income growth and industry employment are derived from the Quarterly Census of Employment and Work (QCEW). Data on aggregate national job vacancies is drawn from the Job Openings and Labor Turnover Survey (JOLTS). Finally, local job vacancy levels come from the Lightcast (formerly Burning Glass) database, which catalogues job postings from more than 65,000 sources.⁹

⁸ See the discussion of the Stable Price Unemployment rate in Crump, Nekarda and Petrosky-Nadeau (2020).

⁹ "Lightcast - a Global Leader in Labor Market Analytics." Lightcast. 2018. <http://lightcast.io>.

Using Lightcast to measure vacancies has both benefits and drawbacks. On the one hand, this database functionally contains the universe of jobs which are posted anywhere online. This makes comparisons over long periods of time difficult as the composition of jobs posted online is likely different between different years (this paper uses only post-2018 data). However, the data have been found to be representative of other sources when looking at occupation/industry representation (Hershbein and Kahn 2019).

3. Results

(i) Place-Based Inequality and Structural Differences

Standard labor market indicators, such as Employment-to-Population ratio (EPOP), vary across counties by both income and race. EPOP is a standard measure of economic activity that tracks the business cycle well, and is a good starting point to illustrate the magnitude of place-based inequality in labor market outcomes. Similar patterns can be found in other common labor market indicators such as the unemployment rate and the labor force participation rate.

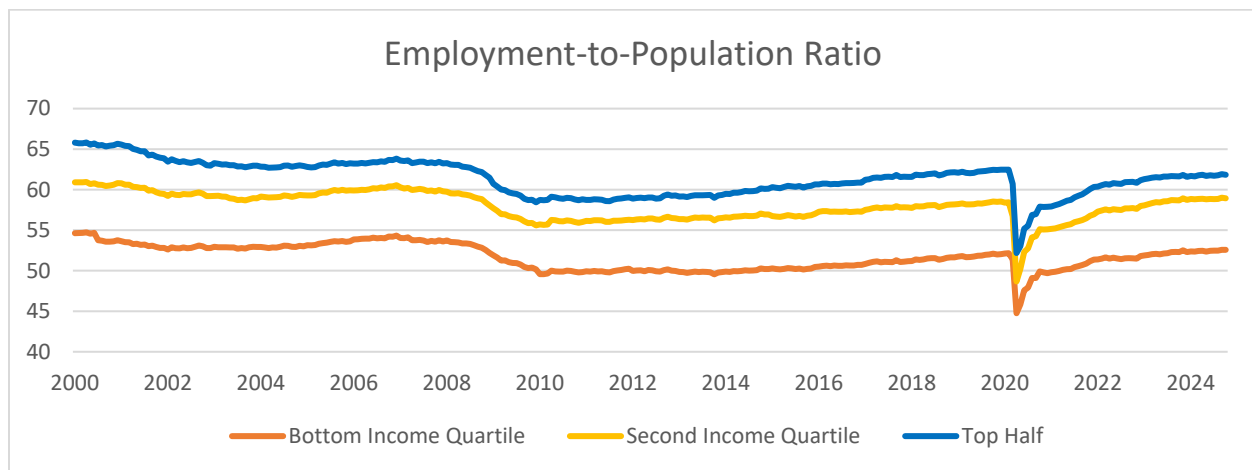
Figure 2 presents the Employment-to-Population Ratio (EPOP) for counties grouped by income quartile over time.¹⁰ While there is clear variation across the business cycles covered in the figure, the gaps between county income groups are always large. The difference in EPOP between the Top Half and the Bottom Income Quartile tends to fluctuate between 9 and 10.5 percentage points, with the pre-pandemic average being 9.9 percentage points.

It can be difficult to conceptualize what a difference of 10 percentage points in employment feels like, but the recent pandemic experience offers a guide. From February 2020 to April 2020, the EPOP in Top Half counties dropped from 62.4 to 52.3. In other words, at the

¹⁰ The ratio of employed individuals to the total (15+) population. Data source: Bureau of Labor Statistics, Local Area Unemployment Statistics.

height of the shutdowns and the nadir of economic activity, counties in the Top Half experienced employment numbers that matched the pre-pandemic norm of those in the Bottom Income Quartile.

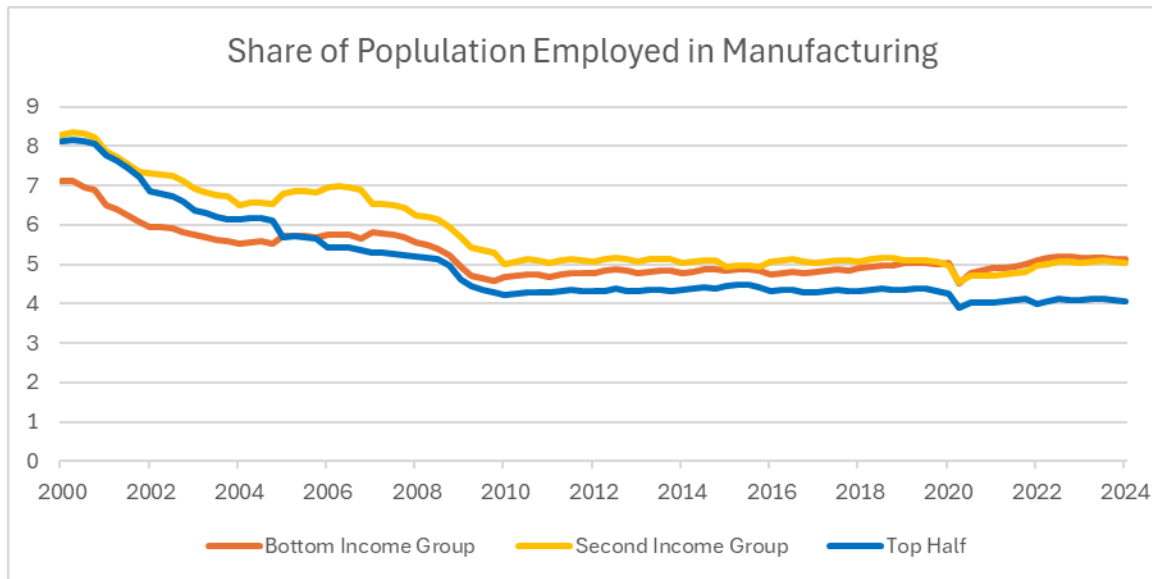
Figure 2:



Data Source: Employment data is from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. Population data is from the Census. Income groups are based on each corresponding year of the 5-year American Community Survey (ACS).

The mix of industries across county income groups is intuitive, and to some extent mechanical, with higher-paying industries such as finance making up a larger share of employment in Top Half counties than in other income groups. Moreover, within-industries, employment-to-population ratios move roughly in parallel to one another across county income groups. The notable exception to this trend is the manufacturing industry, plotted in Figure 3. In the early 2000's, manufacturing employment tended to be more concentrated in high-income counties. More recently, this trend has flipped, with the manufacturing share falling by roughly fifty percent in Top Half counties.

Figure 3:



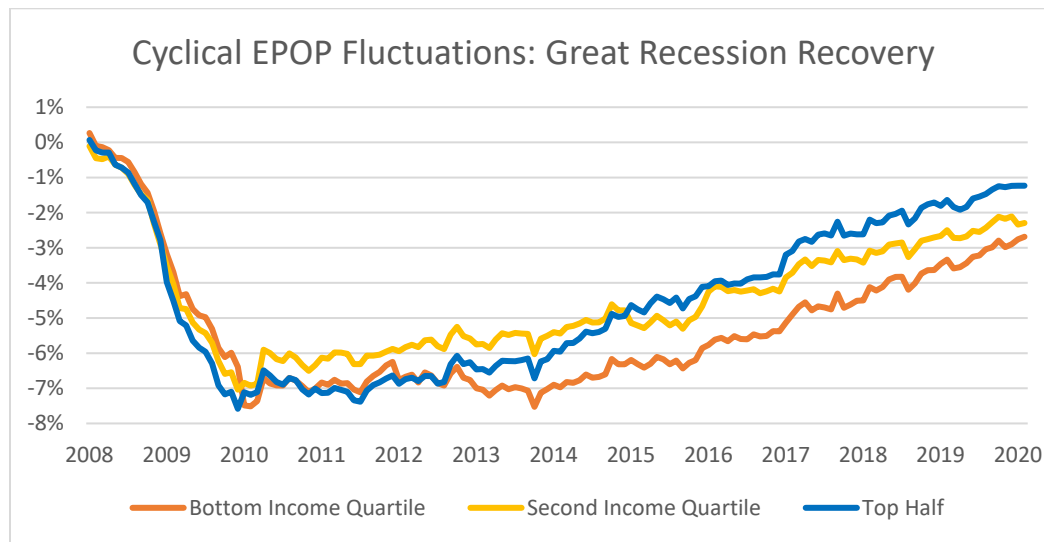
Data Source: Quarterly Census of Employment and Work (QCEW) from the Bureau of Labor Statistics. Income groups are based on each corresponding year of the 5-year ACS.

(ii) Place-Based Inequality and Cyclical Differences Across Recent Business Cycles

Place-based inequality in labor market outcomes has evolved differently during the past two economic downturns. Figure 4a indexes county EPOP values to their December 2007 values, and plots percent deviations from this reference period. All county income groups saw employment declines of between seven and eight percent at the onset of the Great Recession, reaching their lowest points in late 2009 and early 2010. By contrast, the long recovery was unequally-shared. Counties in the top-half of the income distribution saw steady employment growth that started in late 2013 and lasted through February 2020. Bottom Income Quartile counties did not begin to experience similar employment growth until late 2015. On the eve of the pandemic recession, Top Half counties were only 1.2 percent below their December 2007

employment levels, while Bottom Income Quartile counties sat 2.7 percent under the same benchmark¹¹.

Figure 4a:



Data Source: Employment data is from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. Population data is from the Census. Income groups are based on each corresponding year of the 5-year American Community Survey (ACS).

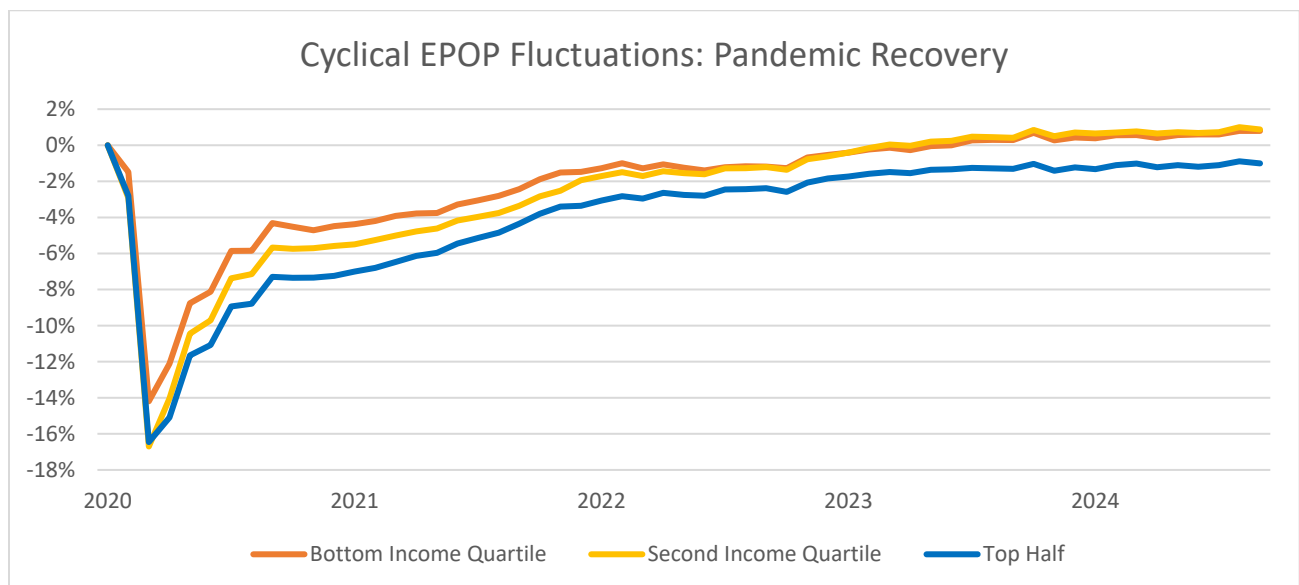
The recovery from the Great Recession was slow by historical standards. However, the recovery was unusually long, and important indicators such as real wages were only seeing broad-based gains by the tail end of the business cycle (Shambaugh and Strain, 2021). In addition to the broad trends during the recovery, inequality across race/ethnicity increased substantially (Addo and Darity Jr. 2021; Biu, Famighetti, and Hamilton, 2021), particularly during the early years after the Great Recession.

¹¹ Nationally, employment to population ratios have also been affected by the growing share of the population that is of retirement age. Furthermore, there are only small differences across county income groups in the proportion of the population age 65 and over (Troland et al, 2025).

By contrast, the labor market during the pandemic recession evolved much differently. Nationally, the labor market and other economic indicators recovered far more quickly following the pandemic than they did in the aftermath of the Great Recession.¹²

The recovery from the pandemic recession also differed from the Great Recession at the county level. As depicted in Figure 4b, with a reference date of February 2020, Top Half counties experienced larger initial declines than Bottom Income Quartile counties. As of September 2023, the labor markets in Bottom Income Quartile counties have fully recovered beyond their pre-pandemic levels, while Top Half counties remain one percent below this baseline.

Figure 4b:



Data Source: Employment data is from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. Population data is from the Census. Income groups are based on each corresponding year of the 5-year American Community Survey (ACS).

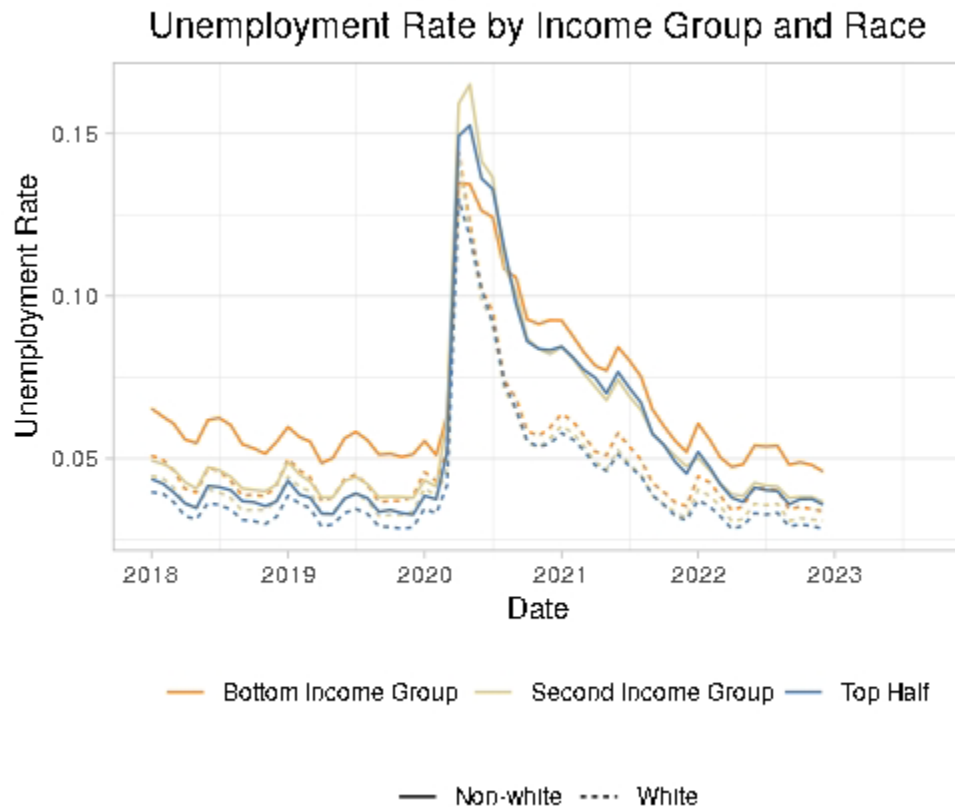
¹² Center on Budget and Policy Priorities. 2023. "Chart Book: Tracking the Recovery from the Pandemic Recession." Center on Budget and Policy Priorities. April 13, 2023. <https://www.cbpp.org/research/economy/tracking-the-recovery-from-the-pandemic-recession>.

Race plays a large role in place-based inequality even within county income groups. It was particularly important during the recent pandemic recovery. Figure 5 plots unemployment rates by further splitting each county income group into two groups based on the share of the population that is White. Prior to the pandemic, the unemployment rate across majority non-White counties in the Bottom Income Quartile was 5.5 percent, compared to 4.2 percent in majority White counties in the Bottom Income Quartile – a 1.3 percentage point gap. Gaps of about 0.5 percentage points between majority non-White and majority White counties are also seen in the higher income areas. These are large and meaningful gaps, particularly among the lowest-income counties, underscoring the large degree to which race is correlated with economic opportunity.

As shown in Figure 5 below, there was a further divergence in outcomes during the pandemic recovery. In late 2020 and throughout 2021, the racial composition of a county was far more important than income in explaining unemployment rates. A particularly striking statistic is that *high-income* majority non-white counties had an unemployment rate a full percentage point higher than *low-income* majority white counties.

The link between race and place-based inequality and economic opportunity has been extensively studied in a number of creative ways (Akee, Jones, and Porter, 2019; Chetty, Hendren, Jones, and Porter, 2020; Derenoncourt 2022). The historical relationship that race has had with geographic inequality is particularly important context given segregation and race-based housing policies such as redlining (see e.g. Logan and Parman, 2017 and Logan, Hardy, and Parman, 2021).

Figure 5:



Data Source: Employment data is from the Local Area Unemployment Statistics (LAUS) from the Census Bureau. Unemployment rate is weighted by the share of working age individuals, derived from Census Bureau's population estimates. County-level demographics and 2021 income groups are based on each corresponding year of the 5-year ACS.

(iii) Place-Based Inequality in New Labor Market Indicators: Estimating County-Level Natural Rates of Unemployment

A central discussion during the pandemic recovery was the degree of “tightness” in the labor market. By tightness, economists typically mean the degree of competition among firms to hire new workers. A tight (more competitive) labor market will experience faster wage growth as employers are forced to bid against one another to hire new workers.

A relatively new and useful measure of labor market activity is the number of (and content within) job postings. This proxy for labor demand can be thought of as a leading

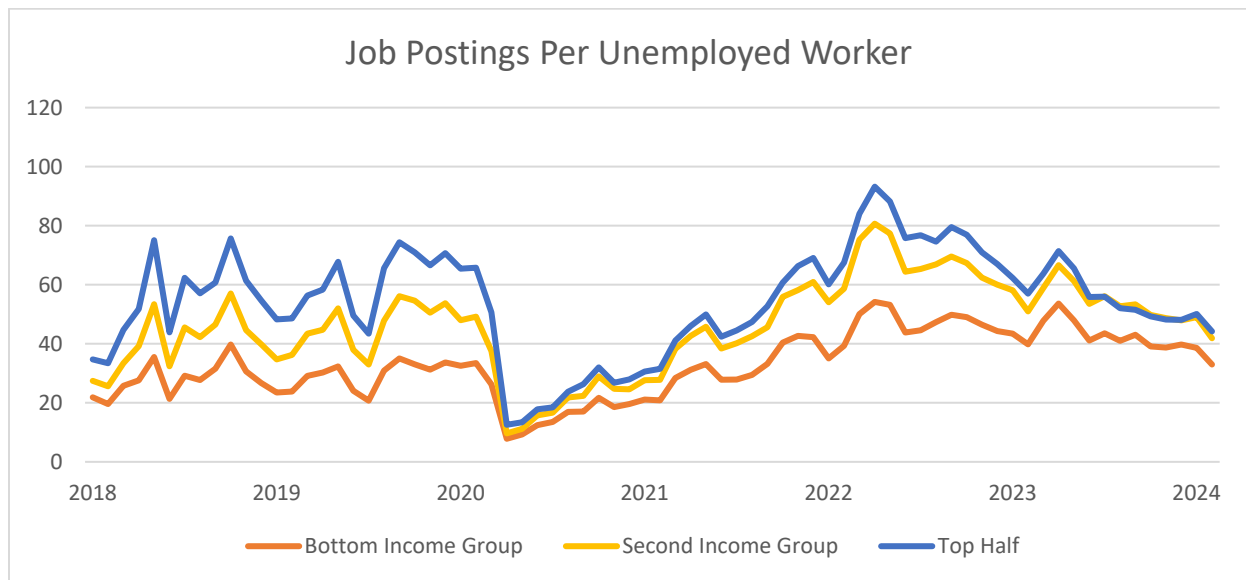
indicator of the labor market since today's job postings are tomorrow's new jobs. Job postings can also be used to measure the tightness of a local labor market. Specifically, we examine the ratio of job postings to the number of unemployed workers in a given county. The more job openings there are per unemployed worker, the tighter the labor market is.¹³

As shown in Figure 6, the labor market is considerably tighter in high-income counties. This is not surprising, and if sustained for an extended period of time it is to some degree mechanically true (e.g. one of the reasons they have high incomes is their labor market tightness). Prior to the pandemic, the ratio of job postings to unemployed workers in Top Half counties was roughly double that of Bottom Income Quartile counties (60-to-1 vs. 30-to-1).¹⁴ Following the pandemic shutdowns, labor markets in all county income groups were initially very loose as hiring was low and unemployment was high. By early 2022, however, the labor market rebounded to unprecedented levels of tightness. By mid-2023, labor markets in Top Half and Second Income Quartile counties had returned to roughly their pre-pandemic levels of tightness, while Bottom Income Quartile counties were still experiencing more worker-friendly environments.

¹³ This is a common measure of labor market tightness, most often computed at the national level using the Job Openings and Labor Turnover Survey (JOLTS). For the purposes of this project, data on the number of job postings is obtained from Lightcast (formerly Burning Glass), which attempts to aggregate all postings across a wide variety of venues. This choice was made because JOLTS does not release data at the county level. It should be noted that there are a number of tradeoffs, both positive and negative, due to this choice of data source. For instance, JOLTS data are derived from surveys, which have seen response rates decline in recent years, potentially complicating comparisons over time. On the other hand, there is a mismatch with the Lightcast data (posts in a month) and the measure of unemployed workers (unemployed at a point in time when they were surveyed). For this reason, the ratios of Lightcast postings to unemployed workers and JOLTS openings (open positions on the last day of the month) to unemployed workers are not directly comparable.

¹⁴ There is substantial "churn" in the labor market during any given month. Transitions directly from one job to another, or with a very short vacancy/unemployment duration are common, and will not show up in point-in-time measures such as JOLTS. For example, 2-3 percent of the labor force is estimated to turn over through this type of churn in any given month (Weingarden, 2020).

Figure 6:



Data Source: Lightcast. Income groups are based on each corresponding year of the 5-year ACS.

It is well-documented that, nationally, low-income workers saw the greatest wage gains in the pandemic recovery (Autor, Dube, and McGrew 2023), so it is natural to assume that low-income workers in low-income counties saw the largest benefits. However, it is also possible that changes in migration (partly fueled by increases in remote work) or other recent shifts could lead to different patterns.

To further examine the role that labor market tightness plays in local economic conditions, we first introduce several new definitions that will be useful. The *vacancy rate* is the ratio of the number of job openings to the size of the local labor force. The vacancy rate can be thought of as the complement to the unemployment rate, representing the capacity/demand present in a given labor market, holding “all else equal” about the county. A high vacancy rate

indicates that many firms are advertising jobs (relative to the size of the market), and all else equal it should be easier to both find a job and to increase one's wage due to the heightened level of competition.

There is considerable variation in vacancy rates across counties. In 2019, the median county vacancy rate was 3.4 percent, but ten percent of counties had a vacancy rate below 1.1 percent and ten percent had a vacancy rate of over 8.5 percent. In other words, in the ten percent of counties with the fewest vacancies, there was typically one vacancy for every 100 workers. In the ten percent of counties with the most vacancies, by contrast, there were eight or more vacancies per 100 workers.¹⁵

It makes intuitive sense that more vacancies per worker would lead to higher incomes, though this can be difficult to test empirically with aggregate data. Using the county-level measures derived in this paper, however, we can estimate the relationship between labor market tightness and income growth. Using only within-county variation in the vacancy rate and income, we find that a one percentage point change in the vacancy rate is associated with incomes in the county growing 0.14 percentage points faster per year.¹⁶ Putting this figure into context, moving from the pre-pandemic tenth percentile county in labor market tightness to the ninetieth percentile county would be predicted to increase income growth by more than a full percentage point.

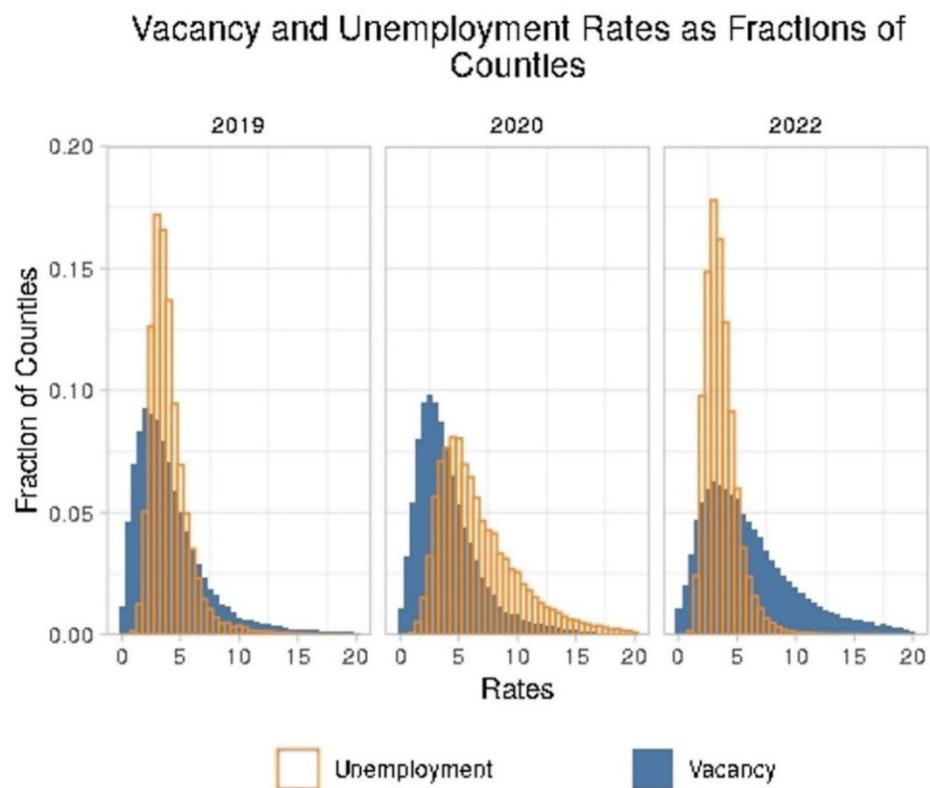
¹⁵ Vacancy rates are calculated using the ratio of Lightcast job postings to the local labor force at the county level. This ratio is multiplied by a monthly adjustment factor in order to make the national Lightcast figure equivalent to the national JOLTS vacancy rate. This adjustment is necessary in order to calculate a county-level vacancy rate, as well as for the reasons described in an earlier footnote (e.g. Lightcast postings will be mechanically much larger than JOLTS openings because JOLTS is measured at a point in time rather than over an entire month).

¹⁶ The regression model includes county and year fixed-effects, spanning the years 2019-2023. Standard errors are clustered at the county level, and the coefficient is significant at the 1% level. Counties are weighted by the size of their labor force (an unweighted regression returns a similarly significant coefficient of 0.10 percentage points).

The vacancy rate is most useful when considered alongside the unemployment rate. This is because a high vacancy rate coupled with a low unemployment rate is indicative of an overheated labor market and can lead to higher inflation as firms pass the cost of higher wage bills on to consumers in the form of higher prices. By contrast, a low vacancy rate coupled with a high unemployment rate is unlikely to be at risk of significant inflation caused by demand-side factors, and instead the primary economic concern is the weak labor market.

The above insights can be used to characterize the distribution of labor market tightness across counties. The three panels in Figure 7 plot the county-level vacancy rates (blue) and unemployment rates (orange) for 2019, 2020, and 2022 respectively (not weighted for population), while Table 1 presents how these county-level figures relate to estimated u^* rates.

Figure 7:



Data Source: Lightcast (vacancy) and LAUS (Unemployment). Data in this figure are not weighted by population.

Table 1: Proportion of Counties with Tight Labor Markets by Year

Year	Tight	Slack	Balanced
Unweighted			
2019	9.4%	13.3%	77.4%
2020	4.5%	39.5%	56.0%
2022	23.6%	6.0%	70.4%
2023	16.6%	6.8%	76.6%
Population weighted			
2019	44.0%	3.5%	52.5%
2020	16.7%	30.7%	52.7%
2022	64.3%	2.1%	33.6%
2023	44.7%	3.6%	51.7%

Notes: The figures in this table represent the proportion of county-month observations (both unweighted and weighted by population) where the unemployment rate is: (tight) more than two percentage points below the calculated u^* , (slack) more than two points above the calculated u^* , or (balanced) within two percentage point of the calculated u^* .¹⁷

In 2019, the majority of labor markets appeared to be roughly in balance, with more than three quarters of all counties having an unemployment rate close to their calculated u^* optimal level, and a roughly even split among the remaining counties of whether their labor markets were too tight (the unemployment rate is more than two percentage points below u^*) or too slack (the unemployment rate is more than two points above u^*). On average, densely-populated counties are significantly more likely to be characterized as a tight labor market. Hence, when

¹⁷ Other thresholds, such as a one-percentage point difference, yielded similar conclusions.

reweighting to reflect county populations, the labor market shows more tightness although a slight majority of population-weighted counties remain in balance.

Not surprisingly, the picture looks dramatically different in both 2020 and 2022. In 2020, many counties had very low vacancy rates relatively to the level of unemployment. The opposite was true in 2022, when the tight labor markets coincided with a time of significantly heightened national inflation.

Looking at labor market tightness by county income group uncovers a divergence between the lowest income counties and the rest of the nation. In 2019, 12.2 percent of residents in the lowest income counties worked in a slack labor market, compared to only 1.3 percent (Second Income Quartile) and 0.3 percent (Top Half) in the other income groups. Consistent with the other measures discussed previously illustrating additional labor-market slack in lower-income counties, the most recent post-pandemic numbers show only modestly-reduced gaps (7.6 percent, 1.3 percent, and 2.6 percent respectively).

Taken together, all of the preceding results paint a complex picture of counties' labor markets. Tight labor markets are a key component of income growth, and thus developments which increase the number of jobs or the mobility of workers are likely to have broad benefits.¹⁸ However, there is notable inequality in access to the competitive labor market pressures that lead to higher wages.

Conclusion

In this paper, we examine place-based inequality in standard labor market indicators, documenting both structural differences as well as changes in recent business cycles. Across

¹⁸ For an excellent discussion of how worker mobility relates to local labor markets and economic outcomes, see Sokolova and Sorensen (2021).

virtually every measure of labor market health, the differences between lower- and higher-income counties are large and persistent. This work highlights the vastly different labor market conditions that workers face depending on the community they live in. Most notably, the healthy competition for workers' labor which leads to wage gains is not evenly distributed across the country.

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