LinkedIn Economic Graph

Analytical Report

The Labor Market through the Lens of the Beveridge Curve

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The Labor Market through the Lens of the Beveridge Curve

The Beveridge curve captures the inverse relationship between job vacancies and unemployment and is thought to be an indicator of the efficiency of the functioning of the labor market. Movements along the Beveridge curve, i.e. changes in unemployment that are associated with changes in vacancies, are typically interpreted as cyclical movements in labor demand. However, shifts in the Beveridge curve (when vacancies rise and unemployment does not fall or falls too slowly) are sometimes seen as indicating structural problems in the labor market. While the data have moved slightly over the past two decades, the COVID-19 pandemic dramatically shifted the Beveridge curve outward, first with the rapid increase in unemployment, followed by increasing job vacancies even as the unemployment rate returned to pre-pandemic levels.

The extent of this shift is historically unprecedented and has received a great deal of attention lately among policymakers and academics, leading to a debate regarding the longer-term prospects for the labor market. The more pessimistic view is that the recent economic fallout wrought permanent damage: the COVID-19 crisis led to substantial reallocation, with workers moving across sectors and space, resulting in a sustained deterioration in matching efficiency (the process of matching job seekers to available jobs). If valid, this interpretation would support one policy implication: however useful aggregate stabilization policies in current circumstances, they are likely to fail in lowering the vacancy rate all the way to the levels that prevailed before the pandemic without leading to a sharp rise in unemployment. [1]

The more sanguine view is that the outward shift in the Beveridge curve is not a permanent shift, but rather due to transitory factors which will be attenuated as aggregate demand softens. It is a sunnier view because it suggests that the Fed can cool an overheated US labor market to ease inflation

pressures and reduce job vacancies, without affecting unemployment substantially. [2] In this scenario, cooling off aggregate demand will cause the job vacancy rate to go back toward its pre-covid Beveridge curve, leaving no lasting mark.

This report leverages LinkedIn's Economic graph data to examine the Beveridge curve dynamics in the U.S. and offer an interpretation of the recent shift. Evidence from decomposing the vacancy and unemployment relationship using data on unemployed persons by type of unemployment (temporary vs permanent) shows that the apparent outward shift in the Beveridge curve has been amplified by the large pool of temporary layoffs at the onset of the COVID-19 recession. Once one separates out those who were temporarily unemployed (waiting to be recalled), the outward shift in the Beveridge curve becomes much less pronounced, with most of the remaining gap seems to be from an increase in reallocation.

While the COVID-19 period has triggered a sharp pattern of labor reallocation compared to prior years, LinkedIn's data suggest that much of the increase in reallocation was happening within industries rather than across industries. The increase in within-industry reallocation coincided with the unprecedented rise in quits, which was partly due to COVID concerns and partly workers perceiving that it was easy to get another job and that job switching may result in better pay or working conditions. This is especially true in low-wage sectors such as hospitality, where intense competition for employees has given workers the leverage to seek new opportunities in order to take advantage of the upward pressure on wages.

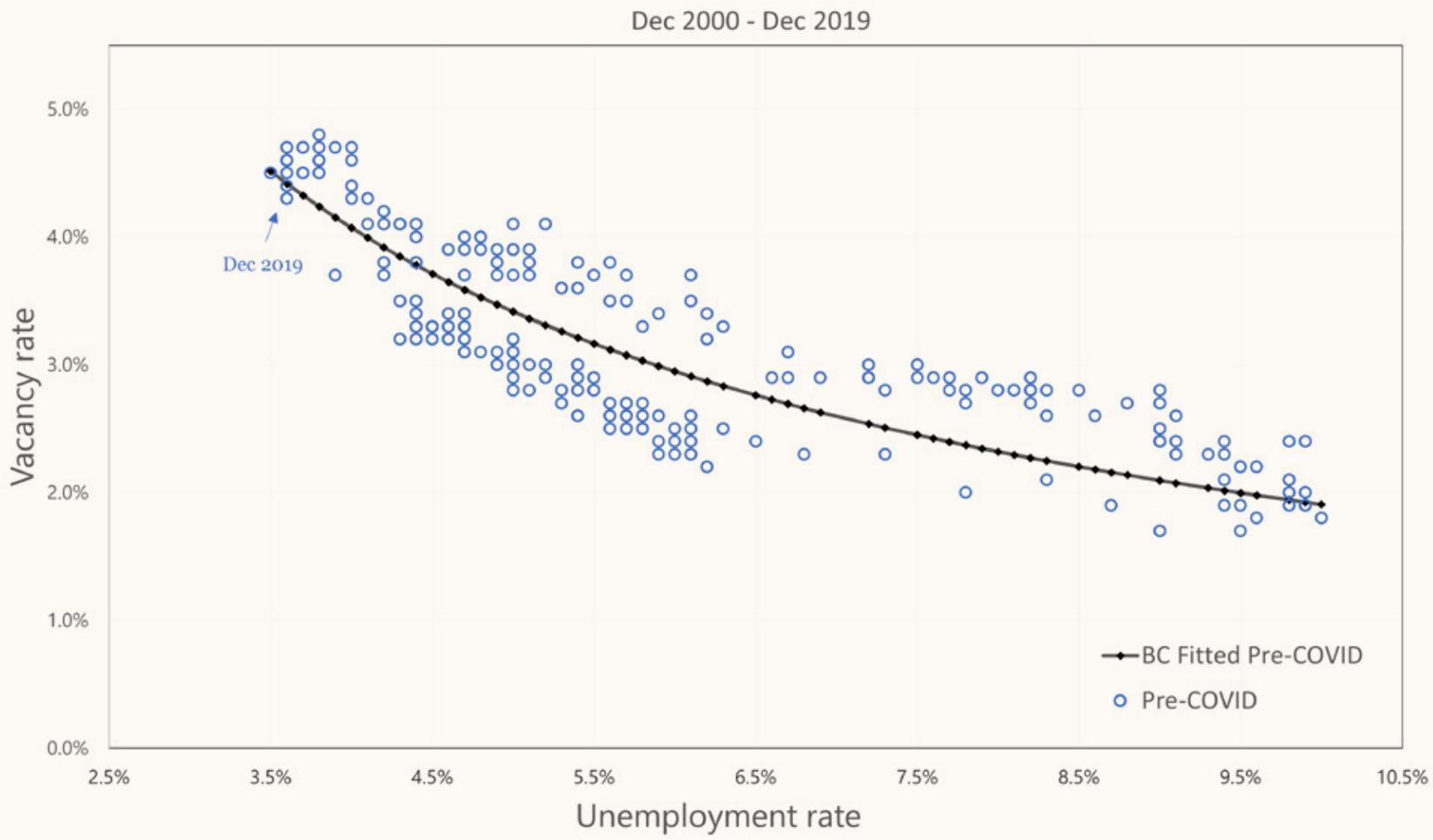
Considering all the evidence together, the findings from this report suggest that the current outward shift in the U.S. Beveridge curve has to do primarily with cyclic factors driven by an overheated economy rather than structural problems in the labor market stemming from a decrease in matching efficiency. These cyclic factors will likely attenuate in the near future as the economy slows, suggesting that the outward shift in the Beveridge curve should largely reverse as aggregate demand softens.

A look into the data

Figure 1A displays an empirical relationship between the job vacancy rate (proportion of jobs without workers) from the Job Openings and Labor Turnover Survey (JOLTS) of the Bureau of Labor Statistics (BLS) and the aggregate unemployment rate (proportion of workers without jobs) obtained from the monthly household survey, also from the BLS. The data span the period December 2000 through December 2019 and are seasonally adjusted.[3] The solid black curve in Figure 1A depicts a stylized Beveridge curve that was estimated as a linear relationship between ln((1-u/u) and ln(v/u) using monthly data on job vacancies and unemployment over this period. From this, the argument goes, policy to slow demand and push down vacancies requires moving downward along this curve and increasing the unemployment rate substantially.

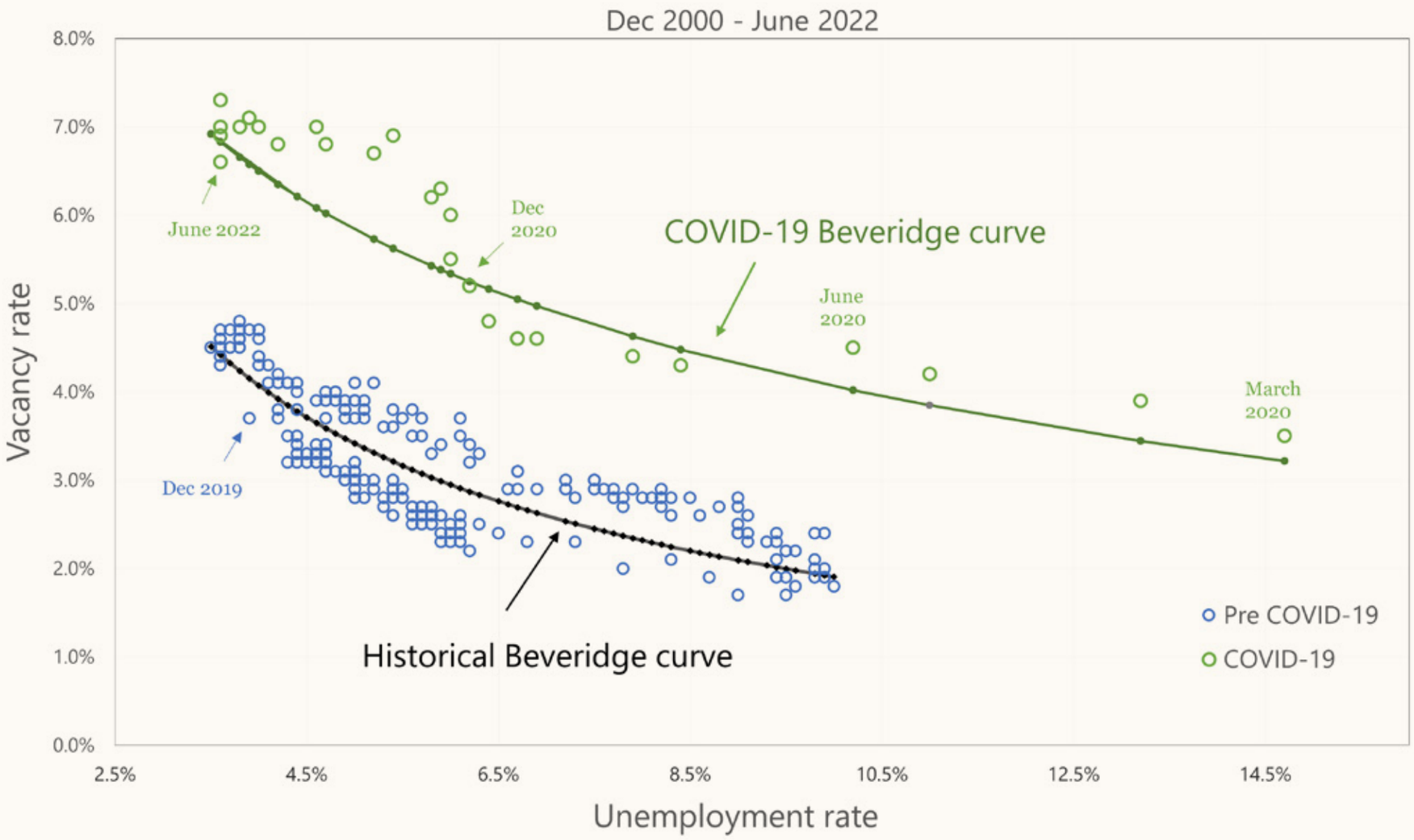
Figure 1B shows the same observations as in Figure 1A but also adds observations from the pandemic (in green) spanning March 2020 to June 2022. The plot reveals a notable shift in the Beveridge curve since the start of the COVID-19 crisis. Since March 2020, the unemployment rate increased substantially without a correspondingly large decrease in job vacancies, after which the points started moving in a counterclockwise direction indicating a higher vacancy rate at any given level of unemployment. Relative to the unemployment rate, vacancies are now higher than one would project from the pre-COVID relationship between the vacancy rate and the unemployment rate, suggesting that the labor market had become worse at matching workers with vacant jobs. If this shift in the Beveridge curve is permanent, the prospects for taming inflation by cooling off aggregate demand are grim, as an elevated vacancy rate suggests that companies are finding talent hard to find. Hence, a decrease in job openings would be associated with a substantial increase in the unemployment rate.

Figure 1A:
Vacancies and Unemployment



Source: CPS and JOLTS. Data are monthly rates and are seasonally adjusted

Figure 1B:
Pronounced shift in the Beveridge Curve

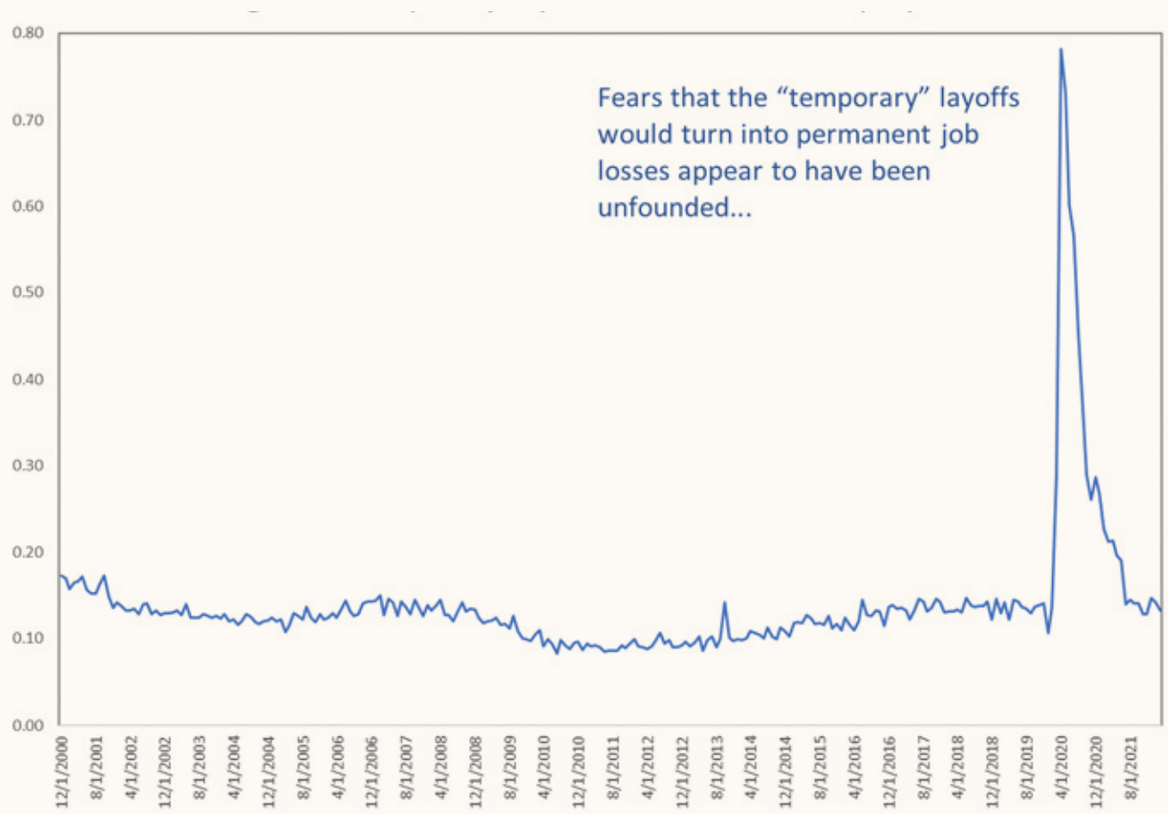


Source: CPS and JOLTS. Data are monthly rates and are seasonally adjusted.

The distinction between permanent and temporary layoffs is crucial for understanding the dynamics of the recent shift.

Since unemployment increased so quickly without much of a collapse in vacancies during the first few months of the pandemic, the ratio of unemployed workers to vacancies reached roughly 4, similar to the ratio observed during the depths of the Great Recession. Such a high ratio of U/V would usually indicate substantial labor market slack, with many unemployed workers competing over scarce vacancies. In this situation, additional search by the newly unemployed workers would normally create congestion in the matching process, which would lead to a reduction in job finding rates for all jobseekers who are actively searching for a job. But this is not observed during the middle of 2020; instead, overall job finding rates for the unemployed in May and June of 2020 exceeded almost every other month during the entire 2001-2019 time period.[4] This is mainly due to the fact that the COVID-19 downturn was characterized by a rapid, unprecedented increased in the number of temporary unemployed who are waiting to be recalled and likely not searching for jobs (Figure 2).

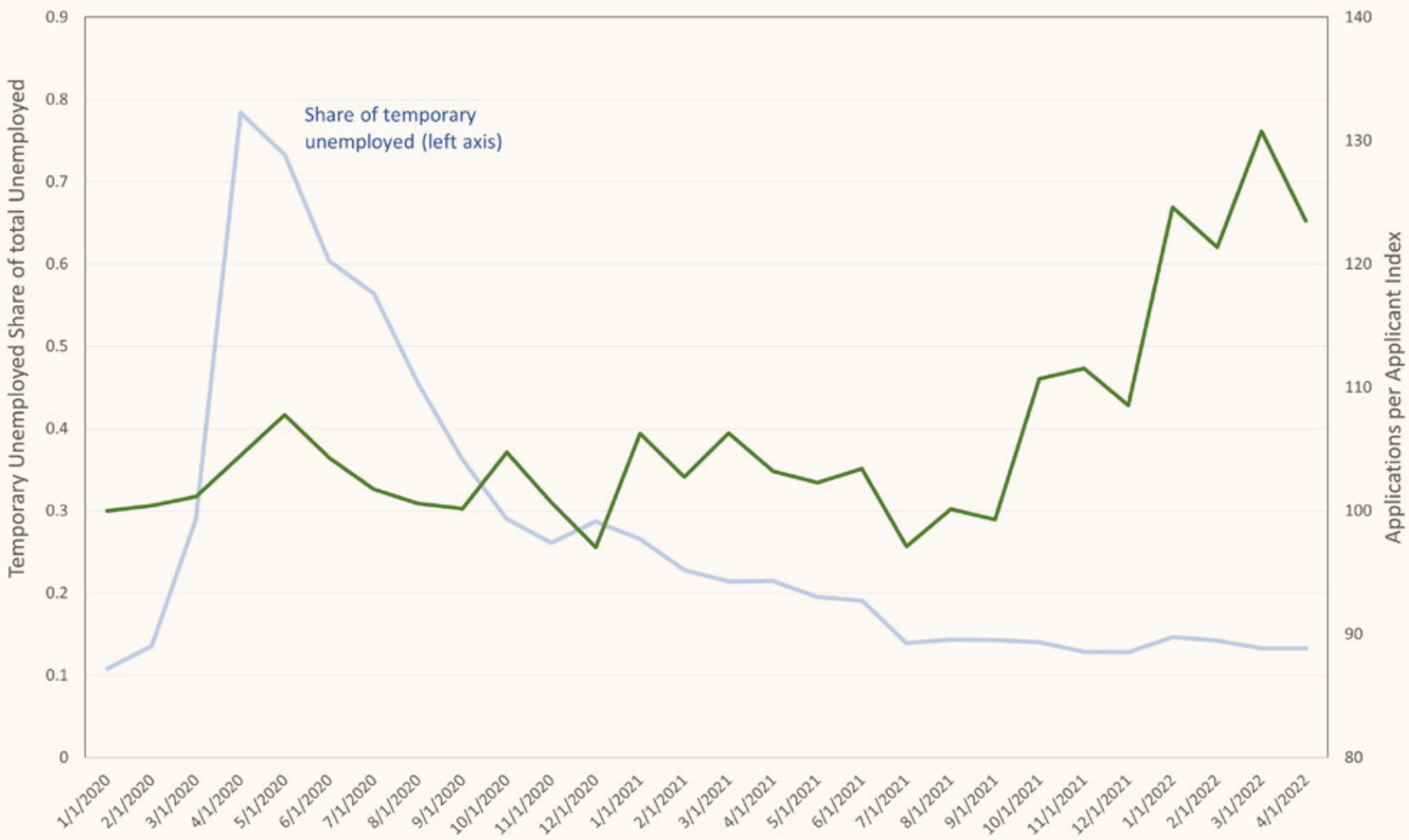
Figure 2:
Temporary Layoff Share of the Unemployed



Source: CPS. Data are monthly rates

To examine the intensity of jobseekers' search effort since the onset of the COVID-19 pandemic, we use LinkedIn's data on the monthly number of applications sent to job openings on the platform to construct our search intensity index. While one would expect average search intensity to increase during recessions [5], data from LinkedIn on average number of applications sent suggest that job search activity did not increase much during the COVID-19 downturn when unemployment spiked, which supports our interpretation that workers on temporary layoff were likely not actively searching for work (Figure 3)[1]. This finding suggests that the temporary unemployed are crucial to understanding the labor market dynamics of the COVID-19 recession and the apparent outward shift in the Beveridge curve.

Figure 3:
Job Search Intensity measured using LinkedIn's Applications Behavior

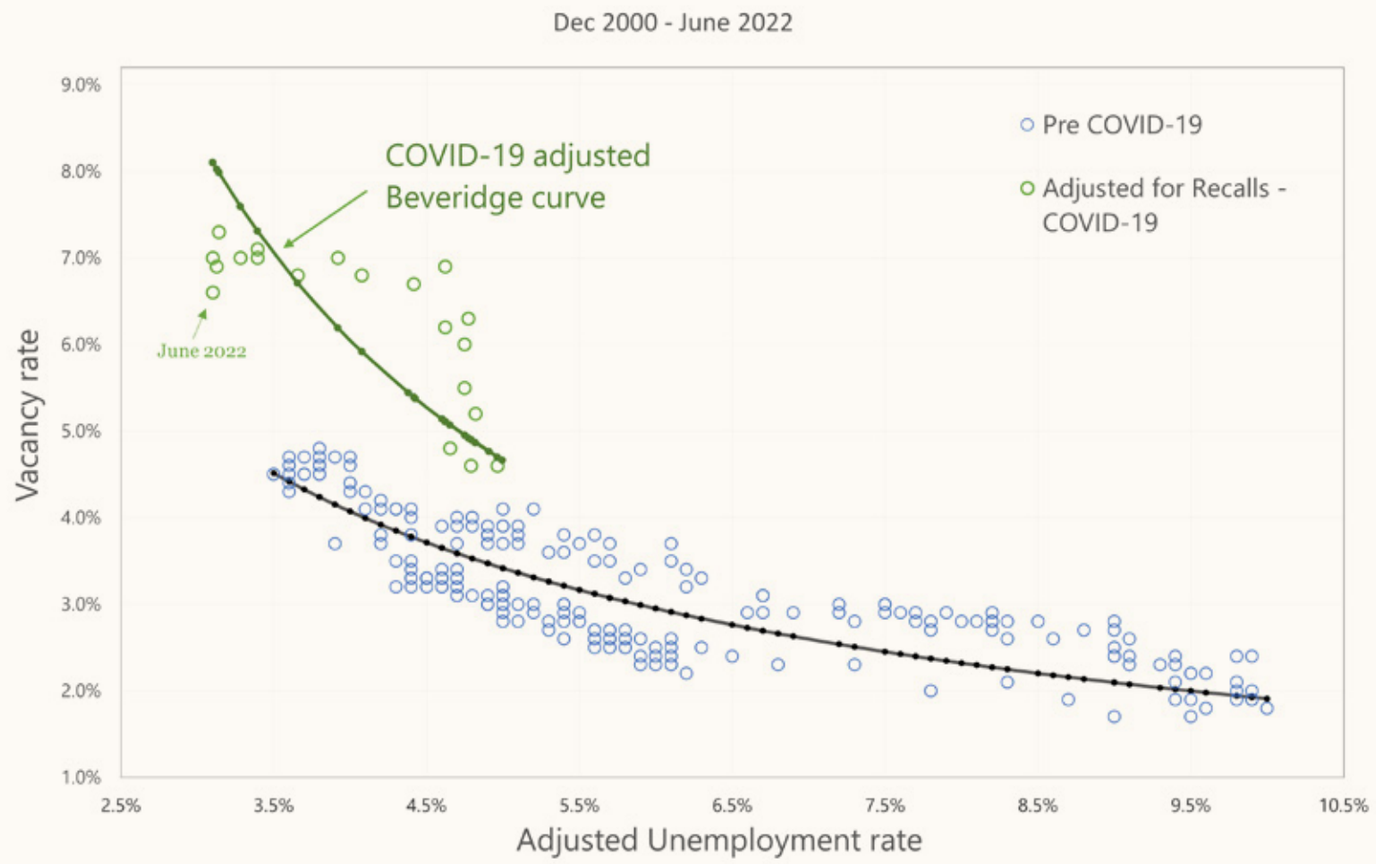


Source: CPS and LinkedIn Economic Graph Data

[1] Online job search data has both advantages and disadvantages over other data sources. The fact that it is available at shorter time lags and higher frequency means that it can provide timely updates on the state of the labor market. The granularity of the data can also provide fresh insights into the job search and hiring process (the matching function). On the other hand, there are important questions about the reliability and representativeness of any online data used in general when conducting economic analysis.

Adjusting for the composition of the unemployed results in a much less pronounced outward shift in the Beveridge curve.

Figure 4:
Pronounced Shift in Leisure and Hospitality



Source: CPS and JOLTS. Data are monthly rates and are seasonally adjusted.

In Figure 4, we show a version of the Beveridge curve by looking just at the permanently unemployed. That is, job losers on temporary layoff are excluded from the stock of unemployed used in this figure. Quantitatively, this means that those who are temporarily unemployed are not counted since they are waiting to be recalled, and therefore, do not search for jobs or search much less than newly unemployed workers who have been permanently laid off. We estimate a fitted Beveridge curve using the same linear relationship as in Figure 1A, but with data from the COVID-19 period. The result of this is a much less pronounced shift in the recall-adjusted Beveridge curve.

Compared to , the slope of the adjusted Beveridge curve in the COVID-19 period, shown in Figure 4, is much steeper, implying that the unemployment rate will change less for a given reduction in vacancies (holding separations constant). A rough calculation using the Beveridge curve fitted for permanent layoffs (in green) suggests that a decrease in job openings from its June 2022 level to the level prevailing prior to the pandemic will be associated with an unemployment rate of about 5 percent. The computation of the expected unemployment rate for a given vacancy rate is merely an accounting exercise and the mathematical details on estimating it is provided in Appendix 1.

What is driving the outward shift in the Beveridge curve starting in January 2021?

A key question for interpreting the pattern of aggregate unemployment and vacancy rates in this recession and recovery compared to earlier ones is whether there has been a changed difficulty of hiring at the disaggregated level.

There were two times in the past when the relationship between vacancies and unemployment has shifted outward in a similar (although much less pronounced) manner. In the 1970s, vacancies rose without a normal drop in unemployment, and the Beveridge curve shifted outward for much of the 1980s. During that period, it was thought that the labor market was doing a worse job than usual of matching workers and jobs. The other time when the relationship shifted outward was in the summer of 2009, following the Great Recession. During that time, the unemployment rate did not decline in line with the Beveridge curve in spite of firms reporting more job openings. A look at the disaggregated data when the Beveridge curves shifted out in the past suggests that the breakdown in the vacancy-unemployment relationships were broad-based across all industries. [6]

The section below presents vacancy-unemployment relationships for six major industries to examine whether the recent outward shift that we see in the aggregate data has been equally pronounced across all sectors of the economy, as during the Great Recession, or whether the underlying pattern differs now. Each plot of Figures 5-10 illustrates the relationship between the unemployment rate and the vacancy rate in a particular industry for the period spanning December 2000 to June 2022.

Seasonally adjusted data by industry for vacancy and unemployment rates were collected from the JOLTS and the BLS respectively and grouped into five major categories covering leisure and hospitality, education and health, manufacturing, finance, and information. These plots differ from the plot in Figures 1A and 1B in that sector-specific, rather than the aggregate, vacancy rates and unemployment rates are used. No distinction is made between temporary and permanent unemployed at the industry level. To be classified as unemployed in an industry by the BLS, a worker's last job must have been in that industry.

The plots show a much more pronounced breakdown in the vacancy and unemployment relationship for the leisure and hospitality and education and health industries. These sectors are ones that traditionally require in-person attendance and, to some extent, have lower wages. That suggests that the supply of labor to those industries might have decreased due to health concerns. A decrease in labor supply might produce an apparent outward shift in the Beveridge curve if industry wages are upwardly sticky (possibly due to firms not knowing if the reduction in labor supply is permanent). These industries are also the sectors that experienced the highest increase in quits over the recent years (Figure 11).

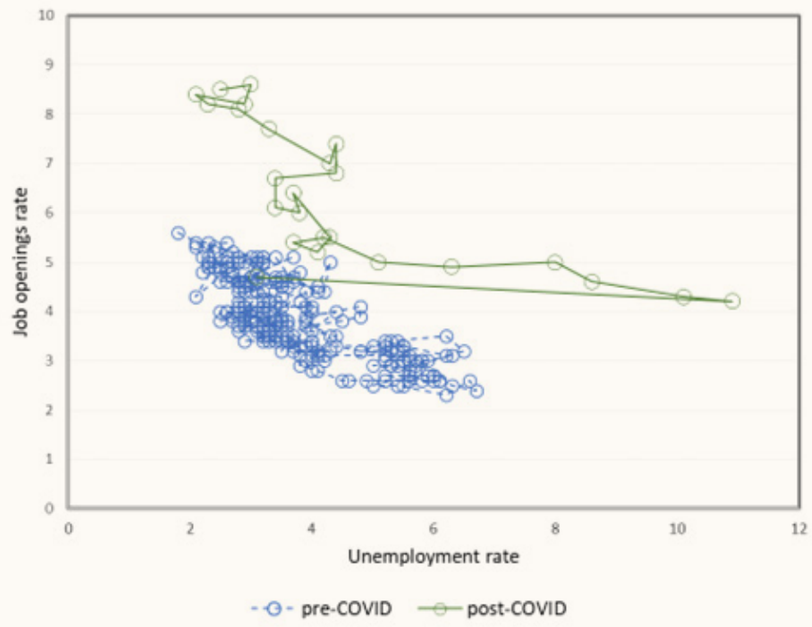
Figure 5:
Pronounced Shift in
Leisure and Hospitality

Dec 2000 – June 2022

Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

Figure 6:
Pronounced Shift in
Education and Health

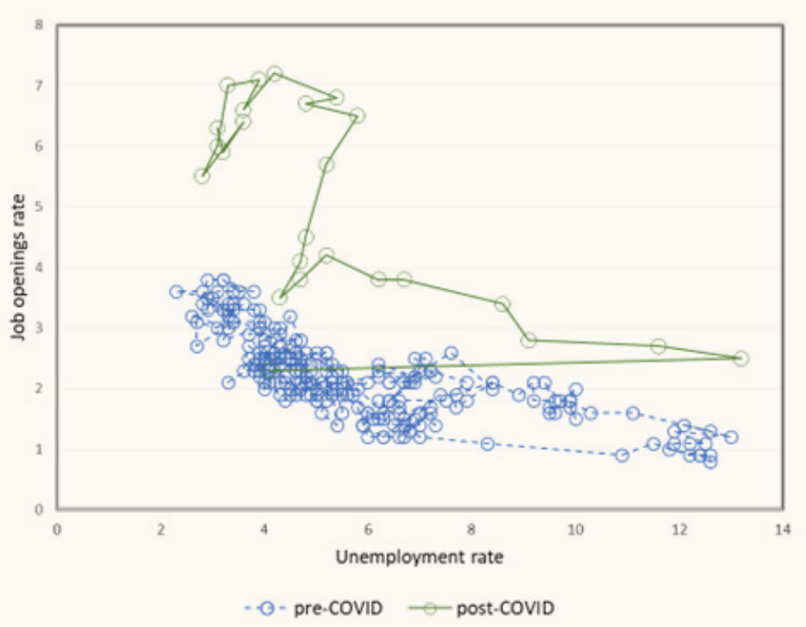
Dec 2000 – June 2022



Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

Figure 7:
Pronounced Shift in Manufacturing

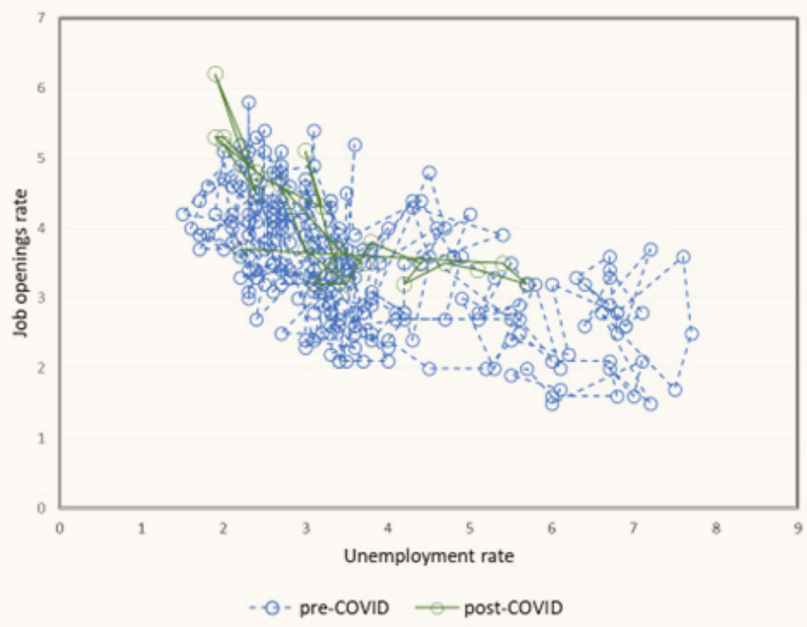
Dec 2000 – June 2022



Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

Figure 8:
No Shift in Financial Services

Dec 2000 – June 2022

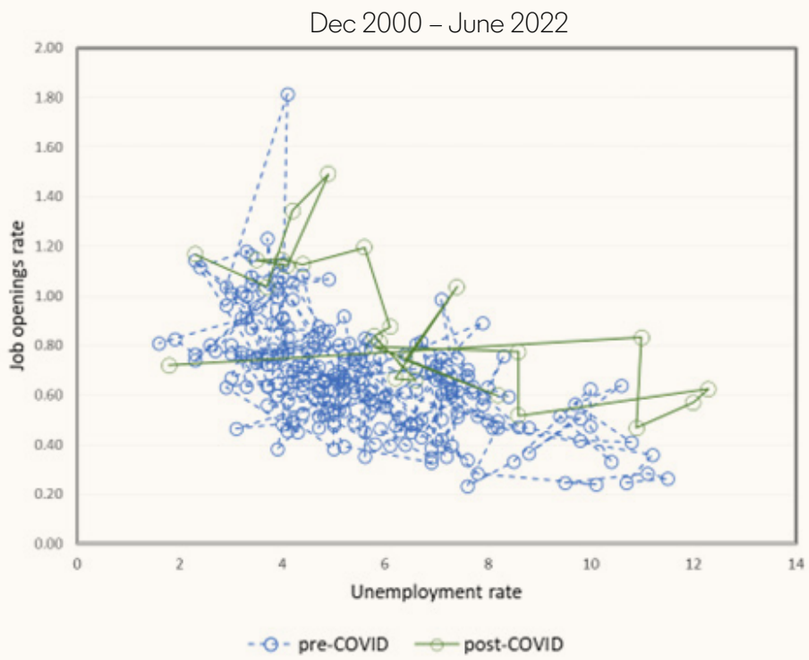


Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

Figure 9:
No Shift in Construction

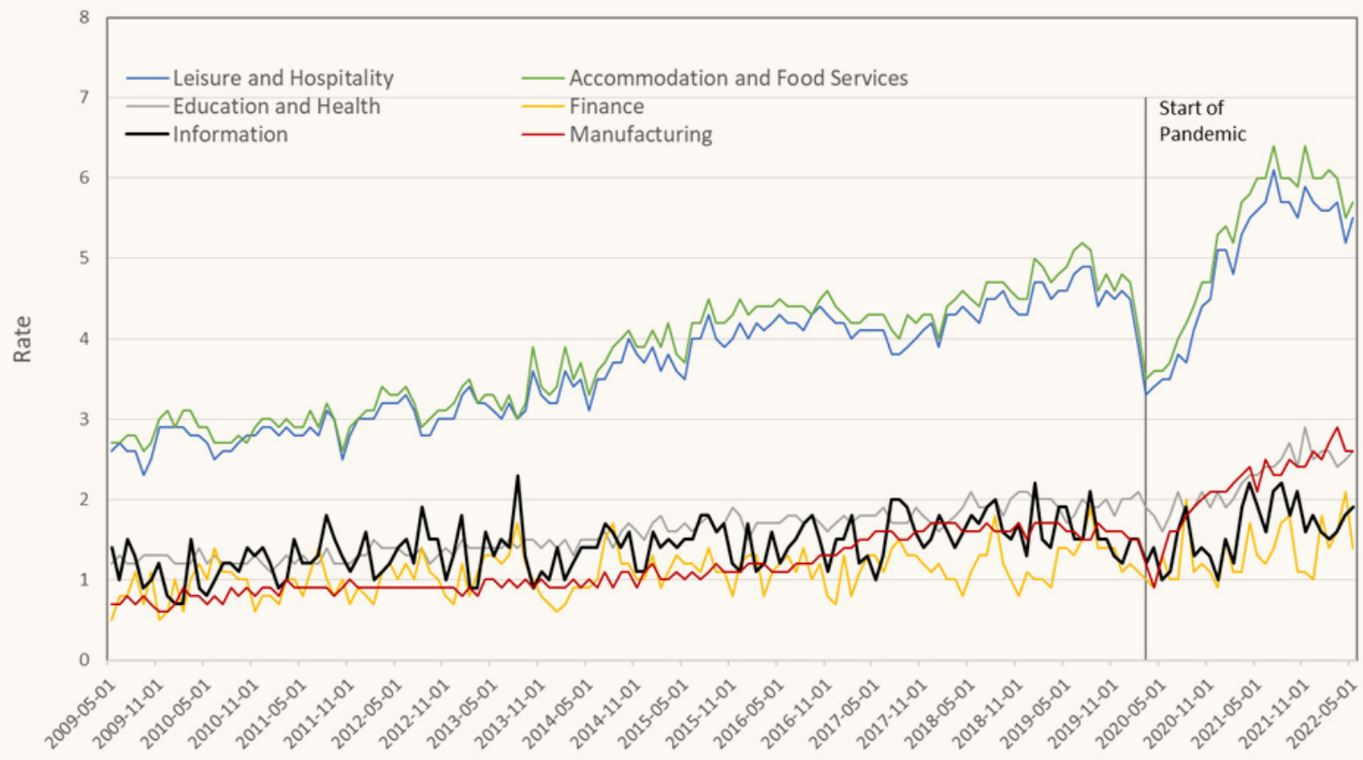
Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

Figure 10:
No Shift in Information and Technology



Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

Figure 11:
Quits by Industry



Source: CPS and JOLTS. Data are monthly and seasonally adjusted.

The increase in quits is consistent with the "Great Reshuffle" hypothesis.

Quits began surging in January 2021, with significant turnover being reported both in absolute terms and also as a percentage of total employment.[7] A large portion of the job churn has been concentrated in frontline services such as leisure and hospitality, accommodation and food services, which rely on in-person customers and can't be done remotely. These jobs are not only among the most dangerous during a viral outbreak, they are also among the lowest-paying.

Following a quit, a worker can move into either employment with another employer or remain not employed. Our previous work using LinkedIn's data on job transitions, showed that job changing was nearly 7 percent higher in 2021 than pre-pandemic levels, as employees were exploring new roles and increasingly favoring flexible and remote work opportunities[1]. Job transitions are calculated from updates to LinkedIn profiles when a new job at a different company is created after a previous job has ended[2]. Hence, part of the increase in quits can be attributed to workers perceiving that it was easy to get another job and that job switching may result in better pay or working conditions. This process of reallocation is indicative of what we call the Great Reshuffle. That is, workers weren't just sitting on the sidelines—they were opting to move into new jobs, ones that either have higher wages, remote options, safer working conditions, or other factors that make them more appealing.

[2] Job changes accelerated, industries embrace flex, and a workforce on the move: Welcome to the Great Reshuffle | LinkedIn
[3] Student jobs, side jobs, and internships are not included. Jobs must be created on LinkedIn in the same month of the job start date to account for lag in how members update their profile.

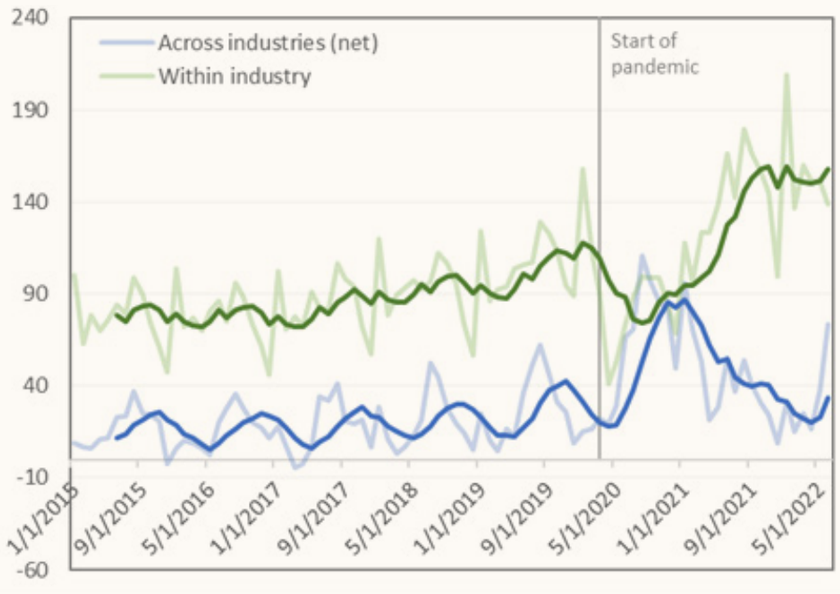
Reallocation can be between industries, but much is within an industry.

Historically, workers have more often been hurt by reallocation shocks, during which a significant share of workers permanently and involuntarily lose their jobs, often forcing them to move to new industries to get rehired. These shocks often come in the wake of recessions or significant economic shifts and workers lose more earning power in these cross-industry, involuntary shifts than in other kinds of shifts. The unusual nature of the Covid shock, with some sectors practically shut down completely, raises the question of whether between-industry share of job reallocation dominates the surge in total reallocation. This question is important because it is harder for workers to move across sectors than between firms in the same sector.

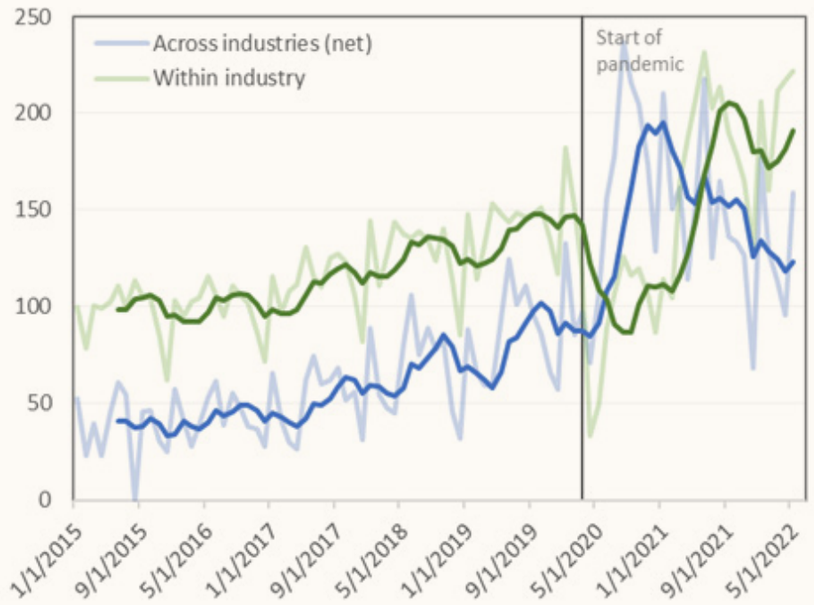
Perhaps because we often conceptualize the economy in terms of industries, one might guess that pandemic-induced reallocation will mainly involve cross-industry shifts. However, industry level evidence using LinkedIn's data suggests otherwise. To get a sense of the relative magnitude of the between-industry and within-industry reallocative effects of COVID, we construct job reallocation indices using data on job transitions by industry. We construct our measure of across-industry reallocation by calculating the net transitions in a given industry as the difference between total inflows and total outflows. Net transitions and within-industry transitions are then indexed to the first month of 2015. The patterns in Figures 12-17 show very little change in the rate at which workers are moving away from some industries to new ones. This is despite the fact that labor market conditions in the entertainment and accommodation industries were noticeably worse than in other industries early on in the pandemic. In contrast, the data show that the bulk of the pandemic-induced reallocation was happening within industries. The restaurant industry provides a salient example of within-industry reallocation over the recent two years. While some restaurants have permanently closed in response to COVID-19, takeout and delivery-oriented chains were experiencing a huge demand boom. Much of this immediate within-industry reallocation has likely been driven by upward pressure on wages.

Figures 12–17:
Within v. Across-Industry Net Transitions

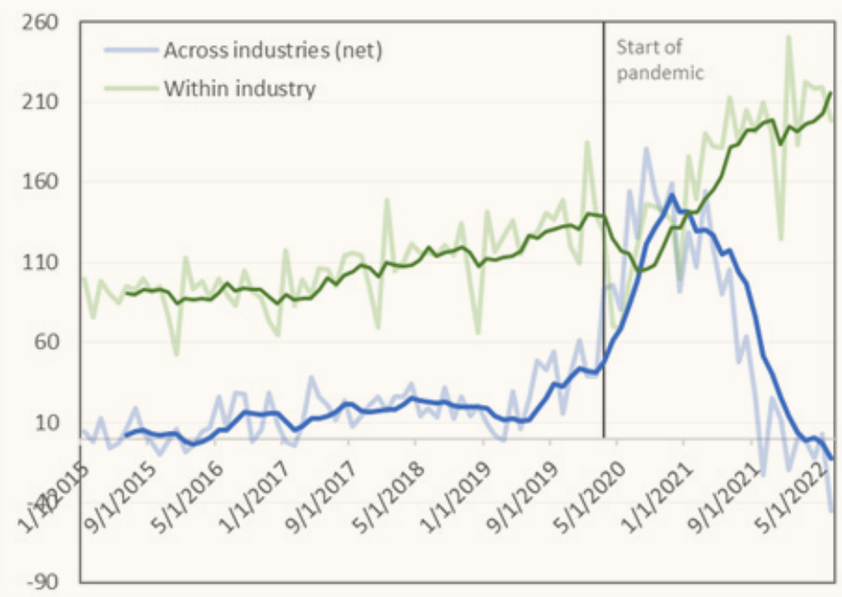
Entertainment Providers



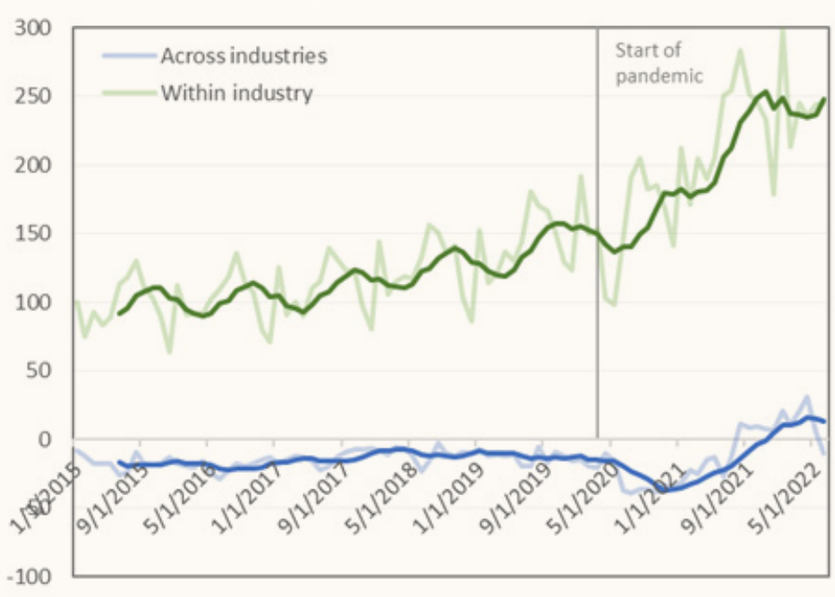
Accommodation



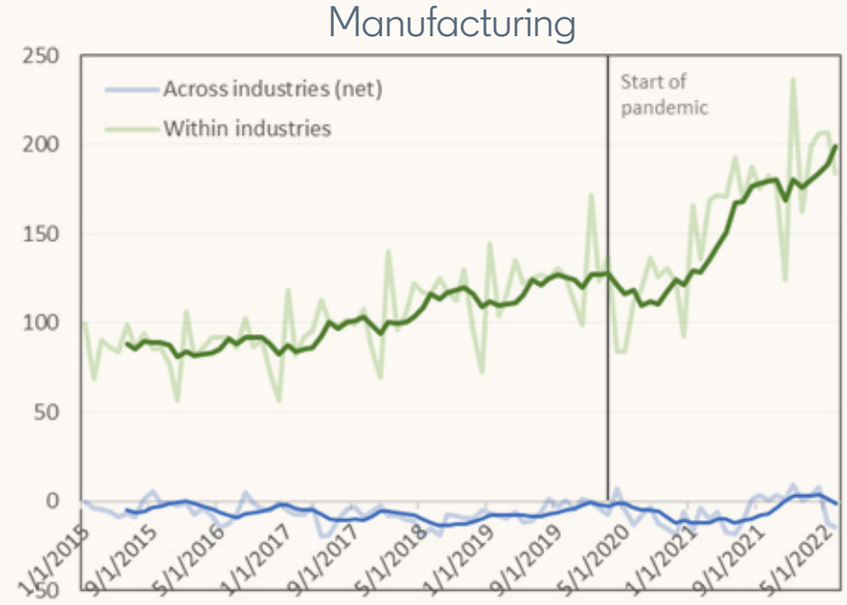
Administration & Support Services



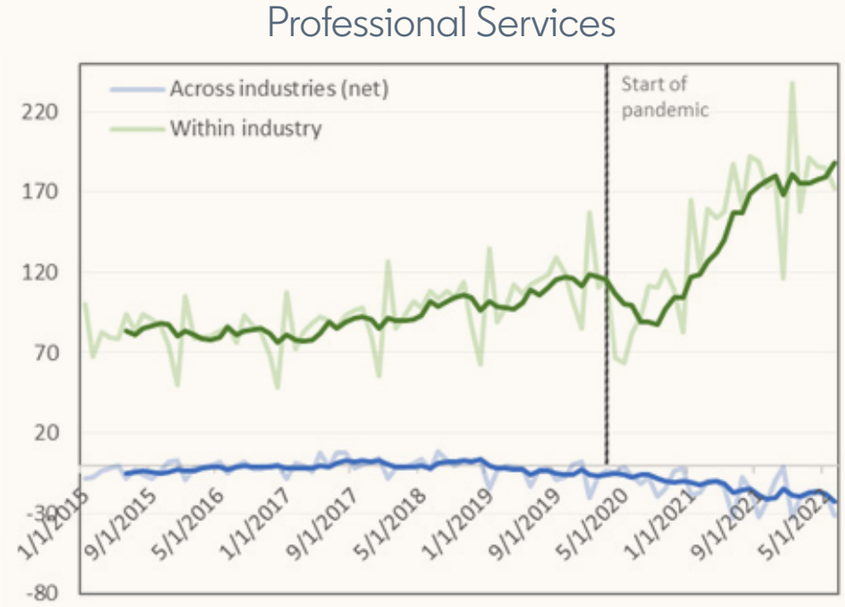
Hospitals & Healthcare



Manufacturing



Professional Services



Notes: Index Jan 2015= 100. A 6-month moving average is used for both series. Net transitions are negative when inflows to an industry exceed outflows. Source: LinkedIn Economic Graph data.

Conclusion and Policy Implications

Using LinkedIn's and publicly available data to disaggregate the vacancy-unemployment relationship reveals some interesting new perspective that may shed light on what appears to be an outward shift of the Beveridge curve in recent years.

The distinction between temporary and permanent unemployed are key to understanding the apparently large shift in the Beveridge curve beginning in 2020. While the Beveridge curve for all workers appears to have shifted outward at the start of the COVID-19 pandemic, much of the shift in the Beveridge curve was due to an increase in temporary layoffs. Since those who were on temporary layoffs were largely simply waiting to be recalled, they did not create congestion in the matching process and therefore they did not affect the job finding rate in the search market. This is consistent with data on job search intensity from LinkedIn, suggesting that total search effort was lower than would normally be indicated by the unemployment rate since the share of unemployed who were on temporary layoffs was very high. By distinguishing between those who are on temporary layoffs and the permanently unemployed, the resulting outward shift in the Beveridge curve appears to be much less pronounced during 2020.

Other than the contrast between the temporary and permanent unemployed, the recent breakdown in the vacancy-unemployment relationship seems to have been more pronounced in industries that have seen the largest number of job quits. These are the industries that are traditionally known to have low-wage workers and therefore likely to experience substantial reallocation when the labor market is tight.

A strand of research has suggested that the shift in the Beveridge curve may reflect an increase in the intensity of reallocation. In this view, the contemporaneous presence of growing sectors and declining sectors would imply a higher turnover (i.e. reallocation) among workers, which would increase vacancies without substantially affecting unemployment. To the extent that higher reallocation is happening between industries then this would lead to a decline in the matching efficiency. To the extent that matching has become more difficult, it would be difficult for the Federal Reserve to cool off demand (reduce job openings) without substantial increase in the unemployment rate. However, our data provides little support for this argument.

While reallocation can be across industries, much of the observed turnover has been happening within the same industry. This within-industry reallocation can happen for several reasons. First, difficult conditions in the leisure and entertainment and food and accommodation industries were perceived by workers and firms to be temporary. As the pandemic was coming under control, workers expected to return to their jobs or find similar jobs. Thus, a transition to other growing industries was not necessary, especially given relatively generous support from unemployment insurance. Second, quits might have been due to workers needing to

change employers in order to take advantage of the upward pressure on wages in some industries (such as leisure and hospitality). Quits trigger vacancies, which beget vacancies through replacement hiring. These job-to-job transitions can give rise to vacancy chains, amplifying fluctuations in the vacancy-unemployment ratio (Akerlof, Rose, and Yellen, 1988).[8] The upward pressure on wages should abate quickly as the economy slows down. It is possible that the upward pressure on wages in customer facing industries be due to an adjustment to relative wages to accommodate an increase in the compensating differential for work that requires a physical presence and also exposes workers to health risks. To the extent that this is happening, stickiness in relative wage adjustments might temporarily push out the Beveridge curve in affected industries, but should be reversed as the wage adjustments take place. It is also possible that an increase in job-to-job transitions associated with the increase in quits could make the Beveridge curve appear to shift out, but without any decrease in matching efficiency.

Taken together, the findings suggest that the matching efficiency of the labor market has likely not fallen permanently. Much of the outward shift in the Beveridge curve seems to be from the increase in reallocation. It is possible to interpret this outward shift as a structural change in the way that the labor market works and thus to assume that it is orthogonal to changes in aggregate demand. However, the fact that most of the increase in reallocation is happening within the same industry gives us reason to suspect that policy tightening in current circumstances to tame inflation will reduce the intensity of quits, which in turn, will lead to a reduction in reallocation. The procyclicality of quits suggests that the outward shift in the Beveridge curve will likely be reversed as the economy slows down.

While it is not possible in theory to reduce vacancies without an increase in unemployment, the nature of the recent shift in the Beveridge curve and its changing slope provide glimpses of hope in the tension surrounding the future state of the labor market. All else equal, the slope of the Beveridge curve, estimated using monthly job openings and unemployment rates since the start of the pandemic, suggests that a decrease in job openings to the level prevailing in December 2019 will be associated with an unemployment rate in the vicinity of 5%.

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Appendix 1:

To estimate the Beveridge curve, I regress *ln((1-u)/u) on ln (v/u).*

$ln((1-u)/u) = \alpha + b\ ln(v/u) + \epsilon \qquad (1)$

We can write *(1) as* $e^{ln((1-u)/u)} = e^{\alpha} * e^{b\ ln(v/u)}$

This simplifies to $((1-u)/u) = e^{\alpha} * (v/u)^{b}$

Re-arranging $u^{(b-1)} - u^{b} - e^{\alpha} * v^{b} = 0$

$v = ((u^{(b-1)} - u^{b})/e^{\alpha})^{(1/b)}$