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Revisiting the Beveridge Curve: Why Has It Shifted so Dramatically?

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The Beveridge curve helps with analyzing the labor market by capturing the inverse relationship between the unemployment rate and the job opening rate. While the data have moved slightly over the past two decades depending on economic conditions, the COVID-19 pandemic changed the existing pattern dramatically. At first, the curve shifted substantially outward. As the economy improved, the curve tilted steeply upward as the sharp increase in job openings outpaced the decline in the unemployment rate. The extent of these changes is historically unprecedented. This *Economic Brief* explains the concepts behind the Beveridge curve and discusses potential factors underlying these shifts.

The Beveridge curve is a central concept in the macroeconomics of labor markets. Named after the British economist William Beveridge,[1] it captures an inverse relationship between unemployment and vacancies (that is, open positions that businesses attempt to fill). The COVID-19 pandemic has caused the Beveridge curve to shift in an unprecedented way. This *Economic Brief* explores how the curve has shifted and discusses why.

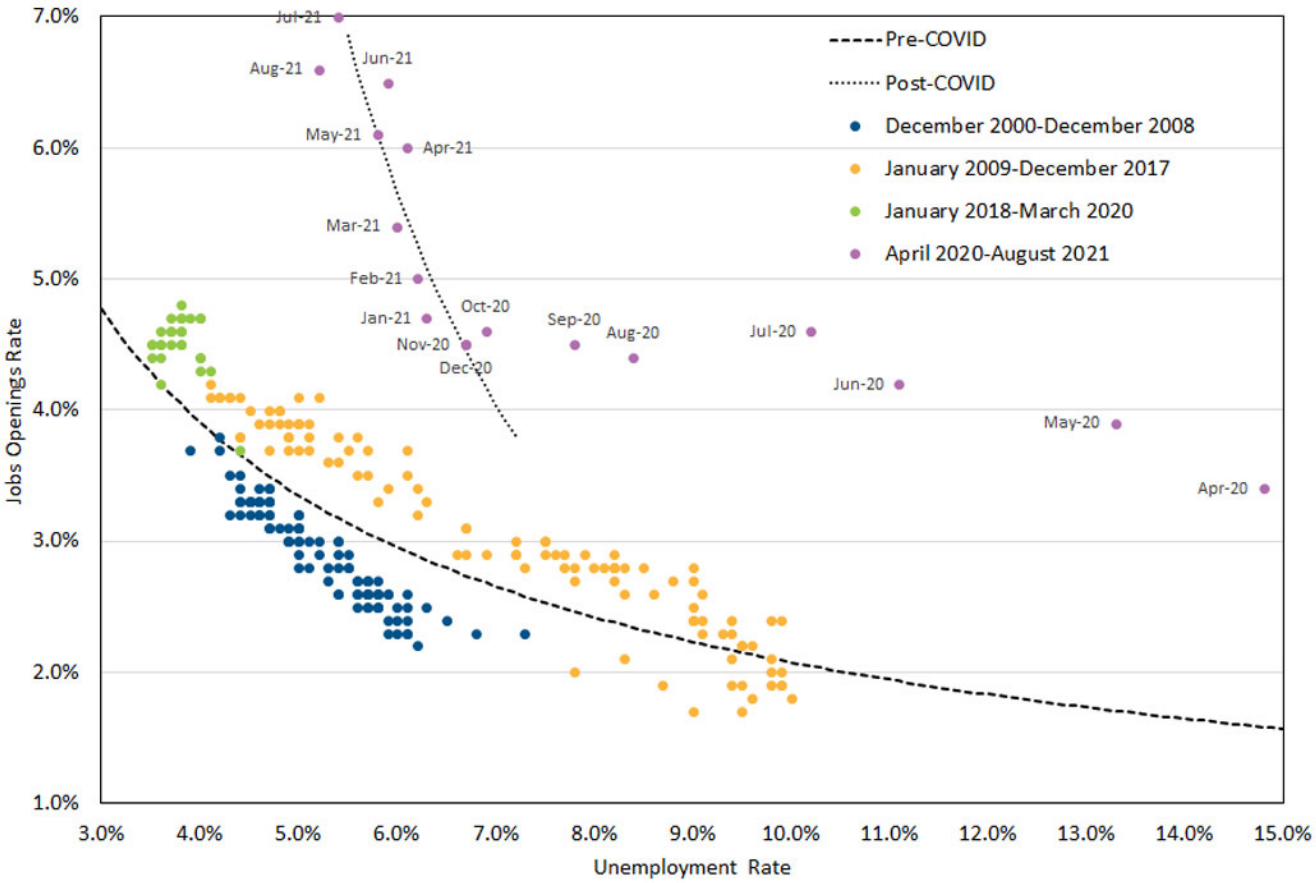
What Is the Beveridge Curve?

The Beveridge curve is one of the most robust regularities in economics, as it holds in different time periods, across countries[2] and at the aggregate and disaggregated (or sectoral) level. When shown in a graph, it plots the job-vacancy rate (on the x-axis) against the unemployment rate (on the y-axis). The curve generally slopes downward, indicating that vacancies tend to be higher when the unemployment rate is lower, and vice versa.

Figure 1 shows the Beveridge curve for the monthly data collected in the Bureau of Labor Statistics' Job Openings and Labor Turnover Survey (JOLTS) from December 2000 until August 2021 (the most recent data point). Each dot represents a combination of the unemployment rate and the job opening rate.[3] The sample is divided into four distinct

periods, which correspond to the period up to the financial crisis, the ensuing recession and recovery up until 2017, and the period between January 2018 and March 2020, during which the unemployment rate was persistently below 4.5 percent. The fourth period — April 2020 through August 2021 — captures the COVID-19 months.

Figure 1: Beveridge Curve



Sources: Bureau of Labor Statistics' Job Openings and Labor Turnover Survey and author's calculations.

Enlarge

The figure illustrates that the Beveridge curve has changed quite dramatically during the pandemic. But even prior to the pandemic, it is noticeable that the data points cluster in specific patterns. The Beveridge curve is a feature of the data, but it can be understood and analyzed by using the so-called "search-and-matching" model in labor economics.[4] Thinking about the Beveridge curve in the context of this stylized model illuminates why it is considered helpful in gauging the state of the labor market. Moreover, it allows us to clarify what lies behind the dots in the figure.

What Generates the Beveridge Curve?

In the search-and-matching framework, firms that want to hire post a job opening. Workers search for jobs but can also instead draw unemployment benefits and search again next period if they do not receive an acceptable job offer. Workers and firms are then matched in a recruiting-and-hiring process.

The assumption that vacancy posting is costly implies that a filled position is valuable: Firms do not want to lose workers since finding new ones is costly. Consequently, there is value in maintaining long-lived employment relationships.

Job Creation Condition

This insight leads to a hiring rule that labor economists generally refer to as the "job creation condition." The expected cost of posting a vacancy — including the likelihood that a firm is matched with a job seeker — is equal to the discounted value of future benefits that the firm expects to gain from the relationship. This mostly reflects revenue net of wages and accounts for potentially needing a new worker in the future.

Matched workers accept any job offer that satisfies at least what economists call their reservation wage, or the minimum amount they would accept to do a job. This concept summarizes the idea that accepting job offers (or not) is an explicit choice. Workers can weigh the benefits of working (mainly the wage and ancillary benefits) versus the benefits from not working (which includes measures of unemployment payments, the likelihood of finding a better offer and the time value of not working). Since employers are aware of these options and make wage offers accordingly, matches result in mutually beneficial employment relationships.

Employment Accumulation Condition

This reasoning then implies a second key relationship, often referred to as the "employment accumulation condition."[5] Workers leave the unemployment pool when they find jobs or when they leave the labor force (for example, due to retirement). Similarly, workers move into the unemployment pool when they lose their jobs. These labor market flows are captured in JOLTS, which helps us track the stock of the employed or unemployed through inflows and outflows.

The Intersection of Job Creation and Employment Accumulation

We can therefore think of job creation and employment accumulation as representing labor demand and labor supply, respectively. In the case of job creation, we see an upward-sloping relationship between the unemployment rate and the job opening rate. When the unemployment rate is high (and consequently the pool of job seekers large), employers find it easier and less costly to hire workers. Hence, they post more vacancies.

Similarly, the employment accumulation condition is downward sloping. As the job opening rate rises, the unemployment rate falls, since new matches between workers and firms are being created.[6]

The Beveridge curve is thus composed of points where the two relationships intersect. When the economy is growing, the job creation condition curve shifts right along the employment accumulation curve and thereby traces out a Beveridge curve over the course

of a business cycle. In Figure 1, each dot thus represents a specific point in time associated with the state of the economy.[7]

The Beveridge Curve Before COVID-19: A Counterclockwise Loop

The figure shows that the first three periods neatly line up around a downward-sloping Beveridge curve.[8] In contrast, the pandemic data show a massive shift upward and to the right from pre-pandemic levels and a steep upward tilt once the recovery picked up speed in October 2020.

When the JOLTS survey started in December 2000, the economy was just at the cusp of the short-lived 2001 recession, with unemployment at 3.9 percent. As the economy came out of the recession at the end of 2001 and labor demand picked up, unemployment fell slowly in line with a gradual rise in the job opening rate. This initial period defines (almost) a complete business cycle from trough to trough, and the data essentially form their own Beveridge curve as they cluster tightly somewhat below the fitted curve for the longer sample.

The onset of the financial crisis and the Great Recession caused the unemployment rate to shoot up quickly to a peak of 10 percent in October 2009. Arguably, labor market data early in this period line up with the preceding data points as job openings declined at the same pace. For several months, the data cluster in narrow ranges before they drift above the dashed line and move left along the curve as labor demand increased, more and more vacancies were being posted and the unemployment rate declined. This pattern has been described by economists Olivier Blanchard and Peter Diamond as a "counterclockwise loop," where the economy is above the curve during an expansion and below the curve during a contraction.[9]

This cycle might have been expected to end. However, while the unemployment rate fell below what many considered to be the natural rate of 4.5 percent in April 2017, the movement to the left along the curve continued, with both unemployment and job opening rates reaching peaks. The persistent improvement in the labor market is clearly visible in the cluster of green dots. What many researchers had feared — namely that the depth of the Great Recession had caused permanent scarring in the labor market and created "mismatch" — did not come to pass.[10]

The Beveridge Curve During the Pandemic: Leaps, Bounds, Shifts and Twists

However, this all came crashing down with the onset of the COVID-19 pandemic. The unemployment rate spiked to 14.8 percent in April 2020, the first full month of the economy-wide lockdown. Subsequent months saw a rapid rebound as the economy roared back from the pandemic shock.

It is notable that the improvement happened along a curve parallel to the pre-COVID one but shifted outward by a large measure. The initial jump in unemployment and subsequent elevated-but-declining unemployment rates are associated with job openings that we typically only observe when the economy is doing exceptionally well.

Fall of 2020 saw another dramatic change in the Beveridge curve. Starting in October — when the unemployment rate was 6.9 percent — job opening rates rose much faster than the unemployment rate fell. This pattern translates into a Beveridge curve that is much steeper than the pre-COVID curve. (See the dashed line among the cluster of purple dots in Figure 1.) Not only do firms have to post more vacancies to maintain a given unemployment rate, but any decline in the latter requires a much steeper rise in job openings.

Why Did the Beveridge Curve Shift?

What explains this shift and twist in the Beveridge curve in the wake of the COVID-19 shock? The search-and-matching model can provide an answer to this question. The location of the curve over the business cycle is determined by how many job postings are needed to maintain a given unemployment rate. If the matching process between workers and firms becomes less efficient, a given unemployment rate implies a higher job opening rate. That is, employers need to post more vacancies to fill a given number of positions. In terms of the model, an outward shift of the Beveridge curve can therefore be explained by a decline in match efficiency.

Such decline in match efficiency can be caused by a variety of underlying factors. Sectoral shifts, changing skill requirements and geographical dispersion can all play a role. For instance, a recently laid-off autoworker in the Midwest may find it difficult to get matched with a job as a nurse in the Southwest.

In the aggregate data, such mismatches would show up as a decline in match efficiency, since unemployed people may not have the skills employers need. Hence, employers post more positions (or search more widely) to find a successful match. Conversely, improvements in job search technology — such as online job postings — would improve match efficiency since information about open jobs would be more readily available to a wider range of job seekers. These factors likely are playing a role during the pandemic, too.

The sharp increase in the Beveridge curve slope in early fall 2020 presents a different puzzle. Since match efficiency has declined, any reduction in unemployment now requires a much higher job opening rate than before the pandemic. In other words, the unemployment rate is now much less responsive to changes in the job opening rate than before the pandemic or even before the full start of the recovery in early fall.

The transition out of unemployment thus faces two increasingly strident headwinds: a decline in match efficiency — which has made it more difficult to bring employers and job seekers together — and a decline in how easily such matches can be converted into

employment. In other words, employers have to compete increasingly more aggressively for workers.

The shifts and twist of the Beveridge curve can thus help economists and policymakers diagnose the state of the labor market and point to potential underlying causes. While there is a sense that it relates to changes in job search technology and recruiting efforts, the existing research on prior Beveridge curve movements as to the source of this mismatch is either inconclusive or shows only small effects.[11]

Similarly, technological changes have made job search easier, but perhaps they have also made hiring harder. Sorting through thousands of resumes submitted online is costly and time-consuming and leads employers to resort to other screening methods.

All in all, it is unclear how these changes have affected the Beveridge curve. There is much still unknown about what makes it move. What we do know is that shifts and twists of this magnitude are quite unprecedented. In previous research ("The Time-Varying Beveridge Curve," co-authored with Luca Benati), I have found that the Beveridge curve changes shape and location ever so slightly after each recession. While it completes a counterclockwise loop over the course of each economic cycle, it never returns to its original location. Most of these changes are statistically indistinguishable from each other, though the recessions in 1981-82 and 2007-09 stand out in the extent of these shifts. What is striking in the current scenario is that recent shifts and twists dwarf even those of the Great Recession.

Conclusion

The COVID-19 pandemic has led to dramatic changes in how economic activities are conducted. A striking example of this is how the labor market has been affected by the recent shift and twist in the Beveridge curve, which is unprecedented. This *Economic Brief* ties these changes to the logic of a theoretical labor market model and argues that they are consistent with structural changes in the labor market, namely a deterioration in match efficiency and match elasticity.

During the pandemic, job creation has become more difficult, and firms have had to recruit more aggressively to find workers. Looking forward, a reduction of the unemployment rate to pre-COVID levels would require job openings to be at twice the level they were before.

While expansionary monetary and fiscal policy are able to support the labor demand that could make this happen in principle, active labor market policies would seem more adapt in addressing these structural changes.

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[1] *For more on the etymology and origin of the Beveridge curve, see Eran Yashiv's 2008 article "Beveridge Curve (PDF)."*

[2] *For more information on the Beveridge curve across countries, see Bart Hobijn and Aysegul Sahin's 2013 article "Beveridge Curve Shifts across Countries since the Great Recession."*

[3] *JOLTS is a monthly survey of about 16,000 business establishments drawn from the universe of approximately 8 million establishments on the Bureau of Labor Statistics' ES-202 Quarterly Census of Employment and Wages file. The participating respondents answer survey questions on a variety of labor variables, such as employment, hires, separations and open positions. A job opening (or vacancy) is defined as a specific position that can be filled immediately and for which active recruiting is going on. Unemployment is the headline unemployment rate from the household survey of the Census Bureau as part of its Current Population Survey (CPS). Every month households are being asked what they employment status of their members is.*

[4] *See Robert Shimer's 2005 paper "The Cyclical Behavior of Equilibrium Unemployment and Vacancies."*

[5] *The labor market flows that describe how unemployment rises and falls is detailed in Shimer's 2012 paper "Reassessing the Ins and Outs of Unemployment." The entry and exit flows into unemployment are visualized as a bathtub model in my 2015 article "The Rise in Long-Term Unemployment: Potential Causes and Implications," co-authored with Andreas Hornstein.*

[6] *In typical labor market descriptions, labor demand (supply) is downward (upward) sloping, but these are usually expressed in terms of employment rather than unemployment as in the Beveridge curve framework.*

[7] *This is discussed in great detail in my 2013 working paper "The Shifting and Twisting Beveridge Curve: An Aggregate Perspective."*

[8] *The dashed line is fitted to these data points using a smooth polynomial to give a visual impression of the form and shape of the Beveridge curve.*

[9] *For more information, see Blanchard and Diamond's 1989 paper "The Beveridge Curve."*

[10] *See Gadi Barlevy's 2011 paper "Evaluating the Role of Labor Market Mismatch in Rising Unemployment" and my 2014 article "Putting the Beveridge Curve Back to Work," co-authored with Karl Rhodes.*

[11] *A detailed discussion of the potential sources of changes in match efficiency can be found in the 2014 paper "Mismatch Unemployment," by Aysegul Sahin, Jae Song, Giorgio Topa and Gianluigi Violante.*

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