

Shifts in the Beveridge curve[☆]Peter A. Diamond^a, Ayşegül Şahin^{b,*}^a Massachusetts Institute of Technology, United States^b Federal Reserve Bank of New York, United States

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ABSTRACT

We put the current shift in the Beveridge curve into context by examining the behavior of the curve since 1950. Outward shifts in the Beveridge curve have been common occurrences during U.S. recoveries. By itself, the presence of a shift has not been a good predictor of whether the unemployment rate at the end of the expansion following a shift was higher or lower than that in the preceding expansion.

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1. Introduction

The negative relationship between the unemployment rate and the vacancy rate over the course of a business cycle is one of the most established stylized facts of macroeconomics (Beveridge, 1944). As Fig. 1 shows, this relationship was remarkably stable from the start of JOLTS data in December 2000 through at least the NBER identified trough in June 2009 or possibly through the point of the highest unemployment rate in October, 2009.¹ However, after October 2009, there was a notable shift in the Beveridge curve, first shifting up (higher vacancy rate) and then paralleling the previous curve, which can be viewed as higher and/or to the right. Relative to vacancies, the unemployment rate was higher than one would project from the pre-recession relationship between the unemployment rate and the vacancy rate. This shift has received a great deal of attention and started a debate regarding the nature of unemployment in the U.S., much as in the past when unemployment has stayed high (Solow, 1964; Woirol, 1996).²

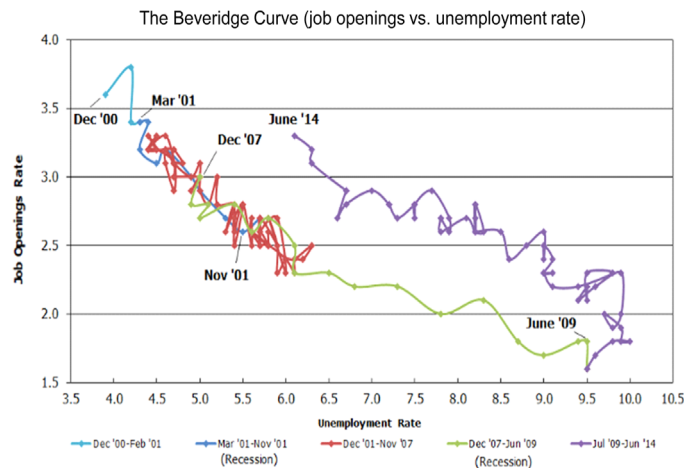
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¹ The appearance of stability depends on how one projects the earlier curve beyond the range of unemployment rates previously observed. For one projection showing stability, see Barlevy (2011).

² See, for example: "The red dots in Fig. 8 depict the Beveridge curve since the U.S. recession was formally declared ended in June 2009. One would normally expect the unemployment rate to decline as economic growth resumes. But here, we see evidence of increased recruiting activity on the part of the business sector together with no apparent decline in the unemployment rate. One interpretation of this recent pattern is that matching jobs with workers has become more difficult in the wake of an exceptionally severe recession. If this is the case, then it is not immediately clear how monetary or fiscal policies might alleviate the problem" (Federal Reserve Bank of St. Louis, 2010).



Source: Bureau of Labor Statistics, Current Population Survey and Job Openings and Labor Turnover Survey, August 12, 2014.

Fig. 1. The U.S. Beveridge curve: December 2000–June 2014.

2. Historical Beveridge curve

A shift in the Beveridge curve, with a higher level of unemployment than before at the same level of the vacancy rate, suggests a deterioration in the matching/hiring process in the economy.³ It is tempting to interpret this decline 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. Indeed, that approach to interpreting a shift in the Beveridge curve has been standard in the academic literature, going back to [Dow and Dicks-Mireaux \(1958\)](#). If valid, this interpretation would support an obvious policy implication: however useful aggregate stabilization policies while unemployment is very high, they are likely to fail in lowering the unemployment rate all the way to the levels that prevailed before the recession, since the labor market is presumed to be *structurally* less *efficient* than before in creating successful matches. One problem with an interpretation based on [Fig. 1](#) is its short sample period, since the source of the vacancy data used in [Fig. 1](#) is the Job Openings and Labor Turnover Survey (JOLTS) which only started in December 2000. Thus, the Beveridge curve shown there spans only 14 years, during which the U.S. economy experienced a mild recession, an expansion, and a deep recession followed by a slow recovery. Extending the sample period reveals that outward shifts in the Beveridge curve after the trough are common in U.S. historical data, and shows diverse experiences during the following expansions. To extend the vacancy series, we use the Composite Help-Wanted Index constructed by [Barnichon \(2010\)](#) for the 1951–2000 period, which is available on a monthly basis.⁴ Using a scaling factor to ensure the level of vacancies computed using the composite index matches the level observed in December 2000 in the JOLTS, we impute the level of vacancies relative to the Index going back to 1951 and divide the number of vacancies by the sum of vacancies and total payroll employment to obtain the vacancy rate.

Using this historical vacancy rate series and the unemployment data from the BLS, we plot the Beveridge curve for the U.S. economy for the 1951–2014 period. Both the unemployment and vacancy series are available at a monthly frequency. We use the quarterly averages of both to plot the Beveridge curve to smooth out very short-term fluctuations. Monthly versions of [Figs. 2](#) and [3](#) are plotted in the Appendix ([Figs. A1](#) and [A2](#)).

To focus on the behavior of the unemployment rate, rather than using NBER dates, we define a *business cycle* as the time period between the end of one expansion (defined as the quarter in which minimum unemployment rate was reached) and the end of the next one (again the quarter in which the minimum unemployment rate was reached).⁵ To better show the cyclical behavior of vacancies and unemployment, we plot different business cycles in different colors in [Fig. 2](#).⁶ The color-coded dates on the plot show the quarters corresponding to the maximum unemployment rates for each of the business cycles. Looking at 60 years of data, instead of just the last 14 years, reveals that outward shifts in the Beveridge curve after the point of maximum unemployment rate are common occurrences in the U.S. labor market.⁷ [Fig. 3](#) plots separately each

³ See, for example: “Evidence that factors other than weakness in overall demand for goods and services are boosting the unemployment rate comes in part from a shift in what is known as the Beveridge curve” ([Congressional Budget Office, 2014](#), page 8).

⁴ The Composite Help-Wanted Index constructed by [Barnichon \(2010\)](#) makes use of the historical Help-Wanted Index, which was derived from help wanted advertisements in 51 major newspapers, and the online Help Wanted index. Barnichon uses the HWI for the 1951–1995 period assuming no online advertising and then he estimates the share of print advertising starting from 1995 and uses that for the 1995–2005 period. Both the historical and online Help Wanted Indices are published by the Conference Board. We follow [Daly et al. \(2012\)](#) and append Barnichon's series with the JOLTS starting from December 2000.

⁵ [Table 1](#) shows the dates of the business cycles we plot in the Beveridge curve and reports the levels of the unemployment and vacancy rates at these critical business cycle dates.

⁶ This plot is very similar to the historical Beveridge curve plot in [Daly et al. \(2012\)](#), who plot different decades in different colors. Instead of decades, we focus on the distinct business cycles. Our message is very similar to theirs.

⁷ Adjusting for the age distribution of the population following [Shimer \(1998\)](#) does not alter the basic premise of frequent shifts in the curve. [Figs. A3–A5](#) in the Appendix plot the historical Beveridge curve using age-adjusted unemployment rates.

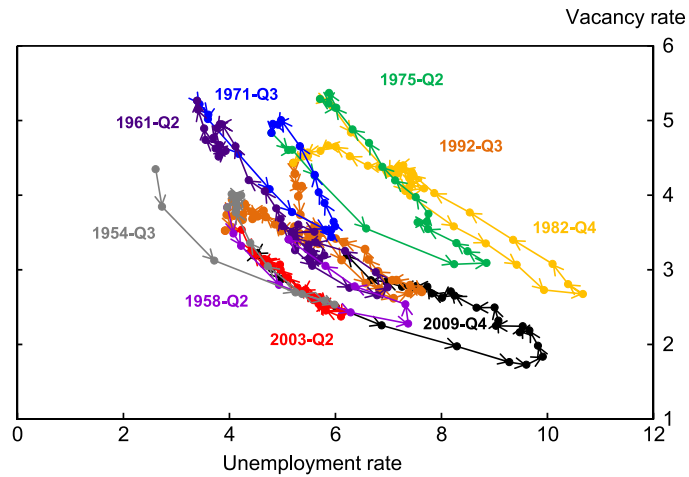
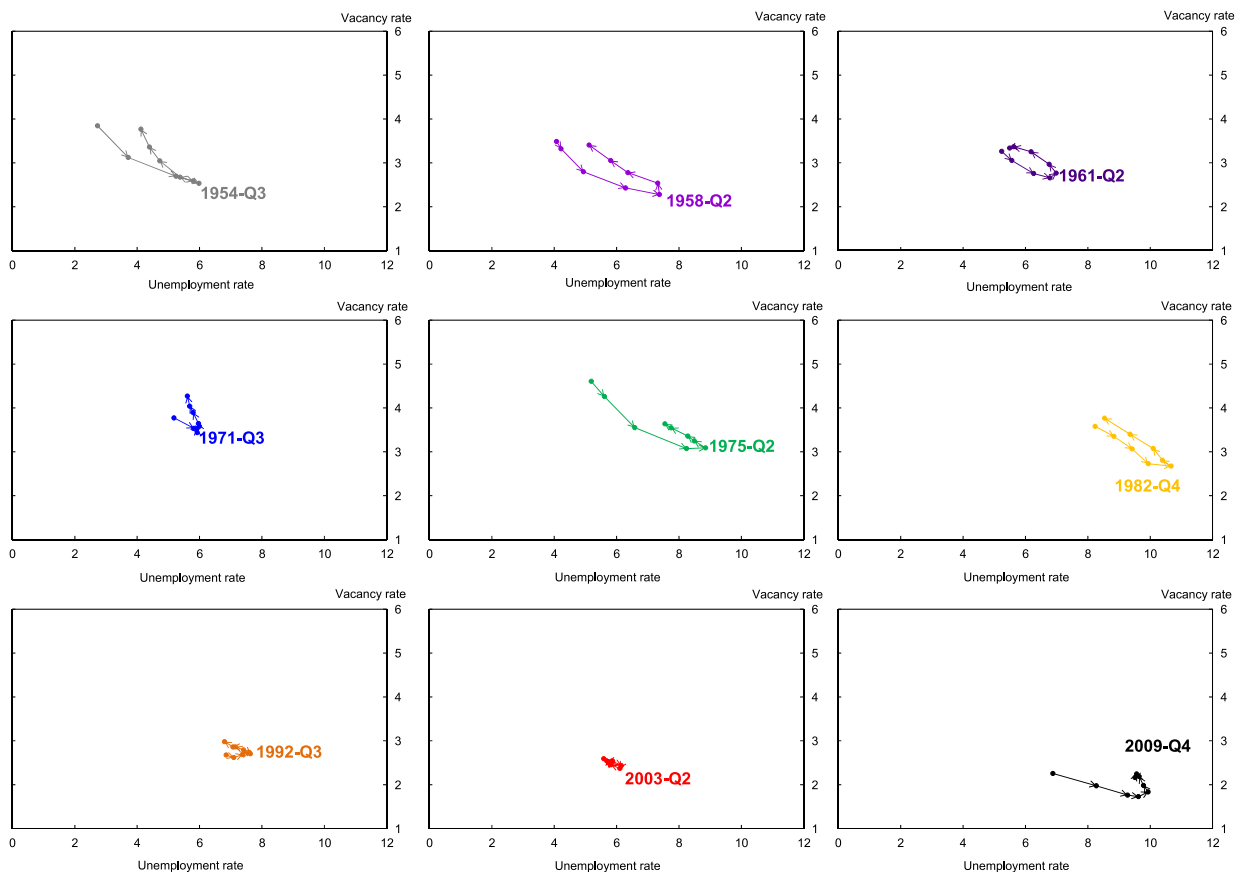
Historical Beveridge Curve: Max u point \pm quarters to min u point

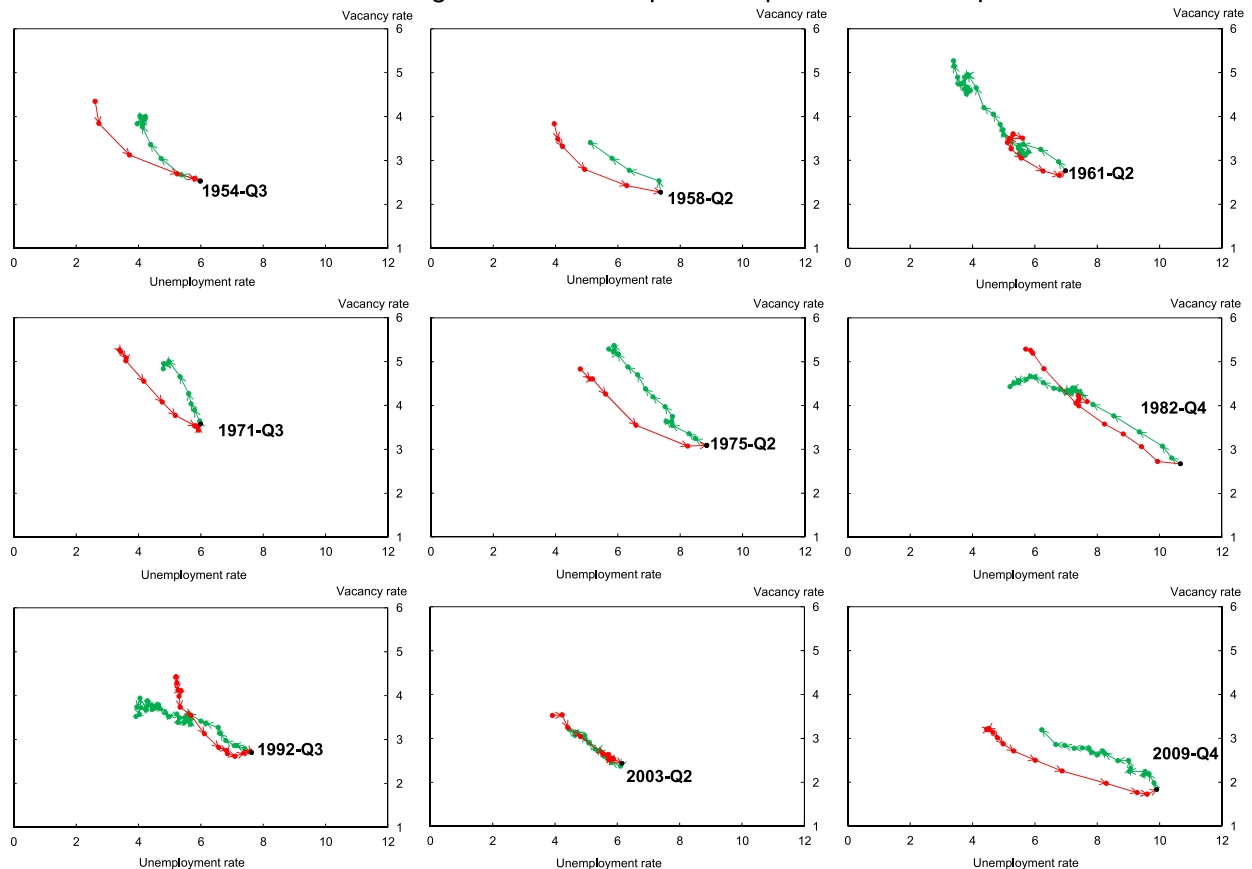
Fig. 2. (Color online) The U.S. Beveridge curve: 1951Q1–2014Q2. *Note:* The data on this page were constructed as part of the paper “Building a composite Help-Wanted Index” (Barnichon, 2010).

Historical Beveridge Curve: Max u point \pm 4 Quarters

Source: BLS, JOLTS, Conference Board, Barnichon (2010)

Fig. 3. The U.S. Beveridge curve: 1951Q1–2014Q2. *Note:* The data on this page were constructed as part of the paper “Building a composite Help-Wanted Index” (Barnichon, 2010).

Historical Beveridge Curve: Max u point \pm quarters to min u point



Source: BLS, JOLTS, Conference Board, Barnichon (2010)

Note: Green: Post-Max U, Red: Pre-Max U, Black: Max U

Fig. 4. (Color online) The U.S. Beveridge curve: 1951Q1–2014Q2. Note: The data on this page were constructed as part of the paper “Building a composite Help-Wanted Index” (Barnichon, 2010).

business cycle trough plus and minus four quarters to better visualize the outward shifts. Interestingly, the only business cycle during which the unemployment–vacancy pairs did not shift, but stayed on the same downward sloping Beveridge curve, is the 2000–2006 cycle. In all the others there is a notable outward shift in the curve after the maximum unemployment rate is reached.

To consider whether the outward shift is an indication of a sustained rise in structural unemployment, we consider the previous and following minimal unemployment rates. If, by itself, the outward shift were a good predictor of a sustained rise in structural unemployment, it should be the case that, after a shift in the curve, the unemployment rate does not reach its pre-recession minimum during the recovery period. Fig. 4 plots each business cycle turning point going from the previous minimum unemployment rate (in red) to the following minimum rate (in green). As Table 2 summarizes, the Beveridge curve shifted outward in seven of the eight completed business cycles in our data. In three of these cycles, the unemployment rate went down below its pre-recession level in the next expansion, while in four it did not. For the 2001 cycle – the only cycle without an outward shift – the unemployment rate did not reach its pre-recession trough. These observations suggest that, by itself, an outward shift in the Beveridge curve does not predict how low unemployment can get during the recovery. Interestingly, achieving a lower minimum unemployment rate has been strongly related to the duration of the expansion. As Table 2 shows, longer expansions are the ones where the unemployment rate went below its pre-recession trough.

3. Conclusion

Our main takeaway from examining the historical data is that while outward shifts in the Beveridge curve were very common in the U.S. economy, they were not predictors of the unemployment rate levels that the economy attained at the end of the following expansions. We are not the first to note the presence of previous shifts. See, for example, Daly et al. (2011) for an earlier analysis. Also Bernanke (2012) noticed that: “We can see some outward shift in the relationship

Table 1
Unemployment and vacancy rates at different business cycles.

Unemployment and vacancy critical points		
	Min U	Max U
	Q2-1953	Q3-1954
U	2.61	5.98
V	4.35	2.53
	Q1-1957	Q2-1958
U	3.96	7.37
V	3.84	2.28
	Q2-1959	Q2-1961
U	5.12	6.99
V	3.41	2.76
	Q1-1969	Q3-1971
U	3.39	5.99
V	5.27	3.58
	Q4-1973	Q2-1975
U	4.79	8.85
V	4.83	3.09
	Q2-1979	Q4-1982
U	5.71	10.67
V	5.29	2.67
	Q1-1989	Q3-1992
U	5.21	7.63
V	4.43	2.70
	Q4-2000	Q2-2003
U	3.92	6.15
V	3.52	2.43
	Q4-2006	Q4-2009
U	4.45	9.93
V	3.21	1.84

Table 2
Beveridge curve shifts, minimum unemployment rate, and length of expansions for different business cycles.

Max U	Experiences shift	Min U (recovery) < Min U (previous expansion)	Length of expansion
Q3-1954	YES	NO	11
Q2-1958	YES	NO	5
Q2-1961	YES	YES	32
Q3-1971	YES	NO	10
Q2-1975	YES	NO	17
Q4-1982	YES	YES	26
Q3-1992	YES	YES	34
Q2-2003	NO	NO	15
Q4-2009	YES	N/A	N/A

between job vacancies and unemployment, consistent with some increase in structural unemployment since the onset of the recession. However, a more in-depth analysis of the evidence suggests that the apparent shift in the relationship between vacancies and unemployment is neither unusual for a recession nor likely to be persistent. Research has found that during and immediately after the serious recessions of 1973–1975 and 1981–1982, the Beveridge curve also shifted outward, but in both cases it shifted back inward during the recovery.”

To consider this issue further, we are examining hiring around the time of the maximal unemployment rate.

Appendix A

See [Figs. A1–A5](#).

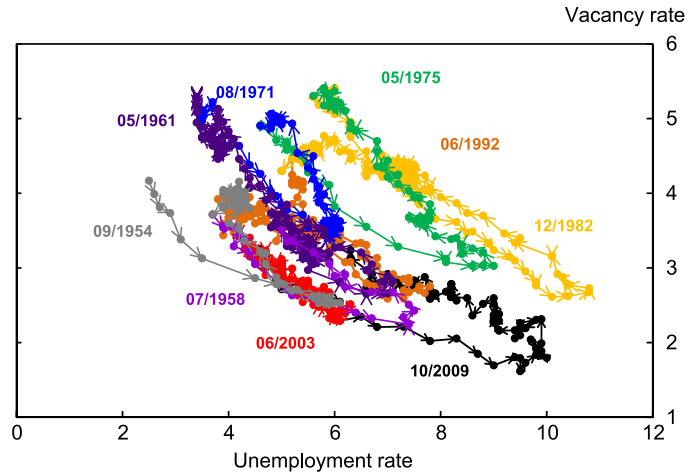
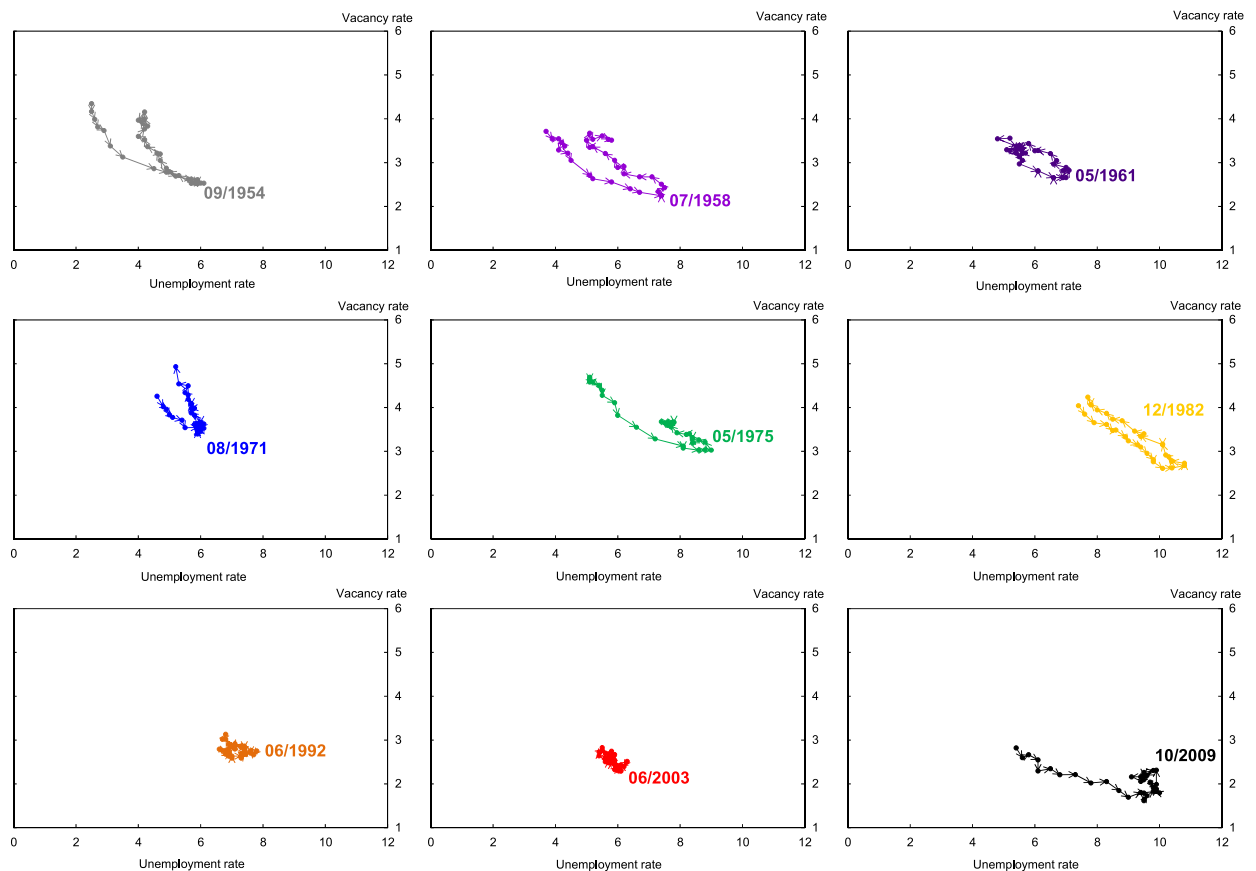
Historical Monthly Beveridge Curve: Max u point \pm months to min u point

Fig. A1. The U.S. Beveridge curve: 01/1951–06/2014. *Note:* The data on this page were constructed as part of the paper “Building a composite Help-Wanted Index” (Barnichon, 2010).

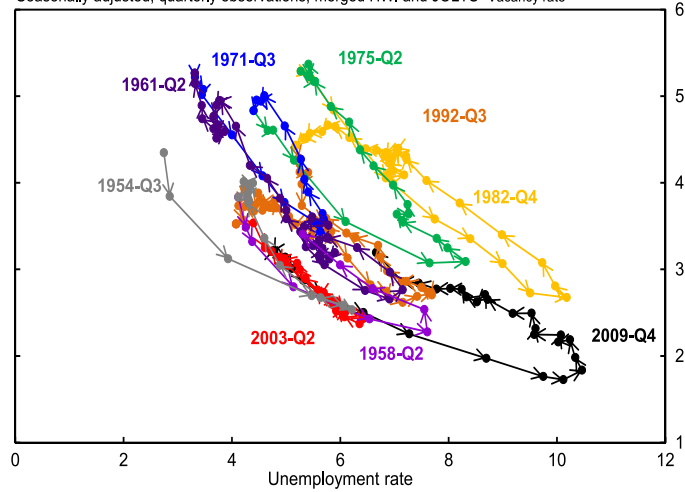
Historical Monthly Beveridge Curve: Max u point \pm 16 months

Source: BLS, JOLTS, Conference Board, Barnichon (2010)

Fig. A2. The U.S. Beveridge curve: 01/1951–06/2014. *Note:* The data on this page were constructed as part of the paper “Building a composite Help-Wanted Index” (Barnichon, 2010).

Age-Adjusted Beveridge Curve: 1950

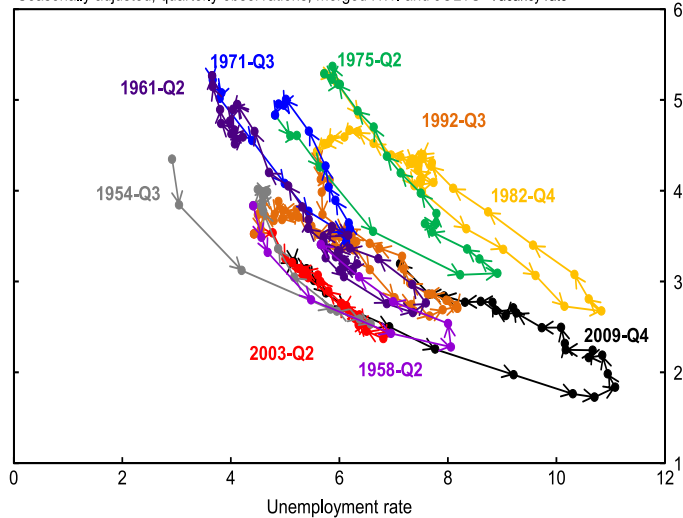
Seasonally adjusted; quarterly observations; merged HWI and JOLTS Vacancy rate



Source: BLS, Conference Board, Barnichon (2010), Daly, Hobijn, Sahin, and Valletta (2012), and authors' calculations

Fig. A3. Age-adjusted U.S. Beveridge curve using the 1950 age composition: 1951Q1–2014Q2.**Age-Adjusted Beveridge Curve: 1979**

Seasonally adjusted; quarterly observations; merged HWI and JOLTS Vacancy rate

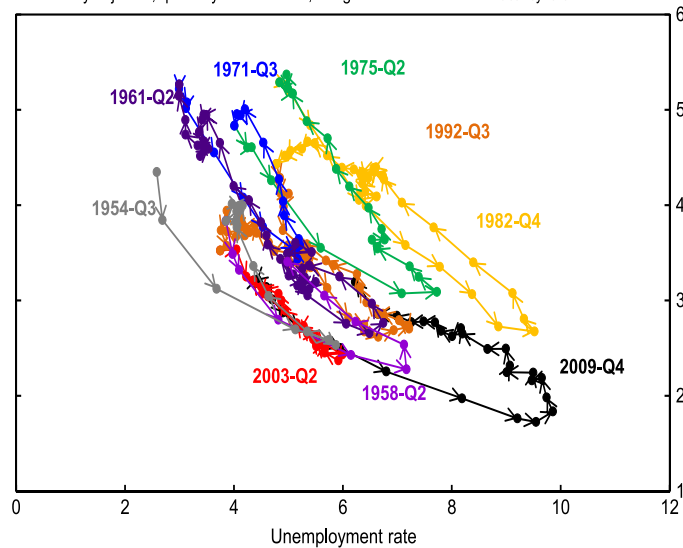


Source: BLS, Conference Board, Barnichon (2010), Daly, Hobijn, Sahin, and Valletta (2012), and authors' calculations

Fig. A4. Age-adjusted U.S. Beveridge curve using the 1979 age composition: 1951Q1–2014Q2.

Age-Adjusted Beveridge Curve: 2014

Seasonally adjusted; quarterly observations; merged HWI and JOLTS Vacancy rate



Source: BLS, Conference Board, Barnichon (2010), Daly, Hobijn, Sahin, and Valletta (2012), and authors' calculations

Fig. A5. Age-adjusted U.S. Beveridge curve using the 2014 age composition: 1951Q1–2014Q2.**References**

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