Hysteresis and Persistent Long-term Unemployment: The American Beveridge Curve of the Great Depression and World War 2

Abstract

Long-term unemployment plagued the American economy of the Great Depression. As employers viewed unemployment duration as negatively correlated with worker quality, reemployment after a long unemployment spell was more difficult long after recovery began, which lead to persistent unemployment or unemployment hysteresis. Using the tool of the Beveridge Curve, I find that hysteresis was a significant problem during the 1930s, but that the essentially unlimited labor demand during the Second World War provided jobs even to the long-term unemployed. The war ended unemployment hysteresis such that labor market conditions in the 1950s resembled those of the 1920s prior to the Depression. Unemployment figures disaggregated by duration confirm these results, as the long-term unemployed were very unlikely to return to gainful employment.

JEL Codes: N12, J60, E32

Keywords: Unemployment, Great Depression, Beveridge Curve, Hysteresis

> The results are striking: the interwar United States is characterized by pure hysteresis, with a completely insignificant [unemployment] level effect.
>
> -Gordon (1988, p. 300)

> Hysteresis appears to be an important feature of American depression.
>
> -Blanchard and Summers (1986, p. 69)

1 Introduction

Long-term unemployment was perhaps the most pressing problem facing policymakers during the Great Depression. Indeed, a primary focus of relief efforts under the New Deal program of the 1930s focused on providing unemployment for those long-term unemployed who had been out of work for years and faced little hope of reemployment. Jensen (1989) labeled these intractably unemployed as the "hard-core" unemployed, and estimates that they represented roughly 10% of the labor force from 1934-1939. This made the hard-core unemployed a plurality of total unemployment, which ranged from 14.3% to 22% over the same period. Woytinsky (1942) also uses a similar appellation of "hard-core" unemployed for the unemployed and unemployable, and finds that already by 1930 in Buffalo the long-term unemployed were 15% of the overall unemployment pool.[1] Bakke conducted a multi-year survey to see the effects of the Depression on the unemployed in England. Both employers and employees confirmed that the long-term unemployed of the time faced much more difficulty in finding work than the recently unemployed: "[T]he longer a man was out of work, the harder it was to get work" (Bakke, 1933, p. 50).[2]

[1] The situation would undoubtedly worsen by later in the decade, though data is not available from Buffalo to examine this possibility.

[2] "Works managers in Greenwich testified that even a short period of unemployment handicapped a man in his efforts to market his labour. There was, first of all, the preference that the employer had for the man who had just come from a job. In all probability he would be more competent than a man who had been away from his tools for some period. The handicap increased with the length of time out of work. ... [T]he complaint was made even among the labourers that the man just out of a job was given the preference. ... The general impression among the men was that the chances of getting a job were inversely proportional to the number of men who had come out since they were discharged." (Bakke, 1933, p. 50-51)

Contemporary observers of the problem of long-term came up with several competing explanations. One explanation, technological unemployment, held that technological progress had outstripped the capacity of the workforce to adapt, such that unemployment would persist even in the face of an economic recovery from the Depression (Clague, 1935; Lonigan, 1939; Woirol, 1996). This view found support even among top policymakers of the time: "I suppose that all scientific progress is, in the long run, beneficial, yet the very speed and efficiency of scientific progress in industry has created present evils, chief among which is that of unemployment" (Roosevelt, 1936). The other theory argued that the long-term unemployed were consider poor candidates for reemployment by employers due to their long period of joblessness, which kept them persistently unemployed. This stigma was exacerbated by their participation in emergency employment programs like the Works Progress Administration (WPA). While a recovery in labor demand would help somewhat, it was unclear if there could ever be a winding down of these programs, given the technological changes in the early twentieth century.

Blanchard and Summers (1986) outlined an alternative theory, that of "hysteresis in unemployment." Negative macroeconomic shocks had allowed high unemployment to develop, which meant that the long-term unemployed now faced discrimination in labor markets which caused high unemployment to be persistent.[3] This implied that the natural rate of unemployment would rise with the actual unemployment rate (Phelps, 1994).Gordon (1989) tested this theory, arguing that hysteresis would imply that the inflation rate is determined not by the level of output, which is the standard Phillips Curve relationship, but instead by the change in output. Gordon (1988) extends this analysis the late American economy of the late 1930s once hysteresis had set in, and found strong support for hysteresis during the American Great Depression, which was also a finding of Blanchard and Summers (1986).

[3]Blanchard and Wolfers (2000) provide an overview of these arguments and a strong case for the interaction between adverse shocks and inflexible labor market institutions. Ljungqvist and Sargent (1998) provide an example of a structuralist view on the European unemployment problem of the 1980s.

Crafts (1989) finds that the long-term unemployed did not exert downward wage pressure and this led to a rise to the British NAIRU from 1925-1939. Ball (2009) finds support for hysteresis after the most recent recession. This paper examines this debate using alternative evidence based not on the relationship between the unemployment rate and the inflation rate, but on the relationship between the unemployment rate and the job opening rate, otherwise known as the Beveridge Curve.

The Beveridge Curve[4] (BC) is the downward sloping relationship between the job opening rate and the vacancy rate, and provides an alternative method to analyze hysteresis which will be fully explored in this paper. During a recession, few jobs will be posted at the same time as the unemployment rate is high. During a boom, employers will have a high job opening rate, while the unemployment rate will be low. This traces out a locus of points which are downward sloping and convex to the origin. This describes a Beveridge Curve over a given business cycle with movements *along* the curve. However, holding business cycle conditions constant, it is possible to observe shift of the BC of movement *of* the curve itself (Dow and Dicks-Mireaux, 1958; Blanchard and Diamond, 1990) as was observed for many European countries in the 1980s (Nickell et al., 2003). If the BC shifts outward, then workers are having a harder time being matched to job openings. This represents a worsening in the job matching process, which will lead to both the unemployment rate and the job opening rate to be higher in equilibrium, vice versa for an inward shift of the Beveridge Curve. While many theories have been developed to explain shifts in the Beveridge Curve, the classes of theories can be group in roughly two categories, mirroring the categories of explanations for long-term unemployment: structuralist and hysteretic.

Shifts of the Beveridge Curve are often assumed to be related to non-demand factors such as "maladjustment" even in the earliest paper on the Beveridge Curve (Dow and Dicks-

[4]This curve is often attributed to Beveridge (1944), though it is not explicitly defined in that book and should perhaps instead be attributed to Dow and Dicks-Mireaux (1958) where this seminal relationship is discussed at length.

Mireaux, 1958). This class of explanations for mismatch in labor markets include sectoral shocks to or technological changes in the labor market which make employers' needs less well matched to workers' skills (Entorf, 1994; Jackman and Savouri, 1999; Kocherlakota, 2010), which I will call "structural mismatch." Workers' skills could be a poor match for employers' needs, inexperienced young workers may not be good fits for positions requiring more experienced workers (Jackman and Savouri, 1999), workers could be in sectors which need to shrink while job openings are in different growing sectors (Barnichon et al., 2012),[5] or unemployed workers could be located far from a booming region where many job vacancies are available (Rogers, 1997)[6].

All these types of mismatch unemployment may be present simultaneously, and this mismatch causes unemployment to rise as the unemployed flow out of unemployment more slowly (Sahin et al., 2014). Structural mismatch cannot be addressed by demand-side stimulus, but can only be addressed by the passage of time (Kocherlakota, 2010) or through structural reforms which improve labor market performance (Jackman et al., 1990; Nickell, 1997; Nickell and Layard, 1999), and thus the increase in the unemployment rate is primarily an increase in the "natural rate" of unemployment (Daly et al., 2012). Additional factors that might cause a similar shift in the BC would be increases in unemployment benefits which reduce search effort (Benjamin and Kochin, 1979; Katz and Meyer, 1990; Hagedorn et al., 2013; Farber and Valletta, 2015)[7]

An alternative theory would be that these shifts in the Beveridge Curve are due to hysteresis in unemployment, working through the difficulties the long-term unemployed face in

[5]The economist John Cochrane voiced support for this view in a recent interview: "When we discover we made too many houses in Nevada some people are going to have to move to different jobs, and it is going to take them a while of looking to find the right job for them. There will be some unemployment" (Cassidy, 2010).

[6]In the 1930s an example would be the numerous jobs available in agriculture in California while farmers could not find work in states affected by the Dust Bowl (Gregory, 1991) or more recently the example of steelworkers in Pittsburgh who must become nurses in a different city (Shimer, 2007)

[7]Unemployment benefits only begin at the State-level in Wisconsin in 1932 and at the National level in 1935, so this will not play much of a role in the early phases of the Depression (Price, 1985).

obtaining work. As the long-term unemployment are viewed as poor candidates for employment, the unemployment rate remains elevated while job vacancies remain open longer as employers wait to hire the recently unemployed or the currently employed. One way that this hypothesis has been tested for the current recession is by disaggregating the Beveridge Curve by duration, so that there is a separate BC for the short-term and long-term unemployed. If sectoral factors are salient, then the BC should shift outward for both the long-term and short-term unemployed. However, if hysteresis is the primary driver of this mismatch, then the Beveridge Curve should not shift outward for the short-term unemployed, while it should shift outward for the long-term unemployed. This test has been performed for the most recent recovery in Ghayad (2013a). The aggregate Beveridge Curve shifted out, as shown in Figure 1. However, the Beveridge Curve for the short-term unemployed show no change in the wake of the 2007-2009 recession, while the BC for the long-term unemployed shifts out decisively, as shown in Figure 2.

This paper will address this debate by combining monthly data on unemployment rates, unemployment duration, and job openings to address this issue. A Beveridge Curve is constructed monthly and annually for the period 1930-1953 which, to the best of my knowledge, has never been done in previous work. The position of the BC is quantified to separate movements along the curve from movement of the curve. I show that, during the 1930s, the Beveridge Curve shifts outwards when output is falling but hardly shifts back much during the slow recovery from the Depression. World War II rapidly makes matching more efficient, as the effectively infinite labor demand of the Second World War decisively ended the problem of long-term unemployment, overcoming the hurdles the long-term unemployed faced in rejoining labor markets. The postwar demobilization does see a brief outward shift as sectoral reallocation take some time before job vacancies in civilian sectors absorb job seekers formerly in the military or munitions production. On net, the 1950s sees a return to a similar Beveridge Curve as the 1920s, with wartime demand sufficient to reverse the labor

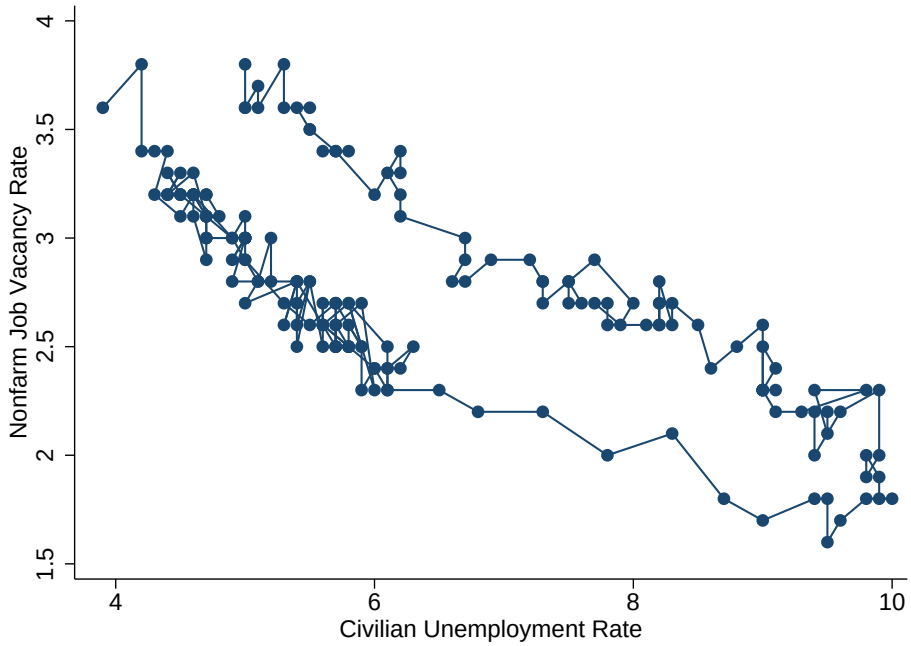
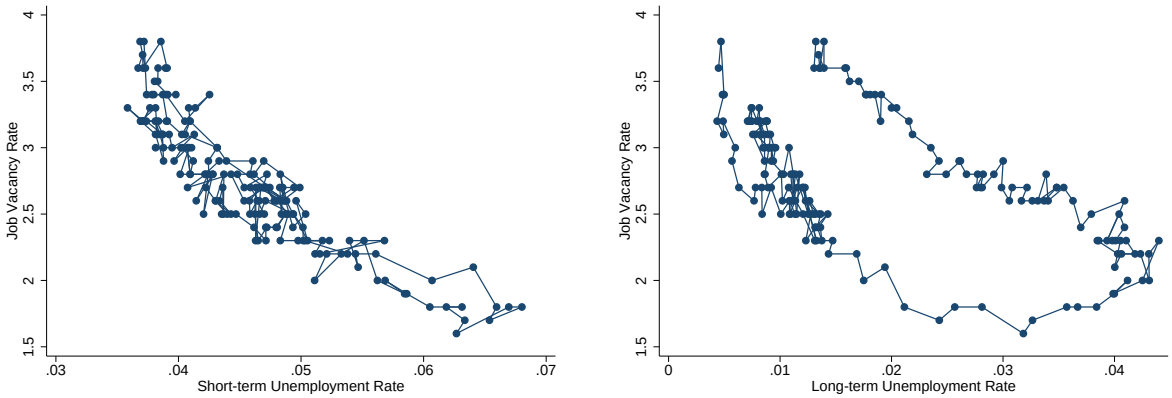


Figure 1: Beveridge Curve 2000-2015. Unemployment Rate from BLS and Nonfarm Job vacancy Rate from BLS JOLTS dataset.



(a) (b)

Figure 2: Beveridge Curve for Short-term (a) and Long-term (b) Unemployment: 2000-2015. Short-term unemployed are unemployed for 26 weeks or less, long-term unemployed are unemployed for 27 weeks or more. Source: Reproduction of chart in Ghayad (2013a), based on BLS unemployment rate and JOLTS data.

market scarring of the Great Depression.

Section 1 introduces the paper. Section 2 outlines some theories of jobless recoveries. Section 3 discusses the Beveridge Curve during the Great Depression. Section 4 discusses the implications of these Beveridge Curve shifts. Section 5 constructs Beveridge Curves by unemployment duration and Section 6 concludes.

2 Theories of Persistent Unemployment

There are several dimensions to hysteresis, whose origins can be traced to the physical sciences and, at its simplest, implies that there is path dependence, where previous values of a variable are important for determining present values of that variables (Isaac, 1994). Hysteresis has been applied to many other subjects like trade and investment.[8] Indeed, hysteresis implies that the natural rate of unemployment consistent with stable inflation (or NAIRU) will be dependent on how high unemployment was in the past.[9] High unemployment will tend to persist in the form of a higher NAIRU, as shown by Layard et al. (2005) and Daly et al. (2012). This phenomenon is also often referred to as unemployment scarring, as the damage done by high unemployment does not heal fully after the recovery (Arulampalam et al., 2001).

Blanchard and Summers (1987) discussed several possible explanations for persistently high unemployment. One is that a lack of investment would then lead to decreased labor demand, which would help explain higher unemployment. The capital stock did shrink during the 1930s due to the investment collapse during the Great Contraction and weak investment during the recovery,[10] so these factors could have played a role in the late 1930s. Another possibility is that of insider-outsider unemployment, as discussed in Lindbeck and

[8] See Baldwin (1988), Dixit (1989), Franz (1990), Dixit (1992), Feinberg (1992), and Cross (1993).
[9] See Friedman (1968); Phelps (1967, 1968); Blanchard and Katz (1997); Ball and Mankiw (2002)
[10] See Kendrick (1961, p. 320).

Snower (1988), where insiders (either the employed or members of labor unions) push for high wages. This benefits insiders who don't see wage cuts but harms the unemployed outsiders, who would prefer employment at lower wages to unemployment.[11] Given that wages were somewhat slow to fall in the Great Depression especially in 1929-1931, and wages rose during the recovery of 1933-1937 despite double-digit unemployment (Bordo et al., 2000; Cole and Ohanian, 1999), this argument seems *prima facie* plausible, though it would clearly interact with unemployment scarring in keeping the unemployed out of work for longer periods.

Another factor underlying persistent long-term unemployment is unobserved heterogeneity, as in Ahn and Hamilton (2014) and Jarosch and Pilossoph (2015), where poor quality workers or workers with poor skills are more likely to be unemployed for longer periods of time as their longer duration of unemployment in response to a negative aggregate labor demand shocks is a direct result of their poor quality. An alternative theory might be that similar workers have some randomness in how long they are unemployed, but that the long-term unemployed face a stigma with employers that prevents them from finding new work easily, so they remain unemployed (Eriksson and Rooth, 2014). There have been several attempts to distinguish between unobserved heterogeneity and duration dependence (Heckman, 1991; Jackman and Layard, 1991; Van den Berg and Van Ours, 1996; Machin and Manning, 1999).[12]

Within duration dependence, there are several reasons that this phenomenon might present itself. As longer unemployment spells tend to occur because employers have not chosen to an employee several times, there can be a stigma effect where the long-term un-

[11] Labor unions lobbied the Roosevelt administration to block job retraining programs for those hired on emergency job programs like the WPA as there were already too few jobs for skilled union workers (Jensen, 1989, p. 577).

[12] I do not stress the term structural unemployment as the many long-term unemployed are in some sense structurally unemployed, as there are reasons other than deficient demand impeding their employment. However, with sufficient labor demand for a substantial period of times they will be hired by employers, so they represent an intermediate case. As argued in Standing (1983), discussions of structural unemployment in this context are often muddled and unclear.

employed are seen as lower quality workers, which is formalized in Doppelt (2014). Layard et al. (2005, p. 258-266) discusses several reasons why employers might discriminate against the long-term unemployed, such as demotivation and demoralization among the unemployed (for which they find extensive support in the literature), which gives employers' discrimination against the long-term unemployed some justification. They also examine the behavior of exit rates from unemployment, which tend to be lower among the long-term unemployed especially after periods of high overall unemployment, which is consistent with duration dependence, and not based on heterogeneity between various groups of workers (that the long-term unemployed differ systematically from the short-term unemployed). Duration dependence can also be due to the human capital of the long-term unemployed degrading as the unemployed are not able to practice their skills.[13] The long-term unemployed may also exert less effort in searching (Elsby et al., 2011; Faberman and Kudlyak, 2014).

While many workers who experience involuntary unemployment during prosperous periods are selected (negatively) based on their quality, a larger share of workers experience involuntary job separations due to weak demand during recessions, which should reduce the quality signal from duration during downturns as shown in Gibbons and Katz (1991), Biewen and Steffes (2010), and Nakamura (2008). During the Great Depression, this effect was undoubtedly important. However, given the large numbers of both short-term and long-term unemployed, employers could easily fill positions from the rank of the recently unemployed or already employed and thus even a mild stigma could still greatly lengthen unemployment duration.[14] The long-term unemployed, once a vanishingly small part of the workforce, became a plurality of the unemployed during the Depression. However, Woytinsky discusses an additional effect which would increase stigma during a deep recession, which relates to

[13]See Pissarides (1992) and Acemoglu (1995).

[14]This effect can be seen in the ranking model of Blanchard and Diamond (1994). A model of stigma for the long-term unemployed is presented in Vishwanath (1989), which predicts lower exit rates from unemployment for the long-term unemployed.

the changing composition of job separations (Woytinsky, 1942, p. 55). While during normal times a large fraction of the flows to unemployment result from voluntary separations (such as quits), during a deep downturn like the Great Depression the quit rate falls due to poor employment prospects for the unemployed at the same time as involuntary separations for economic reasons (like layoffs) increase. As generally quitting workers are seeking better employment prospects, they tend to be high quality workers, so the reduction in the quit rate tends to reduce the average quality of the pool of unemployed.

As the long-term unemployed were not seriously considered as potential employees, they did not represents labor market slack in the same way as the short-term employed are. Layard et al. (2005) find that the long-term unemployed have less of a downward effect on prices and tend to keep the unemployment rate high: "In other words, the long-term unemployed are much less effective inflation-fighters, since they are not part of the effective labour supply." (Layard et al., 2005, p. 39) This result can also be found in Ball et al. (1999, p. 232).

Farber (2011) find that those unemployed during the 2007-2009 period had low probabilities of reemployment and difficulty finding full-time employment. Kroft et al. (2013) and Eriksson and Rooth (2014) found similar results using similar experimental methods. Experimental evidence from Oberholzer-Gee (2008) shows that fake resumes that are identical except for duration of unemployment result in significantly fewer callbacks. Similarly, Ghayad (2013b) sent out fake job applications that varied based on duration of unemployment and the possession of skills relevant for job postings, and found that unemployment duration was a much more important determinant than the relevance of skills.

3 Beveridge Curve

The Beveridge Curve (Dow and Dicks-Mireaux, 1958; Blanchard and Diamond, 1990), which relates changes in job openings to unemployment, is the most useful way to examine labor

market issues of this type as it allows for business cycle conditions to be separated from other factors that affect the labor market. The relationship between job openings and the unemployment over the business cycle is fairly intuitive. During a business cycle downturn, unemployment is high while employers offer relatively few job openings. Near a business cycle peak, unemployment is low and employers offer many job openings to increase production. This describes a single Beveridge Curve over the business cycle.

It is possible, as well, to observe shifts in the Beveridge Curve. An outward shift of the BC, which corresponds with a worsening of job matching, will mean both more job openings and a higher unemployment rate as unemployed workers are matched to job vacancies at a slower rate at any of the business cycle. Similarly, a shift toward the origin of the Beveridge Curve will correspond to the unemployed being matched to jobs at an increasing rate. I use a standard Beveridge Curve formulation of a Cobb-Douglas function with the unemployment rate and job vacancies as arguments following Pissarides (2000).[15]

3.1 Beveridge Curve Data

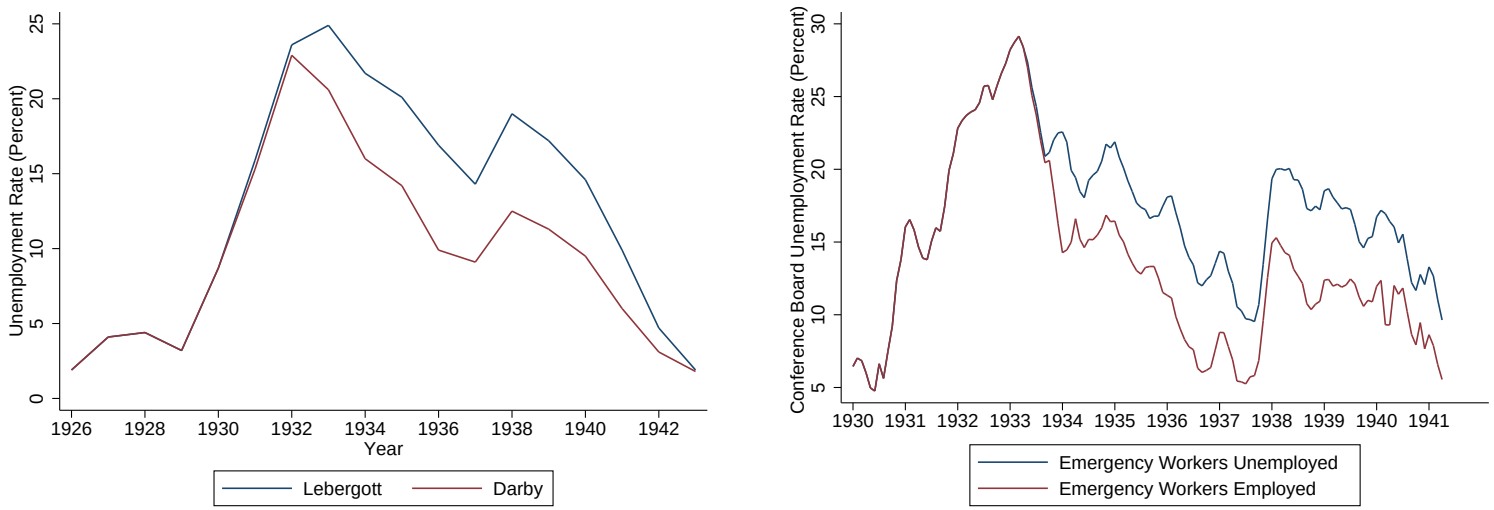
To construct a BC requires figures for the job vacancy rate and the unemployment rate. The job opening data are drawn from the work of Zagorsky (1998), who constructs a job vacancy rate from 1923-1944 using a help-wanted index from the Metropolitan Life Insurance Company. Zagorsky carefully accounts for geographic representation, controls for changes in the number of newspaper pages, and benchmarks his help-wanted index to other job openings measures from the BLS to ensure their accuracy. These vacancy figures are available back to 1923 at a monthly frequency. While currently the Lebergott/Census figures are available at an annual frequency for 1929-1940, similar methods as used by Lebergott can be used to construct monthly series based on employment and labor force data collected by

[15] If there were data on hiring rates for the period and if the assumption of a stable unemployment rate was satisfied, then a matching efficiency term could be derived, which would define an isoquant

governmental agencies.

While I examined several series, the series from the National Industrial Conference Board conformed most closely to the annual estimates of Lebergott. These estimates were published in National Industrial Conference Board (1940) and other issues of the Conference Board's *Economic Record* publication. All estimates follow roughly the same procedure. Non-agricultural employment figures are available from the BLS at a monthly frequency back to 1929. Agricultural employment is available from the Department of Agriculture monthly, and the sum of these two series makes up total employment. The labor force is derived from interpolated estimates of decennial censuses. Unemployment is then the difference between employment and the labor force and the unemployment rate is the ratio of unemployment to the labor force.[16]

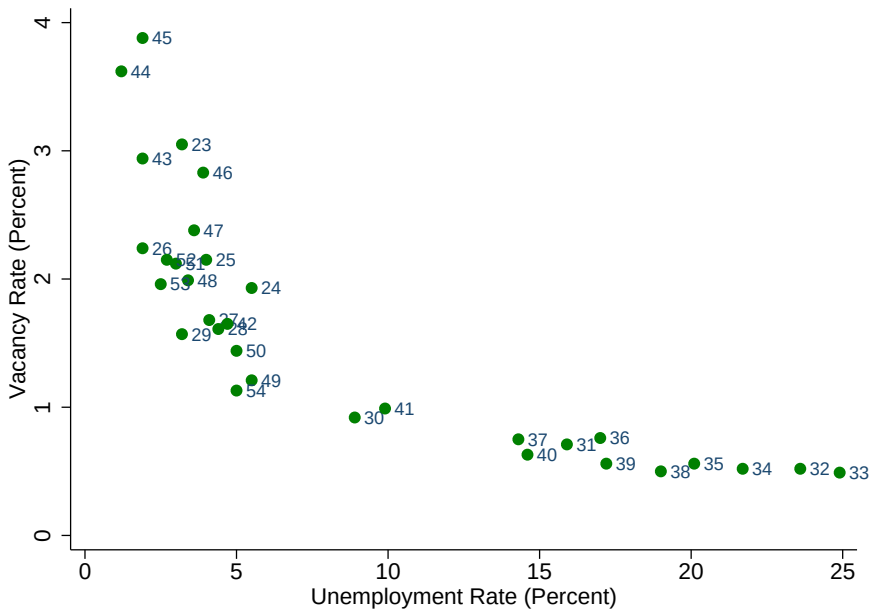
[16]Note that there are no discouraged workers here, and any non-employed "gainful" worker counts as unemployed even if they are not seeking employment actively.



(a) (b)

Figure 3: Great Depression unemployment rate, with (blue) and without (red) Emergency Workers on New Deal employment programs included among the unemployed. Note: Lebergott counts WPA workers as unemployed in his unemployment rate, while Darby counts WPA workers as employed in his unemployment rate. Monthly data from Conference Board counts emergency workers as unemployed, author's calculations for series with emergency workers as employed. Source: Lebergott (1964), Darby (1975), National Industrial Conference Board, *Economic Record*, June 1940 and subsequent issues.

Figure 4: Unemployment Rate and Vacancy Rate: 1923-1954



Notes: Vacancy Rate from Zagorsky (1998) and Unemployment Rate from Lebergott (1957).

The Conference Board figures can be used to calculate two estimates of unemployment. One includes emergency workers hired by New Deal Agencies like the New Deal as unemployed workers, consistent with the method of Lebergott (1964), and another which counts these emergency workers as employed, consistent with the method of Darby (1975). These annual unemployment rates can be seen in Figure 3, and the monthly series are displayed immediately to their right. 1940 sees the beginning of the Current Population Survey (CPS), which was initially under the control of the Work Projects Administration (WPA) but was soon transferred to BLS administration.[17] While the definitions of unemployment, employment, and the labor force are not identical to those of the current BLS definition post-1948, the two series conform closely for the months in 1948 when they overlap. Official unemployment rate data begin in 1948 and are used to examine the condition of the labor market in

[17]To complicate things further, the Census Bureau does the physical work of conducting the survey.

the immediate postwar for comparison.

Woytinsky (1940) is the first to propose the "added-worker" effect. This effect arises when a male head-of-household becomes unemployed and other members of his household will enter the labor force and search for employment to replace his lost income. Woytinsky compared labor force participation for families of differing sizes in Philadelphia, and found that larger families had larger labor supply, with unemployed male breadwinners sending their wives and children to work to replace their income. As this makes the interpolated labor force estimates lower-bounds, this would, if anything make actual unemployment *larger* than the above estimates as unemployment is the difference between employment and the labor force. This also implies that the outward shift of the Beveridge Curve is more pronounced than described above if unemployment is higher than estimated, and makes these findings likely underestimates.

The annual Beveridge Curve for 1923-1954 is plotted in Figure 4. The unemployment rate/vacancy rate pairs for the 1920s, 1940s, and 1950s fall in the upper right of the graph, while those for the 1920s fall in the lower right. However, at this point we cannot tell whether the 1930s were a movement along a stable curve, or whether the BC shifted outward as output declined, in keeping with the hysteresis hypothesis. The method to distinguish these changes are developed in the next section.

3.2 Quantifying Beveridge Curve Shifts

A Beveridge Curve is defined by the plotting of data points for the job vacancy rate and unemployment over a business cycle, as described above. As this relationship is convex to the origin, a common functional form for the Beveridge Curve is of the Cobb-Douglass form in the unemployment rate and the vacancy rate, which finds support in Petrongolo and Pissarides (2001). By specifying a functional form, changes in observed unemployment-vacancy dyads can be separated into movement along a given Beveridge Curve and shifts of

the Curve itself. The Beveridge Curve is defined as a Cobb-Douglass functional form over the unemployment rate u_t, the job vacancy rate v_t, and a variable b_t which represents the position of the Beveridge Curve isoquant, or

$$b_t = u_t^{\alpha} v_t^{1-\alpha}. \tag{1}$$

3.3 Calibration

I calibrate these coefficients in two stages. First I estimate the coefficients for the Beveridge Curve using postwar data. Data on unemployment are drawn from the BLS. Data on vacancies are drawn from Zagorsky (1998). For simplicity, I will use the Cobb-Douglas form of Equation 1 above. As labor markets do not show scale effects, it is a reasonable assumption that Beveridge Curve relationships would not vary with scale and thus the coefficients on unemployment and vacancies would sum to one. As B is simply a constant that represents the position of the Beveridge Curve, this is assumed to be a time-invariant, which implies that there is a single Beveridge Curve. Next I take logarithms and changes, which results in the following expression,

$$0 = \alpha \Delta ln(u_t) + (1-\alpha)\Delta ln(v_t), \tag{2}$$

which can be rewritten as

$$\frac{\Delta ln(v_t)}{\Delta ln(u_t)} = \frac{\alpha_t}{1-\alpha} \tag{3}$$

Letting ψ_t represent the ratio on the left-hand side, we obtain the following

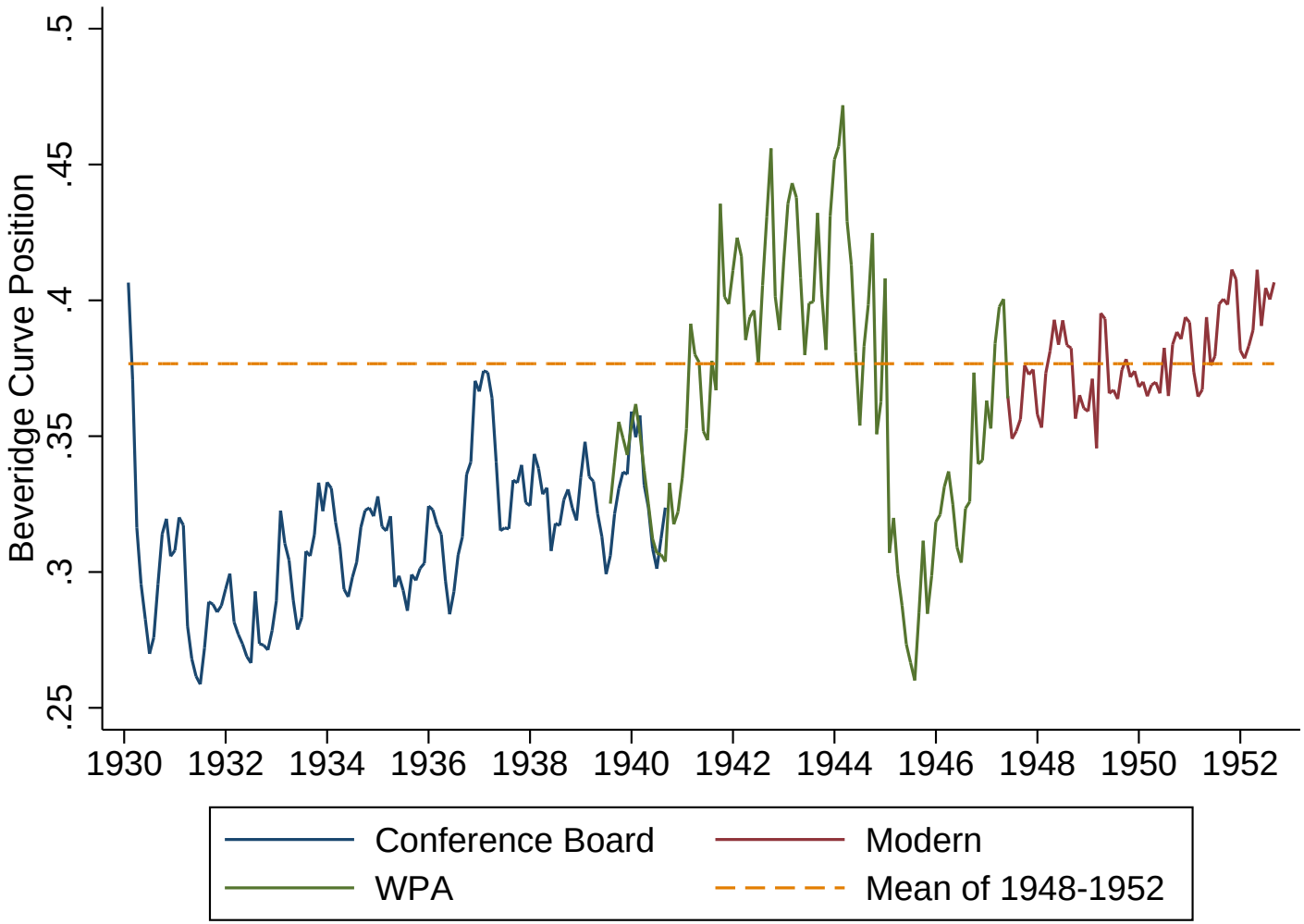
$$\alpha_t = \frac{\psi_t}{\psi_t - 1} \tag{4}$$

Using a difference of 12-months yields n estimate of α of 0.5016561, and for a 24 month difference I obtain .5185415. As these are very close to the 0.5 generally used in the literature, I will use coefficients of 0.5 and 0.5 on the unemployment rate and the vacancy rate.

4 Results

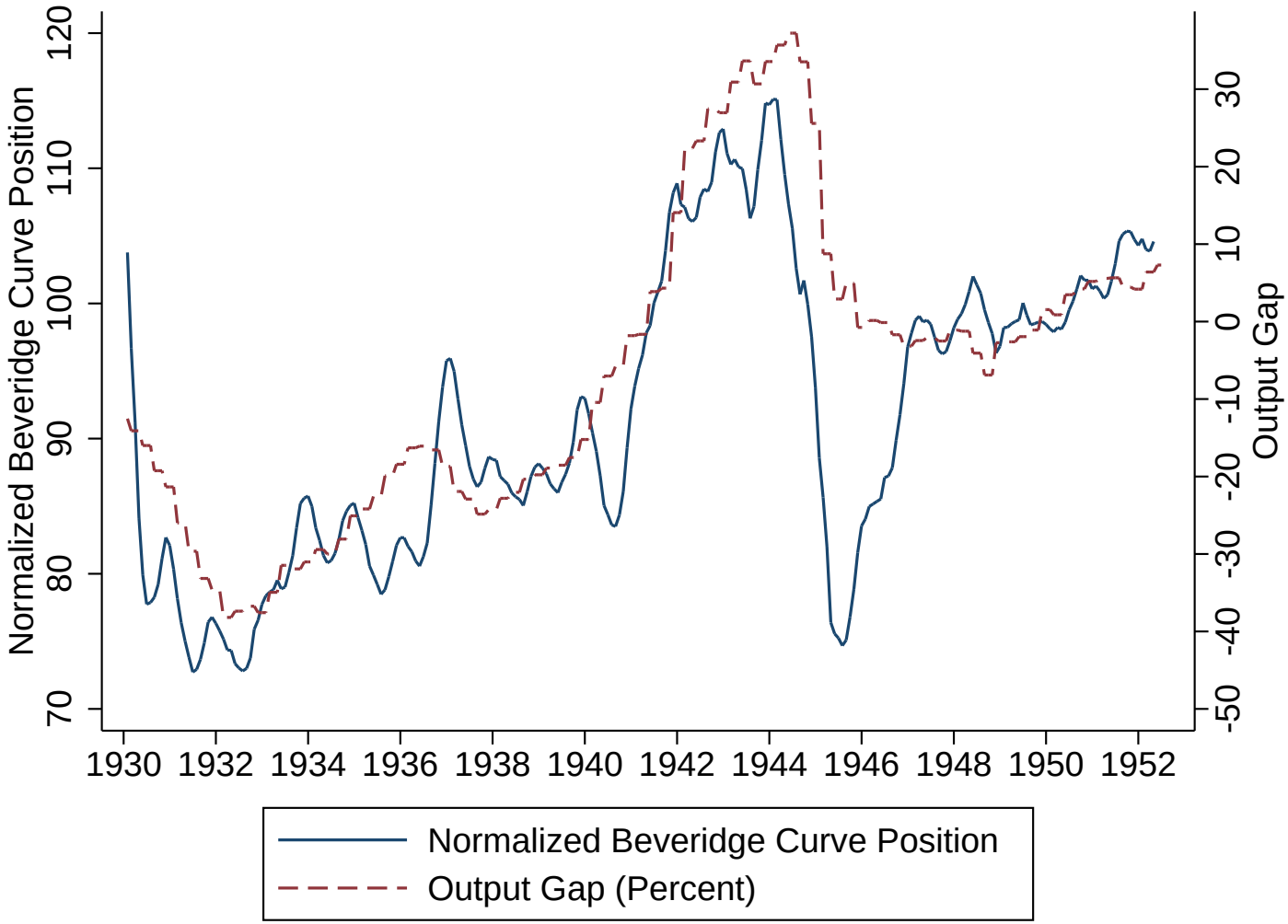
I compare the behavior of these Beveridge Curve's Position over the business cycle and compare the data to the predictions of the structural and hysteretic theories. This is a test in the spirit of the framework used in Gordon (1988) which examines these two types of theories ("structuralist" versus "hysteresis") for the European unemployment experience of the 1980s. The hysteresis hypothesis would predict that matching efficiency should worsen during a downturn as long-term unemployment rise. Matching efficiency should also improve if the economy recovers as the long-term unemployed will then transition into employment. Structural mismatch theories do not predict any relation between matching efficiency and the business cycle, unless business cycle changes in matching efficiency coincide with structural changes. Once we control for the movements of the business cycle, we can see clearly the massive outward BC shift in Figure 5 which occurs during the 1929-1933 collapse in output. Recovery begins in 1933, but it is not strong enough to reemploy the long-term unemployed quickly and unemployment stays high.

Figure 5: Beveridge Curve Position: 1929-1953



Note: Author's calculations of Beveridge Curve isoquant using a Cobb-Douglass functional form of the unemployment rate and the vacancy rate and exponents of $\frac{1}{2}$. Blue Line uses monthly unemployment rate from Conference Board for 1930-1940, Green line uses WPA unemployment estimates for 1940-1947, red line uses official BLS figures starting in 1948. Zagorsky (1998) figures used for vacancy rate in all periods. Dotted line is mean estimated Beveridge Curve Position for 1948-1952 for comparison.

Figure 6: Smoothed Beveridge Curve Position: 1929-1953



Note: Author's calculations of Beveridge Curve isoquant using a Cobb-Douglass functional form of the unemployment rate and the vacancy rate. Estimated Beveridge Curve Position is smoothed with a 7-month moving average. Output gap is percent difference between actual and potential GDP from Gordon and Krenn (2010).

The evolution of the position of the Beveridge Curve shows clear evidence for the hysteresis theory and is not supportive of a structural. The Beveridge Curve Position shifts outward during the 1929-1933 Great Collapse, shifts inward slightly somewhat during the 1933-1941 recovery period[18], and shifts back inward massively during the wartime boom. Only the start of American mobilization for the Second World War and the massive labor demand it engendered shifted the Beveridge Curve inward. As anyone, even minorities, women, and the long-term unemployed could find employment during the war, the scars on the labor market were able to be healed on the domestic front.[19]

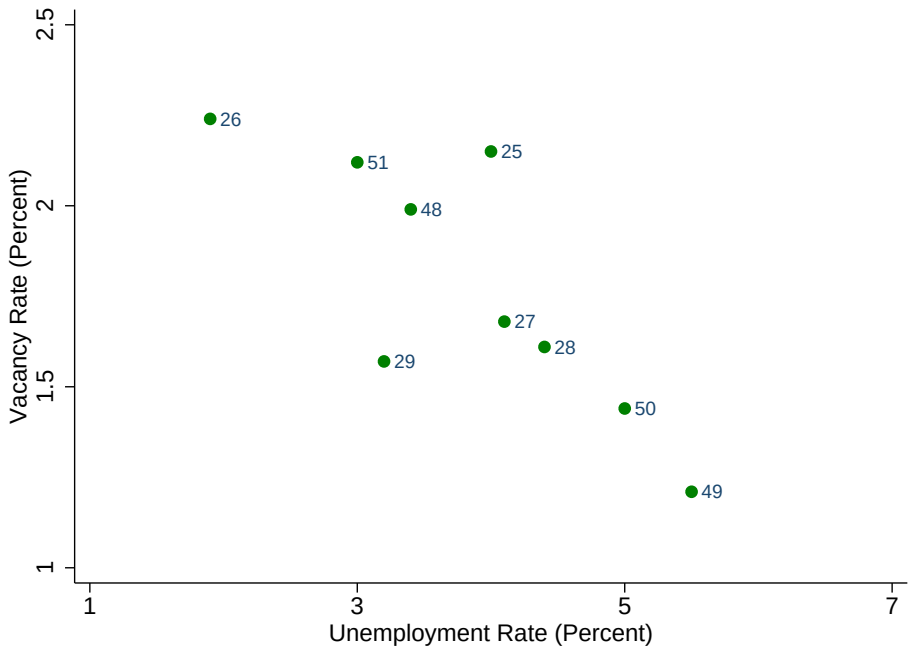
That an increase in demand can reverse hysteresis is also consistent with evidence presented in Ball et al. (1999), where persistent increases in demand can undo the effects of hysteresis. This is consistent with the evidence in Diamond and Şahin (2014), who find that the Beveridge Curve shifts out after recessions and shifts in during recoveries in the postwar.[20] While these authors could find this effect even among the relatively small changes in demand during the postwar, the demand increase during the Second World War is an order of magnitude larger than any change seen in postwar data, and thus the effect can be even more clearly identified during the 1940s. While the Beveridge Curve had shifted inward somewhat during the recovery, the war completed this shift and returned the Beveridge Curve to a position of normalcy after the war. Eriksson and Rooth (2014) find that the of a long unemployment spell stigma is persistent, but that subsequent employment can eliminate the stigma effect, consistent with the cleansing effect on the labor market of wartime

[18] 1937-1938 was a sharp but brief recessionary period which does not seem to have lasted long enough to have had a significant hysteretic effect.

[19] The shift in priorities from creating more employment to deal with a surplus a unemployed workers, which was the problem of the 1930s, to the priority of creating more war material given a rapidly diminishing pool of surplus or unemployed workers in the early 1940s, makes for a stark contrast. The possibilities for increasing war production using the unemployed and any available worker is discussed extensively in the reports of the Office of War Mobilization and Reconversion.

[20] Diamond and Şahin (2014) argue that this means that shifts in the Beveridge Curve are not very informative about structural changes in the economy in terms of a natural rate of unemployment, but these regular shifts related to the business cycle can be adequately explained by a hysteresis-based explanation such as the one presented in this paper.

Figure 7: Beveridge Curve for 1920s and post-war



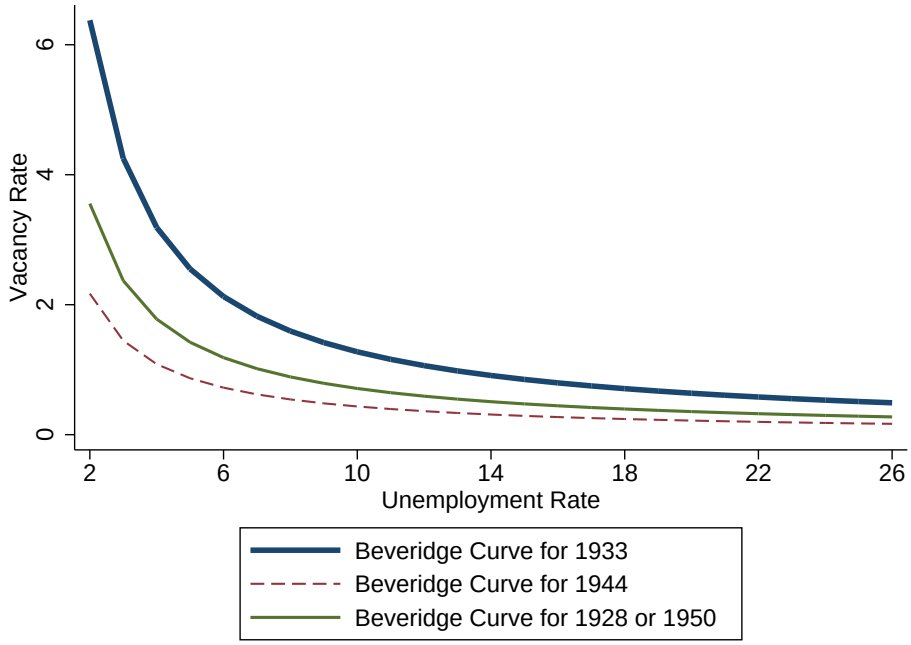
Note: Vacancy rate from Zagorsky (1998) and unemployment rate from Lebergott (1957). Years listed are 1924-1929 and 1948-1951.

demand.

Figure 6 shows a moving average of the BCP so that high frequency fluctuation are smoothed out.[21] This moving average is plotted with estimates of the output gap, which shows a close connection between changes in output relative to trend and matching efficiency with the exception of the immediate postwar. This divergence can be attributed to structural factors, as mismatch increases while output is also high. After the war, demobilization was quick and relatively painless, but former soldiers had to return to their jobs, married women returned to their households, and workers in munitions production had to shift to jobs in

[21]The choice of using a was dictated to smooth out noise while minimizing the distortion of the underlying series. This method is preferred to seasonal adjustment due to issue related to seasonal adjustment as discussed in Wright (2013). A 7-month moving average, symmetric with three months on either side of the center month, was chosen visually to smooth seasonal variation without eliminating trends.

Figure 8: Sample Beveridge Curves for 1928, 1933, 1944, and 1950

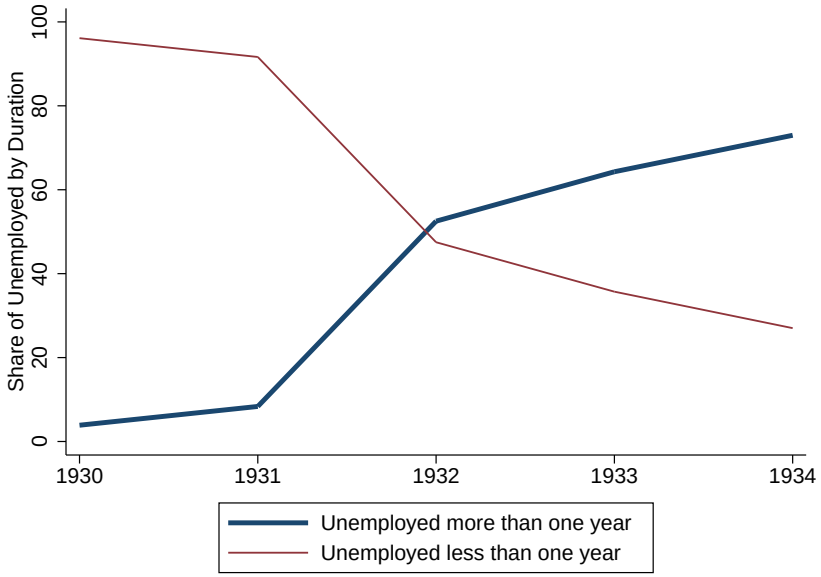


Note: Beveridge Curve position calculated as a function of the unemployment rate and the vacancy rate using $(u_t v_t)^{-1/2}$. Numerically the isoquant for 1933 corresponds to 0.28, that of 1944 corresponds to 0.48, and the isoquants for both 1928 and 1950 are roughly 0.375. Job Vacancy Rates are from Zagorsky (1998) and Unemployment Rates are from National Industrial Conference Board, *Economic Record*, June 1940 and subsequent issues.

other sectors. Examining the behavior of the BCP in relation to the output gap gives results that confirm both intuition and the historical record.

By the early 1950s the American economy returned to normalcy and the Beveridge Curve had returned to its position during the 1920s, which can be seen in Figure 7. The war, despite its great cost and the sacrifice involved, had cleared out the lingering problems in the American labor market resulting from the Great Depression and allowed a fresh start after the war. While I cannot rule out the structural hypothesis decisively, it seem unlikely that structural problems would only present themselves coincidentally during a period of low demand. Furthermore, it seems implausible that the command-and-control economy of the 1940s would have been effective at eliminating severe structural misallocation, especially

Figure 9: National Duration Estimates 1930-1934



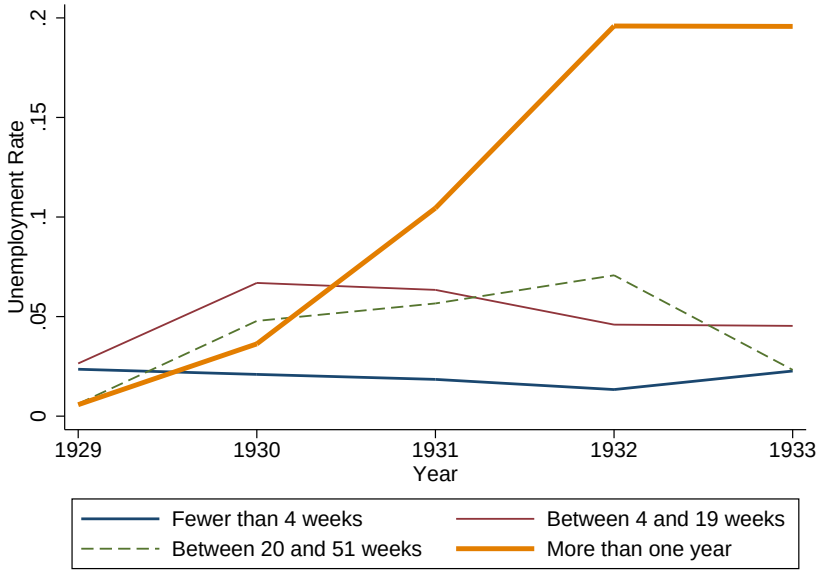
Note: Estimates are from Social Security Administration (Winslow, 1938) based on employees covered by unemployment insurance.

considering the large sectoral shifts required to move away from civilian market-based production to centrally planned military production. Figure 8 shows sample Beveridge Curves given the BCP for the representative years of 1928,1933,1944, and 1950. Once movements along the curve are separated from movements along the curve, we can see that the BC shifts outward from 1928 through 1933, then shifts inward through 1944, before shifting outward slightly so that the Beveridge Curve returns to its original position by 1950.

5 Evidence on Duration

The Social Security Administration collected several estimates of unemployment duration from unemployment insurance records (Winslow, 1938), which are displayed in Figure 9. The share of the long-term unemployed rises steadily even after recovery is underway starting in 1933. An additional source for evidence on the inability of the long-term to exit joblessness

Figure 10: Duration Estimates for Buffalo 1929-1933



Note: Unemployment rate calculated by dividing difference between gainful workers and employed works by number of gainful workers. 1930 Census does not have a labor force concept yet, so gainful workers is used instead, which includes the modern concept of the labor force as well as discouraged workers. Source: Woytinsky (1942)

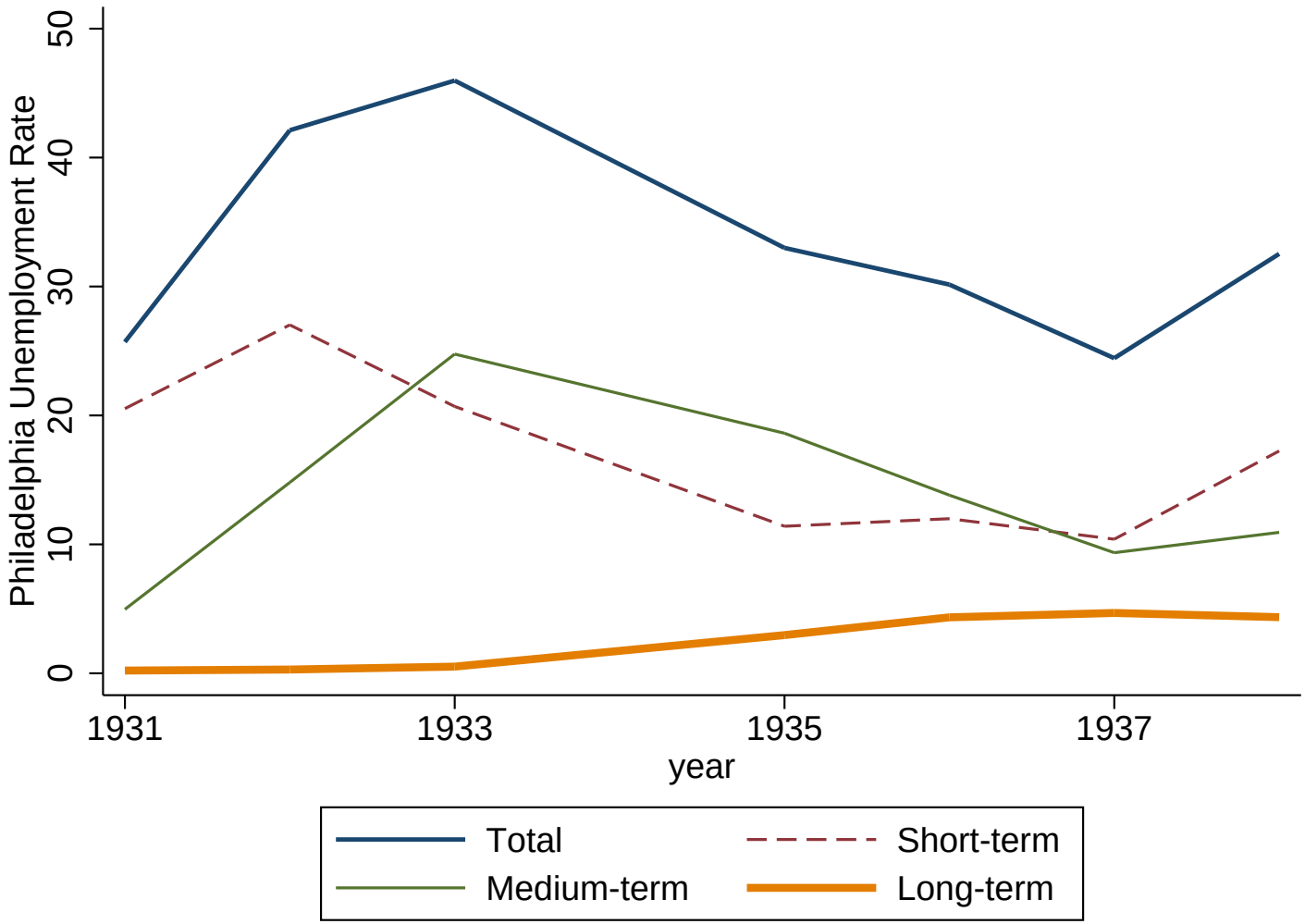
is from several city-level studies published in a series of WPA reports which are reproduced in Woytinsky (1942). The first series chronologically is from Buffalo, where the unemployed were surveyed by year from 1929-1933. This period coincides with the NBER recession dates during the downturn phase of the Depression, and can be seen in Figure 10. The short-term unemployment rate remains low as overall unemployment rose, which meant that those unemployed for more than one year quickly became the vast majority of the unemployed and about 20% of all gainful workers were unemployed. The longest series on duration comes from Philadelphia (Palmer, 1937) where the unemployed were surveyed from 1932-1938 with the exception of 1934. The evidence on duration can be seen in Figure 11, with long-term unemployment staying very high even after unemployment began falling in 1933.

To confirm the importance of long-term unemployment as a driver of the hysteresis effect, a separate BC is constructed for unemployment by duration. If hysteresis is largely

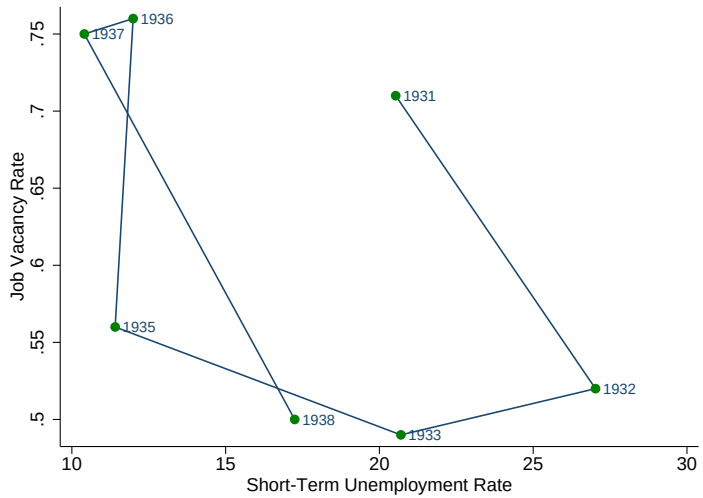
driven by long-term unemployment, then the Beveridge Curve should shift out for long-term unemployed while no shift should be apparent for short-term unemployment. On the other hand, if structural factors are dominant, mismatch should increase for workers across all durations. The evidence regarding shifts in the Beveridge Curve of Ghayad (2013a) for the 2000s is reproduced in Figure 2. The BC for the short-term unemployed is unchanged, while the outward shifts of the Beveridge Curve can be clearly seen uniquely among the long-term unemployed, showing the importance of long-term unemployment in explaining these shifts.

Similar evidence is presented for the Depression using data from Philadelphia, where the WPA commissioned a report on labor market conditions in that city which provided evidence on unemployment by duration for the later 1930s (Palmer, 1937). While a local vacancy rate series is not available, national vacancies are used instead. The Beveridge Curve for the long-term unemployed in Philadelphia shifts outward while the Beveridge Curve for the short-term unemployed actually shifts *inward* during this period as can be seen in Figure 12. The importance of a reduction in matching efficiency among the long-term unemployed is confirmed for the Great Depression, which provides further support for the importance of hysteresis in unemployment and again provides little evidence in support of structural mismatch.

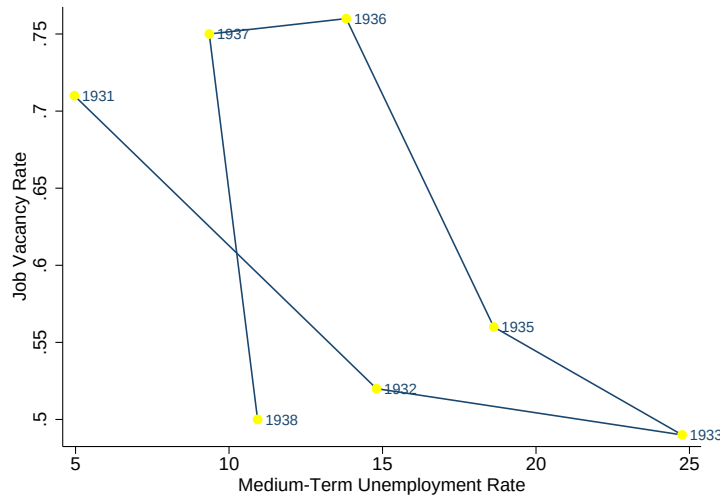
Figure 11: Philadelphia Unemployment Rate by Duration for the 1930s



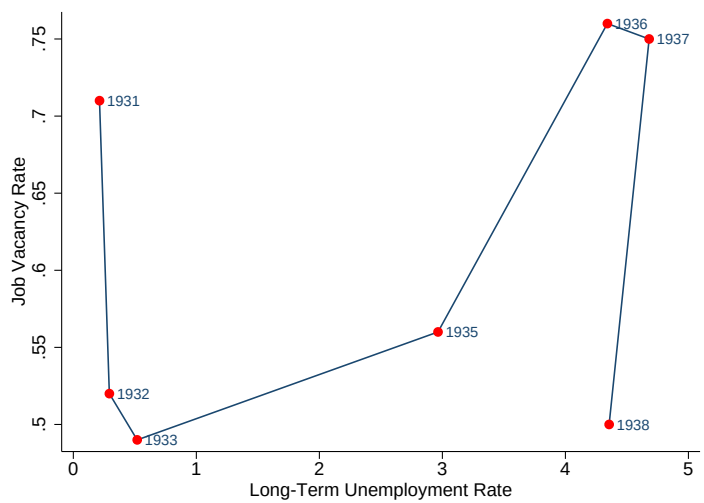
Note: Short-term unemployed are unemployed for less than one year, medium-term unemployed are unemployed between one and five years, and long-term unemployed are unemployed for more than five years. Unemployment rate calculated by dividing difference between gainful workers and employed works by number of gainful workers. The 1930 Census did not have a labor force concept, so gainful workers were used instead, which is effectively the sum of the modern concept of the labor force and discouraged workers. Source: Woytinsky (1942).



(a)



(b)



(c)

Figure 12: Note: Short-Term Unemployed are unemployed for one year or less. Medium-Term Unemployed are unemployed for between one year and five years. Long-Term Unemployed are unemployed for five years or more. Source: Woytinsky (1942). .

Table 1: "Estimated Chance of Being Hired During a 12-month Period After the Specified Duration of Unemployment" (1930s Philadelphia)

Duration of unemployment	1932	1933	1934	1935	1936	1937	1938
Male							
Under 1 year	0.41	0.39	0.48	0.48	0.54	0.70	0.40
1 but less than 2 years	0.22	0.23	0.46	0.46	0.42	0.50	0.13
2 but less than 3 years	0	0.28	0.44	0.46	0.42	0.46	0.12
3 but less than 4 years	0	0	0.20	0.25	0.43	0.41	0.23
4 years and over	0	0	0	0	0	0	0.26
Female							
Under 1 year	0.61	0.66	0.60	0.60	0.62	0.74	0.48
1 but less than 2 years	0.40	0.40	0.50	0.50	0.51	0.57	0.12
2 but less than 3 years	0	0.38	0.50	0.50	0.51	0.50	0.16
3 but less than 4 years	0	0	0.10	0.25	0.32	0.42	0.17
4 years and over	0	0	0	0	0.50	0.40	0.24

Note: Table reproduced from (Woytinsky, 1942, p. 103). Zeroes, especially for longer durations, my be the result of insufficient data and not a precisely measured zero. 1934 and 1935 values interpolated due to a missing year (1934). Columns refer to the 12-month period ending in May.

While these Philadelphia unemployment data do not track individuals and instead sample the unemployed in various years, the data on duration is broken down by number of years unemployed over the years 1932-1938 with the exception of 1934 which is missing. This allowed Woytinsky to calculate the transition probabilities of unemployed workers out of unemployment into employment by duration. As an example, to have been unemployed for between 2 and 3 years in 1937 implies that one was unemployed for between 1 and 2 years in the previous year, 1936, which implies that one was unemployed for less than 1 year in 1935. The probability of the unemployed exiting to employment is lower as unemployment duration increases (Woytinsky, 1942, p. 103), as shown in Table 1, which would generate a shift outward of the Beveridge Curve. This is clear evidence of duration dependence, which holds true even during recovery periods after 1933. For the Great Depression, the evidence supports a strong relationship between the unemployment rate and unemployment duration,

which was also the case in the postwar (Dynarski and Sheffrin, 1990), and is again consistent with hysteretic theories of Depression labor markets.

6 Conclusion

This paper has presented a Beveridge Curve, at both a monthly and annual frequency, for the 1920s through the 1950s. This relationship between the unemployment rate and the vacancy rate was used to separate changes in unemployment/vacancy dyads into movements along a curve and movements of the curve. This was crucial, as the Beveridge Curve was shifting out at the same time as output was falling and unemployment was rising from 1929-1933, in line with a hysteresis-based explanation of these shifts. While the Beveridge Curve did not continue to shift outward,it only slowly shifted inward during the 1933-1941 period when output was recovering[22], which is again consistent with a long-term unemployment problem developing during this period. While emergency programs and other relief efforts blunted some of the effects of the Depression, especially for the long-term unemployed, participation in these programs worsened discrimination against the long-term unemployed. Duration data for this period show that long-term unemployment grew as a share of the unemployed, as mainly the short-term unemployed transitioned back to employment during the recovery. Consistent with this, the Beveridge curve for the long-term unemployed shifted outward, the BC for the medium-term unemployed stayed roughly constant, and the Beveridge Curve for the short-term unemployed actually shifted inward during the late 1930s, consistent again with a hysteretic effect where the long-term unemployed had trouble matching to jobs while the short-term unemployed did not face the same discrimination.

The Great Depression was followed immediately by the Second World War, perhaps not coincidentally. However, this did make the long-term unemployment problem of the 30s

[22]With the exception of the sharp but brief 1937-1938 recession

relatively short-lived. The solution to long-term unemployment was the effectively unlimited labor demand of the wartime era with the goal to produce at all costs. As a result, the Beveridge Curve shifted inward as all workers were quickly and efficiently matched to new jobs. The postwar demobilization period demonstrates that all shifts in the Beveridge Curve are not always due to the hysteretic effect of mismatch stemming from long-term unemployment. Structural mismatch characterizes this period through 1948 as sectors related to the military and munitions production shrank as solders returned from war and workers transitioned back to the civilian sector.

While these enormous shifts took place relatively quicky and costlessly, a higher vacancy rate coexisted with a higher unemployment for a time while this sectoral transition took place, shifting out the Beveridge Curve. By about 1948 however, this process was complete and the Beveridge Curve of the 1950s strongly resembled the Beveridge Curve of the 1920s. While hysteresis can cause high unemployment to persist, it can be reversed given sufficient labor demand to overcome the stigma of long-term unemployment. The discrimination against the long-term unemployed of this period, especially strong among the emergency unemployed who traded destitution for stigma, has not been repeated in American history, even after the most recent recession. However, the unemployment of the 1930s left a scar that would have lasted until the 1940s had not the silver lining of truly full employment appeared in wartime.

Future research will examine the importance of long-term unemployment and their difficulties returning to gainful employment in generating hysteresis in unemployment. The 1940 Census contained detailed information about unemployment duration and employment in emergency employment programs like the WPA and CWA. Using the recently released 100% sample from the 1940 Census and matching workers with the 1930 and 1920 Censuses will allow the long-term unemployed to be tracked, which will allow for a deeper understanding of the determinants of long-term unemployment in this period. Were the long-term

unemployed more likely to be out of work in the past? Did they differ based on demographic characteristics like race and education? Did the long-term unemployment experience differ geographically? This future study will allow for a richer understanding of long-term unemployed in the Depression, with lessons for dealing with the problem of long-term unemployment now and in the future.

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