DID U.S. WAGES BECOME STICKIER BETWEEN THE WORLD WARS?

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ABSTRACT: Historical studies of the cyclical behavior of U.S. wages tend to compare pre-WWI data with post-WWII data. Yet many scholars allege that wages became decidedly stickier at some point between the wars, such as in the immediate aftermath of the Crash of 1929 or with the First New Deal in 1933. This paper attempts to determine whether wages did in fact become stickier at any of several junctures during that period. Results of modified Phillips curve regressions, in which the monthly change in nominal hourly earnings depends on current and lagged values of real output and wholesale prices, indicate surprisingly little change in the responsiveness of wages to output fluctuations and an insignificantly tighter relationship between wages and wholesale prices after 1933. The supposedly historic wage stickiness of 1929-33 is not apparent in these regressions, though an auxiliary regression reveals a much stronger responsiveness of wholesale prices to cyclical fluctuations in the "Great Deflation" of 1920-22 than in 1929-33. If price deflation played a key mediating role between output and wages in economic downturns, then increased price stickiness after 1922 may have led to increased wage stickiness, even if the increase in not visible in the main regression results.

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"Nominal wages and prices came down by half between 1929 and 1933. Why would anyone look at a period like that and say that the difficult problem would be to explain rigid wages? I don't understand it."
-- Robert Lucas[1]

"... I am now of the opinion that the maintenance of a stable general level of money-wages is, on a balance of considerations, the most advisable policy for a closed system; whilst the same conclusion will hold good for an open system, provided that equilibrium with the rest of the world can be secured by means of fluctuating exchanges…. But the money-wage level as a whole should be maintained as stable as possible, at any rate in the short period."
-- John Maynard Keynes[2]

1. Introduction

The unusual character of wage setting between the world wars has long been noted. In his original study of wage inflation and unemployment in the United Kingdom in 1861-1957, Phillips (1958) found 1921 and 1922 to be perhaps the biggest outliers. He argued that the huge wage decreases (of about 20 percent per year) in those two years were mostly attributable to the tremendous decline in the price level, as translated into automatic cost-of-living adjustments in union contracts. But otherwise the 1920s and the early 1930s fit the original "Phillips curve," and he specifically rejected the view that "increased resistance to downward movements of wage rates" was an issue in this period (pp. 294-95). The United States was a somewhat different story, as Figure 1 indicates. While 1922 was similarly an outlier and the next decade resembled a typical nonlinear Phillips curve (steeper in the 1923-29 expansion, flatter in the 1929-32 contraction), the U.S. Phillips curve was, to paraphrase Arthur Okun, an unidentified flying object in the New Deal years of 1933-39. Samuelson & Solow (1960), in presenting a Phillips scatter diagram for the U.S., said "the years from 1933 to 1941 appear to be *sui generis*," with money wages rising despite massive unemployment, and suggested that the wage explosion owed much to the New Deal (p. 188).

More recent macrohistorical studies of the cyclical behavior of wages in the United States typically compare pre-WWI data with post-WWII data. The interwar decades of the 1920s and 1930s do

[1] Quoted in Klamer 1983, p. 46. "Came down by half" is an exaggeration, as one can see from Figures 1 and 2.

not enter into these studies, partly because of data discontinuities and partly because the post-WWI deflation of 1920-21 and the Great Depression of the 1930s are seen as anomalous. Yet many scholars allege that nominal wages became decidedly stickier at some point during those decades, such as in the immediate aftermath of the Crash of 1929 or with the First New Deal in 1933. Those breakpoints loom particularly large in view of the common belief among economists that nominal wage stickiness was the main transmission mechanism in the Great Contraction of 1929-33 and a key inhibitor of economic recovery during the New Deal years of 1933-40. Using monthly data on hourly earnings, prices, and output, we test for increased wage stickiness during the 1920s and 1930s. If wages were indeed stickier during the Depression than in the early 1920s, then the case that wage stickiness played an important role in the Depression is strengthened (see Bordo et al. 1997 and 2000). If not, wage stickiness could still have been an important propagating mechanism in the Depression, but other factors, such as the size of the initial shock or the collapse of the banking system, would seem to loom larger.

Before we continue, we should offer a clear definition of wage stickiness, a term that has a few different usages. Our focus is on nominal wage rates, which in the most literal sense are sticky if they stay the same over time, despite fluctuations in prices and output. Figure 2 indicates that average hourly earnings in manufacturing (the nearest proxy for wage rates in this period) were sticky in this sense from about 1924 to 1931, even as output was rapidly rising (1924-29) and then falling (1929-31). A more neoclassical definition of wage rigidity is a state in which unemployment exists and wages do not fall enough to clear the labor market. But that definition basically assumes its conclusion, as it implies that any increase in unemployment indicates an increase in wage rigidity. Moreover, the assertion that greater wage rigidity entails greater unemployment is not universally accepted and in fact was close to the heart of the original Keynesian-classical debate, as the next section's literature review makes clear. As an empirical matter, the role of wage stickiness in unemployment fluctuations is still unsettled, and this paper seeks to shed some light on that debate as it applies to the U.S. experience in the Great Depression. Toward that end, this paper employs the following definition: Wages are sticky when changes in

[2] Keynes 1936, p. 270.

producer prices and output (holding labor productivity constant) do not bring about changes in nominal wages that are proportional to the reduction in prices, so that real product wages increase in recessions and decrease in expansions. (An apparent, and extreme, example would be the "Roosevelt depression" of 1937-38, in which nominal hourly earnings did not budge despite a 37% drop in factory output and an 11% drop in factory wholesale prices.)

This paper's original work takes the form of modified Phillips curve regressions, in which monthly values of nominal hourly earnings depend on current and lagged values of output and wholesale prices. To test whether wages became less responsive to output or prices after a particular breakpoint, we use dummy interactive terms for the post-breakpoint observations. The extensive use of lags allows us to examine both the timing and magnitude of wage adjustments, though it makes answering our title question more complex than one might like. For example, comparing the Great Deflation of 1920-22 with the rest of the period, the results indicate that wages were significantly more responsive to output after 0-2 months, significantly less responsive after 5 months, and insignificantly different after 3-4 months or after 6-7 months. The relative responsiveness of wages to prices during that episode follows a similarly inconclusive pattern but in reverse.

2. Review of the Literature

Economists' concern with wage stickiness goes back much farther than Keynes's *General Theory* (1936); in fact, Keynes said his classical forbears had customarily blamed economic "maladjustment" on the rigidity of money-wages (p. 257). Classical economists such as Marshall, Jevons, and Pigou took nominal wage stickiness as a given (Laidler 1991). Keynes himself retained wage rigidity as a simplifying assumption for his own general theory of the economy, but stressed early on that "this simplification, with which we shall dispense later, is introduced solely to facilitate the exposition. The essential character of the argument is precisely the same whether or not money-wages, etc., are liable to change" (p. 27). Chapter 19 of *The General Theory*, "Changes in Money-Wages," argues at length that wage cuts will, in general, be unproductive and very likely counterproductive at raising the volume of employment. Yet Keynes arguably did not adequately detail an alternative mechanism by which aggregate-demand shocks could be transmitted into recessions and depressions even in the absence of rigidities (Moore 1996). Today the sticky-wage assumption is commonly seen as Keynes's main contribution to the macroeconomics of labor markets, a situation that is doubly ironic considering that the insight was neither his own nor something that he deemed a crucial element of his theory.

Prompted perhaps by both the classical view of wage stickiness as a critical impediment to full employment and the Keynesian view to the contrary, statistical studies of the behavior of wages over the business cycle go back a long way as well. Early studies by Dunlop (1938) and Tarshis (1939) found a generally procyclical pattern in real and money wages, contradicting the classical and *General Theory*-vintage Keynesian assumption of countercyclical real wages. In reply, Keynes (1939) disavowed that assumption, re-emphasized that his theory of effective demand did *not* depend on wage rigidity, and said the new findings strengthened his theory. The modern literature on the cyclicality of wages is too vast to describe adequately in this space, but a relatively recent survey, focusing on the second half of the twentieth century, concluded that real wages were systematically neither pro- nor countercyclical over all periods (Abraham & Haltiwanger 1995, p. 1262). Moreover, nominal wage cuts are rare today, even in recessions (Bewley 1999). Pairing the 1930s results with the results for more recent decades, as well as the general perception that institutional and governmental changes over the course of the twentieth century made labor markets less flexible, it is tempting to infer that wages became stickier over the course of the twentieth century.

Of course, the early, pre-econometric studies and the sophisticated modern studies of wages over the business cycle are not strictly comparable. Several researchers have conducted more systematic then-and-now comparisons of the response of wages to output fluctuations. Most of those studies, especially the earlier ones, seem to find that wages were more flexible in earlier eras, typically pre-WWI. Mitchell (1985), for example, cites eight such studies and corroborates them with tabular comparisons of wage-changes data from the 1920s and the post-WWII era. In his conclusion he notes the "possibility that institutional and legal changes, which had their roots in the Great Depression, led to wage rigidity" (p.

278). Several more recent studies – including Allen (1992), Hanes (1993, 1996), and James (1998), all of which use modified Phillips curve regressions -- reach essentially the opposite conclusion, finding wages to be decidedly sticky in the late nineteenth and/or early twentieth centuries. Allen (1992) in fact concludes that the cyclical sensitivity of nominal wages is essentially the same now as in the late nineteenth century. Hanes (1996) finds that real product wages were equally countercyclical in the prewar years of 1923-40 and in the postwar years of 1947-90 (excluding the stagflation of 1973-80).

Most of the then-and-now comparisons omit the interwar years, partly because of data discontinuities and partly because those years are seen as anomalous. Sachs (1980), for example, leaves out the Great Depression "because of the well-known perversities in the wage and price dynamics of the period" (p. 79). Yet if those perversities had a lasting effect on wage and price stickiness in the postwar era, then those years would seem to belong in the sample; likewise, if wages did in fact become stickier over the course of the twentieth century, the turning point may well have been during the Great Depression. O'Brien (1985) hypothesizes strongly that the increased rigidity began in 1929, though his empirical evidence, relying on the lengthening lag between peaks in wholesale prices and peaks in wages, is a bit thin. Dighe (1997) compares the relative magnitudes of wage and price changes in 1929-33 to those of other contractions and, finding the rise in real product wages in 1929-33 to have been historically unexceptional, expresses doubt that wage stickiness was the main transmission mechanism in the Great Contraction. The analysis, however, leaves out the relative size of the shocks (other than the change in wholesale prices) associated with the different contractions, so it may have missed some of the essence of wage rigidity. That is to say, bigger shocks should force bigger changes in wages. An econometric approach seems to be the most appropriate.

Among the econometric studies that have looked at interwar U.S. wages are Gordon (1983), Silver & Sumner (1995), and Hanes (1996). Gordon's century-spanning study uses a modified Phillips curve regression that includes dummy variables for New Deal-induced supply shifts such as the National Industrial Recovery Act (NIRA) and the National Labor Relations Act. Gordon finds a slight increase in nominal wage rigidity during the entire 1929-41 period; the response of wages to a one-unit increase in the actual-to-potential output ratio drops from 0.01 to -0.03, a statistically but not economically significant change (p. 94). Gordon's use of annual data may tend to miss the main dynamics of wage adjustment; since monthly data are available for the interwar period, they would seem to be preferable. Silver & Sumner (1995) and Hanes (1996) also find evidence of wage stickiness in that era, but neither offers a definitive answer to the title question of this paper. Hanes does not really ask that question, since he does not test for changes in the cyclical behavior of wages from the 1920s to the 1930s, despite the common belief that wages became stickier over that interval. Moreover, Hanes focuses on real wages instead of nominal wages and omits the vital years of 1920-22, which encompassed a contraction that many view as the last gasp of flexible wages. Silver & Sumner do use the full interwar data period and find that wages became stickier after 1929, but the regression results that drive that conclusion are open to multiple interpretations, and the specification itself is open to question.

Silver & Sumner regress monthly values of industrial production on their lags, nominal wages (hourly earnings), and prices. They compare the sub-periods 1920-29 and 1930-39 to investigate whether wages became stickier after 1929. In all cases, the wage coefficient is near zero and significant in 1920-29, but is highly significant and negative in the 1930s. The authors interpret this result as evidence that nominal wages become countercyclical in the 1930s, an interpretation which we see as unwarranted. By the usual right-to-left interpretation of a regression, their results suggest that output was almost perfectly inelastic with respect to nominal wages in the 1920s and highly elastic with respect to wages in the 1930s. Only by reading the results backward, as in a reverse regression (and the rationale for doing so is not stated explicitly), could one conclude that wages became stickier in the 1930s. And even then, one would be at a loss to explain why the wage-adjustment process went from basically no adjustment (acyclical) in the 1920s to sharply countercyclical in the 1930s. Even "sticky" wages should at least have the right sign on their coefficient. More likely, we believe, those regression results are merely picking up the well-known fact that real wages grew faster in the New Deal 1930s than in the relatively laissez-faire 1920s. Additionally, considering that the response of wages to output fluctuations appears to be non-contemporaneous (as we discuss in a later section), then some lags are needed in the specification. Our analysis takes Silver & Sumner's framework as its starting point but rearranges it into a more conventional Phillips curve framework with lagged adjustments of wages to fluctuations in output and prices.

3. Data

The data used in this paper are the following monthly series for 1920-39: industrial production, as calculated by the Federal Reserve Board; wholesale prices, as measured by the U.S. Bureau of the Labor Statistics (BLS); wages, as proxied by average hourly earnings and measured by the National Industrial Conference Board (NICB). All are for the manufacturing sector, on account of the superior availability of data for that sector. The data appear graphically in Figure 2; their sources and additional details are given in the Appendix. Among the most striking features of these series are the extreme volatility of output, the collapse of wholesale prices in 1920-21, and the huge upward spikes in wages in 1933 and 1937 (which coincide with the introduction of the National Recovery Administration [NRA] codes in mid-1933 and historic union victories at big companies in early 1937).

Because the regression specifications use multiple lags, we would have lost many valuable data points had we not addressed a discontinuity in the NICB hourly earnings series, namely the missing values for the first six months of 1922. (That discontinuity is somewhat mysterious, since it corresponds to the period in the 1920-22 recession in which wages appear to have bottomed out.) We have filled in those missing values by interpolating them based on the close correlation between that hourly earnings series and an index of manufacturing wage rates constructed by Creamer (1950), which extends from 1919 through March 1923. For the 29 months that the Creamer series and the NICB earnings series overlap, their correlation is .995. We have imputed values for the NICB earnings series for January-June 1922 based on the results of a regression of hourly earnings on the Creamer wage series and a time trend. The results of that regression and the imputed values of average hourly earnings for those six months (which may be of independent interest to researchers) are given in the Appendix. The Phillips curve regressions also use monthly dummies to control for seasonal variation, and a dummy for the two months in 1933 (the monthly reporting periods ending on August 15 and September 15) in which most of the NRA codes went into effect, pushing average wages to a new plateau.

The wage and price data in these regressions are from the manufacturing sector. For wages, we use the NICB's average hourly earnings (AHE) series. Because changes in AHE do not always mirror changes in wage rates, we modify the NICB series slightly, to account for changes in the occupational composition of the work force over time, such as the declining share of unskilled laborers in the work force during this period and the alleged tendency of the unskilled to be the first ones laid off in cyclical downturns. Our modified AHE series holds constant the weight of each of the NICB's occupational categories: skilled and semi-skilled males, unskilled males, and females, so that the weight of each occupational group in the overall earnings average is constant throughout the sample period. The NICB series already contained a similar adjustment for changes in the industrial composition of the work force: the NICB used constant industrial-employment weights, so as to control for changes in the overall average that arise from changing employment levels in high- and low-wage industries. We have also used WPI data (from the BLS) and industrial-production data (from the Fed) that cover only the manufacturing sector.

4. Phillips Curve Regressions

The classic approach to gauging the cyclicality of wages is to run "Phillips curve" regressions, in which the percent change in the nominal wage is regressed against a cyclical indicator such as output or employment. Yet Dunlop (1988), drawing on a half-century of his own empirical labor market research, argued emphatically that deflation, not falling output or employment, is what makes wage cuts possible: "Only one set of forces is effective to *reduce* money wage levels: in some periods of depression, declines in product prices may be of such a magnitude and competition in these product markets of such a character as to compel a reduction in wages…. the enterprise has no option but to reduce wages or go out of business" (p. 66). Some researchers (including Bodkin 1966 and Hanes 1993) add the wholesale price index as a regressor, consistent with Dunlop as well as the basic labor-market model in which falling product prices reduce the marginal revenue product of labor and the market wage. We do as well.

Using first differences of the natural logarithms of the same output, wage, and price data as in Figure 2, we regress nominal hourly earnings against current and lagged values of industrial production and wholesale prices. The choice of the number of lags is based chiefly on empirical observation, starting with past researchers' measurements of the timing of wage changes. Creamer (1950, pp. 1, 7, 11) found that the average lag of factory wage rates behind the NBER-dated cyclical peak or trough was 9 months; following the cyclical peak of 1929, the lag was 7 months. Creamer also looked at nine manufacturing industries over the same period and found an average lag of 8 months, as well as an average lag of 7 months of average hourly earnings behind business cycle turning points. O'Brien (1989) examined the response of wages to wholesale price changes in 16 manufacturing industries and found that the lag of the peak of factory wages behind prices stretched from 3 months in 1920-21 to 11 months in 1929-31. Comparing peaks and troughs in the three-month moving averages of wages, prices, and output in our dataset, AHE lagged an average of 7 months behind output and 3 months behind prices.[3] In view of these findings and with an eye to the multicollinearity problems that can arise in regressions with numerous interactive variables covering short subsamples, we feel that 7 output lags and 11 price lags are sufficient. (While the moving-average comparison would seem to require only 3 price lags, it is well established that many firms delayed cutting wages during the Great Contraction until well after a general price deflation had ensued, so we will follow O'Brien's calculation.) Following Silver & Sumner, we also include monthly dummies and a NIRA dummy, covers the months of August and September 1933, in which the Act's industry codes went into effect, causing the largest upward spikes in average wages in this data series.[4] To deal with the inevitable serial correlation in time series like these, we used the Newey-West

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[3] These averages omit the last two of the six major cyclical turning points in the sample, the 1937 peak and the 1938 trough. AHE was almost completely stationary in 1937-39, so to label any particular month the wage "peak" or "trough" would be misleading.

[4] The NIRA dummy is included because the observations for those two months are outliers in two key respects. First, the increases in hourly earnings in those months, of 11% and 6% respectively, were by far the largest in the entire period. Second, the initial imposition of the NIRA codes was arguably an exogenous and temporary shock, with no real counterpart in the rest of the period. Alternate regression specifications without the NIRA dummy returned generally similar results, other than finding a stronger

(1987) estimator, with 12 lags selected, to get autocorrelation-consistent standard errors.

To test whether wages became less responsive to output or prices after a particular breakpoint, we use dummy interactive terms. Specifically, we consider four candidate breakpoints, each corresponding to a particular economic peak or trough, in keeping with the common finding that wages tend to be stickier downward than upward. These breakpoints are similar to the main interwar cyclical peaks and troughs as dated by the NBER, but slightly adjusted so as to incorporate certain developments. The first breakpoint is May 1922, which marks not the cyclical trough (June 1921) but the first month after the wage trough of 1920-22, so as to test whether the wage deflation of that period was truly unique. The second breakpoint is December 1929, six months after the cyclical peak but immediately following the much-publicized White House conference of November 21, 1929, at which President Hoover secured industry leaders' pledges not to cut wages, and which many scholars (notably O'Brien 1989, Silver & Sumner 1995, and Vedder & Gallaway 1993) cite as a turning point in policy. The third breakpoint is June 1933, coincident with the end of President Roosevelt's historic "First Hundred Days" and the imminent passage of the NIRA, both of which indicated a regime shift toward "reflationary" policies aimed at raising wages and prices (see Temin & Wigmore 1990). Some aspects of the New Deal, from NIRA codes that forbade cuts in weekly wages to minimum wages to federal sanction of unions, seemed almost designed to promote downward wage rigidity. The last breakpoint is June 1937, which immediately followed the cyclical peak of May 1937 and closely followed a historic Supreme Court decision upholding collective bargaining rights under the National Labor Relations Act. Possibly the New Deal's contribution to wage rigidity took several years to manifest itself, through union victories and the sudden change in the Court's general stance vis-à-vis the constitutionality of the New Deal. Thus these breakpoints correspond not only to major cyclical turning points, which allows us to consider expansions and contractions separately, but also to plausibly important policy or institutional changes.

The regression equation is

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influence of prices on wages after either 1929 or 1933, which seems to be the result of the initial implementation of the codes in August-September 1933 following closely on the heels of the initial uptick

$$dw_t = a\sum_{k=0}^{4} BREAK_k + \sum_{k=0}^{4}\sum_{i=0}^{7} b_i dy_{t-i} + \sum_{k=0}^{4}\sum_{i=0}^{7} c_i dy_{t-i} BREAK_k$$
$$+ \sum_{k=0}^{4}\sum_{i=0}^{11} d_i dp_{t-i} + \sum_{k=0}^{4}\sum_{i=0}^{11} g_i dp_{t-i} BREAK_k + \sum_{i=1}^{11} h_i m_i + j * NIRA$$

where dw_i, dy_i, and dp_i are the first difference of the natural logarithms of the nominal wage, output, and wholesale price series (allowing us to interpret every value of these variables as a percent change); BREAK is a dummy variable corresponding to each of the four turning points (1922, 1929, 1933, 1937), so dy*BREAK and dp*BREAK are interactive variables; m_1 through m_{11} are monthly seasonal dummies; NIRA = 1 for August and September 1933. Of particular interest here is the impact of changes in output and wholesale prices on nominal wages in each period: Σb_i, Σc_i, Σd_i and Σg_i. The sums of the interactive coefficients indicate whether the current and lagged responses of wages to output and prices changed after each breakpoint, and we test this question for lags of various lengths, from one month to 7 months for output and from one month to 11 months for prices.

Table 1 gives the results of a basic version of this regression without any breakpoints. Although our title question requires that we test for breakpoints within the interwar period, it is helpful to have a benchmark result. The results of this and other regressions are given in cumulative form so as to show the net effect on wages of a given change in output or wholesale prices immediately, one month later, two months later, and so on up to the maximum number of lags. Considering the instability of the U.S. Phillips curve with annual data in Figure 2, this regression equation is unlikely to provide a good fit for our entire sample, yet the results in Table 1 look reasonable. After the first month, the coefficient sums always have the expected positive sign, and the predicted impact of an output or price change becomes larger over time (and is statistically significant in most cases). The cumulative impact of a change in output after its seventh and final lag is 11%, which seems small but not surprising in view of the volatility of output compared with wages (the standard deviation of dy in the sample is more than four times that of dw; also see Figure 2). The cumulative impact of a change in prices rises fairly steadily to 57% after its

in prices a few months earlier.

eleventh and final lag. This incomplete adjustment of wages to product prices is consistent with the fact that real product wages rose in the three major contractions of the interwar period (1920-21, 1929-33, and 1937-38).

Before using the four-breakpoint specification, we ran separate single-breakpoint regressions for each of the breakpoints under consideration. F-tests (of the null hypothesis that the coefficients of the breakpoint's dummy and interactive variables are all zero) allowed us to conclude that each one, in isolation, was an appropriate breakpoint. The 1922 breakpoint appeared by far the most significant (F=30.47, p=.0000), followed by 1937 (F=6.29, p=.0000), 1933 (F=2.39, p=.0011), and 1929 (F=1.94, p=.0011). When all four breakpoints were included in the regression, F-tests for each breakpoint again rejected the zero-coefficients hypothesis at the 1 percent critical level in each case. So it appears that all four breakpoints belong in the regression.

The four breakpoints create five distinct sub-periods: the Great Deflation of prices (and then wages) of 1920-22; the placid prosperity of 1922-29; the Great Contraction of 1929-33; the New Deal recovery years of 1933-37; and the New Deal Depression of 1937-39 (a devastating contraction in 1937-38, followed by relative stagnation through 1939). Table 2 details the responsiveness of wages to output and prices in each of these episodes, including statistical test results of whether they differ from the baseline period of 1922-29. One notable aspect of the table is the weirdness of the 1920-22 results. In that period wages were significantly more responsive (by 16-23%) to output in after 0-2 months but significantly less responsive (by 28%) after 5 months (and less responsive but insignificantly so after 6-7 months). Likewise, wages in 1920-22 were significantly less responsive (by 57%) to prices after 1 month but significantly more responsive (by 70-89%) after 5-6 month (and more responsive but insignificantly so after 7-11 months). So we cannot conclude from these results that wages were more flexible or less flexible in 1920-22 than in 1922-29; we can only conclude that wages behaved oddly in 1920-22. Among the remaining four periods, we mostly see a surprising continuity in the speed and magnitude of wage adjustment, especially between the prosperity years of 1922-29 and the subsequent contraction of 1929-33. In general, the results do not display the usual (or assumed) asymmetry between rapid wage adjustments in expansions and rigid wages in contractions. There is also no statistically significant difference in wage adjustment between 1922-29 and the 1937-39 depression, though the responsiveness of wages to prices looks stronger (if not statistically so) in the later period. The responsiveness of wages to output in most periods is statistically equivalent in all four periods after 1922; in 1922 -37 the impact after 7 months is 19-26%, somewhat larger than the 11% figure in the no-breakpoints regression in Table 1. Other than 1920-22, only the New Deal recovery period of 1933-37 differs significantly from 1922-29, and then only in the increased responsiveness of wages to wholesale price inflation. (The differences are statistically significant only after 5-6 lags and then after 9-10 lags, but in the remaining cases of 3-11 lags the differences still seem fairly large, 46-74%.)

Overall in Table 2, we do not find any sub-periods with an overwhelming pattern of greater or lesser responsiveness of wages to prices or output than in the all other periods. These results seem to suggest that wages were sticky throughout 1922-39 and that they did not become any more so after 1922-29. In fact, wages were more flexible upward, at least in response to wholesale prices, in the New Deal years of 1933-37 than in the twenties. But the standard comparison is not between the Depression years and the steady prosperity of 1922-29; rather, it is between the wage rigidity of the Depression and the seemingly unfettered labor markets of 1920-22. The four-breakpoint regression results allow us to test the proposition that wages became less responsive to prices and output after the early 1920s, through head-to-head comparisons of the sums of current and lagged values of dy and dp for 1920-22 and 1929-33 or 1937-39. Table 3 gives the results of tests for equality of those sums. Not surprisingly, given the erratic results for 1920-22 and the strong similarity of wage adjustment in the other period in Table 2, the results are very much as before. In 1920-22, compared with 1929-33, wages were significantly more responsive (by 13-21%) to output in after 0-2 months, insignificantly different from 1929-33 after 3 months, significantly less responsive (by 22-40%) after 4-6 months, and insignificantly different after 7 months. As regards prices in the two periods, the responsiveness of wages in 1920 -22 was a great deal more at one point (by 120%, after 5 months); 30-71% more responsive (though not statistically significant) after 3, 4, 6, 7, 8, or 10 months; less responsive (though not statistically significant) after 2 months; and almost exactly the same after 0, 2, 9, or 11 months. Referring back to the coefficient sums in Table 1, it appears that wages were extremely unresponsive to price deflation in the first two months of both contractions, then wage cutting began after 3-5 months in 1920-22 but not in 1929-33, but in later months in 1920-22 the wage cutting could not keep pace with the rapid price deflation, whereas a substantial amount of wage cutting finally did occur after 9 months in 1929-33. So it appears in terms of timing wages were more flexible in responding to price deflation in 1920-22, but in terms of magnitude the two periods look very similar after 11 months, i.e., by the time the typical manufacturing firm in the Great Contraction had cut wages.

The comparison of 1920-22 and 1937-39 is similarly mixed, but slightly less favorable to the hypothesis that wages were more flexible in the earlier period. Once again, wages responded significantly faster (though the coefficients are not large) to output in the early going, and more slowly (significantly so after 4-5 months) in the later months. Wages actually were significantly (27-42%) slower in responding to price deflation in the first 0-1 months in 1920-22, significantly faster (38-84%) after 4-6 months, and insignificantly different after 7-11 months.

How do we square these results with the widely held belief that 1920-22 represented a golden age of flexible wages? Some of it may be simple money illusion on the part of contemporaries (and dare we say some economists?) who observed a great deal of wage cutting in the early 1920s but did not factor in the rampant commodity price deflation after the WWI inflation and postwar speculative boom. The conspicuous absence of wage cuts at many large firms in the early 1930s, by contrast, came after a period of exceptional price stability and during an initially mild deflation (see bottom panel of Figure 2). The apparent tendency for wage cuts to come earlier in 1920-22 likely owed something to the Great Deflation of that time, both its severity and its perceived inevitability. Bordo et al. (1997) write that one key difference between 1920-21 and 1929-33 was that in 1920-21 the deflation was largely anticipated. People expected that the U.S. would eventually return to the gold standard and would deflate the price level back to prewar parity with gold, and the Federal Reserve raised the discount rate 200 basis points between November 1919 and February 1920 (pp. 37-38). As such, we consider the possibility that increased *price* flexibility, as measured by the response of wholesale prices to current and lagged changes in output, may have been the key difference between labor markets in the two contractions. If prices fell sooner and faster in response to output in the earlier contraction, then wages might also have fallen sooner and faster, even if the coefficients dw/dy and dw/dp do not show a pattern of being consistently larger. Table 4 shows a comparison of the cumulative response of wholesale prices to output in 1920-22 and 1929-33. Like Table 3, it compares sums of coefficients of current and lagged values of the main explanatory variable (in this case, dy), based on the results of a regression with the same four breakpoints. Keeping the number of dy lags at 7 as in the previous regression, we find that prices were indeed more flexible (in terms of responsiveness to output) in 1920-22; the difference in dp/dy sums for 1920-22 and 1929-33 is consistent for 0-7 lags and rises steadily from 0.15 after 0 lags to 0.80 after 6-7 lags. Somewhat arbitrarily doubling the number of lags to 14, the result still stands: the difference in sums is still 0.80 after 7 lags, and the difference continues to grow steadily, to 1.16 after 14 lags. Clearly, then, the relation between the two key explanatory variables in our main regression, output and prices, changed somewhat after 1920-22 (and possibly 1920-22 was a fluke even in comparison to the decades before it).[5] And if wages respond more to price changes than to output changes, then greater price stickiness after 1922 could have caused greater wage stickiness, even if it is not apparent in our regression results. The difference in wage adjustment in 1920-22 versus 1929-33 seems to follow this script: Falling output forced prices down a lot faster in 1920-21 than in 1929-33, and even though wages may have been no more responsive to price deflation than in the later period, there was simply a lot more price deflation to respond to in 1920-22. As Bordo et al. state, "The extreme price fluctuations during the 1920-21 period would have encouraged, or perhaps forced, great wage flexibility" (p. 38).

5. Concluding Remarks

The regression results indicate that wages were sticky in both the 1920s and the 1930s, in terms

[5] Tests comparing price responsiveness in 1920-22 with 1937-39 were also run. Their results (not shown in Table 4) were broadly similar to those between 1920-22 and 1929-33.

of their responsiveness to output and wholesale prices. Moreover, except for the Great Deflation of 1920-22 and the apparent appearance of an upward wage-price spiral in the New Deal recovery years of 1933-37, the degree of wage stickiness varied insignificantly from one period to the next or from expansions to contractions. The continuity between the prosperity years of 1922-29 and the Great Contraction of 1929-33, as regards wage rigidity, is particularly striking.

Direct comparisons of the contraction of 1920-22 with those of 1929-33 and 1937-39 do not support the common contention that wages were more flexible in 1920-22. Although wages seem to have moved faster in that early episode, after 4-7 months they actually moved less in response to output than did wages in the 1930s contractions. The comparative response of wages to prices is even more mixed: significantly slower in 1920-22 in the early months, significantly faster after about half a year, and insignificantly different after 7-11 months. Yet it does appear that wages fell faster in 1920-22, even if they could not keep pace with the rampant price deflation of the time. An auxiliary regression of prices on either 7 or 14 lags of output suggests a possible explanation: prices appear to have been far more flexible downward in 1920-22 than in 1929-33 or 1937-39, which may have compelled wages to come down sooner and faster.

Possible avenues for future research include modifying the main regression to replace output with employment or total hours worked. Phillips believed that fluctuations in employment created upward and downward pressure on wage inflation; the pressure on wages from output fluctuations may be less direct. Also, employment and hours data are available from the same sample that furnished the hourly earnings data (the NICB), making for a more compatible dataset. Testing more breakpoints would also be desirable. Finally, the finding of greater price stickiness after 1922 suggests that putting wages, prices and output in a simultaneous equations system (if suitable instruments can be found) may be optimal.

Appendix. A Brief Description of the Data

W = wages, as proxied by average hourly earnings (AHE) and published by the NICB (Beney 1936 and NICB 1940).

This variable is a composite of three different NICB series for three subgroups of workers: skilled and semi-skilled males, unskilled males, and females. We computed it as a weighted average of the estimated share of each of those groups in the factory work force in 1929. The series is computed as follows:

$$AHE = .646*AHE_{\text{skilled and semi-skilled males}} + .200*AHE_{\text{unskilled males}} + .154*AHE_{\text{females}}$$

This adjustment is described at length in Dighe (1997).

We interpolated the missing values in the constant-weighted NICB hourly earnings series (AHENICB) for January-June 1922 by running a simple regression of AHENICB on the Creamer (1950) wage-rate index (WCREAMER) and a time trend (TREND) and then using those regression estimates to simulate values of AHENICB for the missing six months. The Creamer index is based on wage-rate changes reported to the U.S. Bureau of Labor Statistics by firms in 13 manufacturing industries. The NICB and Creamer series overlap for just 29 months (June 1920-December 1921, July 1922-April 1923). The estimated equation is

$$AHENICB = -0.2498043 + \underset{(36.13)}{0.0075661*WCREAMER} + \underset{(3.68)}{0.000476*TREND}$$

(Newey-West t-statistics, assuming first-order serial correlation, in parentheses; adj. R-sq. = .9921)

Based on that equation, the filled-in values of AHENICB for January-June 1922 are \$.4896119, \$.484035, \$.480728, \$.4789342, \$.4801668, \$.482156. For the record, they indicate that hourly earnings bottomed out in April 1922 and fell a total of 22.6% from their peak in October 1920.

In all cases, the notation *dx* refers to the first difference of the natural logarithm of the variable X. Following Silver & Sumner (1995), we transformed the data using the first difference of the natural logarithm for the output, wage and wholesale price series.

Y = index of industrial production for manufacturing, as published by the Federal Reserve (August 1940, pp. 764-65).

P = wholesale price index for manufactures, as computed by the U.S. BLS (1946).

The main regression variables (dw, dy, dp) were tested for stationarity using the augmented Dickey-Fuller Generalized Least Squares method created by Elliot, Rothenberg, and Stock (1996). The null hypothesis of a unit root was rejected at the 1% critical level for dw (the dependent variable) and dp for every lag length (0-14 lags). For dy, the unit root hypothesis was rejected at the 1% level for 1-5 lags and at the 5% level for 6-8 lags; at 9-14 lags, a unit root for dy could not be rejected. Since dy is not the dependent variable and since the regression uses only 7 lags of dy, this should not be a problem.

Data are non-seasonally-adjusted. Monthly dummies were included in the regressions so as to control for seasonality.

The nonfarm unemployment rates in the Phillips curve in Figure 1 are estimates by Stanley Lebergott, published in U.S. Department of Commerce (1975), Series D 10.

Figure 1. A Phillips Curve for the U.S. Nonfarm/Manufacturing Sector Between the World Wars

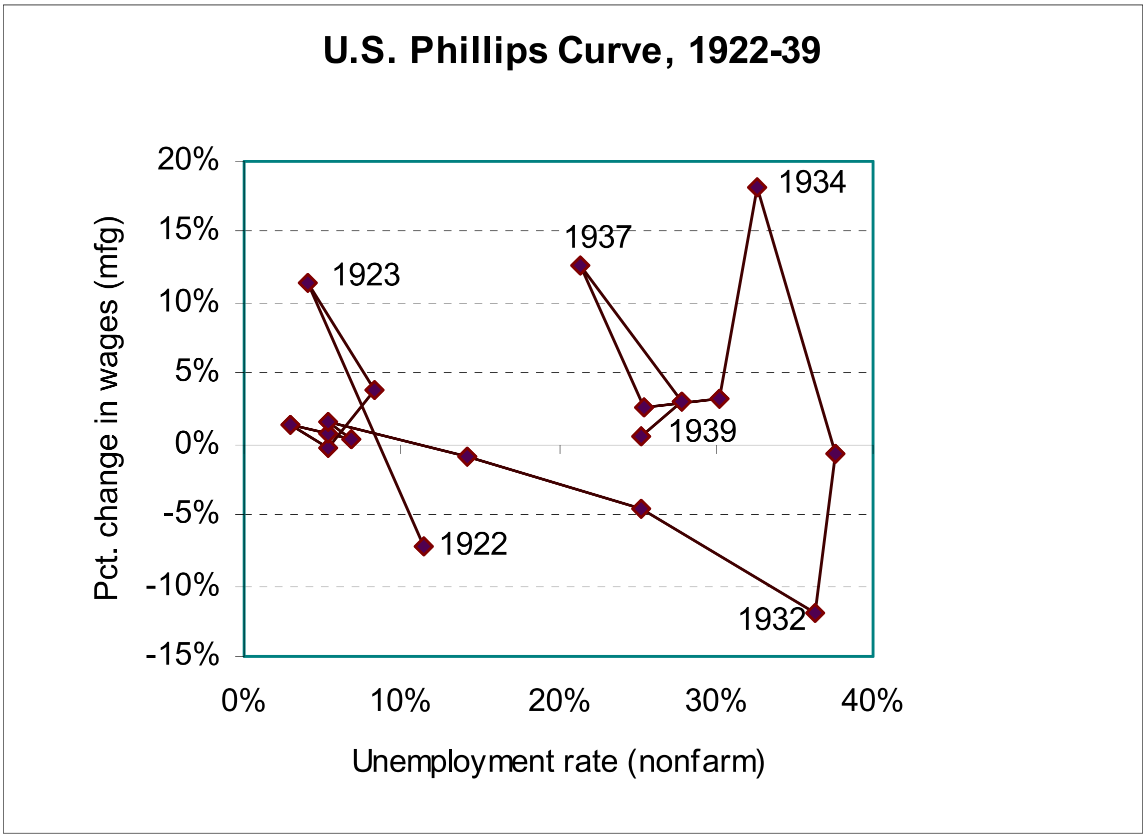

Figure 2. Monthly Series for Industrial Production, Average Hourly Earnings, and Wholesale Prices , Not Seasonally Adjusted, 1920 -1939 (1926=100) **$\overline{Y}$ = 90.05** **$\overline{W}$ = 101.40** **$\overline{P}$ = 93.34**

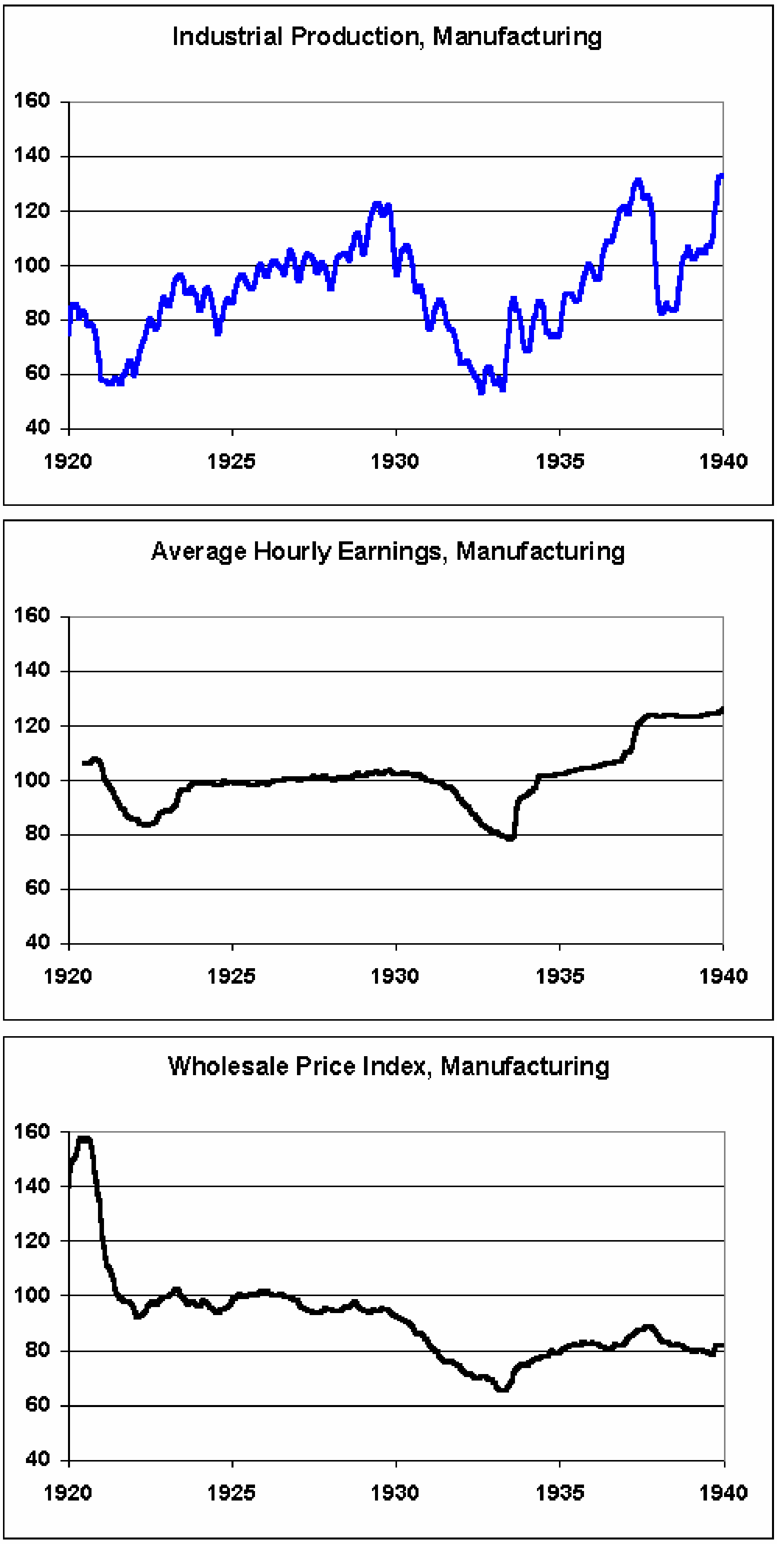

Table 1
Phillips Curve Regression of Wage Changes on Output (DY) and Price (DP) Changes, 1929-39, No Breakpoints

Regressor and cumulative number of lags	Sums of coefficients	|*t*|
DY		
0	0.02	*1.00*
1	0.05	*1.96**
2	0.04	*1.99***
3	0.05	*1.51*
4	0.07	*1.99***
5	0.05	*1.14*
6	0.08	*1.64*
7	0.11	*1.93**
DP		
0	-0.02	*0.24*
1	0.11	*1.98***
2	0.17	*3.05***
3	0.28	*3.21***
4	0.33	*3.89***
5	0.45	*4.20***
6	0.39	*5.46***
7	0.40	*5.64***
8	0.42	*5.63***
9	0.45	*5.59***
10	0.53	*6.40***
11	0.57	*8.85***
NIRA (0-1)	0.07	*13.37***
constant	0.00	*0.38*

Monthly dummies not shown.
*: p<=.10; **: p<= .05
T-statistics are Newey-West.

Table 2

Phillips Curve Regression of Wage Changes on Output (DY) and Price (DP) Changes, 1929 -39, Four Breakpoints

Regressor and cumulative number of lags	1920-22: implied sums of coeffi-cients	|*t*|	1922-29: implied sums of coeffi-cients	|*t*|	1929-33: implied sums of coeffi-cients	|*t*|	1933-37: implied sums of coeffi-cients	|*t*|	1937-39: implied sums of coeffi-cients	|*t*|
DY										
0	0.16	*3.57***	-0.01	*0.19*	0.03	*0.92*	-0.01	*0.02*	0.05	*1.11*
1	0.18	*1.66**	0.08	*1.43*	0.05	*0.71*	0.06	*0.40*	0.10	*0.18*
2	0.23	*2.06***	0.02	*0.31*	0.02	*0.00*	0.07	*0.56*	0.05	*0.30*
3	0.09	*0.38*	0.05	*0.71*	0.07	*0.29*	0.09	*0.46*	0.12	*0.66*
4	-0.10	*1.47*	0.14	*1.76**	0.12	*0.28*	0.16	*0.13*	0.10	*0.35*
5	-0.28	*2.32***	0.12	*1.32*	0.10	*0.15*	0.11	*0.09*	0.13	*0.12*
6	-0.20	*1.55*	0.16	*1.30*	0.20	*0.28*	0.14	*0.14*	0.06	*0.66*
7	-0.13	*1.33*	0.26	*1.97**	0.19	*0.48*	0.22	*0.24*	0.11	*0.88*
DP										
0	-0.32	*1.23*	-0.12	*0.93*	-0.40	*1.29*	0.07	*0.67*	-0.05	*0.42*
1	-0.57	*2.67***	-0.07	*0.46*	-0.28	*1.04*	0.22	*1.25*	-0.15	*0.39*
2	-0.29	*1.42*	0.04	*0.24*	-0.31	*1.25*	0.24	*0.78*	-0.09	*0.45*
3	0.34	*1.39*	-0.05	*0.24*	-0.37	*0.93*	0.46	*1.30*	0.02	*0.25*
4	0.43	*1.60*	-0.03	*0.13*	-0.01	*0.06*	0.54	*1.47*	0.03	*0.19*
5	0.89	*3.04***	-0.06	*0.23*	-0.32	*0.59*	0.73	*1.75**	0.04	*0.29*
6	0.70	*2.11***	-0.10	*0.37*	0.08	*0.37*	0.57	*1.76**	0.32	*1.12*
7	0.34	*0.92*	-0.08	*0.24*	-0.10	*0.05*	0.48	*1.53*	0.16	*0.59*
8	0.35	*0.96*	-0.11	*0.31*	0.04	*0.29*	0.53	*1.58*	0.49	*1.49*
9	0.30	*1.42*	-0.27	*0.76*	0.33	*1.17*	0.86	*2.45***	0.24	*1.28*
10	0.37	*1.03*	-0.05	*0.14*	0.04	*0.20*	0.90	*2.13***	0.50	*1.56*
11	0.38	*0.80*	0.06	*0.16*	0.41	*0.82*	0.74	*1.51*	0.59	*1.43*
NIRA (0-1)					0.05	*3.39***				
constant	-0.01	*2.52***	0.00	*0.12*	0.00	*0.16*	0.00	*0.33*	0.00	*1.11*

Monthly dummies not shown.
*: p<=.10; **: p<= .05
T-statistics are Newey-West.
T-statistics and significance levels for the baseline period of 1922-29 refer to tests of whether those sums are zero. T-statistics and significance for other periods refer to tests of whether a given set of summed coefficients for a particular period is the same as for 1922-29.

Table 3

Comparisons of Estimated Responsiveness of Wage Changes to Output (DY) and Price (DP) Changes, Contractions of 1920-22 vs. 1929-33 and 1937-39

Regressor and cumulative number of lags	1920-22 vs. (minus) 1929-33	|*t*|	1920-22 vs. (minus) 1937-39	|*t*|
DY				
0	0.13	*3.72***	0.11	*3.81***
1	0.13	*2.61***	0.08	*1.63*
2	0.21	*2.76***	0.19	*3.07***
3	0.03	*0.27*	-0.02	*0.30*
4	-0.22	*1.70**	-0.20	*1.94**
5	-0.38	*2.51***	-0.41	*3.13***
6	-0.40	*1.77**	-0.26	*1.39*
7	-0.32	*1.06*	-0.24	*0.93*
DP				
0	0.08	*0.38*	-0.27	*1.78**
1	-0.29	*1.28*	-0.42	*2.86***
2	0.02	*0.05*	-0.21	*1.13*
3	0.71	*1.60*	0.32	*1.53*
4	0.44	*1.07*	0.41	*1.74**
5	1.20	*2.92***	0.84	*3.61***
6	0.62	*1.32*	0.38	*2.17***
7	0.45	*0.94*	0.18	*0.52*
8	0.30	*0.57*	-0.14	*0.39*
9	-0.03	*0.06*	0.06	*0.24*
10	0.32	*0.81*	-0.14	*0.62*
11	-0.03	*0.09*	-0.22	*1.20*
constant	-0.01	*2.03***	-0.01	*3.58***

*: p<=.10; **: p<= .05.
T-statistics are Newey-West.
Numbers in the main columns are the 1920-22 coefficient sums minus the corresponding sums for 1929-33 or 1937-39.

Table 4
Comparisons of Estimated Responsiveness of Wholesale Price Changes to Output Changes (DY), 1920-22 vs. 1929-33

Cumulative number of lags of DY (regression with 7 lags)	1920-22 vs. (minus) 1929-33	|*t*|	Cumulative number of lags of DY (regression with 14 lags)	1920-22 vs. (minus) 1929-33	|*t*|
0	0.15	*1.75**	0	0.20	*2.02***
1	0.23	*2.30***	1	0.33	*3.46***
2	0.45	*3.49***	2	0.54	*4.13***
3	0.52	*3.07***	3	0.68	*3.67***
4	0.57	*3.32***	4	0.76	*4.51***
5	0.65	*3.46***	5	0.79	*4.34***
6	0.80	*3.70***	6	0.90	*4.65***
7	0.80	*3.49***	7	0.80	*4.86***
			8	0.84	*4.43***
constant	0.00	*0.29*	9	0.80	*3.91***
			10	0.93	*4.23***
			11	0.92	*3.31***
			12	1.00	*3.45***
			13	1.07	*3.20***
			14	1.16	*3.36***
			constant	0.00	*0.60*

*: p<=.10; **: p<= .05.
T-statistics are Newey-West.
Numbers in the main columns are the 1920-22 coefficient sums minus the corresponding sums for 1929-33.

REFERENCES

Abraham, Katharine G., & John C. Haltiwanger. "Real Wages Over the Business Cycle." *Journal of Economic Literature* 33(3): 1215-64 (1995).

Allen, Steven G. "Changes in the Cyclical Sensitivity of Wages in the United States, 1891-1987," *American Economic Review* 82: 122-40 (1992).

Beney, M. Ada. *Wages, Hours, and Employment in the United States, 1914-1936*. New York: National Industrial Conference Board, 1936.

Bewley, Truman F. *Why Wages Don't Fall During a Recession*. Cambridge, MA: Harvard University Press, 1999.

Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, various issues, notably August 1940.

Board of Governors of the Federal Reserve System. *Industrial Production in 1959*, Revised Edition (July 1960).

Bodkin, Ronald G. *The Wage-Price-Productivity Nexus*. Philadelphia: University of Pennsylvania Press, 1966.

Bordo, Michael D., Christopher J. Erceg, & Charles L. Evans. "Money, Sticky Wages, and the Great Depression." National Bureau of Economic Research (NBER) Working Paper 6071 (June 1997).

Bordo, Michael D., Christopher J. Erceg, & Charles L. Evans. "Money, Sticky Wages, and the Great Depression." *American Economic Review* 90(5): 1447-63 (December 2000).

Creamer, Daniel, "Behavior of Wage Rates During Business Cycles." NBER Occasional Paper No. 34 (1950).

Dighe, Ranjit S. "Wage Rigidity in the Great Depression: Truth? Consequences?" *Research in Economic History* 17: 85-134 (1997).

Dunlop, John T. "The Movement of Real and Money Wage Rates." *Economic Journal* 48: 413-34 (1938).

--. "Labor Markets and Wage Determination: Then and Now." In Kaufman, Bruce E., ed. *How Labor Markets Work*. Lexington, MA: D.C. Heath and Company, 1988.

Elliot, Graham, Thomas Rothenberg, & James H. Stock. "Efficient Tests for an Autoregressive Unit Root." *Econometrica* 64: 813-36 (1996).

Gordon, Robert J. "A Century of Evidence on Wage and Price Stickiness in the United States, the United Kingdom, and Japan." In Tobin, James, ed. *Macroeconomics, Prices, and Quantities: Essays in Honor of Arthur M. Okun*. Washington, DC: The Brookings Institution, 1983.

Hanes, Christopher. "The Development of Nominal Wage Rigidity in the Late 19th Century." *American Economic Review* 83: 732-56 (1993).

--. "Changes in the Cyclical Behavior of Real Wage Rates, 1870-1990." *Journal of Economic History* 56: 837-61 (1996).

James, John A. "The Early History of Nominal Wage Rigidity in American Industrial Labor Markets." *Rivista di Storia Economica* 14(3): 243-73 (December 1998).

Keynes, John Maynard. *The General Theory of Employment, Interest, and Money*. New York: Harvest/Harcourt Brace Jovanovich, 1964 (1936).

-- . "Relative Movements of Real Wages and Output," *Economic Journal* 49: 34-51 (1939).

Klamer, Arjo. *Conversations with Economists*. Totowa, NJ: Rowman and Littlefield, 1988 (1983).

Laidler, David. "Wage and Price Stickiness in Macroeconomics -- An Historical Perspective," The Thirteenth Henry Thornton Lecture (manuscript), University of Western Ontario, Department of Banking and Finance (1991).

Mitchell, Daniel J.B. "Wage Flexibility: Then and Now." *Industrial Relations* 24(2): 266-79 (Spring 1985).

Moore, Basil. "Why Wage and Price Flexibility is Destabilizing: A Critique of Walras." Manuscript, PKT Virtual Seminar. Internet: http://csf.colorado.edu/pkt/seminars/oct96sem.html (1996).

National Industrial Conference Board (NICB), "Wages, Hours, and Employment in the United States, 1934-1939" (by Robert A. Sayre), *Conference Board Economic Record*, March 28, 1940.

Newey, Whitney K., & Kenneth D. West. "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica* 55: 703-708 (1987).

O'Brien, Anthony Patrick. "The Cyclical Sensitivity of Wages," *American Economic Review* 75: 1124-32 (1985).

--. "A Behavioral Explanation for Nominal Wage Rigidity During the Great Depression," *Quarterly Journal of Economics* 104: 719-35 (1989).

Phillips, A.W. "The Relationship Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957." *Economica* 25(100): 283-99 (November 1958).

Sachs, Jeffrey. "The Changing Cyclical Variability of Wages and Prices: 1890-1976." *American Economic Review* 70(1): 78-90 (March 1980).

Samuelson, Paul A., & Robert M. Solow. "Analytical Aspects of Anti-Inflation Policy." *American Economic Review* 50(2): 177-94 (1960).

Silver, Stephen, & Scott Sumner. "Nominal and Real Wage Cyclicality during the Interwar Period," *Southern Economic Journal* 61(3): 588-601 (January 1995).

Tarshis, Lorie. "Changes in Real and Money Wages," *Economic Journal* 49: 150-54 (1939).

Temin, Peter, & Barrie A. Wigmore. "The End of One Big Deflation," *Explorations in Economic History* 27: 483-502 (1990).

U.S. Department of Commerce, Bureau of the Census. *Historical Statistics of the United States: Colonial Times to 1970.* Washington, DC: U.S. Government Printing Office, 1975.

U.S. Department of Labor, Bureau of Labor Statistics, "Index Numbers of Wholesale Prices of Specified Groups of Commodities," mimeo, 1946. U.S. Department of Labor Library, Washington, DC.

U.S. Department of Labor, Bureau of Labor Statistics. *Employment, Hours, and Earnings, United States, 1909-84*, Volume 1. Washington, DC: U.S. Government Printing Office, March 1985.

Vedder, Richard K., & Lowell E. Gallaway. *Out of Work: Unemployment and Government in Twentieth-Century America*. New York: Holmes and Meier Publishers, 1993.