**Wage Inflation in the Recovery from the Great Depression**

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Abstract: Wage inflation surged during the 1933-37 recovery from the Great Depression, even though unemployment rates appear to have remained very high. In Phillips curves that relate wage inflation to measures of real activity, wage inflation appears anomalously high especially in 1933-35 and again in 1937-38. I test two possible explanations of these anomalies. One is news about changes in monetary policies, such as devaluation of the dollar, that raised the future level of wages and prices expected by the public. In new Keynesian models, such a change in expectations gives an immediate boost to current wage inflation. Another possible explanation is New Deal labor-market policies that created minimum wage rates and boosted workers' bargaining power. In terms of new Keynesian models, these were "wage mark-up shocks." I find that the exact timing of wage-inflation anomalies over 1933-38 is much more consistent with effects of New Deal labor-market policies than with effects of changes in expected future wage and price levels. I find no evidence that changes in expected future inflation affected current wage inflation over 1933-38.

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Wage inflation surged during the 1933-37 recovery from the Great Depression. This is odd because unemployment rates appear to have remained very high in these years. In the first study applying the Phillips curve to American data, Samuelson and Solow (1960:188) observed "the years from 1933 to 1941 appear to be *sui generis*: money wages rose or failed to fall in the face of massive unemployment." They briefly speculated this was due to "the workings of the New Deal (the 20 percent wage increase in 1934 must represent the NRA codes); or alternatively one could argue that by 1933 much of the unemployment had become structural, insulated from the functioning of the labor market.." Following Samuelson and Solow economists have continued to note that wage inflation was anomalously high starting in 1933, but have not settled on an explanation.

New Deal policies that directly affected wages and employment bargaining are an obvious explanation (Weinstein 1980; Gordon 1983; Mitchell 1986). Starting in 1933 the National Recovery Administration (NRA) fixed industry-specific minimum wages, banned wage cuts, encouraged union formation and strengthened union bargaining power. When the NRA was declared unconstitutional in May 1935, its pro-union policies were revived two months later by the National Labor Relations Act (Wagner Act).

But economists have proposed alternative explanations for anomalous wage inflation in the 1930s, based on more fascinating theoretical constructs. Blanchard and Summers (1986) argue it was due to "hysteresis" that raised the natural rate of unemployment: laid-off workers had lost membership in insider bargaining groups - an elaboration of Samuelson and Solow's speculation that high unemployment had become structural. Akerlof, Dickens and Perry (1996) argue it was due to interaction between "downward nominal wage rigidity," a special constraint on nominal wage cuts, and norms linking wages to firms' profits.

In this paper, I focus on an alternative explanation offered by "new Keynesian" models, which have become standard in macroeconomic theory and literature on monetary policy. In standard new Keynesian models an increase in rates of inflation expected to prevail in the distant future raises inflation *today*, holding fixed today's levels of employment and output. Thus a credible policy change that must eventually bring a higher price level gives an *immediate* boost to *current* inflation. Holding fixed nominal interest rates, such a policy change also boosts employment and output by reducing current short-term real interest rates. Based on such models, during our own "Great Recession" economists recommended policy changes such as increases

in central-bank inflation targets, adoption of price-level or nominal GDP targeting (which automatically raise inflation targets in response to a recession), or pegs to devalued exchange rates (Svensson 1999, 2003). The Roosevelt administration appears to have followed just this kind of policy starting in 1933: Roosevelt conspicuously announced a commitment to raise the price level, devalued the dollar and allowed resulting international gold inflows to boost the high-powered money supply. Krugman (1998:161), Svensson (2004:90) and Eggertsson (2008) all argue that these policies may have spurred recovery from the Great Depression through the new-Keynesian expected-inflation channel. Through the same channel, wage inflation would be pushed above levels usually associated with high unemployment rates. Note this goes beyond the common argument made by economic historians (e.g. Temin and Wigmore 1990, Romer 1992, Jalil and Rua 2016) that Roosevelt's monetary policies boosted spending by raising long-run inflation expectations. That common argument does not necessarily imply an immediate effect on wage inflation and *short-term* real interest rates.

In this paper I look for the causes of anomalous wage inflation in the 1930s. I ask whether it is more consistent with effects of New Deal labor-market policies, or effects of changes in expected future wage and price levels through the new Keynesian mechanism. Looking at it from the other end, does 1930s experience give evidence that the new-Keynesian expected-inflation mechanism works in reality? The answer to this question might interest policymakers of our own time, who have generally rejected policies that rely on this mechanism of new Keynesian models. Bank of Canada policymakers noted that "these models assume that agents are forward-looking, fully conversant with the implications [of the policy] and trust policymakers to live up to their commitments." They expressed doubt that these conditions "would be sufficiently satisfied in the real world" (Bank of Canada 2011).

To answer these questions I examine the exact timing of 1930s anomalies in wage inflation. I find that all anomalies are precisely coincident with application of NRA wage regulations and increases in workers' bargaining power. I conclude that New Deal labor policies fully account for the peculiar behavior of wage inflation in the 1930s. There is nothing for alternative theoretical constructs to explain. There is no evidence from the 1930s that the new-Keynesian expected-inflation channel works in reality.

**1. Wage inflation anomalies in the 1930s**

A. W. Phillips (1958) found a negative relationship between rates of wage inflation and

unemployment in British data. Similar relationships appear in American data from the pre-1914 gold standard era, the 1920s, and years from the end of the Korean War price controls to the mid-1960s. Starting in the mid-1960s the empirical relationship between real activity and inflation changed. From then through the 1980s there appeared a new relationship between real activity and the *change* in inflation - the "accelerationist Phillips curve." Starting about 1990 the old Phillips curve relationship between real activity and wage inflation, not acceleration in wage inflation, reappeared. In regressions of wage inflation on real activity and lagged inflation, estimated coeffficients on lagged inflation are practically equal to one in samples dominated by the late 1960s-1980s, practically zero in samples from the pre-1914 era, the 1920s, the 1950s to mid 1960s, and the 1990s on (Gordon 1990; Alogoskoufis and Smith 1991; Allen 1992; Hanes 1993; Gali, 2011; Ball and Mazumder 2015; Blanchard 2016).

The wage-inflation anomalies of the 1930s can be seen most easily by comparing data from the interwar 1920s-30s era with data from other eras with data that seem to fit the original Phillips curve relation between real activity and inflation. Figure 1 is a scatterplot like one Samuelson and Solow used. It plots annual data on wage inflation and unemployment rates over 1891-1914 and 1954-1965, along with 1924-1940. I choose these particular spans because they were unaffected by wage and price controls (Korean War controls were lifted in February 1953 [Rockoff 1984]), and they are covered by wage and unemployment series that are comparable across the different eras. Weir's (1992) estimate of the private nonfarm unemployment rate covers 1890-1990. For all these years, this series defines the number of unemployed to be the difference between the number of employed and an estimate of the long-term trend "usual labor force" based on population censuses.[1] For wage inflation, I use series on average hourly earnings in manufacturing, aggregated up from industry-level series with fixed weights. These are surely

[1]Standard BLS series for the post-World War II era define the unemployed to be people who are not employed but are actively searching for work, as indicated by their answers to monthly household surveys. Such surveys are not available for years before 1948. Weir's estimate of the "usual labor force" is acyclical. In standard postwar series, the number of people in the labor force is strongly procyclical. Weir excludes agriculture, government and relief workers from both the employment and labor force figures. Weir excludes agriculture because, absent survey data, there is no reliable way to estimate short-term variations in agricultural employment (since so much farm labor is family labor). By excluding government workers Weir sidesteps a debate as to whether the large numbers of Federal relief workers in the 1930s should be classified as employed or unemployed (see Darby, 1976 *versus* Lebergott, 1964). Within the 1920-30s Weir's underlying estimates for private nonagricultural employment are not significantly different from those underlying the alternative unemployment series of Lebergott (1964) and Romer (1986).

imperfect indicators of changes in wage rates, but they are the only indicators of wage inflation from the 1930s that can be compared with data from other eras.[2] In the figure, the years 1933-35 and 1937-38 are obvious outliers above the downward-sloping scatter of points representing other years.

Figure 2 illustrates the anomalies in a slightly different way. Regressing annual wage inflation on the current year's unemployment rate and the previous year's unemployment rate over 1891-1914 and 1954-1965, *excluding* the interwar years, gives:

| | | | | |
|---|---|---|---|---|
| Wage inflation = | 6.677 | - 0.456 * Unemployment | - 0.038 * Unemployment$_{-1}$ | |
| SE (robust) | [0.890] | [0.153] | [0.131] | |
| *p-value* | *0.00* | *0.01* | *0.77* | $R^2 = 0.48$ |

Figure 2 plots the deviation of actual wage inflation from a "forecast" using these coefficients. There are substantial deviations within 1891-1914, perhaps reflecting measurement errors in the series which must be greater in these years than in later ones. But the deviations are massive in 1934 and 1937.

Both figures show that wage changes during the Great Depression's downturn, 1929-32, were very much in line with the Phillips curve relationship seen in other years. It is sometimes claimed that nominal wages were unusually rigid in this downturn (e.g. O'Brien 1989; Ohanian 2009). Obviously not true.

**2. Model: New Keynesian wagesetting, empirical Phillips curves and anomalies**

Economists hypothesize that the empirical Phillips-curve relationship between real activity and inflation that prevails in some eras, and the relationship between real activity and the change in inflation that prevails in other eras, both reflect an underlying structural "expectations-augmented Phillips curve" that holds always. Expectations-augmented Phillips curves appear in theoretical models where agents lack information about the current state of the economy. Such models generally imply a structural relationship between real activity and the difference between current inflation and expectations of current inflation formed in the past (e.g. Lucas [1972], Mankiw and Reis [2002]), in line with the arguments of Phelps (1967) and Friedman (1968). I refer to this as the "Friedman-Phelps" expectations-augmented Phillips curve. Based on structural Phillips curves of this type, several economists (e.g. Alogoskoufis and Smith 1991; Ball and

[2] The interwar-postwar series is from Hanes (1996). The 1890-1914 series is Rees' (1960) "nine-industry" index. Changes in industry average hourly earnings are an imperfect indicator of changes in wage rates, as they are affected by shifts in employment shares between high- and low-wage jobs, establishments and firms. The resulting measurement errors may be correlated with business cycles, as observed by Dunlop (1944:19-27). Indexes of wage rates, like the BLS Employment Cost index of our day, are not available for the 1930s.

Mankiw 2002) have argue that the shift from the original empirical Phillips curve relation to the accelerationist Phillips curve in the post-World War II era was due to a large increase in the correlation between expected inflation and recently experienced inflation. This argument is consistent with the fact that the serial correlation in inflation increased at about the same time (Barsky 1987). It is also consistent with historical changes in the behavior of long-term nominal interest rates, which should also reflect expectations of future inflation (Bordo and Dewald 2001).

A different type of structural expectations-augmented Phillips curve appears in models where there is a cost of adjusting nominal prices (Rotemberg 1982; Gertler and Leahy 2008), and in models where nominal prices can be adjusted only at certain points in time with "staggering" - different prices are adjusted at different points in time (Taylor 1980, Calvo 1983). Such models generally imply a structural relation between real activity and the spread between current inflation and *current* expectations of *future* inflation. Roberts (1995) recognized this and named the relationship the "new Keynesian Phillips curve." Based on such models, the appearance of the empirical accelerationist Phillips curve has been explained as the result of a correlation between lagged inflation and current expectations of future inflation (Ball 2000; Erceg and Levin 2002; Kozicki and Tinsley 2005; Cogley and Sbordone 2008).[3] Erceg, Henderson and Levin (1999), following Erceg (1997), show how a new Keynesian Phillips curve can hold for wages as well as prices within a model where a representative agent maximized expected utility with rational expectations. Christiano, Eichenbaum and Evans (2005) argue that application of the new Keynesian Phillips curve to wagesetting, more so than to pricesetting, is necessary to reproduce patterns in macroeconomic data. Gali

[3]This argument is trickier than in models with a Friedman-Phelps expectations-augmented Phillips curve. New Keynesian Phillips curves are usually derived within models with a representative agent who engages in dynamic optimization with discounting of future utility, and a zero-inflation long-run steady state. Erceg and Levin (2002) generate an accelerationist empirical Phillips curve in this sort of model by assuming there are long-term (but not permanent) deviations of a central bank's inflation target from the long-run steady state, and less than perfectly-rational expectations (in the conventional sense). Ascari (2004), Kozicky and Tinsley (2005) and Cogley and Sbordone (2008) show that a relation between real activity and inflation can be derived in a Calvo-type model with a positive, perhaps varying long-run steady state inflation rate, but the relationship is meaningfully different from a standard new Keynesian Phillips curve. (The coefficients on real activity and expected future inflation both depend on the trend inflation rate, and there are extra terms which can vary over time). Kozicky and Tinsely argue that the difference is not likely to be substantial as long as the positive long-run inflation rate is not too high. Ascari (2004) does not agree. Many new Keynesian models reproduce an accelerationist Phillips curve by assuming that wages or prices are indexed to lagged inflation in the periods when they cannot be fully readjusted (e.g. Christiano, Eichenbaum and Evans [2005]). But this cannot account for the appearance of the original empirical Philips curve in many historical eras. I am not aware of a new Keynesian dynamic model in which optimizing agents endogenously choose to index under some circumstances, and not index under others.

(2011) derives a wage-inflation new Keynesian Phillips curve where the real activity variable can be an unemployment rate, as well as output.

New Keynesian Phillips curve models of wage inflation have two features that offer possible explanations for the anomalous wage inflation of the 1930s.

First, standard new Keynesian wagesetting models imply an effect on wage inflation of changes in workers' market power in the form of "markup shocks," that is changes in the spread that the wagesetting process effectively seeks to maintain between wages and workers' opportunity cost of employment (Gali, Smets and Wouters 2011). A obvious source of changes in these markups is changes over time in union power (Christiano, 2011). This feature of the models allows them to depict phenomena such as New Deal policies that affected workers' bargaining power.

Second, unlike Friedman-Phelps Phillips curves, new Keynesian Phillips curves imply that current inflation can be increased by policy announcements that raise the level of inflation expected to prevail in the distant future, or equivalently the expected long-run price level. Eggertsson (2008) argues that this new Keynesian mechanism was at play in the post-1933 recovery from the Great Depression, as New Deal policies raised expected future inflation. Eggertsson and Pugsley (2006) argue that later changes in policy caused the recession of 1937, and the subsequent recovery in 1938, by weakening, then reviving expectations of future inflation. In addition to the structural new Keynesian Phillips curve, this mechanism relies crucially on sufficient degrees of policy credibility, rationality and economic knowledge on the part of the relevant agents so that they translate policy changes into changes in expectations of future inflation and real activity. Eggertsson and Eggertsson and Pugsley emphasize the mechanism's effects on real interest rates and output. But through the same mechanism, policy changes that boosted expected future inflation would create anomalies in the empirical Phillips curve relation between wage inflation and real activity.

I illustrate these points with reduced-form expressions from a standard Calvo-type model approximated around a zero-inflation long-run steady state. An assumption that wagesetters expect a zero average rate of nominal wage inflation in the very long run is not obviously implausible for the 1930s: nominal wage inflation had actually been close to zero on average over both the 1920s and the 1880s-1914.

Variables are in logs. $z$ is the total number of available workers (the labor force). Aggregate output is

$y_t = \lambda l_t$ where $l$ is aggregate employment. Following Gali (2011), labor is "indivisible:" one unit of labor means employment of one worker. The unemployment rate is approximately $u_t = (z - l)_t$. $w_j$ is the wage paid to one group of workers (or type of labor), where the number of groups is large. The wagesetting process for group *j* minimizes a loss function:

(1) $$L_t = E_t\left[\sum_{\tau=0}^{\infty} \beta^{\tau}(w_j - w_j^*)_{t+\tau}^2\right] \qquad 0 < \beta < 1$$

$\beta$ is a discount factor. $E_t$ generally denotes some agent(s) time-t expected value for a future variable, not necessarily a rational expectation. $w_j^*$ is the optimal or "desired" wage for a period. $w_j^*$ increases with the average wage level *w* and the level of real activity. $w_j^*$ also increases with a desired wage "markup" $\mu_j$ over the opportunity cost of labor which may vary across worker groups and time. Thus:

(2) $$w_{jt}^* = w_t - \gamma u_t + \mu_{jt} = w_t + \tfrac{\gamma}{\lambda}(y - \lambda z)_t + \mu_{jt}$$

In most new Keynesian models relationships corresponding to (1) and (2) are derived from obviously unrealistic assumptions, in order to fit into a dynamic representative-agent setting (e.g. Erceg, Henderson and Levin 2000; Erceg and Levin 2003; Gali 2011). But (2) is consistent many other types of employment models including efficiency-wage, insider-outsider and union-bargaining models (Summers 1988). Gali (2016) is a version of an insider-outsider model within a new Keynesian setting.

The natural rate of unemployment is the rate that would prevail in the absence of constraints that generate nominal wage rigidity. It is defined by setting $w_t$ equal to an average of $w_{jt}$'s:

(3) $$u_t^n = \mu_t / \gamma$$

where $\mu_t$ is a corresponding average of $\mu_{jt}$'s. The natural rate of output, defined in the same way, is $y_t^n = \lambda(z_t - \gamma^{-1}\mu_t)$.

In each period there is a fixed probability $\alpha$ that a group's wage $w_j$ can be adjusted. Otherwise it cannot be changed from its value in the previous period. Minimizing (1) subject to this constraint, taking linear approximations around a long-run steady state with zero wage inflation, gives the new Keynesian Phillips curve relation between wage inflation, expected future wage inflation, and the "real activity gap":

(4) $$\Delta w_t = \theta\, s\,(x - x^n)_t + \beta E_t\left[\Delta w_{t+1}\right] \quad \textit{where} \;\; \theta = \frac{\alpha}{1-\alpha}\left(1-\beta-\beta\alpha\right)$$

For unemployment, the "real activity gap" $(x - x^n) = (u - u^n)$ and $s = \gamma / \lambda$ . For output, the real activity gap $(x - x^n) = (y - y^n)$ and $s = -\gamma$. Adam and Padula (2011) show that (4) does not require fully rational expectations. It requires a weaker condition, the "law of iterated expectations": agents do not forecast future-period changes in expected values for variables prevailing in further-future periods.

Solving back from the long-run steady state:

(5) $$\Delta w_t = \theta s (x - x^n)_t + \theta s E_t\left[\sum_{\tau=1}^{\infty} \beta^\tau (x - x^n)_{t+\tau}\right]$$

Current wage inflation is equal to a coefficient on the current real-activity gap, plus a coefficient on the discounted future cumulative real-activity gap.

Under plausible conditions expression (5) generates an empirical Phillips curve like that apparent in Figure 1 for years outside the 1930s. Suppose one has a time series that is fairly well correlated with a real-activity gap, such as an estimate of the unemployment rate, or a deviation of an output measure from a long-run trend. Let $(\tilde{x} - \tilde{x}^n)$ denote this series. Suppose also that there is strong serial correlation in the true real-activity gap, so that it can be *approximately* described as AR(1) with serial correlation coefficient $\rho$. This is plausible because, in macroeconomic data, variables such as unemployment rates, industrial production and real GDP can be described pretty well as AR(1) (e.g. Faust and Wright 2007). Let $e_{t+\tau}^{x-x^n}$ denote the difference between the AR(1) forecast for the real-activity gap in future period $(t+\tau)$ , and wagesetting agents' *actual* forecast of the real-activity gap in period $(t+\tau)$. Then:

(6) $$\begin{aligned} \Delta w_t &= \phi(\tilde{x} - \tilde{x}^n)_t + \epsilon_{1t} + \epsilon_{2t} \quad \textit{where} \quad \phi = \theta s / (1 - \beta\rho) \\ \epsilon_{1t} &= \phi[(x - x^n) - (\tilde{x} - \tilde{x}^n)]_t \\ \epsilon_{2t} &= \theta s \sum_{\tau=1}^{\infty} \beta^\tau e_{t+\tau}^{x-x^n} \end{aligned}$$

$\epsilon_1$ reflects the error in the time-series meaasure of the real-activity gap. $\epsilon_2$ reflects the error in the AR(1) process as a description of wagesetting agents' forecasts for future real-activity gaps. If $\epsilon_1$ and $\epsilon_2$ are not too correlated with $(\tilde{x} - \tilde{x}^n)$, one will observe an empirical Phillips curve of the original form. Extraordinarily

large, positive values of $\epsilon_1$ and/or $\epsilon_2$ in a period will be observed as anomalously high wage inflation relative to an empirical Phillips-curve relationship observed outside those periods.

$\epsilon_1$ can fluctuate due to fluctuations in the average desired wage markup $\mu$. Recall the unemployment-rate gap is $(u-u^n)_t = (u_t - \mu_t / \gamma)$. The output gap is $(y-y^n)_t = (y_t - \lambda(z_t - \gamma^{-1}\mu_t))$. An increase in $\mu_t$ that is not immediately captured by the series for the real-activity gap means an increase in $\epsilon_1$. That is to say, an increase in $\mu$ raises the natural rate of unemployment and lowers the natural rate of output. If this is unaccounted for by the available measure of the real-activity gap, it appears as anomalously high wage inflation.

$\epsilon_2$ can fluctuate as a result of changes in economic policy that have implications for the long-run steady-state wage level. Solving back from the long-run steady state as for (5), wage inflation can also be described as:

$$\Delta w_t = \theta s(x-x^n)_t + E_t\left[\sum_{\tau=1}^{\infty}\beta^{\tau}\Delta w_{t+\tau}\right] = \theta s(x-x^n)_t + (E_t[w^{SS}] - w_t)E_t\left[\sum_{\tau=1}^{\infty}\beta^{\tau}q_{t+\tau}\right] \tag{7}$$

where $E_t[w^{SS}]$ is the expected long-run steady-state wage level. $q_{t+\tau}$ is the fraction of the difference between $E_t[w^{SS}]$ and the current wage level $w_t$ that is expected to be made up in period $(t+\tau)$. If expectations are sufficiently rational there is a necessary relationship between the expected discounted cumulative real-activity gap in (5) and the expected long-run nominal wage level in (7).

The meaning of this relationship depends on the economic regime. In an economy with interest rates set by a central bank, an inflation target and a floating exchange rate, the long-run nominal wage level is not tied down. In standard new Keynesian models of such economies, the realized long-run nominal wage level will depend on future realizations of shocks to productivity, fiscal and monetary policy, etc. The expected steady-state wage can change from period to period.

In an economy where authorities target the price level, the long-run wage level will be pinned down by the price-level target together with the long-run level of the real wage. The latter is presumably determined by factors outside the control of a country's policymakers such as domestic labor productivity, product-market markups and the terms of foreign trade. Thus, a credible policy announcement that implies a

higher long-run price level can have an immediate effect on current wage and price inflation. In (7), it raises $E_t[w^{SS}]$. In terms of (6), such an announcement creates a commitment by the authorities to cause (or allow) higher real activity at some point(s) in the future. That means increase(s) in $e^{x-x^n}$ for some future period(s), which increases $\epsilon_2$. Based on this logic, in recent years many economists recommended replacement of inflation targets with price-level target (or targets for nominal GDP, which imply targets for the price level given trend real growth) as a monetary-policy strategy for countries where real activity was too low, but short-term nominal interest rates could be lowered no further because they were at a lower bound, in a "liquidity trap." By creating current inflation, this could cut current real short-term interest rates and stimulate real activity.

Another way to use the same mechanism would be to announce adoption of fixed exchange rates, which pin down long-run wage and price levels given future foreign wages and prices. Commitment to a sufficiently depreciated set of foreign exchange rates can raise $E_t[w^{SS}]$ just like a price-level target. Based on this logic Svensson (2003:155) recommended adoption of depreciated fixed exchange rates as a way to boost current inflation and escape a liquity trap, as exchange-rate target "serves as a conspicuous commitment to a higher price level in the future."

Of course, this mechanism relies not only on the existence of a new Keynesian Phillips curve like (5), but also the credibility of the policy announcement and the rartionality of expectations, in the conventional sense. The public (or at least members of the public whose beliefs affect wagesetting) must understand that a peg to a depreciated exchange rate requires a central bank to accept (or engineer) a future spell of inflation. The mechansm would fail - wage inflation would not be immediately affected by the announcement - if agents' expectations were based on experienced relationships between macroeconomic variables (Mitra and Honkapohja 2014) rather than inference from the correct economic model.

**3) New Deal policies, expected future inflation and wage mark--ups**

Several New Deal policies announced over 1933-39 had implications for the long-run future nominal wage level. Thus, they might be able to account for the era's Phillips-curve anomalies through the new Keynesian expectations mechanism. Other policies created minimum wages and boosted workers' bargaining power. In just about any view of wage determination, these policies would be expected to affect

wage inflation. In new Keynesian models such as the simply model presented above, they correspond to wage mark-up shocks. In this section, I describe these two sets of policies and their timing.

### 3.1 Background: the late 1920s and the downturn of the Great Depression

In the late 1920s there were no Federal minimum-wage laws. State minimum-wage laws were generally undercut by court decisions. Agreements between employers and labor unions were not enforcable by the legal system. During the First World War, union membership had grown enormously and many employers began to bargain with unions, while the Federal government adopted several policies supporting union power. But in the early 1920s union membership and the fraction of employers bargaining with unions had fallen off sharply, especially during the cyclical downturn of 1920-21. By the late 1920s union membership as a fraction of workers in relevant sectors was about the same as it had been before the First World War (Lewis 1963 Table 51).

The U.S. and most of its international trading partners were in an international gold standard system. Monetary authorities exchanged currency and central bank reserve deposits for a fixed quantity of gold, effectively fixing international exchange rates. Authorities covered deficits in the balance of payments with outflows of monetary gold and/or sales of official foreign-asset reserves. Authorities facing a persistent balance-of-payments deficit would eventually have to raise local interest rates, depressing real activity. The resulting capital inflows and decrease in imports would improve the balance in the short run. In the long run, the disinflation or deflation associated with depressed real activity would decrease the country's relative wage and price level, devaluing its real exchange rate. A country with a balance-of-payments surplus was supposed to do the opposite, according to the gold standard's "rules of the game." In their classic form, the rules barred persistent accumulation of foreign reserves or sterilization of gold inflows so that a balance-of-payments surplus would automatically boost its high-powered money supply and hence reduce its short-term interest rates. Ultimately, a country's long-run price level would be determined by its currency's gold content and the gold price level of tradable goods. The gold price level depended in turn on the balance of world gold supply against gold standard countries' demand for gold reserves (as distinct from reserves of foreign assets). In the United States, most economists and writers in business publications thought about the price level in these terms. They assumed the dollar's gold value would remain fixed and forecast a stable or slightly decreasing price level based on the balance of world gold supply and demand (Nelson, 1991: 6-7).

In fact, many countries with persistent balance-of-payments surpluses accumulated reserves of foreign assets or increased gold reserves rather than allow domestic inflation to take place. One of these was the U.S. In the late 1920s the Federal Reserve system was in charge of America's gold reserves as well as domestic monetary policy. Fed staff monitored measures of domestic prices and economic activity. In decisions about discount rates and open-market operations, Fed policymakers aimed to keep inflation low, stabilize output and forestall financial-market bubbles. This usually required them to sterilize gold inflows and accumulate reserves (Meltzer, 2003: 169,209,230). Fed policymakers did not have a shared, coherent view of monetary policy, but one could argue they followed the Taylor rule rather than the gold-standard rules of the game (Orphanides, 2003).

In 1928 and early 1929 Fed policymakers raised American overnight rates (fed funds and call money) sharply through a combination of discount-window credit rationing, discount-rate hikes and open-market operations that drained reserve supply. Their goal was to reduce stock prices, which they believed to have been inflated by a bubble. In response to the hike in American short-term rates, central banks in other gold standard countries had to hike their own short-term interest rates to avoid drains of gold and/or foreign-asset reserves. In many countries, real activity slowed, then fell. In the U.S., real activity turned down from a cyclical peak in August 1929 (NBER chronology). The stock market crashed in October 1929, while real activity continued to fall. As shown in Figures 1 and 2, wage inflation fell, very much in line with the Phillips-curve relationship observed in other eras. Under the Hoover administration there were no substantial innovations in laws affecting employment or unions. Hoover held conferences in which he exhorted large employers not to cut wage rates, but these conferences had no apparent effect on aggregate wages (Rose 2010).

American short-term interest rates fell steadily after 1929 as the Federal Reserve system cut discount rates, purchased Treasury bonds in open-market operations and refrained from sterilizing gold inflows, except for a spell of tightening in 1931. By early 1934, overnight rates had fallen to floors determined by lenders' transaction costs, while there was no demand for funds at these rates, so that the return to overnight lending was effectively zero: the U.S. was in a liquidity trap (Hanes, 2006).

In the outside gold-standard world, meanwhile, gold demand had increased sharply after 1929 due to widespread runs on banks and currencies. In any gold-standard country, output and employment could

remain at the natural rate only if there was a massive deflation of wages and prices, or a devaluation of the currency relative to gold (Temin, 1989; Eichengreen, 1992; Bernanke, 1995; Bernanke and Mihov, 2000). Britain devalued early on, in 1931, but many others, including France and the Netherlands, held to their 1929 gold values until autumn 1936 (Clarke, 1977; Eichengreen and Sachs, 1985). When countries did devalue, they did not allow exchange rates to float. Instead they continued to peg against gold, or (like Britain) held exchange rates within fairly tight bands.

### 3.2 Monetary policies that may have affected expected future wage levels

In the U.S., the new Roosevelt administration introduced a number of policy innovations which, in the context of the gold standard, could be taken to imply a higher future level of nominal wages and prices in the U.S. Coming out of the Bank Holiday in April 1933, the new Roosevelt administration ordered the Treasury and banks to cease paying out gold for currency and deposits, ordered Americans to sell privately held monetary gold to the government, and allowed the dollar to float against gold in foreign markets. In May 1933 Congress passed the Thomas amendment to the Agricultural Adjustment Act, which was "explicitly directed at achieving a price rise through expansion of the money stock" (Friedman and Schwartz, 1963, p. 465). Roosevelt began to state clearly that his administration intended to "reflate" prices to their pre-Depression level. In his second "fireside chat" on May 7th, Roosevelt said "The Administration has the definite objective of raising commodity prices to such an extent that those who have borrowed money will, on the average, be able to repay that money in the same kind of dollar which they borrowed." In June 1933 Congress passed legislation abrogating financial contracts that required payment in gold at the old parity. Roosevelt sent representatives to an international economic conference in London that was called to promote restoration of gold convertibility at the old exchange rates. But "while it was in process, the President apparently decided definitely to adopt the path of currency depreciation" (Friedman and Schwartz, 1963: 469). At the beginning of July 1933 he sent a message to the conference disavowing its aims.

In a fireside chat on October 22nd 1933, Roosevelt gave perhaps his most explicit and detailed statement of support for a higher future price level:

> I repeat what I have said on many occasions, that the definite policy of the Government has been to restore commodity price levels. The object has been the attainment of such a level as will enable agriculture and industry once more to give work to the unemployed. It has been to make possible the payment of public and private debts more nearly at the price level at which they were incurred. It has

> been gradually to restore a balance in the price structure so that farmers may exchange their products for the products of industry on a fairer exchange basis. It has been and is also the purpose the prevent prices from rising beyond the point necessary to attain those ends...Obviously..we cannot reach the goal in only a few months. We may take one year or two years or three years...When we have restored the price level, we shall seek to establish and maintain a dollar which will not change its purchasing and debt paying power during the succeeding generation.

In January 1934, the Gold Reserve Act allowed Roosevelt to fix a new gold value for the dollar, depreciated about 40 percent from its pre-1933 value. Over January and February 1934 Treasury purchases of gold in foreign markets drove the dollar down to the new rate. The dollar was not devalued again in the 1930s (and for a long time afterwards) but at times another devaluation was widely viewed as possible (Clarke, 1977: 11).

Roosevelt and other supporters of reflation believed (or at least hoped) devaluation would promote reflation and reflation would promote recovery. But it is not clear what channels they had in mind. Roosevelt took counsel from many economists and financiers. Some strenuously opposed devaluation and reflation. Roosevelt's actions were most consistent with the ideas of Cornell economist George F. Warren. Warren understood that under a gold standard each country's price level was determined by its currency's gold value, and that prices of internationally-traded agricultural commodities were set in world markets so their prices in any one country would respond immediately to a change in the currency's gold value (Warren and Pearson, 1933). Warren believed that the structure of relative prices had been disturbed after 1929 because prices of internationally traded agricultural commodities had plummeted but "sticky" prices of domestic manufactured goods had not. In the words of Warren's colleague and co-author, Frank Pearson (1957: 5671), "The problem..was to deflate the high, sticky prices down to the level of the low, flexible prices or to inflate the low, flexible prices up to the high, sticky prices. There was no other alternative..F.D.R. had plenty of advice on what should be done. One group proposed that the process of deflation should be completed; their remedy, completion of deflation, would have been politically unacceptable. Dr. Warren had the correct remedy: the equilibrium should be restored by inflating the flexible relative to the sticky prices by raising the [dollar currency] price of gold."

Real activity had in fact turned up from a cyclical trough in March 1933 (NBER chronology). The upturn appears in the FRB's monthly IP index, plotted in Figure 3 along with the annual-frequency measure

of unemployment I used earlier. The turnaround was perceived at the time. Businessmen expected it to continue.[4]

Some economists have argued that devaluation of the dollar along with Roosevelt's rhetoric about reflating the price level indeed raised the public's expectations for the future price level. Temin and Wigmore (1990: 485) argue that "The devaluation of the dollar was the single biggest signal" of a change in regime that should have affected inflation expectations: "Devaluation...sent a general message to all industries because it marked a change in direction for government policies and for prices in general." Based on analysis of contemporary newspaper articles and business publications, Jalil and Rua (2016: 33) argue that expected future inflation rose sharply over the first six months of 1933, then there was "a sudden moderation of inflationary expectations after July 1933 due to mixed messages from the Roosevelt administration" which "hinted that because the recovery was proceeding so smoothly and the National Industrial Recoovery Act (NIRA) was about the be implemented, it no longer considered inflation necessary." These authors argue further that real activity turned up the March 1933 trough largely due to an increase in inflation expectations around that time. There are alternative explanations of the timing, of course, most obviously the national bank holiday in March 1933, which meant a nearly complete shutdown of credit provision and the payments system, followed by the re-opening and re-capitalization of banks starting in late March 1933. James, McAndrews and Weiman (2013) argue that the less severe bank shutdowns in pre-1914 financial crises had very substantial real effects.

From 1934 through the end of the 1930s the U.S. usually ran a balance of payments surplus and accumulated monetary gold, as it had in the 1920s. Under new institutional arrangements gold was purchased from foreign sellers by the Treasury rather than the Fed. The Treasury also bought gold and silver from domestic mines. Through summer 1936, American policymakers allowed these specie purchases to boost the high-powered money supply. From January 1934 to December 1936 the high-powered money supply increased about 63 percent. Romer (1992, p. 176) argues that due to subsequent high-powered money growth

[4] In this era, railroad managers' associations surveyed freight customers on a quarterly basis to get their plans for rail shipments in the upcoming quarter. Customers reported their planned volumes of shipment for the next quarter as percent increases over the same quarter in the previous year. Suitably aggregated reports from manufacturing firms, given by Hart (1960), indicate their production plans for the upcoming quarter. Since early 1929, manufacters' production plans for coming quarters had embodied decreases in planned output from the same quarter of the previous year (and realized output had always been even lower than planned). Starting in the first quarter of 1933, manufacturers began to plan increases in production over the previous year. See especially Chart 2, p. 210.

"consumers and investors realized that prices would have to rise eventually and therefore expected inflation over the not-too-distant horizon." As the economy recovered, some high-powered money growth went to accommodate increasing demand for currency, but most went into banks' excess reserves. In 1935 and 1936 Federal Reserve policymakers began to push for a hike in reserve requirements to soak up excess reserves. They feared that the buildup of excess reserves could allow a burst of uncontrollable inflation to take place in the future (Goldenweiser 1951: 175-82).

In July and December 1936 occurred policy actions that could have been interpreted as reneging on a commitment to reflate the price level. In July 1936 the Fed announced a hike to take effect in August. In January 1937 the Fed announced that more hikes in reserve requirements would occur in March and May 1937. Meanwhile, in December 1936 the Treasury announced it would sterilize gold inflows. It began to do so immediately. According to the NBER chronology, real activity turned down in June 1937 (cyclical peak May 1937). Eggertsson and Pugsley (2006) argue that the changes in monetary policy caused the downturn through the the new Keynesian expected-inflation mechanism.

In 1937 these actions began to be reversed, which might have been taken as a return to a reflation commitment. Fed and Treasury officials had observed signs of a slowdown in economic growth before that. In March 1937 the Treasury bought bonds; in April the Fed announced that, for the first time since 1933, it would buy bonds to boost reserve supply (Blum 1959: 269-375; Gordon and Westcott 1937: 107). In September 1937 the Fed announced more bond purchases "for the continuation of the System's policy of monetary ease" (Blum, 1959: 378) and the Treasury announced it would boost the money supply by creating gold certificates against part of its stock of inactive gold (Johnson 1939: 137). In February 1938 the Treasury announced that a limited volume of current gold purchases would be allowed to boost the money supply (Crum, Gordon and Westcott 1938b: 93). In April 1938 FDR announced that all sterilized gold and all future gold inflows would be released into the money supply, and reserve requirements would be reduced immediately (Crum, Gordon and Westcott 1938b:94; Blum 1959:425). Real activity turned up from a cyclical trough in June 1938.

**3.3 New Deal labor policies**

The National Industrial Recovery Act (NIRA), passed in June 1933, applied to nearly all nonagricultural employers. The NIRA affected wages directly through the employment provisions of

industry “codes,” which included industry-specific minimum wage rates. According to all accounts adoption of minimum wages raised wages of all workers because employers generally attempted to maintain pre-existing differentials. The first industry code, in cotton textiles, came into effect in July 1933 and was estimated to raise industry average wage rates substantially (Sachs, 1934: 147). At the end of July 1933 Roosevelt “invited” nearly all nonagricultural employers in industries that had not yet adopted their own codes to sign the “President’s Re-Employment Agreement,” known as the “blanket code.” Its provisions required most employers to raise wages. It came into effect in August. The blanket code fixed minimum hourly wage rates, maximum weekly hours and minimum weekly earnings, and required "equitable" maintenance of differentials above the minimums for higher-paid workers (Sachs 1934, 131). Between August and December 1933 industries representing the bulk of employment adopted their own industry codes; by June 1934 all industries had been codified (United States 1935: Chart 36). Industry codes created pay hikes beyond those associated with the blanket code. They required more wage hikes and changes in compensation policies such as premium pay for overtime (Schoefeld, 1935; Weinstein, 1980, 9; 17; 47).

In addition to (but interacting with) setting up the code process, the NIRA stated that employees had a right to organize for collective bargaining. The enforcement agency established by the NIRA, the National Recovery Administration (NRA), took months to work out what this meant in specific regulations and to create institutional structures to enforce them. But as soon as June 1933 and July, auto manufacturers began to give raises to "improve their bargaining power in code negotiations" (Fine 1963: 125). Though the NIRA required employers to negotiate with employee representatives, it was not clear that this meant independent unions. Auto industry executives wanted NRA administrators to allow the industry to remain nonunion. They gave raises immediately to demonstrate unions were not needed (Fine 1963: 48-49, 444 note 12). Workers immediately understood the NIRA to bar employers from replacing strikers or firing employees attempting to organize a union. Figure 4 plots the number of workers involved in strikes beginning in each month. It shows an enormous increase in strikes from May to June 1933, immediately on passage of the NIRA.

The NIRA was declared unconstitutional in May 1935 but most of its pro-union elements were re-established and strengthened by the Wagner Act (National Labor Relations Act) passed in July 1935 (Mills and Brown 1950). In November 1936 "The overwhelming Roosevelt victory" in the presidential election "led employers to expect aggressive organizing drives by trade unions...wage rates were influenced

by the large number of industrial disputes and by the efforts of employers to forestall unions by making concessions" (Slichter 1938: 98-99). Figure 4 shows another enormous increase in strikes around November 1936. In April 1937 the Supreme Court ruled the Wagner Act constitutional, and many companies that had so far refused to bargain with elected unions gave in (Fine, 1963: 415; Schatz, 1983: 70). Estimates of union membership, which are annual (and imperfect), are plotted in Figure 4. They indicate enormous increases in union density from 1936 to 1937 and again from 1937 to 1938.

It is important to keep in mind that workers' bargaining power increased even in establishments that were not formally unionized. Many firms that remained nonunion through the late 1930s raised wages at times over 1934-1938 to forestall union threats. As of March 1934 the auto industry was still not unionized, formally. No union had signed up a majority of workers in any auto firm. Neither automakers nor the NRA had recognized any union as a bargaining agent for worker. But in that month auto manufacturers gave a general ten percent wage increase "with a view to strengthening their position with the administration, their workers, and the public at a time when the A.F. of L. federal labor unions in their plants, for whose existence the N.I.R.A. was largely responsible, were threatening an industry-wide strike" (Fine, 1963:125,142). In March 1937 the nonunion Westinghouse Corporation raised wages in response to General Electric's recognition of a union (Schatz 1983: 67). The Allis-Chambers Corporation did not have an NLRB-certified union until 1938, but in April 1936 "The impact of increasing union pressure on the company was obvious" and it granted substantial bonuses (Peterson 1976:322). Most International Harvester plants were not unionized until 1941, but the company gave a number of company-wide wage hikes in 1935 and 1936 to discourage unionization (Ozanne, 1967: 148, 178, 179).

**4. Timing of wage inflation anomalies versus the two types of policy events**

Which policy innovations best explain the wage-inflation anomalies apparent in Figure 1: labor-market policies that boosted workers' bargaining power and set minimum wages, or news about monetary policies that could have boosted the expected future wage level? To answer this question I examine 1930s wage data at the shortest available frequency, which is monthly. I determine the monthly timing of wage-inflation anomalies by estimating empirical Phillips-curve relationships in monthly data from post-World War II eras unaffected by wage and price controls. I apply estimated postwar coefficients to interwar real-activity series to make "projections" of wage inflation starting in January 1929, based on

postwar Phillips-curve patterns. Big deviations of actual 1930s wage inflation from projected paths are the monthly anomalies to be explained. I compare the timing of these anomalies with the timing of the two sets of policy events.

**4.1 Data**

Series on average hourly earnings (AHE) in manufacturing are the highest-frequency indicators of wage changes in the 1930s that are comparable to wage-related data from other eras. They can be compared with series from the post-World War II era. Unfortunately, there are no comparable series from pre-1914 eras, so I can compare 1930s movements in wage inflation *only* with postwar Phillips-curve patterns. Hanes (1996) matched 1930s industries to industries in postwar data and applied fixed industry weights to construct a monthly manufacturing AHE series that is consistent from the 1920s through 1990.

The only monthly time-series indicator of real activity from the 1930s that can be compared with postwar series is industrial production (IP). (There are no reliable monthly or quarterly estimates of unemployment or real GDP from the 1930s.) To indicate the level of real activity, I use the deviation of monthly IP from a trend. It is tricky to define trends for the Great Depression era. It is clearly inappropriate to use a Hodrick-Prescott trend with conventional parameters, or a loglinear trend estimated on the interwar era alone: either of those trends would imply real activity was back to "normal" or even above normal by the mid-1930s, which would be inconsistent with anyone's view of the Great Depression and with all unemployment estimates. I follow Romer (1989) and Balke and Gordon (1989) and define trends by loglinear interpolation between benchmark "normal" years. Both authors span the Depression era with benchmarks at 1924 and 1947. Through the rest of the postwar era they use 1955, 1962, 1972 and 1981. I use the same benchmark years, plus 1990 (which contains an NBER cyclical peak, in July). Using 1941 rather than 1947 to span the Great Depression gave very similar results.

**4.2 Estimated postwar Phillips curves and projections**

To make monthly projections, I ran this regression on postwar data:

$$(8) \qquad w_t - w_{t-12} = c - a\, IP_t^{GAP} + b_1(w_{t-12} - w_{t-24}) + b_2(w_{t-24} - w_{t-36})$$

where $t$ is a month. $w$ is the log of the AHE series. $IP^{GAP}$ is the deviation of the log of the Federal Reserve index of industrial production from a striaght-line trend between benchmark-year values. Note that I use the

change in the log of the AHE series from the same month in the prior year, rather than month-to-month changes. Month-to-month changes would be sensitive to precise definition of seasonals. There is good reason to believe NRA code adoption affected AHE seasonals strongly. (Many codes introduced worksharing, stabilization of hours and premium pay, among other things). To avoid months affected by wage and price controls, my postwar sample runs from March 1955 through July 1971 and from May 1976 through December 1990.[5] The estimated values are:

$$(9) \quad w_t - w_{t-12} = 0.0044 + 0.1368\, IP_t^{GAP} + \ 0.5627\,(w_{t-12} - w_{t-24}) + 0.3007(w_{t-24} - w_{t-36}) \qquad R^2 = 0.73$$

I apply these coefficient to monthly values of $IP^{GAP}$ in the 1930s, in two ways. For one set of projections I apply the cofficients on lagged inflation. For the other, to deal with the possibility that the accelerationist Phillips curve is not the right specification for the 1930s, I set coefficients on lagged inflation equal to zero. I start projections at January 1929. The projections using lagged inflation jump off from actual wage inflation in 1927 and 1928. From 1930 on the lagged inflation rates entering projections are lagged projections.

There are, of course, many other reasonable specifications of empirical Phillips curves and postwar samples I could have used. I welcome suggestions. Postwar samples after 1990 would generally give smaller coefficients on real activity (Blanchard 2016). This particular specification has some virtues, however. It is transparent and similar to specifications used in other studies (e.g. Akerlof, Dickens and Perry 1996). It is consistent with standard new Keynesian structural Phillips curves, but also consistent with other theoretical approaches. Within the postwar sample it gives more or less unbiassed projections of wage-inflation slowdowns in cyclical downturns. Within the interwar era, the projected paths it gives for wage inflation are extremely close to actual wage inflation from 1929 through 1932. That is consistent with the annual unemployment-rate Phillips curves plotted in Figure 1, which show that wage inflation 1929--32 was very much in line with patterns from other eras.

### 4.3 Anomalies in monthly wage movements

Figure 4 plots projected and actual 12-month wage inflation, at a monthly frequency, after seasonally

[5] Korean War controls were lifted in February 1953, plausibly affecting the rate of wage inflation from 1953 to 1954. With two years' lags in my specification, I begin with 1956. The Nixon controls held in one form or the other from August 1971 through April 1974 (affecting wage inflation from 1974 to 1975). Rockoff (1984) gives chronologies of the Korean and Nixon controls.

adjusting actual and projected wage inflation (with X-11). Figure 5 plots the *level* of the actual AHE series. As noted above, industry-level AHE series like those making up the AHE series can reflect many things other than wage rates (the distribution of workers across a given firm's wage structure, the distribution of employment between high- and low-wage firms, the fraction of hours paid at premium rates). To make sure that the apparent monthly changes in AHE series reflected actual changes in wage rates, not other factors, I compare it with the "wage index" also plotted in Figure 5. Creamer (1950) constructed this wage index from information the BLS collected from the early 1920s through October 1935. In this era the BLS asked respondents to its monthly survey of manufacturing establishments to report actual changes in wage rates (the number of employees affected by wage rates and the percent changes in their wage rates), in addition to total payrolls and employment (from which AHE series are calculated). Unfortunately, this 1930s wage-change index has no counterpart in other eras.

Together, figures 4 and 5 show the months in which the wage inflation anomalies of 1933-35 occurred. In figure 4, through July 1933 actual 12-month wage inflation remains close to the Phillips-curve projections - actually below the projection without lagged-inflation coefficients. Wage inflation turned up in July, but the projections indicate that can be accounted for by the upturn in real activity that began after March 1933. 12-month wage inflation rates soared above projected values from August 1933 through June 1934, then dropped down. From late 1935 through most of 1936 actual wage inflation was actually quite close to the projection with lagged-inflation coefficients set to zero. Starting in November 1936 actual wage inflation again soared above projections. Looking at figure 5, it is clear that the anomalous wage inflation starting around July 1933 reflects an enormous hike in the wage level from July to August 1933 and continuing wage hikes until June 1934. These big hikes appear in the wage index as well as AHE. From June 1934 on the wage level remained nearly stable until November 1936. Then there was another spell of wage hikes that continued until September 1937.

This timing of wage-inflation anomalies is entirely consistent with effects of labor policies. Recall the NRA blanket code took effect in August 1933, and strikes increased enormously from April 1933 through September 1933. The later wage-inflation increase around November 1936 was coincident with another wave of strikes, as well as formal union organization.

The timing of wage-inflation anomalies is less consistent with effects of changes in expected inflation

through the new Keynesian channel. There were several inflation-related policy changes and announcements prior to the big pick-up in wage inflation in August 1933 (including the cessation of gold payments in March 1933 and the Thomas inflation amendment to the AAA) which one might expect to have some effect on wage inflation if the expected-inflation channel were operative. Recall that Jalil and Rua (2016) concluded that the public's future-inflation expectations rose sharply over the first half of 1933 and *moderated* after July 1933. The anomalous pickup in wage inflation beginning in November 1936 is especially hard to explain with changes in inflation expectations. It occurred within the period when monetary policy was being tightened, between the announcement of reserve-requirement hikes in July 1936 and the beginning of gold sterilization in December 1936. Wage inflation moved back towards the projected paths while monetary policy was loosening again in late 1937 and 1938.

Further evidence that the anomalous wage inflation of 1936-37 was due to unionization can be found by comparing AHE in different sectors. The wave of unionization over the 1930s was largely confined to manufacturing, mining and transportation (Lewis, 1963). If 1936-37 inflation was in fact due to an increase in wage markups, it should be concentrated in manufacturing establishments specifically. That should boost manufacturing wages relative to wages in sectors that did not unionize. In 1935 the BLS began to collect data to construct average hourly earnings from establishments in a few mostly-nonunion sectors: wholesale and retail trade, hotels and laundries. Figure 5 plots the ratio of the manufacturing AHE series to a fixed-weight average of the available nonmanufacturing earnings series. This ratio increases at the same time the anomaly appears in manufacturing wage inflation.

**5. Conclusion**

The exact timing of wage-inflation anomalies over 1933-38 is entirely consistent with effects of New Deal policies that created minimum wage rates and boosted workers' bargaining power. Many monetary-policy announcements that could be taken to imply a higher long-run wage and price level were not accompanied by wage-inflation anomalies. I conclude that the correct explanation for anomalous wage inflation in the recovery from the Great Depression is the simple one: New Deal labor policies. There is nothing for alternative theoretical constructs to explain. There is no evidence from the 1930s that the new-Keynesian expected-inflation channel works in reality. The experience of the 1930s does not support arguments that policymakers can use the new Keynesian expected-inflation channel to affect current inflation

and real activity with policy changes such as adoption of price-level targets or depreciated fixed exchange rates.

That said, one cannot conclude that the experience of the 1930s gives evidence *against* the new Keynesian Phillips curve. New Keynesian models imply that New Deal labor policies were wage mark-up shocks that *should* have created anomalies in empirical Phillips curves. There are many possible reasons Roosevelt's devaluation of the dollar and announced commitment to reflate the price level might have failed to affect current wage inflation, even if expectations of the long-run future wage level affect current wage inflation as in the model. Perhaps Roosevelt's announcements were not credible. Perhaps the expectations of the particular people who matter for the wagesetting process were not sufficiently rational or well-informed.

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Figure 1 Wage inflation and unemployment, annual 1891-1914, 1924-1940, 1954-1965

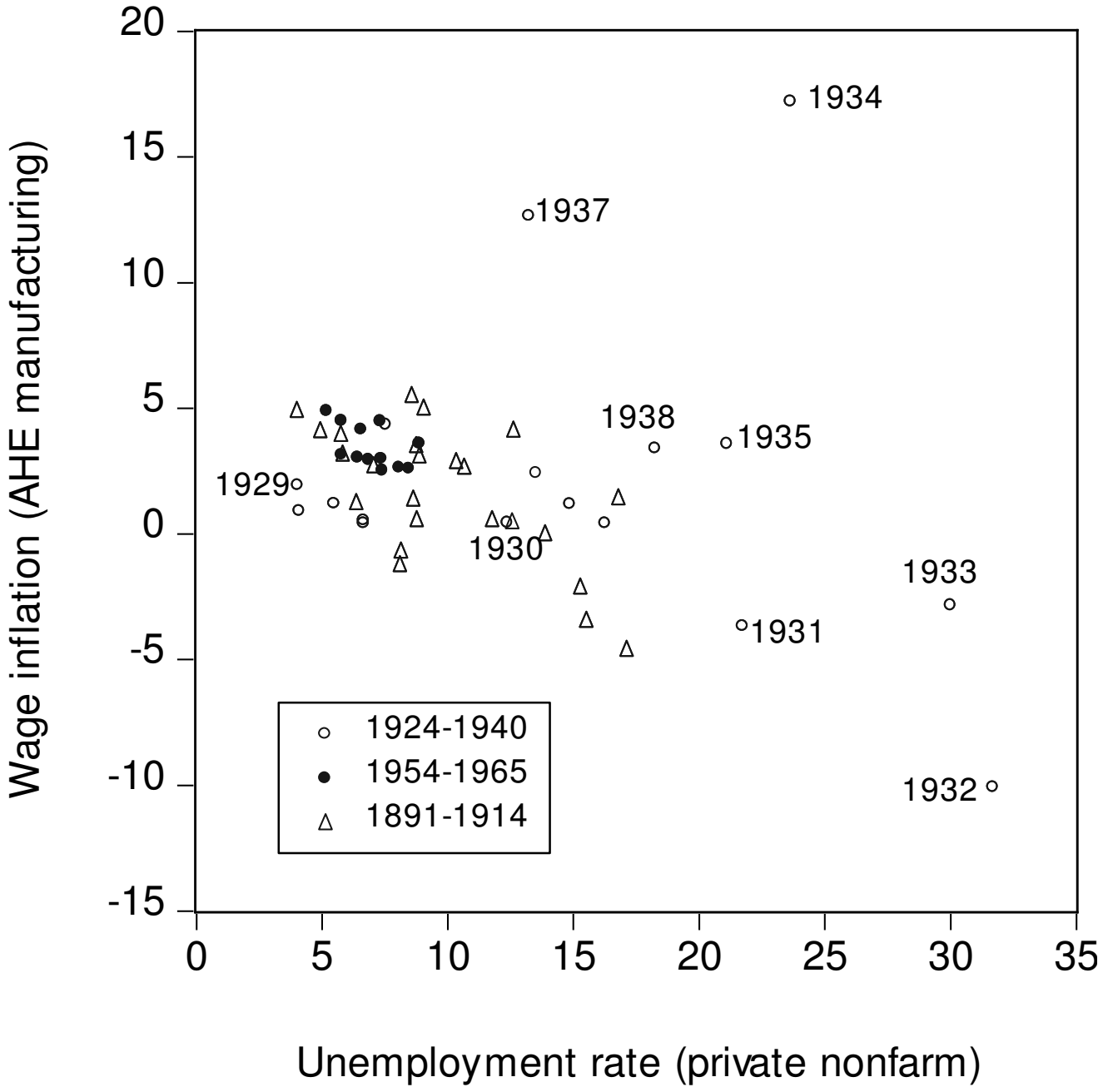


Figure 2 Deviations from Phillips Curve Forecast 1891-1914, 1924-1940, 1954-1965

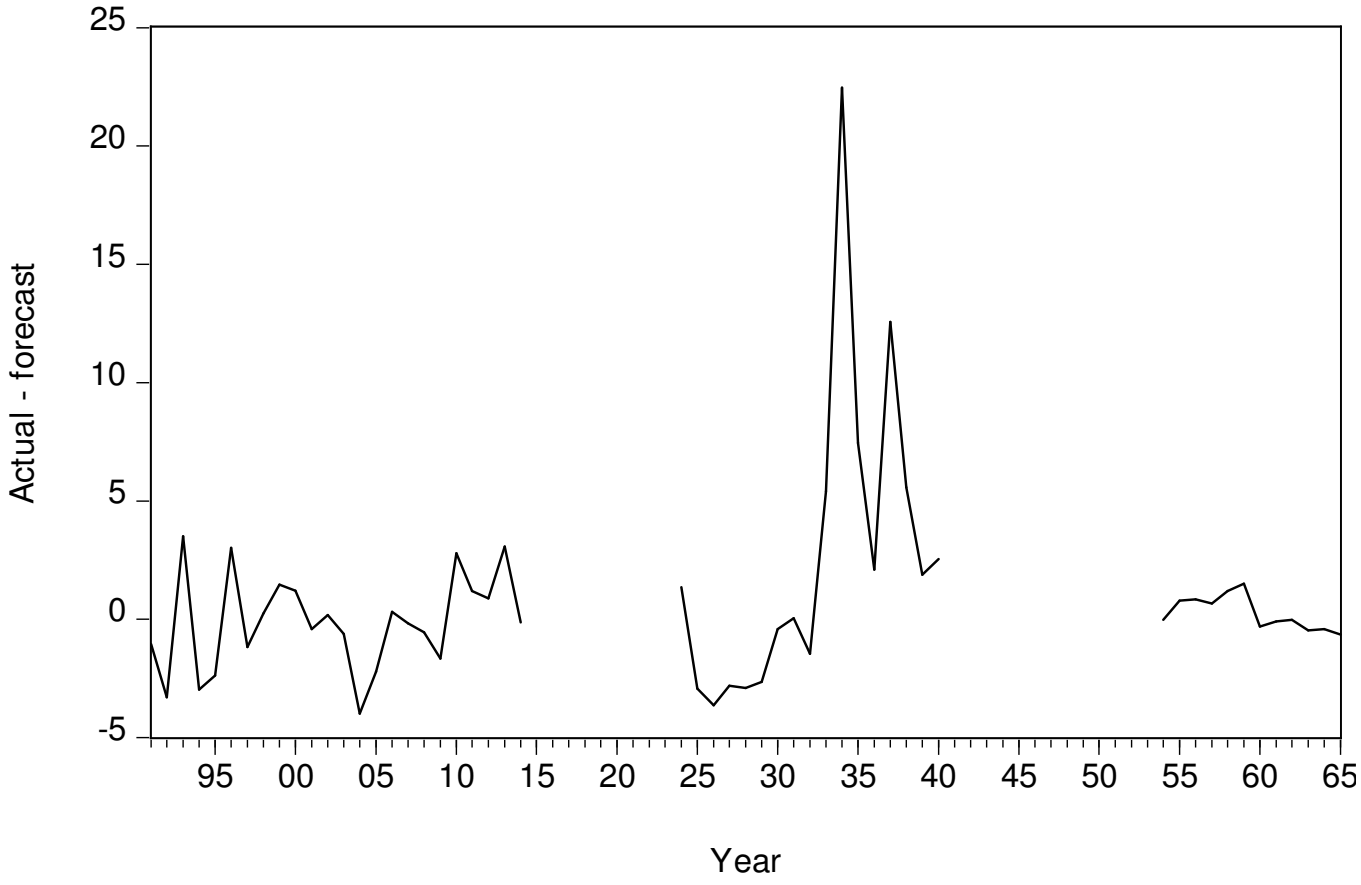


Figure 3 Monthly Industrial Production Index and Annual Unemployment Rate
January 1929-December 1939

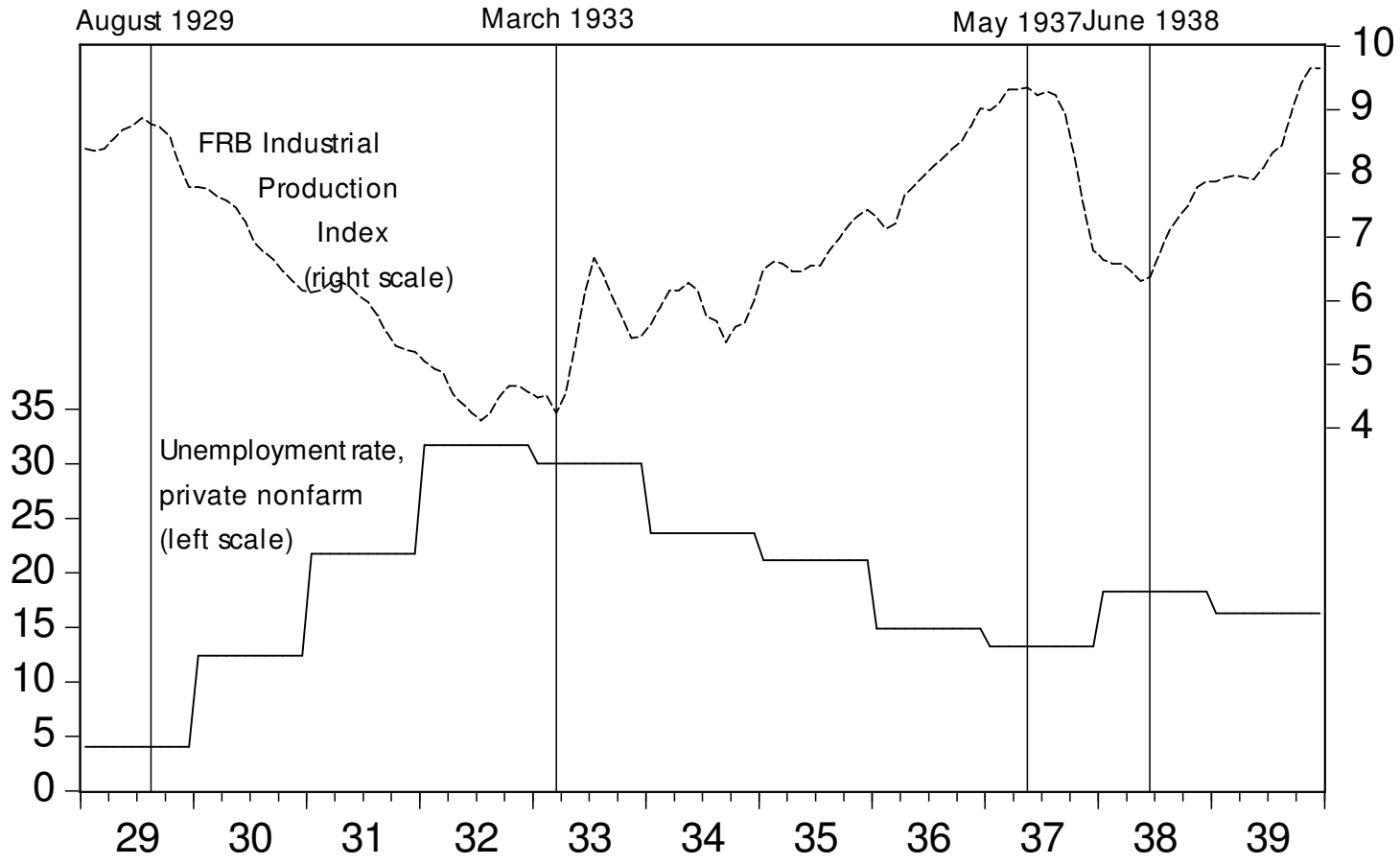
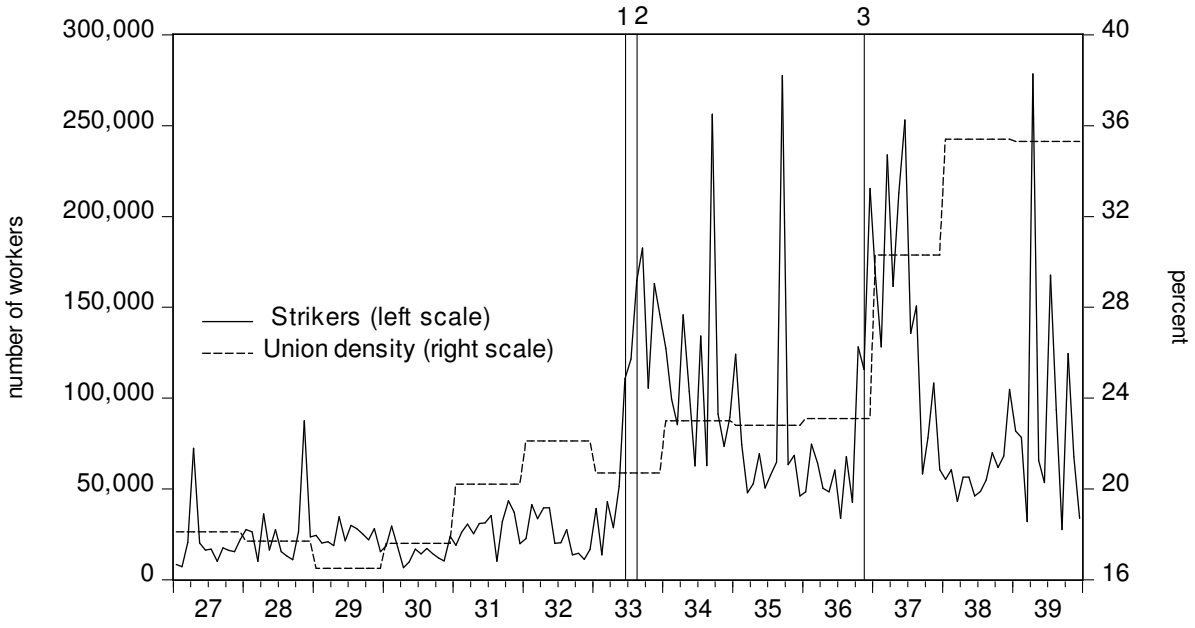


Figure 4 Strikes (monthly) and union density (annual) 1927-1939




Sources: Workers involved in strikes beginning in that month,
from Peterson (1938 Table 21), U.S. BLS (1942, Table 2),
seasonally adjusted by X-11
Percent union membership among wage and salary workers
in manufacturing, mining, forestry, fisheries, construction, transportation, communication and utilities,
from Lewis (1963, Table 51 column 1)

1 June 1933 NIRA passed

2 August 1933 NRA blanket code imposed

3 November 1936 Roosevelt re-elected

Figure 5 Projected and actual 12-month AHE inflation 1929-1939, monthly

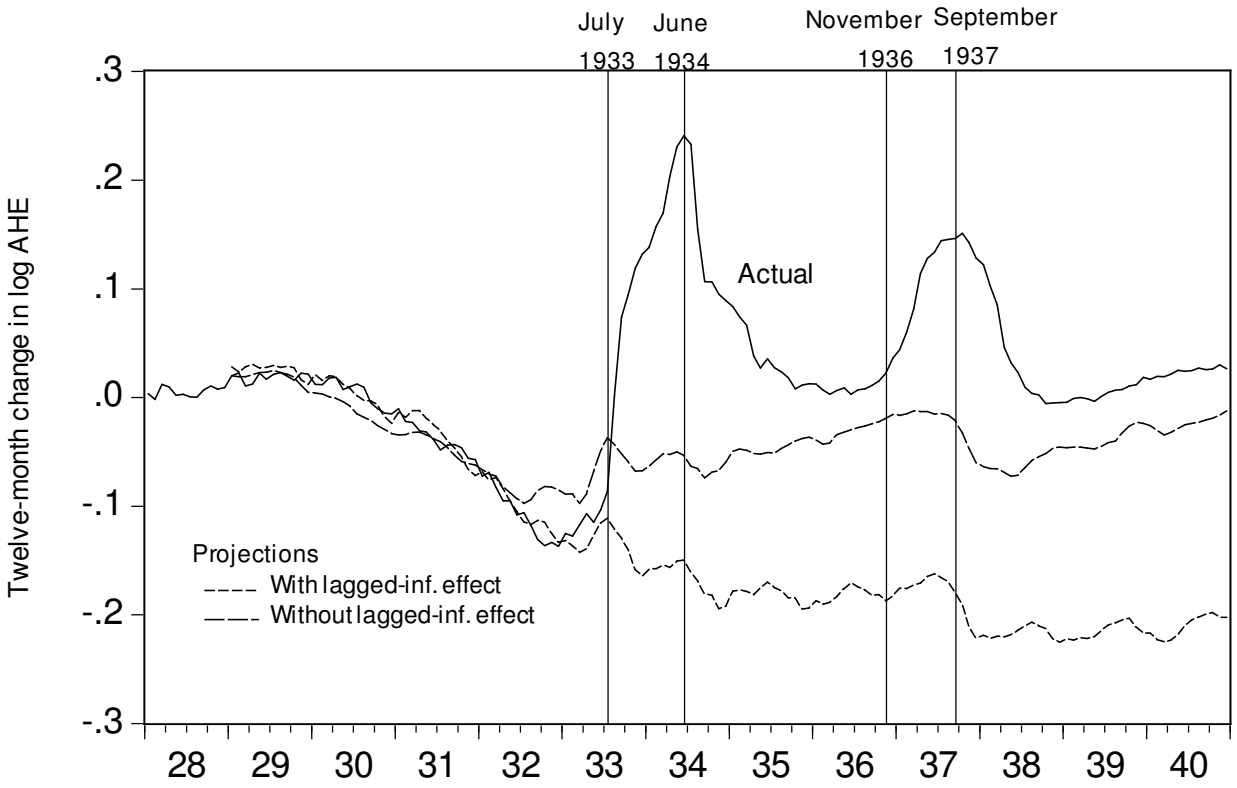
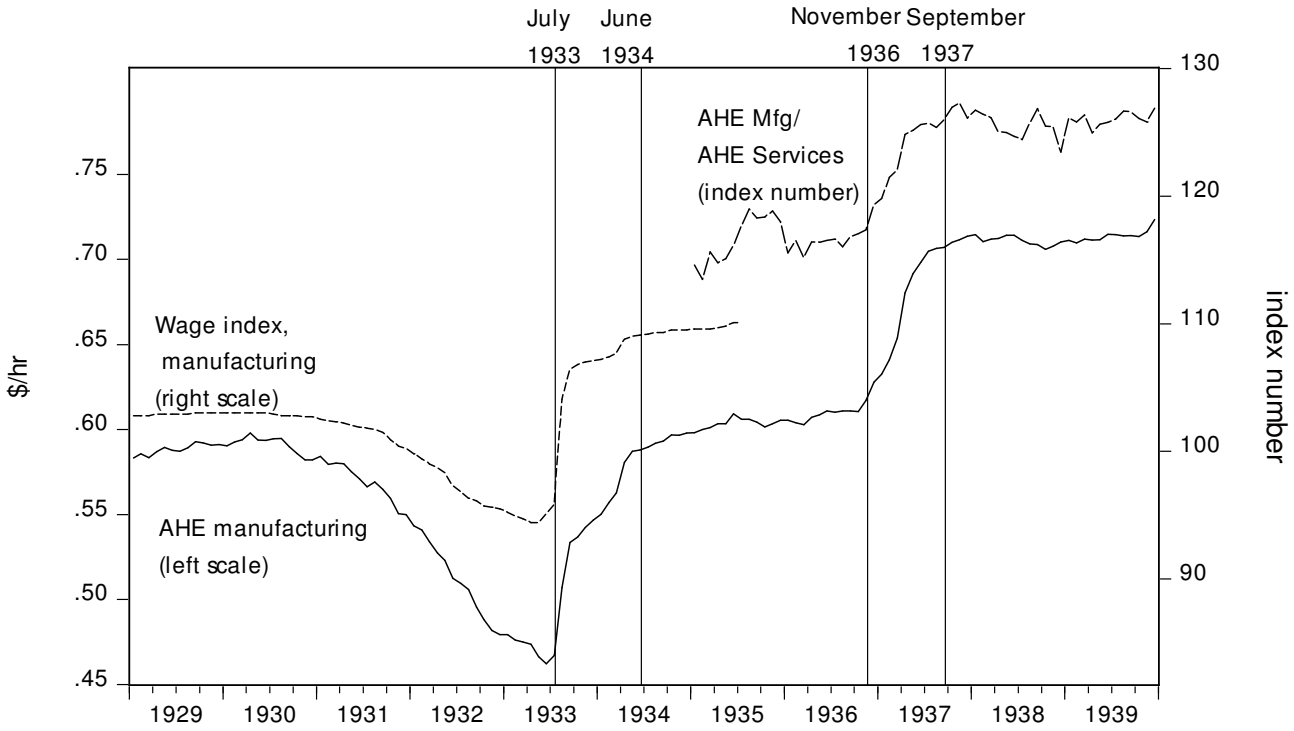


Figure 6 Levels of AHE and wage series, 1929-1939 monthly




Sources: Wage index from Creamer (1950, Tablle A, "all manufacturing")
AHE manufacturing: Hanes (1996)
AHE nonmanufacturing: see text