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Abstract

This study shows that the rate of wage inflation in the year before a recession is positively related to the rate of employment growth in the subsequent recovery. A possible explanation for this relationship is downward nominal wage rigidity. On the other hand, the prior rate of wage inflation is not significantly related to the employment decline during the ensuing recession, suggesting that prior wage growth has a greater impact on the strength of the recovery from a recession than on the severity of the recession.

Keywords: Wage inflation; Recovery strength; Wage rigidity
JEL codes: E32; J30

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1. Introduction

The rate at which employment rebounds from recessions varies greatly. In the U.S., the recoveries from the last three NBER-dated recessions have been characterized by unusually slow growth of employment, relative to previous post-World War II recessions. This study suggests that one determinant of the strength of employment growth during a recovery is the rate of wage inflation in the year before the employment decline. A possible reason for this relationship is downward nominal wage rigidity. A lower rate of wage inflation before a recession means that the adjustment to a negative demand shock is more likely to entail wage reductions for some workers. If these reductions do not occur because of downward nominal wage rigidity, then, *ceteris paribus*, employment growth will be slower.

Akerlof, Dickens, and Perry (1996) demonstrate that higher rates of inflation may allow more real wage reductions to occur in equilibrium, yielding a lower natural rate. The present study shows a second avenue through which inflation may "grease the wheels of the labor market," by enabling employment to rebound more quickly from recessions (with the caveat that the sample size is small). Thus, it suggests a partial explanation for the slow employment growth during the recoveries from the past three recessions, recessions in which the prior rate of wage inflation was far lower than in most of the previous eight post-war recessions.

2. Empirical Relationship between Wage Inflation and Recovery Strength

Table 1 reports figures on employment and wage inflation in the 11 post-WWII recessions and subsequent recoveries in the U.S. The months of the business cycle peaks and troughs are the months when employment reaches its highest level and lowest level,

respectively, and these dates may differ from the NBER's dating. The first four columns are the month and employment level for peak and trough employment.[1] The percentage decline in peak-to-trough employment is reported in the fifth column. The sixth and seventh columns give the month and employment level when employment recovers to at least its previous peak. The months between trough employment and recovery employment is recorded in the eighth column, and the ninth column reports a measure of the strength of the recovery, defined as the annualized percentage change in employment from its trough value to its recovery value.[2]

The last two columns report measures of wage inflation in the year before the start of the employment downturn. In the tenth column wage inflation is measured by average hourly earnings (*AHE*) for production and nonsupervisory workers.[3] These data have been collected by the Bureau of Labor Statistics (BLS) since 1964, so data are not available to measure pre-recession wage inflation for the first four postwar recessions. However, data on average hourly earnings for production and nonsupervisory workers in goods-producing industries (*AHEGP*) have been collected since 1947, encompassing all postwar recessions, and these figures are reported in the 11th column. (Goods-producing industries include natural resources and mining; mining, quarrying, and oil and gas extraction; construction; and manufacturing.) Even though goods-producing industries are only a portion of all industries, wage inflation in goods-producing industries is highly correlated with overall wage inflation, with a correlation coefficient of 0.970 over the period in which data are available for both series.[4]

Figure 1 shows the relationship between the percentage change in average hourly earnings (*AHE*) in the year before a recession and the measured value of the recovery

strength (*RS*) for post-1964 recessions. Points are denoted with the month of the pre-recession peak employment. Also plotted is the estimated OLS regression line, which is

$$\begin{array}{lll} RS = & -0.815 + 0.518\,AHE & R^2=0.806 \\ & (0.719)\ \ (0.114) & N=7. \\ & [0.309]\ \ [0.006] & \end{array} \qquad (1)$$

Standard errors are in parentheses and *p*-values are in the square brackets. The scatterplot shows a strong positive correlation between the growth of *AHE* in the year before a recession and the strength of the subsequent employment recovery, and the coefficient on *AHE* is significant at the 0.6% level.

The analysis can be extended to all postwar recessions with data on *AHEGP*. One difference between pre- and post-1964 recessions is that, for a given level of pre-recession wage inflation, recovery strength was much higher before 1964, as shown in Table 1. There are several possible reasons for why *RS* was higher for a given level of prior wage inflation in the earlier period. First, peak-to-trough employment declines tended to be larger before 1964, and greater employment declines tend to be followed by strong employment rebounds. Second, wages appear to be more flexible in the earlier period, as wage inflation decreased, on average, by far more in pre-1964 recessions than in post-1964 recessions in the year following peak employment. In the year following peak employment, the growth rate of *AHEGP* decreased by an average of 5.48% in pre-1964 recessions (although the average decrease was only 3.47% if the 1948 recession is not included). In post-1964 recessions (excluding the 1980 recession in which wage inflation rose substantially in the year following its onset, probably because of its short duration), the growth rate of *AHEGP* fell, on average, by 0.46%.

To account for the stronger recoveries in the earlier period, Recovery Strength (*RS*) is not only regressed on *AHEGP* by itself, but is also regressed on *AHEGP* and a dummy variable for pre-1964 recessions (*PR*64*DUM*). The estimated equations are

$$RS = \underset{(1.168)\ [0.993]}{0.011} + \underset{(0.159)\ [0.011]}{0.504}\ AHEGP \qquad R^2=0.527,\ N=11, \qquad (2a)$$

and

$$RS = \underset{(0.639)\ [0.670]}{-0.282} + \underset{(0.089)\ [0.0016]}{0.414}\ AHEGP + \underset{(0.525)\ [0.0015]}{2.49}\ PR64DUM \qquad R^2=0.876,\ N=11. \qquad (2b)$$

Both with and without *PR*64*DUM*, there is a strong positive relationship between the growth in earnings in the year before a recession and the rate of employment growth in the subsequent recovery. The coefficient on *AHEGP* is significant at the 1.1% level when *PR*64*DUM* is not included and is significant at the 0.16% level when it is included. Also, in (1), (2a), and (2b) the coefficients on pre-recession wage inflation are similar in magnitude, suggesting that the effect of wage inflation on *RS* is robust to the inclusion of pre-1964 data, the choice of the wage variable (*AHE* or *AHEGP*), and the inclusion of the dummy variable. The results imply that a 1% rise in prior wage inflation is associated with about a 0.4-0.5% increase in annualized employment growth in the subsequent recovery.

Because there have been only 11 post-WWII recessions, the sample size in this study is small, so the results should be taken with some caution. However, while the sample size is small, the effect of prior wage inflation on recovery strength is highly significant, with *p*-values ranging from 0.0016 to 0.011.

A possible explanation for a positive relationship between pre-recession wage inflation and the strength of the subsequent recovery is downward nominal wage rigidity.

(See, for example, Kahn (1997), Altonji and Devereux (2000), Lebow, Saks, and Wilson (2003), and Fehr and Goette (2005) for empirical evidence concerning downward nominal wage rigidity.) During a recession, wage inflation tends to decrease gradually over time, with the growth rate of wages for individual workers distributed around the average growth rate. For a given decline in the growth rate of demand, the adjustment of wages to their new equilibrium will be more likely to entail notional nominal wages decreases for some workers if wage inflation is initially low. If these decreases do not occur because of downward nominal wage rigidity, employment among these workers will be lower than it would have been in the absence of nominal wage rigidity, resulting in lower growth of aggregate employment.

Besides downward wage rigidity, another possible reason for the positive relationship between pre-recession wage inflation and recovery strength is that the zero lower bound on nominal interest rates is more likely to be binding when inflation is low. To test the relevance of this explanation, (1), (2a), and (2b) are re-estimated with a dummy variable for recessions in which the 3-month Treasury bill rate fell below 1%. Contrary to what would be expected if the zero lower bound resulted in weaker recoveries, the coefficient on this variable is always positive (but insignificant), suggesting that the zero lower bound does not explain why recovery strength is related to prior wage inflation.

Also, when (1), (2a), and (2b) are re-estimated with the growth rate of the Consumer Price Index in the year prior to the business cycle peak, instead of the growth rate of wages, the coefficient on price inflation and its degree of significance are much lower than when the equations are estimated with wage inflation, indicating that recovery strength is more closely related to prior wage inflation than to prior consumer price inflation.

These results suggest that central banks should consider wage inflation, as well as price inflation, in their conduct of monetary policy. Erceg, Henderson, and Levin (2000) demonstrate that if wages and prices are both sticky, then wage inflation targeting substantially outperforms price inflation targeting in maximizing policymakers' welfare functions.[5] In addition, Mankiw and Reis (2003) assume that central banks use an inflation target to minimize the variance of the output gap, and consider four measures of inflation: energy prices, food prices, prices of other goods and services, and nominal wages. They demonstrate that central banks should place by far the greatest weight on wage inflation in order to stabilize the output gap.

The present study provides an additional rationale for central banks to take wage inflation into account in conducting monetary policy. While the high rates of wage inflation in the 1970's and early 1980's were probably not desirable because of their repercussions on price inflation, in spite of the stronger recoveries in this period, a moderate target for wage inflation may be beneficial. For example, equation (1) predicts that if the growth rate in *AHE* prior to the 2008 recession had been 4.5% instead of 3.86%, the recovery strength would have risen from 1.58 to 1.91, an increase of 21%.

While pre-recession wage inflation positively affects the strength of the subsequent recovery, it has little impact on the decrease in employment during a recession. When the peak-to-trough employment decline (*PTED*) is regressed on *AHEGP* in the year prior to recessions, the estimated equation is

$$\begin{array}{lll} PTED = 2.54 + 0.0748\, AHEGP & R^2=0.019 & (3) \\ \quad (1.33)\quad (0.181) & N=11. & \\ \quad [0.088]\quad [0.689] & & \end{array}$$

The coefficient on *AHEGP* is insignificant and the regression has little explanatory power, as evidenced by the low R^2. Figure 2 presents a scatterplot of pre-recession wage inflation and the percentage decline in employment during the recession, showing that there is little relationship between these variables. When *PTED* is regressed on *AHE* with data from post-1964 recessions, the coefficient on prior wage inflation is again insignificant.[6]

A possible reason for why prior wage inflation is not significantly related to the severity of the employment downturn is that wage inflation usually decreases slowly in response to a disinflationary shock, so that it normally takes time for notional wage inflation to become negative for a significant number of workers.[7] The one case in which low pre-recession wage inflation was associated with a large decline in employment was the recession beginning in 2008, possibly because the combination of a severe negative demand shock and a low prior rate of wage inflation meant that the adjustment to the shock would have entailed an immediate reduction in nominal wages for many workers, rather than a period in which notional wage inflation gradually fell, before becoming negative for a significant number of workers.

This study considers U.S. recessions and recoveries, and it is not clear whether the same pattern would be found for other countries. Conducting a similar analysis with other industrialized countries would be complicated by later starting dates for wage and unemployment data in many other countries and by different unemployment dynamics, as most other countries experienced more persistent movements in unemployment, but fewer short-term fluctuations.

3. Conclusion

This study finds that the strength of employment growth during an economic recovery depends positively on wage inflation in the year before the onset of the preceding recession, possibly because downward nominal wage rigidity is more likely to be binding when wage inflation is low before an economic downturn. While pre-recession wage inflation is positively related to the strength of the subsequent recovery, it is not significantly related to the severity of the recession. A possible explanation is that it generally takes time for notional wage inflation to become negative for a significant number of workers in response to a contractionary shock, so that downward nominal wage rigidity usually does not adversely affect employment growth until the economy has started to recover.

While it appears that downward nominal wage rigidity generally has a greater impact on the strength of the subsequent recovery than on the severity of the employment downturn, one exception is the 2008 recession. In that recession, a low prior rate of wage inflation was combined with the severe negative demand shock, so that the adjustment to the shock may have involved immediate notional nominal wage reductions for an appreciable number of workers.

The findings in this study may help explain why employment has recovered so slowly in the three most recent recessions, as wage inflation before these recessions was far lower than in almost all previous post-war recessions. An implication of these results is that it may be desirable for central banks to consider wage inflation, as well as price inflation, in their conduct of monetary policy.

References

Akerlof, G.A., Dickens, W.T., Perry, G.L., 1996. The macroeconomics of low inflation. Brookings Papers on Economic Activity 1996:1, 1-59.

Altonji, J., Devereux, P., 2000. Is there nominal wage rigidity? Evidence from panel data. Research in Labor Economics 19, 383-431.

Bureau of Labor Statistics, 2013. BLS Handbook of Methods. http://www.bls.gov/opub/hom.

Campbell, C.M., 2014. Efficiency wage setting, labor demand, and Phillips curve microfoundations. Paper presented at the Royal Economic Society Annual Meetings, Manchester, U.K., April 2014.

Erceg, C.J., Henderson, D.W., Levin, A.T., 2000. Optimal monetary policy with staggered wage and price contracts. Journal of Monetary Economics 46, 281-313.

Fehr, G., Goette, L., 2005. Robustness and real consequences of nominal wage rigidity. Journal of Monetary Economics 52, 779-804.

Kahn, S., 1997. Evidence of nominal wage stickiness from microdata. American Economic Review 87, 993-1008.

Lebow, D.E., Saks, R.E., Wilson, B.A., 2003. Downward nominal wage rigidity: evidence from the Employment Cost Index. The B.E. Journals in Macroeconomics: Advances in Macroeconomics 3, Art. 2, available at http://www.bepress.com/bejm/advances/vol3/iss1/art2.

Mankiw, N.G., Reis, R., 2003. What measure of inflation should a central bank target? Journal of the European Economic Association 1, 1058-1086.

Mehran, H., Tracy, J., 2001. The effect of employee stock options on the evolution of compensation in the 1990s. Federal Reserve Bank of New York Economic Policy Review, December 2001, 17-34.

Ruser, J.W., 2001. The employment cost index: what is it? Monthly Labor Review, September 2001, 3-16.

Table 1

Peak Date	Peak Emp.	Trough Date	Trough Emp.	Peak-Trough Emp. Decrease	Recovery Date	Recovery Emp.	Months to Recovery	Recovery Strength (RS)	%Δ Avg. Hourly Earnings	%Δ Avg. Hourly Earnings, Goods Prod.
09/1948	45,295	10/1949	42,950	5.18%	07/1950	45,454	9	7.85		12.28%
07/1953	50,536	08/1954	48,825	3.39	06/1955	50,790	10	4.85		9.03
04/1957	53,238	06/1958	50,912	4.37	04/1959	53,320	10	5.70		5.29
04/1960	54,812	02/1961	53,556	2.29	12/1961	54,871	10	2.95		3.70
03/1970	71,452	11/1970	70,409	1.46	09/1971	71,617	10	2.06	6.35%	7.14
07/1974	78,635	04/1975	76,461	2.76	02/1976	78,817	10	3.71	7.23	8.05
03/1980	90,994	07/1980	89,837	1.27	01/1981	91,037	6	2.69	7.72	7.98
07/1981	91,602	12/1982	88,769	3.09	11/1983	91,871	11	3.82	8.75	9.90
06/1990	109,862	05/1991	108,241	1.48	02/1993	110,047	21	0.95	4.40	4.27
02/2001	132,767	08/2003	130,147	1.97	02/2005	132,991	18	1.45	4.13	3.32
01/2008	138,365	02/2010	129,649	6.30	04/2014	138,385	50	1.58	3.86	3.43

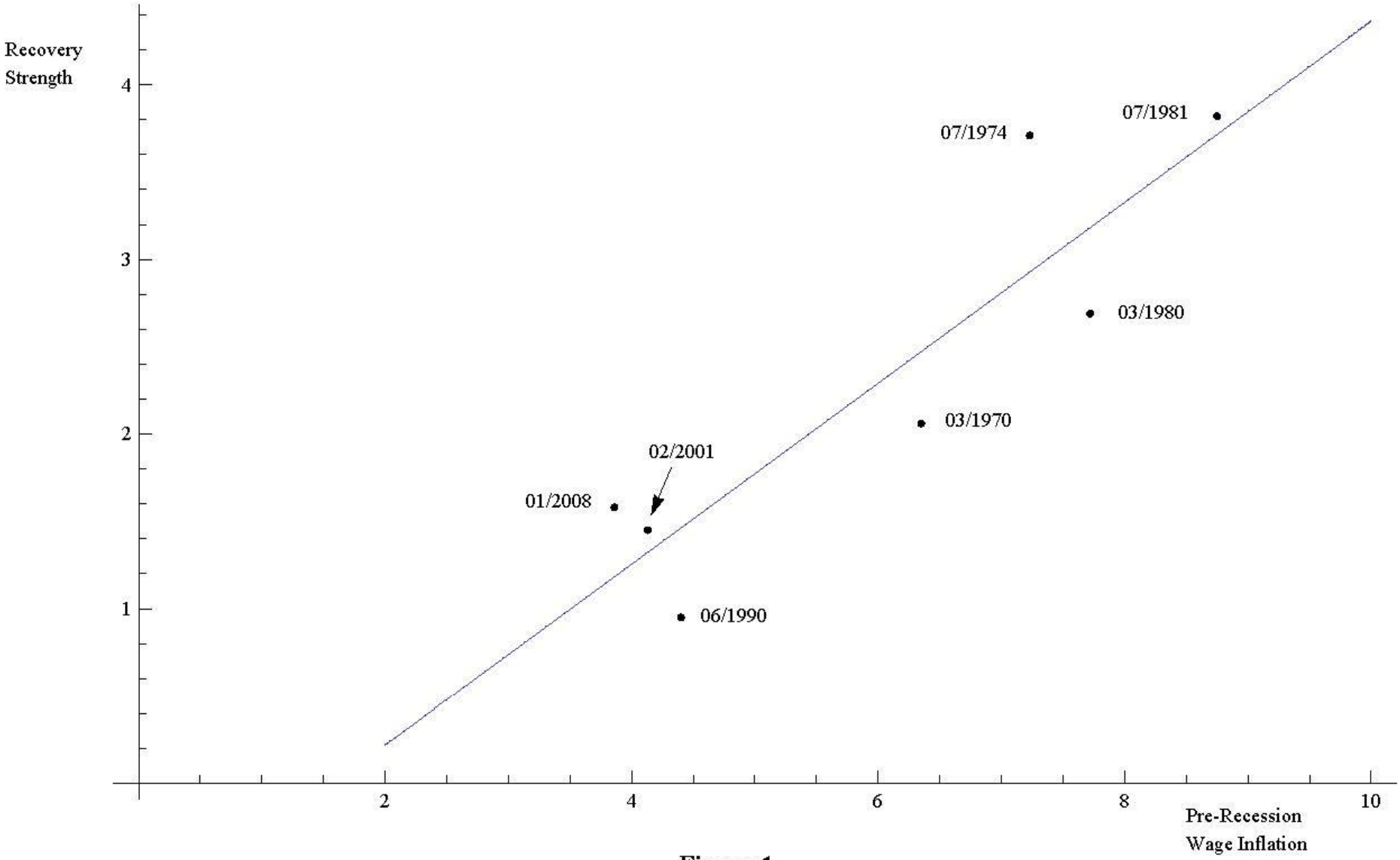
Recovery
Strength
4
3
2
1
07/1981
07/1974
03/1980
03/1970
02/2001
01/2008
06/1990
2
4
6
8
10
Pre-Recession
Wage Inflation

Figure 1

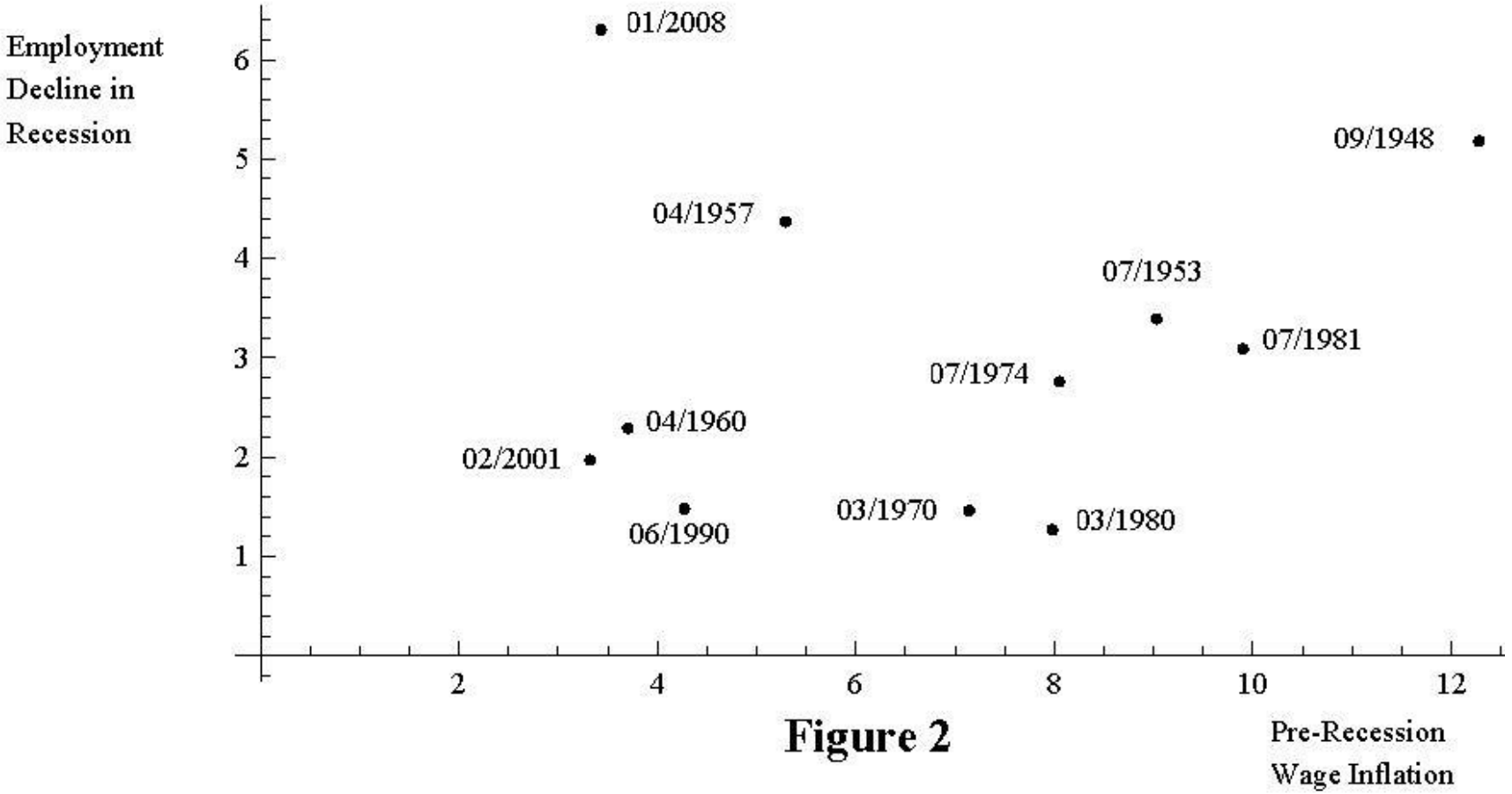
Employment
Decline in
Recession
01/2008
09/1948
04/1957
07/1953
07/1981
07/1974
04/1960
02/2001
03/1970
03/1980
06/1990
6
5
4
3
2
1
2
4
6
8
10
12
Pre-Recession
Wage Inflation

Figure 2

[1] The employment figures are the Bureau of Labor Statistics' estimates of total nonfarm employment.

[2] Mathematically, $\text{Recovery Strength}\,(RS) = [(\text{Rec. Emp.}/\text{Trough Emp.})^{\frac{12}{m}} - 1] \times 100$, where m is the number of months between the trough and recovery.

[3] See Bureau of Labor Statistics (2013), Chapter 2 for a description of how *AHE* is calculated.

[4] Another wage variable that has been collected since 1947 is hourly compensation, which is reported on a quarterly basis. However, this measure is problematic for several reasons. First, it includes proprietors' income, bonus and profit-sharing payments, and realizations of stock options, as well as wage and salary income. The inclusion of stock option realizations is especially problematic when considering wage growth before a recession, since these realizations are likely to be particularly high at the end of an expansion. Second, it is calculated by dividing an estimate of aggregate compensation by an estimate of the total number of hours worked, with the estimate of compensation based mostly on data from the Bureau of Economic Analysis and the estimate of hours worked derived from BLS data. (See Mehran and Tracy (2001, p. 31) and Ruser (2001, pp. 12-13) for a description of hourly compensation.) Third, these data are subject to large revisions, sometimes even after more than 60 years. Thus, hourly compensation may not be an accurate measure of the true marginal cost of labor.

[5] A policymaker's welfare function is assumed to depend on the output gap, wage inflation, and price inflation.

[6] In fact, the two recessions that experienced the greatest employment declines since 1964 were the recession starting in 1981, which was preceded by the highest growth rate in *AHE*, and the recession starting in 2008, which was preceded by the lowest growth rate in *AHE*.

[7] For example, Campbell (2014) simulates the response of unemployment and wage inflation to a decrease in nominal demand growth, and shows that simulated wage inflation is positive as long as employment is decreasing, and does not become negative until employment starts to rise, meaning that downward nominal wage rigidity would not become binding in this model until employment starts to recover.