The Wage Curve After the Great Recession

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Abstract,

Most economists maintain that the labour market in the United States (and elsewhere) is 'tight' because unemployment rates are low, and the Beveridge Curve (the vacancies-to-unemployment ratio) is high. They infer from this that there is potential for wage-push inflation. However, real wages fell rapidly in 2022 and, prior to that, real wages had been stagnant for some time. We show that unemployment is **not** key to understanding wage formation in the United States and hasn't been since the Great Recession. Instead, we show rates of under-employment (the percentage of workers with part-time hours who would prefer more hours) and the rate of inactivity (the percentage of the civilian adult population who are out of the labour force) reduces wage pressure in the United States. This finding holds in panel data with state and year fixed effects in both annual and quarterly data for the period 1980-2022 and is supportive of a wage curve which fits the data much better than a Phillips Curve. The unemployment rate no longer enters significantly negative in wage equations, however specified, in the years since 2008.

Key words: wages; unemployment; labour market inactivity; under-employment; wage curves.

JEL Classification: J30; J20; J60, E24

1. Introduction

In the middle of the 19th century Friedrich Engels (1845) described the unemployed as a "reserve army" whose purpose was to keep wages down. Subsequently Karl Marx famously argued that this reserve army was maintained by capitalists to keep wages down.

"Big industry constantly requires a reserve army of unemployed workers for times of overproduction. The main purpose of the bourgeois in relation to the worker is, of course, to have the commodity labour as cheaply as possible' (Marx, 1847).

Ever since, economists have plugged unemployment rates into wage equations of various forms expecting to see a negative partial correlation. For over a century the unemployment rate was negatively correlated with wage growth but since the Great Recession things have changed. Today the unemployment rate, which is at historically low levels both in the United States and elsewhere, no longer tells anything about the state of the labour market: it is now uncorrelated with wage growth.

In the years before the Great Recession, the unemployment rate was the only labour market variable you needed to summarize slack demand for labour; movements in the unemployment rate were essentially mirror images of the employment rate. This is no longer the case. Why this change has occurred is a matter of conjecture that we discuss below. One possibility is that workers became more fearful of losing their jobs, and perhaps their houses, after the seismic shift in the labour market with the onset of the Great Recession. It was a major financial crisis that involved a big rise in the unemployment rate in the United States and a collapse of the housing market. This involved loan defaults, especially of sub-prime mortgages, foreclosures, negative equity and even jingle mail.[1]   Much economic dislocation resulted which appears to have scared workers. As a result, the basic relations in the labour market changed and it appears that the non-accelerating inflationary rate of unemployment (the NAIRU) fell sharply. At any given unemployment rate, wage pressure was less than it had been in the years before 2008.

Since the unemployment rate is no longer associated with wage growth there is no longer a wage curve in wage-unemployment space. We go on to show that there is also no wage Phillips curve especially since the Great Recession. What we show is that the wage curve should be rewritten in underemployment and inactivity space.

2. Measures of Labour Market Slack

The unemployment rate is defined as the number of unemployed divided by the sum of the employed and the unemployed.[2]   Throughout the twentieth century there was a very high correlation between the unemployment rate and other measures of labour market slack we examine below. Since the Great Recession these correlations have broken down.

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[1] Jingle mail was where homeowners who were unable to pay their e-mortgage loans sent the keys in an envelope to the lender before they had chance to foreclose. This also occurred in states that had no recourse loans the lender cannot go after the borrower's other assets. Non-recourse loans exist in 12 states: Alaska, Arizona, California, Connecticut, Idaho, Minnesota, North Carolina, North Dakota, Oregon, Texas, Utah and Washington, see Mary McMahon, 'What is Jingle Mail?, *Wisegeek*, July 20, 2022, https://www.wise-geek.com/what-is-jingle-mail.htm and Kiah Treece, Recourse loans Vs. Non-recourse loans' *Forbes Adviser*, August 12th 2020, https://www.forbes.com/advisor/loans/recourse-loans-vs-non-recourse-loans/

[2] This is the Bureau of Labour Statistics' U3 measure https://www.bls.gov/cps/definitions.htm#unemployed.

Since Layard, Nickell and Jackman (1990) it has been assumed that non-employment rates (NER)—measured as the unemployed plus the economically inactive divided by the civilian adult population for those aged 16+[3]—should not enter wage equations because those who are not actively seeking work are unlikely to compete for waged employment, and thus will not lower wages. However, growing recognition that the unemployment rate alone did not seem to be a good indicator of labour market slack has led some analysts to revisit the issue by re-weighting different groups in the adult population according to their propensity to be active in the labour market (Abraham et al. 2020).

Hornstein et al (2014) construct a nonemployment index which includes all non-employed, differentially weighted according to their probabilities of transition into employment. They show that, prior to the Great Recession the narrow unemployment rate and the broader nonemployment rate (NER) index they devise moved together. This changed after the Great Recession. Similarly, Abraham et al. (2020) assess labour market tightness with a measure of the ratio of vacancies to effective searchers as opposed to a standard measure of vacancies to unemployment. 'Effective searchers' include both the unemployed, those out of the labour force, and the employed. Their measure is a weighted sum of 22 different groups within the population where weights are based on the relative base period job-finding rate for each of the groups. They find that between 1994 and 2019 a Beveridge curve constructed using vacancies and effective searchers is more stable than the curve constructed using vacancies and unemployment.

Marx and Engels made no such distinction between the unemployed and the NER in their discussions of the 'reserve army of labour'. Whether the NER acts as a break on wage growth is an empirical question. If it does, then the labour market has greater amounts of slack in the United States than previously believed.

Table 1 presents the inactivity rate for those aged 15+ in the US and, where available in thirty-one other OECD countries between 2000 and 2022.

The bottom row of Table 1 shows the inactivity rose by 5 percentage points in the United States between 2000 and 2021. Out of the other major OECD countries, since 2008 the inactivity rate fell in seventeen, was stable in Italy, Finland and France, with only Norway and Iceland having larger increases than the USA. Canada saw a 2 percentage point increase: Greece and Spain had a smaller increases despite their unemployment rates having increased to over 20% in the post-recession years. The rise in the United States is unlikely to be linked to demographics or technology given that these are common phenomena across countries and welfare benefits for non-work tend to be less generous in the United States than in most other OECD countries.

Table 2 shows the inactivity rate by age groups in the United States from January 2000 to February 2023. Across the whole population it rises over the period from 35% to 40%. It rises for all age groups under 55 but is most notable among those aged under-25 years.

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[3] The non-employment rate is the inverse of the employment rate. It is calculated as (U+O)/(U+O+E) where U=unemployed, E=employed and O=not in the labour force. O individuals are (1) not employed during the survey reference week and (2) had not actively looked for work (or been on temporary layoff) in the last 4 weeks.

We now move on to look at the underemployment rate, which we define for workers only as an expressed desire for more hours. In an early study for the UK, Blanchflower, Oswald and Garrett (1990) noted that wages are set by a blend of insider and outsider forces. Using data for both the United States and the UK, Bell and Blanchflower (2021) conceived of underemployment as an indicator of weak bargaining power on the part of "insiders" – that is, full-timers in the firm. The idea was that other workers' ability to disrupt the supply of labour to the employer diminished in the face of part-time co-workers who were signaling their desire to work more hours than they were being offered. They confirmed that underemployment was a brake on wage growth both in the US, the UK and internationally confirming work from Hong, Kóczán, Lian, and Nabar (2018) from the IMF that found similarly.

Our data source for the United States, the Current Population Survey, does not identify full-timers who want different or fewer hours. Nevertheless, it is possible to calculate an underemployment measure based on the number of part-time workers who say they are part-time for economic reasons. We simply express this as a proportion of the employed and call it U7, as defined in Bell and Blanchflower (2021). There is a growing literature on the underemployed including Sum and Khatiwada (2010); Cajner, Mawhirter, Nekarda, and Ratner (2014); Veliziotis, Matsaganis, and Karakitsios (2015); Golden (2016); Borowczyk-Martins and Lalé (2016, 2018) and Glauber (2017).

Chart 1 shows movements in the underemployment rate U7 in the United States and the unemployment rate.[4] The unemployment rate was 5.0% in December 2007 rising to 10.0% in October 2009 and dropping below 5% in January 2016.[5] In February 2023 it jumped 0.2% on the month to 3.6%. The underemployment rate shot up after the Great Recession but did not mean revert as quickly the unemployment rate did. It was 3.0% in December 2007 as recession hit and reached a peak of 6.7% in March 2010 and didn't reach the pre-recession level of 3.0% until July 2018. At the time of writing in March 2023 it is 2.5% and comparable to its level in 2001, just above its historic low of 2.3%. Chart 2 plots non-employment and inactivity rates which track each other closely – using data from the BLS. Both rose steadily from around the start of 2000. Unlike the unemployment rate they have still not mean reverted to pre-recession levels and are also below pre 2020 lockdown levels. As shown in Table 1 this is unusual among advanced countries.

We examine below the impact on wage changes of all four measures of labour market slack – the unemployment, underemployment, inactivity and non-employment rates. We will show that underemployment, inactivity and non-employment rates "work" better in wage equations than the unemployment rate does, since the Great Recession. They all show larger levels of slack than the unemployment rate suggests and have a significant negative impact on wages in the post Great Recession period, while the unemployment rate does not.

3. Wage Changes and Labour Market Slack

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[4] Bell and Blanchflower (2021) create U7 as a measure of underemployment as part-time for economic reasons divided by employment.

[5] In April 2020 the official unemployment rate rose to 14.7% but the Bureau of Labor Statistics noted that the true rate was 19.7% due to difficulties in data collection during Covid. Upward adjustments need to be made to these data over the next couple of years although the extent of the bias fell over time. See https://www.bls.gov/news.release/archives/empsit_05082020.htm

A major puzzle in the period 2010-2019 was that despite low and falling unemployment, wage growth in the United States remained low, at around 2%, and well below pre-Great Recession levels of around 4%. Chart 3 shows nominal weekly wage growth among private sector production and non-supervisory workers in the United States since 1990. These workers constitute three quarters of private sector workers, and this is the longest wage series available. Nominal wage growth was around 4% at the start of the Great Recession when the unemployment rate was 5%. However, year over year wage growth averaged 2.2% between 2011 and 2017. The chart suggests the reason for this sluggish wage growth was because the labour market had more slack than was indicated by the unemployment rate.

Chart 4 shows the relationship between annual median usual weekly nominal wage growth for full-time workers using data from the Outgoing Rotation files of the Current Population Survey (CPS). The BLS publishes median weekly earnings with these data on a quarterly basis. Below in our wage regressions we make use of the same micro data but use it to construct average mean wages at the state-year cell level.

4. The Phillips Curve and the Wage Curve
In his original *Economica* paper Phillips (1958) examined the relationship between unemployment and the **rate of change of money wage rates** in the UK from 1861–1957. He found wage growth fell as the unemployment rate rose, with the rate of change flattening out at higher rates of unemployment. He argued this pattern was consistent with the proposition that, as with commodities other than labour, its price would fall in circumstances where demand was exceeded by supply.

Chart 5 revisits this issue plotting weekly wage growth against the unemployment rate in the United States since 1965. The chart provides a scatter plot between the annual growth in weekly earnings of private sector production and non-supervisory workers by month between January 1965 and February 2023 (n=699). As noted earlier, these workers constitute four fifths of the private sector workforce and exclude the top-end of the wage distribution. It is the longest wage series available in the United States. It shows that there is no evidence whatever of a Phillips Curve in wage changes. If we restrict the data to the post Great Recession period, 2008-2022, to establish whether there is evidence of a Phillips Curve since the Great Recession, we find no significant relation between wage growth and the unemployment rate either. We find similarly in our econometric analysis below.

In the 1990s some consensus emerged that the relationship between wage growth and unemployment was better explained by a wage curve which estimates wages as a function of lagged wages and unemployment using data at the state and year cell level. Studies examining the wage curve (Blanchflower and Oswald, 1990, 1994a, 1994b, 1995) estimated log wage equations with data from the Current Population Survey from 1963-1988 for the United States, supplemented with other data for eleven other countries – Australia, Austria, Canada, Germany, Ireland, Italy, the Netherlands, Norway, South Korea, Switzerland and the UK.

Further evidence in support of a wage curve came with further estimates from Blanchflower and Oswald (2005) using data through to 2001. They showed, with references, that wage curves had been reported in a further thirty countries - Argentina, Belarus, Belgium, Brazil, Bulgaria, Burkina

Faso, Chile, China, Côte d'Ivoire, Czech Republic, Denmark, Estonia, Finland, France, Hungary, India, Japan, Latvia, New Zealand, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, South Africa, Spain, Sweden, Taiwan and Turkey. They also showed that the evidence of a wage curve was robust to instrumenting wages along with the inclusion of benefits and union density rates. Evidence of a wage curve was especially strong in Right-To-Work states.

These various papers suggested that the unemployment elasticity of pay was -0.1, implying that a doubling of the unemployment rate lowered real wages by ten percent. The results suggest that the United States had a wage curve rather than a Phillips Curve.[6] In their meta-analysis study Nijkamp and Poot (2005) found consistent evidence of a wage curve across numerous studies concluding:

"the wage curve is a robust empirical phenomenon ... but there is ... evidence of publication bias. There is indeed an uncorrected mean estimate of about -0.1 for the elasticity. After controlling for publication bias by means of two different methods, we estimate that the 'true' wage curve elasticity at the means of study characteristics is about -0.07".

Robicki, Blien, Hewings and Hang Von (2021) concluded in a recent study for Poland and the United States that the wage curve exists even when accounting for regional price differentials. Jokinen (2020) provides recent evidence of a wage curve in Finland. Baltaji and Baskaya (2022) provide support for a wage curve for formal and informal workers in Turkey while Faryna, Pham, Talavera and Tsapin (2022) estimate a wage curve for Ukraine. Wage curves have also been found for Norway (Iacono, and Ranaldi, 2020; Johansen, Egging and Johansen, 2019), Russia (Shilov and Möller, 2009), Greece (Cholezas and Kanellopoulos, 2015), Korea (Park and Shin, 2007), Japan (Inagaki, 2015), Germany (Kosfeld and Dreger, 2018) and the United States (Holmes and Otero, 2022).

Blanchflower and Oswald (1995) were at pains to point to the differences between a Phillips Curve and a wage curve. First, Phillips's construction is claimed to be a locus linking the rate of change of wages to the level of unemployment. The Phillips Curve was proposed as a disequilibrium adjustment mechanism. The wage curve is instead an equilibrium locus that is not, in any useful sense, a description of inherently temporary phenomena or of transitory dynamics. Second, the Phillips Curve links the rate of change of pay to the aggregate unemployment rate. The wage curve links the level of pay to the local unemployment rate. Third, the Phillips Curve is traditionally estimated on time-series macroeconomic data. The wage curve is estimated on pooled microeconomic data.

In his survey of the wage curve book, David Card (1995) argued:

"(T)he tendency for the wage curve to show up for different kinds of workers, in different economies, and at different times, suggests that the wage curve may be close to an "empirical law of economics." ... One can imagine future research that uses the negative correlation between unemployment and wages as a means to study other phenomena. One can also imagine a growing body of work that follows The Wage Curve's lead in using the diverse experiences of local labour

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[6] For an attempt to reconcile Phillips curves and the wage curve see Montuenga-Gómez and Ramos-Parreño (2005).

markets as an "intermediate-level" laboratory for economic research-part way between the individualistic focus of traditional microeconometric research, and the aggregate focus of traditional macroeconometrics. More than any other lesson, this may be the long-run contribution of The Wage Curve."

4. Estimating Wage Equations in the United States

In this section we estimate wage growth in the United States building on earlier work by Blanchflower and Posen (2014) that looked at the impact of inactivity rates on wages and Blanchflower and Levin (2015) who examined underemployment and the role of long-term unemployment. It uses the same data as in Bell and Blanchflower (2021) updated from 2017 through October 2022.

We undertake an econometric analysis of the impact of rises in non-employment and inactivity on wages in the US economy. To the degree that the rise in unemployment in the United States is structural, movements in non-employment, unemployment and participation should have no impact on the wages of those employed; by definition, such individuals are unemployed because they cannot or do not want to compete for jobs. If anything, in a world where there is a sudden sharp rise in structural unemployment, wages should increase because of the negative shock to labour supply, all else equal. In contrast, if the rise in joblessness is largely cyclical, labour markets will see downward pressure on wages, because of the possibility of reentry by these idled workers.

Our data is from the Merged Outgoing Rotation Groups (MORG) files of the Current Population Survey (CPS) from 1979-2022. We aggregate the micro data to the state*year cell and construct a lagged dependent variable leaving us with an overall sample size of 2193 (50 states and the District of Columbia across 43 years=2193 observations).

We then estimated a series of wage equations reported in Tables 3-7 below, which are variants of wage curves. They take the following form:

$$W_i = \beta_0 + \beta_1 Wage_{t-1} + \beta_2 Unemp + \beta_3 Inactive + \beta_4 Underemp + \beta'_5 Year + \beta'_6 State$$

where W_i denotes log weekly or hourly wages and is a function of lagged wages, the underemployment rate, and then – depending on the precise model specification – a combination of labour market slack measures, in this case the unemployment and inactivity rates. All equations include a full set of year and state dummies.

We finally report wage Phillips curves in Table 7 and show they do not perform as well as the wage curve specification as they omit an important variable, the lagged wage level. The difference between the wage curve and Philips Curve specifications is the latter excludes the lagged wage term.[7] Gali and Gambetti (2019) also report, using a VAR analysis, reduced importance of the unemployment rate in explaining wage formation since the Great Recession.

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[7] The wage curve is estimated at $LnW_t = f (lnW_{t-1}$ and terms). This gives a Phillips Curve as long as the coefficient on the lagged wage term is not significantly different from one. We find that it is not so hence the Phillips curve suffers from a missing variable bias. The data supports wage curves not Phillips curves.

Finally, we repeat the analysis for the period 2008-2022 using quarterly data, at the suggestion of a referee and find the same. The unemployment rate does not enter wage equations in the most recent period (Appendix Table 1).

Table 3 estimates a traditional wage curve as reported in Blanchflower and Oswald (1994), separately using weekly and hourly earnings. We use the two earnings measures as increasing numbers of individuals are not paid by the hour and over time there are restrictions on the availability of hours through underemployment. The dependent variable is the log of the relevant wage measure. Equations include a lagged dependent variable and a full set of state dummies.

We examine the full period 1980-2022 and then separately for 1980-2007 and 2008-2022. In panel a) for weekly wages the coefficient on the lagged dependent variable varies between .87 and .59. In the hourly wage equations in panel b) it varies between .84 and .49. As the lagged dependent variable is significantly different from one the data is consistent with a wage curve not a Phillips Curve.

The log unemployment rate is negative and statistically significant in all three columns for weekly wages and for two of the hourly wage equations. It is weakly significant (t=1.62) in the hourly wage equation post-Great Recession.

Table 4 adds the underemployment rate, U7 to the specifications in Table 3. The underemployment rate is always negative and significant in all periods for weekly and hourly pay. The unemployment rate is now *insignificant* in the period since the Great Recession for both weekly and hourly wages.

Table 5 adds the log inactivity rate to the models reported in Table 4 which includes both the unemployment and underemployment rates. The lagged inactivity rate is negative and statistically significant over the whole period (column 1) and the later period whereas it was negative but not statistically significant prior to the Great Recession. Underemployment remains negative and statistically significant throughout.

A referee has suggested that estimation should occur minus the highly significant year dummies. This does not change the results. Excluding the year dummies in Table 6 raises the coefficient on the lagged dependent variable, and the underemployment rate remains statistically significant. This is the case for weekly and hourly wages. Unemployment is negative and significant prior to the Great Recession but becomes positive post-Great Recession, so exhibiting the wrong sign, and even statistically significant in the case of weekly wages. In the final column we insert a time trend. Again, underemployment and inactivity rates are strongly negatively associated with wage growth whereas unemployment is positively signed and, in the case of hourly wages, on the margins of statistical significance.

Table 7 presents Philips curves estimates of weekly wage change for the period 1980-2022 and pre and post 2008. The equations do not incorporate the highly significant lagged wage terms on the right-hand side, which suggests the equation is mis-specified. If the equation for the full period in column 1 was estimated in wage changes, taking W_{t-1} from both sides the lagged dependent variable has a coefficient of 1-.8745=.1255. The Phillips Curve imposes a coefficient of one on

the lagged dependent variable, so deducting w_{t-1} from both sides results in no lagged wage term on the right-hand side. A test of whether it is a Phillips Curve, or a wage curve is whether the coefficient on the lagged dependent variable, W_{t-1} is statistically different from zero. It always is.[8] So the Phillips curve is mis-specified as it omits a crucial significant variable, the lagged wage term. In any case the results are essentially the same. In the later period the unemployment rate is insignificant while the underemployment rate is significantly negative

The data supports a wage curve, not a Phillips Curve written in underemployment and inactivity space in the post-recession period. The Phillips curve is mis-specified as it suffers from omitted variable bias as it excludes the highly significant lagged wage variable.

5. Conclusion and Implications
Erceg and Levin (2013) argued that "*labour market slack may not be well summarized by the unemployment rate and consequently the monetary policy rule developed for the Great Moderation may have to be adapted to account for broader measures of slack*." Judging by the evidence we present in this paper, that seems right. They suggested that the participation rate should enter into wage equations, meaning the higher the participation rate the higher are wages, but did so without any empirical evidence. We present supporting evidence here that the underemployment rate, the non-employment rate, and the inactivity rate play a role in wage formation, especially in the years since the Great Recession.

We find evidence of a statistically significant negative effect of non-employment and underemployment on wages post the Great Recession. Those not in the labor force or not employed exert additional downward pressure on wages over and above the unemployment rate. This pattern holds across previous decades in the U.S. data, and the relationship strengthens in recent years when variation in participation increases. Our analysis is based on observations by state and year and therefore is robust to the local impact on employment of, say, fracking in North Dakota or ongoing real estate overhang in Nevada.

There is no wage Phillips curve in wage growth and unemployment space in the years since the Great Recession. Our preferred specification is a wage curve, which dominates a Phillips curve specification due to the significance of the lagged, dependent variable. There is no wage curve in the wage/unemployment space, though in the years after the Great Recession, there is one in the wage/underemployment and non-employment combined space. The wage curve specification fits the data better, as there is an important role for the lagged wage term.

In the past, commentators have argued that the long-term unemployed (LTU) were on the margins of the labour market (Krueger, Cramer and Cho, 2014). As such, it was assumed that they had little or no impact on wages. Instead, it was suggested, one should focus on the short-term unemployment rate where labour market attachment was stronger. But there is no empirical evidence for this proposition. Some time ago Blanchflower and Oswald (1990) noted that long-

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[8] Bell, Nickell and Quintini (2002) for the UK, for example, found that the long-run elasticity of average regional wages with respect to regional unemployment is in the range 0.11–0.13 The long-run elasticity of individual wages with respect to regional unemployment is around −0.053. They found that while wages exhibited a high degree of autocorrelation both at the regional and the individual level, "*the lagged dependent variable coefficient is well below unity*".

term unemployment is not "an important element in the wage determination process". Instead, what appears to matter is joblessness, whether captured by the inactivity or non-employment rate. Underemployment also matters for wage growth. Since the Great Recession it has been a break on wage growth.

The implication for policymakers is that high non-employment and high underemployment *are* indeed additional measures of labour market slack, pushing down on US wages. A substantial portion of those American workers who became inactive should not be treated as gone forever but should be expected to spring back into the labour market if demand rises to create jobs.

In 1968 in his presidential address to the American Economic Association Milton Friedman (1968) famously explained that "*the natural rate of unemployment, in other words, is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is imbedded in them the actual structural characteristics of the labour and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labour availabilities, the costs of mobility, and so on*"

He went further though arguing that the rate could change in either direction.

"I do not mean to suggest that it is immutable and unchangeable. On the contrary, many of the market characteristics that determine its level are man-made and policy-made. In the United States, for example, legal minimum wage rates, the Walsh-Healy and Davis-Bacon Acts, and the strength of labour unions all make the natural rate of unemployment higher than it would otherwise be. Improvements in employment exchanges, in availability of information about job vacancies and labour supply, and so on, would tend to lower the natural rate of unemployment.

It is perfectly possible, and indeed likely that the Great Recession scared workers and non-workers, reducing their bargaining power, hence lowering the NAIRU.

Demand deficiency appears to be a reasonable explanation for underemployment, which implies that workers are off their labour supply curves, which explains in part why they are discontented (Bell and Blanchflower, 2020). There are obvious opportunities for the underemployed to adjust their hours upwards given that they could take second jobs. Of note is that the multiple jobholding rate, with the numbers expressed as a percent of employment, has declined over time. The multiple jobholding rate, expressed as a percent of total employment, according to the BLS, was 5.8% in 2000, 5.2% in January 2008 and January 2020 and is 4.9% in February 2023.

In the USA there has been little evidence of any rise in nominal wage growth, despite the very low levels of the unemployment rate in the years since the Great Recession. Charts 3 and 4 illustrate this phenomenon. As the unemployment rate declined there was little response from wage growth, which stayed steady at around 2% during the period 2010-2020.

It seems that non-employment, inactivity, and underemployment have replaced the unemployment rate as measures of U.S. labour market slack. These measures enter wage equations whereas the unemployment rate does not. Wage growth did not mean revert to pre-recession levels, whereas

the unemployment did; non-employment, inactivity and underemployment rates did not mean revert and hence are more correlated with wages than the unemployment rate. We have shown that the unemployment rate is no longer a useful guide to what is happening in the U.S. labour market.

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Table 1. Inactivity rates by major country age 15+, 2000-2022

Time	2000	2008	2019	2020	2021	2022	2008-2022
Australia	37	35	34	35	34	33	-1
Austria	42	40	39	39	39	38	-1
Belgium	48	46	46	46	46	45	-1
Canada	34	32	34	36	35	35	+2
Chile	46	44	37	44	43	40	-4
Czech Republic	40	42	40	40	40	40	-1
Denmark	34	35	38	38	37	37	+2
Estonia	41	39	36	36	36	34	-5
Finland	39	39	41	41	40	39	0
France		44	45	45	44	44	0
Germany		41	38		39	39	-2
Greece	48	47	48	49	49	48	+1
Hungary	50	50	43	43	40	40	-10
Iceland		18	19	21	27	25	+7
Ireland	40	34	38	39	37	35	+1
Israel	46	43	37	38	38	37	-7
Italy	52	51	50	51	51	51	0
Japan	37	40	38	38	38	37	-2
Korea	39	38	37	37	37	36	-2
Netherlands	36	35	35	35	33	32	-3
New Zealand	35	32	29	30	29	29	-3
Norway	27	26	36	36	34	34	+8
Poland	43	46	44	44	43	43	-3
Portugal	39	38	41	42	42	41	+3
Slovak Republic	40	41	40	41	39	38	-2
Slovenia	42	41	42	42	42	41	+1
Spain	47	41	42	43	42	42	+2
Sweden		36	34	34	33	33	-3
Switzerland		32	32	32	33	33	+2
Türkiye		54	47	51	49	47	-7
United Kingdom	37	36	36	36	37	37	+1
United States	33	34	37	38	38	38	+4

Source: OECD

Note: The inactivity rate is calculated as: O/(U+O+E). where U=unemployed, E=employed and O=not in the labour force. O individuals are (1) not employed during the survey reference week and (2) had not actively looked for work (or been on temporary layoff) in the last 4 weeks.

Table 2. Inactivity rates by age group (seasonally adjusted).

USA	16+	16-19	20-24	25-54	55+
January 2000	33	48	22	16	67
January 2008	34	59	25	17	61
January 2020	36	64	27	17	60
February 2023	37	63	28	17	62

Source: Bureau of Labour Statistics

Table 3. Wage equations and the unemployment rate

	1980-2022	*1980-2007*	*2008-2022*
a) Weekly			
Lagged wages	.8738 (89.00)	.8619 (69.97)	.5867 (19.67)
Unemployment rate	-.0266 (9.17)	-.0318 (9.40)	-.0180 (2.73)
Adjusted R^2	.9978	.9967	.9846
N	2193	1428	765
b) Hourly			
Lagged wages	.8447 (74.12)	.8422 (59.05)	.4912 (15.06)
Unemployment rate	-.0220 (6.87)	-.0263 (7.03)	-.0116 (1.62)
Adjusted R^2	.9973	.9959	.9814
N	2193	1428	765

T-statistics in parentheses. All variables in logs. Equations include full sets of state and year controls.

Table 4. Wage equations including the underemployment rate

	1980-2022	*1980-2007*	*2008-2022*
a) Weekly			
Lagged wages	.8654 (88.36)	.8523 (69.32)	.5669 (19.25)
Underemployment rate	-.0134 (4.37)	-.0198 (5.67)	-.0324 (6.37)
Unemployment rate	-.0092 (2.11)	-.0138 (2.98)	.0034 (0.45)
Adjusted R^2	.9978	.9967	.9865
N	2193	1428	765
b) Hourly			
Lagged wages	.8400 (73.60)	.8353 (58.31)	.4809 (14.83)
Underemployment rate	-.0153 (5.18)	-.0139 (3.62)	-.0241 (3.69)
Unemployment rate	-.0064 (1.60)	-.0135 (2.62)	.0043 (0.52)
Adjusted R^2	.9973	.9959	.9818
N	2193	1428	765

T-statistics in parentheses. All variables in logs. Equations include full sets of state and year controls. Underemployment rate U7 is part-time for economic reasons/employment

Table 5. Wage equations including the inactivity rate

	1980-2022	1980-2007	2008-2022
a) Weekly			
Lagged wages	.8497 (82.62)	.8498 (68.56)	.5584 (18.93)
Unemployment rate	-.0080 (2.05)	-.0138 (3.00)	.0046 (0.61)
Underemployment rate	-.0170 (6.06)	-.0188 (5.30)	-.0332 (5.57)
Lag inactivity rate	-.0587 (4.79)	-.0237 (1.50)	-.0926 (2.64)
Adjusted R^2	.9979	.9967	.9854
N	2193	1428	765
b) Hourly			
Lagged wages	.8243 (69.42)	.8325 (57.64)	.4740 (14.56)
Unemployment rate	-.0084 (1.93)	-.0135 (2.63)	+.0054 (0.65)
Underemployment rate	-.0114 (3.68)	-.0128 (3.30)	-.0244 (3.74)
Lag inactivity rate	-.0589 (4.41)	-.0254 (1.47)	-.0783 (2.04)
Adjusted R^2	.9974	.9959	.9812
N	2193	1428	765

T-statistics in parentheses. All variables in logs. Equations include full sets of state and year controls

Table 6. Wage equations excluding year dummies and including a time trend

	1980-2022	1980-2007	2008-2022	1980-2022
a) Weekly				
Lagged wages	.9707 (695.06)	.9484 (339.55)	.9910 (68.24)	.8175 (82.8)
Unemployment rate	-.0042 (1.26)	-.0161 (3.80)	+.0128 (1.95)	.0024 (0.75)
Underemployment rate	-.0219 (8.42)	-.0263 (8.49)	-.0353 (5.30)	-.0228 (9.27)
Lag inactivity rate	-.1404 (7.97)	-.0761 (2.28)	-.0490 (0.77)	-.0430 (3.79)
Year dummies	No	No	No	No
Time trend	No	No	No	Yes
State dummies	Yes	Yes	Yes	Yes
Adjusted R^2	.9970	.9956	.9767	.9973
N	2193	1428	765	2193
	1980-2022	1980-2007	2008-2022	1980-2022
b) Hourly				
Lagged wages	.9712 (628.81)	.9486 (309.32)	.9748 (59.84)	.7863 (70.6)
Unemployment rate	-.0031 (0.86)	-.0112 (2.42)	+.0086 (1.16)	.0062 (1.79)
Underemployment rate	-.0199 (6.96)	-.0264 (7.80)	-.0329 (4.41)	-.0206 (7.63)
Lag inactivity rate	-.1363 (7.01)	-.0750 (2.06)	-.0465 (0.64)	-.0595 (4.88)
Year dummies	No	No	No	No
Time trend	No	No	No	Yes
State dummies	Yes	Yes	Yes	Yes
Adjusted R^2	.9963	.9946	.9693	.9968
N	2193	1428	765	2193

T-statistics in parentheses. All variables in logs.

Table 7. Weekly wage change Phillips Curve equations minus the lagged dependent variable

a)	*1980-2022*	*1980-2007*	*2008-2022*
Unemployment rate	-.0291 (9.65)	-.0357 (9.99)	-.0163 (2.09)
Adjusted R^2	.3435	.3646	.2116
N	2193	1428	765

b)	*1980-2022*	*1980-2007*	*2008-2022*
Unemployment rate	-.0158 (3.90)	-.0231 (4.81)	-.0018 (0.20)
Underemployment rate	-.0140 (4.85)	-.0140 (3.85)	-.0220 (3.24)
Adjusted R^2	.3505	.3710	.1982
N	2193	1428	765

c)	*1980-2022*	*1980-2007*	*2008-2022*
Unemployment rate	-.0158 (3.90)	-.0237 (4.81)	-.0013 (0.16)
Underemployment rate	-.0140 (4.85)	-.0145 (3.86)	-.0221 (3.25)
Lag inactivity rate	-.0014 (0.12)	+.0100 (0.56)	-.0352 (0.88)
Adjusted R^2	.3501	.3707	.2177
N	2193	1428	765

T-statistics in parentheses. All variables in logs. Equations include full sets of state and year controls
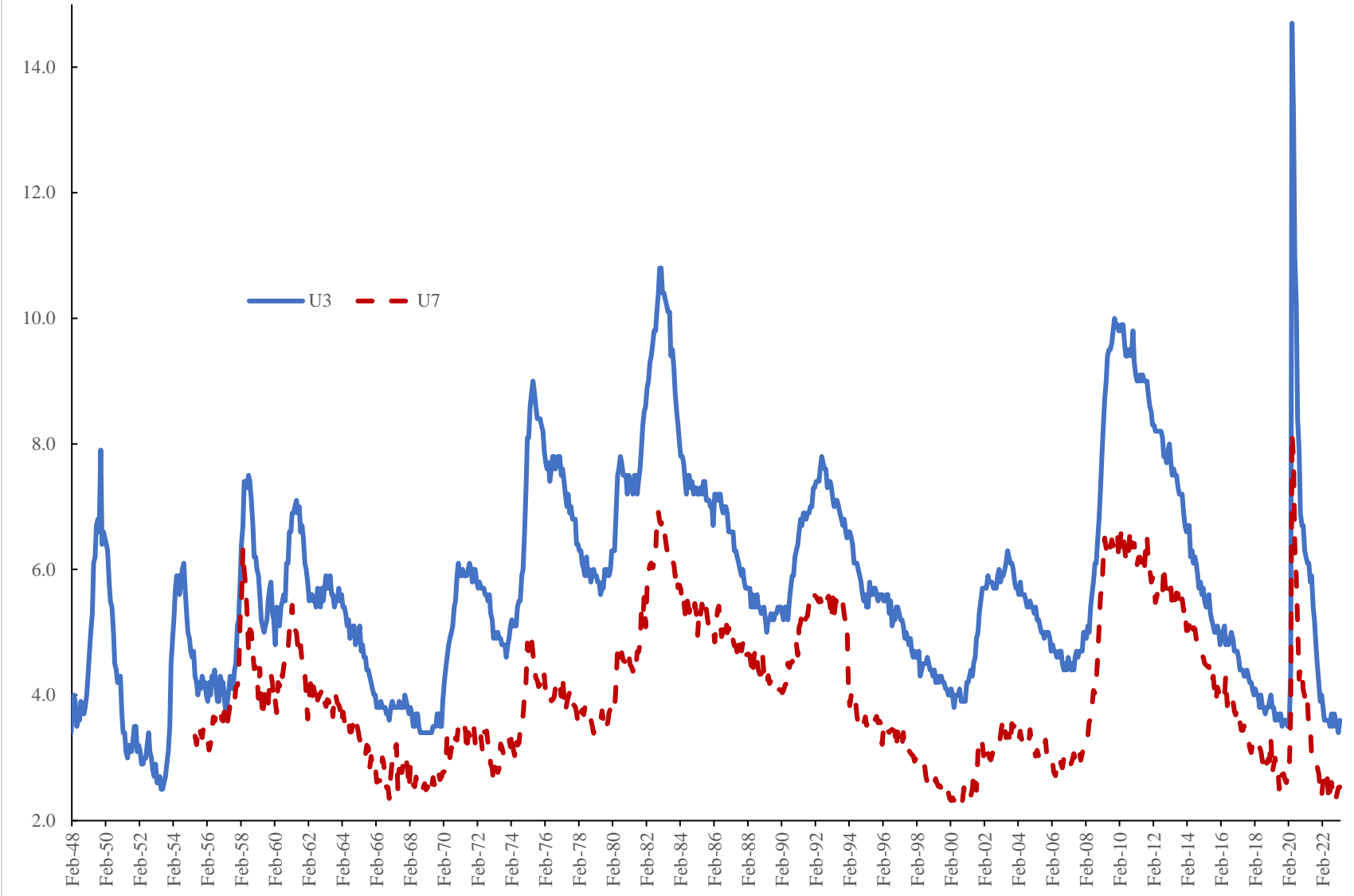
Chart 1. US Unemployment and Underemployment Rates

Chart 2. Non-employment and inactivity rates

Legend: Inactivity rate (solid red line), Non-employment rate (dashed blue line)
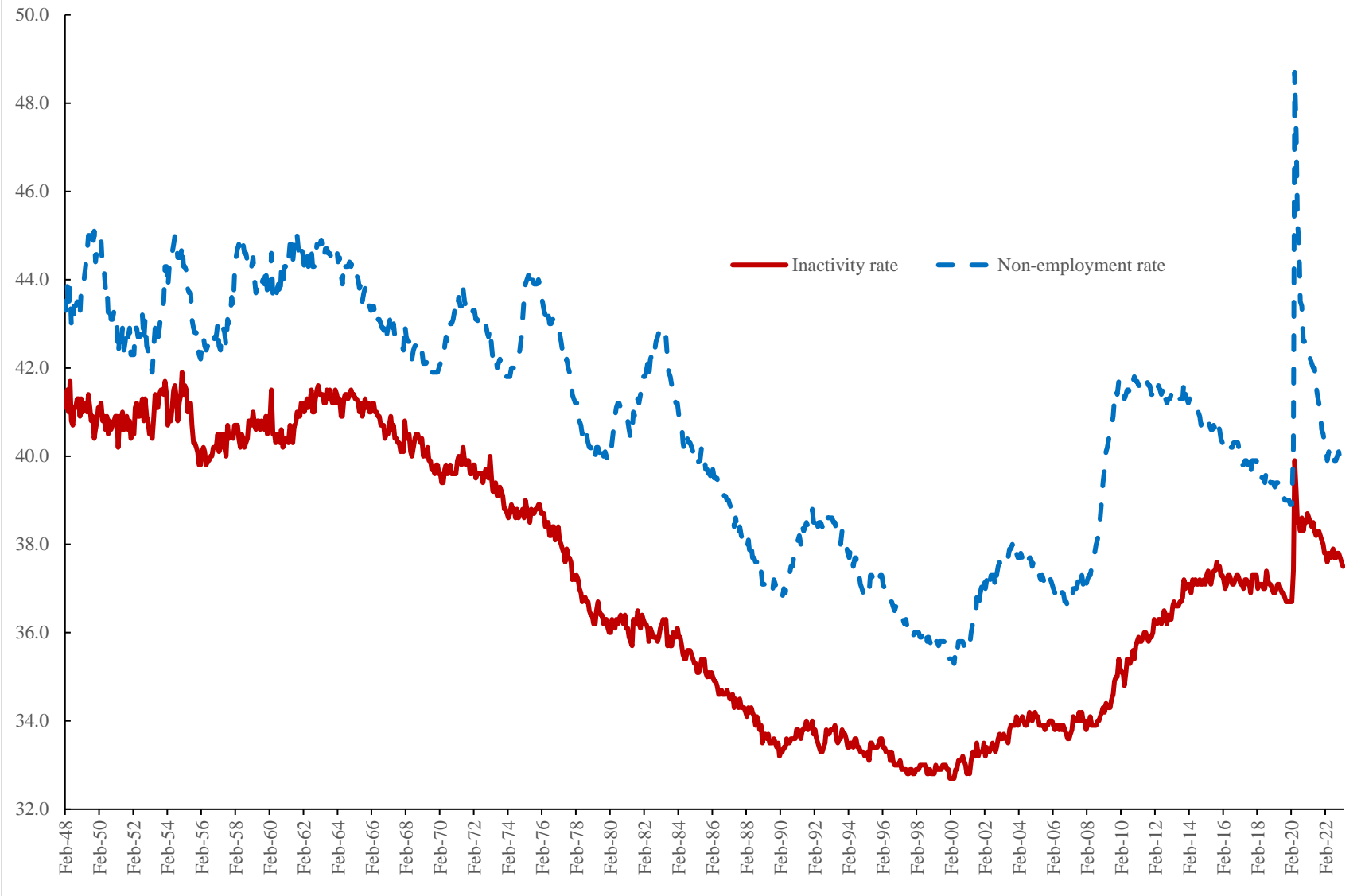
Chart 3. Weekly nominal wage growth PNSW and the unemployment rate, 2008-2023
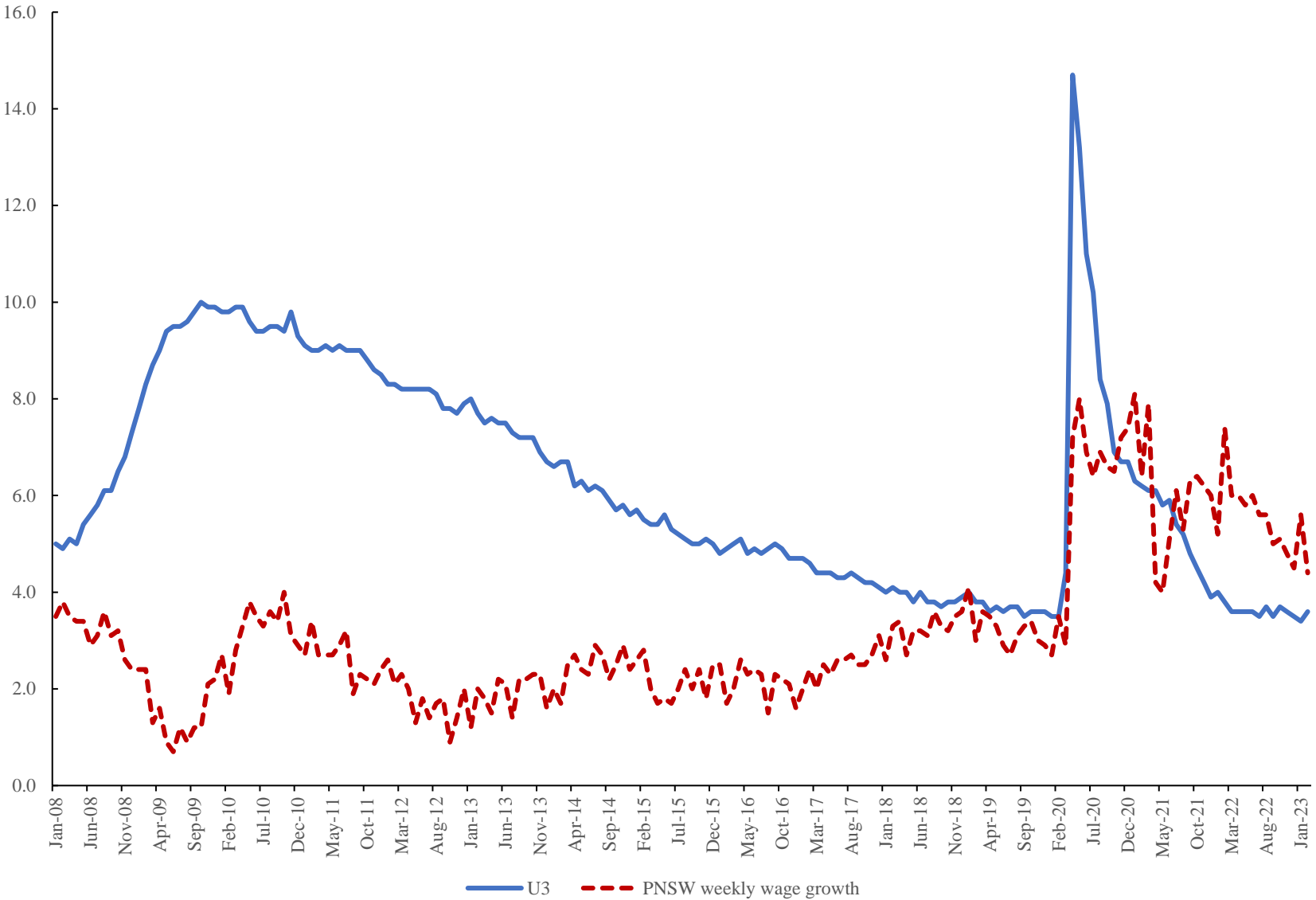
Chart 4. US Quarterly usual annual median weekly earnings growth for FT wage and salary workers
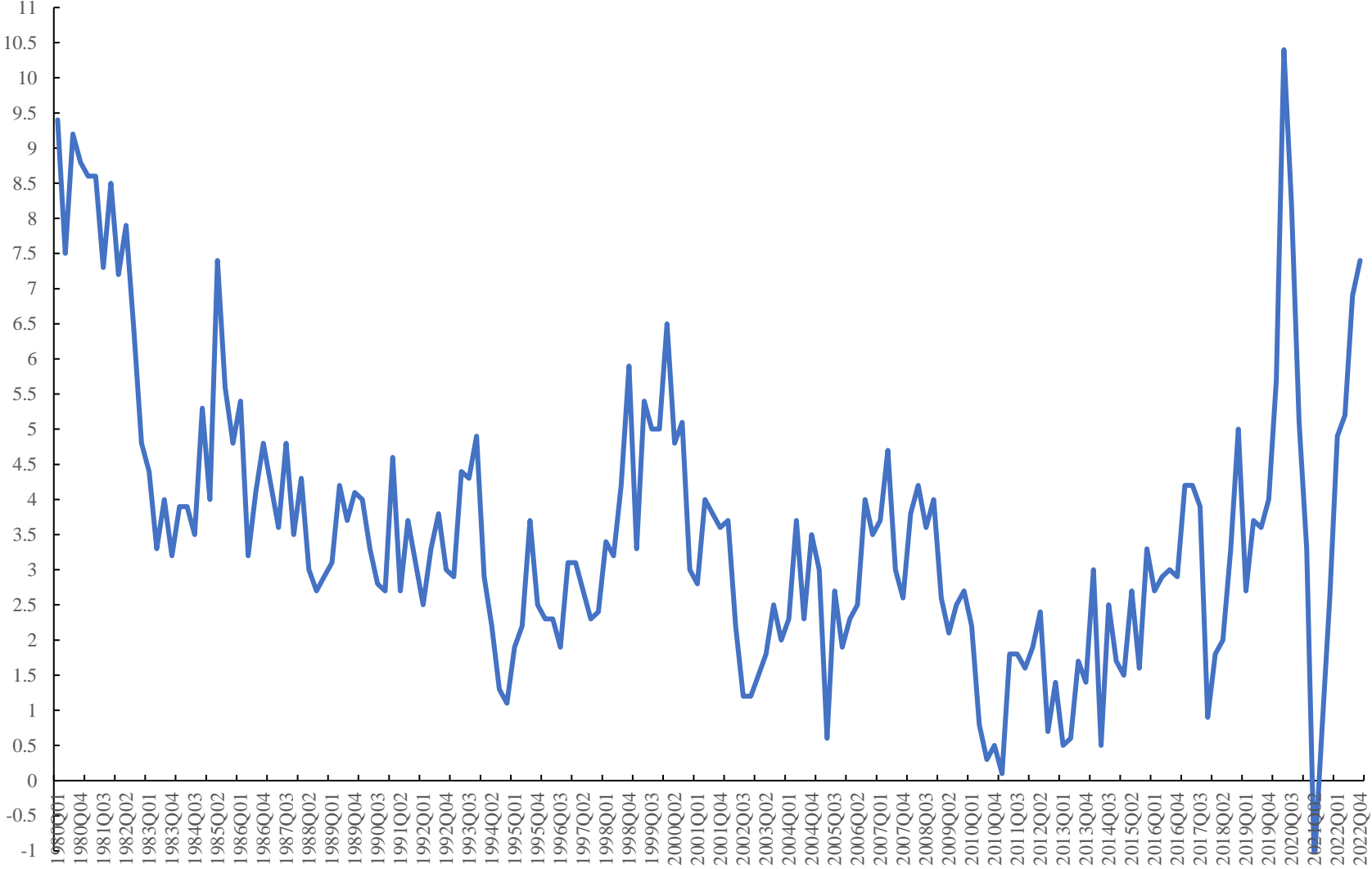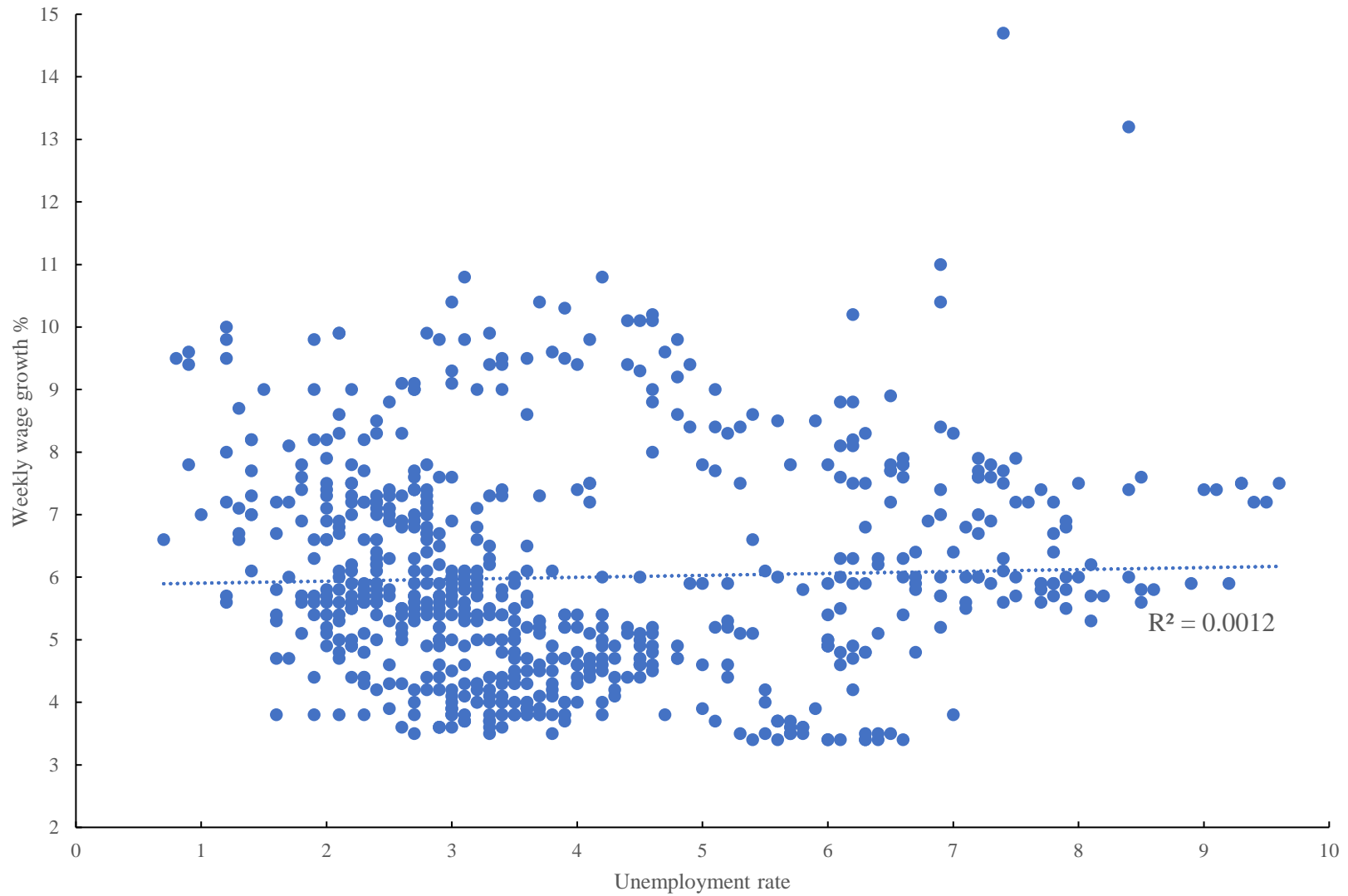
Chart 5. Private Sector Non-Supervisory Workers Weekly Earnings and the US Phillips Curve. 1965-2023

$R^2 = 0.0012$

Weekly wage growth %

Unemployment rate

Appendix Table 1. Wage equations using quarterly data, 2008-2022

	Weekly		Hourly	
Lagged wages	.8652 (90.45)	.2914 (17.34)	.8520 (16.67)	.2436 (14.26)
Unemployment rate	+.0083 (1.76)	+.0326 (6.48)	.0045 (0.89)	+.0307 (5.72)
Underemployment rate	-.0379 (8.24)	-.0340 (8.52)	-.0343 (6.94)	-.0235 (5.58)
Lag inactivity rate	+.2262 (8.53)	-.1192 (4.09)	+.2465 (8.60)	-.1111 (3.59)
Year dummies	No	Yes	No	Yes
Adjusted R^2	.9345	.9564	.9226	.9501
N	3060	3,060	3,060	3,060

T-statistics in parentheses. All variables in logs. Equations include full sets of state and year controls