

Underemployment in the US and Europe

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Abstract

We produce estimates for a new, and better, underemployment rate for twenty-five European countries using the European Labor Force Surveys based on worker's reports on their preferred hours at the going wage. Both voluntary and involuntary part-timers report they want more hours. Full-timers who say they want to change their hours mostly say they want to reduce them. When recession hit the number of hours of those who said they wanted more hours increased and there was a fall in the number who wanted less. Both remain elevated.

We provide evidence for the UK and the US as well as from an international sample that underemployment lowers pay in the years after the Great Recession, but the unemployment rate does not. We also find evidence for the US that falls in the home ownership rate have helped to keep wage pressure in check. Underemployment replaces unemployment as the main influence on wages in the years since the Great Recession.

The failure of wages to recover to their pre-recession growth rates in the developed world has been a continuing puzzle for economists. Although output has grown significantly in most of these countries, real wages have recovered much more slowly. Nominal wage growth has been weak so that real wages have hardly risen even though price inflation has also been sluggish. Our paper investigates a possible explanation of this seeming paradox, that the unemployment rate does not adequately measure labor market slack in the post-recession years.

The traditional explanation for a lack of wage growth would be, that wage growth has been held back, by high levels of unemployment (Blanchflower and Oswald, 1994). But this explanation is not consistent with the recent facts. Unemployment rates are low in most developed countries, and at historically low rates in some of these, such as the USA (49-year low of 3.7% in September 2018) and the UK (40-year low of 4.2% in May 2018). In the pre-recession years unemployment rates this low would have generated much higher wage growth than currently observed. The search for alternative explanations has focused attention on underemployment - as measured by the willingness of current workers to increase their working time without increasing their wage rate.

We have written extensively on this topic in relation to underemployment in the UK labor market (Bell and Blanchflower (2011, 2013, 2014, 2018a 2018b, 2018c). In this paper, we extend our analysis to the USA and mainland Europe, exploring the strengths and limitations of various datasets and measures that can be used to measure aspects of underemployment.

This lack of a credible explanation for sluggish wage growth poses a challenge to the credibility of the economics profession, given its significant micro and macroeconomic consequences. The lack of a robust model for wage growth that takes account of conditions in the post-recession labor market weakens the credibility of central bank interest-rate decisions. It is our contention that underemployment should play a significant role in such a model.

Underemployment

In our interpretation of the concept, underemployment implies workers are off their labor supply curves, in contrast to the so-called “canonical” model (Pencavel, 1986) in which workers are free to choose their hours of work, given the wage rate. This model has been dominant in the literature since Lewis (1957). Yet it neglects the role of employer preferences in determining hours Pencavel (2016, 2018). Though Lewis himself stepped back from this position (Lewis 1969), acknowledging that the preferences of employers are neglected in the canonical model, the assumptions that workers select from a continuum of hours, while treating the wage rate as exogenous, continues to dominate research and teaching. This approach persists, even though aggregate hours fluctuate in response to changes in demand and the organization of production requires employers to place some restrictions on working time, for example, to ensure that a production line is fully staffed.

Some authors, acknowledging that observed hours and wage combinations reflect both supply and demand influences have sought to identify these effects empirically. Thus

Feldstein (1968) and Rosen (1969) attempt to identify the supply and demand for worker hours using industry variation, with limited success. Further, Hwang, Mortensen and Reid (1998) argue that search behavior further complicates the analysis of how workers select between different combinations of wages and nonwage job amenities such as hours of leisure. They suggest that *“the equilibrium relationship between wages and a nonwage job amenity will generally bear little resemblance to workers’ underlying valuations of the job amenity”* This argument is consistent with a situation where workers’ valuations of leisure are not aligned to their contracted hours of work and they therefore may express a wish to change their working time.

These arguments are reinforced by the employment function literature, which focuses on how firms adjust to a positive output shock, which dates back to the 1960s and 1970s.¹ Hart and Sharot (1978), for example, argued that their results *“hinge on the proposition that firms achieve short-run changes in labor requirements by varying their worker utilization rates, whereas... the response of employment is more sluggish and long-term.”* Of course, the same applies to a negative shock.

Where hiring, firing and training costs are high, employers are more likely to rely on the internal labor market. Where they are low, there is likely to be more job turnover, implying greater reliance on the external labor market. This does not seem much like employees selecting a utility maximizing combination of the real wage and leisure: rather it suggests that firm profitability (or survival) is taking precedence over worker’s hours preferences, at least in the short-run. Short-run hours variations may be the best way to protect joint investment in firm specific skills.

If employment contracts are non-binding with workers being free to leave and firms to fire at will, Stole and Zweibel (1996) show that the optimal number of workers exceeds the number implied by the neoclassical profit maximizing model. This resulting “overemployment” leads to downward pressure on the internal wage, bringing it closer to the outside option. Utility maximizing workers in such firms may choose to accept hours-wages packages that do not meet their income aspirations and be prepared to work additional hours in the same job at the same wage rate, especially if monopsony considerations limit their outside opportunities.

The Jackson Hole meeting of the Federal Reserve in August 2018 specifically looked at how changes in the labor market might affect monetary policy and included papers on superstar firms by Jon Van Reenen (2018) and the importance of monopsony power by Krueger (2018). If employers are monopsonists, they may be able to impose variations in workers’ hours even if there is little joint investment in firm-specific skills (see Ashenfelter et al (2010), Manning (2003) and Card et al, (2018)). Variations in hours are generally less expensive than rescaling the workforce and firms may use such variations when they perceive the probability of inefficient separations is low. Bhaskar, Manning and To (2002), suggest a number explanations as to why modern labor markets are typically 'thin', increasing employers’ market power.

¹ Brechling (1965); Ball and St Cyr (1966) and Hart and Sharot (1978).

Manning, while also lamenting the pre-eminence of the canonical model, argues that under monopsony, utility maximizing employees may be displaced from their supply curve and express a desire to increase or decrease their hours at the current wage rate (Manning, 2003, p. 228). Using data from the British Household Panel Survey for the period 1991-98, he shows that the desire to reduce hours substantially exceeded desired hours increases during this period. This finding is consistent with our analysis using the UK Labour Force Survey (ONS 2015) for the early part of the following decade, but we find a subsequent reversal after the Great Recession.

Depew and Sørensen (2013) examined job duration data for the US from 1919 to 1940 and found that monopsony power is greater in slack labor markets. Recently Hirsch et al (2018) came to a similar conclusion using German administrative data from 1985 to 2010. And even if the labor market recovers, negative effects on wage growth may persist. Again, drawing on the hedonic wage model where workers and firms seek a match over a range of job characteristics, not all of these characteristics need respond immediately to changes in the economic environment. For a period, firms may compete for workers over characteristics other than the wage. This is consistent with Piore's (1973) argument that "*customs tend to grow up around existing practice. The practice may initially be dictated by economic considerations*". If employers have market power, anchoring around a wage norm may persist until some new shock causes employers to break ranks.

Azar et al (2017) show that labor market concentration is high in the US, and increased concentration is associated with lower wages such that there is a negative correlation between labor market concentration and average posted wages in that market. Using data from the employment website CareerBuilder.com, they calculate labor market concentration for over 8,000 geographic-occupational labor markets in the US. The authors show that going from the 25th percentile to the 75th percentile in concentration is associated with a 15-25% decline in posted wages, suggesting that concentration increases labor market power. Note that in such labor markets, workers may be more likely to agree contracts which give employers rights to vary working time at short-notice without varying pay rates – such workers may therefore describe themselves as underemployed.

Another version of this argument was suggested to us by an editor, who argued that a firm might have some fully employed workers and some underemployed workers. The latter group may be thought of as a reserve army, enabling the firm to resist wage demands from the fully employed. The existence of underemployed workers working alongside those who are satisfied with their hours may exert more downward pressure on wages than the pool of unemployed workers in the locality. As substitutes for the labor of fully employed within a firm, underemployed workers have lower costs and risks than the unemployed. Employers are also likely to be aware who the underemployed are. Underemployment is personal in a way that unemployment is not.

In this paper, we extend our earlier work in which we constructed an underemployment rate in hours space for the UK by quarter using the UK Labor Force Survey (UKLFS), by constructing similar underemployment measures for twenty-five other European countries.

We show that, in contrast to the unemployment rate, underemployment in most countries has not returned to its pre-recession levels. The main exception is Germany. We also show why it is not possible to construct a comparable comprehensive measure of underemployment for the United States. Instead, it is only possible to build a measure based on survey responses to questions about part-time working and whether the worker would prefer to be full-time. However, we do show that in the post-recession years, this measure has a significantly negative effect on US wages, while the unemployment rate is insignificant. We also show there is a low prevalence of part-time work in the US, which suggests that this measure may well understate the true amount of underemployment. In our view, elevated levels of underemployment rates are a large part of the reason why wage growth has been weak in the US post-recession. This is consistent with our recent work for the UK showing the same role for underemployment (Bell and Blanchflower, 2018a).

We also find that in Europe large numbers of workers would like to change the number of hours they work without changing their wage rate. Those who wished to increase their hours (the underemployed) rose sharply across Europe in the years after 2008, while the number who wished to reduce their hours (the overemployed) fell slightly. During the recovery, over-employment fell back to pre-recession levels, but underemployment did not. In the UK we found that for the years 2001-2007 unemployment was above underemployment.

The evidence in Bell and Blanchflower (2018b) is that such individuals, including those who want fewer hours - the over-employed - and those who want more hours - the underemployed - have lower levels of wellbeing. We also found for the UK that those who want to reduce their hours are paid a compensating differential via higher earnings, while those who want more hours are paid less. If aggregate demand was higher, our data suggests that more wage-hour combinations would be available that include extra hours, which is likely to improve welfare and wellbeing. Low demand reduces the availability of such choices and generates underemployment.

Existing Measures of Underemployment

The most widely available measure of underemployment estimated by statistical agencies around the world, such as the Bureau of Labor Statistics in the US; the Office for National Statistics in the UK and the EU statistical agency Eurostat, is the share of involuntary part-time workers in total employment – the involuntary part-time rate that we call U7.² This measure only captures the number of part-time workers who wish to extend their hours. It carries no information on the number of additional hours these workers wish to work, nor if some (other) workers, including voluntary part-timers and full-timers, would also prefer to increase their hours. Similarly, it conveys no information on the overemployed – those

² Philippa Dunn pointed out to us that the BLS originally their broad labor market utilization measure was originally called U7 as outlined in Shiskin (1976) and Sorrentino (1993, 1995). U6 was defined differently from 1976-1993 as total full-time jobseekers, plus half of the part-time jobseekers, plus half of the total number of persons working part-time for economic reasons, as a percent of the civilian labor force, less half of the part-time labor force. U-7 then added discouraged workers in the denominator and numerator. They definitions were changed to those described in the online appendix as a result of the redesign of the CPS in January 1994. The new modified set of alternative indicators U1-U6, dropping U7 were described in Bregger and Haugen (1995). In 1994 the old U7 was 10.2% and the new U6 was 10.9%.

who would prefer to reduce their hours of work. Further, since the share of part-time workers in the workforce varies by country for fiscal, institutional and cultural reasons, the possible range for the estimate of share of involuntary part-timers in total employment varies widely across countries. This makes cross-country comparisons of involuntary part-time rates problematic.

However, the widespread use of the IPTR measure of underemployment reflects the lack of alternatives, particularly in the USA. In Europe, involuntary part-timers are described as part-timers who want full-time jobs (PTWFT), whereas in the United States they are described as part-time for economic reasons (PTFER). In Europe, statistics on PTWFT are obtained from the individual level European Labor Force Surveys (EULFS) and in the United States on PTFER from the Current Population Survey. We treat these measures analogously. Monthly data on these measures are published for the US and the UK, while quarterly data is available for most European countries.

There is a growing literature on the behavior of the underemployed.³ Blanchflower and Levin (2015) showed that in the United States, its rise represents another dimension of labor underutilization. Valetta et al (2018) report that the young of both sexes under the age of twenty-four, the single, the least educated, blacks and Hispanics and the unincorporated self-employed are most likely to be IPT. Hurley and Patrini (2017) reported on the distribution of involuntary part-time work across the EU28 in 2015. They were disproportionately female, young, less educated, on temporary contracts and in elementary occupations.

Involuntary part-time work is typically associated with low wage rates. Golden (2016), for the United States, found that among those who are paid by the hour, voluntary part-time workers earned \$15.61 per hour on average compared with only \$15.11 for those working part-time involuntarily. Among those who could “find only part time work” their hourly earnings were even lower, \$14.53.

In Bell and Blanchflower (2018a), using UKLFS data, we found that individuals who reported that they wanted more hours, over and above whether they were PTWFT, had lower wages. Individuals who were PTWFT had lower hourly wages than voluntary part-timers and full-timers. This implies that wages will be depressed the greater is the willingness of workers to provide more hours at the going wage rate. Part-timers who want extra hours are paid less than part-timers who are content with their hours. It seems that having workers in jobs where they want more hours keeps wages down as they accept lower pay, conditional on their characteristics.

The Great Recession and its Aftermath

By the start of the Great Recession in December 2007 in the US and April 2008 in the UK, involuntary part-time employment was above its previous minimum, both in levels and rates. The latest data for the United States for September 2018 from the Bureau of Labor

³ For other recent papers on underemployment see Borowczyk-Martins and Lalé (2016, 2018), Cajner et al (2014); Glauber (2017); Golden (2016); Sum and Khatiwada (2010) and Veliziotis et al (2015).

Statistics, reports that there are 4,642,000 PTFER, down from a high of 9.25 million in September 2010, representing 3.0% of total employment now compared with 6.4% at the peak. This compares to a low of 3.1 million or 2.3% of employment in July 2000.

PTWFT in the UK in the latest data was 943,000 in July 2018, down from a peak of 1,465,000 in April 2013 and up from the pre-recession level in April 2008 of 696,000 and 537,000 in October 2004. As a percentage of employment in the UK PTWFT now represents 2.7% of total employment compared with a peak rate of 4.9% and a low of 1.9% in the last three months of 2004.

Chart 1 plots the monthly time series of three measures of labor utilization for the United States – the unemployment rate U3 and what we call U7, which expresses PTFER in the United States as a proportion of employment. U3 and U7 are plotted back to 1970 although the series is available from the BLS to May 1955. U3 has returned to a pre-recession low of under 4%. In January 2008 at the start of the recession U3 was 5.0%. U7 in September 2018 was 3.0% versus 3.3% in January 2008. Of note though is that U7 is still above its low of 2.3% experienced in seven separate months in 2000. U3 was last at 3.7% in October 1969. U7 though could go lower.

The rise in involuntary part-time employment has occurred at the same time as there has been little change in average hours worked in both the US and the UK. In the US, private sector weekly hours, according to the BLS, averaged 34.4 in January 2008, versus 34.5 in September 2018. For production and non-supervisory workers, it was unchanged at 33.7 on both dates. In the UK, for example, average actual hours at the start of the recession in March to May 2008 was 37.1 for full-timers and 15.6 for part-timers. This compares to 37.3 and 16.2 respectively for June 2018 to August 2018. In Germany, average hours declined slightly from 35.6 to 35.2. Usual weekly hours fell in the European Union, according to Eurostat from 37.9 in 2008 to 37.1 in 2016.

The numbers of involuntary part-timers are large as compared, for example, to the number of unemployed people, which in the latest data for the US in September 2018 is 4.6 million, compared with just under 6 million unemployed. At its peak, PTFER reached over 9 million in September 2011 while unemployment hit a peak of 15.4 million in October 2009. In the most recent data for June to August 2018 the UK had 943,000 PTWFT, down from just under 1.5 million, at the peak. This compares with 1.4 million unemployed, down from a peak of 2.7 million in November-January 2012. So, the additional level of labor market underutilization represent by the underemployed is substantial.

According to Eurostat, in 2017, there were 9 million PTWFT part-time workers ages 15-74 in the EU-28 of which 6.6 million were in the Euro area. This compares with 18.8 million unemployed ages 15-74 in the EU28 and 14.7 million in the Euro Area in 2017. In four countries in 2016 – Germany (1.37 million); Spain (1.4 million); France (1.5 million) and the UK (1.5 million) there were more than a million PTWFT. Between 2008 and 2013, which is the peak year, the numbers rose in almost every country, the main exceptions being Germany; Croatia and Norway, which is not in the EU.

Table 1 reports U7 rates, expressed as a proportion of total employment for the European Union. Rates spiked as high as 8.1% in Ireland and 7.9% in Spain. Rates were higher in 2017 than the 2008 pre-recession rate in all countries except Germany, Malta, Norway, Poland and Sweden. They were the same in Estonia and Lithuania. **Table 1** also reports the ILO unemployment rates by country, which mostly shows how the two series rose through 2012 and declined thereafter. Unemployment rates were higher in 2017 than in 2008 except in Germany, Hungary, Ireland, Malta, Poland, Romania, Slovakia, and the UK.

Countries with high unemployment rates like Cyprus, Spain and Greece even in 2017 had high U7 rates whereas Italy and Portugal had relatively low U7 rates given their high unemployment rates. The Netherlands, which experienced a rapid rise in the self-employment rate from 13.2% in 2008 to 16.7% in 2017, has a noticeably high underemployment rate in 2017.⁴ In 2017 several East European countries such as Estonia, Poland and Hungary have very low rates. Some of these contrasts reflect structural differences in national labor markets, for example through differences in part-time working, discussed below.

The Bell/Blanchflower Underemployment Measure

In Bell and Blanchflower (2011, 2013, 2014, 2018a 2018b, 2018c), using data from the UK Labour Force Survey (UKLFS), we showed that measuring underemployment using the number of part-time workers who want full-time jobs does not fully capture the extent of worker dissatisfaction with currently contracted hours. This is due to its focus on a particular group of workers - involuntary part-timers - rather than all workers. It turns out that over the Great Recession years and subsequently, not only do part-timers who say they would prefer full-time jobs appear to be underemployed, but so also do part-timers who wish to remain part-time as well as full-timers.⁵

We also examined the phenomenon of overemployment, as some workers report that they want to work fewer hours. In Bell and Blanchflower (2018c), we showed that both the underemployed and the unemployed in the UK had relatively low levels of well-being. In the case of the underemployed there was evidence that in the post-recession years there was a marked rise in the probability that they report being depressed.

⁴ Source: OECD as a percent of employment. Most other major countries such as Australia, the US, Germany and Canada saw a declining self-employment rate. The main exception is the UK although there is more recent evidence that the rate has also risen in France (from 10.6% to 11.6%). The self-employed disproportionately want more hours. See Blanchflower (2015 and Bell and Blanchflower (2018b). https://www.oecd-ilibrary.org/employment/self-employment-rate/indicator/english_fb58715e-en

⁵ With the UKLFS, full-time part-time status is self-defined. Analysis of the 2006 data suggest that 90% of those that describe themselves as part-time work between 5 and 32 hours per week, while 90% of those who describe themselves as full-time worked between 34 and 60 hours per week. (Walling, 2007)

In the UKLFS, workers report whether they would like to change their hours at the going wage rate and how many extra or fewer hours they would like to work.⁶ A desired hours variable can thus be constructed for each individual. It is set to zero for workers who are content with their current hours. It is negative for those who wish to reduce their hours (the overemployed) and positive for the underemployed who want more hours.

Equivalent questions are asked in the European Labor Force surveys, which currently cover twenty-five countries including three non-EU countries – Switzerland, Iceland and Norway – plus the UK.⁷ We do not have micro data on Bulgaria, Slovenia, Slovakia or the Czech Republic. None of the major US surveys regularly asks workers whether they wish to increase or decrease their hours.⁸ Hence the calculations that we report below are not available for the United States.

The variable we used to calculate desired hours in the EULFS is HWWISH which asks workers the numbers of hours that they would like to work in total. They also were asked the number of hours actually worked during the reference week (HWACTUAL). For each individual we could then calculate the difference between desired and actual hours from HWWISH minus HWACTUAL. If the result was positive we called these individuals the underemployed and if negative, they were the overemployed.⁹

⁶ Workers in the LFS who were not looking for a different job were asked: *'Would you prefer to work longer hours at your current basic rate of pay – that is, not overtime or enhanced pay rates -if you were given the opportunity?'* (UNDEMP). If they answered positively they were asked *'How many extra hours, in addition to those you usually work, would you like to work each week?'* (UNDHRS). The criteria to select workers in to the question for those who said they wanted a different job was a) the reasons for seeking another job was longer hours or b) they were looking for an additional job. They were then asked UNDHRS.

Workers who did not want more hours were asked *'Would you rather work shorter hours than at present, even if it meant less pay?'* (LESPAY). If so they were asked *'How many fewer hours would you like to work in your job?'* (OVHRS). This question was asked of workers who said they were looking for a different job with fewer hours as well as workers who said they wanted fewer hours but were not looking for a different job. The most recent questionnaire for May 2018 is available here http://doc.ukdataservice.ac.uk/doc/8381/mrdoc/pdf/lfs_user_guide_vol2_questionnaire2018.pdf

⁷ The exact questions used to calculate HWWISH varies slightly by country. Eurostat which quality controls European national statistics, which these are, uses an "output harmonization approach" across countries, which means they only define the final quantities to be measured. It does not force different countries to use exactly the same questions "inputs". So as a result, data collection is in the hands of the national statistical institutes; countries do not necessarily use the same questionnaire, the same sample design, the same sampling unit or the same panel rotation. Over time harmonization appears to have improved and the questionnaires now seem comparable. The development and history of the EU LFS is described here. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_labour_force_survey_%E2%80%93_development_and_history

⁸ There is an issue with missing variables in the data the ONS provides for the UK to the EULFS, so we use the original data from the UK Labor Force Surveys. They do not provide data on those who want less hours but only those who want more which means we cannot use these data to calculate our index.

⁹ The EU LFS user guide and questionnaires are here <https://ec.europa.eu/eurostat/documents/1978984/6037342/EULFS-Database-UserGuide.pdf>
https://ec.europa.eu/eurostat/statistics-explained/index.php/EU_labour_force_survey_-_methodology#Core_questionnaires

Golden and Gebreselassie (2007) documented that in the United States the preferences for workers having more or fewer hours remained virtually unchanged between 1985 and 2001. They examined data on underemployment and overemployment from the 2001 May Supplements of the Current Population Survey and compared the findings with the results in Shank (1986), who used the 1985 May Supplement. They found that 7.0% of the employed were overemployed in 2001 compared with 7.6% in 1985 while 27.5% were underemployed in both years. Here overemployment and underemployment are defined in response to the question "*If you had a choice would you prefer to work fewer hours and earn less money; work more hours but earn more money or work the same number of hours and earn the same money?*"

This definition is much more expansive than the one we use as it covers both voluntary and involuntary part-timers and full-timers. In contrast to their findings part-time for economic reasons (PTER) as a proportion of employment were not the same in May 1985 (=5828/106932=5.5%) as it was in May 2001 (=3439/137092=2.5%). This does suggest that workers other than involuntary part-timers want to change their hours.

In Bell and Blanchflower (2013), we defined an underemployment rate using the UKLFS. Our measure is more general than the unemployment rate because it reflects the willingness of workers to vary their hours at the current pay rate – either underemployment or overemployment. For any given unemployment rate, a higher underemployment rate implies that reductions in unemployment will be more difficult to achieve because existing workers are seeking more hours — there is excess capacity in the internal labor market.

The key insight of our index is to define the underemployment rate in hours rather than people space. To demonstrate this, we multiply each argument of the unemployment rate by a constant number of hours. Setting these at \bar{h} , average hours worked by the employed, the unemployment rate is shown in Equation 1 where the product of average hours worked, and employment is, by definition, equal to aggregate hours worked, where there are N employed workers.¹⁰

$$u = \frac{U}{U + E} = \frac{U\bar{h}}{U\bar{h} + E\bar{h}} = \frac{U\bar{h}}{U\bar{h} + \sum_i^N h_i} \quad (1)$$

The next step is to add the intensive margin of the labor market. Preferences over hours are not realized for all workers. Some say they want more hours: others would prefer to work fewer hours. We incorporate these preferences in our index. Thus, the sum of preferred additional hours is given by $\sum_k h_k^U$, where the index k is defined over all workers who wish more hours. In aggregate, the preferred reduction in hours is given by $\sum_j h_j^O$,

¹⁰ This assumption is based on the prediction of hours worked by the unemployed conditional on their characteristics. These predictions do not differ significantly from mean hours worked by the employed. The estimates derive from hours of work functions estimated for the employed. These clearly do not take account of unobserved differences between the employed and unemployed. Details available in the online appendix.

where the index j is defined over all workers who wish fewer hours. We assume that market imperfections, transactions costs and sectoral, and geographical, differences in the distribution of underemployment and overemployment prevent mutually beneficial exchanges of working time between these groups. The net effect of the desired changes in hours is then added to the numerator of Equation 1 to complete the underemployment rate, u_v , which is given in Equation 2.

$$u_v = \frac{U\bar{h} + \sum_k h_k^U - \sum_j h_j^O}{U\bar{h} + \sum_i h_i} \quad (2)$$

If the desired increase in hours equals the desired reduction in hours, then u_v simply reproduces the unemployment rate. Excess capacity in the labor market is only influenced by the extensive margin. But u_v will differ from the unemployment rate if there is excess supply (or excess demand) of hours on the internal labor market. The underemployment rate could be greater, or less, than the unemployment rate. For example, it is lower than the unemployment rate when, in aggregate, desired hours reductions exceed desired hours increases. Note that the index is not affected by increases and reductions in desired hours of equal magnitude, though this might be taken as an indicator of increased mismatch between employers' job offers and workers' hours preferences.

To clarify, the denominator is the product of unemployment with the average hours of the currently employed plus the number of hours worked by employed individuals. The numerator is the total number of "unemployed" hours plus the extra hours that some of the employed would like to work minus the reduction in hours desired among the set of employees who wish to work less. For any given unemployment rate, an underemployment rate of greater magnitude implies that reductions in unemployment will be more difficult to achieve because there are existing workers who are willing to more hours without any increase in pay rates. There is therefore excess capacity on both the external and the internal labor markets.

If the underemployment rate is high relative to the unemployment rate and there is an upturn in demand, cost-minimizing producers will offer existing workers longer hours at the same wage, so avoiding recruitment costs and the costs of uncertainty associated with new hires. Thus, the unemployment rate will not fall so rapidly when the underemployment rate is high and there will be less upward pressure on wages. Plus, the unemployment rate will not fall so rapidly in a recovery, if the underemployment rate is relatively high at the start of the recovery since cost-minimizing employers will offer existing workers more hours in the first instance.

By taking account of both the intensive and extensive margins, our index gives a more complete picture of excess demand or excess supply in the labor market than the unemployment rate alone. Our index is therefore potentially superior to the unemployment rate as a means of calibrating the output gap.

By way of illustration, **Chart 2** plots, for the UK over the period 2001Q2 to 2018Q2, the number of extra hours those who say they want *more* hours and the number who say they want *less* hours *at the going wage* would like to work, measured in millions of hours per week. These are the second and third terms, respectively, from the numerator of equation 2. The latter series was broadly flat until recently but was always above the fewer hours series before 2008. That these aggregates have not returned to their pre-2008 relationship perhaps suggests there are still under-utilized resources in the labor market available to be used up before the UK reaches full-employment. There has been a rise both in the number of hours of those who want more hours and of those who want fewer hours since the recession.

Chart 3 plots the underemployment rate (from equation 2) and the unemployment rate for the UK over the same period. When the excess demand for hours is zero, as has been almost true during 2018, the underemployment rate and the unemployment rate are equal. This follows in a straightforward manner from equation 2. Note however that underemployment was *below* the unemployment rate in the years before the recession and, until recently, *above* it. Thus, both **Chart 2** and **Chart 3** illustrate different aspects of equation 2 and both suggest that the UK labour market has not returned to its pre-2008 state.

Measuring Underemployment in the European Union

In this section we describe estimates of the Bell-Blanchflower index of underemployment using individual data for twenty-six countries from the annual EULFS. We use the same approach as in our earlier work for the UK. We calculate estimates from 2000 to 2016 on workers' hours preferences, although there are some gaps by country. We have concerns about the accuracy of the data in the early years for some countries, due to smaller sample sizes and inconsistencies in the questions asked. Respondents to the EULFS are asked how many hours they would like to work in total at the going wage, as well as the number of hours actually worked during the reference week. The difference between these provides an estimate of workers' hours preferences at the going wage rate, relative to actual hours supplied.

We also use the EULFS micro-data to estimate aggregate employment, unemployment, and average hours of work. All of these statistics are converted to national aggregates using weights supplied with the EULFS. We include the employed, self-employed, family workers, and those on government schemes when calculating total employment and average working hours. Together these calculations provide all five of the components necessary to calculate our underemployment rate.

Note that unemployment rates peaked in most countries around 2013. They were especially high in Greece and Spain, where they reached over 25%. The unemployment rate peaked between 15% and 20% in Estonia; Ireland; Croatia; Cyprus; Latvia; Lithuania and Portugal. In the UK it peaked at 8.1% compared with 9.6% in the United States. Poland, which had an unemployment rate of 20% in 2002, saw a steady fall in its rate after its accession to the EU in 2004. Other Accession countries – both the A8 that joined in 2004 and the A2 that joined in 2007 – saw much lower unemployment rates in 2017 than

prior to the Great Recession.¹¹ By 2017 over 2.65 million from the A8 and around one million from the A2 had registered to work in the UK.¹² According to the OECD the annual unemployment rate peaked in Canada at 8.4% in 2009 and at 6.1% in Australia in both 2014 and 2015 at 6.4% in New Zealand in 2012 and at 3.7% in Japan in 2010, which is the same level it reached in 2016 and 2017.

Table 2 reports the underemployment rates derived using Equation 2 and calculated for each of the twenty-six countries. There is data available for the years 1998-2000 but it is unreliable and missing for many countries in these years hence we restrict ourselves to reporting data from 2001-2016. In the case of the UK, we use the UKLFS to construct underemployment estimates because the EULFS data file does not contain data on those who express a wish to cut their hours. In 2016, eleven of the twenty-six countries had double-digit underemployment rates.

Table 3 shows that underemployment rates were mostly higher than the equivalent ILO unemployment rates, and especially so in recent years. Overall, the underemployment rate in 2016 was above the Eurostat unemployment rate in twenty-three of the twenty-six countries. The exceptions are Switzerland, Latvia and Luxembourg. There are several countries in the pre-recession years where the underemployment rate was below the unemployment rate including principally the UK and Switzerland but also in one or more years in Austria, Croatia; Cyprus, Estonia, Greece, Iceland, Italy and Romania.

Germany experienced a steady decline in the underemployment rate over time from 2004. Switzerland had a negative rate in all years showing workers on the net wanted fewer hours. In almost every other case the rate rose through around 2012 or so and then fell back. This category included Belgium; Denmark; Spain; France; Greece; Ireland; the Netherlands; Portugal; Sweden; Cyprus; Estonia; Croatia; Hungary; Iceland; Lithuania; Malta; Poland and the UK. In a couple of other countries, the drop came later, for example both Finland and Romania did not see a decline until 2016. Austria and Norway saw steady rises from 2011 and 2012 onwards. Luxembourg's rate reached a peak in 2008.

Data on the millions of extra hours desired by those who want more hours and the equivalent number for those who want fewer hours is shown in the **Online Appendix Tables 1 and 2** respectively. **Appendix Table 3** reports the ILO unemployment rates. It shows that aggregate desired additional hours in 2016 were higher than in 2008 in the majority of countries, with the notable exceptions of Switzerland, Estonia, Finland and Greece. Aggregate desired hour reductions were mostly smaller in 2016 compared with 2008 in the majority of countries. Exceptions were Switzerland, Denmark, Estonia, France, Portugal, Sweden, the UK and Luxembourg.

¹¹ The A8 are Czech Republic; Estonia; Hungary; Latvia; Lithuania; Poland, Slovenia and the Slovak Republic. The A2 are Bulgaria and Romania.

¹²<https://www.gov.uk/government/statistics/national-insurance-number-allocations-to-adult-overseas-nationals-to-december-2017>

To complete our index, we add the hours that the unemployed are predicted to work to both the numerator and denominator of (2). We estimated the predicted hours of the unemployed by regressing usual hours of work on age, age squared, gender, education, year and country for the employed using the EULFS. We then predicted average hours for the unemployed using these regressors. The averages of predicted hours for the unemployed and the usual hours worked by the employed differed by less than 0.1 hours. With the qualification that these results cannot account for differences in unobserved individual characteristics between the employed and unemployed, we have opted to use the average hours of the employed to estimate average hours of the unemployed in forming our index.

Table 4 decomposes the net variation in aggregate desired hours between countries into components from voluntary and involuntary part-timers, and full-timers. It is clear that U7 is a biased estimator of the extent of labor market slack in the period after the Great Recession. The extent of the bias will move over the business cycle and remains uncertain - the United States that does not have such data, but it does seem there are consistent time series patterns across countries. As the recession hit all three groups of workers – involuntary and voluntary part-timers were more likely to say they would like more hours. In the UK, Germany, France, Austria, and Italy, for example, in 2016, voluntary part-time employment accounted for only around a third of excess hours. There is considerable variation in these groups across countries, implying that there is no straightforward relationship that could be exploited to predict the US underemployment rate. This seems a major omission.

Low Wage Growth and its Association with Underemployment

This section establishes some key stylized facts for a range of labor markets before and after the Great Recession. Our first piece of evidence concerns low wage growth internationally. Nominal and real wage growth has been low around the world since the onset of the Great Recession. We argue that a major explanation relates to the rise of underemployment. Large numbers of workers say they would like to increase their hours at current pay rates. Past debates have associated wage pressure with the extensive margin – the number of those without a job that are seeking work. However, in our view, post-recession, underemployment is a more convincing explanation of the recent sluggishness of wage growth across countries.

Even though the unemployment rate has returned to its pre-recession levels in several countries, including the US, underemployment in most countries has not. Large numbers of part-time workers around the world – both those who choose to be part-time and those who are involuntarily part-time and would prefer a full-time job - report they want more hours. Some full-timers say they want fewer hours, but many others seek to extend their working time. When recession hit in 2008, in most countries, aggregate extra hours desired by those who wanted more hours, rose sharply and there was a decline in the numbers seeking fewer hours.

The first two columns of **Table 5** provide the latest comparable evidence from the OECD of *nominal* annual earnings changes, not adjusted for changes in prices for the thirty-five

OECD member countries in the period prior to recession (2001-2007) and subsequently (2008-2016). Nominal wage growth has been markedly lower since the Great Recession. For example, in the UK, in the former period average nominal wage growth rates were 4.1% versus 1.7% in the later period; in the US they were 3.8% and 2.2% subsequently, while in France they were 3.0% and 1.7%. Greece had averaged 5.7% pre-recession versus minus 1.7% subsequently. Japan saw a slight pick-up from -0.8% to -0.2% but still had falling wages. Germany is the one major country with a major pick-up from an average of 1.6% wage growth before the recession to 2.3% afterwards. Chile had the biggest rise from 4.9 to 7.0%, while Israel experienced a rise of 1.8% in the earlier period and 2.3% in the later one.

The second two columns of **Table 5** provide the latest comparable evidence from the OECD of *real* annual earnings changes for the same thirty-five countries in the period prior to recession and subsequently. Data are presented in the last two columns averaging annual changes over the periods 2001-2007 and from 2008-2016 across thirty-five OECD countries. In five countries, real wage growth was higher in the second period than in the first. In Belgium there was a small rise from 0.1% to 0.3%, but this fell back to -1.0% in 2016. There were post-recession real wage increases in Poland, Israel and Chile, particularly in 2016. And in Germany where wage growth was low pre-recession, there has been a steady pick-up post-recession. For the remaining thirty countries, real wage growth was slower post-recession than pre-recession, with the difference especially marked in Greece (2.6% to -2.2%).

The second piece of evidence establishes a considerable tightening of external labor markets post-recession. At the time of writing, the most recent data available for EU countries showed that ten of these had unemployment rates below 5%.¹³

Japan has an unemployment rate of 2.4% and no significant wage growth. For 2017, real wages fell by 0.2 percent, following a 0.7 percent increase in the previous year.¹⁴ Nominal wage growth was 0.9% in 2014; 0% in 2015; 1.0% in 2016 and 0.5% in 2017. Even the big car makers are only awarding low pay increases. In 2018, Nissan granted an average increase of 2.4 per cent in monthly pay, Hitachi offered 2.3 per cent and Toshiba a raise of 2.5 per cent.¹⁵ The Australian Bureau of Statistics reported all employee average weekly total earnings growth from May 2017 to May 2018 of 2.4%.¹⁶ According to the OECD *"on average, hourly wage growth in OECD countries was still 0.4 percentage points lower in the last quarter of 2017 than it was in late 2008, while unemployment was at a similar level."*¹⁷ Bulligan

¹³ Czech Republic (2.3%); Germany (3.4%); Poland (3.5%); Hungary (3.6%); the Netherlands (3.8%); Malta (4.0%); UK (4.0%); Romania (4.2%); Bulgaria (4.8%) and Austria (4.9%).

¹⁴ <http://www.mhlw.go.jp/english/database/db-1/30/3002pe/3002pe.html>

¹⁵ Robin Harding and Kana Inagaki, 'Japan wage increases fall short of Abe's 3% target', Financial Times, 14th March 2018.

¹⁶ Average Weekly Earnings, Australia, May 2018, Australian Bureau of Statistics.

¹⁷ OECD Employment Outlook, 2018, p.29.

et al (2018) found that the sensitivity of hourly wage changes to labor market slack increased in France, Spain and Italy but not in Germany.

In France basic monthly wage growth has not exceeded 2% since 2012.¹⁸ Hourly labor costs according to Eurostat, grew by 1.1% in France between 2016 and 2017, in enterprises with ten or more workers excluding agriculture and public administration.¹⁹ Quevat and Vignolles (2018) show that the average wage growth per capita in France was 2% or less in the years 2011-2016.

There is no sign of rapid wage acceleration in the UK or the US over the last two years despite the unemployment rate dropping to historical lows. In the US, average hourly earnings of private sector production and non-supervisory workers (PNSW) that make up more than 75% of the private sector workforce, averaged 2.4% over the 24-month period from January 2016 through April 2018.²⁰ It picked up to 2.9% in August 2018 before falling back to 2.7% in September 2018. Average weekly earnings for PNSW reached 3.1% in September 2018.

The Federal Reserve's Beige Book for October 2018 reported that across its twelve districts *"wage growth was mostly characterized as modest or moderate, though Dallas reported robust growth. Most businesses expected labor demand to increase modestly in the next six months and looked for modest to moderate wage growth."* For example, the Minneapolis Fed reported *"that "wages and prices both experienced moderate pressure"* while the Chicago Fed reported similarly that *"wages and prices rose moderately."* The Philadelphia Fed reported *"moderate wage pressures"* while the Boston Fed said that *"wages increased at moderate pace."*²¹

Real hourly earnings in constant 1982-1984 dollars of private sector employees on private non-farm payrolls, seasonally adjusted, rose from \$10.76 in August 2017 to \$10.78 in August 2018. Real weekly earnings rose from \$370.14 to \$372.06, in both cases by only 0.1% over the year. In the most recent data release for the UK by the Office of National Statistics, the national statistic, Average Weekly Earnings (AWE) total pay for the whole economy at 2015 constant prices was £492 in July 2018, the same as it was in October 2016 and down 6% from the peak in February 2008.²² Wage settlements in the three

¹⁸ <https://www.insee.fr/en/statistiques/2662658?sommaire=2662688&q=wages>

¹⁹ 'Hourly labor costs ranged from €4.9 to €42.5 across the EU Member States in 2017', Eurostat, 9th April 2018 <http://ec.europa.eu/eurostat/documents/2995521/8791188/3-09042018-BP-EN.pdf/e4e0dcfe-9019-4c74-a437-3592aa460623>

²⁰ https://www.federalreserve.gov/monetarypolicy/files/BeigeBook_20180418.pdf

²¹ 'The Beige Book, Summary of Commentary on Current Economic Conditions by Federal Reserve District', October 28th 2018. https://www.federalreserve.gov/monetarypolicy/files/BeigeBook_20181024.pdf

²² 'Real Earnings Summary', BLS, September 13th, 2018 and 'UK Labour Market' ONS, 16th October 2018.

months to July 2018 in the UK according to pay experts XpertHr slowed from 2.5% to 2.3%.²³

Even in Germany where the unemployment rate is only 3.8% and underemployment is well below pre-recession levels, wage growth is weak. According to the Federal Statistical Office DESTATIS, the annual change in gross hourly earnings for industry and services in Germany was only 2.2% in 2017, down slightly from 2.3% in 2016. Earnings in 2017 Q4 were up 1.9% while labor costs were up 1.5% compared with the same quarter a year earlier.²⁴ Similarly, in the Netherlands, with an unemployment rate of 3.9%, hourly wage growth in April 2018 in the private sector was only 1.8%.²⁵

According to Eurostat, the 2017 Q4 growth in annual labor costs was just 1.5% in the Euro Area, 1.5% in Germany, 1.6% in France and -0.2% in Italy.²⁶ It is not a coincidence that price inflation also remains low. In July 2018, HICP inflation was 2.1% in the Euro Area and 1.4% excluding energy.

Wages, Unemployment and Underemployment

How far has labor market slack lowered wage growth? As the economy approaches the NAIRU, wage growth is expected to increase, but there is little evidence of that happening in advanced countries in 2018. We argue that the recent evidence supports the view that wage growth is more closely linked to underemployment than unemployment.

Conventional macroeconomic analysis of cyclical variations in labor market pressure has typically focused on the gap between the unemployment rate and the so-called “natural rate of unemployment”, the NAIRU. This gap, as estimated, has turned out to be a poor predictor of wage pressure, mainly because the number of individuals currently seeking, and available, to work expressed as a share of the workforce cannot fully explain the outcome of the wage bargaining process, especially when the labor market is changing rapidly.

The estimates of the NAIRU have been much too high and continue to be. For example, in the June 2013 Economic Outlook, No. 93, the OECD estimated the NAIRU for 2014 for the Euro Area as 10.1%; 6.3% for Germany; 6.9% in the UK and 6.1% in the USA. The November 2017 Economic Outlook No. 102 estimate by the OECD for 2018 were markedly lower than they were just three years earlier. NAIRU estimates were 4.7% (5.2%) for Germany 5.2% (5.9%) for the UK and 4.9% (5.0%) for the US, which still seem high given current levels of price and wage inflation. The numbers in parentheses are the

²³ 'Summer pay awards drop back', XpertHr, August 23rd, 2018.

²⁴ Statistisches Bundesamt
https://www.destatis.de/EN/PressServices/Press/pr/2018/03/PE18_086_624.html

²⁵ <https://opendata.cbs.nl/statline/#/CBS/en/dataset/82838eng/table?ts=1525551349123>

²⁶ <http://ec.europa.eu/eurostat/documents/2995521/8752244/3-16032018-BP-EN.pdf/75ce8cea-0807-44ce-a3df-521a5763b71b>

revised estimates for 2014 that the OECD made in 2017. FOMC participants estimates of the NAIRU at their March 2018 meeting were in the interval 4.2% to 4.8%, even though inflation is below target and the unemployment rate is 3.9%.²⁷ The St. Louis Fed's estimate of the long-term natural rate of unemployment in the US for 2018 is 4.6%.²⁸ Given the recent history of wage increases, these look too high.

Chart 4 plots wage growth against the unemployment rate from 2012 Q1 through 2017 Q4 for Germany, using data on labor costs from Springford (2018).²⁹ It shows a very flat simple Phillips curve of the form $\dot{w} = a + bU$, with an R^2 of only .002. The data point to the bottom left shows that wage growth fell to 1.4% in 2017 Q4. Assuming the same relationship exists in the data as unemployment fell say to 3%, the line of best fit ($\dot{w} = 2.6726 - .0534*U$) would predict actual wage growth of 2.7%. We focus on the period post 2011 because the German unemployment rate was high pre-recession. For example, the quarterly unemployment rate in Germany was 7.8% in 2008 Q1 and averaged 9.2% over the period 2000 Q1-2008 Q1. It fell below 6% in 2011 Q2 and, as is clear from the chart steadily declined from there. We now turn to the econometric evidence.

a) Cross-country evidence

Important recent work by Hong et al (2018) from the IMF across 30 countries has shown that the IPTR – expressed as a percent of total employment - enters significantly negative in wage change equations. In the same equations, the unemployment rate and the change in the unemployment rates are also significantly negative. Across all countries, they find that on average, a one percentage point increase in the involuntary part-time employment share is associated with a 0.3 percentage point decline in nominal wage growth.

Hong et al find that the effect is more pronounced in countries where the unemployment rate is below pre–Great Recession averages - Czech Republic, Germany, Japan, Israel, Slovak Republic, United Kingdom, and United States. Within this group of countries, a 1 percentage point increase in the involuntary part-time employment share is associated with a 0.7 percentage point decline in wage growth. The estimated effect is only 0.2 percentage point for countries with unemployment appreciably above the pre–Great Recession averages. The authors conclude that "*involuntary part-time employment appears to have weakened wage growth even in economies where headline unemployment rates are now at, or below, their averages in the years leading up to the recession.*"

We are grateful to Hong et al (2018) for providing us with their data. We map it onto our underemployment rates for 19 of the countries in **Table 2**, making 275 observations in all.³⁰

²⁷ https://www.federalreserve.gov/faqs/economy_14424.htm

²⁸ <https://fred.stlouisfed.org/series/NROU>

²⁹ We thank John Springford for providing us with his data.

³⁰ Austria; Belgium; Cyprus; Denmark; Estonia; Finland; France; Germany; Greece; Iceland; Ireland; Latvia; Luxembourg; Malta; Portugal; Spain; Sweden; Switzerland and the United Kingdom. We mapped on some additional unemployment rates that were missing from the master file for Cyprus; Lithuania and Malta.

We regressed the log of hourly pay from the Hong et al (2018) file on its lag and the log of the unemployment rate and the underemployment rate for the period 1998-2016 and then for the period 1998-2007 and 2008-2016. We don't take logs for the underemployment rate as there are nineteen negative values, mostly for Switzerland. Equations include full sets of year and country dummies.

The results are reported in [Table 6](#), with t-statistics in parentheses. Over the whole period both the (log) unemployment rate and the underemployment rate are significantly negative. In the later period the coefficient on the underemployment rate is significant while that on the unemployment rate is not. In the earlier period the reverse is true. We find similar results below with the IPTR for the United States.

b) United Kingdom

In Bell and Blanchflower (2018b) we created a balanced panel of 20 regions by sixty-three quarters for the UK from 2002 to 2017 using data from the LFS. Data are available on wages, hourly and weekly, since 2002 and we mapped these data onto a file that contains the unemployment rate as well as the logs of excess hours and over hours desired for workers, along with a few personal characteristics. We then estimated a series of wage equations with the dependent variable the log of the wage, on a lag, wave and region dummies and personal characteristics along with unemployment and underemployment variables.

There were 1260 observations in all (63 waves*20 regions) once we have calculated the lagged dependent variable and dropped missing observations. With the dependent variable the log of hourly pay, we initially included the log of the unemployment rate which was insignificant. We included the log of the number of additional hours the underemployed would like as an additional underemployment measure. This entered significantly negative and remains significant when the unemployment rate is dropped. This variable performed better than the underemployment rate. We found that the number of hours of those who wanted more hours played no role in wage determination. The results are the same using weekly wages. The wage curve in the UK, we argue, has now to be rewritten into wage * underemployment space.³¹

c) United States

We explore the issue of underemployment reducing wage pressure further for the United States where only data on PTFER is available. The extent of any bias in estimates of labor market slack due to the absence of continuous measures of excess hours obviously cannot be measured directly.

In the three parts of [Table 7](#) we report the result of estimating a series of log hourly wage equations on balanced US state year panels from 1979 through 2017, using state level data from the BLS matched by state and year to data from the Merged Outgoing Rotation Group (MORG) files of the Current Population Survey. We construct a lagged dependent

³¹ A recent paper by Clark and Gregg (2018) for the UK also found that unemployment "has become an increasingly poor proxy for the amount of slack in the labour market".

variable, so we lose one year of data so, the final number of observations is 1938 (50 states + DC * 38 years). We take the micro data in each year and collapse it to the state*year cell to calculate hourly wages as well as personal characteristics including schooling, age, race and gender. The wage data are weighted using the earnings weight variable *earnwt*.

We also calculate the proportion of workers who say they are PTFER as a proportion of total employment by state (U7) from the MORG files from 1979 through 2018 using the weight variable *weight*. The personal controls are measured across all individuals while the wage data is calculated for employees only. PTFER is calculated over all workers. We map that onto state level data by year from the BLS on the unemployment rate (U3) as well as data on U4 through U6, which are alternative measure of labor market slack, from 2003 through 2017.³²

Our estimating equation is given by:

$$\ln(w_{it}) = \beta_0 + \beta_1 \ln(w_{it-1}) + \beta_2 \ln(U_{it}) + \beta_3 X_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (3)$$

where w is hourly earnings, U is one (or more) measures of labour market slack, X is a set of controls indexed by state and time, μ and ν are state and time fixed effects respectively and ε is a random error. We use state level clustering to estimate standard errors and hence account for potential incorrect inference due to heteroscedasticity and/or autocorrelation.³³ We estimate wage curves with a lagged dependent variable. Estimates of its coefficient are significantly less than one, which suggests the relationship is not a Phillips curve. This estimation methodology follows Blanchflower and Oswald (1994, 1995 and 2005) and Blanchflower and Levin (2015).

Chart 5 plots the relationship between the underemployment rate U7 and firm level data on hourly wage growth of production and non-supervisory workers (PNSW) from 1990 to 2018. Of note is how closely the two series moved inversely together until recently. Interestingly, in the most recent data release for September 2018 U3 fell from 3.9% to 3.7%, with unemployment falling by 270,000. At the same time U7 rose from 2.8% to 3.0% as the number of Part-time for economic reasons rose by 263,000. Hourly wage growth of PSNW fell from 2.9% to 2.7% between August and September. On the previous twenty months between 1990 and 2018 that U7 was 3% wage growth averaged 3.43%.

Chart 6 plots rather volatile quarterly median weekly earnings for full-time wage and salary workers based on individual level data also since 1990, against U7. This is the same Current Population Survey data we use below for the econometrics, although there we use wage means. The data here are taken from the BLS and show the weak response of wages post 2008 as compared to the response before the Great Recession. Once again, the two series move closely together, inversely until recently

³² How the various alternative labor utilization measures are calculated is described in the online [Appendix](#).

³³ For more on clustering when calculating state panel estimates see Bertrand et al (2004) and Stock and Watson (2008).

Table 7a estimates hourly wage equation with a lagged dependent with all of the relevant variables in logs. In the first column we include the log of U3, the unemployment rate, which enters significantly and negative with a coefficient of $-.03$. The lag on the wage has a coefficient of $.66$, which as Card (1995) noted, suggests what is being estimated is a wage curve not a Phillips curve, because the coefficient is significantly different from one. The long-run unemployment elasticity of pay is estimated as $-.05$, calculated by setting W_{t-1} to W_t and solving. As the unemployment rate doubles, real wages fall by 5%, which is half the finding in Blanchflower and Oswald (1994). It is a little lower than the finding of $-.07$ in a meta-analysis by Nijkamp and Poot (2005). In the second column we estimate the same equation for the period 1980 to 2007 and find broadly similar results, with a long run unemployment elasticity of $-.1$. Then things change.

The third column is restricted to the period since the onset of the Great Recession, 2008-2017, which the NBER business cycle dating group categorized as starting in December 2007. Here we have 510 observations (10 years * 51 states including DC). In this case the lagged wage is much lower than in the prior period dropping to $.044$ and now the logged unemployment rate is insignificant. There is no wage curve in hourly wage/unemployment space.

Column 4 is for the entire period and adds the log of PTFER as a percent of employment calculated by us from the MPRG files.³⁴ That variable enters significantly negative and drives the coefficient on the unemployment rate to insignificance. Column 5 is for 2008 through 2017 and is broadly similar to the previous column where both the underemployment rates is significantly negative and the unemployment rate is not. Column 6 is for the post-recession period and only the log PTFER variable is significant and negative.

In **Table 7b**, we experiment with alternative unemployment measures, which are available from the BLS by state from 2003-2017. There are 765 observations (51 * 15 years). In the first column we include the log of the U6 measure, which is insignificant for 2003-2017. In the second column we include U7, which drives U6 to insignificance and is significant on its own in column 3. The third column includes only the significant U7 variable.

The fourth column includes two further variables. We define U8 as the discouraged worker rate, which is measured as the (log of) discouraged / (labor force + discouraged), and U9 which identifies the number of marginally attached minus the number of discouraged workers, which is measured as the (log of) marginally attached-discouraged / (labor force + marginally attached - discouraged). The coefficients on U3 and U8 are insignificant in column 4 while the coefficient on U9 is significant and positive. The final four columns

³⁴ Another possibility is to express the underemployment rate as a proportion of the labor force rather than of employment. We decided to separate out the effects of unemployment (U3) and underemployment relative to employment (U7) as PTFER only applies to workers so we enter the underemployment and unemployment rates separately to work out their relative importance. A further way would be to include the number of marginally attached workers in the denominator, but these data are only available by state from 2003. The results are very similar whichever denominator we use.

of part B are restricted to the post-recession period of 2008-2017 ($n=510 - 10 \text{ years} * 51 \text{ states}$). The underemployment measure U7 is always significantly negative while U3 and U6 are not. Higher discouraged or marginally attached worker rates do not push down on wage growth.

Table 7c builds on work by Blanchflower and Oswald (2013) and discussed in Blanchflower (2019) on the home ownership rate, which finds that a lagged home ownership rate is a significant predictor of unemployment rate. A five-year lag on the home ownership rate enters positively into unemployment equations. A higher home ownership rate in a state also lowered mobility. It is notable that the home ownership rate has declined steadily from its peak in 2004.³⁵ According to the Census Bureau home ownership rates reached a peak of 69.4% in the second quarter of 2004 and fell steadily through the second quarter of 2016 to 63.1% but have risen since then to 64.2% in the first quarter of 2018. In the table we examine the impact of changes in the home ownership rate impacts wage growth. In the period 1980-2007, annual change in the home ownership rate averaged +0.1% per annum. In the years 2008-2017 it averaged -0.4%. Every year from 2005-2016 the change in home ownership was negative while in 2017 it turned positive again.

Table 7c includes the log change in the home ownership rate in the hourly wage equation. In the years that we have data for from 1985 through 2005 sixteen years had positive changes. From 2005-2016 all were positive and 2017 was positive again. The change in home-ownership rates is significantly positive in all six columns. A rising home ownership raises wage growth in the pre-recession years; falling home ownership rates lowers wage pressure in the pre-recession years. The involuntary part-time variable U7 is significant again and the unemployment rate, whether measured as U6 or U3, is not.

The decline in the size of the coefficient on the lagged dependent variable, especially in the hourly earnings equations, suggests that in the pre-recession period, where there is a significant coefficient on the lagged dependent variable, a shock to wages is persistent. In the later period a shock to wages quickly mean reverts around a 2% trend and is not persistent. It is notable how stable the coefficients on the underemployment variables in **Table 7** are at around -.02 and the instability of the coefficient of the unemployment rate at -.02 in the pre-recession period but zero thereafter,

Online Appendix Table 4 reports the results of re-estimating three sets of equations contained in **Table 6** but now uses weekly wages for PNSW workers rather than hourly wages as the dependent variable. The results are broadly similar, though the estimated long-run wage unemployment elasticity is -.12 in column 1 of **Table 7b**. The remaining

³⁵ According to the Census Bureau annual home ownership rates – averaging across the seasonally adjusted four quarters were = 1980=65.6%; 1981=65.4; 1982=64.8; 1983=64.7; 1984=64.5; 1985=63.9; 1986=63.8; 1987=64.0; 1988=63.8; 1989=63.9; 1990=64.0; 1991=64.1; 1992=64.2; 1993=64.0; 1994=64.0; 1995=64.8; 1996=65.4; 1997=65.7; 1998=66.3; 1999=66.8; 2000=67.4; 2001=67.8; 2002=68.0; 2003=68.3; 2004=69.0; 2005=68.9; 2006=68.8; 2007=68.2; 2008=67.8; 2009=67.4; 2010=66.9; 2011=66.1; 2012=65.5; 2013=65.2; 2014=64.5; 2015=63.7; 2016=63.4; 2017=63.9; 2018Q1=64.2; 2018Q2=64.3.

<https://www.census.gov/housing/hvs/data/histabs.html>

results are comparable to those using hourly earnings, with U7 and the change in the home ownership rate pushing down on wage growth in the post-recession years.

These results are entirely consistent with those reported in a paper by Bracha and Burke (2018) from the Federal Reserve Bank of Boston. They find that hidden labor market slack in the form of informal “gig” economy work helps to explain the benign wage puzzle. They argue that informal work represents additional labor market slack. They focus on informal work that is labor-intensive, in the Survey of Informal Work Participation for 2015–2016. The SIWP is an annual module within the Federal Reserve Bank of New York’s Survey of Consumer Expectations. A respondent is defined as an informal worker if he or she (1) indicated working in at least one informal paid activity that is not survey work or renting/selling activities, and (2) reported strictly positive hours considering all activities except surveys and renting/selling. According to this measure, 19% of the individuals in their analysis sample (averaged over the three survey waves) are classified as informal workers. The authors find that informal labor is negatively associated with wage growth at the census division level, while no such association exists between wage growth and unemployment rates, whether defined as U3 or U6.

Possible additional causes for the lack of wage response include globalization, competition from migrant workers, movement of plants, contracts or subcontract to other countries. As noted earlier, rising monopsony power is another possible explanation. Krueger and Ashenfelter (2018) document that agreements to refrain from recruiting and hiring away employees from other units in a franchise chain are common in franchise contracts. Such no-poaching agreements they show can limit labor market turnover and reduce competition.

According to the BLS the share of private sector employment in the US in firms over 1000 workers has risen from 37.5% in 2005 to 40% in 2017 and from 40 million to 48 million.³⁶ Benmelech et al (2018) find there is a negative relation between local-level employer concentration and wages that is more pronounced at high levels of concentration and increases over time. They argue that, “*the negative effect of employer concentration on wages appears to be concentrated in a labor market that resembles a monopsonistic market—one in which there is one significant employer of a given set of workers.*” Also, they find that, the negative relation between labor market concentration and wages is stronger when unionization rates are low.

Declining unionization rates have resulted in workers’ bargaining power being weakened. And the offsetting effects of union power have been declining, though this is a long-term trend rather than one associated with the Great Recession. Between 1997 and 2007, the share of wage and salary workers in the US that were union members declined by 14.2%; between 2007 and 2017, the reduction in membership was 11.6%. Current union density rates in the US private sector are down to 6.5% and below 3% in ten states Arizona (1.7%);

³⁶ https://www.bls.gov/web/cewbd/table_f.txt

Florida (2.7%); Georgia (2.5%); Louisiana (2.8%); North Carolina (2.3%); South Carolina (1.7%); South Dakota (2.5%); Texas (2.7%); Utah (2.2%); Virginia (2.5%).³⁷

Underemployment may be partly caused by the weakness of worker bargaining power. For the US, we find that it is less prevalent in the union than in the non-union sector, as is part-time employment. In **Table 8** we report the distribution of labor market status according to whether the worker was a union member or not using weighted data from the 2017 MORG files from the CPS. Part-time for economic reasons, is the sum of “PT for Economic Reasons, usually FT”, and “PT Hours, Usually PT for Economic Reasons”.

It is apparent that a lower proportion of union members were part-time (22.7%) than in non-union sector (26.6%). The share of PTER in the non-union sector is nearly double that in the unionized sector. In part the problem in the US of using the measure of PTFER as an indicator of underemployment is that part-time employment is much less prevalent in the US than in most other OECD countries. According to the BLS, in non-agricultural industries in June 2018, there were 155,659,000 workers of whom 4,743,000 (3.0%) were part-time for economic reasons and 21,304,000 (13.7%) were part-time for non-economic reasons.³⁸ In total, part-time employment in the United States accounts for 16.7% of total employment.

The OECD provides data on part-time employment as a percentage of total employment in 2017, which is reported in **Table 9**. The definition of what constitutes part-time employment has a lower threshold of 30 hours a week versus under 35 in the US so that estimate is biased upwards compared to the rest of the OECD.³⁹ In the 2017 CPS MORG, file 13.3% of workers said their usual hours were under 30 so we use that below. The US proportion is lower than those of all major advanced countries and only above those in Korea, Greece, Turkey, Portugal and seven East European countries.

The lower incidence of part-time work in the US means that simply using the proportion of workers who are PTFER may seriously underestimate US underemployment. It would make sense for the BLS to include a question on worker's desired hours in its Current Population Survey given the importance of the involuntary part-time variable in the wage equations we have found. It remains uncertain how much additional information would be obtained from being able to construct our measure, because in the analysis we performed the results from using our index are broadly similar to those using U7. The extent of any

³⁷ Source: Union Membership and Coverage Database from the CPS, www.unionstats.com

³⁸ Part-time refers to those who worked 1 to 34 hours during the survey reference week and excludes employed persons who were absent from their jobs for the entire week. <https://www.bls.gov/news.release/empsit.t08.htm>

³⁹ The OECD defines part-time employment as people in employment (whether employees or self-employed) who usually work less than 30 hours per week in their main job. Employed people are those aged 15 and over who report that they have worked in gainful employment for at least one hour in the previous week or who had a job but were absent from work during the reference week while having a formal job attachment. <https://data.oecd.org/emp/part-time-employment-rate.htm>

bias is uncertain though given the rather different results by country in terms of the share of underemployment accounted for by the involuntary part-timers. In the post-recession years since 2008, we show measures of underemployment replace the unemployment rate as the most significant measure of labor market slack.

So what?

Since the recession, underemployment has been a better predictor of wage growth than the unemployment rate has been. Underemployment has not returned to its pre-recession level in many countries, unlike the unemployment rate. Before the recession, with low unemployment rates in countries like the US, the UK and Germany, there was a pay norm around 4%. This dropped to around 2% post-recession with some signs that it has picked up to 2.5% to 3% in 2018. Underemployment aids understanding of such weak wage growth. In contrast, the unemployment rate seems to contain little or no information about the evolution of wage pressure post-recession. The Great Recession appears to represent a structural break in wage equations.

Even though the unemployment rate is at historic lows in many countries, it may be that these country's labor markets are still not close to full-employment. In his 1944 book *Full Employment in a Free Society*, William Beveridge argued that “*full employment means that unemployment is reduced to short intervals of standing by, with the certainty that very soon one will be wanted in one's old job again or will be wanted in a new job that is within one's powers,*” (p.18). Full employment likely does not mean excessively high underemployment rates where workers are willing to work more hours at the going wage.

But falling unionism, globalization, rising monopsony power have been occurring for a long time. Why are they having effects now but not in the recent past? The answer isn't obvious, but home ownership rates which started declining around 2004 and which accelerated downwards rapidly from 2007 are part of the story. The Great Recession accelerated the weakening of worker's bargaining power that had been going on for years as union density in the US private sector fell precipitously. The Great Recession appears to have scared workers.

Downward pressure on wages, perhaps precipitated by increased employer market power, coupled with workers' increased fear of joblessness during the recession, may have resulted in employers establishing a wage “norm” around 2% or so. Anchoring around this norm has been facilitated by the absence of significant exogenous shocks to price inflation and to productivity.

Our argument is that anchoring has also been facilitated by shifts in the internal labor market that have led to a net increase in worker demand for extra working time at the going wage rate. We do not claim that form of underemployment fully explains the weakness of wage growth since the recession, but it is part of the story, and is consistent with both theoretical and empirical characterizations of the post-recession labor market.

References

- Ashenfelter, Orley C., Henry Farber, and Michael R. Ransom. 2010. Labor market monopsony. *Journal of Labor Economics* 28(2): 203–210.
- José A. Azar, Ioana Marinescu, Marshall I. Steinbaum and Bledi Taska. 2017. Labor market concentration, NBER Working Paper 24147.
- Ball, Robert J. and Eric B.A. St Cyr. 1966. Short-term employment functions in British manufacturing industry. *Review of Economic Studies* 33(3), July: 179-207.
- Bell, David N.F. and David G. Blanchflower. 2018a. The lack of wage growth and the falling NAIRU. *National Institute Economic Review* 245(1): R1-R16.
- Bell, David N.F. and David G. Blanchflower. 2018b. The well-being of the overemployed and the underemployed and the rise in depression in the UK. NBER Working paper #24840.
- Bell, David N.F. and David G. Blanchflower. 2018c. Underemployment and the lack of wage pressure in the UK. *National Institute Economic Review* 243(1): R53-R61.
- Bell, David N.F. and David G. Blanchflower. 2014. Labor market slack in the UK. *National Institute Economic Review* 229(1): F4-F11.
- Bell, David N.F. and David G. Blanchflower. 2013. Underemployment in the UK revisited. *National Institute Economic Review* 224(1): F8-F22.
- Bell, David N.F. and David G. Blanchflower. 2011. Youth underemployment in the UK in the Great Recession. *National Institute Economic Review* 215(1): R1-R11.
- Benmelech, Efraim, Nittai Bergman and Hyunseob Kim. 2018. Strong employers and weak employees: how does employer concentration affect wages? NBER Working Paper 24307.
- Bertrand, Marianne. Esther Duflo and Sendhil Mullainathan. 2004. How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics* 119(1): 249–275.
- Bhaskar, Venkataraman, Alan Manning and Ted To. 2002. Oligopsony and monopsonistic competition in labor markets. *Journal of Economic Perspectives* 16(2):155-174.
- Blanchflower, David G. 2019. *Not Working: Where Have All The Good Jobs Gone?* Princeton University Press, Princeton, NJ.
- Blanchflower, David G. 2015. *Self-employment across countries in the Great Recession of 2008-2014*. Randstad.

Blanchflower, David G. and Andrew T. Levin 2015. Labor market slack and monetary policy. NBER Working Paper 21094.

Blanchflower, David G. and Andrew J, Oswald. 2013. Does high home ownership impair the labor market? NBER Working Paper 19079.

Blanchflower, David G. and Andrew J, Oswald. 2005. The wage curve reloaded'. NBER Working Paper #11338.

Blanchflower, David G. and Andrew J, Oswald. 1995. An introduction to the wage curve. *Journal of Economic Perspectives* 9(3):153-67.

Blanchflower, David G. and Andrew J, Oswald. 1994. *The Wage Curve*. MIT Press, Cambridge, MA.

Borowczyk-Martins, Daniel. and Etienne Lalé. 2018. The welfare effects of involuntary part-time work. *Oxford Economic Papers* 70(1): 183–205.

Borowczyk-Martins, Daniel, and Etienne Lalé. 2016. Employment adjustment and part-time work: lessons from the United States and the United Kingdom. IZA WP #9847, March.

Bracha, Anat and Mary A. Burke. 2018. Wage inflation and informal work. *Economics Letters* 171: 159–163.

Brechling, Frank P.R. 1965. The relationship between output and employment in British manufacturing. *Review of Economic Studies* 32(3): 187-216.

Bregger, John E. and Steven E. Haugen. 1995. BLS introduces new range of alternative unemployment measures. *Monthly Labor Review*. Vol. 118, No. 10: 19-26.

Bulligan, Guido and Eliana Viviano 2017. Has the wage Phillips curve changed in the euro area? *IZA Journal of Labor Policy* 6:9

Cajner, Tomaz, Dennis Mawhirter, Christopher Nekarda and David Ratner. 2014. Why is involuntary part-time work elevated? *FEDS Notes*, Board of Governors of the Federal Reserve, April 14th.

Card, David. 1995. The wage curve: a review. *Journal of Economic Literature* 33(2): 785-799.

Card, David, Ana R. Cardoso, Joerg Heining and Patrick Kline. 2018. Firms and labor market inequality: evidence and some theory. *Journal of Labor Economics* 36 (S1): S13-S70.

Clark, Stephen and Paul Gregg (2018). Count the pennies. Explaining a decade of lost pay growth. Resolution Foundation

Depew, Briggs, and Todd A. Sørensen (2013). The elasticity of labor supply to the firm over the business cycle, *Labour Economics* 24(1): 196–204.

Eurostat (2017). *European Labour Force Survey, 1998-2016*.

Feather, Peter M., and W. Douglass Shaw. 2000. The demand for leisure time in the presence of constrained work hours. *Economic Inquiry* 38(4): 651-661.

Feldstein, Martin S. 1967. Specification of the labour input in the aggregate production function. *The Review of Economic Studies* 34(4): 375-386.

Glauber, Rebecca. 2017. Involuntary part-time employment. A slow and uneven economic recovery. Carsey Research National Issue Brief #116, University of New Hampshire, Spring.

Golden, Lonnie. 2016. Still falling short on hours and pay. Employment Policy Institute Report, December 5th.

Golden, Lonnie and Tesfayi Gebreselassie. 2007. Overemployment mismatches: the preference for fewer work hours. *Monthly Labor Review* April:18-37.

Hart, Robert A. and Trevor Sharot. 1978. The short-run demand for workers and hours: a recursive model. *Review of Economic Studies* 45(2): 299-309.

Hirsch, Boris, Elke J. Jahn, and Claus Schnabel. 2018. Do employers have more monopsony power in slack labor markets? *Industrial and Labor Relations Review* 71(3): 676–704

Hong, Gee H., Zsoka Kóczán, Weicheng Lian, and Malhar S. Nabar (2018). More slack than meets the eye? Recent wage dynamics in advanced economies,' IMF Working Paper /18/50, IMF Research Department.

Hurley, John and Valentina Patrini. 2017. Estimating labor market slack in Europe. European Foundation for the Improvement of Living and Working Conditions,

Hwang, Hae-shin S., Dale T. Mortensen and W. Robert Reed. 1998. Hedonic wages and labor market search. *Journal of Labor Economics* 16(4): 815-847.

Krueger, Alan B. 2018. Reflections on dwindling worker bargaining power and monetary policy'. Address at the Jackson Hole Economic Symposium, August 24th.

Krueger, Alan B. and Orley Ashenfelter. 2018. Theory and evidence on employer collusion in the franchise sector. NBER Working Paper 24831

Lewis, H. Gregg. 1957. Hours of work and hours of leisure. Paper presented at the Proceedings of the Ninth Annual Meeting of the Industrial Relations Research Association, Madison, WI: 196–206.

Lewis, H. Gregg. 1969. Employer interests in employee hours of work. *Cuadernos de Economia* 6(18):38–54.

Manning, Alan. 2003. *Monopsony in Motion*. Princeton University Press, Princeton, NJ:

Nijkamp, Peter, and Jacques Poot. 2005. The last word on the wage curve? *Journal of Economic Surveys* 19(3): 421-450.

Office for National Statistics. Social Survey Division, Northern Ireland Statistics and Research Agency. Central Survey Unit. (2015). *Quarterly Labour Force Survey, 1992-2015*. [data collection]. UK Data Service. Retrieved from <http://discover.ukdataservice.ac.uk/series/?sn=2000026>

Pencavel, John. 1986. Labor supply of men: a survey. *Handbook of Labor Economics*, edited by Orley Ashenfelter and David Card, volume 1: 3-102.

Pencavel, John. 2016. Whose preferences are revealed in hours of work? *Economic Inquiry* 54(1): 9-24.

Pencavel, John. 2018. *Diminishing Returns at Work*. Oxford University Press, Oxford.

Piore, M. (1973). Fragments of a "sociological" theory of wages. *The American Economic Review*, 63(2), 377-384.

Quévat, Benjamin and Benjamin Vignolles. 2018. The relationships between inflation, wages and unemployment have not disappeared. A comparative study of the French and American economies. INSEE, Conjoncture in France, March. <https://www.insee.fr/en/statistiques/3372431?sommaire=3372475&q=earnings>

Rosen, Sherwin. 1969. On the interindustry wage and hours structure. *Journal of Political Economy* 77(2): 249-273.

Shiskin, Julius. 1976. Employment and unemployment: the doughnut and the hole. *Monthly Labor Review*, February. 3-10.

Sorrentino, Constance. 1993. International comparisons of unemployment indicators. *Monthly Labor Review*, March: 3-24

Sorrentino, Constance. 1995. International unemployment indicators, 1983-93. *Monthly Labor Review*, August: 31-50.

Springford, John. 2018. The German wage puzzle. Insight, Centre for European Reform, May.

Stock, James. H. and Mark W. Watson. 2008. Heteroskedasticity-robust standard errors for fixed effects panel data regression. *Econometrica* 76(1):155-174.

Stole, Lars A. and Jeffrey Zwiebel. 1996. Intra-firm bargaining under non-binding contracts. *Review of Economic Studies* 63(3): 375-410.

Sum, Andrew and Ishwar Khatiwada. 2010. The nation's underemployed in the 'Great Recession' of 2007-2009. *Monthly Labor Review* November: 3-15.

Valletta, Robert G, Leila Bengali and Catherine van der List. 2018. Cyclical and market determinants of involuntary part-time employment. Federal Reserve Bank of San Francisco Working Paper 2015-19.

Van Reenen, John. 2018. Increasing differences between firms: market power and the macro-economy'. Paper given at the Jackson Hole Economic Symposium, August 24th.

Veliziotis, Michail, Manos Matsaganis and Alexandros Karakitsios. 2015. Involuntary part-time employment: perspectives from two European labor markets. Improve Discussion Paper 15/2 January.

Walling, Annette. 2007. Understanding statistics on full-time/part-time employment. *Economic and Labor Market Review* 1(2), February: 36-43.

Table 1: U7 (Part time want full-time as % total employment) and the ILO unemployment rate, ages 15-74.

| GEO/TIME | U7 % | | | ILO Unemployment rate % | | |
|-----------------------|------|------|------|-------------------------|------|------|
| | 2008 | 2012 | 2017 | 2008 | 2012 | 2017 |
| Austria | 3.4 | 3.6 | 4.3 | 4.1 | 4.9 | 5.5 |
| Belgium | 0.8 | 3.5 | 3.7 | 7.0 | 7.6 | 7.1 |
| Cyprus | 2.0 | 5.3 | 7.8 | 3.7 | 11.9 | 11.1 |
| Denmark | 2.4 | 3.3 | 3.8 | 3.4 | 7.5 | 5.7 |
| Estonia | 0.7 | 1.7 | 0.7 | 5.5 | 10.0 | 5.8 |
| Finland | 2.9 | 3.0 | 3.9 | 6.4 | 7.7 | 8.6 |
| France | : | : | 5.9 | 7.4 | 9.8 | 9.4 |
| France (metropolitan) | 4.8 | 5.2 | 5.8 | | | |
| Germany | 6.4 | 4.5 | 3.3 | 7.4 | 5.4 | 3.8 |
| Greece | 2.1 | 5.1 | 6.9 | 7.8 | 24.5 | 21.5 |
| Hungary | 0.2 | 2.2 | 0.8 | 7.8 | 11.0 | 4.2 |
| Ireland | : | 8.1 | 4.8 | 6.8 | 15.5 | 6.7 |
| Italy | 1.7 | 2.6 | 3.2 | 6.7 | 10.7 | 11.2 |
| Latvia | 2.2 | 5.0 | 3.1 | 7.7 | 15.0 | 8.7 |
| Lithuania | 1.2 | 2.9 | 1.2 | 5.8 | 13.4 | 7.1 |
| Luxembourg | 0.7 | 2.2 | 2.0 | 4.9 | 5.1 | 5.5 |
| Malta | 1.9 | 2.4 | 1.4 | 6.0 | 6.3 | 4.6 |
| Netherlands | 1.1 | 1.8 | 5.3 | 3.7 | 5.8 | 4.9 |
| Norway | 3.0 | 3.1 | 2.6 | 2.5 | 3.2 | 4.2 |
| Poland | 1.6 | 2.2 | 1.5 | 7.1 | 10.1 | 4.9 |
| Portugal | 1.9 | 5.6 | 4.3 | 8.8 | 15.8 | 9.0 |
| Romania | 2.3 | 2.5 | 2.4 | 5.6 | 6.8 | 4.9 |
| Slovakia | 0.8 | 1.6 | 2.2 | 9.6 | 14.0 | 8.1 |
| Slovenia | 1.4 | 2.0 | 3.0 | 4.4 | 8.9 | 6.6 |
| Spain | 4.0 | 7.9 | 7.2 | 11.3 | 24.8 | 17.2 |
| Sweden | 4.7 | 5.1 | 3.4 | 6.2 | 8.0 | 6.7 |
| United Kingdom | 4.3 | 6.5 | 4.7 | 5.6 | 7.9 | 4.4 |

Source: Eurostat. https://ec.europa.eu/eurostat/statistics-explained/index.php/Underemployment_and_potential_additional_labour_force_statistics

Table 2: Estimated underemployment rates from European Labour Force Surveys

| | AT | BE | CH | CY | DE | DK | EE | ES | FI | FR | GR | HR | HU |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2001 | 2.8 | 7.7 | -3.2 | 3.2 | | 5.8 | 13.7 | 15.5 | 14.3 | | 9.7 | | 8.9 |
| 2002 | 4.5 | 8.2 | -1.5 | 2.6 | | 5.4 | 10.4 | 15.5 | 13.4 | | 9.0 | 18.7 | 7.6 |
| 2003 | 4.6 | 9.3 | -1.0 | 3.3 | | 7.2 | 12.0 | 16.9 | 14.4 | 12.2 | 8.5 | 17.7 | 9.1 |
| 2004 | 7.3 | 8.9 | -0.9 | 3.6 | | 7.3 | 10.0 | 15.4 | 13.0 | 13.3 | 8.9 | 16.3 | 8.3 |
| 2005 | 5.9 | 10.4 | -0.8 | 4.1 | 13.2 | 6.3 | 7.4 | 10.3 | 10.8 | 13.2 | 9.4 | 15.1 | 9.9 |
| 2006 | 5.9 | 10.3 | -1.4 | 3.9 | 12.9 | 6.1 | 4.6 | 9.2 | 12.6 | 13.8 | 8.8 | 13.6 | 10.3 |
| 2007 | 5.9 | 9.7 | -1.0 | 3.7 | 11.1 | 4.3 | 3.7 | 9.0 | 8.3 | 13.3 | 8.5 | 12.0 | 10.5 |
| 2008 | 5.3 | 9.1 | -2.0 | 6.4 | 10.1 | 4.4 | 5.7 | 13.0 | 8.6 | 12.8 | 8.4 | 10.2 | 10.2 |
| 2009 | 7.7 | 10.1 | -0.3 | 9.4 | 11.7 | 7.7 | 16.3 | 20.6 | 11.7 | 14.7 | 11.1 | 11.0 | 12.7 |
| 2010 | 6.7 | 10.4 | -2.6 | 10.0 | 10.4 | 9.1 | 18 | 22.6 | 11.3 | 14 | 13.9 | 13.8 | 13.7 |
| 2011 | 6.1 | 9.7 | -2.8 | 12.6 | 8.8 | 9.0 | 13.1 | 24.5 | 10.3 | 13.9 | 19.7 | 16.2 | 14.5 |
| 2012 | 7.0 | 10.3 | -2.0 | 17.4 | 8.0 | 9.3 | 11.7 | 28.7 | 10.7 | 14.7 | 27.1 | 18.3 | 16.2 |
| 2013 | 7.5 | 11.1 | -2.3 | 23.6 | 7.9 | 9.1 | 10.3 | 30.3 | 11.5 | 16.4 | 30.3 | 20.0 | 16.2 |
| 2014 | 8.0 | 11.1 | -1.6 | 24.9 | 7.2 | 8.9 | 9.5 | 28.5 | 12.2 | 16.6 | 29.8 | 20.3 | 13.5 |
| 2015 | 8.7 | 11.1 | -1.9 | 23.7 | 6.7 | 8.1 | 8.4 | 25.6 | 13.4 | 16.5 | 28.4 | 19.8 | 12.2 |
| 2016 | 8.9 | 10.4 | -2.2 | 20.2 | 5.8 | 7.0 | 7.4 | 22.7 | 11.9 | 15.7 | 26.8 | 15.7 | 9.1 |
| | IE | IS | IT | LT | LU | MT | NL | NO | PL | PT | RO | SE | UK |
| 2001 | 4.7 | 1.0 | 9.6 | 16.0 | -1.3 | | 5.6 | 4.7 | 18.1 | 6.0 | | 12.9 | 4.5 |
| 2002 | 5.6 | 2.8 | 9.9 | 12.6 | 0.1 | | 6.0 | 5.1 | 20.2 | 7.6 | 9.0 | 12.2 | 4.4 |
| 2003 | 6.1 | 5.3 | 9.6 | 13.7 | 4.3 | | 6.9 | 6.1 | 20.9 | 10.5 | 7.8 | 14.2 | 4.1 |
| 2004 | 6.3 | 4.8 | 7.8 | 11.1 | 5.1 | | 8.4 | 6.1 | 20.3 | 8.4 | 7.6 | 14.5 | 4.0 |
| 2005 | 5.8 | 2.2 | 7.9 | 8.8 | 5.1 | | 5.5 | 6 | 19.3 | 10.2 | 8.2 | 11.4 | 4.7 |
| 2006 | 6.0 | 2.5 | 6.9 | 6.3 | 6.7 | | 5.9 | 3.7 | 15.1 | 10.5 | 8.3 | 11.3 | 5.3 |
| 2007 | 5.6 | 1.6 | 6.2 | 4.2 | 5.8 | | 4.8 | 3.2 | 10.6 | 11.1 | 7.3 | 10.7 | 5.1 |
| 2008 | 8.7 | | 7.1 | 5.4 | 6.8 | | 3.5 | 3.3 | 8.2 | 11.2 | 6.8 | 10.6 | 7.0 |
| 2009 | 17.3 | | 8.6 | 14.3 | 3.0 | 11.9 | 4.7 | 4.5 | 9.7 | 12.7 | 8.3 | 13.6 | 8.9 |
| 2010 | 19.0 | | 9.3 | 18.7 | 1.3 | 13.2 | 5.3 | 4.6 | 11.2 | 13.7 | 8.8 | 12.6 | 9.1 |
| 2011 | 20.4 | | 9.2 | 16.4 | 2.1 | 13.2 | 5.5 | 4.4 | 11.5 | 21.2 | 8.5 | 12 | 9.7 |
| 2012 | 20.8 | | 12.1 | 14.6 | 1.7 | 13.1 | 6.8 | 4.2 | 12.9 | 24.7 | 8 | 12.5 | 9.5 |
| 2013 | 19.2 | | 13.6 | 13.0 | 3.0 | 12.9 | 9.0 | 5.2 | 13.9 | 25.1 | 8.2 | 12.8 | 8.5 |
| 2014 | 16.9 | 9.1 | 14.2 | 12.1 | 2.5 | 12.6 | 8.8 | 5.0 | 12.3 | 22.8 | 8.4 | 12.9 | 6.8 |
| 2015 | 14.6 | 7.5 | 13.3 | 10.1 | 1.5 | 12.2 | 8.2 | 6.0 | 10.0 | 20.4 | 8.5 | 12.3 | 5.8 |
| 2016 | 12.3 | 6.1 | 13.0 | 8.4 | 3.3 | 9.6 | 6.4 | 6.4 | 8.0 | 19.2 | 7.2 | 10.8 | 5.2 |

Key to Country Codes. AU=Austria; BE=Belgium; CH=Switzerland; CY=Cyprus; DE=Germany; DK=Denmark; EE=Estonia; ES=Spain; FI=Finland; FR=France; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IS=Iceland; IT=Italy; LT=Latvia; LU=Luxembourg; MT=Malta; NL=Netherlands; NO=Norway; PL=Poland; PT=Portugal; RO=Romania; SE=Sweden; UK=United Kingdom

Note: The underemployment rate is the unemployment rate plus the difference between the additional hours wanted by the underemployed and the fewer hours wanted by the underemployed translated to unemployment equivalents using average hours – which may be negative as shown in Table 3.

Table 3: Difference between underemployment rates and Eurostat unemployment rates by European country

| | AT | BE | CH | CY | DE | DK | EE | ES | FI | FR | GR | HR | HU |
|------|------|------|------|------|------|-----|------|-----|------|-----|------|-----|------|
| 2001 | -1.2 | 1.5 | -5.7 | -0.8 | | 1.6 | 0.6 | 5.1 | 4.0 | | | | 3.2 |
| 2002 | -0.4 | 1.3 | -4.4 | -0.7 | | 1.1 | 0.4 | 4.3 | 3.0 | | | 3.6 | 2.0 |
| 2003 | -0.2 | 1.6 | -5.1 | -0.9 | | 1.8 | 0.7 | 5.6 | 3.9 | | -0.9 | 3.7 | 3.3 |
| 2004 | 1.5 | 1.5 | -5.2 | -0.8 | | 2.1 | -0.2 | 4.3 | 2.6 | | -1.4 | 2.6 | 2.5 |
| 2005 | 0.3 | 1.9 | -5.3 | -1.2 | | 1.5 | -0.6 | 1.1 | 2.4 | 4.7 | -0.6 | 2.4 | 2.7 |
| 2006 | 0.6 | 2.0 | -5.4 | -0.7 | 2.6 | 2.2 | -1.3 | 0.7 | 4.9 | 5.3 | -0.2 | 2.4 | 2.8 |
| 2007 | 1.0 | 2.2 | -4.7 | -0.2 | 2.4 | 0.5 | -0.9 | 0.8 | 1.4 | 5.6 | 0.1 | 2.1 | 3.1 |
| 2008 | 1.2 | 2.1 | -5.4 | 2.7 | 2.6 | 1.0 | 0.2 | 1.7 | 2.2 | 5.7 | 0.6 | 1.6 | 2.4 |
| 2009 | 2.4 | 2.2 | -4.4 | 4.0 | 3.9 | 1.7 | 2.8 | 2.7 | 3.5 | 6.0 | 1.5 | 1.8 | 2.7 |
| 2010 | 1.9 | 2.1 | -7.4 | 3.7 | 3.4 | 1.6 | 1.3 | 2.7 | 2.9 | 5.1 | 1.2 | 2.1 | 2.5 |
| 2011 | 1.5 | 2.5 | -7.2 | 4.7 | 3.0 | 1.4 | 0.8 | 3.1 | 2.5 | 5.1 | 1.8 | 2.5 | 3.5 |
| 2012 | 2.1 | 2.7 | -6.5 | 5.5 | 2.6 | 1.8 | 1.7 | 3.9 | 3.0 | 5.3 | 2.6 | 2.3 | 5.2 |
| 2013 | 2.1 | 2.7 | -7.1 | 7.7 | 2.7 | 2.1 | 1.7 | 4.2 | 3.3 | 6.5 | 2.8 | 2.7 | 6.0 |
| 2014 | 2.4 | 2.6 | -6.5 | 8.8 | 2.2 | 2.3 | 2.1 | 4.0 | 3.5 | 6.3 | 3.3 | 3.0 | 5.8 |
| 2015 | 3.0 | 2.6 | -6.7 | 8.7 | 2.1 | 1.9 | 2.2 | 3.5 | 4.0 | 6.1 | 3.5 | 3.6 | 5.4 |
| 2016 | 2.9 | 2.6 | -7.2 | 7.2 | 1.7 | 0.8 | 0.6 | 3.1 | 3.1 | 5.6 | 3.2 | 2.6 | 4.0 |
| | IE | IS | IT | LT | LU | MT | NL | NO | PL | PT | RO | SE | UK |
| 2001 | 1.0 | -0.9 | | | -3.1 | | 3.5 | 1.0 | -0.3 | 2.1 | -0.1 | 8.2 | -0.2 |
| 2002 | 1.4 | -0.2 | 0.7 | -1.2 | -2.5 | | 3.4 | 1.1 | 0.2 | 3.0 | 0.7 | 7.2 | -0.6 |
| 2003 | 1.6 | 1.3 | 0.7 | 1.6 | 0.6 | | 3.3 | 1.9 | 1.5 | 4.3 | 0.9 | 8.6 | -0.7 |
| 2004 | 1.8 | 0.8 | -0.1 | -0.6 | 0.0 | | 3.7 | 1.8 | 1.2 | 2.0 | -0.1 | 7.8 | -0.6 |
| 2005 | 1.4 | -0.3 | 0.2 | -1.2 | 0.6 | | 0.8 | 1.6 | 1.5 | 2.5 | 1.0 | 3.6 | -0.1 |
| 2006 | 1.6 | -0.3 | 0.1 | -0.7 | 2.0 | | 2.0 | 0.3 | 1.2 | 2.7 | 1.0 | 4.2 | -0.1 |
| 2007 | 0.6 | -0.7 | 0.1 | -1.9 | 1.7 | | 1.6 | 0.7 | 1.0 | 3.0 | 0.9 | 4.5 | -0.2 |
| 2008 | 1.9 | 0.1 | 0.4 | -2.3 | 1.7 | | 0.7 | 0.8 | 1.1 | 3.5 | 1.0 | 4.4 | 1.4 |
| 2009 | 4.7 | | 0.8 | -3.2 | -2.1 | 5.0 | 1.3 | 1.4 | 1.5 | 3.1 | 1.4 | 5.2 | 1.3 |
| 2010 | 4.4 | | 0.9 | -0.8 | -3.1 | 6.3 | 0.8 | 1.1 | 1.5 | 2.7 | 1.8 | 4.0 | 1.3 |
| 2011 | 5.0 | | 0.8 | 0.2 | -2.8 | 6.8 | 0.5 | 1.2 | 1.8 | 8.3 | 1.3 | 4.2 | 1.6 |
| 2012 | 5.3 | | 1.4 | -0.4 | -3.4 | 6.8 | 1.0 | 1.1 | 2.8 | 8.9 | 1.2 | 4.5 | 1.6 |
| 2013 | 5.4 | | 1.4 | 1.1 | -2.9 | 6.5 | 1.7 | 1.8 | 3.6 | 8.7 | 1.1 | 4.7 | 1.0 |
| 2014 | 5.0 | 4.2 | 1.5 | 1.3 | -3.4 | 6.8 | 1.4 | 1.5 | 3.3 | 8.7 | 1.6 | 4.9 | 0.7 |
| 2015 | 4.7 | 3.5 | 1.4 | 0.2 | -5.2 | 6.8 | 1.3 | 1.7 | 2.5 | 7.8 | 1.7 | 4.9 | 0.5 |
| 2016 | 3.9 | 3.1 | 1.3 | -1.2 | -3.0 | 4.9 | 0.4 | 1.7 | 1.8 | 8.0 | 1.3 | 3.8 | 0.4 |

Key to Country Codes. AU=Austria; BE=Belgium; CH=Switzerland; CY=Cyprus; DE=Germany; DK=Denmark; EE=Estonia; ES=Spain; FI=Finland; FR=France; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IS=Iceland; IT=Italy; LT=Latvia; LU=Luxembourg; MT=Malta; NL=Netherlands; NO=Norway; PL=Poland; PT=Portugal; RO=Romania; SE=Sweden; UK=United Kingdom

Note: difference is defined as the difference between the underemployment rate in Table 2 and the ILO unemployment rates

Table 4: Share of excess hours by European country (%)

| | 2008 | | | 2012 | | | 2016 | | |
|-------------|-----------|-------------|-----------|-----------|-------------|-----------|------------|-------------|-----------|
| | Voluntary | Involuntary | Full-time | Voluntary | Involuntary | Full-time | Voluntary. | Involuntary | Full-time |
| Austria | 110 | 55 | -65 | 75 | 27 | -1 | 64 | 34 | 1 |
| Belgium | 25 | 33 | 43 | 35 | 19 | 45 | 37 | 21 | 43 |
| Croatia | 23 | 30 | 47 | 23 | 23 | 54 | 19 | 23 | 58 |
| Cyprus | 8 | 21 | 71 | 7 | 30 | 63 | 6 | 45 | 50 |
| Denmark | 77 | 45 | -21 | 42 | 37 | 21 | 158 | 92 | -151 |
| Estonia | 58 | 38 | 4 | 27 | 17 | 56 | 73 | 27 | 0 |
| Finland | 14 | 33 | 53 | 16 | 24 | 59 | 15 | 39 | 47 |
| France | 11 | 21 | 68 | 13 | 23 | 64 | 12 | 27 | 61 |
| Germany | 27 | 70 | 2 | 34 | 39 | 27 | 49 | 38 | 13 |
| Greece | 36 | 115 | -51 | 15 | 59 | 26 | 13 | 70 | 17 |
| Hungary | 15 | 16 | 69 | 9 | 18 | 73 | 9 | 13 | 77 |
| Ireland | 18 | 13 | 69 | 21 | 35 | 45 | 20 | 32 | 48 |
| Italy | 22 | 152 | -74 | 7 | 70 | 22 | 5 | 99 | -4 |
| Latvia | -93 | -89 | 280 | 38 | 68 | -6 | 50 | 94 | -44 |
| Luxembourg | 42 | 14 | 44 | -29 | -20 | 149 | -36 | -19 | 155 |
| Malta | | | | 10 | 9 | 81 | 6 | 16 | 79 |
| Netherlands | 237 | 58 | -195 | 138 | 62 | -100 | 280 | 167 | -347 |
| Norway | -36 | 47 | 89 | -17 | 38 | 79 | -3 | 25 | 78 |
| Poland | 40 | 38 | 22 | 16 | 23 | 60 | 19 | 27 | 54 |
| Portugal | 8 | 23 | 69 | 10 | 21 | 69 | 11 | 20 | 70 |
| Romania | 16 | 91 | -7 | 13 | 95 | -7 | 11 | 83 | 6 |
| Spain | 24 | 74 | 2 | 9 | 74 | 17 | 10 | 91 | -1 |
| Switzerland | -8 | -8 | 117 | -3 | -9 | 112 | -1 | -10 | 110 |
| UK | 38 | 22 | 41 | 31 | 37 | 32 | 37 | 32 | 31 |

Source: EULFS

Notes: Excess hours is the number of hours of those who say they want more hours *minus* the numbers who say they want less. Shares are then calculated for a) involuntary part-time= part-time wants full time b) voluntary part-time =part-timers who do not want a full-time job c) full-timers. In each of these three cases the answer may be negative hence the negatives in the table.

Table 5: Annual average wage changes 2000-2016 (annual % changes)

| | Nominal | | Real | |
|-----------------|-----------|-----------|------------|-----------|
| | 2000-2007 | 2008-2016 | 2000-2007. | 2008-2016 |
| Australia | 4.2 | 2.9 | 1.3 | 0.6 |
| Austria | 2.8 | 2.3 | 0.8 | 0.4 |
| Belgium | 2.5 | 1.7 | 0.1 | 0.3 |
| Canada | 3.5 | 2.6 | 1.7 | 1.2 |
| Denmark | 3.4 | 2.7 | 1.5 | 1.1 |
| Finland | 3.4 | 2.4 | 1.8 | 0.5 |
| France | 3.0 | 1.7 | 1.1 | 1.0 |
| Germany | 1.6 | 2.3 | 0.2 | 1.1 |
| Greece | 5.7 | -1.7 | 2.6 | -2.2 |
| Ireland | 5.9 | 1.2 | 2.4 | 1.2 |
| Israel | 1.8 | 2.3 | 0.2 | 0.5 |
| Italy | 3.1 | 1.2 | 0.4 | -0.1 |
| Japan | -0.8 | -0.2 | -0.1 | 0.0 |
| Korea | 5.6 | 2.7 | 2.5 | 0.5 |
| Netherlands | 3.5 | 1.8 | 1.0 | 0.7 |
| New Zealand | 4.3 | 2.3 | 2.5 | 0.8 |
| Norway | 4.7 | 3.6 | 2.8 | 1.3 |
| Poland | 4.8 | 3.8 | 1.2 | 2.0 |
| Portugal | 3.4 | 0.6 | 0.0 | -0.4 |
| Slovak Republic | 8.9 | 3.2 | 3.6 | 1.7 |
| Slovenia | 8.0 | 2.1 | 3.0 | 0.9 |
| Spain | 3.3 | 1.8 | -0.1 | 0.7 |
| Sweden | 3.5 | 2.7 | 2.2 | 1.3 |
| Switzerland | 1.9 | 0.5 | -1.0 | 0.6 |
| United Kingdom | 4.1 | 1.7 | 2.7 | -0.3 |
| United States | 3.8 | 2.2 | 1.5 | 0.7 |

Note: Average annual wages per full-time equivalent dependent employee are obtained by dividing the national-accounts-based total wage bill by the average number of employees in the total economy, which is then multiplied by the ratio of average usual weekly hours per full-time employee to average usually weekly hours for all employees. Real wage growth is in constant 2016 prices NICU. www.oecd.org/employment/outlook

Table 6. Wage equations across an international panel of countries

| | 1998-2016 | 1998-2007 | 2008-2016 |
|-----------------------|------------------|------------------|------------------|
| Lagged wage | .9198 (70.9) | .9447 (24.7) | .7873 (20.2) |
| Log unemployment rate | -.0224 (2.3) | -.0554 (2.7) | -.0242 (1.4) |
| Underemployment rate | -.0025 (3.3) | -.0041 (0.8) | -.0036 (3.1) |
| N | 275 | 133 | 142 |

Note: underemployment rate is the Bell/Blanchflower index from [Table 3](#). T-statistics in parentheses.

Source: Hong et al (2018) and own calculations

Table 7. US state level hourly wage equations with various measures of labor market slack, 1980-2017 with robust standard errors

a) Unemployment rate and involuntary part-time rate

| | <i>1980-2017</i> | <i>1980-2007</i> | <i>2008-2017</i> | <i>1980-2017</i> | <i>1980-2007</i> | <i>2008-2017</i> |
|------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Log W_{t-1} | .6612 (21.76) | .7185 (22.75) | .0439 (1.30) | .6479 (20.38) | .6999 (22.35) | .0474 (1.35) |
| Log $U3_t$ | -.0171 (4.51) | -.0211 (5.23) | .0068 (0.59) | | | |
| Log PTFER | | | | -.0238 (6.91) | -.0212 (6.08) | -.0263 (3.23) |
| N | 1938 | 1428 | 510 | 1938 | 1428 | 510 |
| R ² within | .9964 | .9962 | .8727 | .9965 | .9963 | .8727 |
| R ² between | .9569 | .9600 | .3660 | .9663 | .9668 | .2592 |
| R ² overall | .9924 | .9916 | .4946 | .9931 | .9922 | .4326 |

b) Using alternative measures U6-U9

| | <i>2003-2017</i> | <i>2003-2017</i> | <i>2003-2017</i> | <i>2003-2017</i> | <i>2008-2017</i> | <i>2008-2017</i> | <i>2008-2017</i> | <i>2008-2017</i> |
|------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Log W_{t-1} | .2410 (5.52) | .2353 (5.42) | .2373 (5.37) | .3237 (7.13) | .0440 (1.29) | .0366 (1.11) | .0412 (1.12) | .0342 (1.01) |
| Log $U6_t$ | -.0176 (1.84) | .0190 (1.39) | | | -.0004 (0.03) | +.0441 (2.04) | | |
| Log $U3$ | | | | -.0002 (0.02) | | | .0216 (1.74) | .0150 (1.21) |
| Log $U7_t$ | | -.0353 (3.84) | -.0222 (3.21) | -.0256 (3.58) | | -.0438 (2.89) | -.0257 (2.44) | -.0283 (2.74) |
| Log $U8_t$ | | | | .0006 (0.33) | | | | +.0047 (2.16) |
| Log $U9_t$ | | | | +.0119 (2.20) | | | | .0076 (1.10) |
| N | 765 | 765 | 765 | 765 | 510 | 510 | 510 | 510 |
| R ² within | .9380 | .9386 | .9385 | .9389 | .8701 | .8718 | .8714 | .8726 |
| R ² between | .6476 | .7115 | .6912 | .6833 | .3259 | .3954 | .3934 | .3685 |
| R ² overall | .7625 | .7892 | .7807 | .7772 | .4727 | .5076 | .5069 | .4931 |

c) Hourly wages and change in the home ownership rate, with robust standard errors

| | <i>1980-2017</i> | <i>1980-2017</i> | <i>1980-2007</i> | <i>1980-2007</i> | <i>2003-2017</i> | <i>2008-2017</i> |
|---------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Log W_{t-1} | .5513 (12.34) | .5569 (12.92) | .5732 (10.64) | .5768 (11.49) | .2389 (5.49) | .0448 (1.35) |
| Log PTFER | -.0254 (4.98) | -.0210 (5.36) | -.0155 (2.90) | -.0140 (3.30) | | |

| | | | | | | |
|--------------------------|--------------|--------------|--------------|--------------|---------------|---------------|
| Log U3 _t | .0093 (1.69) | | .0034 (0.51) | | | |
| Log U6 _t | | | | | .1090 (1.40) | .0427 (2.00) |
| Log U7 | | | | | -.0338 (3.76) | -.0408 (2.73) |
| ΔLog Home _{t-1} | .1252 (4.66) | .1245 (4.61) | .0927 (2.89) | .0923 (2.84) | .1449 (3.23) | .1750 (2.45) |
| N | 1683 | 1683 | 1173 | 1173 | 765 | 510 |
| R ² within | .9950 | .9950 | .9946 | .9946 | .9392 | .8734 |
| R ² between | .9599 | .9556 | .9481 | .9468 | .7095 | .3750 |
| R ² overall | .9877 | .9874 | .9835 | .9834 | .7887 | .4975 |

Notes: equations include a full set of year and state effects, plus 20 personal controls - 15 education variables; age, gender and 3 race variables. U3 is the unemployment rate. U6 is the BLS broader measure of labor underutilization. PTFER is part-time for economic reasons as a percent of employment calculated from the MORG files (weighted using variable=weight). U7 is PTFER as a percent of employment from the BLS. U8 is discouraged workers as a percent of (the civilian labor force + discouraged). U9 is all marginally attached minus discouraged as a per cent of (the civilian labor force plus marginally attached minus discouraged). T-statistics in parentheses. State alternative measures of labor utilization available at https://www.bls.gov/lau/stalt_archived.htm

Table 8. US labor force status for union and non-union workers, 2017

| | Non-Union | Union |
|-----------------------------------------------|-----------|--------|
| FT Hours (35+), Usually FT | 73.4 | 77.3 |
| PT for Economic Reasons, Usually FT | 0.8 | 0.7 |
| PT for Non-Economic Reasons, Usually FT | 5.6 | 7.9 |
| Not at Work, Usually FT | 2.3 | 5.3 |
| PT Hours, Usually PT for Economic Reasons | 2.7 | 1.4 |
| PT Hours, Usually PT for Non-Economic Reasons | 13.7 | 6.5 |
| FT Hours, Usually PT for Economic Reasons | 0.1 | 0.1 |
| FT Hours, Usually PT for Non-Economic | 0.5 | 0.3 |
| Not at work, Usually Part-Time | 1.0 | 0.6 |
| N =163,781 | 146,689 | 17,092 |

Source: 2017 MORG files of the CPS

Table 9. Percent of workers who are part-time by OECD country

| | | | |
|----------------|------|-----------------|------|
| Netherlands | 37.4 | France | 14.3 |
| Switzerland | 26.7 | Luxembourg | 14.2 |
| Australia | 25.7 | Finland | 14.0 |
| United Kingdom | 23.5 | Sweden | 13.8 |
| Japan | 22.4 | Spain | 13.8 |
| Germany | 22.2 | USA | 13.3 |
| Ireland | 22.0 | Korea | 11.4 |
| New Zealand | 21.1 | Greece | 11.0 |
| Austria | 20.9 | Turkey | 9.6 |
| Denmark | 20.4 | Slovenia | 8.8 |
| Canada | 19.1 | Portugal | 8.5 |
| Norway | 18.8 | Estonia | 8.1 |
| Italy | 18.5 | Latvia | 6.5 |
| Chile | 17.6 | Poland | 6.1 |
| Mexico | 17.2 | Slovak Republic | 5.8 |
| Iceland | 17.1 | Czech Republic | 5.4 |
| Belgium | 16.4 | Hungary | 3.6 |
| Israel | 15.3 | | |

Source: OECD

Chart 1. US Monthly Unemployment Rate (U3) and Underemployment Rate U7 (Part-time for Economic Reasons / Employment) %, 1965-2018.

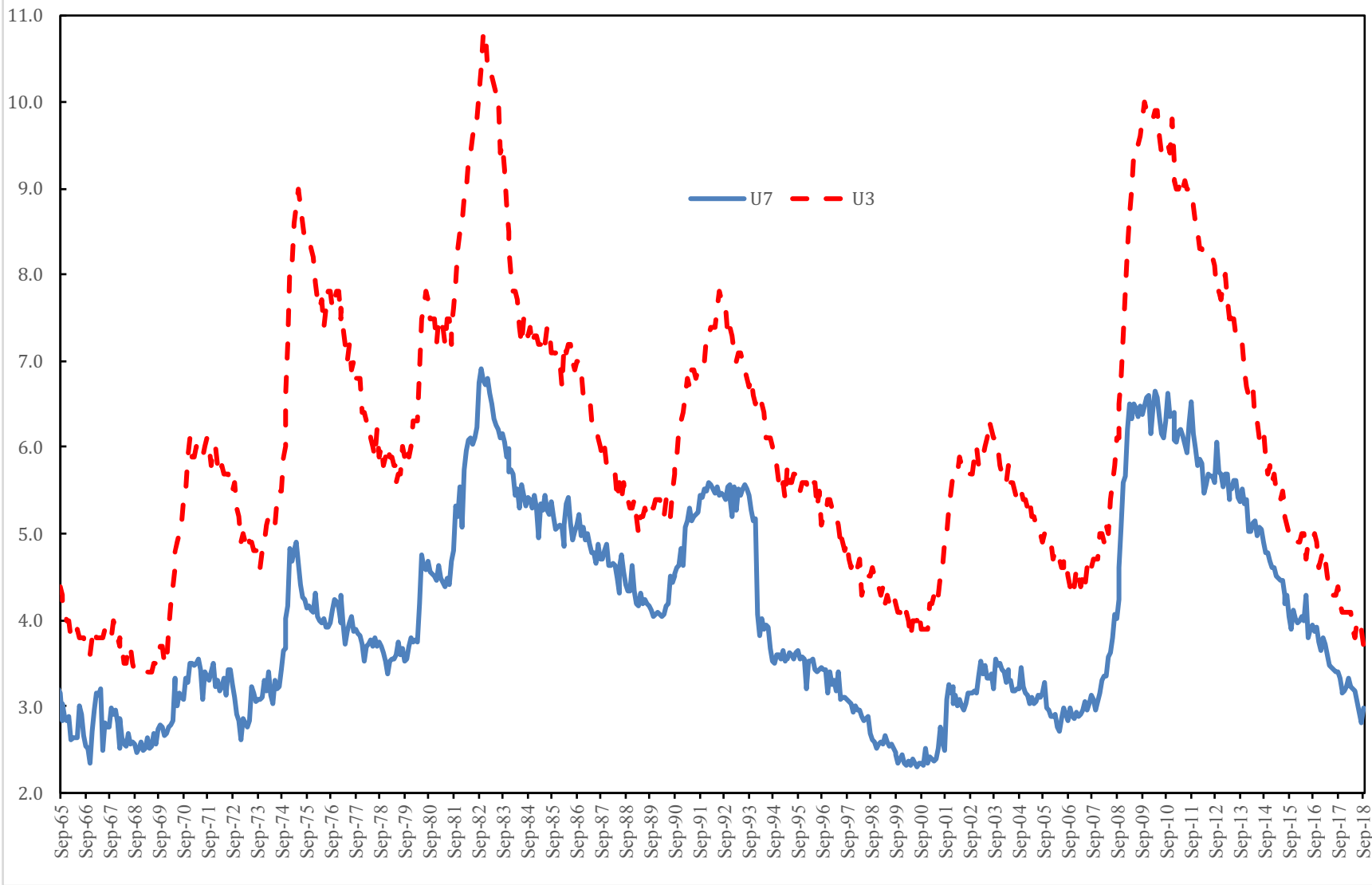


Chart 2. Desired Changes in Hours UK 2001Q2-2018Q2 (millions of hours per week)

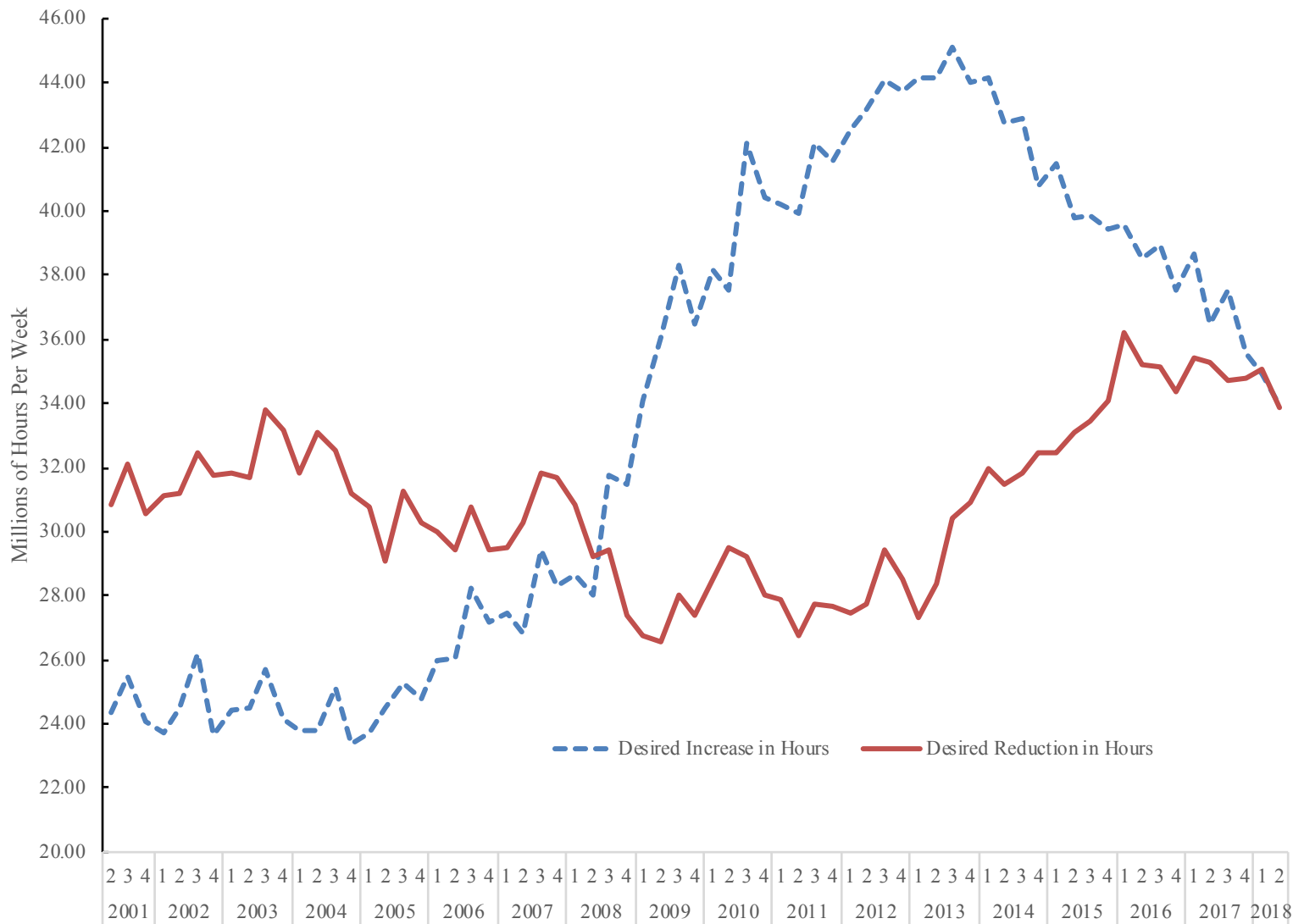


Chart 3. Unemployment and Underemployment Rates UK 2001Q2- 2018Q2



Chart 4. German Wage Growth and the Unemployment Rate, 2012Q1-2017Q4
(Each data point plots quarterly annual wage growth against the unemployment rate).

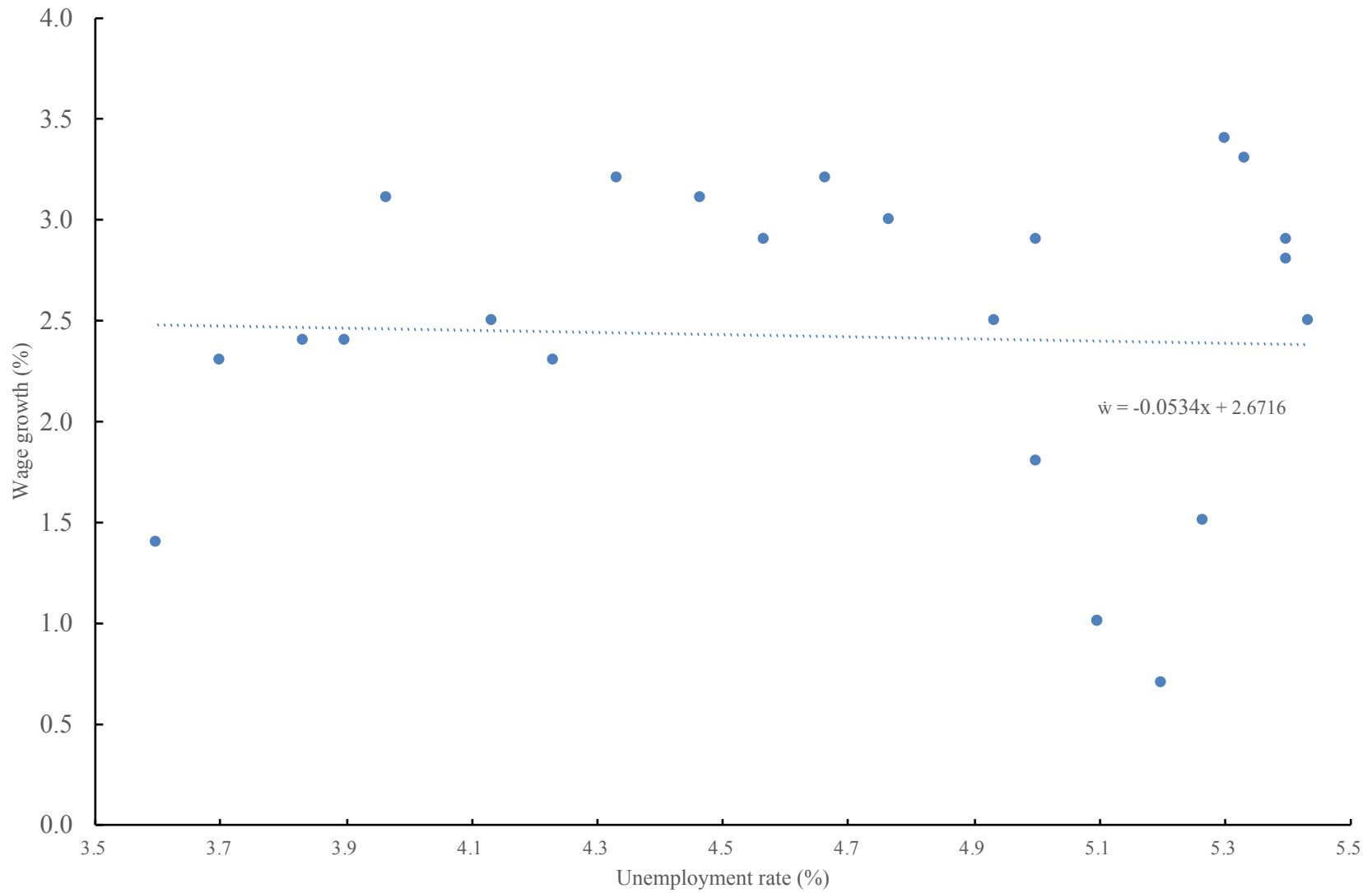


Chart 5. US Production and Non-Supervisory Workers' Mean Annual Hourly Wage Growth and the U7 Underemployment Rate (%) by month, 1990-2018

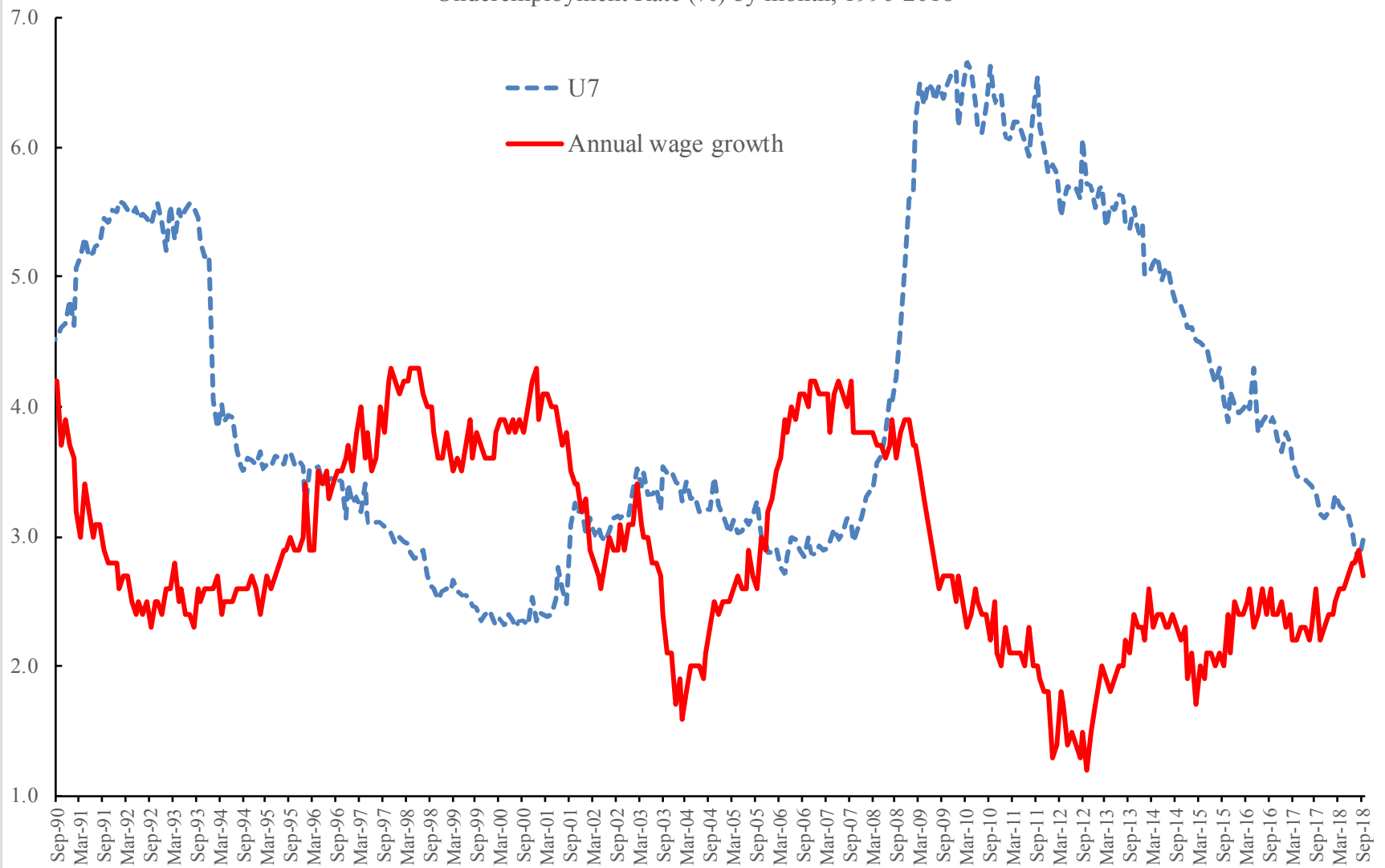


Chart 6. CPS Median Usual Weekly Earnings of Full-time, Wage and Salary Workers, by quarter, 1990Q1-2018Q3

