

The Labour Market and Wage Growth after a Crisis

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Abstract

The substantial improvement in labour market conditions since 2013 has been one of the most noteworthy aspects of Ireland's economic recovery. An important exception in this turnaround is, however, wage growth, which remains subdued relative to pre-recession trends. This article uses a number of metrics to fully assess underlying labour market conditions, before considering the reasons behind recent muted wage growth and the potential path of future wage developments. The evidence suggests that some of the post-crisis weakness in wages may be attributed to temporary factors including low inflation, employment composition effects and the estimation of labour market slack. Furthermore, our analysis points to a non-linear relationship between wage growth and unemployment, whereby the degree of sensitivity of wages is greater during periods of low or high unemployment. We also note a number of reasons as to why historical trends may not represent a reliable guide to future wage developments including changes in institutional wage setting, a shift in the natural rate of unemployment, recession-related scarring effects and productivity developments.

1. Introduction

The turnaround in the labour market since 2013 is one of the most remarkable aspects of Ireland's economic recovery. Having shed over 300,000 jobs between 2007 and 2012, by the second quarter of 2017 the numbers in employment were just 80,000 below the pre-recession peak. At the same time, the recovery in employment has been accompanied, until recently, by little or no growth in nominal hourly wage rates at the aggregate level. As a result, the main driver of increases in household incomes in recent years has been the growth in employment and the increase in average hours worked.

With labour market indicators pointing to ever-tightening conditions in the near-term, questions arise as to whether the degree of slack in the labour market is falling, and the potential consequences for wage developments. This article looks at these issues, using a range of metrics to assess underlying conditions in the labour market and the factors which have driven wage growth, before attempting to assess some of the potential influences on future wage developments.

In Section 2, we assess how close the economy is to full employment, presenting a dashboard of key labour market indicators, covering employment flows, job vacancies, hours worked and labour force participation. We show that whilst there has been substantial improvements in recent years, wage growth has lagged behind. In Section 3, we examine the determinants of wage growth, relating changes in nominal wages to unemployment, inflation, productivity and other factors. We show that the relationship between wage growth and unemployment in Ireland is non-linear, with a far greater degree of sensitivity at low or high levels of unemployment. We also explore the extent to which past patterns are a reliable guide to the future and the extent to which some changing labour market

features could have a bearing on future wage developments.

2. Labour market developments

The growth of the economy in recent years has been supported by strong and broad-based growth in employment, which is currently growing at its fastest rate in a decade, thereby facilitating a sharp fall in unemployment (see Box 1 on Okun's Law, linking unemployment to output, and Figure 1(a)). As Figure 1(b) shows, the composition of employment has shifted away from construction towards services sectors such as education, health, professional services, information and communications, and accommodation and food services. The number and share of workers working in industry has also declined since 2007, by around 1.5 per cent or 40,000 workers. This, however, reflects a long-term decline stretching back to the early 2000s.

Turning to the supply-side, labour force participation – that is, the proportion of the 15-64 year old population in either work or unemployed – declined sharply during the recession (Figure 1(c)). The fall-off for men, from a peak of 82 per cent to just over 76 per cent is particularly stark. As Byrne and O'Brien (2017) point out, the rise and fall in participation reflects both cyclical and structural factors. They show that the rapid rise in labour force participation before the recession was "almost entirely due to the enlargement of the labour force through immigration from new EU member states". The paper also shows that the recovery in female participation in recent years has been driven by a cyclical response to an improving labour market. Figure 1(d) highlights the significant role played by inward migration in Irish employment since the early-2000s. It is noteworthy that by early 2017, non-Irish employment was already approaching pre-recession levels, at 15.8 per cent of total employment (versus a peak share of 16.2 per cent) and 327,000 workers (peak 350,000).

Separately, recent evidence suggests that there may be a greater degree of slack in the labour market than that indicated by the unemployment rate, which may also drag on wage growth. Both ECB (2017) and Yellen (2014) highlight the usefulness of broader measures of slack when analysing wage growth in the recent recovery in Europe and the US. Underemployment, whereby workers are unable to work up to their desired hours, is one factor omitted from the standard (ILO) headline measure of the unemployment rate. As Figure 1(f) shows, in the first quarter of 2017 around one-in-ten Irish workers were willing to work up to 16 hours more per week on average – down from one-in-five at its peak (2013). Moreover, subdued labour force growth has also kept the unemployment rate down without necessarily reflecting a tightening labour market.

For Ireland, a useful alternative measure of slack in the labour market is the non-employment index (NEI) developed by Byrne and Conefrey (2017). In contrast to the narrower ILO definition of the unemployment rate, the NEI measure of labour utilisation includes individuals that are not in the labour force, such as discouraged workers and passive job seekers, and weights them by their probability of finding employment. As well as pointing to a somewhat greater amount of labour market slack than that suggested by the headline unemployment rate (see Figure 1(e)), Byrne and Conefrey (op. cit.) also highlight the comparatively smaller decline in broader measures (including underemployed alongside non-employed) of slack over the course of the recovery.

The final two charts in Figure 1 look at the contribution of average hours worked to total hours worked (i.e. numbers employed multiplied by average hours) and weekly pay. Prior to the recession, average hours worked were in trend decline, reflecting both compositional changes – notably the rise in female participation, which tends to be concentrated in jobs involving irregular work hours – and income effects from higher wages. However, at the onset of the recession, there was a cyclical decline in hours as firms cut back on labour demand. The recovery has seen the steady growth in average hours make a significant contribution to overall total hours, alongside employment growth (see Figure 1(g)). The final chart in Figure 1 shows the contribution of increases in average weekly hours to growth in average weekly pay (nominal). It shows that around half of the growth in average weekly earnings since the second half of 2016 was from increases in average weekly hours of work. We return to the subject of hourly wage growth in the next section.

As regards unemployment and unemployment dynamics, Box 1 re-examines the historical relationship between output growth and changes in unemployment using a new indicator for domestic economic activity, i.e. modified domestic demand (MDD). Having broken down in the recent past, when using GDP as the measure of economic activity, Box 1 re-establishes Okun's Law in an Irish context and forecasts unemployment going forward. This points to a further decline in unemployment to below 6 per cent in 2018.

Figure 1: Labour Market Indicators



Box 1: Unemployment and output – Okun’s law with modified domestic demand

In 2017, the CSO published new indicators of the level of economic activity, designed to exclude globalisation effects that affect traditional measures, such as GDP. One of the new measures – Modified Total Domestic Demand, or MDD – is specifically designed to provide greater insight into activity within the domestic economy and is more closely related to employment growth as it focuses on the physical capital used to produce domestic output (see CSO, 2017). This box tests how successfully it achieves this aim by estimating the historical relationship between unemployment and output fluctuations using both GDP and MDD (Okun, 1962).

Figures B1.1 and B1.2 plot the quarterly change in unemployment against changes in GDP or MDD, for the 1998 to 2017 period. There is a negative correlation between unemployment and output, with some notable outliers particularly for the sub-period 2008-2010 and 2015. The latter relates to the exceptional (GDP) growth rates recorded in that year while the former relates to the rapid rise in unemployment during the crisis.

Figure B1.1: Okun’s Law with GDP



Source: CSO and authors’ calculations.

Figure B1.2: Okun’s Law with MDD



Source: CSO and authors’ calculations.

We now model the Okun’s Law relationship using both GDP and MDD as a measure of output. Our specification is in first differences (quarterly changes) with output entering the equation in log form. We include three lags of differenced output to capture the dynamics of the relationship. We also include a lag of the change in the unemployment rate to deal with stationarity issues. See Equation 1 below, which is estimated from 1998Q2 to 2017Q2.

$$(1) \Delta U_t = \alpha + \beta(\Delta Y_t) + \beta(\Delta Y_{t-1}) + \beta(\Delta Y_{t-2}) + \beta(\Delta Y_{t-3}) + \delta(\Delta U_{t-1}) + \omega_t$$

We find that the MDD model explains more of the variation in the unemployment rate than the alternative model using GDP.¹ We find that the sum of the coefficients on lagged MDD (-0.25) is close to previous estimates of the Okun coefficient for Ireland (see Conefrey et al., 2014). We then use our forecasts for MDD to 2018 to forecast the unemployment rate.² Results are shown in the table below, with the model predicting an average unemployment rate of 6.2 per cent in 2017 (the monthly average in the year to August is 6.4 per cent) and a fall to 5.6 per cent in 2018.

¹ Our GDP specification includes a dummy for 2015.

² We smooth the annual forecasts for the remainder of 2017 and 2018.

Table B1.1: Forecasting Unemployment with MDD

	2016 (actual)	2017f	2018f
Unemployment Rate	7.9%	6.2%	5.6%

Figure 2: Labour Market Heat Map 2004Q1 to 2017Q1



Source: Authors' calculations based on: QNHS, EHECS, QNA.

Note: Heat map shadings are determined by the number of standard deviations from the mean. A growth rate two standard deviations below the mean is assigned the darkest red, a growth rate two standard deviations above the mean is shaded the darkest green.

Taking another approach to examine overall labour market conditions, we build on the methodology employed in Byrne and Smyth (2016) and construct a labour market heat map covering employment, unemployment, mobility, labour force, and hours (Figure 2). For each variable, we take the longest time series available and standardise the year on year growth rate for each quarter, which abstracts from seasonality concerns.³ We then assign colour bands from red to green, to depict whether a series is below or above

average, respectively, or at its long-run average (neutral). Although the series span a relatively short sample period – quarterly labour market data only starts in 1998 – there are a number of cyclical peaks and troughs over the past 19 years. This is a rich period of analysis encompassing the Celtic Tiger years, the housing bubble, the financial crisis and the subsequent recovery.

For many variables, the heatmap tells a similar story to the charts in Figure 1, that of a labour

³ An alternative approach might be to exclude periods when clear imbalances existed – for example, the years in the lead up to the financial crisis. However, we felt it was more appropriate to include the longest possible data sets whenever possible.

market experiencing a robust recovery. The pick-up in employment and the decline in unemployment (inverted for the purposes of the heat map) are clearly visible. Aside from wages (discussed below), three variables, stand out: flows into and out of employment (hires and exits)⁴ and job vacancies. We discuss each in turn.

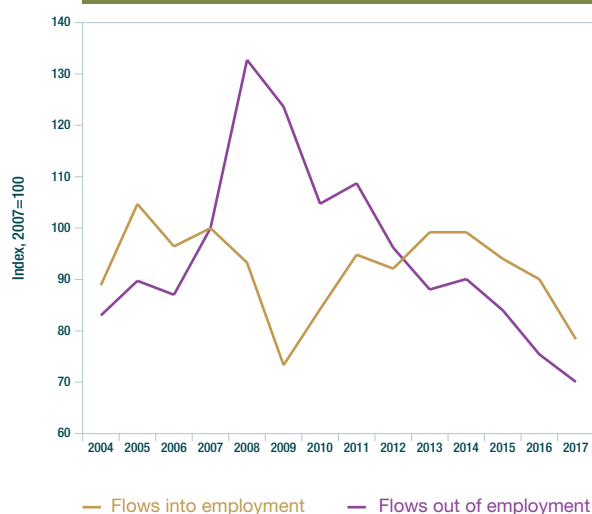
2.1 Flows into and out of employment

Flows into and out of employment provide a useful insight into the supply-demand balance in the labour market, a key factor when it comes to thinking about the influence of ‘slack’ on wage growth. As the heatmap suggests, the exit rate from employment has declined steadily since the start of the turnaround in the labour market. However, in recent quarters the hires rate has slowed somewhat, having peaked earlier on in the recovery. Figure 3 shows this by plotting the number of workers flowing into and out of employment. Given that output growth has showed little sign of weakening in the last two years, the slowdown in the flow into employment could point to an increase in labour productivity. It could also be early evidence of a declining pool of potential labour supply, and therefore less slack in the economy. Given the potential for both of these factors to impact on wage growth, we return to this issue in Section 3 below.

2.2 Job Vacancies

The number of job vacancies posted by firms, as published by the CSO since 2008, is indicative of the number of job openings, and is therefore an important part of aggregate labour demand.⁵ The number of vacant jobs is linked to the unemployment rate via the job-matching process – if this process is functioning properly, vacancies will be filled and a higher availability of work will lead to a lower unemployment rate. We plot the relationship between the vacancy rate and the unemployment rate, known as a

Figure 3: Flows into and out of employment (2007=100)



Source: CSO.

Note: Flows into employment consist of all those moving from unemployment or inactivity into employment in the past year. Flows out of employment consist of all those moving from employment to non-employment in the past year.

Beveridge Curve, in Figure 4.⁶ Typically, cyclical fluctuations in the business cycle generate movements along the curve. For example, an environment of low vacancies and high unemployment sees a move down and to the right along the curve. Shifts in the curve can signal structural changes in the economy. The curve appeared to shift outwards after the onset of recession, signalling a breakdown in the job-matching process from 2009 onwards. In recent quarters, momentum in the falling unemployment rate and increasing vacancy rate has seen a move along the curve, up and to the left, consistent with a cyclical upturn in the Irish economy.

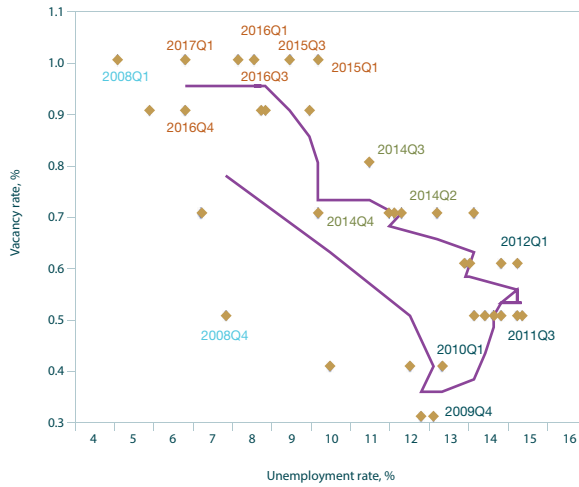
In summary, a range of indicators show that the labour market has recovered strongly from the recession, while overall compensation and hourly earnings growth remain subdued when compared to the pre-crisis period. However,

⁴ Exits are also inverted for the purposes of the heat map.

⁵ A job vacancy is defined as a newly created, unoccupied, or about to become vacant post on a specific reference date. A post open to internal candidates is not considered a job vacancy. It is important to point out that not all job openings appear as posted job vacancies, and vacancies are therefore likely to understate the level of aggregate demand; see Davis, Faberman and Haltiwanger (2013).

⁶ The vacancy rate is defined as the ratio of job vacancies to vacancies and occupied positions.

Figure 4: Beveridge Curve



Source: CSO and authors' calculations.

it is useful to extend this analysis to look at sectoral dynamics, as aggregate measures can mask variation across sectors in the labour market. Figure 5 shows that some sectors are experiencing stronger wage growth than others and the vacancy rate seems to be positively linked with this growth. High skill sectors such as finance, professional activities and IT have both relatively high vacancy rates and higher wage growth, suggesting that labour tightness in those particular sectors may be leading to stronger wage growth. This emphasises the importance of a careful examination of the factors driving wages before any conclusions are drawn. We undertake this in the next section.

3. Wage growth

The behaviour of nominal wages, at least in the short to medium term, is determined by demand and supply factors in the labour market and inflation. In the longer term wage movements are also affected by trends in

Figure 5: Growth in Real Wages and Vacancies (2017)

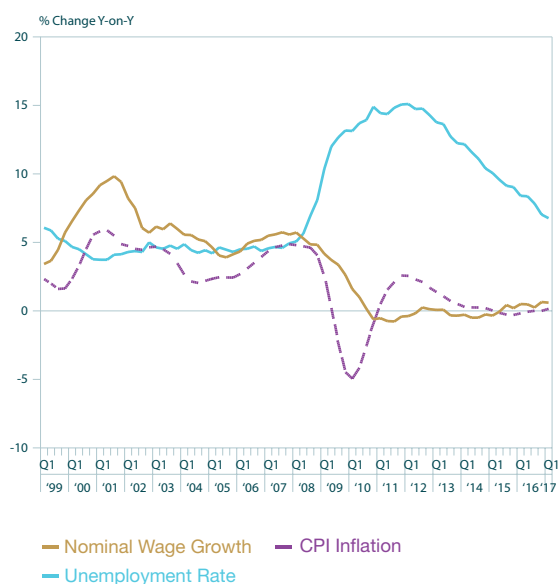


Source: CSO (EHECS).

*IT is the average growth from 2014-2016. All other sectors is 2016 to 2017 growth.

productivity and the labour share of income. As an economy and aggregate demand expand, this creates an environment in which firms require additional labour to satisfy increased demand. This additional labour can vary in terms of its composition, as extra workers are hired or existing employees work longer hours. As new workers are hired, the pool of available additional labour shrinks, leading to a tighter labour market. This creates the conditions for wage increases as firms compete to hire the available additional labour and to retain their incumbent workforce. Inflation expectations also play an important role in wage determination as employees will seek to increase their wages to maintain their standard of living as prices rise.

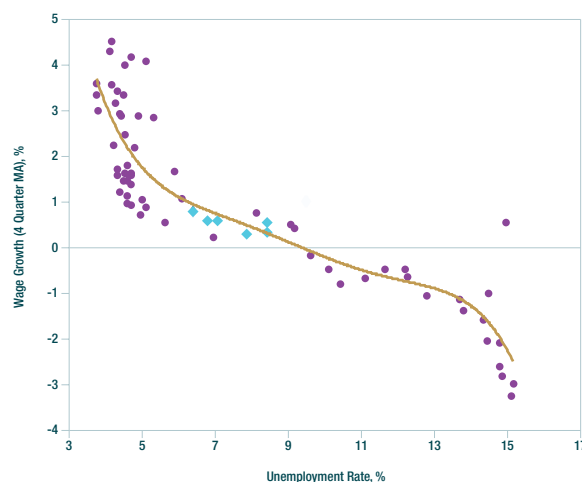
The previous analysis suggests that several key indicators are signalling a tighter labour market going forward. Figure 6 shows that, after a decade of strong nominal (5.7 per cent) and real (2.7 per cent) growth up to 2008, nominal wages have been broadly flat over the last seven years. Nevertheless, it is important

Figure 6: Nominal Wage Growth, Inflation and Unemployment

Source: CSO.

Notes: Wage growth figures are a four-quarter moving average. Wage growth is defined as the annual change in hourly earnings. Data from 2008 is from EHECs (Table EHQ03). For earlier years, we use historical weekly earnings data for Services (QE01), Industry (QIQ1/QIPQ1), Financial Services (BIQ01), Construction (BDQ01). Weekly earnings are then divided by usual hours of work (QNHS) to get hourly earnings. The growth rates from the pre- and post-2008 sources are merged.

to highlight that weak nominal wage growth, against a backdrop of strong employment growth, is not unique to post-crisis Ireland. Indeed the UK and the US have had similar experiences over recent years, which is often termed the 'wage puzzle' (see Saunders (2017) and Yellen (op. cit.)). In fact, and unlike the case in Ireland, the US and the UK have had low unemployment rates for much of the past decade, indicating a low degree of slack in the labour market, yet aggregate wage growth has remained weak in these economies. The second half of 2016 saw a return to low levels of nominal wage growth, in Ireland, which appears to have continued into 2017 and picked-up pace in the last quarter (although, as the CSO points out, quarterly data is subject to revision). The focus in this section is average wage or earnings growth.

Figure 7: Real Wage Growth and Unemployment

Source: CSO and authors' calculations.

Notes: Blue points indicate the period from 2016q1-2017q2. Wages are defined as average hourly earnings.

It should be emphasised, however, that there are differences across sectors and types of workers that give rise to these average trends as is evident in the earlier chart on vacancies and wage growth (Figure 5).⁷

3.1 Wages and Unemployment

While the rapid fall in unemployment from its peak in 2012 may lead to expectations of wage increases, the historical relationship between wage growth and the unemployment rate does not necessarily suggest that this will be the case. Figure 7 plots real wage growth against the unemployment rate from 1999Q1 to 2017Q2.⁸ The relationship is non-linear, with real wage growth broadly flat in the 5 per cent to 10 per cent unemployment

⁷ See Walsh (2012) and Bergin, Kelly and McGuinness (2012) for an in-depth analysis of compositional factors and earnings trends in the recession. Explanations for the missing wage growth 'puzzle' in the US and UK – i.e. weak wage growth during a prolonged period of low unemployment – have also examined the role of compositional factors; see, for example, Daly and Hobijn (2016).

⁸ Note that 2009Q1-2010Q2 is excluded as exceptional real wage growth over this period was driven by a collapse in consumer price inflation.

Table 1: Phillips curve 2000-2017

Annual percentage change in nominal wages	Coefficient	Standard error
Inflation (CPI) ^(a)	0.93***	(0.34)
Unemployment	-5.75***	(1.68)
Unemployment ^{^2}	0.62***	(0.18)
Unemployment ^{^3}	-0.022***	(0.006)
Change in unemployment	0.13	(0.25)
Output per worker ^(b)	0.34***	(0.11)
Migration (% growth in non-Irish employment)	-0.045***	(0.015)
Nominal effective exchange rate (change)	-0.045*	(0.023)
Constant	17.60***	(5.51)
Observations	64	
Time	2000q1-2017q2	
R-squared	0.931	

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

(a) Inflation is instrumented with the lag of the oil price; (b) Output per worker is a three-year moving average and is from the OECD productivity database, except for 2015 where we use growth in modified domestic demand to smooth out exceptional increases in GDP due to the activities of multinationals in Ireland which are largely unrelated to domestic economic output (see Box 1). The sample period (2000Q1-2017Q2) is determined by the availability of quarterly migration data from the QNHS (the percentage of non-Irish workers in total employment). Coefficients from a model using data back to 1995 (excluding migration) are very similar.

range.⁹ Outside of this range, real wages tend to be more responsive to changes in the unemployment rate. For example, the period from 2000 to 2007, when unemployment was under 5 per cent, saw real wage growth averaging 2.2 per cent per year. Conversely, when unemployment was above 10 per cent from 2010 to 2015, annual real wage growth averaged -0.3 per cent. The blue-coloured points on the chart show the most recent data points, from 2016Q1 to 2017Q2. It is important to point out that the relationship between wage growth and unemployment may be contingent on the sample period available for estimation. The quarterly dataset we have constructed captures three distinct phases of the cycle: a prolonged period of low unemployment (1999-2007), followed by a period of rising and high unemployment (2008-2012), followed again by a period of falling and, more recently, low unemployment (2013 onwards).

To more formally examine the determinants of wage growth, we estimate a wage Phillips curve relating changes in nominal wages to unemployment (level and changes), inflation, productivity, migration and changes in the nominal effective exchange rate. The analysis and results are very similar to Leddin (2010).¹⁰ The regression results are shown in Table 1. The results indicate that both slack (unemployment) and inflation are important factors for nominal wage growth.¹¹ Trend productivity growth, measured here as a 3-year moving average, is, as expected, positively correlated with nominal wage growth. The last two terms – migration and the effective exchange rate – are included to capture the impact of potential labour supply and margin pressures that could affect firms' ability to award pay increases. Both factors are negatively correlated with nominal wage growth, as expected.

⁹ Bermingham et al. (2012) also find evidence of threshold effects in the Irish Phillips curve. Phillips, in his original work on wages and unemployment, also explicitly considered the possibility of non-linearities in the relationship, Phillips (1958).

¹⁰ With one significant difference: to approximate the shape of the wage growth-unemployment relationship in Figure 7, the unemployment level is included as a cubic polynomial.

¹¹ Although, the inclusion of the cubic terms for unemployment means that its influence is greater at higher or lower levels of unemployment. The rate of change in unemployment matters also, but only when unemployment is falling, i.e. accelerating wage growth when unemployment is falling.

Given the results in Table 1, the obvious question is what does the path forecast for unemployment (to end-2018) imply for nominal wage growth. To make this prediction, we make the following assumptions about the path for the other variables: inflation, 0.7 per cent in 2017, 1.3 per cent in 2018 (from the forecasts in Central Bank Quarterly Bulletin Q3 2017); output per worker, 3 per cent (three-year average); migration, 6 per cent growth in non-Irish employment (2017 year-to-date mean value); no change in the nominal effective exchange rate. Putting all of this together gives a prediction for nominal hourly wage growth in 2018 of just under 2.8 per cent, and 1.5 per cent in real terms (the value for 2017Q2 was 2.2 per cent¹²). Allowing for an increase in average hours broadly in line with that of 2016 (of around 0.4 per cent) implies an overall nominal increase in compensation per employee of 3.2 per cent in 2018.

3.2 The past as a reliable guide to the future?

As pointed out earlier, the regression results are really only useful to the extent that the past is a reliable guide to the future. On this issue, two related questions arise. First, has the natural rate of unemployment – i.e. the point at which full employment is reached and nominal wage pressures build – shifted during the recession/recovery? Second, have changes to the institutional wage bargaining framework affected the rate at which wages might be expected to grow?

Changes in structural unemployment can shift the natural rate of unemployment. Looking at the latest unemployment trends, particularly the continued fall in long-term unemployment, does not suggest that there has been a significant increase in the natural rate, although it may be some time before a clear picture emerges. Whilst the share of long-

term unemployed is higher than pre-recession levels – for example, 55 per cent in 2017Q1 compared with 32 per cent for the 2000-2007 period – it has been falling steadily since the start of the recovery. Wider measures of slack, such as the Non-Employment Index in Figure 1(e), are also close to, or approaching, pre-recession levels.

Institutional changes in the wage-setting process also have implications for future wage growth. As Leddin (2010) shows, previous bargaining agreements with benchmarking had a strong influence on wage setting across the entire economy, and not just those sectors formally signed up to the agreements. Changes in the institutional framework, could therefore lead to quite different wage growth-employment outcomes. For example, there is some evidence of the emergence of other forms of collectivised wage setting, such as pattern bargaining, whereby an agreement between employees and (a leader) firm within a sector are mirrored by other firms. As Calmfors and Seim (2013) point out, pattern bargaining can promote wage-moderation if the ‘leader’ firm is in the tradables sector and exposed to international competition.¹³

An extended period of low inflation may have implications for wage setting behaviour and the natural rate of unemployment (see Holden, 2003). These include a slower rate of downward real wage adjustment than would have been the case with a higher inflation rate, due to downward nominal wage rigidity. For instance, results from the ESCB Wage Dynamics Research Network indicates the presence of downward wage rigidities in a number of European countries.¹⁴ In addition, as prices, including wages, are denominated in nominal terms, inflation dynamics affect the frequency of wage adjustment and the forward-looking component of the wage setting process. In Ireland, the effect of

¹² This is the annual growth rate in Q2 2017 of seasonally adjusted hourly earnings in EHECS. We use this series because it is the closest match to the pre-2008 data we use to construct a longer time series. An alternative is the annual growth rate for the series *excluding* irregular earnings, which, in Q2 2017, is slightly lower at 1.5 per cent. However, the trend movement in the two series is very similar.

¹³ Although the main point of the Calmfors and Seim (2013) paper is to question this ‘conventional wisdom’. They show that in a small, open economy pattern bargaining does not always result in wage restraint and high employment in equilibrium, in particular as the relative size of the ‘tradables’ sector declines.

¹⁴ See Keeney and Lawless (2010) and Linehan, Lydon and Scally (2015).

downward nominal wage rigidity on the optimal adjustment of real wages, in the presence of low inflation since 2009, may have been mitigated by two factors. The high number of exits from employment between 2008 and 2012, and the lower wages of new entrants to employment during the recession and early recovery periods (see Conefrey and Smith (2013) and Lydon and Lozej (2016)). However, the prevailing low inflation environment has likely contributed to subdued wage growth over recent years as one possibility is that gains in real terms may have moderated demands for wage increases.

A perception of increased job insecurity versus the pre-recession years could also contribute to wage restraint on the part of workers. For instance, there is some evidence that the costs of losing a job increased significantly during the recession and remained high during the early years of the recovery. Using data from 2005-14, Lydon and Lozej (2016) find that the wages of new hires fell by almost 20 per cent during the recession, and have remained at that level up to 2014. To the extent that individuals' wages are path dependent, this could be interpreted as evidence of 'wage scarring', whereby unemployment experiences in the recession continue to weigh on wages long after the recovery has started.¹⁵

4. Conclusions

The improvement across a range of Irish labour market indicators provides clear evidence of a well-established labour market recovery from the recession. One noteworthy exception in terms of this recovery has, however, been wage growth – both overall compensation and hourly earnings growth have proven modest relative to the pre-crisis period. Even now, when several key indicators are signalling a tighter labour market going forward, Irish wage growth remains subdued.

There are a number of potential reasons behind this weakness. The evidence presented here suggests that some of the post-crisis weakness may be attributed to temporary factors (including low inflation and changes in employment composition) as well as how slack is measured (unemployment versus non-employment). In addition, our examination of the determinants of wage growth points to a non-linear relationship between wage growth and unemployment, whereby the degree of sensitivity of wages is higher during periods of low or high unemployment. In view of this and given the short-term outlook for unemployment, nominal hourly wage growth below but close to 3 per cent is envisaged for 2018.

It is nevertheless important to note that historical trends, from a wage perspective, may not necessarily prove to be a reliable guide to future developments for a variety of reasons. First, the natural rate of unemployment may have shifted, for example due to changes in the structural unemployment rate. Much will also depend on the effects of productivity and competitiveness trends, wage bargaining processes and crisis memory or scarring effects, all of which are very difficult to predict in the short to medium term.

¹⁵ See Saunders (2017) for UK evidence on wage scarring.

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