BANK OF ENGLAND

Speech

# Pay Power

Speech given by

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It is great pleasure to be here at the Acas Annual Conference whose theme this year is the “Future of Work”. It is a particular pleasure to have Brendan Barber as Chair. As a member of the Bank of England’s Court between 2003 and 2012, Brendan’s insights on the labour market and wider economy were crucial in helping the Bank steer a policy course through a period of first macroeconomic calm and then extra-ordinary macroeconomic storm following the global financial crisis.

It is the labour market that I want to discuss today. We have seen an unusual pattern emerge here over recent years. Jobs growth has been strong, with over 2 million new jobs created since the end of 2012. But pay growth has remained weak by historic standards, averaging around 2% annually. This pattern has been replicated across a number of other advanced economies. As we reach the anniversary of what has become a “lost decade” for inflation-adjusted pay in the UK, it is a good time to take stock.

What explains this puzzling pattern of rich jobs but poor pay growth? Some of the reasons for weak pay have been cyclical. The financial crisis caused large job losses. A significant pool of unemployed workers emerged and job insecurities rose, depressing pay growth. Recently, the UK’s economic recovery has shrunk the pool of unemployed workers and reduced somewhat job insecurity. Had these cyclical factors been the only ones at work, we might have expected a stronger recovery in pay.

The reason we have not is because longer-term, structural forces have also been holding back pay growth, notably weak productivity. Over the medium-term, productivity is the single most important determinant of the national income pie. Productivity growth pays for pay rises, at individual firms and for the economy as a whole. Over the past ten years, productivity has barely grown in the UK. That second “lost decade” goes a long way towards explaining the lost decade in pay.

Productivity is not, however, the only structural factor at work in the labour market. The world of work is being reshaped in many advanced economies by the secular fall in the degree of unionisation and collective bargaining, by changes in employment contracts and working patterns and by rises in the degree of concentration and automation in the company sector. By reducing workers’ “pay power”, they too have depressed wage growth, actually and prospectively.

I will start by discussing recent pay developments and the factors responsible for driving them, cyclical and structural. I will then discuss the implications of these cyclical and structural factors for domestic cost growth, inflationary pressures and hence for monetary policy in the period ahead.

**Jobs and Pay**

I do not need to tell this audience that the past decade has been a strikingly weak one for pay growth. Ten years ago, the mean weekly wage in the UK was around £435 per week. A decade on, it has risen to £520

per week, an average annual rise of less than 2% in money terms. This makes it the weakest decade for growth in money wages for British workers since the 1930s.

That is not the end of the story, of course. Over the same period, consumer prices in the UK have risen by, on average, 2.2% per year. That means inflation-adjusted, or real, pay has *fallen* by around 3.7% cumulatively over the past decade. That weekly pay packet in 2008 has, in purchasing power terms, fallen to be worth only around £420 per week.

This makes the recent period very unusual by historical standards (Chart 1). Since as far back as 1870, there have been only two episodes when the real pay of workers has fallen over a ten-year period. The other episodes were associated with seismic shocks in the labour market, often wrenching technological change or sharp cyclical downturns, which raised levels of unemployment and job insecurity.

The past decade has bucked that historical trend, with a boom in job creation accompanying weak pay growth. The employment rate in the UK has risen to over 60%, and the unemployment rate has fallen to 4%, respectively their highest and lowest levels since the mid-1970s. The vast majority of these new jobs, around 75%, have been full-time. And this boom has persisted, with around 830,000 job vacancies currently being advertised – the highest since records began.

This picture of weak pay and strong employment has been broadly-based, spanning all regions and sectors. Real pay has fallen across every region of the UK since 2008 (Figure 1) and in all three major sectors of the economy (Chart 2). Meanwhile, unemployment has fallen steeply across every region of the UK, by at least 2.5 percentage points.

The high-level picture of the UK labour market, then, is a jobs-rich but pay-poor recovery. This pattern is broadly replicated in other countries. For example, there is a striking correlation between the pattern of unemployment and wage growth in the UK and the US (Charts 3 and 4). In the US, unemployment has fallen to its lowest levels since 1969, while pay growth has remained modest.

Given the strength of jobs growth, the weakness in pay has surprised many people, including the Bank of England. Chart 5 plots the Bank's wage forecasts at annual intervals since 2012. Over this period, there has been a sequence of negative forecast errors, averaging around one percentage point per year. The same has been true of external wage forecasts, for the UK and elsewhere. These surprises suggest that the recent pattern in pay and unemployment has been unusual by historical standards.

In the 1950s, A W Phillips uncovered a negative empirical relationship between pay growth and unemployment: pay grows faster when unemployment is lower. The Phillips curve was born (Phillips (1958)). This relationship has since become a central pillar of macro-economic theory and policy. Part of

the attraction of the Phillips curve lies in the fact that it tells a simple story: the tighter the jobs market, the greater the pressure on pay.

Exactly 60 years on, the Phillips curve is still widely used, and widely debated, by economists and policymakers. But with pay undershooting expectations, and with unemployment touching generational lows, some big questions are being posed of it. Has the Phillips curve died of old age, or is it merely sleeping? Has it changed shape or location? The juries (or coroners) have yet to reach a definitive verdict.

There have been a number of recent re-examinations of the evidence.[1] Using different datasets and techniques, these have tended to conclude that the Phillips curve has a pulse and remains alive and kicking. As an illustration, Charts 6 and 7 plot the relationship between wage growth and unemployment in the UK and the US over three sample periods dating back to the 1970s. They also plot some simple regression lines of best fit.

All of the regression lines are negatively-sloped and, for the UK, statistically significant. Across the three samples, the estimated Phillips curves are similarly-sloped.[2] These curves have, however, shifted downwards significantly over time. Taken together, this evidence is consistent with the Phillips curve having a pulse that is beating at a similar rate to the past, despite the patient having moved hospital.

**Explaining the Pay Puzzle**

To explore the behaviour of pay in greater detail, we can use a slightly more sophisticated model which takes account of factors in addition to unemployment. Table 1 provides some econometric estimates of pay relationships over the period 1992 to 2018. The factors determining pay growth can be grouped under three headings, each of which is important in explaining its evolution over the (distant and recent) past.

One key factor affecting pay growth is inflation or expectations of inflation.[3] This makes intuitive sense. In the end, workers are interested in the purchasing power of their pay, not its money amount. They bargain over *real* wages. So inflation, or its expectation, affects pay with a coefficient close to one. Put differently, in the course of wage bargaining, employers insure workers against inflationary shocks, at least on average.

Movements in inflation have been a key driver of pay growth historically. They are the main reason why the Phillips curve shifted downwards significantly as the Great Inflation of the 1970s gave way to the Great Moderation of the late 1990s. That period saw inflation expectations ratchet down to target levels where they have remained anchored since (Chart 8). Pay growth has, in response, fallen pretty much one-for-one. This explains the first downwards shift in the Phillips curves shown in Charts 6 and 7.

[1] For example, Coibion and Gorodnichenko (2015), Gordon (2013), Vlieghe (2018), Saunders (2017) and Tuckett (2018).
[2] In statistical terms, you cannot reject the null that their slopes are the same.
[3] Both measures have a statistically significant impact on wage growth. The regressions in Table 1 use inflation expectations as they give a slightly better empirical fit.

A second key determinant of wage growth is unemployment or, more precisely, the gap between unemployment and its longer-run trend (sometimes called the NAIRU or Non-Accelerating Inflation Rate of Unemployment).[4] The larger this unemployment gap, the weaker the upward pressures on pay growth, as A W Phillips had first postulated 60 years ago.

In econometric wage equations, the unemployment gap is a (statistically and economically) significant determinant of pay (Table 1). A 1 percentage point unemployment gap drags on wage growth by around 0.8 percentage points. That means the 2 percentage point narrowing in the UK unemployment gap since 2012 would be expected to have raised wage growth by 1.6 percentage points, a significant tailwind.

The NAIRU itself is unobservable. It is also moveable, depending on structural features of the labour market. This means the NAIRU needs to be estimated and these estimates are apt to shift over time. Over recent years, the Bank has revised down its estimate of the NAIRU in the UK, by just under a percentage point, to around 4 ¼%. These downwards surprises to the NAIRU (upwards revisions to the unemployment gap) help account for the persistent overshoot in the Bank's wage forecasts.

There are a variety of alternative, complementary measures of slack in the jobs market. For example, the number of hours a person works, relative to their desired hours, is also relevant to gauging the degree of spare capacity in the labour market. A number of research papers, theoretical and empirical, have found that such "under-employment" may also have a significant bearing on the setting of pay.[5]

There are various measures of under-employment, including the proportion of the workforce working part-time involuntarily and the gap between actual and desired hours worked. In practice, these two measures exhibit a very similar pattern (Chart 9). They also track the unemployment rate closely. This suggests the incremental information contained in measures of under-employment, relative to measures of unemployment, might be relatively modest.

Econometric estimates confirm that impression. Replacing the unemployment gap with a measure of the under-employment gap produces a very similar wage equation (Table 1).[6] And in a pairwise comparison, under-employment is statistically insignificant if the unemployment gap is included. Under-employment is important for pay, but does not appear to much improve the explanation of recent wage dynamics.

A third factor determining pay pressures is productivity. It is through gains in productivity that individual firms, and the economy at large, can finance increases in workers' pay. Econometric estimates confirm that intuition. The productivity of the labour force is a (statistically and economically) significant determinant of pay (Table 1). On average across firms, a 1 percentage point rise in productivity raises aggregate wage growth by around 0.8 percentage points.

[4] Espinosa-Vega and Russell (1997) provide a history and review of the NAIRU concept.
[5] For example, Bell & Blanchflower (2018).
[6] Specifically, the involuntary part-time share of employment.

Productivity growth in the UK has consistently surprised to the downside since the crisis, averaging 0.5% per year since 2010 or around 1.5 percentage points below its historical average. We would expect weak productivity in turn to have been reflected in lower pay growth. Consistent with that, the fall in productivity growth since the crisis largely explains the (second) downward shift in the Phillips curve (Charts 6 and 7).

Since 2012, the Bank's forecasts have consistently over-estimated productivity growth, on average by just under 1 percentage point per year (Chart 10). This suggests a sizable fraction of the Bank's negative forecast errors for wages might plausibly be explained by downside surprises to productivity, alongside the effects of a lower than expected NAIRU. Had the Bank known a decade ago how weak UK productivity growth (and how much lower the NAIRU) was likely to be, its forecast errors for wages would have been smaller.

We can confirm this by re-running our pay equations substituting in the actual outcomes for inflation, the unemployment gap and productivity growth, in place of the forecasts for these variables at the time (Chart 11). The fitted values for wage growth now track actual wage growth reasonably closely. With perfect foresight about its determinants (productivity, unemployment and the NAIRU), there would have been far less systematic over-estimation of pay growth during the lost decade.

This suggests the UK's lost decade for real pay can, to a significant extent, be accounted for by macro-economic developments: *cyclically*, the large pool of unemployed that built up immediately after the crisis, generating a drag from the unemployment gap; and *structurally*, from lower levels of productivity and a lower NAIRU than in the past. With those accounted for, there is far less of a pay puzzle left to explain.

**The Wage Bargaining Game**

A more granular look at the labour market suggests, however, that it is not behaving identically to the past. Tectonic shifts in the labour market - cultural, contractual, technological, organisational – have come thick and fast recently. Because this structural change is slow-moving, it is difficult to detect in monthly pay movements. On a longer fuse, however, empirical evidence suggests these seismic shifts in the jobs market are influencing pay significantly.

The Phillips curve plots the relationship between the *stock* of unemployed and wage growth. Another strand of the labour market literature has looked instead at *flows* of people into and out of work and the associated process of job-matching between employers and employees.[7] In these models, pay is determined by flows of workers between jobs, and by the relative bargaining strength of employees and employers, as well as by fluctuations in labour demand and supply.

[7] For example, Moscarini and Postel-Vinay (2017).

Flows of workers and their bargaining power are, in turn, affected by structural features of the labour market. A rise in *job insecurity* will reduce flows of workers between jobs and their bargaining strength. A fall in the *degree of unionisation and collective bargaining* in the labour market, and a rise in the *degree of automation and concentration* in the company sector, will also reduce workers' pay power. We discuss each in turn.

If these structural forces were reducing workers' bargaining power, we might expect them to receive a declining share of the income pie – a fall in the "labour share". Internationally, there is strong evidence of the labour share having fallen across a large number of developed countries.[8] Structural factors, such as rising levels of automation and falling rates of unionisation, are typically found to have been an important contributor to those falls in international labour shares.[9]

At face value, the UK appears to have bucked those trends. Chart 12 plots the UK labour share since 1955. Over the past two decades, it has been broadly flat. The UK labour share in 1990 was 50%, largely unchanged from today. In the UK, there appear to be fewer signs of any significant shift in the bargaining power of workers having resulted in them taking away a smaller slice of the income pie. I will discuss some of the reasons for that below.

But we also need to be cautious when interpreting the labour share. First, looked at over a longer horizon, it is clear there *has* been a fall in labour's share of income in the UK over the past 60 or so years. Since 1955, the labour share has fallen by around 10 percentage points, falling sharply during the 1970s and 1980s. Moreover, the *level* of the UK labour share today, at 52%, is similar to advanced economies as a whole (around 51%), many of which have experienced falls more recently.[10]

Second, looking at the *sources* of labour income is also important. These comprise not only wages and salaries, but also defined-benefit pension contributions from companies and social contributions. While technically-speaking these are all income, they are not always equivalent when it comes to thinking about the wage bargaining process and spending patterns. The distribution of these different sources of income may also be uneven across cohorts of workers.

Take defined-benefit pension contributions. For those still in work, these are deferred income that cannot easily be spent today. With most defined-benefit schemes having closed, this income also only accumulates to a subset of (mostly older) workers. As these pension contributions have risen recently as a share of total income, the resulting boost to labour income will have been spread unevenly across generational cohorts and the increase in the average worker's true purchasing power may have been exaggerated. If we strip out back payments made by firms to fill pension deficits, the labour share shows greater signs of falling, if only gradually, over time (Chart 12).

[8] IMF (2017).
[9] IMF (2017).
[10] IMF (2017).

A more stripped-down measure of the labour share, which better tracks workers' purchasing power, is wages and salaries (Chart 12). That measure has fallen by around 1 percentage point since 1990. This picture is more striking still if we look at different cohorts. For workers aged over 55, their share of income has doubled from 4% in the early 1990s to 8% today. For workers aged 16-34, their wage share has fallen from 15% to 12% over the same period. The "lost decade" for young people has been particularly pronounced.

Finally, aggregate movements in the labour share can obscure important pay dynamics at the sectoral level. Different sectors of the economy are affected to differing degrees by changes in the form of employment, technology, unionisation and company concentration. As I discuss below, these sectoral data provide a clearer picture of the significant impact of slow-moving structural factors on workers' pay power.

*(a) Job Market Flows*

The quickest way to secure a pay rise is by moving job. That is quite sobering if, like me, you have never moved job. Pay growth of UK workers moving jobs ("twisters") has exceeded that of workers remaining in their position ("stickers") by 4 percentage points since 1994 (Chart 13). When workers exercise the outside option of moving between jobs, this puts upward pressure on pay through two main channels.

The direct, or arithmetic, effect arises from moving workers securing a pay rise and boosting the batting average for overall wage growth. More twisters means higher average pay. The indirect, or behavioural, effect arises when companies pay higher wages to *existing* staff, as well as new staff, to encourage them to stay rather than exercise their outside option. The threat of twisting can also boost pay.

This flow-based model suggests a slightly different specification of the Phillips curve. The flow of workers, as well as the stock of unemployed, may matter for pay growth. Sure enough, if we replace the unemployment gap with measures of voluntary job-to-job flows, this provides a (statistically and economically) significant explanation of wage growth (Table 1). As with under-employment, in a statistical horse-race between the two measures the unemployment gap does slightly more of the donkey work.

Flows between jobs also provide a useful framework through which to explain recent pay developments. Chart 14 plots voluntary job-to-job flows in the UK recently. The global financial crisis raised unemployment and job insecurity. With workers fearful of unemployment – and employers having less need to attract workers given the large pool of unemployed – voluntary job moves plummeted, falling from around 1% of the working population pre-crisis to a low of around 0.5% in 2009.

As the economy and jobs market has recovered, and job insecurity has fallen, more people have voluntarily moved jobs to secure a higher wage. Job-to-job flows today are back to their pre-crisis averages. In this tightening market, the pay growth of "twisters" has picked up markedly, from a little under 4% in the

aftermath of the crisis to over 7% now.[11] Through the direct (batting average) channel, this has in turn boosted aggregate pay growth.

More surprising, however, is how little impact strong employment has had on those *not* moving job. Wage growth for "stickers" has flat-lined at around 2%. Despite a tightening labour market, companies have so far not felt compelled to pay-up to any significant degree to retain workers. The indirect, or behavioural, channel for pay pressures has largely been missing during the recent jobs recovery.

This may be a sign that stickers' pay is behaving differently than in the past. Chart 15 plots two empirical Phillips curves – one for twisters, the other for stickers. The twisters' Phillips curve is behaving relatively similarly to the past, with pay broadly as expected given the tightness in the jobs market. But the Phillips curve for stickers looks to be somewhat flatter, and the rise in pay somewhat weaker, than might be expected given labour market tightness.

Why might companies have felt less need to pay-up to retain staff than in the past? Equivalently, why might the pay power of existing workers have fallen? One possible explanation is recent change in employment contracts. Although the *cyclical* degree of job insecurity has fallen as people have become less fearful of losing their job, there may have been a compensating rise in *structural* job insecurity as people have become more uncertain about their hours and income in a job.

There are various dimensions of employment contracts and different metrics of their impact on job security. One commonly-used measure is the share of the working population self-employed, doing agency work or on temporary or zero-hours contracts. The share of workers in each category has risen significantly recently. For some, these shifts in employment contract are welcome as they bring increased job flexibility.

For others, they may be less welcome. The dark side of job flexibility is increased income uncertainty and job insecurity. It is estimated that more than one in ten of those on part-time contracts would prefer full-time work and close to half of those on zero-hours contracts would prefer to be on fixed-hours contracts. At the same time as the quantity of work has risen, for a growing number of workers its quality may have fallen.

This pool of poorer-quality work appears to be fairly deep. For example, around a quarter of those in temporary work say they could not find a permanent job and over 10% of part-time workers say they could not find a full-time job.[12] A *Skills and Employment Survey* published just last week found around 1.7 million workers might be suffering from high levels of anxiety about their uncertain hours of work.[13]

One of the side-effects of structurally-higher job insecurity is a reduced willingness to add to that uncertainty by moving job. If so, this would mean "twisters" are fewer in number than in the past and that stickers are at

[11] Note that data for pay growth for "stickers" and "twisters" is annual, with latest estimates to 2017.
[12] Taylor (2017).
[13] Skills and Employment Survey (2018).

an even greater pay disadvantage to twisters as their outside option has lost value. In short, job insecurity reduces workers' pay power and weakens upward pressure on pay.

Empirical evidence is consistent with that. Even after controlling for different occupations and locations, self-employment has been found to result in a wage *discount* for workers of around 15%.[14] Temporary contract workers face a wage discount of around 5-6% and agency workers of around 2 ½%.[15] Zero-hours contract workers suffer a wage discount of around 7%.[16]

A second implication of structurally lower pay power is that there is greater scope for employers to differentiate between workers in their pay awards. If companies are less fearful of losing talent, they will no longer feel obliged to pay a "going-rate" across their firm to maintain staff numbers. The flat-lining of stickers pay, despite the pay recovery for twisters, is evidence of that differentiation.

Wage differentiation can also be seen in advertised salaries. Charts 16 and 17 plot the distribution of wage rates for two sets of advertised job vacancies – those containing the words "self-employed" and "flexible hours" and those without. These violin charts suggest that, for more flexible employment contracts, wage distributions are materially wider. Less secure work results in a greater degree of wage differentiation.

*(b) Unionisation and Collective Bargaining*

A second set of structural factors potentially affecting the pay power of workers is the degree of unionisation and collective bargaining in the labour market. Both have fallen secularly over time. Levels of unionisation have fallen from 50% in the late 1970s to around 22% today (Chart 18). The fraction of workers covered by collective bargaining arrangements has fallen from over 60% in 1998 to around 40% today (Chart 19).

These trends will have reduced the pressure on companies to increase wages for existing workers ("stickers"), even when new entrants ("twisters") are seeing pay rises. As with job insecurity, this will in turn have tended to lower workers' pay power and increased the degree of wage differentiation within the workplace.

Empirical research confirms those findings. Trade union membership has been found to result in a pay premium for workers. In the UK, this premium is typically found to lie in the range 10-15%, though it may have fallen over time.[17] There is also evidence that falls in rates of unionisation and collective bargaining have resulted in wages becoming more dispersed and differentiated across occupations and locations.[18]

[14] Bradley (2016).
[15] Gardiner (2016).
[16] Gardiner (2016).
[17] Bryson (2014).
[18] Gregg *et al* (2014).

We can quantify these effects in our wage equations. In Table 1, we include the unionisation rate and estimate over a longer sample period (1892 to 2015) to reflect the lower-frequency movements in unionisation. This suggests unionisation is positive for pay growth and (statistically and economically) significant. Over the sample, a 10 percentage point rise in the degree of unionisation raises wage growth by around 25 basis points per year.

Over recent decades, unionisation rates have fallen by 30 percentage points. Using the long-run estimates, that will have lowered wage growth by around 0.75 percentage points per year over the past 30 years, a significant effect. Consistent with it, the sharpest falls in unionisation came in the 1970s and 1980s, coinciding with falls in the UK labour share. Rolling regressions suggest the effects of unionisation on pay were largest during this period.

If we look at the sectoral level, similar effects are seen. Sectors of the UK economy with higher levels of unionisation have seen smaller falls in their labour shares (Chart 20). Over the past few decades, a sector like administration and support activities with under 10% unionisation rates has seen its labour share decline, while a sector like education with a unionisation rate close to 50% has seen its labour share rise.

*(c) Automation*

A third factor potentially affecting the pay power of workers is the degree of automation in the workplace. The easier and cheaper it is to replace human with machine, the lower is likely to be the wage bargaining power of workers relative to companies. Increased automation and the dawn of a Fourth Industrial Revolution could, then, result in slower pay growth and workers receiving a smaller slice of the income pie.[19]

Recent research has confirmed that intuition. The IMF has found a significantly negative effect of automation on labour's share.[20] Acemoglu and Restrepo (2018) look at the influence of multi-purpose industrial robots on pay growth across different sectors of the US economy. They find that one extra robot per thousand workers lowers wages by 0.25-0.5%.

At 71 robots per 10,000 employees, the UK's degree of robot automation lies well below France (127), Spain (150), the US (170) and Germany (301) (Chart 21).[21] This might help explain why the UK's labour share has fallen less markedly than in these other countries. Using the Acemoglu and Restrepo ready-reckoner, if the UK had the same degree of industrial robot penetration as the US spread over a decade, this would lower wage growth by around 0.4 percentage points per year.[22]

[19] For example, Acemoglu and Restrepo (2018).
[20] IMF (2017).
[21] These automation measures take no account of differences in industry structure across countries.
[22] We use 0.4 as the approximate mid-point of the Acemoglu and Restrepo range.

What is true across countries appears also to be true across sectors. Chart 22 plots a measure of automation across sectors against changes in the labour share. It suggests a downward-sloping relationship, consistent with increased automation depressing pay.

*(d) Monopsony*

A final factor influencing the pay power of workers is the degree of concentration in the corporate sector. There has been much recent discussion of the rise of so-called "superstar" firms, benefitting from global network economies of scale and scope.[23] The larger a company's share of the product (monopoly) or labour (monopsony) market, the greater its degree of power over customers or workers.[24]

Measures of industry concentration in the US (and in some other countries) have trended upwards, secularly and significantly, over several decades. This is consistent with superstar firms gaining a greater degree of monopolistic power over customers.[25] There is also evidence linking superstar firms to rising degrees of concentration in the labour market, consistent with a greater degree of monopsonistic power over workers.[26]

These shifts in industry concentration appear to have influenced pay growth. Rising concentration across different sectors of the US economy has been found to have had a significantly negative effect on their labour share.[27] Monopsony power among US industries has been found to have had a negative effect on wage growth in that sector, the more so when unionisation rates are low.[28] And larger firms have also been found to differentiate to a greater degree in the wages they pay their workers.[29]

Colleagues at the Bank, Will Abel, Silvana Tenreyro and Greg Thwaites, have recently found similar effects in the UK.[30] Higher industry concentration is associated with lower pay, the more so the less of a sector is covered by collective bargaining. One important difference from the US is, however, that labour market concentration has not increased anything like as much in the UK as in the US. This, too, might help explain the relative flatness of the UK's labour share.

[23] For example, Autor *et al* (2017a).
[24] Concentration in the labour market is only one means by which an employer might enjoy greater bargaining power over workers. As Krueger (2018) discusses, there are other types of "implicit contract" which might dilute workers' bargaining power. See also Manning (2003).
[25] Autor *et al* (2017b).
[26] Autor *et al* (2017b).
[27] Autor *et al* (2017b).
[28] Benmelech, Bergman and Kim (2018).
[29] Mueller, Ouimet and Simintzi (2017).
[30] Abel, Tenreyro and Thwaites (forthcoming).

**Implications for Monetary Policy**

Let me conclude with some reflections on current and prospective pay developments. A year ago, prospects for pay were cloudy. Average weekly earnings growth – excluding the volatile bonus component – was running at a 2% annual rate, in line with its growth over the preceding three years. Average pay settlements were running at just over 2%. Signs of a pay pick-up had, to that point, proved to be false dawns.

A year on, I think there is more compelling evidence of a new dawn breaking for pay growth, albeit with the light filtering through only slowly. Average weekly earnings growth (excluding bonuses) has risen to 2.9% – a clear rise and a little stronger than the MPC had expected at the time of its *Inflation Report* in August. Pay settlements have risen to 2.8% in a similar pattern (Chart 23). Measures of labour market tightness have increased to their highest levels since before the crisis and, in some cases, ever.

Looking beneath the headline figures, evidence of an up-tick in pay is clearer still. Private sector pay growth (again excluding bonuses) has been grinding through the gears; it recently hit the psychologically-important 3% barrier. Private sector wage settlements so far this year are running at 2.8% and in some sectors, such as construction and IT, are running well in excess of 3%.

The public sector has, for a number of years, been held to a 1% pay cap. This had the effect of suppressing whole-economy pay growth, both directly (given the public sector comprises around 18% of total employment) and potentially indirectly (due to the possible spill-over effects of public pay awards on the private sector). That public sector pay cap has now been lifted and decisively so.

Earlier this year, over 1 million NHS workers received a one-year pay settlement of at least 3%. Some workers have received double-digit pay rises. They have been joined recently by a further 1 million workers from the armed forces, police and teachers, who have secured pay rises of between 2-3.5%. The largest segment of public sector workers – including those in Local Authorities – have yet to settle. But with the cap breached, it seems possible their pay settlements could also ratchet upwards.

We can see that upward ratchet in pay in the distribution of pay settlements (Chart 24). According to the Bank's comprehensive wage settlements database, so far this year around 65% of deals have been struck at rates above their level the previous year. The largest contributor to this rightwards shift in the settlements distribution has been the public sector.

This evidence suggests the pulse of the Phillips curve has quickened as the labour market has tightened. Unlike over much of the past decade, estimated wage equations are now broadly tracking pay (Chart 5). A year ago, the Bank's forecasts of average weekly earnings growth into mid-2018 was 2.5%. Wage growth in the year to 2018 Q2 was 2.4%.

How are these pay developments affecting the monetary policy outlook? Inflation is currently above the Bank's 2% target. That is entirely due to the effects of past external price shocks, notably sterling's post-referendum depreciation. As these external effects fade, inflation is projected to be maintained at or slightly above its target by a slow build in domestic cost pressures, underpinned by a rise in wage growth.

The rise in wages projected by the Bank is, to coin a phrase, limited and gradual. Private sector pay is assumed to rise from 3% currently to around 3 ¾% three years hence, or around 25 basis points per year. That is below the pace at which wage growth has built over the past few years. Over the same period, unemployment is projected to fall further below its natural rate, though again at a slower pace than over recent years.

The path of domestic costs in the economy depends on developments in firms' productivity, as well as in pay. Weak productivity means even low nominal pay increases can be inflationary. With growth in money wages running at close to 3%, and with productivity growth running closer to zero, domestic cost growth in the UK is already running at, if not slightly above, rates consistent with the inflation target, even before any further (limited and gradual) build in wage pressures.

A limited and gradual build in domestic cost pressures is one important factor underpinning the limited and gradual pace of further interest rates rises expected by financial markets and communicated by the MPC. At present, financial markets expect rate rises of around 25 basis points per year over the next three years. That is not dissimilar to the projected build in wage growth over the period.

There are two-sided risks around this forecast, reflecting both cyclical and structural factors. On the cyclical side, there remains a significant degree of uncertainty around the amount of slack in the economy. It is possible the NAIRU could be below 4 ¼% or that under-employment is greater than assumed. Each ½ percentage point of extra slack lowers the projected level of wages at the policy horizon by around 1%.

While wage growth was undershooting, it made sense for the Bank to lower its estimates of the NAIRU. But with wage growth now tracking, and with wage forecasts no longer under-shooting, it is no longer clear risks to the NAIRU, and hence wages, are skewed to the downside. With wage growth picking up for the first time in a lost decade, the risks to domestic costs are now broadly-balanced, though still significant.

The risks to pay from structural factors are probably larger, though operate with a longer lag. Take unionisation. Its downward trend historically has suppressed pay growth. If this trajectory were to continue, the fraction of the workforce unionised would fall by a further 16% percentage points by 2030. According to our estimates, that could suppress wage growth by over ¼ percentage point each year.

The same is true of trends in automation. To date, UK levels of automation have lagged international competitors. Were the UK to catch up, this could have significant implications for wage growth. If the UK in

a decade was to reach levels of robot use in, say, Germany, then this could lower wage growth by around a percentage point each year. If the dawn of the Fourth Industrial Revolution resulted in robots and automation becoming much cheaper, easier and more ubiquitous, the impact on pay could be larger still.

Finally on company concentration, as with automation there has so far been only a modest rise in the degree of monopsony power among UK companies compared to the US. If the rise of superstar firms were to reach US proportions, however, the impact on pay could be larger, if not necessarily large. If the UK reached US levels of monopsony power over a decade, this could reduce pay growth by around 5 basis points per year.

**Conclusion**

Pay prospects are determined in part by employment, in part by productivity and in part by power. All three have been important in explaining the weakness of pay during its recent "lost decade". And each is likely to continue to be important for pay in the period ahead.

Monetary policy can support the first piece of the pay jigsaw – employment. It has done so significantly over recent years, perhaps to the tune of creating 1 ½ million new jobs. But it can do little over the medium term to support productivity or to reshape the structural forces influencing pay power, the second and third pieces of the pay jigsaw.

Doing so relies on policies which shift the supply side of the economy. Longer-term, it is through improved skills, productivity and structural reform and regeneration that pay power for workers can be restored. This underlines the importance of the Government's Industrial Strategy, whose objectives are to do just that.

In its White Paper on Industrial Strategy published last year, the Government proposed setting up an Industrial Strategy Council.[31] This independent body of experts was designed to monitor, and report publically, on progress towards meeting the objectives of the industrial strategy.

Earlier this week, I was delighted to be appointed, in a personal capacity, to Chair the Industrial Strategy Council. I believe it can play an important role in supporting the Government's industrial strategy, which seeks to increase living standards across the UK, help industry to thrive and boost workers' pay power.

[31] Department for Business, Energy & Industrial Strategy (2017).

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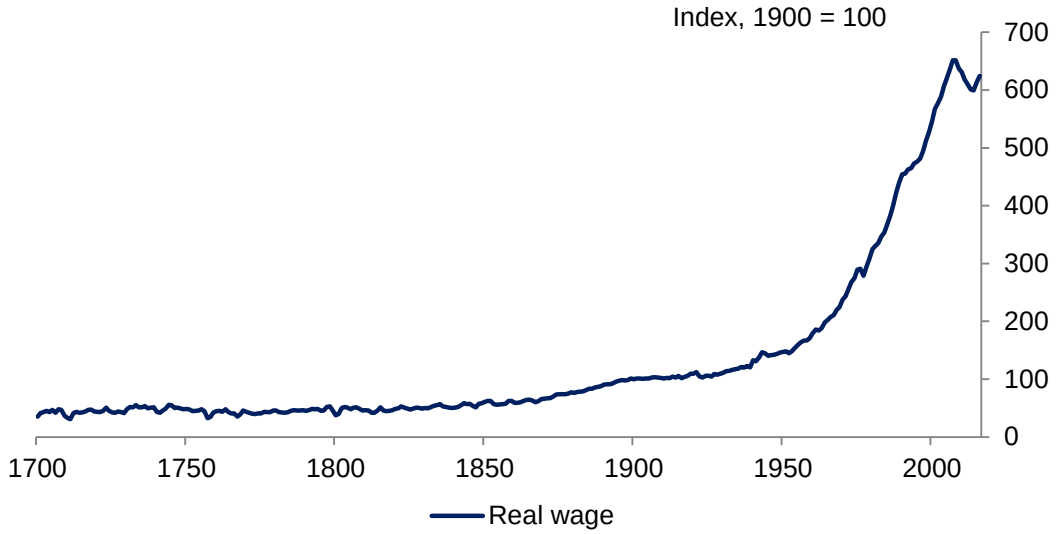
**Annex**

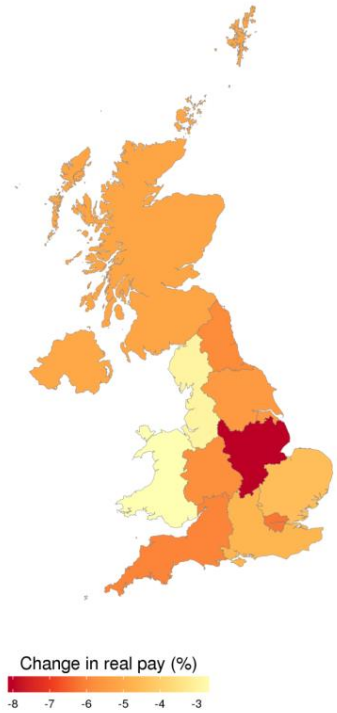
**Chart 1: Long-run real pay**




Source: Bank of England "A Millennium of Macroeconomic Data for the UK"

Notes: Data shows an estimate for real consumption earnings for Great Britain.

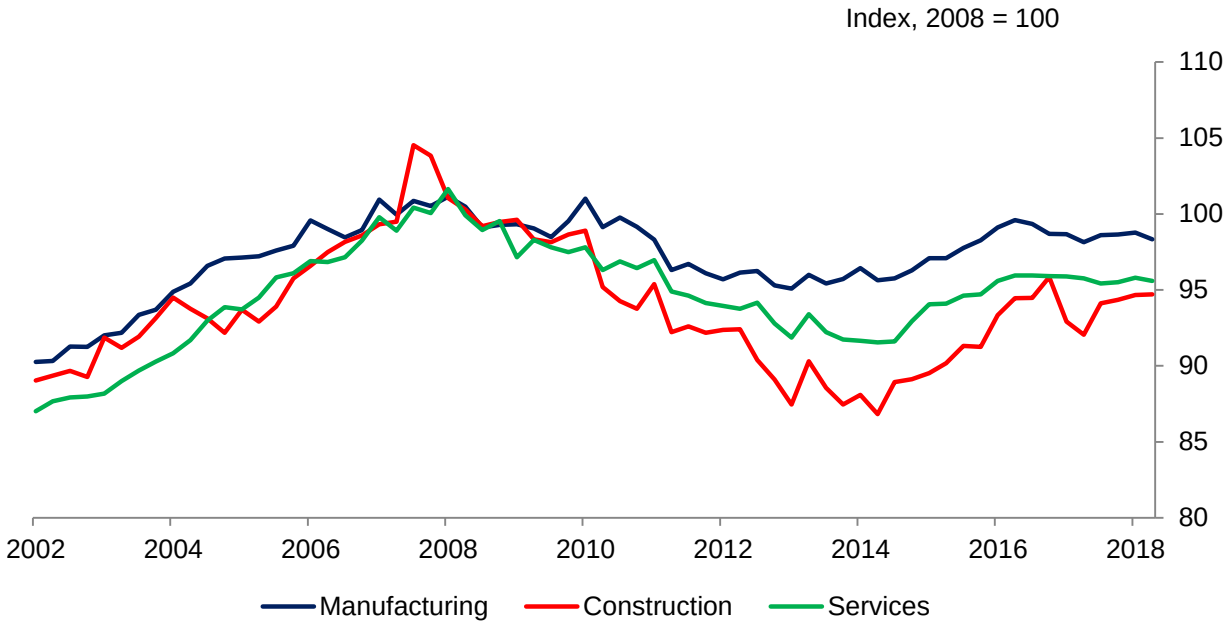
**Figure 1: Change in real pay by region in the UK since 2008**




Sources: ONS and Bank calculations.

Notes: Nominal regional pay divided by CPI with a four-quarter moving average.

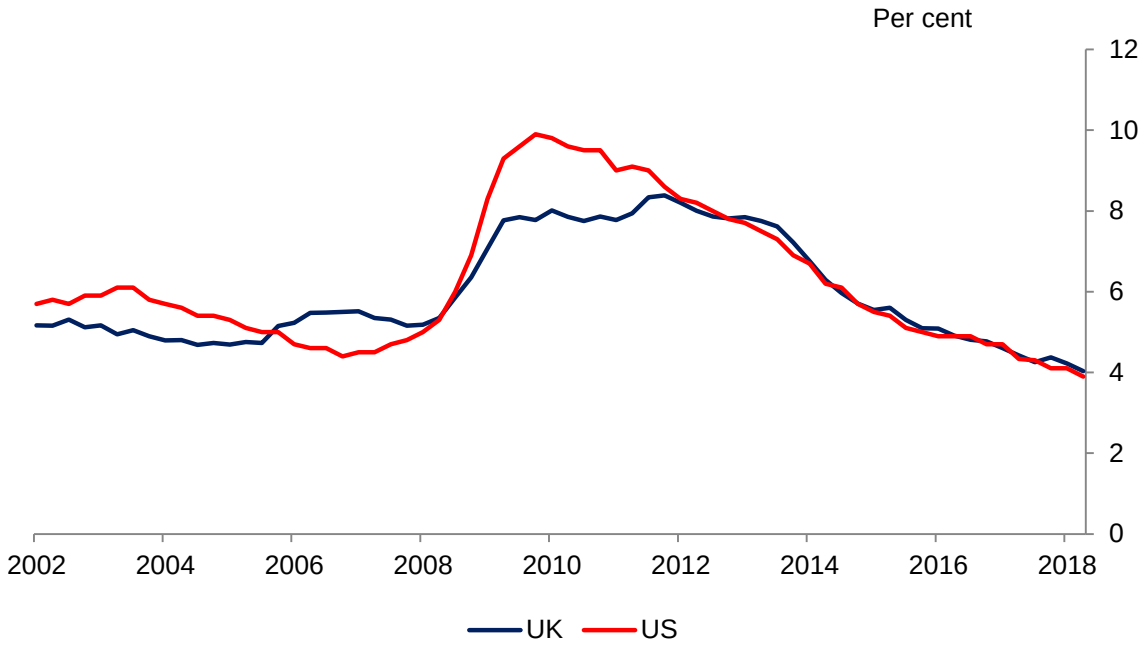
**Chart 2: Index of real average weekly earnings for major economic sectors**




Sources: ONS and Bank calculations

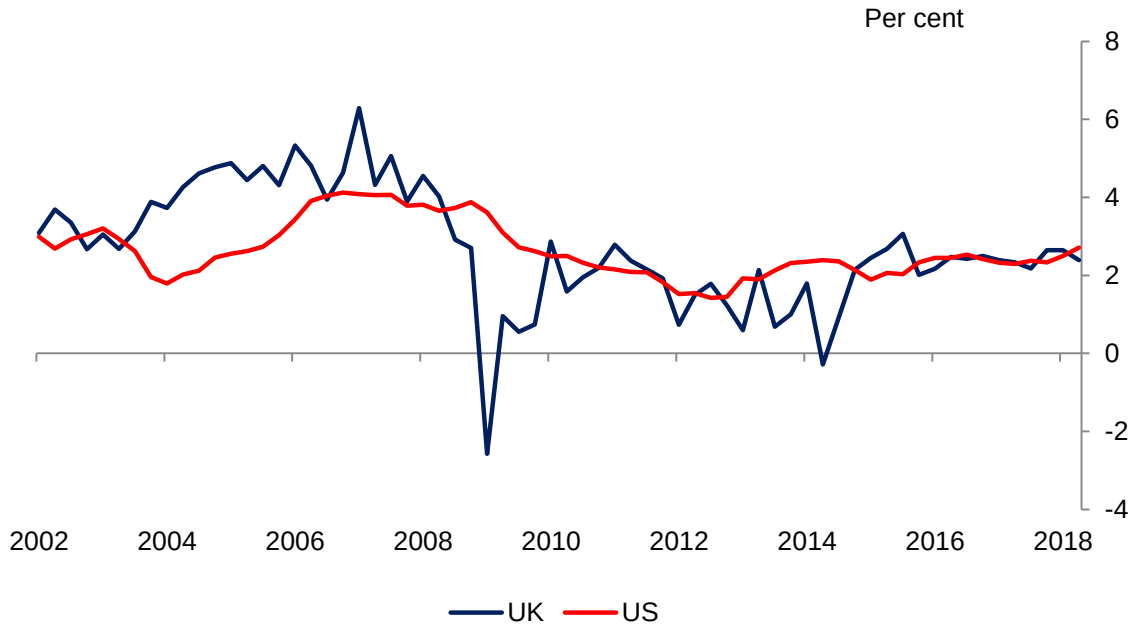
Notes: Charts show nominal earnings in each sector divided by CPI.

**Chart 3: UK and US unemployment rates**




Source: ONS, US Bureau of Labour Statistics and Bank calculations.

**Chart 4: UK and US wage growth**




Source: ONS, US Bureau of Labour Statistics and Bank calculations.

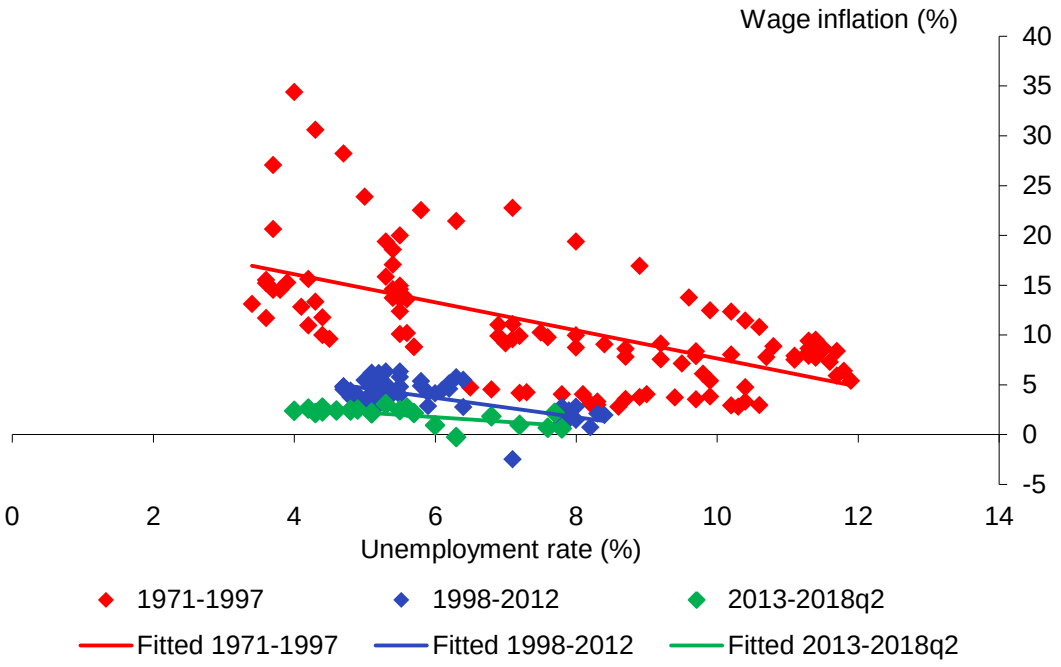
Notes: UK series shows the four-quarter growth rate of whole economy total average weekly earnings; US series shows the four-quarter growth rate of total private hourly earnings of production and non-supervisory employees.

**Chart 5: *Inflation Report* forecasts of wage growth from 2012**


Source: ONS, Bank of England and Bank calculations

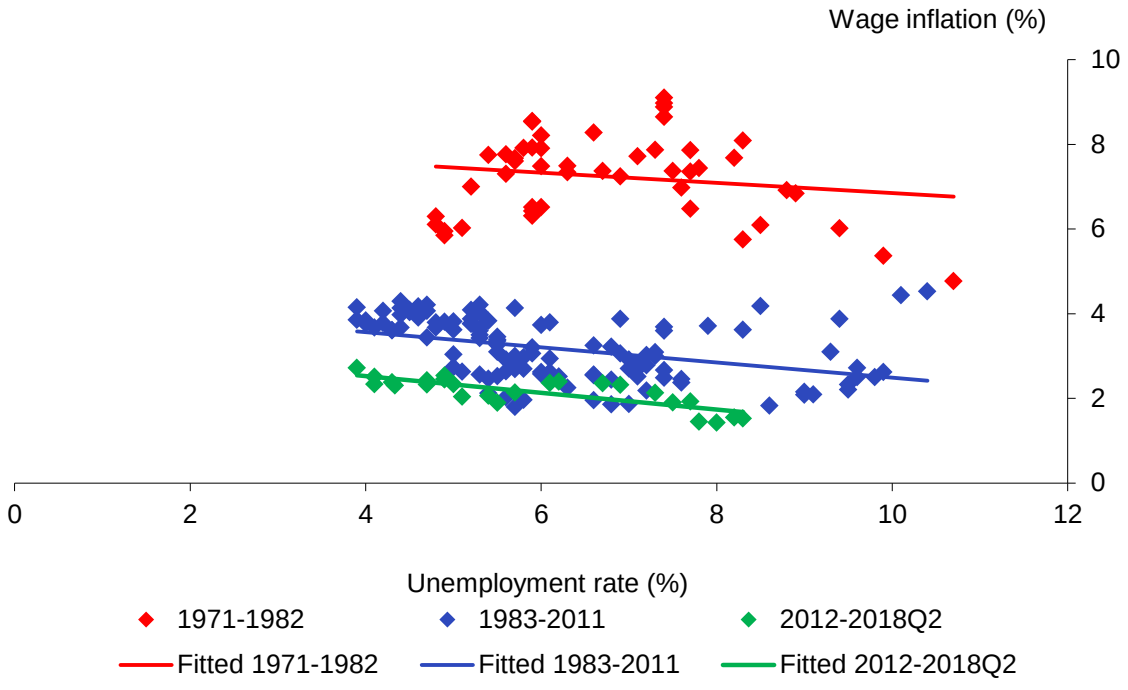
Note: Chart shows realised four-quarter whole economy wage growth and vintages of May *Inflation Report* forecasts from 2012 to 2017.

**Chart 6: UK Phillips curve**




Sources: ONS and Bank calculations

**Chart 7: US Phillips curve**



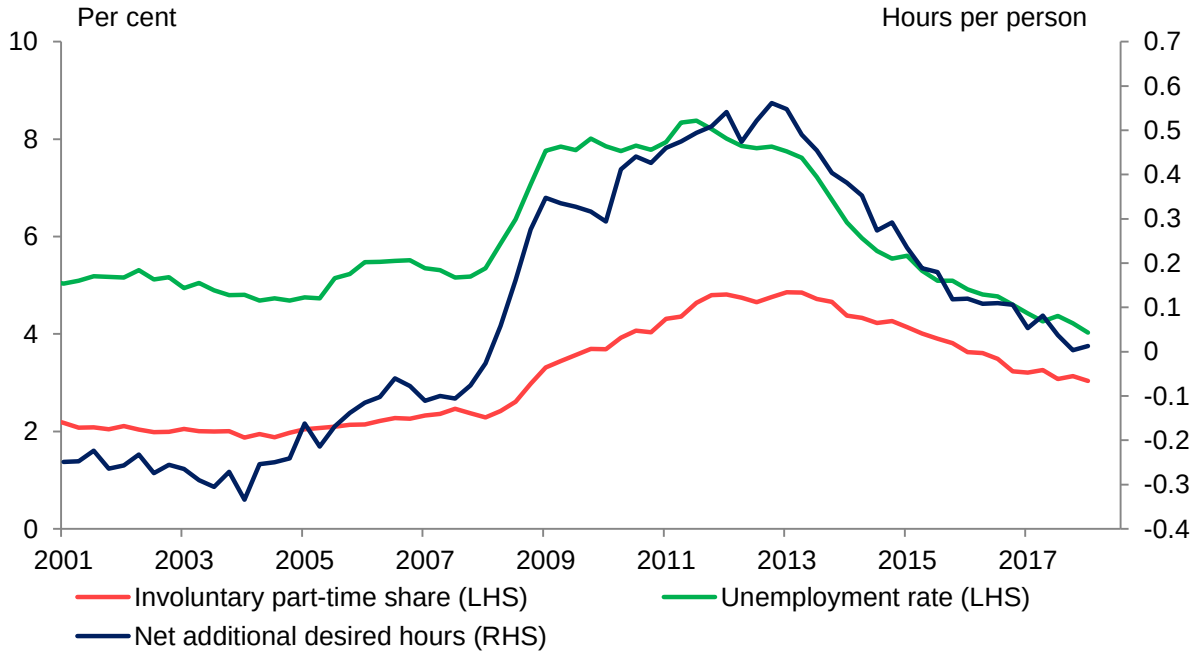

Sources: FRED and Bank calculations.

Notes: The measure of wages used is four-quarter growth rate of total private average hourly earnings of production and non-supervisory employees.

**Chart 8: Financial markets' inflation expectations (5 year – 5 year breakevens)**


Sources: Bloomberg and Bank calculations

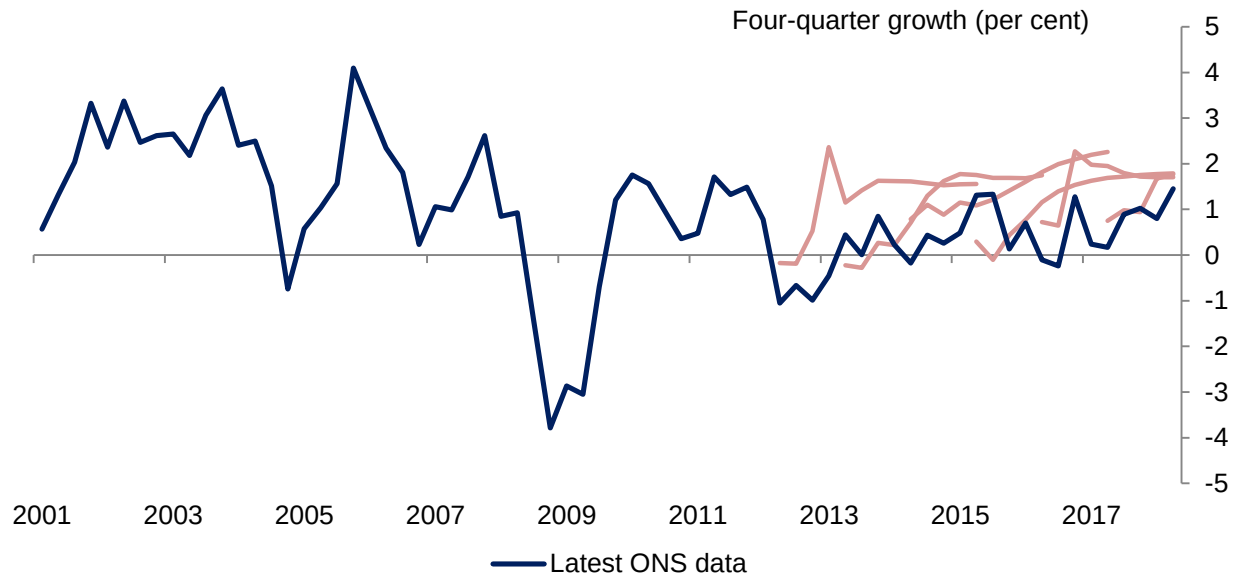
**Chart 9: Involuntary part-time share of employment and average net desired hours, alongside unemployment**




Sources: ONS and Bank calculations.

Notes: Involuntary part-time workers are those that would like a full-time job but haven't been able to find one. Average net desired hours is the average number of additional hours that employed individuals would like to work at their current hourly rate.

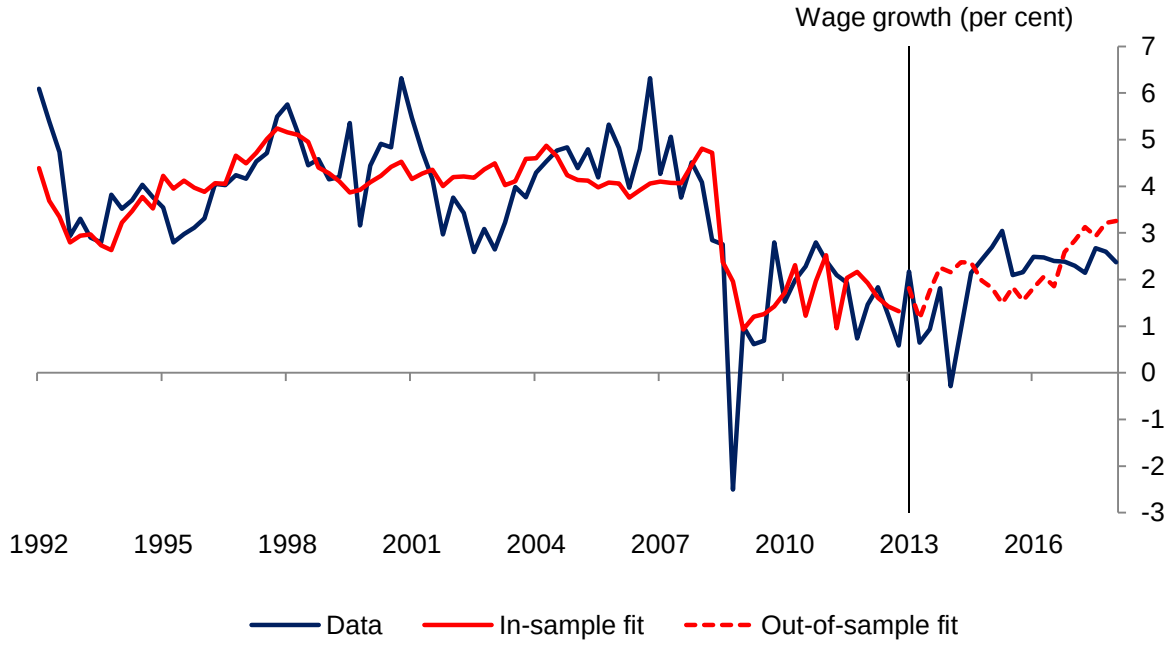
**Chart 10: *Inflation Report* forecasts of productivity growth from 2012**




Source: ONS, Bank of England and Bank calculations

Note: Chart shows latest estimate for four-quarter output per hour growth and vintages of May *Inflation Report* forecasts from 2012 to 2017.

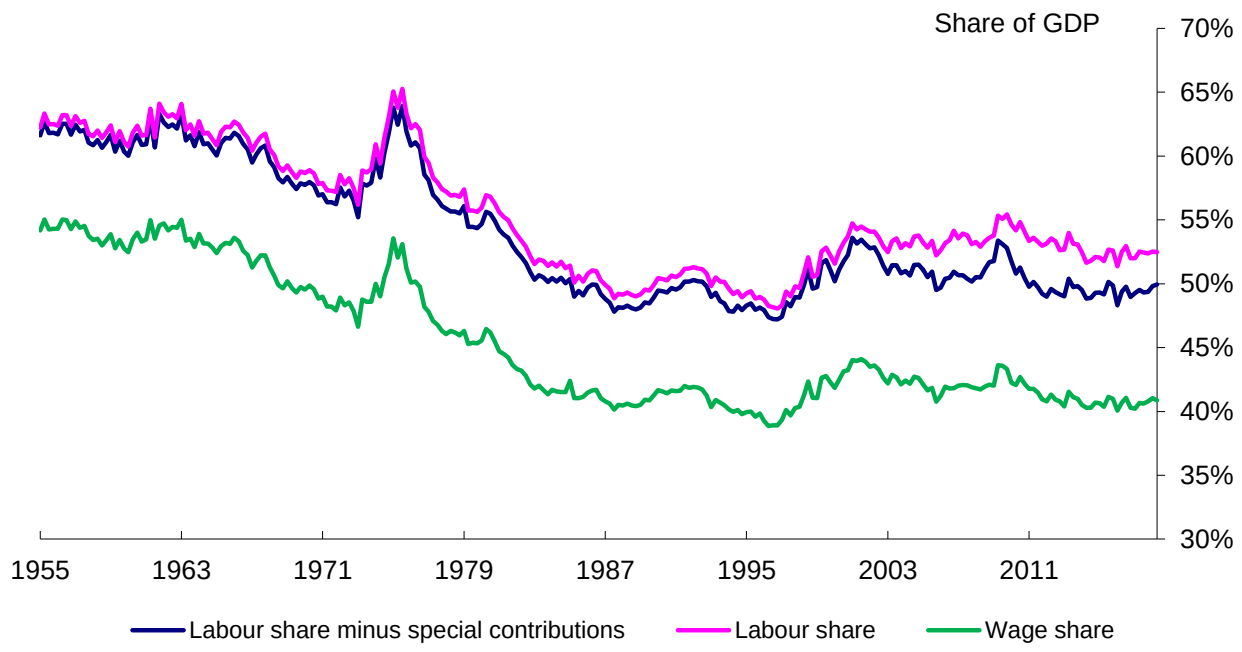
**Chart 11: Out-of-sample wage equation fit for the past 5 years**




Sources: ONS, Barclays and Bank calculations.

Notes: Wage equation is specification (1) in Table 1. Sample period used for estimation is 1992Q2-2013Q1.

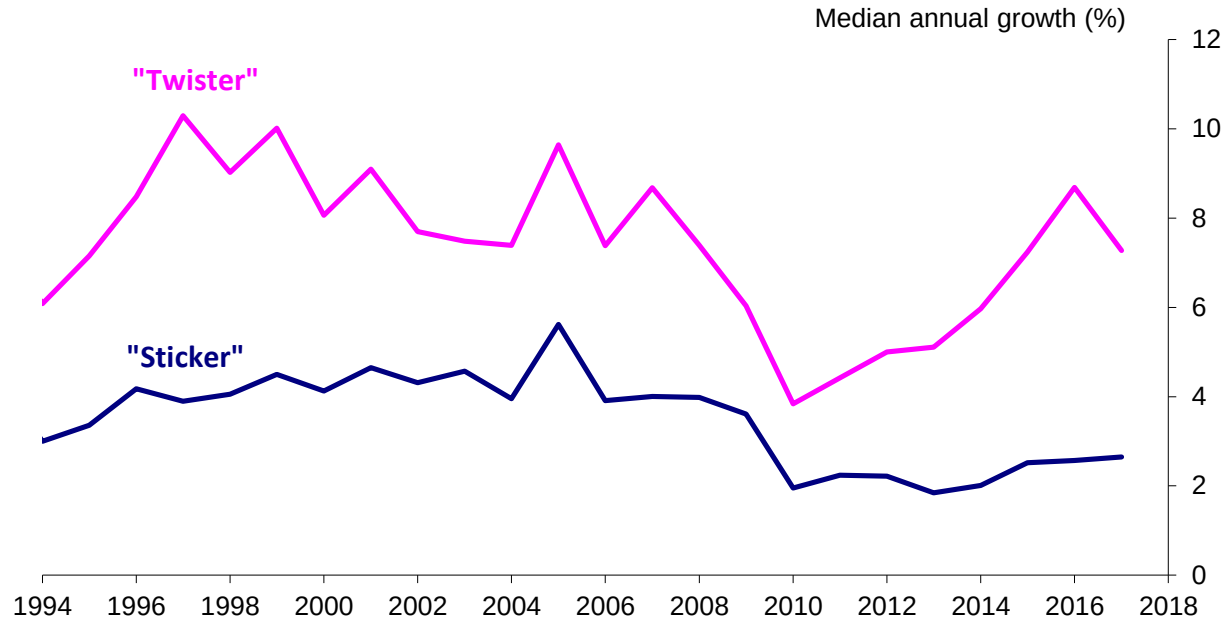
**Chart 12: UK labour share since 1955**




Source: ONS and Bank calculations.

Notes: Labour share is wages and salaries plus employers' social contributions plus a fraction of mixed income as a share of GDP. Wage share is wages and salaries as a share of GDP. Special contributions capture one-off payments by firms which we have assumed represent one-off back payments to fill pension deficits.

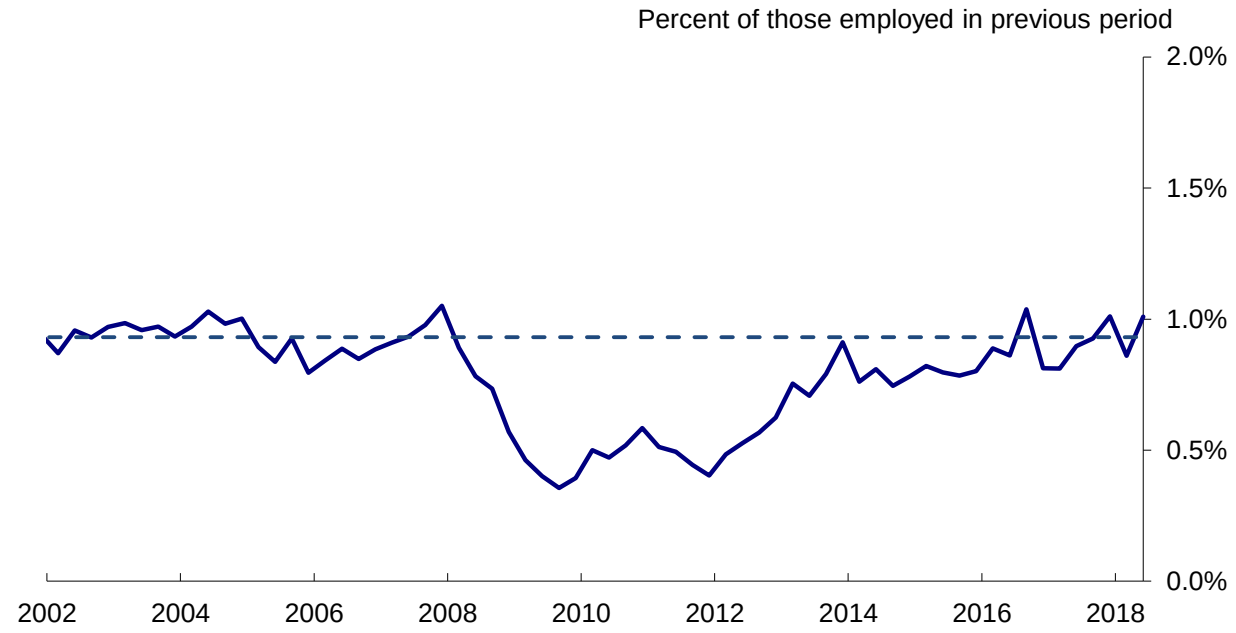
**Chart 13: Typical wage growth of 'stickers' and 'twisters'**




Sources: ONS and Bank calculations,

Note: "Twister" line shown includes job moves within firms, but results are near identical if only job moves between firms were shown.

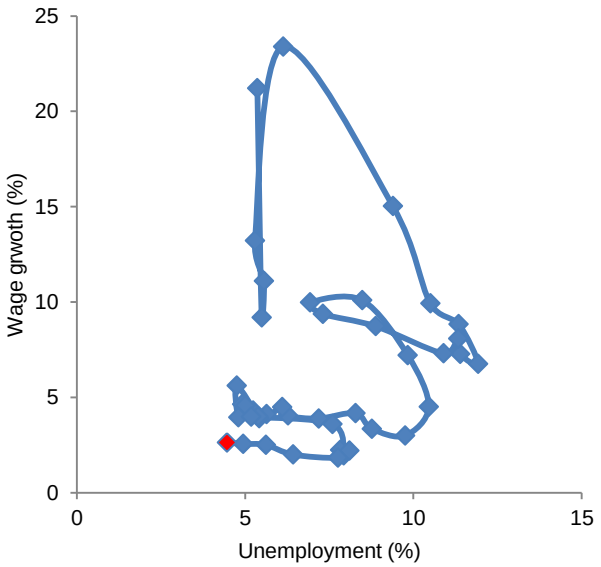
**Chart 14: Voluntary job-to-job flow rate**



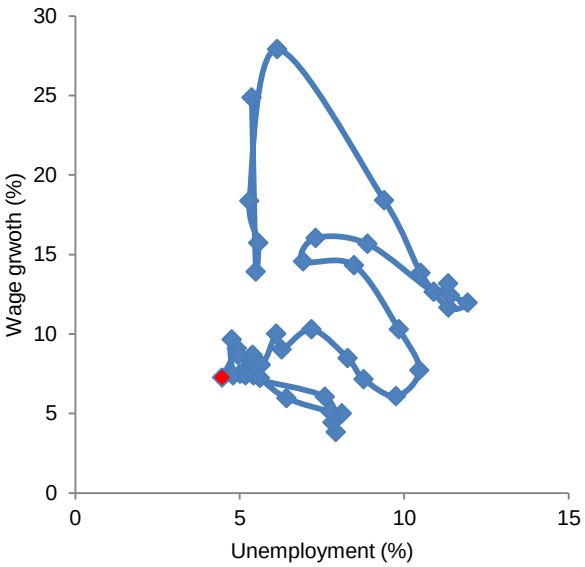

Source: ONS and Bank calculations.
Notes: Dashed line shows average over time period in chart.

**Chart 15: Two empirical Philips curves – "stickers" and "twisters"**

**"Sticker"**



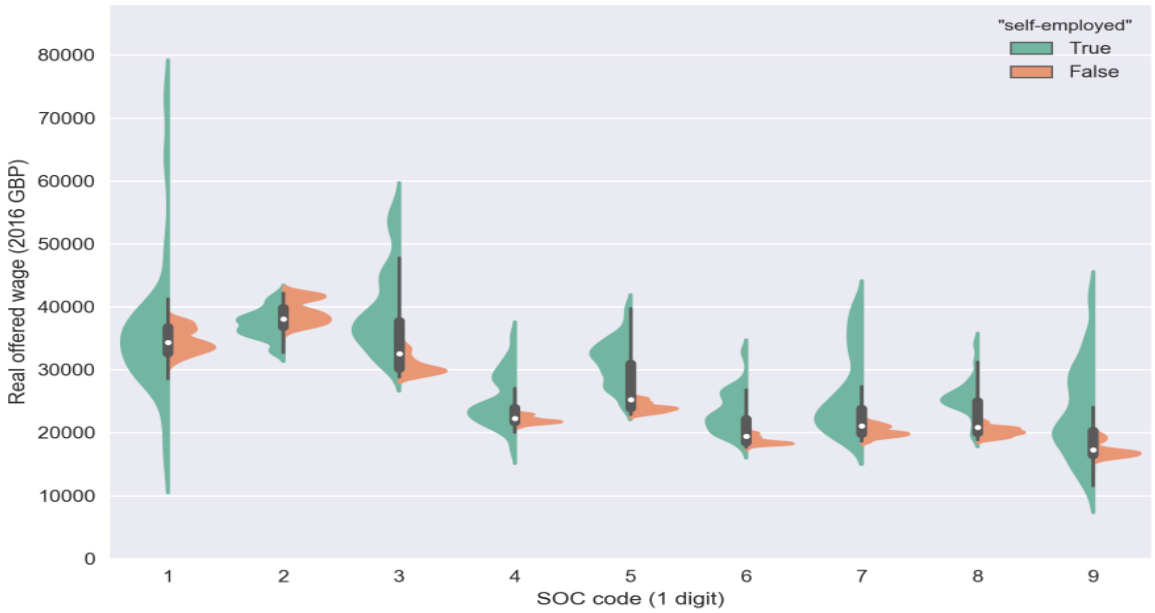

**"Twister"**




Sources: ONS and Bank calculations.

Notes: Red diamond shows latest observation (for 2017).

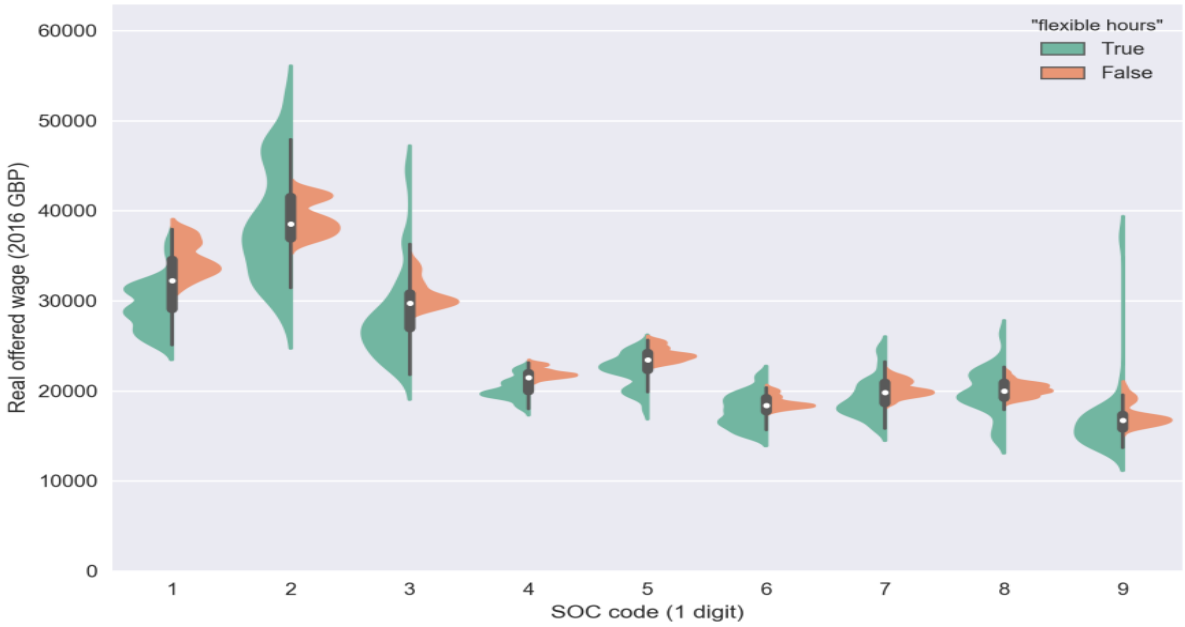
**Chart 16: Distribution of offered wage by occupation, with and without the term 'self-employment'**




Sources: Reed and Bank of England calculations.

Notes: 'SOC code' refers to standard occupational classification code. The area labelled 'True' shows the distribution of offered wages for job adverts which include the term 'self-employment', and the area labelled 'False' shows the distribution for adverts which do not. The data are drawn from a cross-section of online job vacancies. Distributions are constructed using data covering the period 2008-2016.

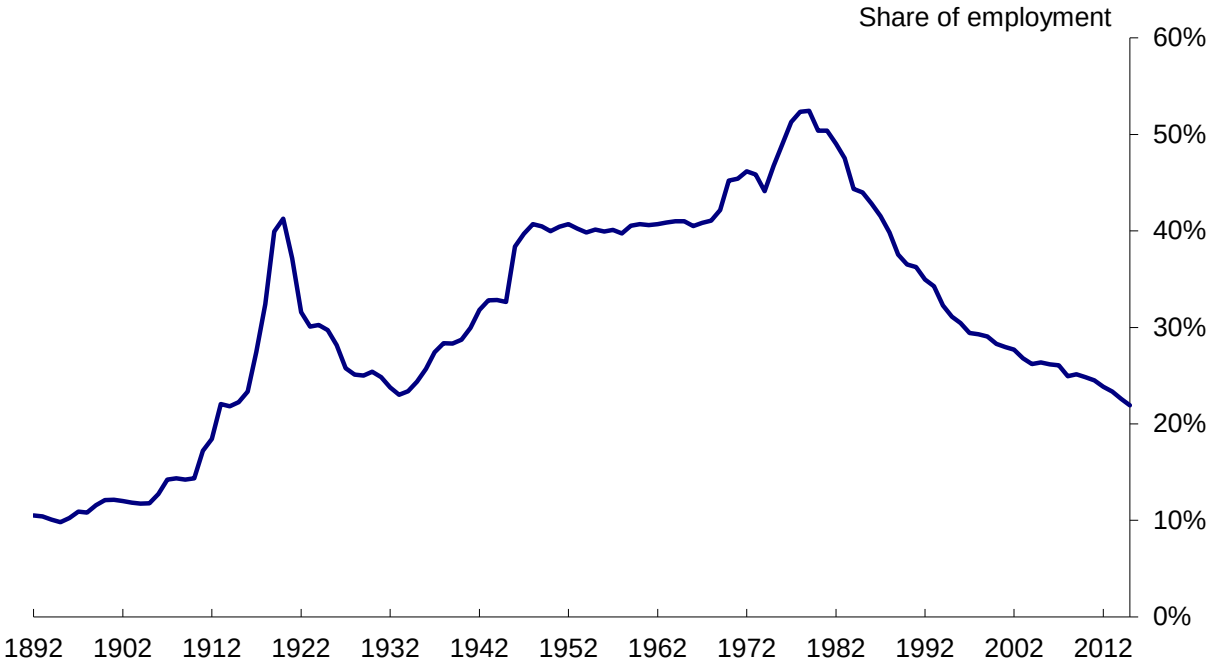
**Chart 17: Distribution of offered wage by occupation, with and without the term 'flexible hours'**




Sources: Reed and Bank of England calculations.

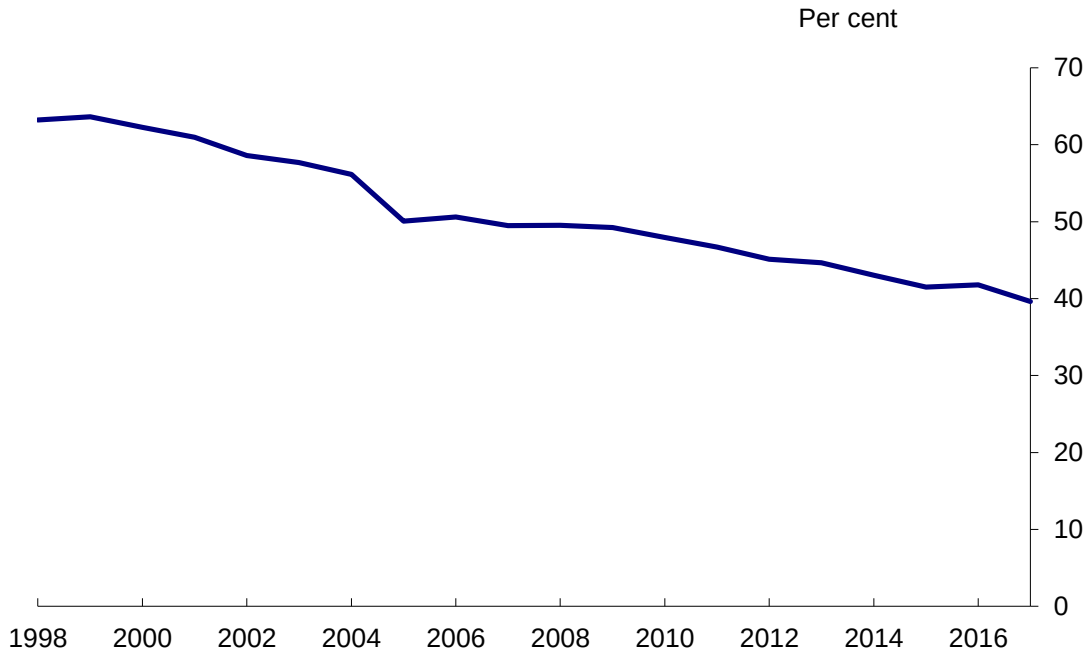
Notes: 'SOC code' refers to standard occupational classification code. The area labelled 'True' shows distribution of offered wages for job adverts which include the term 'flexible hours', and the area labelled 'False' shows the distribution for adverts which do not. The data are drawn from a cross-section of online job vacancies. Distributions are constructed using data covering the period 2008-2016.

**Chart 18: Union membership**



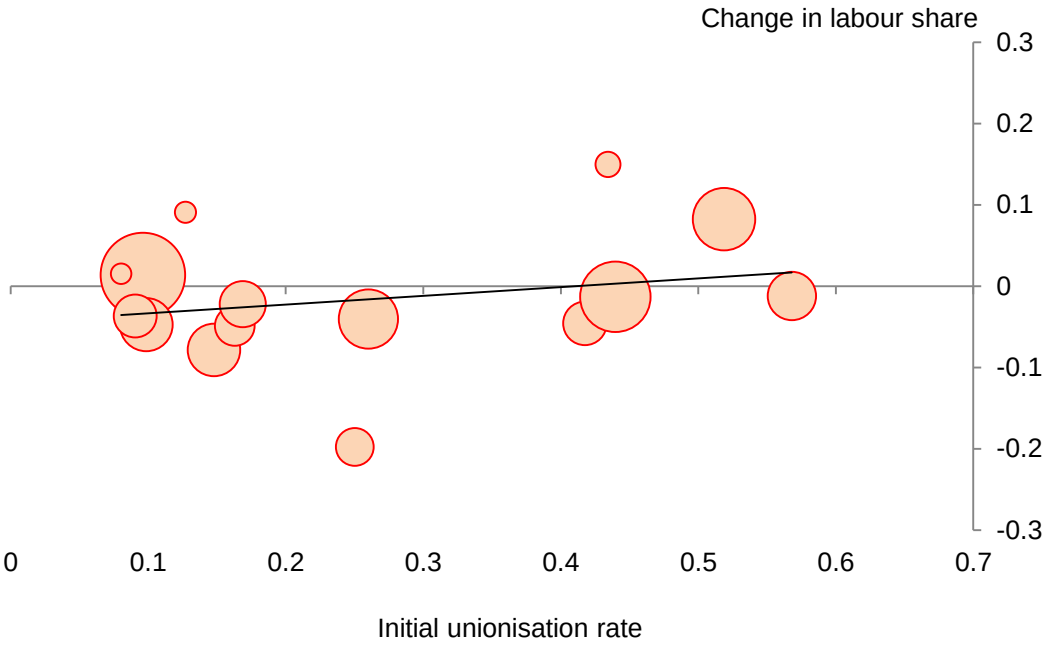

Sources: Department for Business, Energy & Industrial Strategy, Bank of England and Bank calculations.

**Chart 19: Collective bargaining**




Source: ONS and Bank calculations.
Notes: Share of employees with Collective Bargaining Agreement coverage.

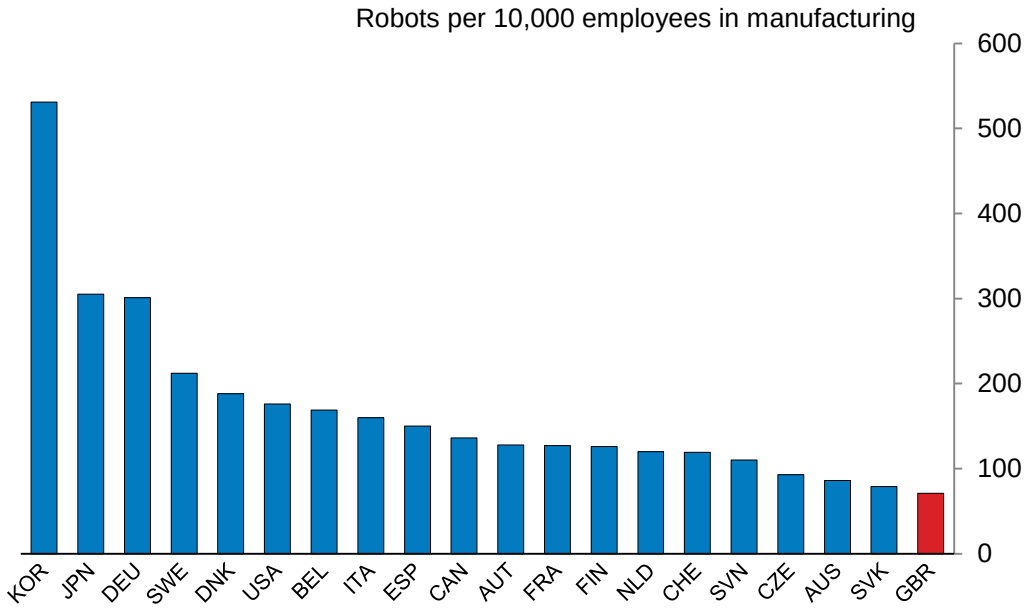
**Chart 20: Union membership vs. change in labour share by industry**




Source: ONS and Bank calculations

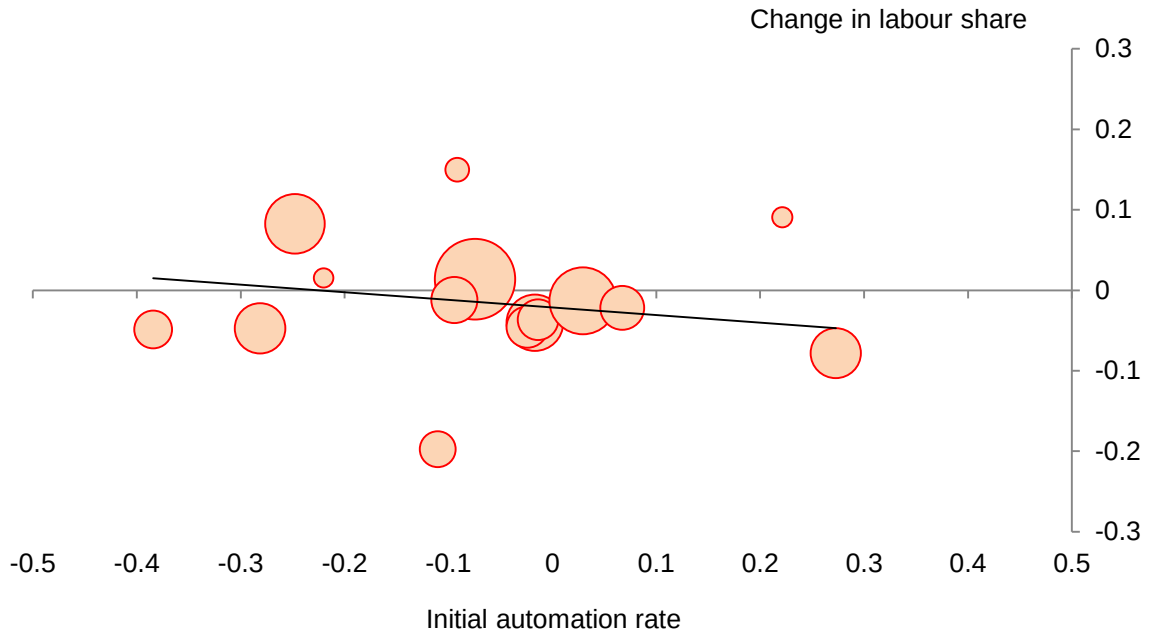
Note: Data shown at SIC1-digit level. X-axis shows unionisation rate in 2001, and y-axis shows change in labour share between 2001 and 2016. Size of bubbles represents size of industry. Trend line weighted by size of industry.

**Chart 21: Robot use by country in manufacturing**



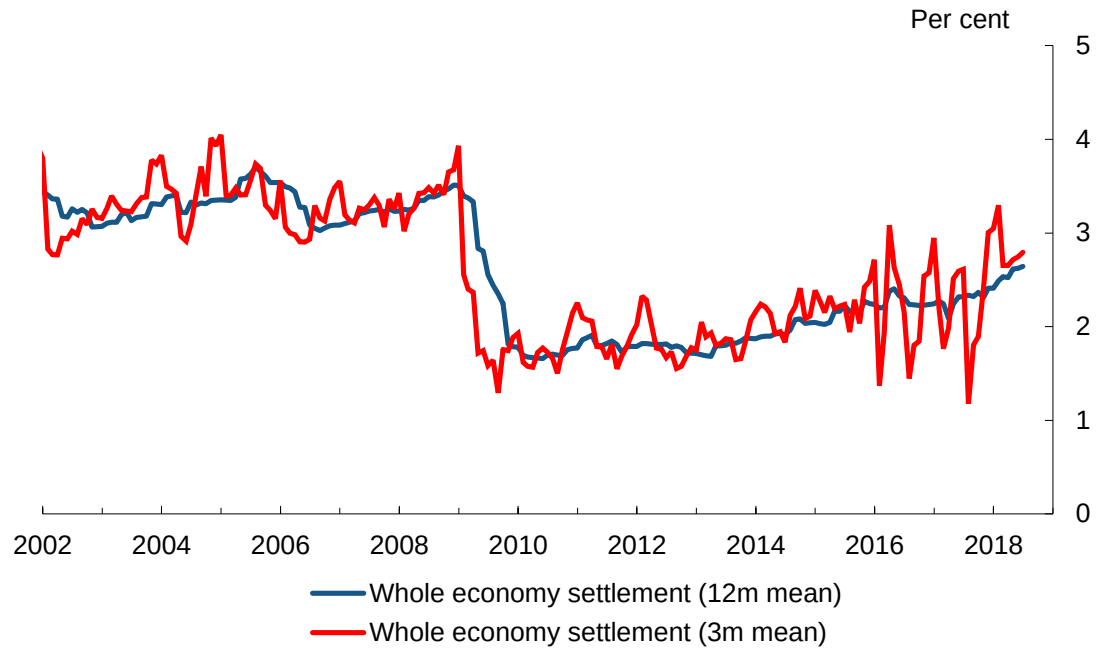

Source: International Federation of Robotics.

**Chart 22: Automation exposure vs. change in labour share by industry**



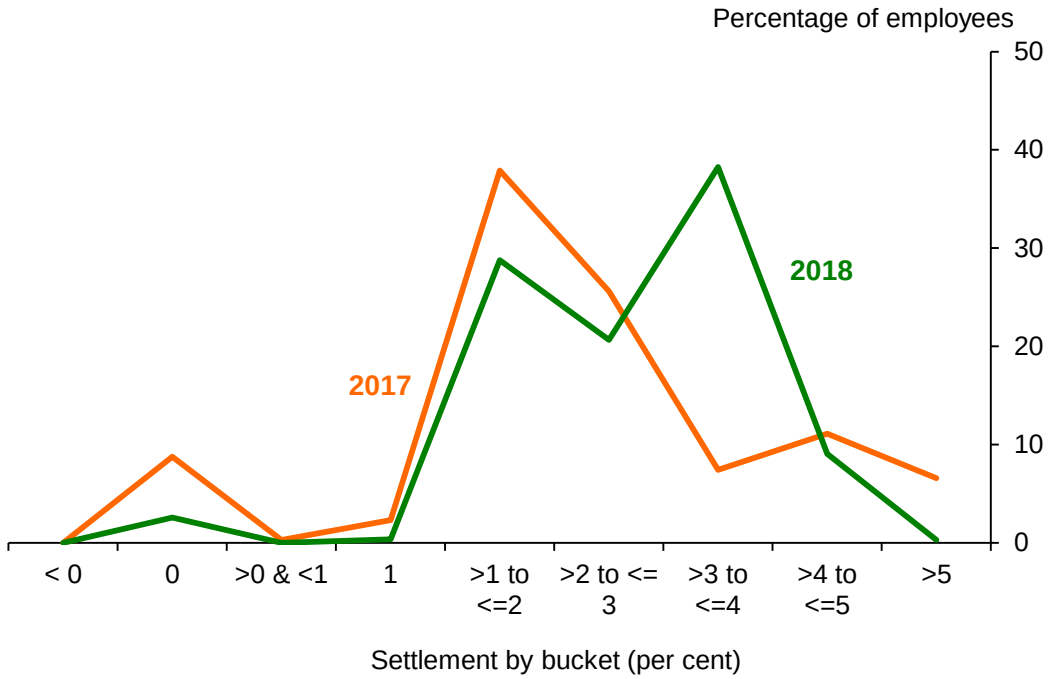

Source: ONS, Frey and Osborne (2013) and Bank calculations.
Note: Data shown at SIC1-digit level. X-axis shows an estimate for the automation rate in 2001 based on Frey and Osborne estimates for the future probability of automation by occupation. Y-axis shows change in labour share between 2001 and 2016. Size of bubbles represents size of industry. Trend line weighted by size of industry.

**Chart 23: Settlements data (whole economy)**




Source: Bank of England, Incomes Data Research, XpertHR, Incomes Data Service, Labour Research Department and Bank calculations.
Note: "3m mean" refers to annualised three month-on-three month settlement rate, and "12m mean" refers to settlement compared to same period a year earlier.

**Chart 24: Distribution of pay packets**




Sources: Bank of England, Incomes Data Research, XpertHR, Incomes Data Service, Labour Research Department and Bank calculations.

**Table 1: Wage growth models**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Variables | AWE | AWE | AWE | AWE | AWE | AWE |
| Inflation expectations (lagged one quarter) | 0.718** | 0.361 | 0.680** | 0.323* | 0.464** | |
| | (0.270) | (0.237) | (0.255) | (0.143) | (0.161) | |
| Inflation | | | | | | 0.417** |
| | | | | | | (0.023) |
| Unemployment gap | -0.847** | | -0.709* | | -0.857** | -0.038 |
| | (0.198) | | (0.289) | | (0.313) | (0.055) |
| Involuntary part-time employment share | | -0.602* | -0.237 | | | |
| | | (0.297) | (0.364) | | | |
| Trend productivity growth | 0.834** | 0.763* | 0.708* | 0.888** | 0.735** | |
| | (0.166) | (0.340) | (0.275) | (0.199) | (0.160) | |
| Voluntary job-to-job transition rate | | | | 2.646** | 0.896 | |
| | | | | (0.739) | (0.843) | |
| Unionisation rate | | | | | | 0.027** |
| | | | | | | (0.010) |
| Constant | 0.299 | 2.876* | 1.239 | -1.249 | 0.432 | -0.125 |
| | (0.794) | (1.347) | (1.459) | (0.676) | (0.800) | (0.288) |
| Observations | 105 | 105 | 105 | 94 | 94 | 122 |
| Adjusted R-squared | 0.603 | 0.566 | 0.604 | 0.617 | 0.644 | 0.856 |

Newey-West robust standard errors in parentheses

** p<0.01, * p<0.05

Sources: ONS, Barclays and Bank calculations.

Notes:
Estimation period is 1992Q2-2018Q2 for specifications 1, 2 & 3. For specifications 4 & 5 the sample begins in 1995Q1 due to data limitations. The dependent variable for these models is the four-quarter growth rate of whole economy total average weekly earnings. As such, the residuals from these regressions will be serially correlated, and so we report Newey-West standard errors. Specification 6 is run on annual data back to 1892; the dependent variable is annual nominal wage growth. Trend productivity growth is calculated as a five-year trailing average.