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Speech

Spare capacity and inflation

Speech given by

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Thank you very much for inviting me here to talk to you today. It is a great pleasure to visit Northern Ireland and to get to know its people and countryside as well as its businesses.

I would like to address today the question fundamental to the work of the Monetary Policy Committee: what factors influence the outlook for inflation and what can we learn from studying them?

Finding a coherent answer to this question is more challenging than it has been for some time. I am confronted by contradictory evidence on the health of the economy. On one hand, unemployment has fallen much more quickly than expected since last August, and GDP growth has been much stronger than the anaemic progress we have had to bear since the financial crisis. Both of these are, of course, welcome developments. On the other hand, growth in nominal wages has been unusually weak over the past few quarters, and is not yet consistently on a par with price inflation. How far can the labour market tighten before inflationary pressures start building up?

My colleagues and I need to make a judgement each month about the evidence and vote accordingly. I would therefore like to use my time here to set out to you what I think is the most helpful evidence on the factors which influence inflation over the medium term. That way, I hope that you will have a clearer idea of how I weigh the current evidence on the economy, and where, over the next few months, I think we should look for inflationary pressure.

Some inflationary pressures come from forces beyond the influence of the MPC. An increase in the price of oil, for example, affects the rate of inflation in the short term, but changes to Bank Rate can do nothing to stop this. I am not going to discuss that sort of influence here, except to note that the normal reaction of the MPC would be not to respond to them. A recent example is our decision to look through the direct influence of the recent rise in the exchange rate in holding down inflation.

I will focus on two sources of inflationary pressure that the MPC can try to affect. The first lies within firms, where I will consider what motivates them to adjust their prices. I can do this thanks to the wealth of data that you provide via business surveys each quarter. The second is the labour market, where I will examine the influences on pay growth.

Spare Capacity in Firms and Inflation

My starting point in understanding firms' behaviour is a standard textbook model. This assumes that firms may be unable to change prices as often as they wish, maybe because they have fixed contracts to supply goods at an agreed price. Or perhaps they can change prices but face a cost in doing so – for example, upsetting their customers. In such circumstances, firms respond by setting prices today with an eye on what they might plan for the future. Underpinning these plans is the outlook for firms' costs of production, which

are driven by both the nature of production – such as how much labour and capital input is needed – and the cost of employing workers or running machinery.

Although the outlook for costs plays a crucial role in understanding future price setting, there tend to be few reliable data measuring how much it would cost a firm to produce one extra unit of output. So as a proxy for costs we often use data on capacity utilisation, which measures how intensively firms are using their physical capacity and labour resources. The reasoning is that firms tend to produce with diminishing returns to scale, so costs are high when producing above normal capacity and low when below capacity.

Fortunately I can explore this by drawing on a rich source of firm-by-firm survey data on prices and capacity utilisation, to which many of you have probably contributed. This is the Confederation of British Industry's *Industrial Trends Survey* which it has kindly provided to the Bank of England on a completely anonymous basis. No one at the Bank knows who participates in the survey. Three questions are of interest: how much firms have changed their prices in the past twelve months; how much they expect to change them over the next twelve months; and their current rate of capacity utilisation. I have data for all three questions since 2008.

I should stress how valuable both these data, and the official returns that you make to the
Office for National Statistics, are for us at the Bank. I am aware that providing data can be something of a burden, but good policy-making without good data is not possible.

The data enable me to explore how well the textbook model's story corresponds to what businesses actually do. The first two columns of Table 1 relate firms' current price changes to capacity utilisation. I show not only my estimates of the impact of each variable but also a plausible range[1] for it, taking account of the uncertainties which always arise in the analysis of data of this type.   What jumps out is that expected future price changes strongly influence current behaviour; in contrast, the current level of capacity utilisation has an impact which seems more likely to be negative than positive, contradicting my expectation that heavy use of capacity will push up prices. This doesn't necessarily disprove the textbooks – but it does suggest that firms' reported levels of capacity utilisation are poor markers of their costs of production.

Wage costs, however, do seem to be important in determining current price changes. I combine the CBI firm-level survey data with data from the Office for National Statistics on unit wage costs in manufacturing as a whole, in the final two columns of Table 1. These point to a coherent relationship between current price changes and wage costs. The effects of prices and costs are approximately equal but pull in opposite directions, with the implication that in the long run cost increases are more or less fully passed on; and expected future price changes remain significant.

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[1] A 95% confidence interval.

As the ranges for the different effects show, nothing is very precise. That, unfortunately, is the nature of almost all attempts at economic modelling. Nevertheless, the effects are more precise and more plausible for firms with 150 employees or fewer rather than large firms. It is not clear whether this is the case because there are fewer observations of large firms or whether it reflects some inherent difference between small firms and large firms.
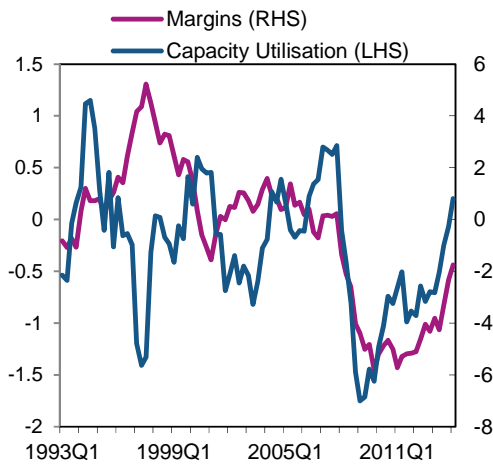
Table 1: Influences on Price setting computed from CBI *Industrial Trends Survey* data, 2008 Q3- to 2013 Q3

Employees	Impact of Capacity Utilisation on firm-level price inflation		Impact of Unit Wage Costs on firm-level price inflation	
	<150	150+	<150	150+
Expected Price Change	0.782 (0.34 to 1.23)	0.93 (0.55 to 1.31)	0.983 (0.68 to 1.28)	1.346 (0.96 to 1.73)
Capacity Utilisation	-0.002 (-0.004 to 0)	0 (-0.002 to 0.002)		
Price level (log)			-0.09 (-0.12 to -0.06)	-0.067 (-0.13 to -0.01)
Unit Wage Costs (log)			0.074 (0.001 to 0.15)	0.079 (-0.04 to 0.20)
Observations	664	163	664	163

Sources: author's calculations based on firm-level survey data from the CBI, and ONS data for the manufacturing sector (for unit wage costs). Plausible ranges (95% confidence intervals) for the effects are shown in brackets. Further details on the empirical method are available on request.

These findings are not particularly novel. Mavroeidis, Plagborg-Møller and Stock (2014) point out that estimates of the impact of capacity are often weak and poorly defined. Nevertheless, as far as I am aware, this is the first time this framework has been used to explore price-setting by individual firms. Further work to understand why this survey measure of capacity utilisation appears to be a poor proxy for costs would be welcome. So far, however, the results suggest that I should not put too much faith in the standard story that inflationary pressures arise mainly from capacity utilisation in firms.

Chart 1: Margins and capacity utilisation

Note: both lines show per cent deviations from long-term averages.

Macro-economic Evidence on Spare Capacity

Since manufacturing now comprises only just over an eighth of the business sector (and a tenth of the economy as a whole), it would be a mistake, nevertheless to draw too many conclusions.[2] So I now examine capacity in firms from a different perspective, namely its influence on profit margins, or the wedge between firms' costs and the prices they charge. My focus here is on margins for consumer goods and services across the economy, echoing the MPC's target for consumer price inflation.

Chart 1 shows one measure of margins together with capacity utilisation, the aggregate of the variable used in my earlier analysis. A quick glance at this graph does not suggest a strong relationship between margins and capacity utilisation except perhaps in the last few years.

Statistical techniques, however, offer a more scientific way of understanding the relationship between the two than I can achieve by simply looking at a graph. If I explore the relationship between margins, capacity, and two other variables, the Bank Rate and the exchange rate I find that there is, despite my earlier analysis, an underlying relationship between capacity and margins. Broadly-speaking, as one increases, so too does the other.

More importantly, given the path for capacity, Bank Rate and the exchange rate that underpin the May *Inflation Report's* forecast, it is possible to see what that implies for margins in my statistical model. It just so happens that this path does take margins back to their long-term average over the three years of the forecast – a pattern broadly consistent with our projection for inflation. The recovery of margins certainly should put upward pressure on inflation in the near term. Nevertheless, if they have recovered to their long-run position in two to three years' time, margin growth is not a material source of inflation at the time horizon of concern to the Committee; at that point, the different pictures obtained from micro-economic and macro-economic analysis are not of great importance.

Wage Growth and Spare Capacity in the Labour Market

Taking a step back and looking at the bigger picture I have painted so far, I would l like to emphasise the central link between costs and inflationary pressure. Of these, for the economy as a whole, labour costs are

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[2] The CBI have also made available surveys which extend to some parts of the service sector. These do not as yet, however, provide a data set complete enough to be able to explore the issues in the same way.

by far the most important component, something reflected in any account of inflation in Britain over the past forty years. An analysis of inflation without the labour market would be akin to a performance of Hamlet without the Prince; the MPC has, of course, always paid a great deal of attention to what is happening in the labour market.

Against this background, I would now like to explore influences on wage setting. Given that I have just discussed the influence of spare capacity on price setting, an obvious place to start is to examine the effect of unused resources in the labour market – so-called labour market slack – on wage growth. The first and most famous study of this type was carried out by Phillips (1958). More recent examples include those by Layard, Nickell and Jackman (1991) and Castle and Hendry (2013), while Gali (2011) provides a theoretical model which suggests that wage growth should be explained in terms of expected wage growth and unemployment.

As the MPC set out in its recent *Inflation Report* (May 2014, p. 29), it believes the pool of unused resources in the labour market has three parts.

First, it is not overall unemployment but rather the deviation of unemployment from its medium-term equilibrium (the unemployment gap) which is the relevant influence on the wage rate. This medium-term equilibrium is an estimate of the rate that would prevail if money wages were fully flexible in the short run and is calculated making the assumption that the longer people have been out of work, the less substitutable they are for existing employees, and thus the less downward pressure they put on wages.

Secondly, some people who would like a job are nevertheless not actively seeking one, perhaps because they have been temporarily discouraged by a lack of available work. If these people can enter the labour market quite quickly as the economy recovers, they might well restrain wage growth. Cyclical movements in the labour force participation rate allow us to identify a "participation gap"

Thirdly, the Committee has identified an "average hours gap", the difference between the actual hours people work and an estimate of the hours that they would like to work. I discussed recently (Weale, 2014) why I thought the average hours gap might be less than seemed, on the surface.[3] In reality some people who said they would like to work more hours were subsequently satisfied with smaller increases than they said they wanted. It is also likely that as the economy improves, desired hours of work will decline.

High unemployment indicates spare capacity in the labour market. The hours gap and participation gap are also defined so that numbers greater than zero indicate spare capacity in the labour market.

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[3] The hours gap used in the MPC's analysis is different from what I described in March. The calculations described here use the MPC's estimate rather than my own. These figures do not take account of the effect I identified in March, that people may settle for fewer extra hours than they say that they want, but they do take account of a cyclical effect. Allowing for a cyclical influence in my March calculations would almost certainly lead to a measure of the hours gap smaller than the MPC's estimate.

With these three elements of labour market spare capacity in mind, I want to focus on whether they have similar effects on wage growth. I mentioned in my last speech that I had not yet found evidence that they do. Today I would like to shed further light on this, and on other possible influences on wages. For example, wage inflation may be affected by past inflation and/or inflation expectations or expectations of wage growth; historically, the wage growth may also have reflected productivity growth. These issues have been widely discussed elsewhere, and are uncontroversial.

Besides the influence of these factors on growth in total pay, I also want to explore how they affect its constituent parts. The average wage, as computed in the Office for National Statistics' measure of Average Weekly Earnings, is made up of two components, regular pay and bonuses. Bonuses amount to about six per cent of the wage bill and one might expect that they would be particularly subject to a squeeze on total pay, of the sort we have seen since 2008. Bonuses in the financial sector attract a great deal of attention; they amount to about thirty per cent of total pay in that sector, and make up about four per cent of the pay bill in manufacturing, and about six per cent in the distribution sector and in construction.

Bryson, Forth and Stokes (2014) suggest that, over the period since 2000, bonuses rose relative to regular pay towards the end of the boom, fell in the early phase of the crisis and have since recovered towards the level of the mid- 2000s. This echoes a suggestion by Gordon (1982) that bonuses, because of their discretionary nature, might add an element of flexibility to wages; thus employers can cut overall pay first, before having to cut employment during a recession. His analysis implied that flexibility with bonuses was likely to increase the sensitivity of pay to unemployment, and thus help stabilise the economy. Meade (1986) pointed out an important disadvantage of this. To the extent that bonuses amounted to a form of revenue or profit-sharing by firms they would have the effect of raising the cost of capital and would be likely to lead both to an increase in debt finance and capital starvation;[4] effects which have indeed been observed in the financial sector and which may have contributed to the financial crisis of 2008.

There has, however, so far been very little work on the role of bonuses as a part of wage adjustment. By splitting up quarter on quarter change in wages into two components, that attributed to regular pay and that attributed to bonuses it is possible to see whether bonuses do, in fact, increase wage flexibility and thus serve to stabilise the economy.

Looking at the role of each component of labour market slack separately, I find the following influences on quarterly growth in total pay, measured as a proportion of total pay in the previous period. I do not find a clear role for expected wage growth or expected future inflation; this may be because, over the period studied and particularly after June 1997, the creation of the Monetary Policy Committee served to stabilise inflation expectations. There is also weak evidence that a "catch-up" term links wages to productivity and the ability of the economy to pay in the long run.

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[4] If half of a firm's revenue is paid out in bonuses, then any increment in capital is remunerated only half as much as it would be if labour and capital each received their own contributions to net revenue.

Table 2: Influences on Wage Growth

Variable	Growth in Total Pay
Unemployment Gap	-0.3 (-0.7 to 0.04)
Participation Gap	0.04 (-0.6 to 0.7)
Average Hours Gap	-0.2 (-0.5 to 0.02)
Past Change in productivity	0.19 (-0.06 to 0.44)
Past Change in wages	-0.3 (-0.5 to -0.1)

Data Source: ONS and Bank calculations. Estimation period 1996Q1 to 2014Q1. Plausible ranges (95% confidence intervals) for the effects are shown in brackets. The equation is estimated on seasonally adjusted data. A constant term and dummy variables for 2009Q1 and 2009Q2 are also included.

As I said earlier, the unemployment gap measures the difference between the current rate of unemployment, and its medium-term equilibrium. So I interpret the coefficient of -0.3 as meaning that for every one percentage point of spare capacity in unemployment, quarterly pay growth is 0.3 per cent lower than it would otherwise be. Similarly, the coefficient of -0.2 on average hours means that for every percentage point of spare capacity in hours, wage growth is 0.2 per cent lower. Fluctuations in labour participation seem to have little effect on inflation. The impact of past change in wages, shown at the bottom of the table, means that the effect of any labour market slack is attenuated in subsequent quarters.[5]

There is, of course, uncertainty around these numbers. A conventional approach would remove the participation term on the grounds that it is not statistically significant. Calculating the coefficients again leaves the hours gap term also insignificant, but once this is removed the unemployment term becomes statistically significant. But a statistically safe assumption is that changes in unemployment and average hours have the same influence on wages, whilst changes in participation have no impact. This leads me to combine the unemployment and average hours gaps in my next results, which break down the behaviour of overall pay into regular pay and bonuses.

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[5] Gregg, Machin and Fernadez-Saldago (2013) present a range of estimates of the effect of unemployment on wages. They use the Annual Survey of Hours and Employment rather than the Monthly Wages and Salaries Survey, from which the Average Weekly Earnings statistic is derived, and look at the issue from a number of different directions. These estimates are a bit higher than the general impression given by their results, but lie within the range of values that they present.

Table 3: A Simplified Model of Influences on Wage Growth

Variable	Growth in Total Pay	Growth in Regular Pay	Growth in Bonuses
Unemployment\hours Gap	-0.3 (-0.4 to -0.2)	-0.17 (-0.2 to -0.1)	-0.06 (-0.1 to 0.03)
Past Change in productivity	0.19 (-0.05 to 0.43)	0.06 (-0.05 to 0.18)	0.16 (-0.03 to 0.34)
Past Change in wages	-0.3 (-0.5 to -0.1)	0.02 (-0.07 to 0.12)	-0.2 (-0.4 to -0.1)

Data Source: ONS and Bank calculations. Estimation period 1996(1)-2014(1).   The nature of seasonal adjustment means that the coefficients for regular pay and bonuses do not add to those for total pay.   An analysis of "seasonally adjusted" bonuses is open to the objection that, because they are so concentrated in the first quarter, the concept of seasonally adjusted bonuses is purely an artefact.

Table 3 shows that there is about three times as much movement in regular pay as there is in bonuses as a result of the unemployment\hours gap. Since, however, bonuses are only a small component of total pay, it certainly seems to be the case that bonuses have been a factor behind wage flexibility during the recent period of recession and stagnation. The productivity effect appears to be concentrated disproportionately in bonuses although neither finding is very precise. As Table 4 shows, high earners are more likely than low earners to receive bonuses, so this might point to some widening of the wage distribution if productivity growth recovers towards its historical rate.

Table 4: The Probability of Receiving a Bonus in 2012 by Income Group

All Employees	Top Fifth of Earners	Middle Fifth of Earners	Lowest Fifth of Earners
38%	56%	37%	17%

Data Source: ONS Annual Survey of Household Earnings.

Uncertainties around the Outlook for Wages

The analysis above makes it possible to explore how wages should be expected to grow over the next three years, when we take the path of the rest of the economy as given. In some sense this question is easily answered. If, as our forecast assumes, productivity growth returns to historically normal rates, and spare capacity in the labour market is used up, then wage inflation will also return to a historical norm which, in the past, we know has been consistent with the inflation target.

In line with the views expressed in the *Inflation Report*, the combination of falling unemployment and a recovery in productivity growth mean that wage growth should pick up. Indeed, over three years this analysis implies that wage growth could pick up to around 4 per cent per annum, subject of course to considerable uncertainty. If, as I have argued, there is less spare capacity than was assumed in the *Inflation Report,* then the growth rate projected in the *Inflation Report* could lead to undesirable inflationary pressures developing in the labour market.

Chart 2: Forecasts and Outturns of recent wage growth

Per cent growth on previous quarter

We should be wary, however, of taking a forecast like this at face value. Chart 2 shows the most recent sequence of forecasts for quarterly wage growth from a similar model, in purple, compared to the data themselves, in blue. Though the forecasts and outturns were broadly in line over the first eighteen months of the chart, the more recent performance has been different. Some erratic movement in wages due to the Government's changes to the top rate of income tax clouds the picture, but the broad message is that in five of the last six quarters the actual outturn for wage growth has been weaker than forecast.

There are many possible explanations of this weakness. I would like to focus on one of these. It is perfectly possible that the medium-term equilibrium level of unemployment is now lower than the Bank's calculations have implied. If that is the case the actual level of unemployment will bear down more strongly on wage inflation, even if the impact of one percentage point of unemployment is the same as I discussed earlier.

I do not have other indicators of medium-term unemployment, but I can ask how low the medium-term equilibrium would have to be, to explain all of the recent weakness in wage growth. As you can see in Chart 2 the forecast errors move around, and it would be wrong to put too much weight on any one observation. So I have used the average of recent errors to see what they imply for extra spare capacity measured in terms of GDP.[6]

If I put all of the weakness in wages over the past year (shown by the errors in the last four quarters) down to the unemployment\hours gap being larger than we currently believe, this points to extra spare capacity of more than half a per cent of GDP. This is consistent with a medium-term unemployment rate closer to 5% than our current range of 6%-6½%. Only, however, if I stretch the averaging much further back can I come up with an estimate of extra capacity appreciably below half a per cent. I should stress that these answers are themselves highly uncertain. Table 3 indicated the plausible range for the influence of the unemployment and hours gap on wages growth. If I apply these error ranges to my estimate of half a per cent, I can be reasonably confident that it lies between a third and one and a half per cent!

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[6] The average of the residuals is divided by 0.27, the coefficient on the unemployment\hours gap. This gives the difference between the measure of medium-term equilibrium unemployment used by the Bank and that implied by this framework. Analysis at the Bank suggests that this would be multiplied by 0.87 to convert it to extra output, if the productivity of newly employed people were the same as the average of the population. My earlier work (Weale, 2014) suggested that newly-employed people earn only about 60 per cent of the average wage, so I need additionally to multiply by 0.6 to allow for this.

I certainly do not want you to think that there is any definitive answer about what to draw from this; it is, as always, a matter a judgement. Even if all of my colleagues were looking at the labour market and inflationary pressure through the same lens as me, I would expect, and indeed hope, that they would come to different judgements from which I could learn. I am sure we will all take note of the way that the data for April, released last week, reinforced this sense of unusually weak wage growth.

I should mention a second possible explanation of the weakness. This is that expectations of low wage growth may have become entrenched, so limiting actual wage growth, in much the same way that actual price growth was found to be influenced by expected price growth. I could not find a role for expectations when I looked at the issue, but that cannot rule out the explanation. It has rather fewer implications for available capacity.

Looking ahead, I would like to draw on another source of information on wage prospects in the near term. The Recruitment and Employment Confederation collects data on wage trends identified by recruitment agencies. Since these relate to new employees rather than existing employees, their measure picks up early trends in the labour market. The change in the survey balance is probably a better guide than the level as a tool for anticipating movements in Average Weekly Earnings over the next six months. When I combine both in a simple statistical model, I forecast annual wage growth to be in the range 2½%-3% towards the end of this year. But, as with most indicators of this type, there is a great deal of uncertainty: wage growth in the last quarter of this year is as likely to be in the range 1.4%-4% as it is to be somewhere outside this.

Policy as a Matter of Judgement

I have tried to set out why the policy decision is more balanced than it was some months ago. The balance that I have described is a balance between two opposing forces of uncertain magnitude.

On the one hand there is my view that measures of underemployment, which contribute to the *Inflation Report* view of labour market slack, overstate the underlying amount of spare capacity in the labour market. One factor is that people who have been recently unemployed are less productive than average (Weale, 2014). If this is the case, then, as the economy continues to grow, unemployment could fall more quickly than the MPC expects. That on its own certainly points to a need for a policy profile tighter than in our May forecast. That case is augmented if, as I think likely, the hours gap is less than we assumed in May.

On the other hand, there is the continuing unusual weakness in wages and a question of what signal should be drawn from that. It may well imply that there is rather more spare capacity in the economy than the Committee has assumed. Should wage growth fail to revive, that will, on its own, tip the scales further in favour of maintaining a strong monetary stimulus.

In the background, of course, is the point that, even after interest rates have started a gradual rise, monetary policy will still be providing a great deal of support for the economy. Even if there is more spare capacity than

the employment and labour force data suggest, a slightly less stimulatory monetary policy will still be making a very substantial contribution to ensuring that that spare capacity is absorbed. Moreover, other things being equal, the policy of raising Bank Rate gradually does imply that the first rise needs to come sooner than would otherwise be the case.

I think all the members of the Monetary Policy Committee are keen to stress that our votes depend on both the data as they become available and the interpretation we put on them; that is certainly the way I come to a decision each month.

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