



BANK OF ENGLAND

# Speech

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## Slack and the labour market

Speech given by

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## **Introduction**

Very many thanks for coming here today. The past six months have seen good news about the economy. Inflation – which the Monetary Policy Committee has the job of keeping close to the target of two per cent – now stands at 1.9%, the lowest rate since 2009. Output has been rising; and employment rose by nearly 400,000 in 2013. The unemployment rate for the three months to January was 7.2%, far lower than the MPC – and many others – predicted in summer last year.

But, just as spring seems to have arrived early, after a prolonged spell of awful weather, we should not be too quick to assume that the good weather will last. The outlook for inflation depends, in part on the degree to which the economy can sustain continued increases in output and falls in unemployment, before inflationary pressures begin to build.

Even though unemployment has fallen rapidly, wage inflation has remained exceptionally low and price inflation has fallen sharply. This suggests that the slack in the economy has not been fully used up, and that there is, over the next two or three years, room for the economy to grow by more than rising labour supply and underlying productivity growth would, on their own allow. I would like to talk to you today about how much more room there might be.

## **Inflation, the Output Gap and Spare Capacity**

Many people find it helpful to produce an estimate of the output gap. For example the Office for Budget Responsibility forms a view of the gap between “between the current level of activity in the economy and the potential level it could sustain while keeping inflation stable” (Office for Budget Responsibility, 2011). They are concerned about the long run potential of the economy and have to consider separately how fast any gap is likely to close. The gap they identify aggregates spare capacity in firms and any deviation of unemployment from its natural rate.

The MPC’s goal is, however, first and foremost achieving the Government’s inflation target, which it aims to do over a two to three year horizon. So whether the concept of the output gap is useful in this task depends on whether the different components of the output gap exert much the same influence on inflation over the next two to three years or not. If a one per cent shortfall between actual output and potential output arising because firms were operating below capacity had the same influence on inflation at two to three years as a one per cent shortfall between actual output and potential output because of unemployment, then the two could be safely added up. But if demand were thought to influence inflation mainly through the workings of the labour market, then the key focus of the Committee would need to be on labour market conditions. The overall growth rate would depend on the way in which spare capacity in firms was expected to move in line with demand; this would matter for the Committee’s growth forecast but labour market conditions would offer the most appropriate guide to policy.

This aggregation issue appears in a second guise. The evidence is that short-term unemployment exerts more downward pressure on wage inflation than does long-term unemployment. Research suggests that it is not so much the overall level of unemployment, or the extent to which it differs from the natural rate, as the difference between actual unemployment and a level identified as the medium-term unemployment rate, which influences inflation over the period of concern to the Bank.

This medium-run equilibrium, which Bank staff judge to lie between 6% and 6.5% at present, is affected by two factors. One is the speed with which currently unemployed people are likely to find jobs, balanced against the rate at which formerly employed people are losing theirs. These flows into and out of employment determine where the unemployment rate is likely fall in the long run, once temporary shocks to the economy have dissipated. The second is the proportion of long-term unemployed, defined as those who have spent more than a year out of work. This is relevant because, following Layard, Nickell and Jackman (1991), we might expect those who are long-term unemployed to be less connected to the labour market, and therefore exert less downward pressure on wage growth than those who became unemployed more recently.

To these observations I should add an obvious point. Slack in the economy is a waste of resources. Our subsidiary goal, of supporting “the economic policy of Her Majesty’s Government, including its objectives for growth and employment” means that we have to consider what the degree of slack in the economy is and how far we can reduce any slack without taking risks with inflation.

Given these considerations, I think that the sort of estimate of the output gap used by bodies such as the Office for Budget Responsibility is not a great deal of help in the judgements that I have to make. I also need to stress that, given the need to keep inflation close to target, I can take account of slack in firms and in the labour market but also need to consider how far it has some bearing on the outlook for inflation. It is from this perspective that I would like to describe, as best I can, the current state of slack in the economy.

I will first discuss spare capacity in firms; I will then consider unemployment, and will finally focus on underemployment, the phenomenon whereby there is an excess of people in employment wanting to increase their working hours relative to those wanting to reduce their working hours.

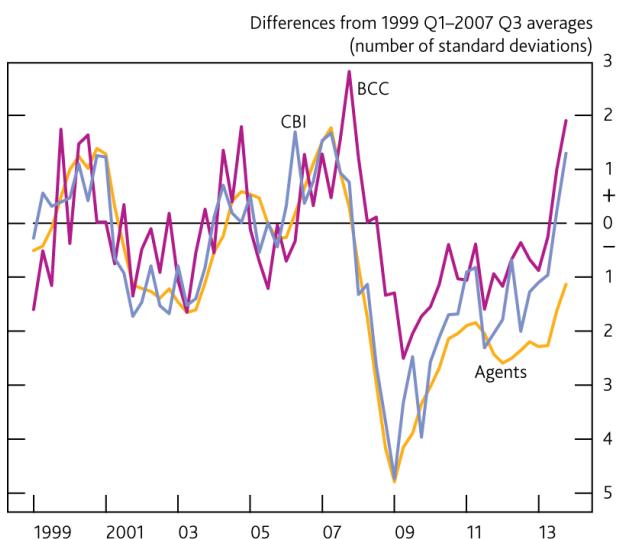
Underpinning my analysis of unemployment and underemployment is the issue of how far a given change in labour input might translate into a change in GDP. Two questions are relevant. First, how does the extra labour which might be employed compare with “average” labour already in employment. I make comparisons on the basis of the likely rates of pay of this extra labour as compared to the average. This provides an estimate of the likely change in effective labour input, which adjusts the extra labour that may be employed for differences in the number of hours worked, and productivity, compared with those already in work. Having done this separately for unemployment and underemployment, I pull my results together by making an assumption about how the increase in effective labour input feeds through into an increase in output.

## Slack in Firms

The Committee tends to use indicators of capacity utilisation to draw inferences about slack in firms; three such measures are shown in Figure 1. Although all pointed to some degree of spare capacity during the financial crisis, the more recent picture is mixed, with two surveys – the BCC and CBI measures – reporting that on average, firms are currently working above normal capacity levels. Meanwhile, the Bank's regional agents report that many firms are operating below to normal. On balance I am happy with a judgement that firms are, broadly speaking, producing at their normal level of output. Thus the issue I raised above, about how slack in firms influences inflation, is largely irrelevant at the present time. In order to consider how far output can expand relative to supply while inflation remains close to target I therefore turn to look at circumstances in the labour market and initially at unemployment.

## Unemployment and slack

**Figure 1: Survey indicators of capacity utilisation**



**Source:** February 2014 *Inflation Report*.

**Note:** Three measures are produced by weighting together surveys from the Bank's Agents (manufacturing and services), the BCC (non-services and services) and the CBI (manufacturing, financial services, business/consumer services and distributive trades) using nominal shares in value added.

The BCC data are not seasonally adjusted.

The data on activity one year earlier are collected in the survey only in the second quarter of each year, which is why these data relate to 2013Q2.

The data show that those who had been in work a year earlier, earned slightly more than the average wage. In contrast, those who entered or re-entered employment in nearly all cases earned less than the average.

The UK's headline unemployment rate stood, in the fourth quarter of 2013, at 7.2 per cent while the Bank's estimate of the medium-term unemployment rate lies between 6 and 6½ per cent. I use the middle of that range. If the entire gap between headline unemployment and the medium-run equilibrium – currently around one per cent – were translated into an increase in employment, how would effective labour input change? A very simple calculation would be based on the assumption that all labour is equivalent. If hours worked increase by one per cent, then effective labour input increases by one per cent. But how far is this true? How do the earnings of people who have been recently unemployed compare with those of the rest of the labour force? A summary answer to this can be seen in Table 11. This table shows the average hourly wage rates and the number of hours worked as reported by a sample of people in the Labour Force Survey, as a function of what they were doing a year earlier.

People who had been unemployed one year earlier earned only sixty per cent of the average and also faced a working week about fifteen per cent shorter. It is not possible to say from these data, how long such effects are likely to persist. But a large body of academic work (e.g. Arulampalam (2001) and Gregory and Jukes (2001)) suggests, at the very least, that only the most fortunate of the formerly unemployed will find themselves earning close to the average wage rate after a further year of employment.

**Table 1: Hourly Rates of Pay and Weekly Hours Worked in 2013Q2**

Activity twelve months earlier:	Pay	Hours	Head-count (thousands) <sup>(1)</sup>
Working in paid job or business	£ 13.61	33.1	22,497
Laid off, short time at firm	£ 10.31	32.6	18
Unemployed, actively seeking work	£ 7.92	28.0	600
Special government scheme	£ 6.94	25.5	10
Unpaid work for self or relative	£ 8.71	18.0	43
Full time student	£ 7.50	22.1	734
Looking after family or home	£ 10.61	18.4	222
Temporarily sick or injured	£ 8.92	20.9	54
Long term sick or disabled	£ 11.08	12.2	48
Retired	£ 12.72	12.2	60
None of these	£ 12.45	27.9	263
Average	£ 13.24	32.3	

**Source:** Labour Force Survey and Bank calculations.

(1) The population weighted number of individuals who are employed in 2013Q2 and who provide a response to the question.

A standard assumption in economics is that the best measure we have of the productivity of each different type of labour is the rate at which it is paid. This is, of course, not at all the same thing as claiming that people are always worth what they're paid; furthermore Lazear and Rosen (1981) have identified circumstances where businesses may depart from this, not for specific individuals but as a general principle. Nevertheless if we follow the standard approach, the implication is very clear. Combining the fact that those who were unemployed work fewer hours and earn less pay than the average – when they do find work – I find that their equivalent labour input is only around half of the figure which would be inferred just from studying the total number of people employed.

While it is not the main focus of this talk, it is worth noting that the low wages are not solely the result of having previously been unemployed. Forty per cent of the people taking up work were aged under thirty, and it is well known that, as Table 2 shows, young workers are paid appreciably less than the average of the population. This explains much of the difference in earnings between those who were formerly unemployed and the average.

**Table 2: Age and Hourly Pay in 2013Q2**

Age range:

16-19yrs	£ 5.72
20-24yrs	£ 8.18
25-29yrs	£ 11.12
30-34yrs	£ 13.36
Average	£ 13.24

Source: Labour Force Survey and Bank calculations

### Underemployment

A recent study by Bell and Blanchflower (2013) drew attention to the fact that a substantial imbalance has developed between those who say they would like to work longer than they do, and those who would like to reduce their working hours, even at the cost of lower pay. Earlier work by Stewart and Swaffield (1997) found that a third of manual workers would have preferred to work fewer hours at the wage rate they were paid. Table 3C of the February *Inflation Report*, reproduced below and updated to include the Q4 figure, summarises the present imbalance, showing the difference between the hours that people actually work and the hours that they would like to work, suggesting a rather different situation.

**Table 3: Actual Hours Worked and Desired Hours of People Employed**

	1998-2007	2011	2012	2013			
				Q1	Q2	Q3	Q4
Average Hours	32.4	31.6	31.9	32	32	32.1	32.1
Desired Hours	32.1	32.1	32.4	32.7	32.6	32.7	32.6

Source: *Inflation Report* February 2014, p.29, Labour Force Survey and Bank calculations. The figure for 2013Q2 differs from that of Table 1 because these data are compiled from a slightly different sample.

It is obviously tempting to look at these figures and regard the gap between actual hours and desired hours as a simple additional source of labour market slack. On that basis it might seem that hours worked could rise by around 1½ per cent, simply as a result of people finding as much work to do as they would like to do. There are, however, grounds for caution, even before those figures are translated into effective labour supply.

First of all, it is important to remember that the MPC is concerned about keeping inflation close to target. Without evidence on how the gap between actual and desired hours influences wage inflation, it is not possible to come to firm conclusions about how far it is possible for it to fall as the economy recovers. It may be the case that some of the net underemployment is a response to the state of the economy rather than any indication of genuine extra capacity. For example people whose partners lose their jobs may well say that they would like to work longer. But once their partners find new jobs, they may lose interest in doing so. This is consistent with the observations of Benito and Saleheen (2013) who find that people increase their hours of work in response to

financial shocks, and the analysis of Attanasio, Low and Sanchez-Marcos (2005) which suggested that female labour supply could vary in response to shocks to household income.

I am afraid I cannot address all the interesting issues raised by underemployment. I would, however, like to scratch below the surface and set out what we do know about net underemployment, coming to some conclusions about what the implications might be for output if the imbalance between actual and desired hours were resolved. The source for this is the Labour Force Survey; those of you who, like myself, have contributed to its data will know that respondents are contacted five times at intervals of approximately three months. My main focus will be on looking at people who were working less (or more) than their desired hours in the first wave of the survey, to see what happened to them four quarters later. In order to build up a reasonably large sample I look at all the people who answered the survey for the first time in 2012 and for the fifth time in 2013. I begin, however, with a simple analysis of under and overemployment (which could jointly be described as misemployment) in the final quarter of 2013 as a function of age. This is shown in Figure 2, and is of considerable interest in its own right. Stakhanovite young people are keen to work more, while old people, perhaps squeezed by the need to find time to care for elderly parents, want to reduce their working hours.

What happens to people who would like to increase their working hours? As I noted, an analysis of initial and final responses to the Labour Force Survey makes it possible to explore this. A degree of caution is called for, however.

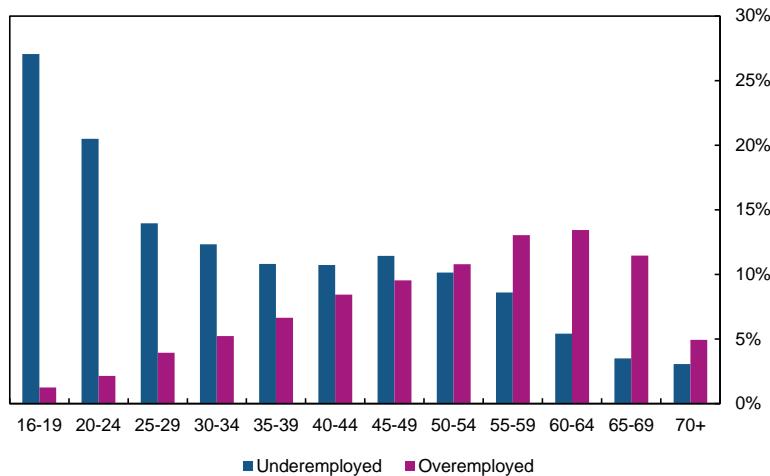
There are issues of selection bias. People who respond to sample surveys are never as assiduous as statisticians and economists making use of the data would like them to be. So only about sixty per cent of those

in the survey at the start are still there five quarters later.

Furthermore the people most likely to drop out are young people and those who are not very well educated.

These are exactly those most likely to want to work extra hours. I can correct for this to some extent, by estimating how the probability of dropping out depends on age and education, and adjusting the importance given to each observation in the light of this (Wooldridge, 2002). Other things equal, people with a low chance of staying in are given enhanced

**Figure 2: Numbers of employed people wanting longer hours (underemployed) and shorter hours (overemployed): % of employed population in each age group. 2013Q4**



Source: Labour Force Survey and Bank calculations

importance if they do stay in. But there still seem to be too many over-employed people relative to underemployed people. Adjusting for survey attrition can take us only so far.

For those who have, in the past, said that they were over or underemployed, and whom I describe as misemployed, an obvious question is how far they needed to change their working patterns in practice, in order to feel fully employed instead. The rows highlighted in red in Table 4 shows the amounts by which people who were misemployed said that they wanted to change their working week.

**Table 4: Desired and Actual Changes in Hours Worked between 2012 and 2013**

		Labour market status in 2012		
		Under-employed	Fully employed	Over-employed
Labour market status in 2013	Under-employed	<b>Desired change</b>	<b>13.5</b>	<b>0.0</b>
	Under-employed	<b>Actual change</b>	1.2	-2.9
	Fully employed	<b>Desired change</b>	<b>11.7</b>	<b>0.0</b>
	Fully employed	<b>Actual change</b>	6.5	-0.5
	Over-employed	<b>Desired change</b>	9.7	<b>0.0</b>
	Over-employed	<b>Actual change</b>	7.1	1.4

**Note:** A negative number indicates people wanted to, or did, reduce their working hours. For each of the three labour market states, two figures are reported: in the upper row in red, how much on average, people in that group wanted to change their hours when asked in 2012; and in the lower row in blue, the actual change in their working hours between 2012 and 2013. The top right and bottom left cells are in grey to reflect the small sample size of respondents in these categories, compared to the other groups.

**Source:** Labour Force Survey and Bank calculations.

People who were underemployed said, on average, that they wanted to work an extra twelve or thirteen hours. Those who were overemployed said that they wanted to cut back by an average of around eleven hours. Very few people moved from underemployment to overemployment or vice versa; the figures shown in these parts of the table are not of any importance.

These desired changes in hours can be compared with actual changes in hours. The blue rows in Table 4 show the hours worked by people in all possible combinations of employment in 2012 and 2013. If we look at people who were misemployed in 2012 but fully employed in 2013, we can compare the changes in actual hours with the desired changes reported above them.

Here we see that the people who were underemployed in 2012 but fully employed in 2013 increased their working week by, on average 6.5 hours. This compares with the 11.7 extra hours that they said they wanted to

work. But the mismatch between what people say they want and what they settle for is much greater among those who saw themselves as overemployed in 2012. This group said they wanted to cut their working week by just over eleven hours. A year later a reduction of only four hours had kept them happy.

Nothing of course is certain, but in interpreting the figures of under and overemployment, rather than take what people say at its face value, it seems sensible to me to use the adjustments given in Table 4 as an indicator of the average amount that someone who claims to be misemployed actually wants to alter their working week. This obviously writes down overemployment much more than it writes down underemployment and has the effect of making the degree of net spare capacity bigger.

When we adjust for the relative productivity of the different groups, using relative wages as a measure, however, it is underemployment which is written down rather more than overemployment. It is not clear why those who remained underemployed earned less than those who became fully employed. But, for the latter group, we can see that they earned appreciably less than the people who were fully employed in both quarters. So, too, did the people who were fully employed in 2012 but were underemployed a year later. Conversely the people who were overemployed tended to be paid more than those who were fully employed.

Table 5 shows average rates of pay between 2012 and 2013 for the sub-group of people for whom we have wage data in both periods<sup>1</sup>.

It is not clear why those who remained underemployed earned less than those who became fully employed. But, for the latter group, we can see that they earned appreciably less than the people who were fully employed in both quarters. So, too, did the people who were fully employed in 2012 but were underemployed a year later. Conversely the people who were overemployed tended to be paid more than those who were fully employed.

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<sup>1</sup> If the transition from underemployment to being fully employed led to a pay rise it would be necessary also to take into account the implied increase in productivity. The hourly pay for people underemployed in 2012 and fully employed in 2013 was, however, £9.40 in 2012 and £9.58 in 2013 (2013Q4 £s). I have assumed that these differences arise from sampling rather than underlying differences.

**Table 5: Hourly Rates of Pay by Employment Category (2013Q4 prices)**

	Labour market status in 2012		
	Under-employed	Fully employed	Over-employed
Labour market status In 2013	Under-employed		
	Employed	£ 8.74	£ 10.09
	Fully employed	£ 9.49	£ 13.94
	Over-employed	£ 10.96	£ 15.42
	Employed		£ 12.65
			£ 16.16
			£ 17.24

**Source:** Labour Force Survey and Bank calculations.

In the first instance, we might, therefore, take the middle row of the table as an indication of the relative productivity of those who seem themselves as under and overemployed. Comparing a wage of £9.49 to £13.94, this suggests that underemployed people have a productivity of 68% of the average. But comparing £16.16 to £13.94 implies that those who are overemployed have a productivity of 116% of the average worker. So, to take account of these figures when working out the degree of spare capacity, we need to multiply the number of extra hours we expect from underemployed people by 0.68, while we need to multiply what we expect from overemployed people by 1.16.

### The Dynamics of Under and Overemployment

I mentioned earlier that I have so far not found evidence that net underemployment influences wage determination. This means that, without some sense of the factors which drive net underemployment over time, it is not possible to say how this might change in response to rising overall demand. At present all I can do is give some indication of the dynamics of under and overemployment.

Table 6 shows what people were doing in 2013 as a function of the way in which they described themselves a year earlier. I have included here not just the three categories of employment, but also whether people were inactive- meaning that they were neither working nor looking for work- or unemployed, meaning that they were actively looking for work. I have also distinguished those who, in 2013, report a new job within the last twelve months from those who do not.

There are some oddities of the data such as the fact that some of those who moved from being out of work in 2012 to being in work in 2013, still say that they have been in their jobs for more than twelve months. This may in fact be true because the interview dates, in the nature of things, may be slightly less than twelve months

apart. But there may also be an element of reporting or recording error. Anyway, these are unlikely to be sufficiently frequent so as to make the overall message unreliable.

Of the people who were inactive in 2012, one in six of those who found work regarded themselves as underemployed. The proportion of formerly unemployed people who regarded themselves as underemployed is slightly higher. Very few people previously not working see themselves, however, as overemployed. That suggests that people previously not working who start work tend to be keen to work rather than resent it as an imposition that eats into their leisure.

**Table 6: Activity in 2013 as a Function of Activity in 2012 (People aged Sixteen or over)**

		Activity in 2012					
		Age 15	Inactive	Unemployed	Under-employed	Fully Employed	Overemployed
Number in 2012:		841,161	19,214,863	2,310,772	2,305,485	23,315,368	1,628,769
Activity in 2013	Inactive	72%	90%	18%	4%	4%	4%
	Unemployed	13%	3%	39%	3%	2%	2%
	Underemployed	1%	0%	2%	36%	6%	2%
	Old job	Fully Employed	4%	2%	7%	42%	74%
		Overemployed	0%	0%	0%	1%	6%
	New job	Underemployed	2%	1%	10%	4%	1%
		Fully Employed	9%	3%	22%	9%	6%
		Overemployed	0%	0%	1%	0%	1%

**Source:** Labour Force Survey and Bank calculations.

The chance of someone stopping working does not depend very much on whether they were misemployed or not. Those who have been inactive or unemployed in the past have quite high chances of being underemployed if they do start work. Nevertheless the main “entry” into underemployment is from being fully employed; the table suggests, overall, a seven per cent risk of becoming underemployed in such circumstances.

In contrast, just over two fifths of those previously underemployed now regard themselves as fully employed without any change of job, while a further nine per cent regard themselves as fully employed after a change of job. The chance of someone underemployed changing their job is nearly twice that of someone who is fully employed. Overall, more than half of the people who initially reported themselves as underemployed are not underemployed a year later. This proportion is just over sixty per cent for overemployment. Once again the main way out of this does not involve a change of job. Six per cent of those previously overemployed do, however, escape from this through a change of job.

So the exit rates from both underemployment and overemployment are high. My guess is that it is likely to be fluctuations in entry rates which are the main drivers of both over and underemployment. I am afraid I cannot, at present, offer any analysis of these – this will have to wait for an investigation of the way in which entry and exit rates have changed over time. But I would certainly caution against the assumption that normalisation of the labour market necessarily means that the pattern of entry and exit rates will necessarily revert to those which kept under and overemployment in balance in the period before the crisis. As I mentioned earlier, it is perfectly possible to think of both entry and exit rates as being driven, at least to some extent, by unemployment.

### **Slack in the Labour Market and Slack in the Economy**

What does this all mean for an estimate of overall slack in the labour market and, by extension, the economy? I can bring these pieces together to give some estimate of the extent to which there is slack in the labour market which can be used up while maintaining inflationary pressures consistent with keeping inflation close to target over the two to three year horizon on which the MPC focuses. These calculations are made on two untested assumptions. First, that net underemployment is all available as “spare” labour, after adjustment for the difference between reported desired changes to hours worked and the actual changes which are sufficient to leave people fully employed. Secondly, the entry and exit dynamics are such that it can be reduced to zero over the same sort of time-scale as unemployment falls back. The calculations are presented in Table 7.

**Table 7: Slack in the Labour Market 2013Q4**

	(1)	(2)	(3)	(4)	(5)
	Number of people (thousands)	Hours per person per week	Adjustment for actual/desired hours	Adjustment for relative pay	Effective hours (millions)
<b>Employment:</b>					
<i>People working</i>	30,146	32.1			966.8
<b>Unemployment:</b>					
<i>People Unemployed</i>	2,342				
<i>Medium-term equilibrium</i>	2,031				
<i>Difference</i>	312	28.0		0.60	<b>5.2</b>
<b>Underemployment:</b>					
<i>Desire extra hours</i>	3,381	12.2	0.56	0.68	<b>15.8</b>
<i>Desire reduced hours</i>	2,153	-11.5	0.35	1.16	<b>-10.0</b>
Total increase in effective hours					<b>11.0</b>
Per cent of actual hours					<b>1.1%</b>
x 0.8 to give impact on GDP					<b>0.9%</b>

**Source:** Labour Force Survey and Bank calculations.

- Column 1 shows the starting point for the calculations, based on an assessment of the labour market in the fourth quarter of last year. The figures for unemployed and medium-term equilibrium unemployed are presented in thousands of people.
- Column 2 relates to average hours worked per week. The first entry – 32.1 – is just the average length of a working week for those in work in 2013Q4. The second is the average length of week for those who were unemployed a year earlier, but manage to find work. And the final two numbers, 12.2 and -11.5 show, respectively, the desired increase or decrease in hours, for those who said they weren't happy with how much they were currently working.
- Column 3 shows the change in hours of those who moved from being misemployed to being fully employed, as a fraction of the change they had said they wanted.
- Column 4 shows the rate of pay of the people concerned relative to the average hourly rate for the economy as a whole.
- The entries in column 5 are computed by multiplying those in column 1 by those in columns 2, 3 and 4, with overall labour market slack being shown as the sum of these.

This result is shown in units of effective labour. An increase in effective labour input of one per cent should be expected to increase output by less than one per cent because output is the result of joint inputs of capital and

labour; an increase as large as one per cent would be expected to result only if the capital stock were increased in line with the increase in labour input.

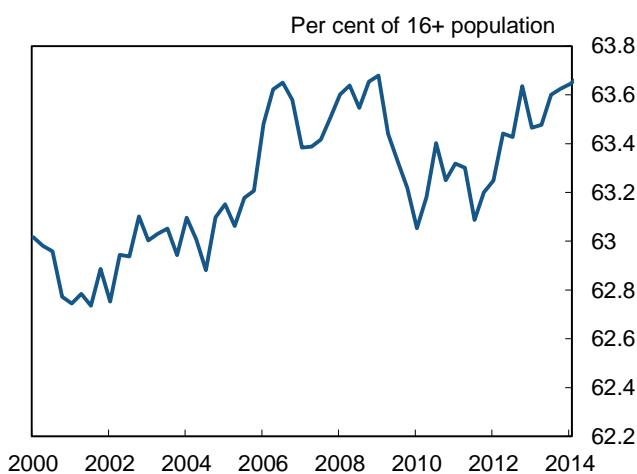
The conventional way of estimating the increase in output associated with a one per cent increase in labour input is to multiply it by the share of output which accrues to labour rather than being taken up in either depreciation or the return to capital. The most recent figures (for 2012) put this at 0.66. However analysis at the Bank suggests that the underlying contribution of labour is slightly higher than this at around 0.8, and multiplying by this might give a better sense of the possible contribution that increased labour input could make to output without running into inflationary pressure. After taking this into account I come up with a best estimate of slack of 0.9 per cent of GDP

### **Errors, Omissions etc.**

In the discussion above I have focused on the extra labour which might become available if unemployment were to fall and if net underemployment were also to be reduced. These are, of course, not the only means by which employment might grow. The working-age population is expected to grow by two and a quarter per cent between the June of 2013 and June of 2016. Such growth is normally regarded as something quite distinct from labour market slack.

It is also possible that employment as a proportion of the population of working age, the participation ratio, will

**Figure 3: Labour participation**



**Note:** Figure shows total employment as a share of the 16+ population. Figure for 2014 represents Bank staff projection.

rise. Figure 3 shows the recent behaviour of this proportion; it is clear that different approaches to forecasting would give rather different answers about how this might be expected to move over the next two to three years. One could take the view that there will be a further upward movement, perhaps supported by the fact that people who in the past did not make adequate provision for their retirement are increasingly working beyond the traditional retirement age. The government's benefit policies are intended to increase the participation of people of traditional working age; perhaps some impact should be assumed from these. Or one could take the view that the high figures in 2006 represent something of a cyclical peak, and that, particularly if

living standards start to rise again, participation may not rise any further. The *Inflation Report* has built in the assumption of a modest further rise and – whether or not it is appropriate to call this labour market slack – it is clear that if it materialises, supply will rise by more than if it does not. That is one upward factor built in to the *Inflation Report* figures absent from my calculations above.

Pointing in the other direction, however, is the fact that I have assumed that all of the net underemployment, after correcting for the differences between what people say, and what they do, is available as extra labour. This may not turn out to be the case if net underemployment has very little influence on pay bargaining. In those circumstances a fall in unemployment to below the medium term equilibrium rate could raise inflationary pressures even while net unemployment remains.

A second factor, which might also reduce the impact of net underemployment as currently measured, is the possibility that it is, at least in part, a consequence of current levels of unemployment. As people whose partners are currently unemployed find jobs, their own interest in working longer hours may decline even though their own circumstances have not changed. Yet a third possibility is that the rise in net underemployment since 2008 is a consequence of some structural change in the labour market; in other words that the increase reflects a change in the natural rate of underemployment rather than an amount of labour which can be made available to meet an increase in demand for labour.

Uncertainty also surrounds the medium-term equilibrium unemployment rate. It is perfectly possible that this is lower, or higher, than the figure I have used.

Yet another issue concerns self-employment. This has risen very sharply, and particularly so in the last three months of 2013, when the number of people describing themselves as self-employed rose by 172,000, or 4.1 per cent of the figure for the previous quarter. It is possible that self-employment is concealed unemployment and is therefore labour which might be better used with different employment arrangements. It is, however, the case that it is disproportionately old people who become self-employed; if this is a choice that they make, there is surely a risk of double-counting in assuming that labour force participation is rising and that the increasing number of self-employed would necessarily all prefer to work as employees.

Finally, of course, there is uncertainty in the calculations I have presented above. The figures there for hours worked and rates of pay for people in different circumstances are presented as point estimates. In fact they are of course calculated from the Labour Force Survey, and there is a considerable margin of uncertainty surrounding many of them. Those used in the calculation of the effective labour input of formerly unemployed people are assuming that the figures of Table 1 are relevant for the whole of the period of interest while some abatement, particularly of the hours penalty might be expected. After all, Table 6 implies quite a high exit rate from underemployment.

I am, *faut de mieux*, making the judgement that any underestimate to the degree of spare capacity which might result from the neglect of participation effects and the decay of the unemployment penalty is probably broadly offset by the assumption that, after the adjustments I have made, all of the net underemployment can be utilised over the two to three year period of concern to us. No-one could say, however, that it was unreasonable for other people to make different judgements. Indeed it is unlikely that the differences resulting from judgements of this type are large relative to the general uncertainty surrounding estimates of labour market slack.

## Conclusions

With wage growth currently well under two per cent I do not think there are many economists who would doubt that unemployment can fall some way before the economy faces any risk that wage pressures in a tight labour market will push inflation above target. Based on Bank work exploring the relationship between unemployment and wage inflation, I am comfortable that hours worked could increase by around one per cent as a result of that mechanism. There must, however, be a very substantial margin of uncertainty around this figure. A calculation of the growth in output likely to result from such an increase in hours worked needs, additionally, to take account of the fact that newly employed people earn less than the average both because they tend to be younger than average and because there is a wage penalty associated with a history of unemployment. The change in effective employment is likely to be less than the crude reduction in unemployment might indicate.

The treatment of underemployment as a source of labour market slack is rather more involved. First, without some evidence that underemployment influences wage inflation, this means it can be seen as spare capacity only in so far as the workings of the labour market mean that it is drawn down broadly in step with unemployment. Secondly, a general improvement in economic conditions may mean that people lose interest in increasing their working hours, even without any actual change; people's desired hours may be sensitive to the state of the economy. Even, however, putting these concerns to one side, a calculation which takes account of the fact that underemployed people earn less than overemployed people and that people seem satisfied with smaller changes to their working hours than they had said they wanted, results in the impact of this being rather smaller than might appear at first sight.

I should stress that these observations do not leave me uncomfortable with the broad pattern of the forecast the MPC produced for February's *Inflation Report*. Rather, I think the forecast is broadly consistent with slack being used up over the next two to three years while the collective judgement of the committee was that slack would remain at the end of that period. The overall degree of uncertainty surrounding this is of course considerable and is reflected in the fan charts for output and inflation which the MPC produces. I might also add that the reason these issues were not aired in the minutes of our February meeting or in the *Inflation Report* is rather mundane; much of the results I showed you today reflect work done since then.

While I am like other members of the Committee, keen to explain the structure underlying our forecast, it is very important that the associated profiles for variables such as growth and unemployment are not interpreted in any sense as targets that the Committee has adopted. In the same way, while I expect interest rates to remain low over the next two to three years, it is not possible to guarantee this. The MPC's target remains consumer price inflation of two per cent as set out by the Chancellor and restated yesterday (Osborne, 2014). We set interest rates to deliver that inflation target in the light of the economic facts as they evolve.

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## Data Appendix

This appendix details the variables used and assumptions made to generate Tables 1 & 2 and 4-7.

### Tables 1 & 2

Tables 1 and 2 use the Quarterly Labour Force Survey (QLFS) data from the second quarter of 2013. The variable *oycirc* details the respondent's employment situation 12 months previously. We chose to censor the total actual hours worked variable (*sumhrs*) at 97 hours per week. Pay information is contained in the variable *hourpay*. Data were weighted using the appropriate weights (person or person income weights).

### Tables 4, 5, & 6

To generate the figures in tables 4, 5 & 6 we first merged together the QLFS datasets from 2012 and 2013. For example, we kept all of the individuals who were first interviewed in the first quarter of 2012 and match this data to the responses that these individuals gave to the survey in 2013 Q1, the last time that they were interviewed. This process was repeated for the second, third and fourth quarters. As mentioned in the text, when matching data in this way it is necessary to account for the non-random attrition, and we did this by estimating how the probability of dropping out depends on age and education, and adjusting the importance given to each observation in the light of this.

The variables in the QLFS data that detail the respondent's desired increase or reduction in hours are *undhrs* and *ovrhrs* respectively. We again chose to censor all of the hours variables at 97 hours per week.

Following other papers in the literature, we chose to make several modifications to the information contained in the desired hours variables. These were:

- Claims of underemployment among those aged between 16 and 18 and working 40 hours or more per week, and those aged over 18 and working 48 hours or more per week, were disregarded.
- Claims of overemployment among those aged between 16 and 18 and working 15 or fewer hours per week, and those aged over 18 and working 20 or fewer hours per week, were disregarded.
- Desired extra hours were constrained to be no more than the total actual number of hours worked per week.

The final assumption we made in order to produce Tables 4, 5 and 6 is to exclude those individuals who report that they were employed, but that their total actual number of hours worked was zero.

### Table 7

The figures in Table 7 derive from the 2013 Q4 QLFS and our calculations from the figures in Tables 1, 4 and 5.