National Audit Office

Audit of Assumptions for the 2005 Pre-Budget Report

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL | HC 707 Session 2005-2006 | 5 December 2005

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Comptroller and Auditor General
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2 December 2005

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AUDIT OF ASSUMPTIONS FOR THE 2005 PRE-BUDGET REPORT

Statement of Responsibilities

1 Sections 156 and 157 of the Finance Act 1998 provide for me to examine and report on conventions and assumptions underlying the Treasury's fiscal projections that are submitted to me by the Treasury for examination.

2 The Chancellor of the Exchequer has asked me to audit:

- whether on the basis of existing data it is a reasonable and cautious view that the previous economic cycle as defined by the Treasury ended in 1997.

3 The Chancellor has advised me that none of the other assumptions examined in my previous reports on Budget and Pre-Budget Report assumptions has been changed.

4 At the time of the March 2000 Budget, the Chancellor requested that I conduct a three year Rolling Review of the assumptions I have audited previously. This is to provide a check both that the assumptions remain reasonable and cautious, and to see whether they have indeed resulted in reasonable and cautious projections in the period since they were last audited. The remit is:

- to ensure that the key audited assumptions underpinning projections of the public finances remain valid, the Comptroller and Auditor General shall examine each audited assumption three years after its most recent audit:
  - a to review whether the assumption has resulted in reasonable and cautious projections of the elements of the public finances projections it relates to since it was first audited; and
  - b to check that it remains a reasonable and cautious assumption to use in future projections of the public finances.

5 The Rolling Review for this Report covers the convention used for forecasting future oil prices and the VAT strategy introduced in 2002. I first audited the oil price convention in 1997 and in 1999 when the convention was modified, and then examined it as modified in 2002.[1] I examined the VAT ratio in 1997 and in 2000. In 2002, the VAT ratio assumption was extended to take account of the direct and preventive effects of a new VAT strategy designed to produce additional tax revenue.[2]

6 My report for the 2002 Pre-Budget Report included a review of an extended assumption for tobacco duties first examined in 2000,[3] but the extended assumption was itself replaced in 2003[4] and so does not fall due for examination under the Rolling Review on this occasion.

7 As before, the Treasury remains responsible for making projections of future public expenditure and revenue on the basis of the audited and other assumptions.

Basis of Report

8 To examine the dating of the end of the previous economic cycle I have considered evidence gathered for this audit from relevant papers and discussions with officials in the Treasury, the Bank of England, Members of the Bank of England Monetary Policy Committee, the Office for National Statistics and with a number of external organisations as set out in Appendix 1. For the Rolling Review I have examined papers and had discussions with officials in the Treasury and in HM Revenue and Customs.

1 HC 361, Session 1997-98; HC 873, Session 1998-99; and HC 109 Session 2002-03.
2 HC 361, Session 1997-98; HC 959, Session 1999-00; and HC 109 Session 2002-03.
3 HC 348, Session 1999-00.
4 HC 627, Session 2002-03.

Report

Dating the end of the previous economic cycle

The Treasury needs to date the economic cycle to estimate the underlying growth rate and to assess progress against its fiscal rules

9 Dates for the start and end of the economic cycle are needed to estimate the underlying growth rate of the economy, which informs the Treasury's central estimate of trend growth going forward.[5] For the purposes of public finance projections, the Treasury uses a trend growth rate that is ¼ percentage points lower than its central estimate, which I audit.[6]

10 Dates for the start and end of an economic cycle are also needed to assess whether the Government's two fiscal rules have been met after that cycle has ended. The fiscal rules are:[7]

- the **golden rule**: over the economic cycle, the Government will borrow only to invest and not to fund current spending; and
- the **sustainable investment rule**: public sector net debt as a proportion of GDP will be held over the economic cycle at a stable and prudent level. Other things being equal, net debt will be maintained below 40 per cent of GDP over the economic cycle.

11 In July 2005, based on new national accounts data, the Treasury published its revised judgment that the previous economic cycle ended in the first half of 1997, rather than 1999.[8] On this basis, I have been asked by the Chancellor to examine whether it is a reasonable and cautious view that the previous economic cycle as defined by the Treasury ended in 1997.

12 The interpretation of caution under the remit given to me relates to whether the change of date for the end of the previous cycle would result in more or less cautious fiscal projections, rather than to whether a change of date would be associated with the need for a tighter or looser fiscal position in order to meet the fiscal rules.

13 The start and end dates of the economic cycle are used as the basis for assessing whether the golden rule has been met, measured by the average annual surplus or deficit on the current budget as a percentage of GDP.[9] The result will clearly depend on the period used to calculate the average. I have not been asked to audit whether the fiscal rules have been met, and I have not done so. The national statistics required to make such an assessment basing the end date of the previous cycle on either 1997 or 1999 are available on the Office for National Statistics website in the monthly Public Finance Statistics First Release.[10] These data show that the current budget was in deficit in 1997-98 with a more than offsetting surplus in 1998-99.

14 To assess the Treasury's revised judgement for the end date of the previous cycle I have examined approaches to defining the economic cycle and ways of identifying economic cycles from the data; reviewed the cyclical indicators used by the Treasury in terms of whether they are an appropriate set and what they show in relation to the output gap; and compared the Treasury's view with that of other organisations, where such information is available.

The Treasury now estimates that the current economic cycle began in 1997 rather than in 1999

15 In Budget 2000, the Treasury made the provisional judgement that there might have been a full economic cycle between the first half of 1997 and mid-1999. The data available at the time suggested that output fell below trend towards the end of 1998 for a short time and then returned to trend in mid 1999[11]. The closeness of the cycle around trend, combined with the possibility of measurement errors, meant that the Treasury emphasised the provisional nature of its judgement.

5 See HM Treasury, Trend Growth: Recent Developments and Prospects, April 2002.
6 See Audit of Assumptions for the 2002 Budget, HC 760 Session 2001-02.
7 HM Treasury, Analysing UK fiscal policy, November 1999.
8 HM Treasury, *Evidence on the UK economic cycle*, July 2005.
9 HM Treasury, Budget 2005, paragraph 2.54.
10 http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=805
11 Budget 2000, paragraph 2.37.

16 This provisional assessment remained in place until a new Treasury assessment in July 2005[12], following Office for National Statistics (ONS) revisions[13] to GDP and non-oil Gross Value-Added (GVA) – the variant of GDP used by the Treasury to measure the economic cycle[14] – dating back to 1996. Non-oil GVA is derived by subtracting taxes on products and adding back subsidies to non-oil GDP, on the grounds that taxes and subsidies do not directly affect the economy's productive capacity.

17 A further reason why the Treasury took a revised view of the date of the end of the previous cycle was new data providing an experimental series for non-oil business output (market sector GVA).[15] This series provides an alternative basis for measuring the economic cycle.

18 Overall, on the basis of the new information, the Treasury concluded that there was no clear economic cycle between the first half of 1997 and mid-1999, with output remaining above trend throughout this period. The Treasury's current view is therefore that the previous economic cycle ended in 1997.

There are a number of approaches for defining the economic cycle

19 Harding and Pagan[16] identify three types of cycle in the literature: periodic; the "growth" cycle as used by the Treasury; and turning point cycles, (the latter referred to by the Treasury as "classical cycles" [17]).

20 The *periodic cycle* is based on fitting a smooth wave shape such as a sine or cosine to output data, but this is unlikely to be a useful representation of the irregular nature of economic growth.

21 The *growth cycle* approach has been adopted by many of the policymaking institutions around the world, including the Treasury. This approach is defined in terms of upswings and downswings around the long run trend level of output as shown in **Figure 1a overleaf**. On this approach, a movement in output towards the trend following a turning point, and under the Treasury's definition, completes either an **up-phase** or **down-phase** only if output "decisively" passes through trend.[18] For example, if output heads down towards trend from above but stays above the trend level and does not cross it in a decisive way before moving up again, as in **Figure 1b overleaf**, then the Treasury considers this latter turning point to be a part of the **up-phase** and not the end of the cycle.

22 The *turning point cycle* relies on identifying turning points in output, which correspond to cyclical peaks and troughs. The cycle is then measured from peak-to-peak or trough-to-trough. On this approach there is no necessity to define a trend level of growth, and the upswing and downswing phases of a turning point cycle may or may not oscillate around the long run growth trend.

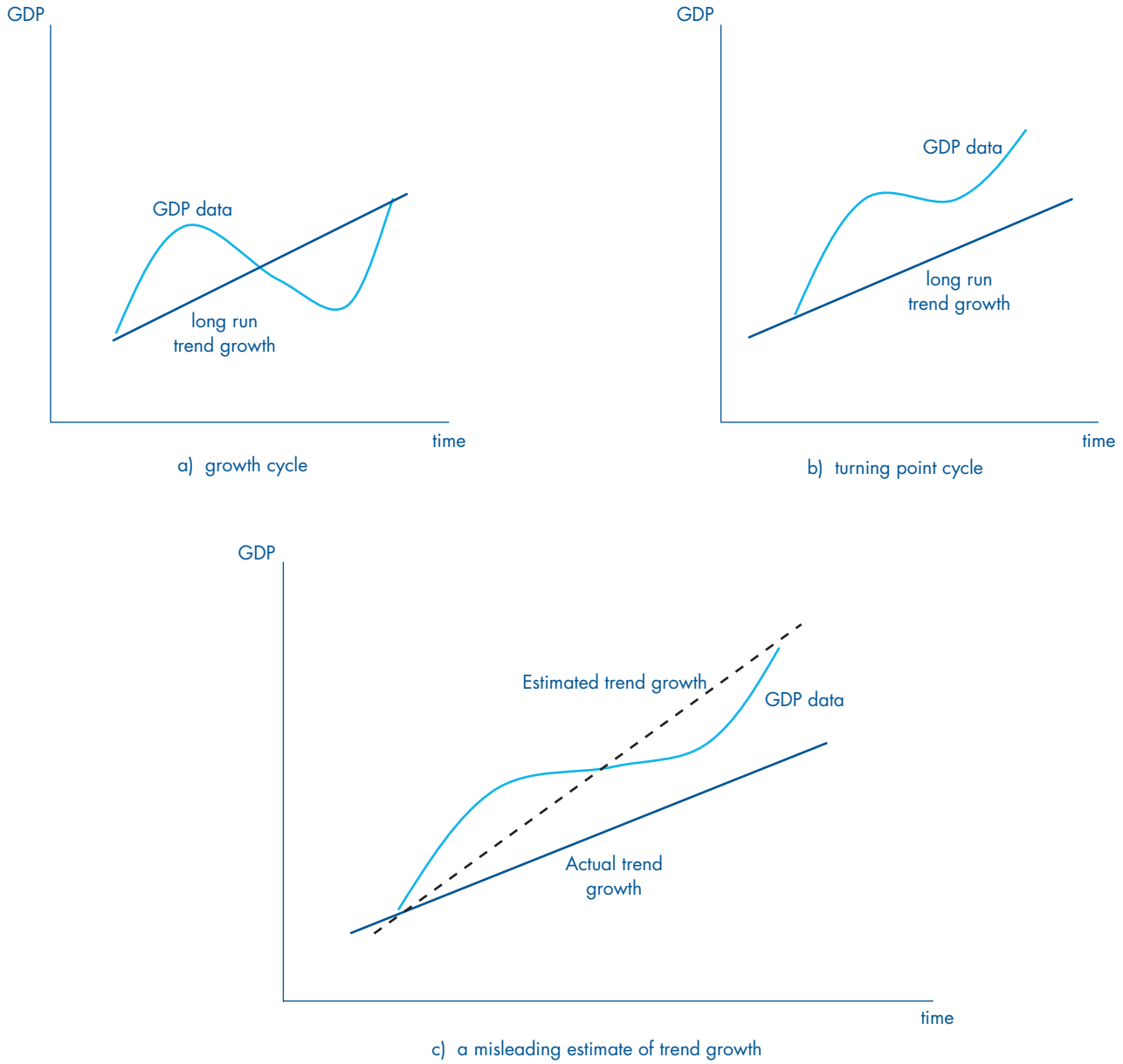
Overall, there are legitimate reasons to favour the Treasury's growth cycle approach

23 There is no ideal way to define the cycle. A trend fitted across what is thought to be a growth cycle may be misleading if it is in fact a turning point cycle as in **Figure 1c overleaf**. But while the growth cycle approach is dependent on the sample of data thought to represent a cycle, the turning point approach also has drawbacks. A short lived slowing of growth in the middle of a prolonged boom, as in Figure 1b, would be interpreted as a cycle, when in fact the economy had remained above the sustainable long run trend throughout the period.

24 A central objective of economic policy is stability, and this requires knowledge of where the economy is in relation to its long run sustainable level. Provided on-trend points can be determined accurately, the Treasury's growth cycle approach has the advantage that it facilitates the estimation of spare capacity in the economy, which is important for setting fiscal policy. A number of other forecasting bodies also use the growth cycle approach, including the National Institute of Economic and Social Research, Oxford Economic Forecasting, the OECD and IMF.

12 HM Treasury, *Evidence on the UK economic cycle*, Box 2.1.
13 Blue Book 2005: http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=1143
14 While the oil and gas sector significantly affects output levels, the Treasury takes the view that fluctuations in oil and gas output do not signal a change in the amount of slack in the economy, and so do not affect the size of the output gap. The main basis for this assumption is that employment in the oil and gas sector is small, and changes in output do not therefore lead to changes in wage pressure or the degree of slack in the economy. This is an approximation as crowding out effects more generally may apply, see Government Economic Service Working Paper no. 54 (Treasury working paper no. 22), *North Sea Oil and Structural Adjustment*, I C R Byatt et al, HM Treasury, 1982.
15 Rhys Herbert and Rob Pike, Office for National Statistics, *A new experimental National Accounts aggregate – Market Sector Gross Value Added*, July 2005.
16 D Harding and A Pagan, *A suggested framework for classifying the modes of cycle research*, Journal of Applied Econometrics, 20, 151-159, 2005.
17 HM Treasury, *Evidence on the UK economic cycle*, paragraphs 2.8,2.9.
18 HM Treasury, *Evidence on the UK economic cycle*, paragraph 3.3.

1 Illustrations of types of economic cycle and the problems of estimating trend growth rates



There are different ways of identifying an economic cycle from the data

25 As well as a choice of how to define the economic cycle, there are a number of ways to identify the cycle from the data. Within the growth cycles approach, they all involve estimating the output gap, defined as actual output minus estimated trend output. In essence, all the methods estimate such a trend, though this is unobservable and cannot ever be checked directly, for example, in the way that an economic forecast can be, by reference to outturn data. Given an estimated trend rate of growth, the output gap can then be estimated by comparing it with actual output.

26 Based on my consultations with the experts listed in Appendix 1, the three main available methods are:

a Statistical filtering. Commonly used approaches are the Hodrick-Prescott[19] and the Baxter-King band-pass filters.[20] These methods use data on the variable of interest, in this case non-oil GVA, and separate the trend over time from fluctuations that are unlikely to be representative of the trend, for example because they occur over very short time periods. The Hodrick-Prescott filter divides output into trend and cyclical components, and the Baxter-King band-pass filter decomposes output into trend, cyclical and 'irregular' (outlier) components. Once the filter has been applied, the output gap at any point in time is calculated as the difference between the actual and trend output at that time. Applying a filter requires an a priori decision about how smooth the trend should be, and this affects both when the output gap is estimated to be zero and its size at other points in the cycle. Simulations in the 2005 IFS Green Budget illustrate these effects;[21]

b Model based, production function, approaches. These account for economic growth in terms of factors of production, (capital stock and workforce), together with the growth of total factor productivity, which is the part of total output not related to the identifiable factors of production. One recent variant used by Harvey et al takes a Bayesian approach, incorporating prior notions of the length of the cycle.[22] The output gap can again be calculated as the difference between actual and long term trend output, when output is at levels consistent with a rate of price inflation that does not increase or decrease; and

c The use of selected cyclical indicators to judge when the economy is on trend. This is the method used by the Treasury to identify on-trend points for completed cycles. The output gap is calculated as the difference between actual output using the non-oil GVA measure and trend. Trend output is determined by the level of output at the start of the cycle and the trend growth rate. When the output gap is positive, the economy is described by the Treasury as in the 'up-phase' of the cycle. When it is negative, the economy is said to be in the 'down-phase'.

27 A further possible method makes use of all available cyclical indicators. The statistical method used is dynamic principal components/factor analysis.[23] The method identifies combinations of cyclical indicators, based on the correlations between the original variables, to identify an underlying trend in output growth. The approach has been used by the Centre for Economic Policy Research to identify a monthly indicator of Euro area GDP,[24] but to date has not been widely applied to dating the economic cycle.

There are advantages and disadvantages to all the methods for identifying the cycle and the output gap

28 Those I consulted emphasised that there is no ideal method of identifying economic cycles. **Figure 2 overleaf** shows the methods used by the organisations I consulted.

29 Statistical filtering methods have the advantage of being simple to estimate, and as shown in Figure 2, they are commonly used, in part because of this. They also do not require judgements to be made about which cyclical indicators to use as they are applied directly to data for output, which is the variable of interest. On the other hand, being purely statistical approaches, they lack theoretical foundations, and have no economic content to explain the cyclical position of the economy, important to those who require such interpretations for deciding monetary or fiscal policy. The results are also sensitive to revisions in existing data; and they have an inherent tendency to converge on the trend by the end of the data series analysed, commonly known as the *end-point problem*, as the trend is disproportionately influenced by the last data points.

19 R J Hodrick and E Prescott, *Post-war U.S. Business Cycles: An Empirical Investigation*, Journal of Money, Credit and Banking 29(1): 1-16, 1997.
20 M Baxter and R G King, *Measuring Business-cycles: Approximate Band-Pass Filters for Economic Time Series*, Working Paper No 5022, National Bureau of Economic Research, 1995.
21 Institute for Fiscal Studies in collaboration with Morgan Stanley, *The IFS Green Budget*, January 2005, Chapter 3.
22 Andrew C Harvey, Thomas M Trimbur, Herman K van Dijk, *Trends and Cycles in Economic Time Series: A Bayesian Approach*, Erasmus University, August 2005.
23 See, for example, L Reichlin, "Factor models in large cross sections of time series", in M Dewatripont, L P Hansen and S J Turnovsky eds *Advances in Economics and Econometrics: Theory and Applications*, 8th World Congress Volume III Econometrics Society, Cambridge University Press, 2003.
24 Altissimo, F., Bassanetti, A., Cristadoro, R., Forni, M., Lippi, M., Reichlin, L. and G. Veronese, *A real time coincident indicator of the Euro area business cycle*, Centre for Economic Policy Research Working Paper, 2001.

2 Methods used by organisations to identify economic cycles and the output gap

Organisation	Methods used
National Institute of Economic and Social Research	Statistical filtering
Oxford Economic Forecasting Ltd	Production function
Confederation of British Industry	Cyclical indicators
Ernst and Young Item Club	Mainly production functions but some use of statistical filtering
Institute for Fiscal Studies/Morgan Stanley	Statistical filtering
Barclay's Capital	Statistical filtering in combination with analysis of key economic data
Bank of Canada	Statistical filtering and production function based information
Organisation of Economic Co-operation and Development	Production function and statistical filters
International Monetary Fund	Production function, capacity utilisation data and statistical filtering
European Commission	Production function and statistical filters

Source: National Audit Office

30 Production functions have the advantage of being constructed using economic aggregates consistent with economic theory. They are based on a simplified model of the economy, using data which are hard to construct, particularly for the capital stock, and the inputs are aggregate measures of a wide variety of sub categories of factors of production. The production function estimates of trend growth and output gap are also known to be susceptible to data and forecast revisions as this approach depends heavily on the forecasts for the labour and capital inputs. Statistical filters are generally used to remove the cyclical elements in labour and capital inputs, as well as the cyclical elements in the total factor productivity component, and will be subject to the end-point problem as above. It is also hard for such methods to take account of structural change.

31 The cyclical indicators approach provides a way of relating trends in overall output to a potentially wide range of variables, and this is a major advantage. The method is indirect, as it is not based on analysis of the variable of interest, though it is possible to check the validity of indicators by assessing their correlation with output trends. The approach requires judgement about the weight to be placed on each indicator, particularly as the indicators do not usually all point to the same conclusion. As a result, conclusions drawn using the method may not be replicable by others unless the judgements are made widely known.

Estimates of the economic cycle are very uncertain

32 All those whom I consulted supported the view that there is great uncertainty attached to estimates both of when the economy is on trend and the output gap, regardless of which method is used. The process was often described as being "as much an art as a science", requiring informed judgement. In view of the advantages and disadvantages of each of the methods for identifying the cycle, the general view among those I consulted was that the Treasury's approach based on cyclical indicators was not unreasonable. It was pointed out, however, that in view of the uncertainties, there would be advantage in not relying on only one method and that the use of a combination of methods would provide a consistency check. While the Treasury has in the past published results from statistical filtering and production function approaches, its 2005 analysis relied on the cyclical indicators approach.

The Treasury uses a wide range of cyclical indicators to identify on-trend points

33 The Treasury's cyclical indicators are used to help identify points in the economic cycle when the economy is judged to be operating at normal capacity, when the economy is on trend (zero output gap) with no upward or downward pressure on inflation. The Treasury's current estimate of the end date of the previous economic cycle is based on 22 indicators (some of which use more than one data series), **Figure 3 on page 8**. The indicators are based on a combination of business survey data, economic analysis and Office for National Statistics data.

34 Appendix 2 shows the time series for the indicators, together with their average levels. Further details of the indicators are given in the Treasury paper published with the 2005 Pre-Budget Report.[25]

35 The period used in the calculation of the average is important in terms of possible bias that may be imparted. For example, averages calculated from above trend data across a part cycle will be positively biased. The Treasury tests the periods it uses to calculate long run averages to see whether the output gap estimates average out reasonably close to zero and the data series have a normal distribution. The latter test indicates if the data over the chosen period lie equally above and below the average, as would be required if the average is to be interpreted as a "normal" level associated with a zero output gap. Details of the tests are given in the Treasury's paper.

36 The Treasury's analysis shows that a number of the cyclical indicators are not normally distributed across the complete period for which the data are available. The Treasury has accordingly excluded the early part of the data series, influenced by the protracted down-phase of the early 1990s, which would bias the long term averages downwards. This approach has been adopted by others.[26]

37 Given the difficulties in clearly identifying a "normal" level of an indicator, there is a significant element of uncertainty about the interpretation of the long run averages used.

38 With the exception of labour's share of national income and capacity utilisation in financial services, the same set of indicators as shown in Figure 3 was used by the Treasury in making its Budget 2000 assessment that 1997H1 was an on-trend point marking the end of the cycle that started in 1986, and for the provisional judgement that mid-1999 was an on-trend point marking the end of the cycle that started in 1997.

39 The indicators in Figure 3 concentrate to an extent on labour shortage information, with ten out of 22 relating to this, but they nevertheless cover a wide range of information. Though there are problems, such as non-availability of the data for some periods, the Treasury's choice of indicators is reasonable. The CBI for instance uses a very similar mix of indicators. The British Chambers of Commerce confirmed that the indicators were suitable ones to use in the context of dating the economic cycle.

40 My consultations stressed the inevitable uncertainty around the interpretation of some data, for example, survey responses based on opinion about the degree to which firms were operating at or below capacity, as well as the general level of uncertainty in dating the economic cycle. Some of the series have a long history, however, and this experience aids interpretation. The CBI Industrial Trends Survey has been running for nearly 50 years, (since 1972 on a quarterly basis), though it covers only the manufacturing sector. The weight of this sector in the economy has reduced over time, but the survey still covers companies employing about a third of all manufacturing workers. The British Chambers of Commerce Quarterly Economic Survey has been running since 1989, and it covers close to 6,000 manufacturing and service sector companies spread throughout the UK employing, between them, more than a quarter of a million employees.

41 There is a degree of uncertainty regarding some of the components of the indicators. For example, the non-Accelerating Inflation Rate of Unemployment used in one indicator is hard to estimate with accuracy, but the Treasury has used up-to-date external estimates from three sources, which provides a degree of assurance on this point.

42 One point put to me during my consultations including by the NIESR and CBI is that the measured degree of spare capacity in the economy will depend not just on the level of the cyclical indicators, but also on their rate of change. The evolution of a variable such as capacity may itself be cyclical, through the "accelerator effect", where new investment is induced by increasing output. The more quickly the economy grows, however, the less likely this effect is to apply, and bottlenecks will appear instead. The Treasury has acknowledged this possibility.[27] It considers it not to have been a material factor in the period under review, as it was not one of sustained above trend growth.

43 It is important, if they are to be useful, that the cyclical indicators track trends in overall output with reliability. The Treasury has calculated correlation coefficients between year on year changes in the survey based indicators and changes in non-oil GVA over the period from 1990 to 2005 as a simple test. Year on year changes are used because the cyclical indicator data are not seasonally adjusted but non-oil GVA is. For the other indicators, such as average earnings, increase in the growth rate of earnings would be expected as the rate

25 HM Treasury, Technical Note on Cyclical Indicators, available at http://www.hm-treasury.gov.uk/pre_budget_report/prebud_pbr05/assoc_docs/prebud05_adindex.cfm
26 See, for example, *Analysis of private sector factor utilisation*, Chart C, Bank of England Inflation Report, February 2005.
27 *Fiscal policy: public finances and the cycle*, page 5, HM Treasury, March 1999.

3 Treasury cyclical indicators currently used for dating the end of the previous economic cycle

Source	Indicators (using quarterly data)
CBI Industrial Trends Survey	Percentage of manufacturing firms with output below capacity
	Percentage of manufacturing firms which think supply of skilled labour will limit output in the next three months
CBI/PWC Financial Services Survey	Percentage of financial firms with business above or below normal
British Chambers of Commerce Quarterly Economic Survey	Percentage of manufacturing firms operating either at or below full capacity
	Percentage of service firms operating either at or below full capacity
	Percentage of manufacturing firms experiencing difficulties finding suitable staff
	Percentage of service firms experiencing difficulties finding suitable staff
	Percentage of manufacturing firms experiencing difficulties in finding skilled manual and technical staff
	Percentage of service firms experiencing difficulties in finding skilled manual and technical staff
	Percentage of manufacturing firms experiencing difficulties in finding professional/ managerial staff
	Percentage of service firms experiencing difficulties in finding professional/ managerial staff
	Percentage of manufacturing firms experiencing difficulties in finding clerical labour
	Percentage of service firms experiencing difficulties in finding clerical labour
	Percentage of manufacturing firms experiencing difficulties in finding semi/unskilled staff
	Percentage of service firms experiencing difficulties in finding semi/unskilled staff
Office for National Statistics	Number of vacancies at Job Centres per 100 employee jobs[1]
	Year on year rate of Consumer Price Inflation and Retail Price Inflation excluding mortgage interest payments (RPIX)
	Year on year growth rate of quarterly average earnings index, seasonally adjusted, private sector and private sector services, including bonuses
	Year on year growth rate of quarterly average earnings index, seasonally adjusted, manufacturing and services (private sector), including bonuses
	Year on year percentage change in unit wage costs, whole economy, seasonally adjusted; and unit wage cost growth deflated by RPIX
	Total compensation of employees, (current prices), divided by GVA at basic prices, (current prices)
NAIRU estimates from OECD, European Commission and Oxford Economic Forecasting Ltd; unemployment data from ONS	Estimated UK NAIRU minus unemployment rate seasonally adjusted ILO definition, percentage points difference

Source: HM Treasury

NOTE

1 Data for this series are available only up to 2001.

of growth of output picks up. The expected relationship would therefore be between changes in the year on year growth rate and changes in year on year growth in non-oil GVA. All the correlations show a high degree of statistical significance, though the extent to which any one indicator moves exactly in line with non-oil GVA varies.

Identification of on-trend points in 1997 and 1999 is based on judgements and is uncertain

44 The Treasury's summary judgements of what the cyclical indicators showed are set out in the relevant Budget and Pre-Budget documentation. The Treasury was not, however, able to provide me with any internal papers describing in more detail how the cyclical indicators information has been used to identify 1997 and 1999 as on-trend points.

45 The *Financial Statement and Budget Report 1997* provided a review of spare capacity and the output gap at that time, **Box 1 overleaf**,[28] concluding that the output gap was likely to be close to zero, though there was a significant risk that output could already be above its trend level.[29] The subsequent 1997 Pre-Budget Report concluded, weighing up the indicators of pressure of demand, that "it was difficult to discriminate between the first and second quarters of 1997 as points when output was on trend. The economy was therefore assumed to be on trend, "on average in the first half of the year".[30]

46 Budget 2000 suggested that 1999 might have been an on-trend point:[31]

> "Output fell below trend towards the end of 1998, but only for a very short time, before returning to trend again in the middle of 1999. Thus, early indications suggest the economy may have completed a full economic cycle – albeit a short and shallow one by historical standards – since 1997-98. Given the closeness to trend and possible measurement errors, this conclusion can only be provisional at this stage."

47 The 2000 Pre-Budget Report provided a further assessment, based on various cyclical indicators, **Box 2 overleaf**,[32] concluding that the economy was around trend.[33]

48 The Treasury does not use any formal weighting system to take a view of the cyclical indicators and makes judgements based on an assessment of the data available. The majority of those whom I consulted believed that the use of a formal weighting system would not be justified given the uncertainties in the data and their interpretation.

The cyclical indicator evidence is consistent with both 1997 and 1999 being on-trend points, though there is considerable uncertainty in making such judgements

49 The Treasury's assessments that the economy was on or close to trend in both 1997 and 1999 are uncertain, and are based on applying judgement in their review of the evidence of the cyclical indicators. As the detail of such judgements is not available in internal Treasury documents I cannot review the underlying thinking directly. I have instead adopted the straightforward approach of giving each of the Treasury's cyclical indicators equal weight and assessing what the preponderance of evidence is on this basis.

50 Based on the data shown in Appendix 2, **Figure 4 on page 12** presents an assessment of the position of each cyclical indicator used by the Treasury in relation to its long run trend, itself uncertain for the reasons given above. The dates used for the assessment correspond to the Treasury estimates of first half 1997 and mid 1999 as on-trend points.

51 A caveat which applies is that the above or below assessments used in relation to the relevant long run average do not take account of the extent to which this is the case, though when an indicator is close to the trend it has been taken as being "on" trend. One approach to this issue would be to define a minimum distance away from the trend for it to be regarded as off trend. For example, decisions could be taken on whether data were outside a given number of standard deviations from the mean. However, since the relationship between each indicator and the economic cycle is likely to vary over time as the structure of the economy changes, such an approach would be problematic. In addition, the data for some series show that the indicator was close to trend throughout the period 1997-1999.

28 Presented here verbatim.
29 *Financial Statement and Budget Report 1997* Chapter 3 paragraph 3.15.
30 HM Treasury Pre-Budget Report, November 1997, paragraph A19.
31 Paragraph 2.37.
32 Presented here verbatim.
33 Paragraphs A16, A17.

BOX 1 The Treasury's Budget 1997 assessment of the output gap based on cyclical indicators

Spare capacity and the output gap

The output gap is the difference between actual output and a measure of "potential" or "trend" output. It can be used as a measure of demand pressure – i.e. the degree of under or over-heating in the economy. If actual output were above trend – a positive output gap – for a sustained time, experience suggests there would tend to be upward pressure on inflation.

It is impossible to measure the output gap with any degree of certainty. Business surveys of capacity utilisation provide an indication of short-term capacity pressures in product markets. And surveys of skilled labour shortages, together with other labour market indicators – unemployment, vacancies and average earnings – can be used to estimate the degree of slack in the labour market.

Capacity utilisation

The most quoted measure of capacity utilisation, from the CBI survey of manufacturing, has been just above its long-run average since mid-1994. But it is unlikely that the economy as a whole was above trend in 1994, so soon after the early 1990s recession. Other surveys suggest that capacity utilisation may be tighter in the service sector. The British Chambers of Commerce (BCC) survey shows that it has continued to rise in services in recent quarters and is now above its level in 1989, when demand pressure was certainly high. The Building Employers' Confederation survey indicates that capacity utilisation is also slightly above its long-run average in construction.

Skilled labour shortages

Indicators of skilled labour shortages are more conflicting. The CBI survey suggests that they may still be slightly below average in manufacturing. However, the BCC survey suggests that skill shortages are back to their 1989 levels in both manufacturing and services.

Labour market indicators

Other indicators suggest that the labour market has tightened in recent months and may now have little or no slack remaining. (If this were correct, the scope for further falls in unemployment, without putting upward pressure on inflation, would depend solely on structural reforms.) Unemployment has continued to fall, although part of the sharp decline in the claimant count since last autumn can be attributed to distortionary effects from the introduction of the Jobseeker's Allowance (JSA). Vacancies in early 1996, even before JSA had distortionary effects, were already back to the levels seen in the late 1980s. There has also been a pick-up in average earnings growth since mid-1995, with a steady rise in manufacturing and a sharper rise in service sector earnings growth.

Speed limits

It is possible that if the economy is growing fast enough, inflation could still rise even when the economy is operating below its supply potential, i.e. with a negative output gap. This is the so-called "speed limit" effect. High levels of capacity utilisation, which may reflect the weakness of investment in recent years, began to show in the manufacturing sector as early as 1994. Since then manufacturing growth has slowed, but service sector output has accelerated, and this has been reflected in the acceleration in service sector earnings.

The output gap

These modest inflationary pressures probably reflect the economy running into speed limits in first the manufacturing and then the service sector, though they do not necessarily imply that the output gap in the economy as a whole has turned positive. The evidence overall suggests that the output gap is now close to zero. But there is a significant risk that output could already be above its trend level (a positive output gap).

Source: Financial Statement and Budget Report 1997, Chapter 3

BOX 2 The Treasury's 2000 Pre-Budget Report assessment of 1999 as an on-trend point

Business survey indicators of capacity and labour utilisation are broadly consistent with the economy being at or close to trend around mid-1999. For manufacturing, both the CBI and British Chamber of Commerce (BCC) measures were close to their long-run averages at this point, as was the CBI indicator of skilled labour shortages. In services, the BCC capacity indicator exceeded its long-run average throughout the year, but remained close to its level during the first half of 1997 when the economy is previously estimated to have been on trend.

Wage and price inflation have remained subdued over this period, though it is difficult to disentangle underlying domestic pressures from the downward impact of sterling's earlier appreciation. The upturn in underlying service sector inflation over recent years, for example, poses the risk that fairly significant pressures on capacity have emerged. However, the absence of any clear trend in domestic cost growth suggests that output has remained fairly close to productive potential throughout. Buoyant GDP growth over recent years – averaging just over 2½ per cent a year between the first half of 1997 and mid-1999 – therefore appears to have been broadly matched by an equivalent expansion in trend output.

Source: 2000 Pre-Budget Report, paragraphs A16-17

52 Taking the indicators together on the basis that they all have equal weight, Figure 4 indicates that there is a case for regarding both 1997 and 1999 as on-trend points, on the basis of the frequency of "on" assessments, which shows, particularly for 1997, that a number of the indicators were at their long run average value. This is by no means true of all the indicators in either year, however, and because of this and in light of the caveats above, there is uncertainty in making an overall judgement.

Revised national accounts data have led the Treasury to conclude that output did not decisively cross the long run trend in 1999

53 As far as dating the economic cycle is concerned, the Treasury's definition requires that the end or start point must not only be an on-trend point but output must also decisively cross the long run trend. The evidence above suggests that both 1997 and 1999 can be regarded as on-trend points. The Treasury's current assessment, compared with its provisional Budget 2000 judgement, is that whereas output was regarded then as possibly having fallen below trend, new evidence suggests that it did not.

54 The main reason why the Treasury now regards mid-1999 as being an on-trend point, but not the end date of the cycle that started in 1997 (or the start date of the current cycle), is that, in June 2005, the Office for National Statistics, ONS, revised past data for whole economy non-oil GVA.

55 These revisions reflected methodological change and followed earlier revisions made since the data were first published. Up to 2002, the data were revised by ONS to take account of more complete and comprehensive data sources. In 2003 revisions were made as a result of improvements to price deflators for some components of the expenditure measure. These generally resulted in downward revisions to the price indices, so that when used for deflation, the result was upward revisions to the volume series.

56 The 2005 upward revisions to the estimate of non-oil GVA in 1999 arose from three main sources:

- revisions to ONS's approach used to convert between GVA (at basic prices) and GDP (at market prices) in volume terms. The difference between the two types of valuation comprises the taxes on products, such as VAT, less subsidies on products. ONS's revised approach removes the effect of increases in VAT compliance in recent years, as this conceptually should not affect GDP volume growth. Previously, increasing compliance was widening the gap between GDP and GVA. The new methodology brings the measures of volume growth closer together. ONS estimates that this change accounts for two thirds of the upward revision;
- ongoing work on the measurement of government spending, which has led to a more accurate allocation of expenditure by function. There were reallocations of central government consumption expenditure away from areas where volumes of output are measured by direct output indicators, such as health or education, to areas such as public administration where output is measured by inputs, for example employment or deflated procurement costs. This increased output as a result of higher levels of deflated procurement. ONS estimates that about one sixth of the upward revision in non-oil GVA in 1999 was due to this reallocation effect; and
- changes to the adjustments that are a normal part of the ONS method to achieve consistency between the production, expenditure and income measures of gross domestic product. ONS estimates that about a further sixth of the upward revision was due to these changes.

4 Position of the cyclical indicator in relation to its long run average, above (+), below (-) or at or close to its average level (on), in 1997 and 1999

Indicator	First half 1997	Mid 1999
Percentage of firms with output below capacity	+	on
Percentage of manufacturing firms operating either at or below full capacity	-	-
Percentage of service firms operating either at or below full capacity	on	on
Percentage of financial firms with business above or below normal	+	+
Percentage of manufacturing firms which think supply of skilled labour will limit output in the next three months	on	on
Percentage of manufacturing firms experiencing difficulties in finding skilled manual and technical staff	on	-
Percentage of service firms experiencing difficulties in finding skilled manual and technical staff	on	on
Percentage of manufacturing firms experiencing difficulties in finding professional/ managerial staff	+	-
Percentage of service firms experiencing difficulties in finding professional/ managerial staff	+	on
Percentage of manufacturing firms experiencing difficulties in finding clerical labour	on	-
Percentage of service firms experiencing difficulties in finding clerical labour	+	on
Percentage of manufacturing firms experiencing difficulties in finding semi/unskilled staff	on	+
Percentage of service firms experiencing difficulties in finding semi/unskilled staff	on	on
Percentage of manufacturing firms experiencing difficulties finding suitable staff	on	+
Percentage of service firms experiencing difficulties finding suitable staff	on	on
Number of vacancies at Job Centres per 100 employee jobs[1]	+	+
Estimated UK NAIRU minus unemployment rate, percentage points difference[2]	on/-/-	-/on/-
Year on year growth rate of Consumer Price Inflation and Retail Price Inflation excluding mortgage interest payments (RPIX) respectively	on/on	-/-
Year on year growth rate of quarterly average earnings index, seasonally adjusted, all private sector and private sector services including bonuses, respectively	on/on	on/+
Year on year growth rate of quarterly average earnings index, seasonally adjusted, manufacturing and services (public and private sectors), including bonuses respectively	-/-	+/-
Year on year percentage change in unit wage costs, whole economy, seasonally adjusted; and unit wage costs deflated by RPIX	on/on	on/+
Total compensation of employees, (current prices), divided by GVA, at basic prices, (current prices)	Trough turning point	increasing

Source: National Audit Office

NOTE

1 This data series was discontinued in 2001.

2 OEF zero; EC, OECD below zero in 1997. EC above zero; OEF below, EC on, OECD below in 1999.

57 **Figure 5** shows the results of the ONS data revisions on output growth. In particular, 1999 non-oil GVA growth was revised up from 2.6 per cent to 3.1 per cent, changing the profile of the economic cycle significantly around 1999.

58 Taking 1997 and 2001Q3[34] as on-trend points, **Figure 6** shows the Treasury's estimates of the output gap using non-oil GVA before and after the June 2005 ONS data revisions, and as at Budget 2000. Over time, the data revisions have resulted in a reduction in the extent to which the economy was estimated to be in a down-phase, and on the latest data, output in 1999 barely crossed trend. With the apparent absence of a decisive pass through the trend, marking a complete down-phase of the cycle, the Treasury has concluded that, though still an on-trend point, 1999 cannot be regarded as the end date of the cycle that started in 1997.

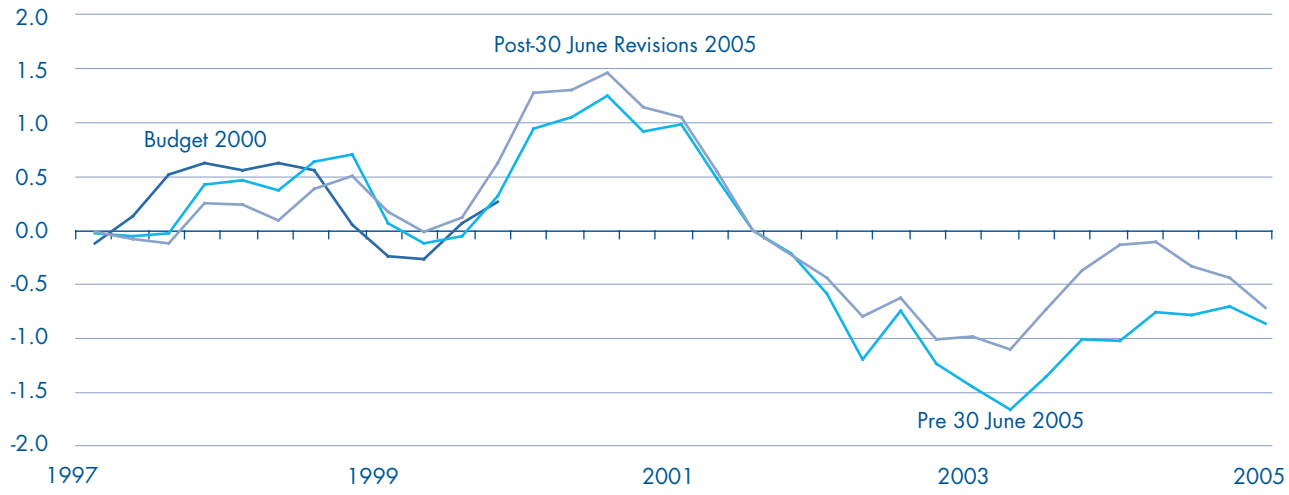
5 Non-oil GVA growth estimates before and after June 2005 ONS data revisions

	Post Blue Book 2005	Pre Blue Book 2005	Budget 2000
1997	3.2	3.3	3.4
1998	3.4	3.5	2.4
1999	3.1	2.6	1.8
2000	4.2	4.1	2¾(F)

Source: HM Treasury

NOTE
(F) = Forecast

6 Treasury estimates of the output gap from 1997 to date, before and after 30 June 2005 ONS revisions to non-oil GVA, and at the time of Budget 2000



Source: HM Treasury

34 Using the cyclical indicators approach, 2001Q3 is estimated by the Treasury to be the next on-trend point after 1999, see HM Treasury, *Trend Growth: Recent Developments and Prospects*, April 2002, paragraph 2.8 and Box 2.1. I have not been asked as part of this audit to review whether 2001Q3 can be regarded as an on-trend point. The evidence presented by the Treasury in *Trend Growth* points to a mix of indicators, at, above and below their long term trend levels.

59 **Figure 7** shows the longer term Treasury estimates of the output gap using the revised data. The Treasury dates previous completed economic cycles as follows:

- 1972Q4 to 1978Q1;
- 1978Q1 to 1986Q2; and
- 1986Q2 to 1997H1.

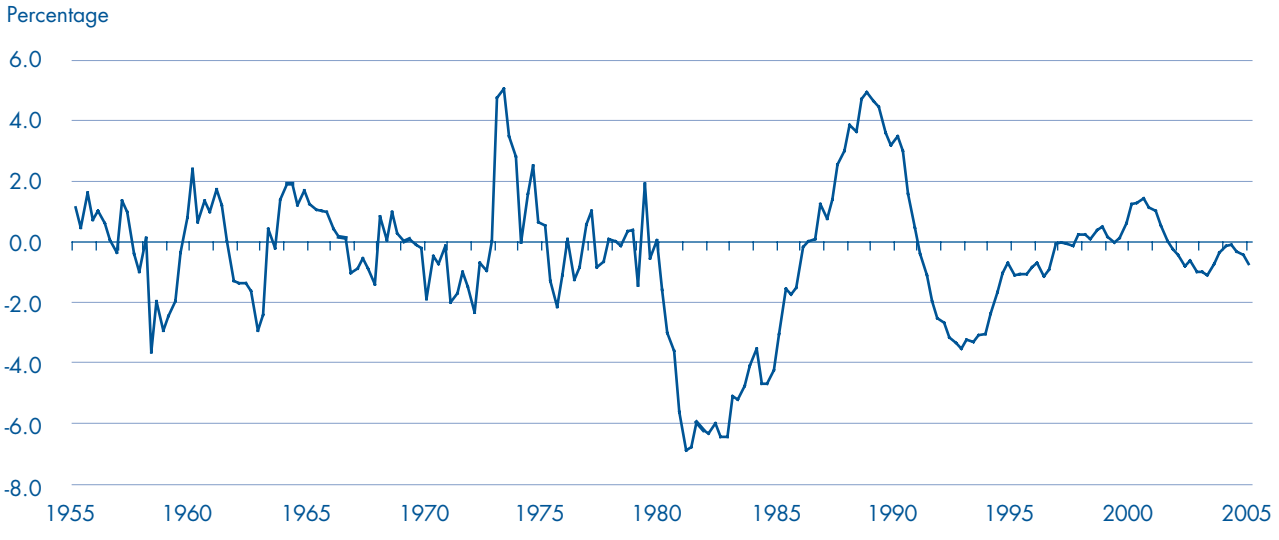
60 One of the Treasury's supporting arguments for this revised view comes from the new cyclical indicator for the labour share of national output, measuring the proportion of national income paid to workers. **Figure 8** shows that turning points in this indicator tend to be matched, though not perfectly, to on-trend points previously identified by the Treasury. This is not the case in 1999, when the labour share was growing, unlike in 1997, when it was a turning point in this data series. As the Treasury points out,[35] being just one of the indicators for dating the cycle, the evidence from this indicator is corroborative rather than conclusive.

61 The Treasury puts forward additional evidence for the view that 1999 was not a point at which output crossed the long term trend decisively, based on trends in market sector, rather than whole economy, non-oil GVA. The rationale for focusing on market output is that the output gap should measure fluctuations in activity arising from the business cycle, and as such public sector output could be taken as less dependent on aggregate demand than private sector output.

62 In July 2005, the ONS produced an "experimental" data series on market sector value added.[36] The measure includes almost all market activity and excludes most non-market activity, in particular that of general government. While the ONS regards the new measure as a very close approximation to market sector value added, two caveats should be noted. Firstly, it is not possible to exclude the value added of non-profit making institutions serving households such as charities from other activity, even though most of this would not be marketed. Secondly, even though some parts of general government value added are marketed, all of this is treated as non-market activity.

63 **Figure 9** shows the output gaps estimated by the Treasury, using whole economy non-oil GVA and market sector data, again based on taking 1997 and 2001Q3 as on-trend points. The comparison shows that the non-oil market sector part of the economy was considerably more buoyant relative to trend in the late 1990s than whole economy non-oil GVA. The Treasury suggests that this is evidence for output not having crossed the long term trend in a decisive way in 1999. Again this is evidence which is corroborative, rather than conclusive, as the indicator covers only part of the economy.

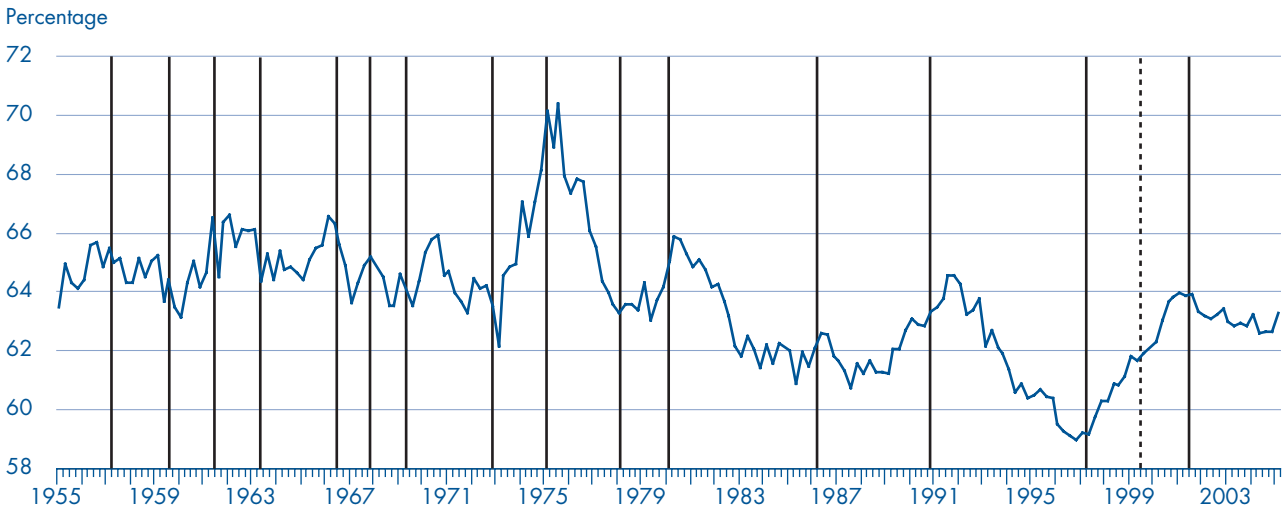
7 Output gap 1955-2005 as estimated by the Treasury based on post-June 2005 ONS data



Source: HM Treasury

35 Evidence on the UK economic cycle, para 5.8.
36 Rhys Herbert and Rob Pike, *A new experimental National Accounts aggregate – Market Sector Gross Value Added*, Office for National Statistics, July 2005.

8 Turning points in the labour share in national income tend to coincide with on-trend points identified by the Treasury, shown by the vertical lines, 1999 shown dashed

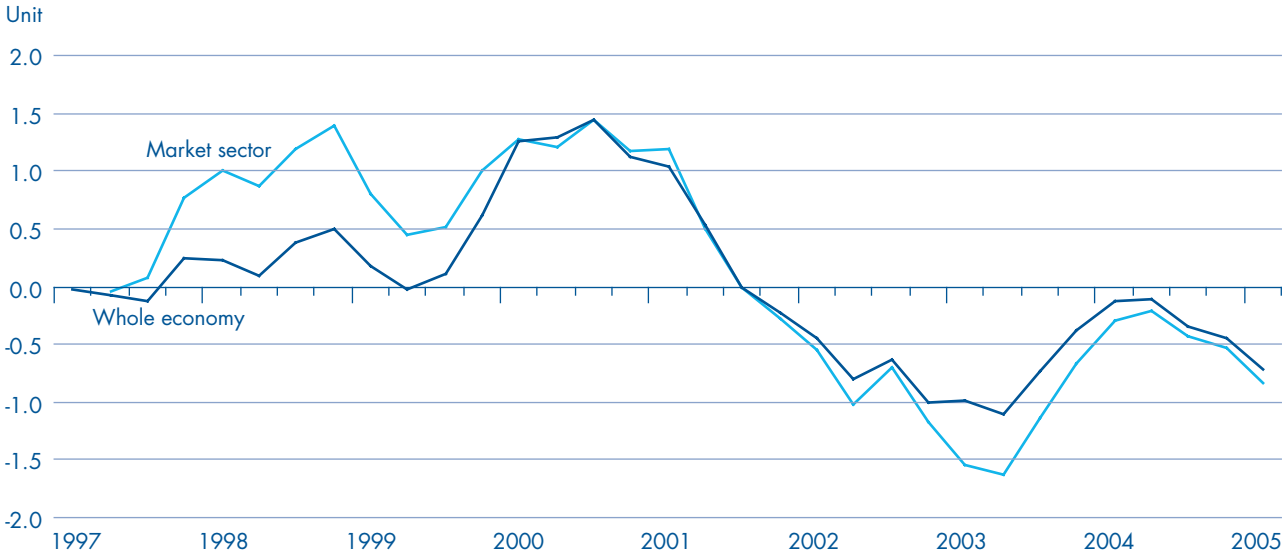


Source: HM Treasury

NOTE

Vertical lines represent on-trend points previously identified by HM Treasury.

9 Treasury estimates of whole economy and market sector output gap (excluding oil)



Source: HM Treasury

There is a range of estimates of the size of the output gap in the second half of the 1990s

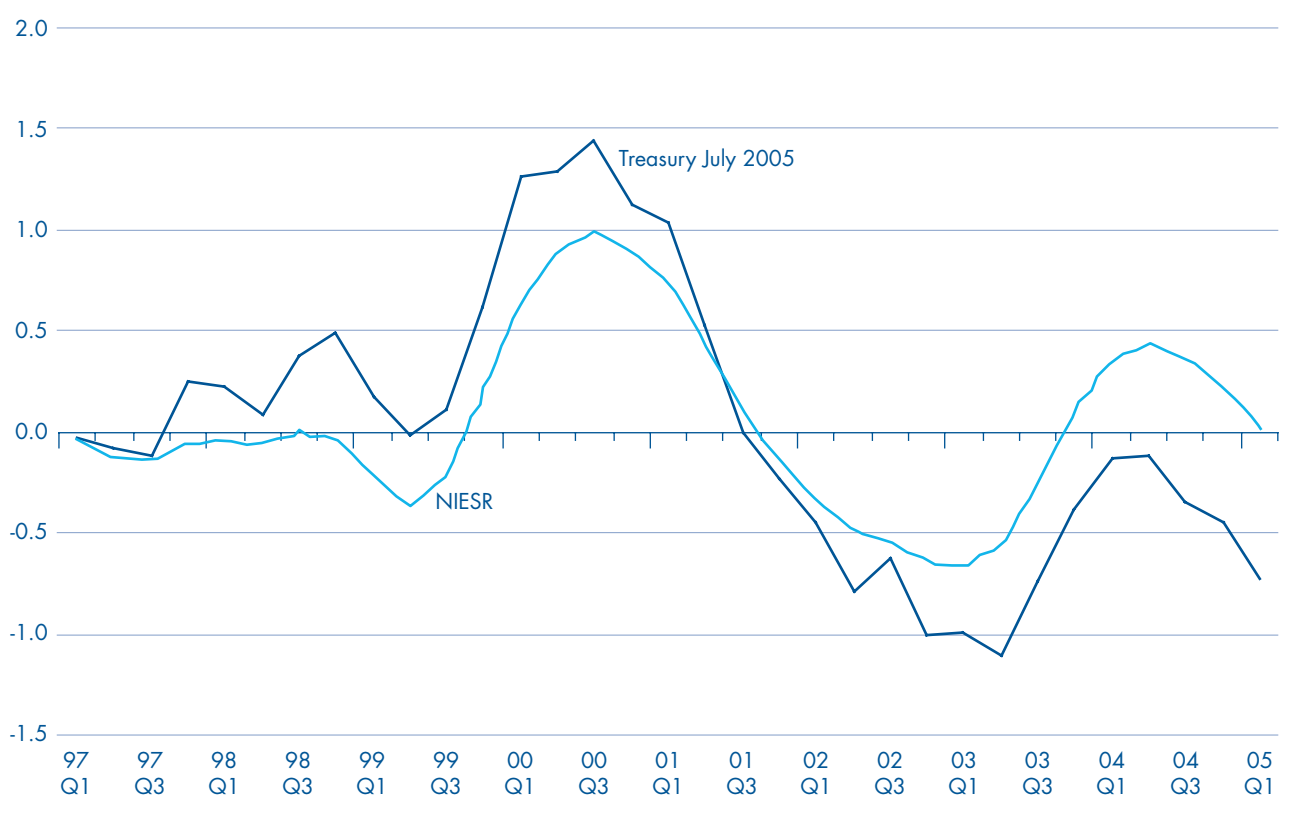
64 I asked external forecasting institutions what estimates they had made of the dating of the economic cycle. While external forecasting organisations carry out work to identify where the economy is in the cycle now, many do not usually actually date it because they said they did not need to know the position of the economy some years ago to make their current forecasts.

65 The National Institute referred me, however, to the analysis of the output gap it has carried out on the latest ONS output data, published in July 2005,[37] using a statistical filtering technique. The results of this analysis are shown in **Figure 10**, which indicates that 1999 was a below trend year, in distinction to the Treasury's conclusion.

66 The CBI has also produced estimates of the output gap using the latest national accounts data, using a methodology similar to the Treasury's. The CBI estimates of the output gap, **Figure 11**, indicate that the economy was on-trend at the start of 1998 rather than 1997, approaching trend in 1999 but remaining above it.

67 The CBI's estimates of the output gap for 1999 are consistent with the Treasury's view that the economy did not cross trend decisively in this year. However, Figure 11 shows that the CBI's estimate of the size of the output gap in 1999 was very similar using either the previously published or June 2005 revised ONS data. The CBI had previously dated the end of the previous economic cycle to 1998 on the basis of analysing a range of cyclical indicators. In the CBI's view, there is therefore no case for altering the date of the start of the cycle on the basis of the revised data.

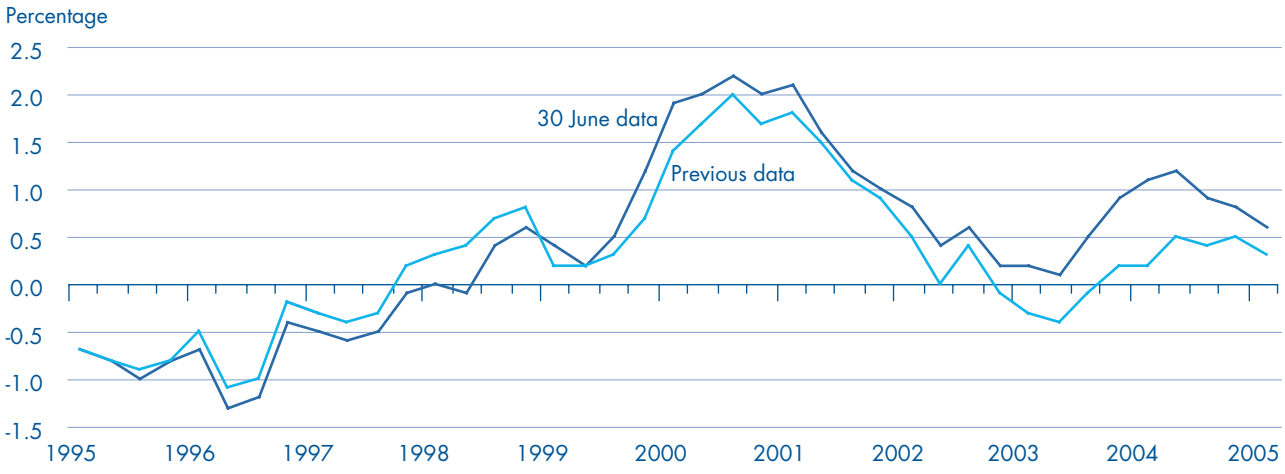
10 National Institute estimates of the output gap using June 2005 revised ONS output data, in comparison with the latest Treasury estimates



Source: NIESR and HM Treasury

37 National Institute for Economic and Social Research Review, No 193, July 2005.

11 CBI estimates of the output gap, percentage deviation from potential output, based on non-oil GVA



Source: CBI

68 Organisations including the OECD, IMF and European Commission make estimates of the UK output gap. **Figure 12 overleaf and Figure 13 on page 19** show their estimates, which take account of the latest revisions to national accounts data.

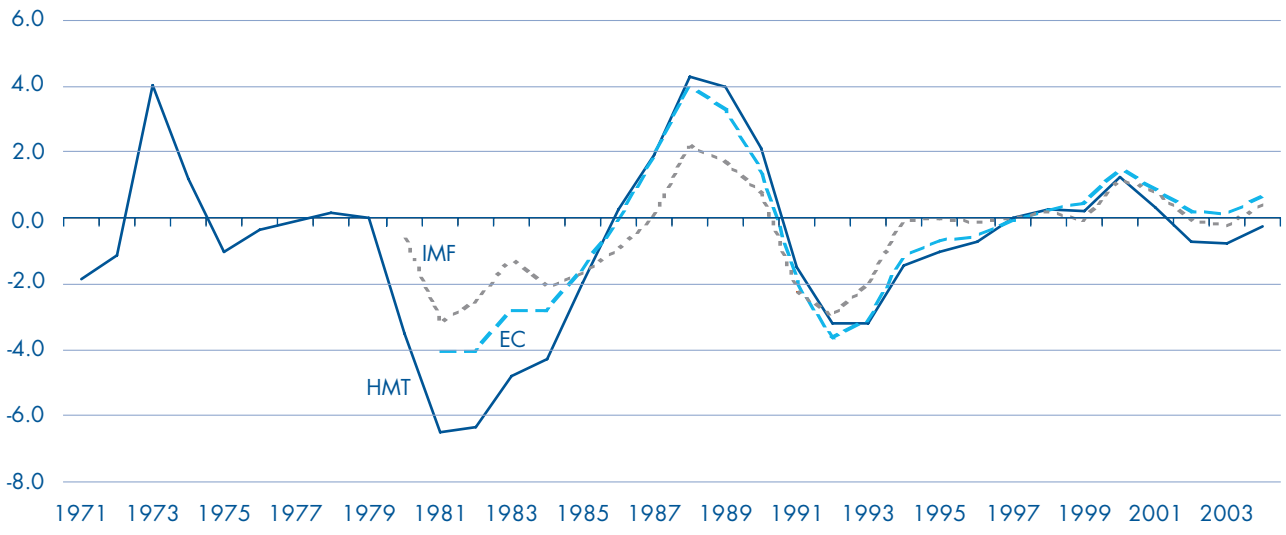
69 All the estimates of the output gap show similar patterns, with the IMF and EC estimates of the output gap showing, like the Treasury's, no clear down-phase in 1999. The OECD estimate of the output gap crosses below the long term trend in 1999 however, though not to any great extent. The OECD's general view when I consulted the organisation for this audit is that it is difficult to assess when the output gap series crosses the long run trend with any confidence. The OECD calculates that the average standard deviation of the annual output gap over the last decade resulting from the updating of past estimates and from data revisions is about ¼ of one percentage point. The IMF's view is that output was very close to potential output from around 1997 to 1999 and that it was not possible to pin down a precise end date of the previous cycle.

The choice of either 1997 or 1999 as the end date for the previous economic cycle does not in practice change the Treasury's estimate of the long term underlying growth rate, and hence there is no effect on the fiscal projections, all else equal

70 The annual average growth rate over the economic cycle, measured between 1997H1 and 2001Q3, ignoring the possibility that 1999 marked the start/end of a distinct phase of the cycle, was 3.14 per cent. Over the period 1999 to 2001Q3, the average annual growth rate was 3.12 per cent, which is very little different.

71 The long term growth rate as calculated by the Treasury, taking account of the growth rates across individual cycles, is therefore robust to the choice of either 1997 or 1999 as the end date for the previous economic cycle. For the purposes of making the fiscal projections, the Treasury has continued to use a figure of 2½ per cent per year to the end of 2006-07, and 2¼ per cent thereafter, as a cautious estimate of the long term growth rate.

12 Comparisons of output gap estimates by the Treasury, European Commission and IMF



Source: HM Treasury, EC and IMF

Dating the end of the previous economic cycle: Conclusions and recommendations

72 There is little doubt that dating the economic cycle is an uncertain process. There is no clear best methodology among those available for identifying on-trend points, and each has its advantages and disadvantages.

73 The Treasury's method of using cyclical indicators to identify on-trend points is a reasonable one, bringing information of an economic nature to bear, though it is necessary to make judgements about the emphasis to be given to the indicators used, which may vary from assessment to assessment, and are difficult to make transparent.

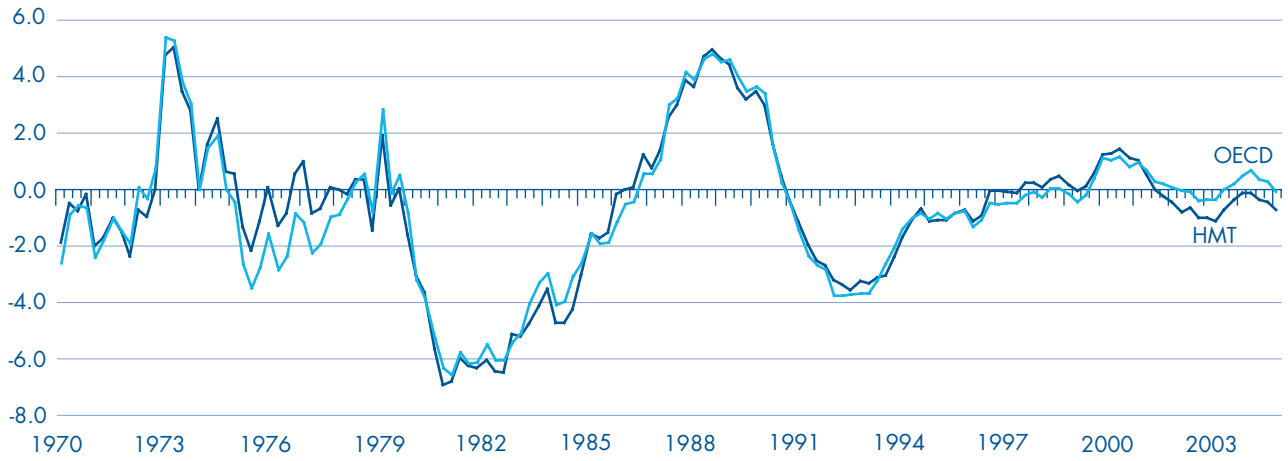
74 The indicators used by the Treasury are similar to those used by other organisations which use this approach, and are a reasonable choice, though it may be possible in future that additional indicators would also have validity. On this occasion the Treasury has for the first time incorporated information from the labour share in national income into its judgement. The Treasury should therefore continue to keep the mix of indicators used under review and report on the strength and weaknesses of any new ones adopted.

75 In dating the cycle, the Treasury's definition is that output must cross its long term trend decisively and not merely come close to trend. There are other definitions of the cycle whose advocates would argue are superior. The Treasury's approach is, however, consistent with considering fiscal policy in the context of where the economy is in relation to the long run sustainable path.

76 It is as likely as not that the output gap was close to zero for much of the period between 1997 and 1999, as suggested by the Treasury's estimates. The evidence that the economy did not decisively enter a below trend down-phase in 1999 is fairly strong, based on the fact that a majority of the cyclical indicators used by the Treasury were either on or above trend in 1999.

77 Though there are many uncertainties, there are reasonable grounds to date the end of the previous economic cycle to 1997. Calculations of long term growth rates needed in making the fiscal projections are not sensitive to the choice of either 1997 or 1999 as the end date for the previous cycle. The average growth rate over either period is virtually the same, at about 3.1 per cent per year, and the Treasury in any case uses lower trend growth rates on the grounds of caution. In this respect dating the end of the previous economic cycle to 1997 would therefore not reduce the extent of caution in making the fiscal projections.

13 Comparison of quarterly output gap estimates



Source: HM Treasury and OECD

78 The golden rule and sustainable investment rule are assessed over the period of an economic cycle, so a change to the end date of the cycle would affect the conclusions reached. I have not been asked to comment on whether these fiscal rules have been met. Data to make such an assessment are readily available and show that the current budget was in deficit in 1997-98 with a more than offsetting surplus in 1998-99.

79 Some reduction in uncertainty in the timing of economic cycles could result from the consistent use of more than one method of estimating the output gap. Thus I recommend for the future that the Treasury considers more systematically than previously what estimates of the output gap would be if other techniques were used in addition to its cyclical indicator based approach. The Treasury meets with external organisations regularly, including to discuss trends in the output gap. I recommend that the Treasury continues to do this and in future presents a formal assessment of the views of external organisations in terms of how they have influenced the Treasury's judgement of the dating of economic cycles.

80 To add further transparency, the Treasury should continue to publish, as it has with the 2005 Pre-Budget Report, the details of the cyclical indicators it uses to identify on-trend points, providing a full description of the basis of the judgements used in coming to a conclusion about the dating of on-trend points, and whether they represent start or end points of economic cycles.

The convention for future oil prices

The Treasury bases its projections of future oil prices on the average of independent forecasts

81 The oil price convention is formulated in terms of the US dollar price of Brent crude oil in real terms, where the deflator used is an index of world manufactures prices. The Treasury requires forecasts of future oil prices on this basis mainly for estimating revenues from the oil industry. These currently amount to around two per cent of all tax revenues. The Treasury estimates that a one dollar increase in the oil price would, other things being equal, increase North Sea revenues in the first instance by about £200 million.[38]

38 The Treasury notes, however, that there are a number of offsetting effects that mean the impact of higher oil prices on the public finances as a whole will be reduced. For example, higher pump prices reduce demand for petrol and thus revenues from fuel duties. Temporarily higher inflation will increase the indexation of various allowances and benefits and then payments made.

82 When I first examined the oil price convention in my audit of assumptions for the November 1997 Pre-Budget Report, the assumption adopted was that oil prices would be close to their current levels in nominal dollar terms over the coming year, and remain flat in real terms thereafter.[39] In the 1999 Pre-Budget Report,[40] the Chancellor modified the convention, which remains as follows:

- The oil price will be based on the average of independent forecasts for one year ahead. If the average of independent forecasts shows a fall in the oil price, that price in real terms will be used for the remainder of the five year forecast period. If the average of independent forecasts for one year ahead shows a rise, then the previous convention that oil prices would be close to their current levels in nominal dollar terms over the coming year,[41] and remain flat in real terms thereafter, will be adopted.

83 The Treasury has applied the convention over the three year Rolling Review period since 2002 using independent forecasts for oil prices one year ahead, made no more than three months before the Pre-Budget Report or Budget in question, contained in the Treasury publication *Forecasts for the UK Economy*.

Projecting future oil prices is very uncertain and subject to large errors

84 Forecasting oil prices is difficult because unforeseeable movements in supply and demand can give rise to significant changes in the spot price. This has been particularly true for oil prices over the last two years. Some of the independent forecasters use econometric modelling techniques, but most rely heavily on judgement.

85 The independent forecasts are subject to a high degree of error particularly over recent years. I reported in my review of the convention for future oil prices in 2002[42] that the average absolute forecast error in the independent forecasts from 1999 to 2001 was $4.08 a barrel, compared with the average price over the period of $23.82. Over the period 2002 to 2005 the absolute forecast error in the independent forecasts increased to $9.52 a barrel compared with the average price of $35.75. Over the same period approximately half of the independent forecasts used by the Treasury had an absolute forecast error of between $4.01 and $13.84 a barrel.

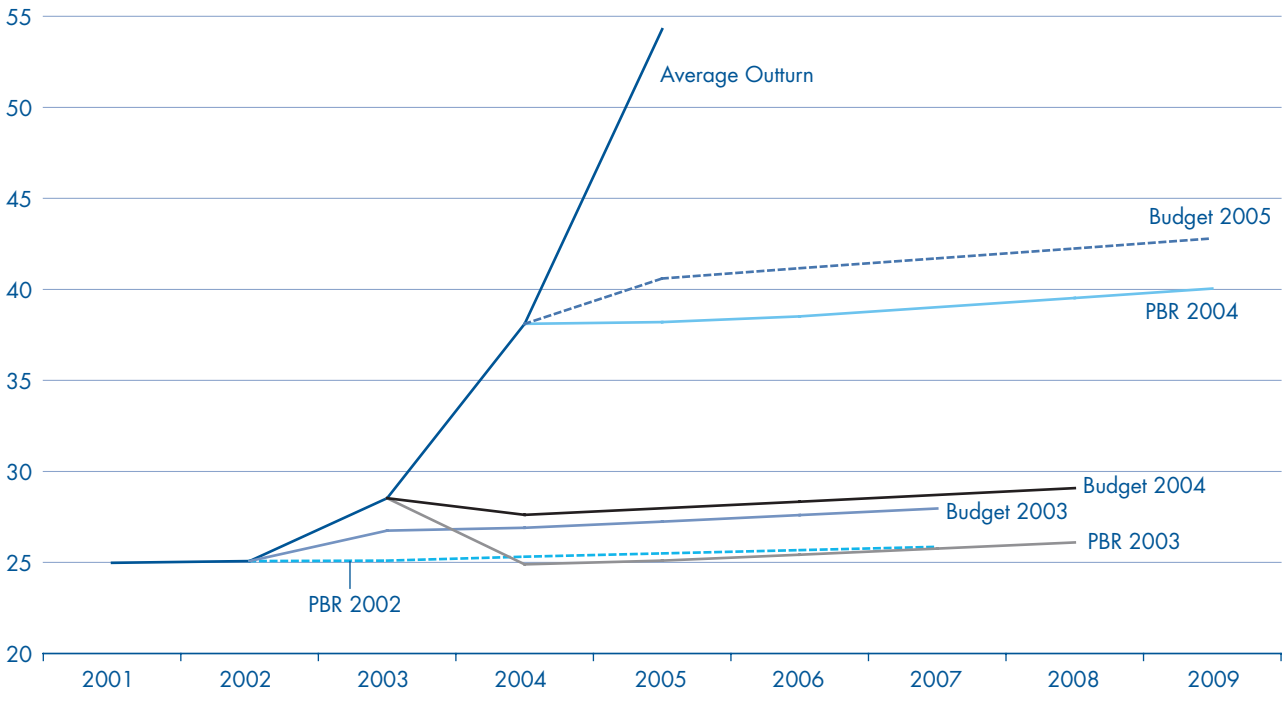
86 **Figure 14** shows the profile of Treasury assumptions for oil prices against actual prices for the rolling review period 2002 to 2005. Spot prices have risen markedly since early 2004, driven by strong oil demand growth, particularly from emerging market economies. Demand growth outstripped increases in supply capacity, resulting in a decline in spare global production capacity. Prices reached new highs in September 2005 as a result of the impact of Hurricane Katrina on US oil production and refining facilities. In the light of the considerable uncertainties, the oil price futures curve and independent forecasters' one-year forward forecasts of the oil price have tended to move in line with spot prices.

The use of the Treasury convention has resulted in cautious projections over the rolling review period

87 Figure 14 shows that the oil price convention used by the Treasury between 2002 and 2005 has resulted in forecast oil prices which were consistently below actual prices. The convention would therefore, other things being equal, have resulted in under-estimates of oil tax revenues during the three year Rolling Review period as a whole, and it has therefore proved cautious.

39 Audit of Assumptions for the Pre-Budget Report, November 1997, Session 1997-98.
40 Audit of the future oil price convention for the November 1999 Pre-Budget Report, HC 873, Session 1998-99.
41 The Treasury has taken 'close to current levels' to mean constant in nominal US dollar terms.
42 HC 109, Session 2002-03, paragraph 46.

14 Comparison of Budget and Pre-Budget oil price assumptions and outturn prices over the rolling review period since November 2002, US dollars per barrel



Source: HM Treasury

88 For the future, very considerable uncertainty attaches to the independent forecasts of oil prices. My previous reports discussed alternative approaches to forecasting oil prices, such as using information from the oil futures market and extrapolation of past trends.[43] Both of these approaches had and continue to have significant deficiencies. The oil futures market is limited in its futures trading. Information on futures trading from the International Petroleum Exchange shows that most trades are for up to a three month ahead period, with very little volume at one year ahead. Extrapolation could produce implausible results over the five years of the fiscal projections period by giving too much weight to short term trends. While there are clearly substantial potential errors involved in using the convention as adopted, it is not easy to see a superior alternative method.

The convention for future oil prices: Conclusion and recommendation

89 The convention was a cautious one over the three year period of the rolling review from 2002 and remains a reasonable one for establishing the level of oil tax revenues incorporated in the fiscal projections. There is no clearly better method available for use in the future, though large uncertainties in predicted oil prices remain. The Treasury should continue to monitor the degree of caution achieved, if for example oil prices were to fall significantly from their historically high levels, as external forecasts might then overestimate future oil prices and lead to an over-forecast of tax revenues.

43 HC 873, Session 1998-99 and HC 109, Session 2002-03.

The revenue impact of the 2002 VAT Strategy

Background

90 In my review for the Pre-Budget Report 2002, the Chancellor of the Exchequer asked me to audit an extension to the assumption that was then used for forecasting VAT. The extended assumption took account of the direct and preventive effects of a new VAT Strategy designed to produce additional tax revenue, which was announced in the Pre-Budget Report 2002. The extension was:

> 'The underlying ratio of VAT receipts to consumers' expenditure will be assumed to fall by 0.05 percentage points a year. The underlying ratio adjusts for the effects of changes in rates and coverage of the tax **and it will also now adjust for the revenue impact of the direct and preventive effects of the VAT Strategy announced in the 2002 Pre-Budget Report, but not take account of the deterrent effects**.'

91 At that time, I concluded that the proposed extension made reasonable allowance for uncertainties about the size of the impact of the Strategy and the fact that its effect may decline over time. I noted that its impact would not be easy to estimate and that timely evaluation work to establish this was important.[44]

92 For the Pre-Budget 2003 and Budget 2004, I examined further changes in the assumptions for VAT. The first was a further extension to the assumption for forecasting VAT to reflect the additional revenue effects of further Strategy measures announced in the 2003 Pre-Budget Report to increase compliance and reduce debt owed by traders. In Budget 2004, I examined a revised assumption to replace the assumption relating to the underlying ratio as follows:

> 'For the purpose of projecting VAT receipts, the VAT gap (the difference between the estimated theoretical yield and actual VAT receipts, as a percentage of the theoretical yield) will be assumed to rise by 0.5 percentage points per year, from a level that is at least as high as the estimated outturn for the current year.'

The Treasury continued to combine this assumption with the assumptions relating to the VAT Strategy.

93 I have now been asked by the Chancellor to carry out a rolling review of the extension to the VAT assumption introduced in 2002, namely the adjustment to the VAT receipts forecast in respect of the 2002 VAT Strategy.

The impact of the 2002 VAT Strategy

94 HM Treasury forecast that the 2002 VAT Strategy would generate £2,740 million additional revenue over the three years 2003-04 to 2005-06, **Figure 15**. The forecast impact for 2006-07 and beyond remains unchanged for HM Treasury's current 2005 Pre-Budget forecasts. The Strategy involved a number of measures to increase the VAT yield through a combination of more effective collection of VAT, better compliance with VAT regulations, limiting opportunities for avoidance, and reducing fraud.

15 Forecast revenue impact of the 2002 VAT Strategy, included in the fiscal projections at Pre-Budget 2002

2003-04 £ million	2004-05 £ million	2005-06 £ million	2006-07 £ million	2007-08 £ million	2008-09 £ million
390	930	1,420	1,720	1,900	2,000

Source: HM Revenue and Customs

95 In my review for Pre-Budget Report 2002, I noted that the former HM Customs and Excise (now HM Revenue and Customs) was putting in hand arrangements to monitor and evaluate the effectiveness of the measures introduced by the Strategy and the accuracy of the assumption. These plans were to be subject to scrutiny by HM Treasury and the Prime Minister's Delivery Unit.[45] In my review for Pre-Budget 2003, I recommended that this evaluation work be extended to cover the impact of the extension of the VAT Strategy announced in December 2003.[46]

96 HM Revenue and Customs has taken the following approach to evaluating the extension to the forecasting assumption:

- comparing the outturn for VAT receipts with the forecast based on the extended assumption;
- comparing the actual VAT gap with the level it would have reached if it had grown by the 0.5 percentage points per year assumed in the absence of the Strategy; and
- estimating the impact of the main elements of the Strategy on the available direct measures of fraud and of the yield from compliance activities.

44 HC 109, Session 2002-03, paragraph 54.
45 HC 109, Session 2002-03, paragraph 29.
46 HC 35, Session 2003-04, paragraph 65.

97 This approach does not provide a clear-cut assessment of the actual revenue impacts achieved from the direct and preventive effects of the 2002 Strategy. HM Revenue and Customs has taken this approach because of its need also to assess: actual VAT receipts against forecast, its progress in meeting its Public Service Agreement target for reducing the VAT gap; and to track progress on the overall effect of all of its work to tackle losses of VAT, of which the 2002 Strategy measures included in the assumption are one strand. Given these wider monitoring requirements, HM Revenue and Customs places greater emphasis on the results of the first two methods. It also finds it hard to distinguish the revenue effects of the 2002 Strategy measures from the effects of the additional Strategy measures introduced in 2003 and other legislative measures, as well as wider factors affecting the total level of VAT receipts.

98 HM Revenue and Customs considers that the overall performance of the forecast of the VAT gap and movements in the VAT gap provide an indication of how well the forecast for the 2002 VAT Strategy has fared. Accordingly, it has drawn a high degree of assurance about the cautiousness of the 2002 Pre-Budget forecasts in two ways:

- from the VAT gap being £3.9 billion less than forecast over the two years following the implementation of the Strategy, **Figure 16**; and
- from an estimated reduction of £3.6 billion in the VAT gap after the Strategy was introduced, compared to the £1.8 billion reduction in the VAT gap that was forecast from implementing the VAT Strategy and other initiatives (paragraph 102 and, **Figure 17 overleaf**).

99 Over the two years since the introduction of the Strategy – 2003-04 and 2004-05 – actual VAT receipts have also been more than forecast. Receipts were £2.7 billion more than forecast in 2003-04, though £0.1 billion less than forecast in 2004-05, Figure 16.

100 Higher than forecast VAT receipts and a lower than forecast VAT gap provide only a general indication of whether the assumed revenues from the 2002 VAT Strategy have proved to be reasonable and cautious, because both will also reflect the impact of the 2003 Strategy and of various other legislative measures against non-compliance.

16 Analysis of variations from VAT forecast for 2003-04 and 2004-05

	2003-04 £ billion	2004-05 £ billion
VAT receipts forecast, at preceding Budget (Budget 2003 and Budget 2004, respectively)	66.6	73.1
Outturn VAT receipts	69.2	73.0
Difference:	**2.7**	**(0.1)**
Explained by variations in the forecast of:		
In-year receipts :	(0.1)	(0.7)
VAT Total Theoretical Liability:	(0.4)	(0.2)
VAT gap:	**3.1**	**0.8**

Source: HM Revenue and Customs

NOTE

Some figures do not add because of rounding.

101 HM Revenue and Customs' second main indicator of the performance of the VAT Strategy – the reduction in the VAT gap following the VAT Strategy – is similarly affected by these factors. The Department compared the actual VAT gap in 2004-05 with what the gap might have been without the Strategy, and compared the resulting margin with the forecast revenue impact of the VAT Strategy and other measures. Thus, they compared the actual VAT gap of 13.5 per cent against an assumed VAT gap without the Strategy of 17.8 per cent, resulting in a 4.3 percentage points difference. The assumed VAT gap of 17.8 per cent is derived from the 16.8 per cent actual gap in 2002-03 (the year before the Strategy was implemented), and the assumed annual growth in the gap of 0.5 percentage points, Figure 17. I audited this new assumption in Budget 2004 and concluded that this level of increase was cautious to the extent that it was greater than the historical long term trend.[47] Since Budget 2004 these data have been revised, but the assumed trend growth in the VAT gap remains reasonable.

47 HC 434, Session 2003-04, paragraph 39

17 The margin between the actual VAT gap in 2004-05 and the assumed gap in the absence of the VAT Strategy

	per cent	£ billion
Trend VAT gap for 2004-05 based on actual VAT gap plus assumed annual growth of 0.5 percentage points	17.8	14.9
Actual VAT gap for 2004-05	13.5	11.3
Difference:	**4.3**	**3.6**
Comprising:		
The forecast impact of the 2002 VAT Strategy	1.0	0.9
The forecast impact of the 2003 extension of the VAT Strategy	0.3	0.2
The forecast impact of VAT legislation	0.8	0.7
Margin remaining	**2.2**	**1.8**

Source: HM Revenue and Customs

102 The 4.3 percentage points difference translates into a £3.6 billion difference between the actual VAT gap and the previously identified long-term trend. Once the £1.8 billion forecast impact of the VAT Strategy and legislation have been taken into account, a margin of £1.8 billion remains, Figure 17. This margin could reflect cautiousness in the forecasts for the impact of the 2002 VAT Strategy, specifically, but it could also be the product of cautious forecasts for the 2003 Strategy measures or legislative changes, or reflect the deterrent effects. Nevertheless, the relative size of this margin might suggest that the Strategy's impacts were cautiously forecast.

103 The results of the VAT gap analyses for 2003-04 and 2004-05 have differed significantly, making it difficult to draw firm conclusions about their stability. While the analysis for 2003-04 showed a VAT gap of £3.1 billion less than forecast, Figure 16 and a margin of £2.2 billion, **Figure 18**, the analysis for 2004-05 showed an under-estimate of the VAT gap of £0.8 billion and a negative margin of £0.6 billion.

18 The margin between the actual VAT gap and the assumed trend VAT gap in the absence of the VAT Strategy, 2003-04 and 2004-05

	2003-04		2004-05	
	per cent	£ billion	per cent	£ billion
Trend VAT gap, before taking account of forecast VAT Strategy impacts and other adjustments (after a 0.5 percentage point increase each year)	17.3	13.8	14.0[1]	11.8
Actual VAT gap	13.5	10.8	13.5	11.3
Difference:	**3.8**	**3.0**	**0.5**	**0.4**
Comprising:				
The forecast impact of the 2002 VAT Strategy	0.5	0.4	0.6	0.5
The forecast impact of the 2003 extension of the VAT Strategy	–	–	0.2	0.2
The forecast impact of VAT legislation	0.5	0.4	0.4	0.3
The margin that is not accounted for by the forecast impact of identified measures	**2.8**	**2.2**	**(0.7)**	**(0.6)**

Source: HM Revenue and Customs

NOTES

1 The 14.0% trend VAT gap for 2004-05 is the result of an assumed 0.5 percentage point increase in the VAT gap applied to the 13.5% actual gap in the previous year.
2 Some figures in this table do not add because of rounding.

104 This analysis is based on two years' data, whereas the 2002 Pre-Budget forecast for the VAT Strategy covered three years, and over half of the total additional revenue forecast for 2003-04 to 2005-06 was scheduled for the final year, 2005-06, Figure 15. HM Revenue and Customs has indicated that VAT receipts for 2005-06 have been below the level that might have been expected given the Budget 2005 forecast. It believes that part of this reflects slower than expected economic growth, but part may also be the result of a higher than forecast VAT gap. Final outturn data on VAT receipts and on the VAT gap will not however be available until 2006.

105 HM Revenue and Customs has supplemented its primary analysis of the movement in the VAT gap with analysis of its operational data on specific components of the VAT Strategy. The 2002 VAT Strategy was forecast to reduce VAT losses by more than £2 billion by 2005-06 in four main ways – reducing general non-compliance, the failure of businesses to register for VAT, abusive tax avoidance and Missing Trader Fraud. The Strategy was to be supported by the deployment of more than 1,000 staff to the main problem areas over the three years of the programme. Operational data indicates that overall the extra staff resources have been deployed as envisaged.

106 HM Revenue and Customs cannot directly observe the additional VAT that has been generated from all of the individual Strategy measures. Instead it has estimated the revenue effect for the first three of the four main components of the Strategy, using a combination of actual data (for example on VAT receipts, staff numbers deployed and the actual number of compliance events) and estimates of the expected revenue effects that were derived from operational research and used to produce the original forecasts of the impact of the Strategy in 2002. These estimates suggested that revenue had increased since 2002-03 although this rise was levelling out in 2004-05.

107 HM Revenue and Customs has also calculated the relative revenue impact of individual VAT Strategy measures by comparing its estimates of the total VAT revenue achieved from each element of the Strategy with an estimate of what the yield profile might have been in the absence of the Strategy, **Figure 19**. For Missing Trader Fraud, it did so by using independent data on the value of intra-Community supplies of goods.

19 HM Revenue and Customs' estimates of the impact of the VAT Strategy compared with the impacts forecast in the 2002 Pre-Budget Report

	PBR 2002 forecast of the revenue impact of the 2002 VAT Strategy (£ million)		Outturn estimate of the revenue impact of the VAT Strategy relative to baseline assumption[1] (£ million)	
Strategy Measure	2003-04	2004-05	2003-04	2004-05
Missing Trader Fraud[2]	215	390	310 - 845	470 - 930
Other components of the Strategy[3]	175	540	110 - 175	170 - 370
Total	**390**	**930**	**420 - 1,020**	**640 - 1,300**

Source: HM Revenue and Customs

NOTES

1 HM Revenue and Customs calculated the outturn estimate of the impact of the VAT Strategy by comparing the estimated revenue impact of compliance activities with assumed VAT yields from those activities in the absence of the Strategy.
2 The estimate of reduced VAT losses as a result of Missing Trader Fraud measures has been calculated by measuring changes in the level of fraud compared with an assumed growth in fraud of 10 per cent a year.
3 Other components of the VAT Strategy were to tackle general non-compliance and failure to register, and anti-avoidance initiatives.

108 This showed that HM Revenue and Customs' estimate of the revenue impact of between £1,100 million and £2,300 million broadly matches the 2002 forecast of £1,320 million over the two years. However, the results of the analysis have wide margins of uncertainty. While at the top end of the range the estimated revenue impact exceeds the 2002 forecast, the minimum end of the range for 2004-05 falls below the forecast, Figure 19. The results also depend heavily on estimates and forecasts of what would have happened in the absence of a Strategy. While direct measurement of the actual revenue impact of the VAT Strategy measures could be difficult, the accuracy of these estimates could be improved by reviewing and validating the detailed assumptions that were used in the original calculations of the direct and preventive effects of the VAT Strategy.

109 HM Revenue and Customs' analyses of the VAT gap and VAT receipts suggest that the 2002 VAT Strategy has had a positive impact on revenues. But there are significant uncertainties because the trends in these indicators may well also reflect a range of factors other than the impact of the 2002 VAT Strategy. Analysis of available operational data is also not conclusive because of its dependence on estimates and the wide margins of uncertainty involved. The 2002 forecast anticipated that the additional revenue generated by the Strategy would increase over the three years and over half of the forecast additional revenue was due to accrue in the third year (2005-06). The VAT gap results for 2004-05 and data so far for 2005-06 raise uncertainties about whether the third year impact will be achieved. A final conclusion on whether or not the assumption has proved cautious and reasonable would only be possible once final outturn data is available for 2005-06.

The forecast of the future effects of the 2002 VAT Strategy

110 HM Revenue and Customs has forecast the future impact of the 2002 VAT Strategy using the same figures it calculated for Pre-Budget 2002, **Figure 20**, in the absence of any more up-to-date estimates of its likely effect.

20 Additional revenue from the 2002 VAT Strategy, included in the fiscal projections at Pre-Budget 2005[1]

2006-07 £ million	2007-08 £ million	2008-09 £ million
300	480	580

Source: HM Revenue and Customs

NOTE

1 With the Pre-Budget 2005 fiscal projections made in 2005-06, and any impact of the 2002 VAT Strategy up to that year already subsumed in the VAT gap for that year, the projections include only the marginal additional impact forecast for future years.

111 The way that the overall model for forecasting VAT is constructed reduces to some extent the risk that any inaccurate assumption about the impact of the 2002 VAT Strategy could be compounded over a number of years. The model accounts for the forecast impact of the Strategy by adjusting the VAT gap for future years by only the marginal additional VAT impacts for those years. This is because any variance between forecast and the actual impact of the Strategy in past years is subsumed in the actual VAT gap that provides the baseline for the forecasts. Accordingly, any over-estimation of the impact of the Strategy for past years is not carried forward. For example, the current forecast for VAT receipts in 2006-07 includes an assumed impact from the 2002 Strategy, over and above any additional revenue achieved up to 2005-06, of £300 million, Figure 20.

112 I concluded in 2002 that the Department had introduced caution into the Pre-Budget 2002 projection, and had adopted a reasonable approach, but recognised that accurately predicting future yields remained difficult. Many uncertainties remain, especially in the absence of conclusive evidence about the revenue effects of the Strategy since 2002. HM Revenue and Customs has however introduced some caution in the forward estimates by including only part of the forecast impacts in the fiscal projections.

The 2002 VAT Strategy: Conclusions and recommendations

113 When I audited this assumption for the Pre-Budget Report 2002, the former HM Customs and Excise planned to introduce arrangements to monitor and evaluate the effectiveness of the VAT Strategy measures and the accuracy of the assumption. I commented that given the uncertainties inherent in the assumptions made, it would be important that these evaluations were carried out as planned. The Department, now HM Revenue and Customs, has monitored the trends in VAT receipts, the movement in the VAT gap and estimated the revenue effects of the various measures in the 2002 Strategy. However, monitoring of operational data to evaluate the actual revenue impacts achieved from the Strategy has been limited and the Department has not managed to establish a clear link between these results and additional VAT received. Accordingly, it is not possible to evaluate the degree to which the assumption has proved to be cautious and reasonable.

114 Such an assessment will require firmer direct evidence of the revenue effects of the VAT Strategy. In the light of my findings, the Treasury and HM Revenue and Customs have agreed to carry out the necessary evaluative work as part of the research and analysis programme on VAT liabilities, yields and VAT gap currently underway. The Treasury has indicated that it intends to ask me to carry out a further review of the forecasting assumptions that underlie VAT receipts, including those related to the VAT Strategy, as part of my audit of Budget assumptions for Budget 2007 or before.

APPENDIX 1

Individuals and organisations consulted outside HM Treasury

Kate Barker, External Member, Bank of England Monetary Policy Committee

David Walton, External Member, Bank of England Monetary Policy Committee and Visiting Research Professor at Oxford University and Chairman of the Society of Business Economists

Professor Peter Spencer, University of York and Economic Adviser, Ernst & Young ITEM Club

Professor Michael Artis, Manchester University

Andrew Harvey, Professor of Econometrics, Cambridge University

Professor Mike Wickens, Department of Economics, University of York

Bank of Canada

Bank of England

Barclay's Finance

British Chambers of Commerce

Confederation of British Industry

European Central Bank

European Commission

International Monetary Fund

Institute for Fiscal Studies

Morgan Stanley

National Institute of Economic and Social Research

Office for National Statistics

Organisation for Economic Co-operation and Development

Oxford Economic Forecasting Ltd

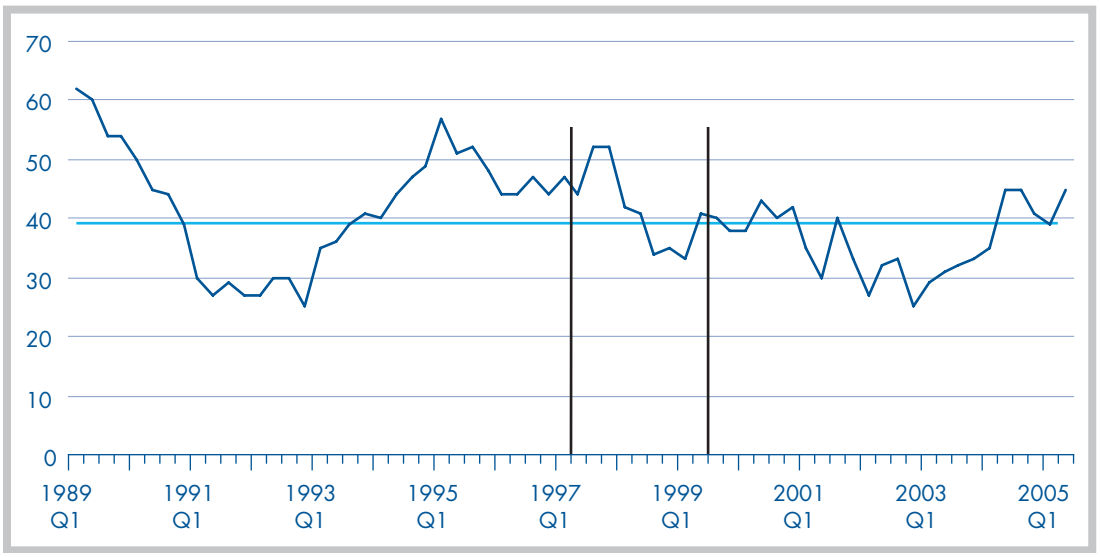
APPENDIX 2

Cyclical Indicators used by HM Treasury

The charts below show the data series as provided by the Treasury for each cyclical indicator, and its long run average. The vertical lines denote the first half of 1997, taken as between Q1 and Q2, and mid 1999, taken as between Q2 and Q3.

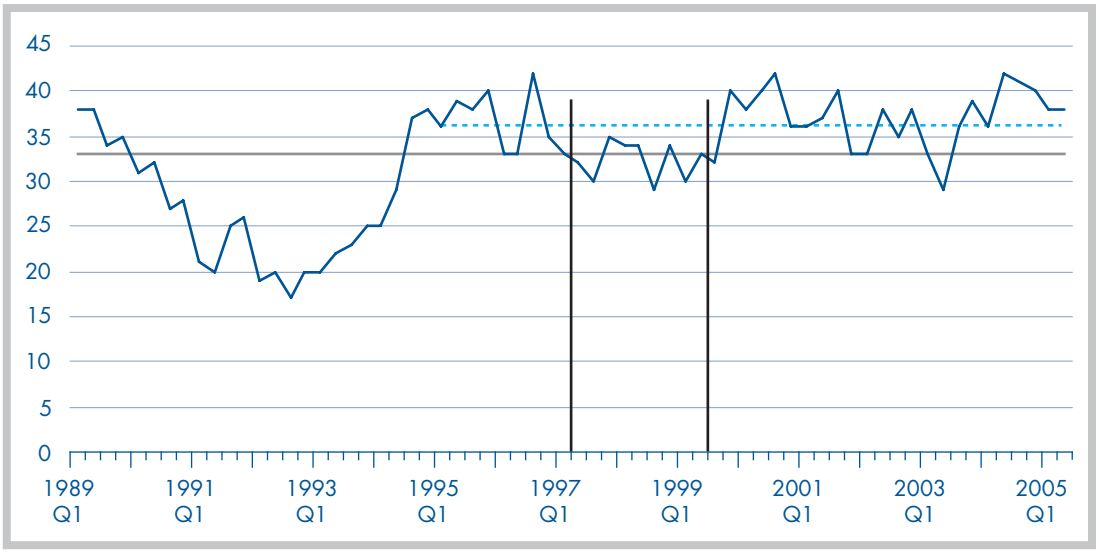
1 CBI Industrial Trends Survey: Capacity Utilisation

This shows the percentage of firms operating at full capacity. The question asked in the survey is 'Is your present level of output below capacity (i.e. are you working below a satisfactory full rate of operation)?' The data series reflects the percentage of firms operating at full capacity. The horizontal line shows the long run average used by the Treasury for the assessment of on-trend points, currently calculated between 1972Q1 and 2005Q3.



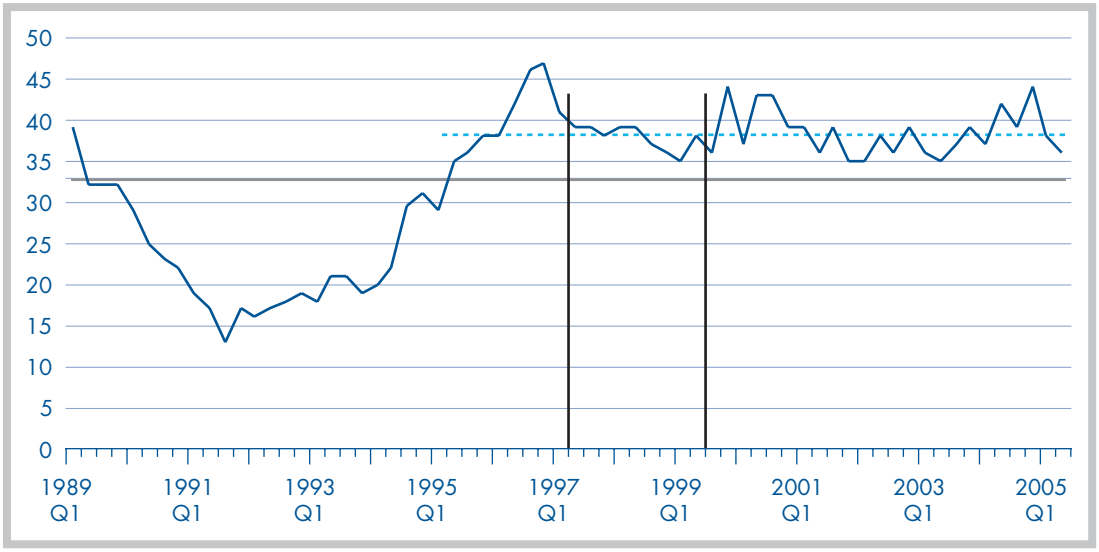
2 British Chambers of Commerce Quarterly Survey: Capacity Utilisation (Manufacturing)

This shows the percentage of manufacturing firms operating at or above full capacity. The question asked in the survey is 'Are you currently operating: at full capacity/below full capacity?' The data series reflects the percentage of firms operating at full capacity. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



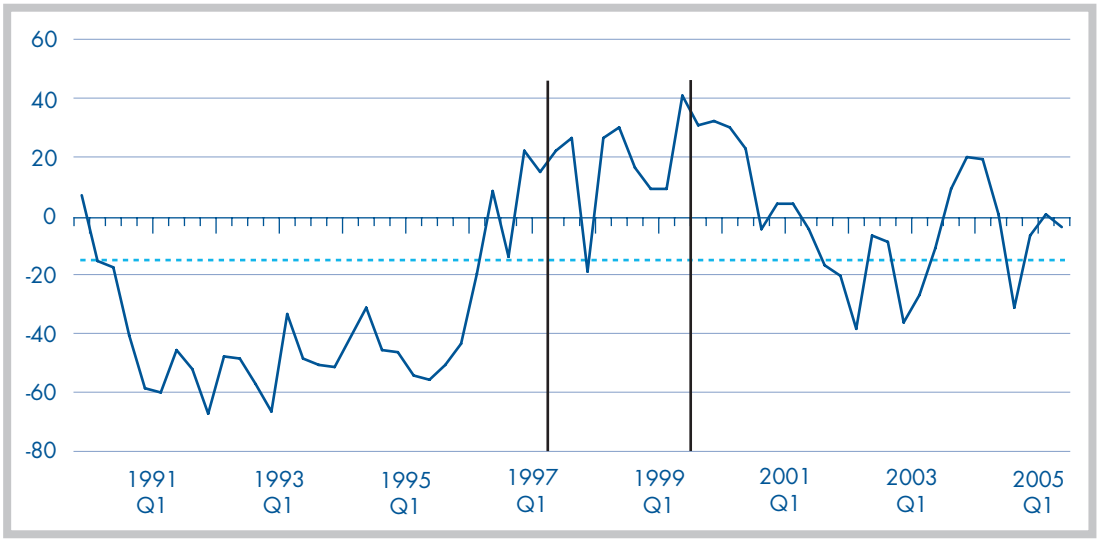
3 British Chambers Of Commerce Quarterly Survey: Capacity Utilisation (Services)

This shows the percentage of service firms operating at or below full capacity. The question asked in the survey is 'Are you currently operating: at full capacity/below full capacity?' The data series reflects the percentage of firms operating at full capacity. The solid horizontal line is the average since 1989Q1; the average more appropriate to measuring on-trend points is currently calculated since 1995Q1, shown by the dashed line.



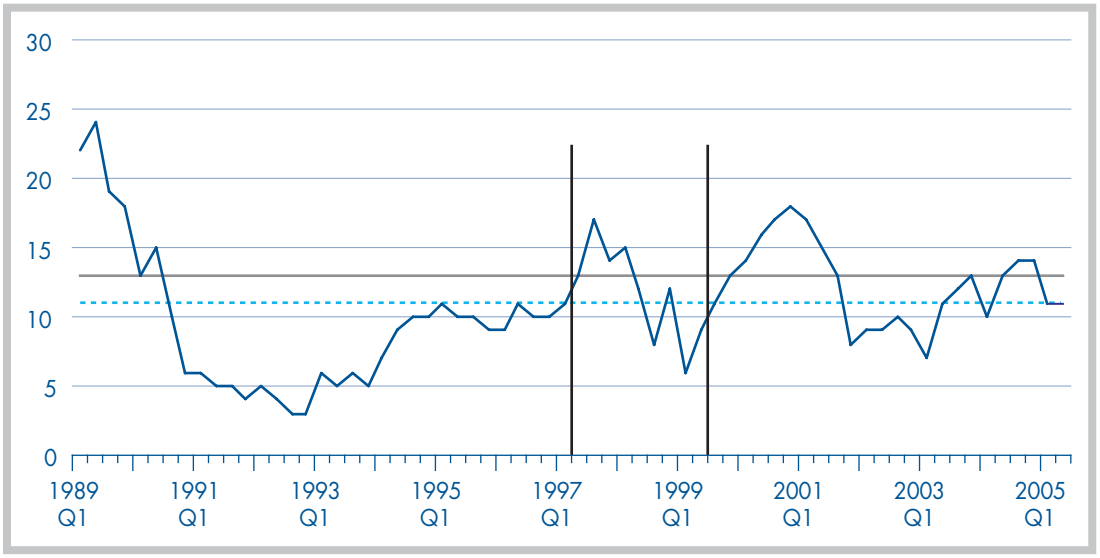
4 CBI/PricewaterhouseCoopers Financial Services Survey: Capacity Utilisation (Financial Services)

This shows the percentage balance of financial service firms with levels of business above/below normal. The question asked in the survey is 'Excluding seasonal variations, do you consider that in levels terms, your present level of business is above/below normal?' The data series reflects the percentage point difference between firms operating at above and below normal levels. The average calculated between 1989Q4 and 2005Q2 is shown by the dashed line. The Treasury also considers the average since 1995Q1, not shown in the chart below, and which is very close to zero.



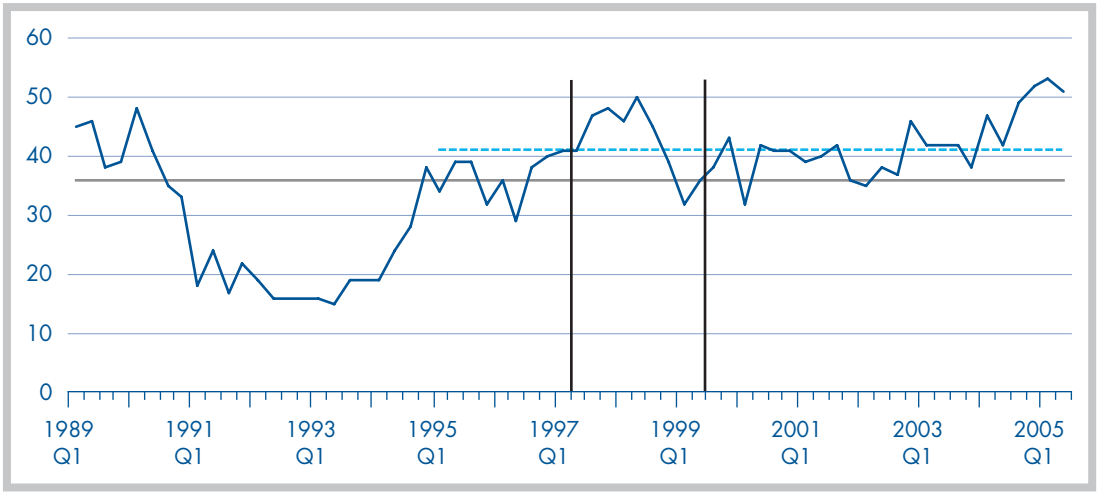
5 CBI Skilled Labour Constraint (Manufacturing)

This shows the percentage of manufacturing firms experiencing skilled labour recruitment difficulties. The survey question is 'What factors are likely to limit your output over the next three months?' The data series reflects the percentage of firms answering 'skilled labour'. The solid horizontal line is the average since 1972Q1; the average more appropriate to assessing on-trend points is currently calculated since 1989Q1, shown by the dashed line.



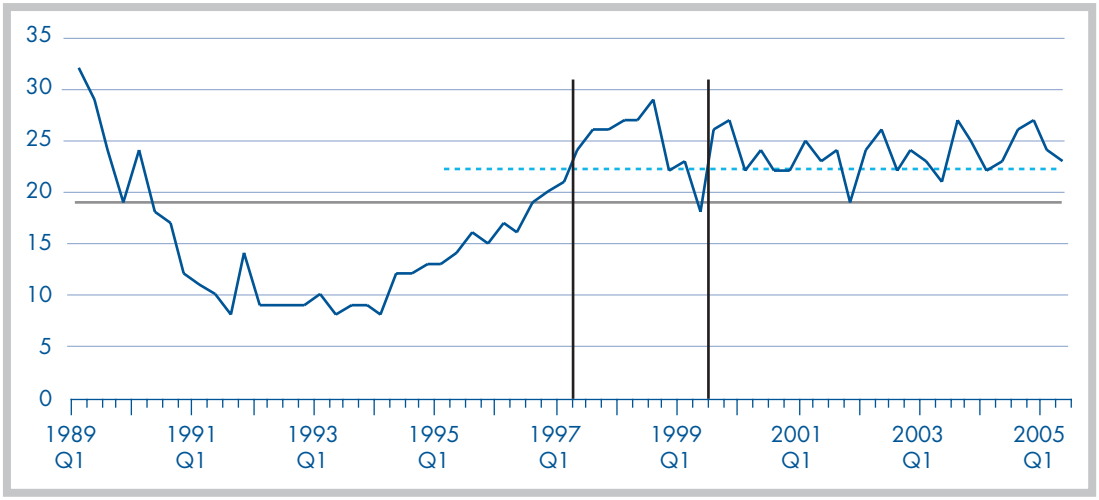
6 British Chambers of Commerce Skilled Labour Constraint (Manufacturing)

This shows the percentage of manufacturing firms experiencing skilled manual and technical labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'skilled manual and technical'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



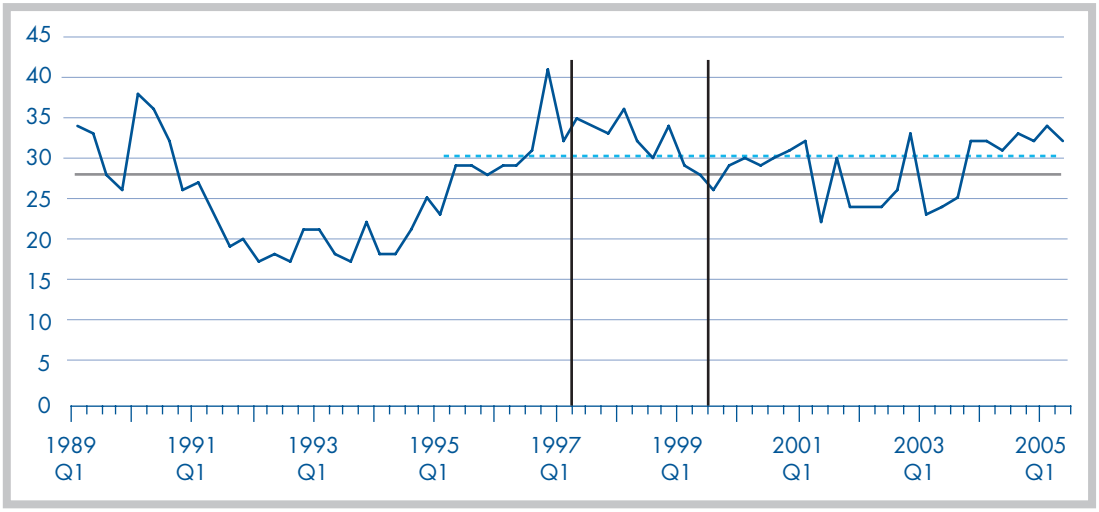
7 British Chambers of Commerce Skilled Labour Constraint (Services)

This shows the percentage of service firms experiencing skilled manual and technical labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'Skilled manual and technical'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



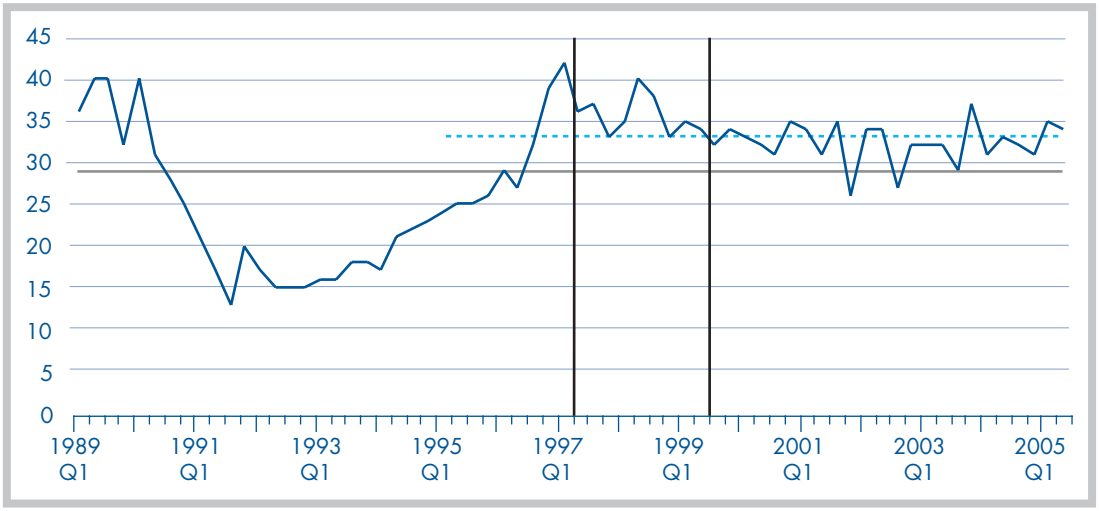
8 British Chambers of Commerce Professional/managerial labour constraint (Manufacturing)

This shows the percentage of manufacturing firms experiencing professional/managerial labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'professional/managerial'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



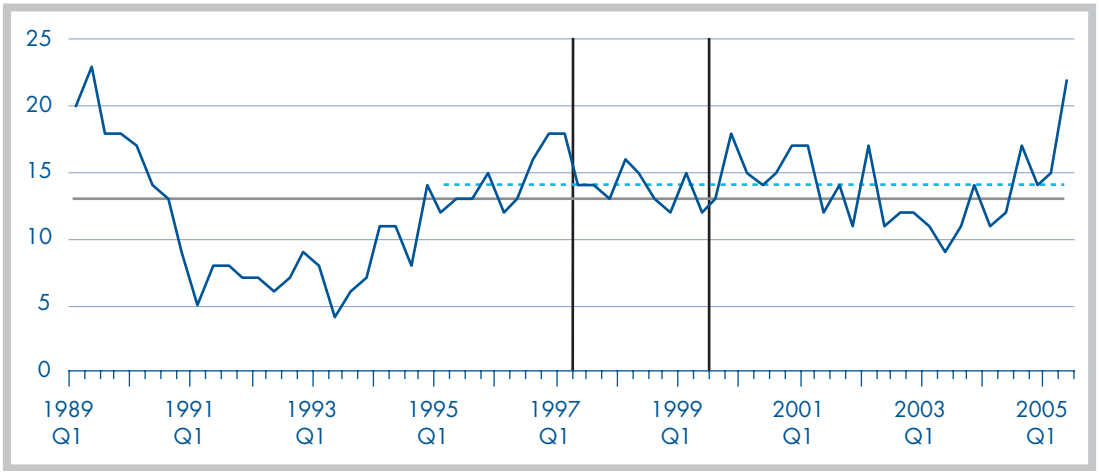
9 British Chambers of Commerce Professional/managerial labour constraint (Services)

This shows the percentage of service firms experiencing professional/managerial labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'professional/managerial'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



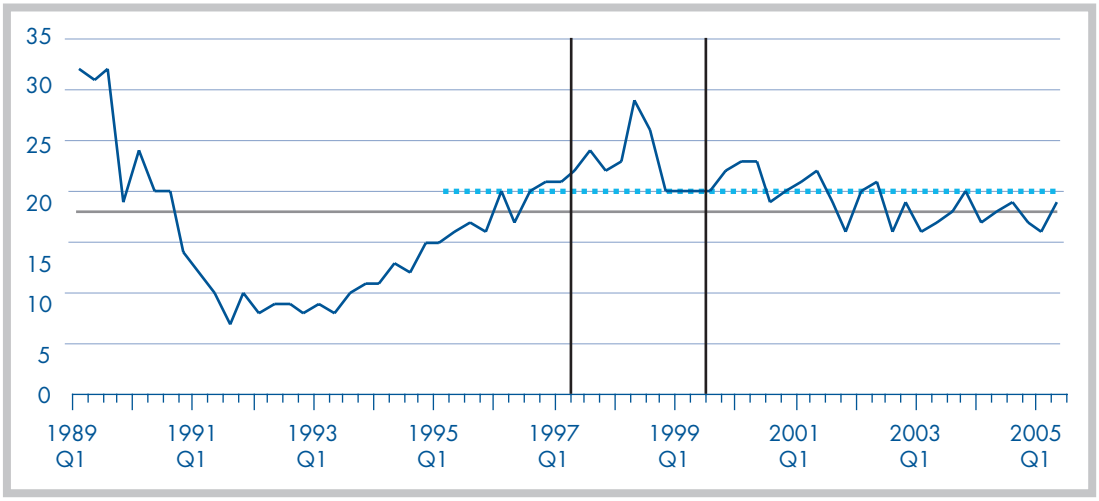
10 British Chambers of Commerce Clerical Labour Constraint (Manufacturing)

This shows the percentage of manufacturing firms experiencing clerical labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'clerical labour'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



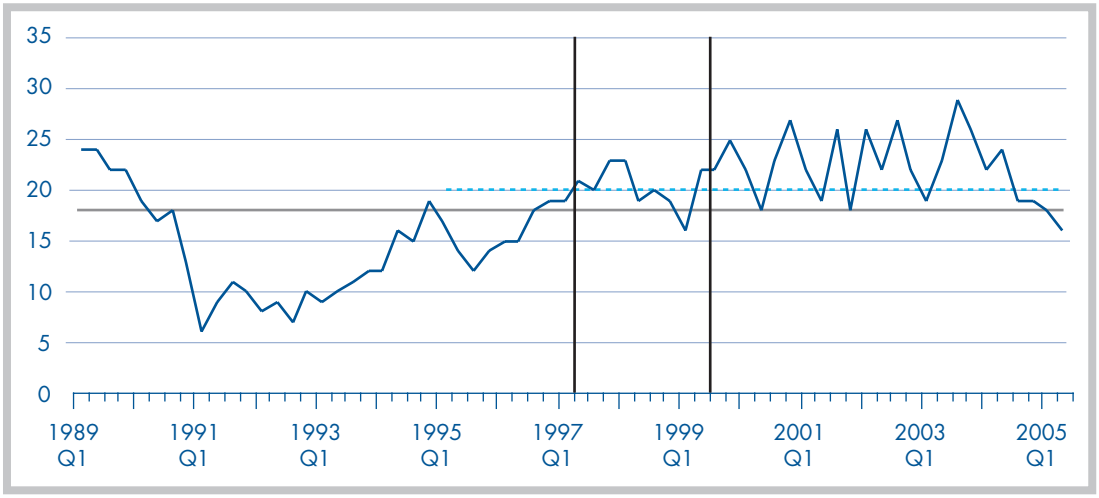
11 British Chambers of Commerce Clerical Labour Constraint (Services)

This shows the percentage of service firms experiencing clerical labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'clerical labour'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



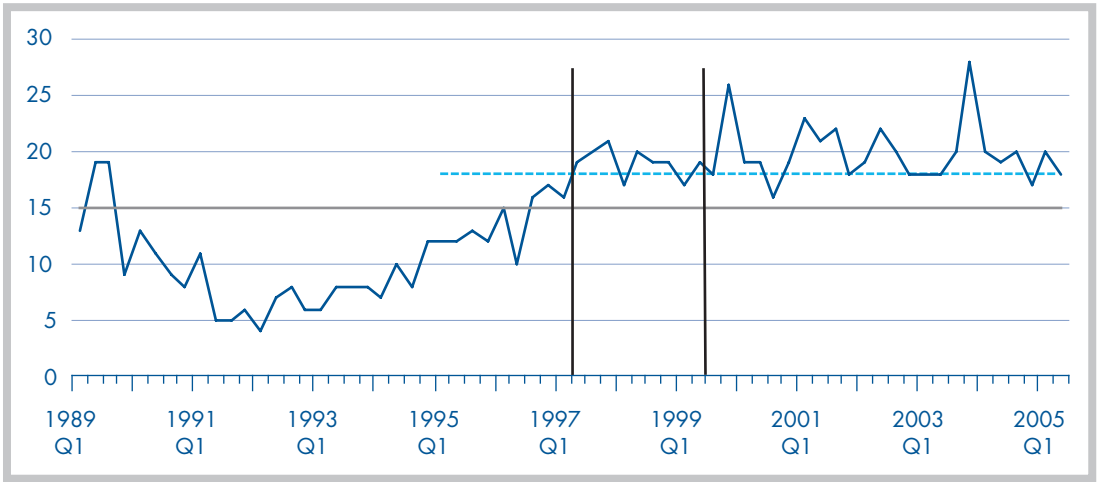
12 British Chambers of Commerce Semi/unskilled Labour (Manufacturing)

This shows the percentage of manufacturing firms experiencing semi/unskilled labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'semi/unskilled'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



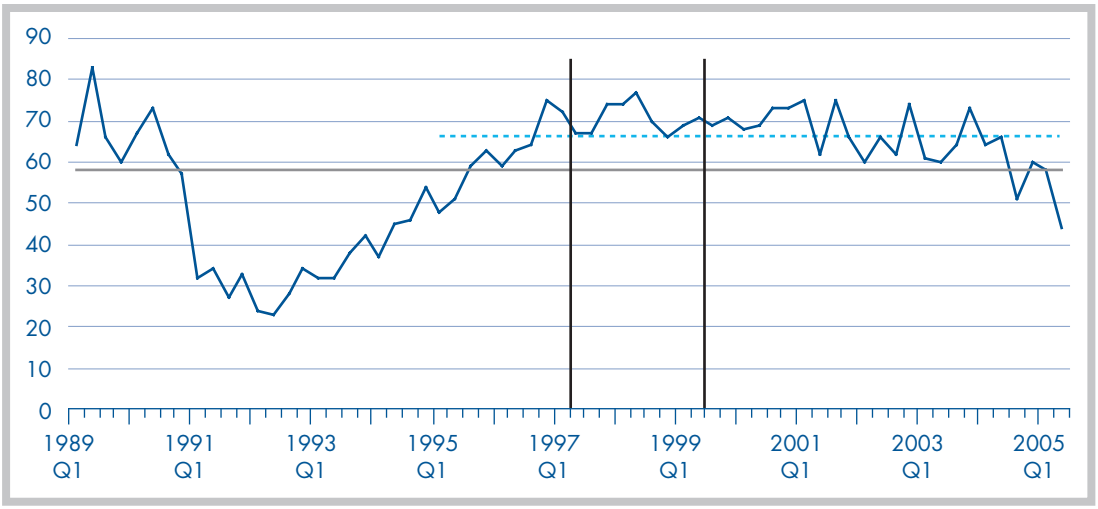
13 British Chambers of Commerce Semi/unskilled Labour (Services)

This shows the percentage of service firms experiencing semi/unskilled labour recruitment difficulties. The survey question is 'For which of the following categories did you experience difficulties in finding suitable staff?' The data series reflects the percentage of firms answering 'semi/unskilled'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



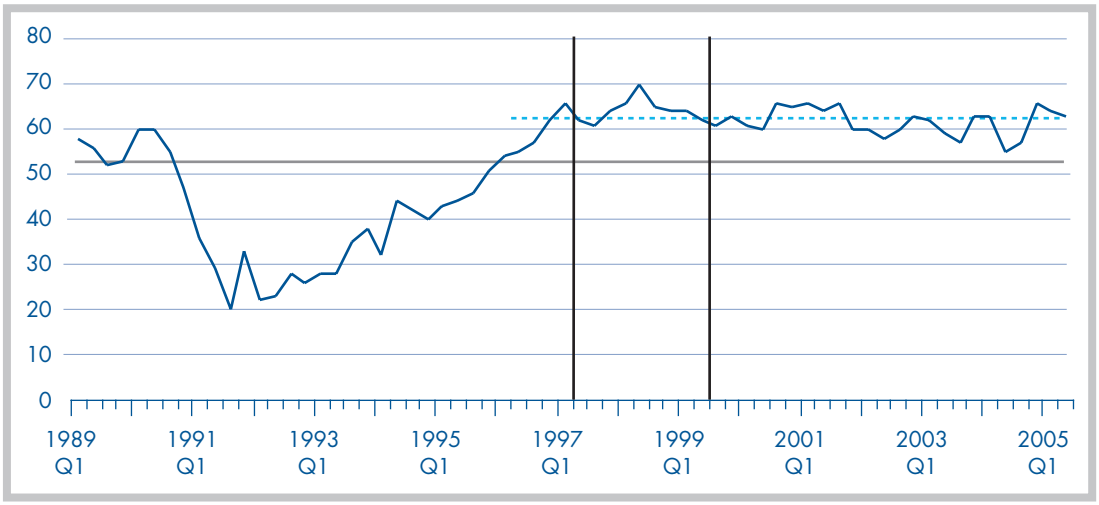
14 British Chambers of Commerce Recruitment Difficulties (Manufacturing)

This shows the percentage of manufacturing firms experiencing recruitment difficulties. The survey question is 'Did you experience any difficulties finding suitable staff?' The data series reflects the percentage of firms answering 'yes'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1995Q1, shown by the dashed line.



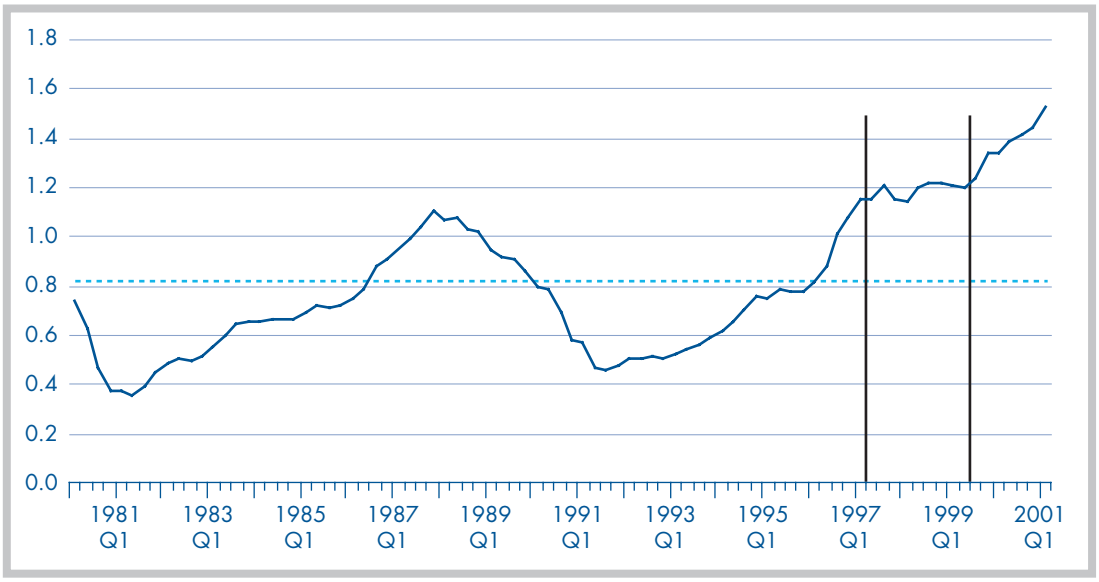
15 British Chambers of Commerce Recruitment Difficulties (Services)

This shows the percentage of services firms experiencing recruitment difficulties. The survey question is 'Did you experience any difficulties finding suitable staff?' The data series reflects the percentage of firms answering 'yes'. The solid horizontal line is the average since 1989Q1; the average more appropriate to assessing on-trend points is currently calculated since 1996Q1, shown by the dashed line.



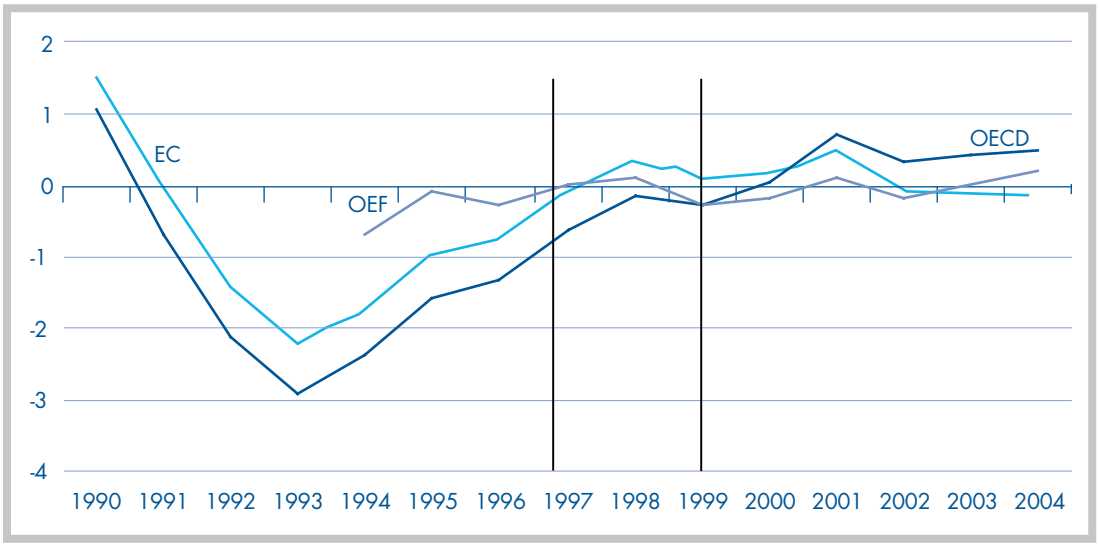
16 Vacancy Ratio

This shows the number of vacancies per 100 employee jobs. The calculation of this ratio uses the ONS data series Vacancies at Jobcentres and Employee jobs (both UK, seasonally adjusted). The dashed horizontal line shows the average between 1980 and 2001, (when the data series was discontinued), used by the Treasury for assessing on-trend points.



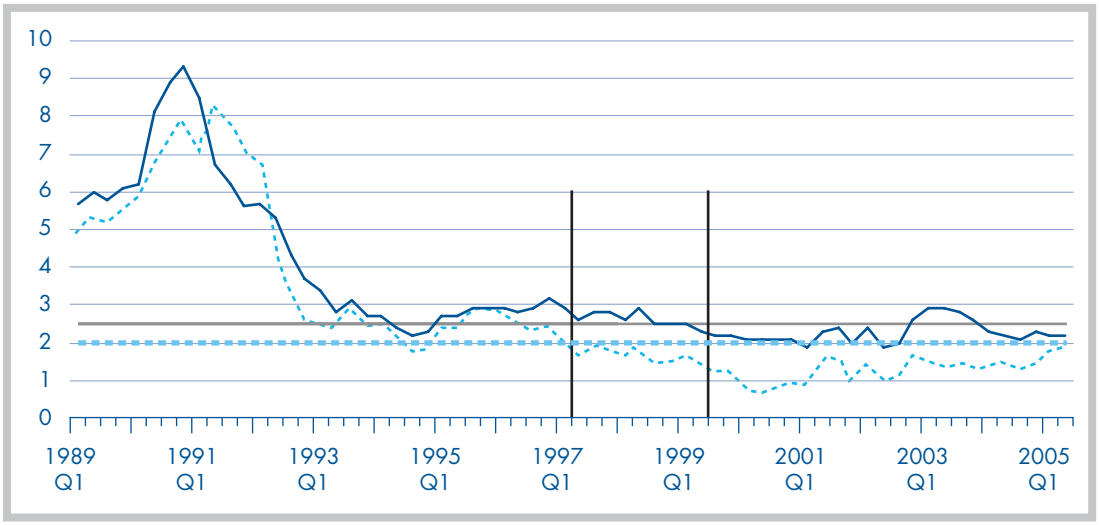
17 Deviation of Unemployment from NAIRU

The sources used by Treasury are: Unemployment rate, (ILO definition, 16+, seasonally adjusted) from the Office for National Statistics; estimates of NAIRU from OECD (Economic Outlook No. 77, May 2005), European Commission (Spring 2005) and OEF (Economic Outlook, July 2005). The series show the percentage point difference between the estimated UK NAIRU and the unemployment rate, (NAIRU minus unemployment rate).



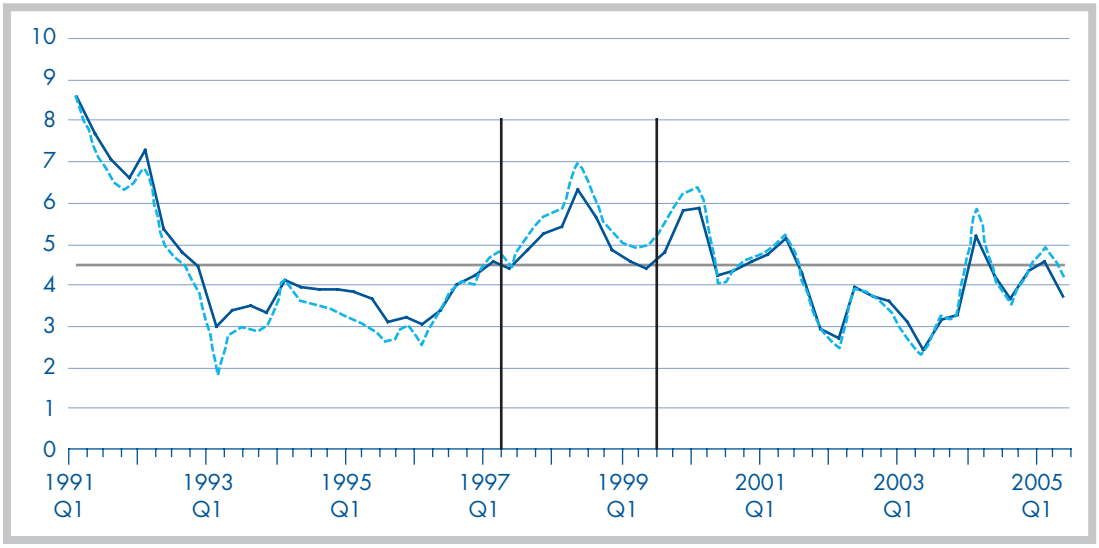
18 Office for National Statistics price inflation (RPIX & CPI)

The series used by the Treasury to assess on-trend points are Consumer Price Inflation (CPI) and Retail Price Inflation excluding mortgage repayments (RPIX), in relation to the official targets. The solid lines show RPIX and its former 2½ per cent target; the dashed lines show CPI and its current 2 per cent target.



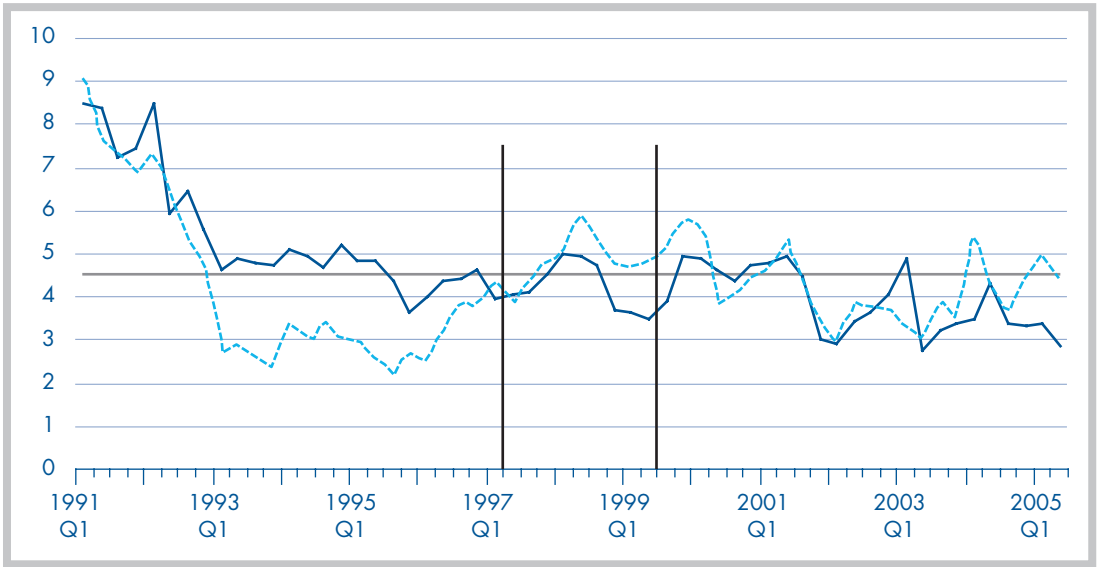
19 Wage Inflation (All Private Sector and Private Sector Services)

The series used by the Treasury to assess on-trend points is the year on year growth rates of ONS quarterly Average Earnings Index series (seasonally adjusted, private sector, including bonuses). The solid line represents AEI for all private sector industries; the dashed line represents AEI for private sector service industries. The horizontal line marks the 4½ per cent rate, which is around the whole economy rate considered by the Bank of England to be sustainable and broadly consistent with meeting the inflation target in the medium term.



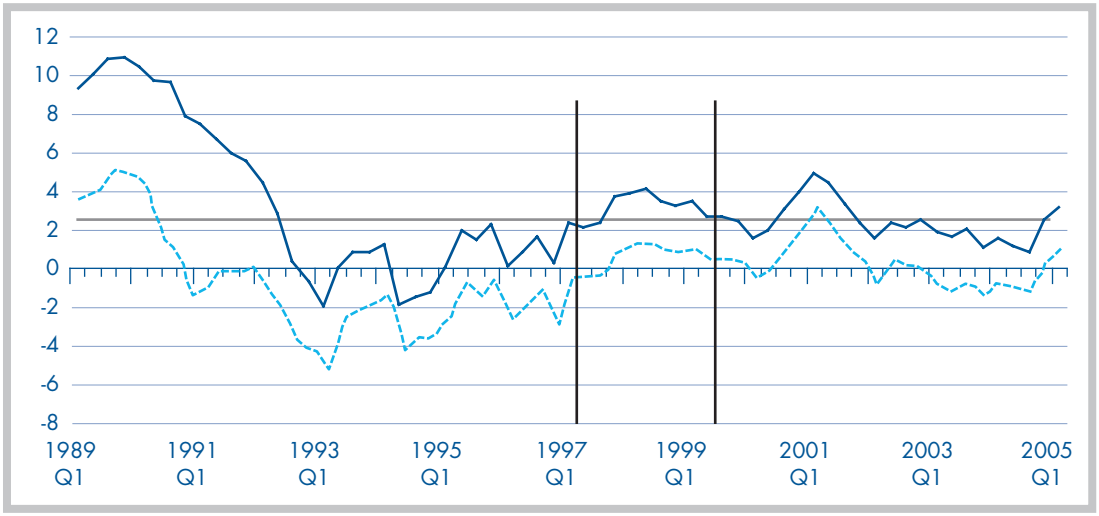
20 Wage Inflation (Private and Public Sector Manufacturing and Services)

The series used by the Treasury to assess on-trend points is the year on year growth rates of ONS's quarterly Average Earnings Index series (seasonally adjusted, including bonuses). The solid line represents AEI for manufacturing industries; the dashed line represents AEI for service industries. The horizontal line marks the 4½ per cent rate, which is around the whole economy rate considered by the Bank of England to be sustainable and broadly consistent with meeting the inflation target in the medium term.



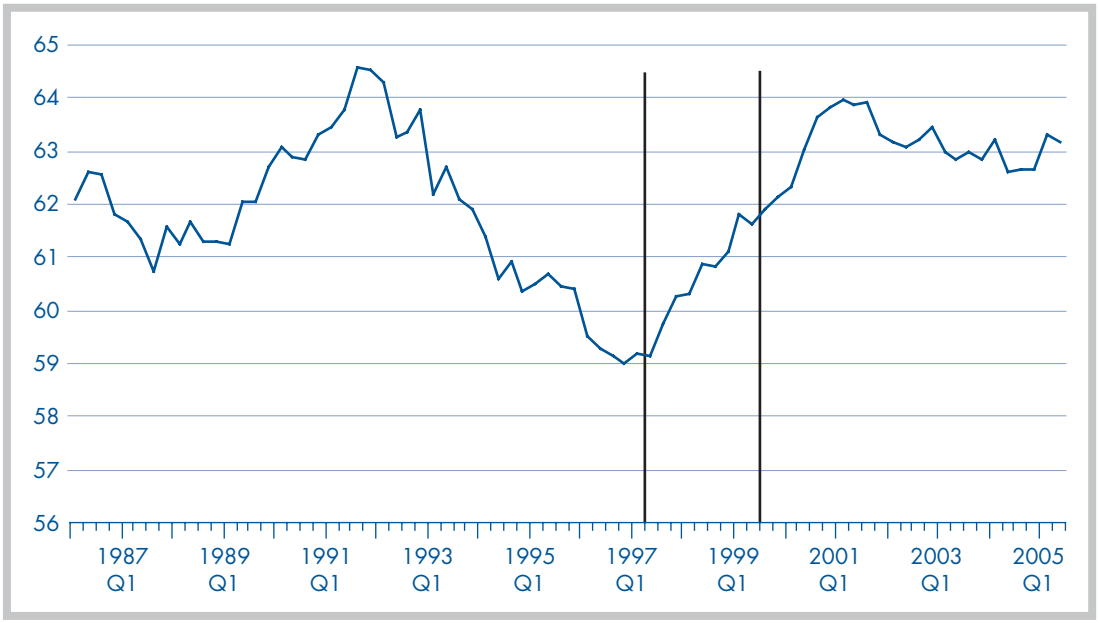
21 ONS Unit Wage Cost Growth

The series used by the Treasury to assess on-trend points is the year on year percentage change in unit wage costs, UWC, seasonally adjusted, for the whole economy. The solid line is unit wage cost growth; the dashed line is real UWC growth (deflated with RPIX). The horizontal line marks 2½ per cent, which was the inflation target rate when it was defined in terms of RPIX.



22 Labour Share of GVA

The series used by the Treasury to assess on-trend points is the share of national income paid to workers: comprising the total compensation of employees divided by GVA at basic prices, expressed as a percentage. Both numerator and denominator are in current prices. The Treasury has identified an association between turning points in the series and on-trend points.



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