
FISCAL POLICY: PUBLIC FINANCES AND THE CYCLE

Summary

The economic cycle has an important short-term impact on the public finances. Under the *Code for Fiscal Stability*, the Government is required to publish estimates of the cyclically-adjusted fiscal position. This helps to promote transparency in the operation of fiscal policy and to enhance the quality of policy decisions.

The importance of short-run cyclical effects is also recognised in the Government's fiscal rules, which are defined over the economic cycle. The rules take into account the likelihood of short-run cyclical variations in taxes and public spending, and allow public borrowing to fluctuate over the course of the economic cycle to smooth output. But cyclical fluctuations must not be allowed to disguise any worsening in the underlying fiscal position.¹ Cyclically-adjusted fiscal indicators therefore play an important role in assessing the true state of the public finances.

The analysis here provides the background to the estimates of cyclically-adjusted fiscal indicators published in the March 1999 Budget. Since both the current cyclical position of the economy and the likely response of the public finances to the economic cycle are uncertain, the Treasury also looks at and publishes variant projections of cyclically-adjusted indicators, to allow for the possibility that the cyclical position has been misjudged. The paper shows that even on a more cautious case, the Government remains on track to meet its fiscal rules.

This paper forms part of an ongoing assessment of the effects of the economic cycle on the public finances. It updates earlier Treasury analysis and takes a more detailed look at Treasury estimates of potential output and the output gap². We will continue to update this analysis as new data and new estimation techniques emerge.

On the basis of the updated analysis, the paper concludes that the overall sensitivity of the public finances to the cycle is little changed from previous estimates, although the latest figures suggest that the effects of the cycle come through more quickly than previously estimated.

¹ See "Fiscal policy: lessons from the last economic cycle", HM Treasury, November 1997.

² See "Public finances and the cycle", Treasury Occasional Paper number 4, September 1995 and "Fiscal developments and the role of the cycle", *Treasury Bulletin*, volume 2, issue 1, Winter 1990-91.

In particular, a 1 per cent increase in output relative to trend is estimated after two years to:

- reduce the ratio of public sector net borrowing to GDP - the Government's preferred measure of assessing fiscal stance - by just under $\frac{3}{4}$ percentage point; and
- increase the ratio of surplus on current budget to GDP - the focus of the Government's golden rule - by just under $\frac{3}{4}$ percentage point. (Public investment in future is fixed in cash terms within the three-year Departmental Expenditure Limits, and will not vary with the economic cycle).

About two thirds of the overall effect derives from the change in the ratio of expenditure to GDP.

These estimates are approximate and simplified representations of the true dynamic impact of the output gap on the public finances. And they are subject to margins of error since estimates of the output gap are uncertain. Nevertheless, other estimates of the cyclicity of the UK's public finances, for example those produced by the IMF, OECD and European Commission, yield similar results.

1. Introduction

The economic cycle has important short-term effects on the public finances. These effects need to be taken into account when assessing the underlying (structural) position of the public finances. Experience has shown that serious mistakes can occur if purely cyclical improvements in the public finances are treated as if they represented structural improvements, or if a structural deterioration is interpreted as a cyclical effect. This is why the *Code for Fiscal Stability* requires the Government to publish estimates of the cyclically-adjusted fiscal position.

How the cycle impacts on the public finances is liable to change over time, for a number of reasons. New data observations may change our view about where the economy is relative to trend. Policy changes may affect how quickly different effects feed through. And developments in techniques for estimating the effects of the cycle may also lead to different views.

This update of the effects of the cycle on the public finances focuses on the Government's new fiscal aggregates and takes account of the implications of the move to ESA 95. The key aggregates are the surplus on current budget, which is used to judge performance against the golden rule; net borrowing, which on a cyclically-adjusted basis provides an indication of the overall fiscal stance; and the ratio of public sector net debt to GDP, which is used to judge performance against the sustainable investment rule.

This paper is presented in two parts. The first section describes in detail how the Treasury measures the economic cycle. It focuses on measuring the level of trend output, and the output gap, with particular reference to determining on-trend points. Based on methodology set out in previous Treasury papers, the second section uses these estimates of the output gap to estimate the responsiveness of the main components of tax revenues and public expenditure, and consequently the new fiscal aggregates, to the economic cycle.

Additional detail is set out in two annexes. Annex A compares the new estimates with the previous estimates, and Annex B sets out the updated estimation results in detail.

2 Potential output and the output gap

This section considers the concept of potential output (also referred to as trend output) and describes how the Treasury derives estimates of potential output and the output gap. Estimates of the output gap are an important factor in assessing the sustainability of the public finances.

2.1 Potential output and inflation

The output gap

Output growth has a trend and a cyclical component. The trend is a function of continual advances in technology and production techniques. In the long term the economy tends to grow consistently. But over shorter periods, cyclical movements mean that the economy may at any given point in time be operating either above or below this long-term trend.

The output gap is the difference between the actual level of output and its potential level, usually expressed as a percentage of the level of potential output. When actual output is above potential output, the paper identifies this as a positive output gap; when actual output is below potential output, the output gap is negative.

Government expenditure and revenue are both highly cyclical, with expenditure falling and revenue rising in an economic upswing. Hence the public finances will be stronger when the economy is operating above trend, and weaker when the economy is below trend. This makes estimating the output gap extremely important. If the economy is operating close to trend, then this suggests that the public finances should be broadly in balance to be sustainable. But if the economy is operating above trend, then in the absence of any change in fiscal policy the public finances must be expected to deteriorate as output subsequently returns to trend.

The output-inflation trade-off

We can use our estimate of the output gap as an indicator of the risk of inflation: inflation tends to rise when output is above potential (ie. a positive output gap), and fall when output is below potential (a negative output gap). Therefore, a short-run trade-off (usually known as a Phillips Curve relationship) is said to exist between output and inflation.

In line with the consensus among economists, we assume that a positive output gap can typically only be sustained while inflation is higher than expected. It is this 'surprise' element that brings forward the extra employment and output, as real wages are temporarily reduced by the unexpectedly higher inflation. Once inflation expectations adjust, output returns to its potential level, but at a higher rate of inflation. Hence in the long run, there is no trade off and periods of

excess demand serve only to ratchet up the inflation rate (in technical terms the long-run Phillips Curve is vertical).³

Unfortunately, the relationship between the output gap and inflation is not simple. The inflation rate is dependent on a number of other temporary factors, such as movements in the real exchange rate. Even abstracting from such short-term influences, it is possible that the trade-off may be asymmetric and non-linear. And there may be 'speed limits' on how fast a negative output gap can be closed without putting upward pressure on inflation, for instance, due to supply bottlenecks.

However, the implication of this underlying view of the economy is that we must assume actual output cannot be sustained above the level of potential output without eventually generating ever-increasing levels of inflation. Hence even if there are no immediate signs of inflation, in assessing the sustainability of the public finances we must assume that output will return to trend.

Asymmetry and non-linearities in the trade-off

There is some evidence that excess demand conditions are more inflationary than excess supply conditions are disinflationary; ie. inflation may rise by more when output is above potential than it falls when output is below potential.⁴ This might happen, for instance, if people resist any downward pressure on the rate at which their earnings grow. In the context of reducing inflation, this means an unfavourable trade-off: the lost output needed to bring about a given fall in inflation is greater than the temporary increase in the output that can be achieved while generating a similar rise in inflation. This asymmetry makes it important to prevent inflationary booms: any increase in inflation today may require a larger future loss of output in order to get inflation back down.

Speed limits

A "speed limit" arises if an increase in inflation can be attributed to rapid or uneven output growth, despite output being below potential. This could be because plant capacity takes time to plan and install, or because wages might be responsive to the change in unemployment, not just the level. For example, rapid growth in the manufacturing sector in 1994 and the service sector in 1995 and 1996 caused the economy to run into bottlenecks, leading to higher inflation, even though the output gap was probably still negative.

³ As output above its sustainable trend level is assumed to lead to inflation, it is clear that potential output is closely related to the concept of the sustainable level of unemployment or NAIRU (Non-Accelerating Inflation Rate of Unemployment). However, there are likely to be short-run differences since cyclical movements in unemployment tend to lag behind the GDP cycle.

⁴ See Turner, "Speed limit and asymmetric inflation effects from the output gap in the major seven economies", OECD Economic Studies, 1995; Debelle and Laxton, "Is the Phillips Curve really a curve?", IMF Working Paper 1996.

2.2 Estimating potential output over the past

Trend extraction methodology

Neither the level nor the growth of potential output is directly observable. A variety of methods can be used to estimate potential output over the past, including purely statistical techniques, economic models of productive potential, or econometric models of the economy⁵. The Treasury's current approach interpolates the rate of growth between comparable points in the cycle.⁶

Cyclical peaks are easy to identify, and hence are commonly used for estimating trend growth. But peak-to-peak comparisons can be misleading if cycles are of different amplitude. Where survey data are available, an alternative approach is to measure trend output by calculating average growth between dates when the economy is judged to have been on-trend, ie. mid-cycle to mid-cycle. In contrast to techniques that are purely statistical, this methodology requires the use of informed judgement to identify the cycle, but it also allows us to bring to bear a great deal more information (such as survey data) than narrower statistical techniques. It also permits breaks in the trend output series around each estimated on-trend point.

2.3 Survey evidence - identifying on-trend points

The CBI survey and other indicators

On-trend points can be identified by looking at a range of indicators. For manufacturing, time series are available from the CBI Industrial Trends Survey, which has a long and established track record. The Survey includes questions on capacity utilisation (see chart 2.1) and the perceived constraints imposed by plant capacity and the availability of skilled labour. For the service sector, sources include the British Chambers of Commerce Survey (available only since 1989) and the CBI Distributive Trades Survey. There are a range of other indicators - unemployment, vacancies, average earnings - which also relate to the degree of slack in the labour market.

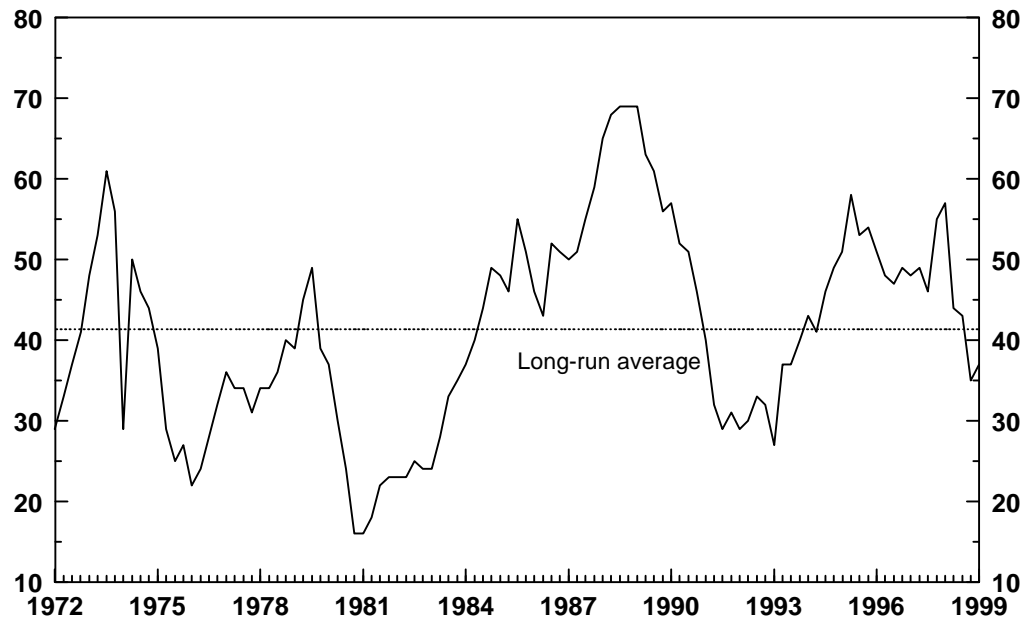
The response to survey questions can, however, be affected by subjective bias. For instance, the answers will be difficult to interpret if firms' perceptions about the normal rate of capacity utilisation vary with the economic cycle or over time. And while survey evidence offers a broad guide to pressures on capacity in particular sectors, no single survey question has the breadth to measure capacity utilisation across the whole economy. In practice, different sectors or regions of the economy are likely to be subject to different pressures, especially in the short run.

⁵ These approaches are discussed in more detail in Treasury Occasional Paper number 4, "Public finances and the cycle", September 1995.

⁶ We continue to keep abreast of new developments in estimation methodology, and will consider the use of alternative methods if these prove to be robust.

It is unfortunate that the surveys of the service sector only go back as far as the late 1980s.

Chart 2.1 - CBI survey of capacity utilisation in manufacturing



Estimating the trend across full cycles and half cycles

In practice, the inferred trend growth rate can be sensitive to the precise dating of on-trend points. For example, the economy passed rapidly from its peak in mid-1979 to a deep trough in early 1980, and the choice of on-trend point between these dates affects estimated trend growth over this period. In the 1970s and early 1980s, a smoother and more robust trend line can be obtained by interpolating across full cycles - ie. across three on-trend points - avoiding the need to identify explicitly every on-trend point.

Cycles in the late 1980s and early 1990s were longer and could be measured by a broader range of survey indicators. As a result, it is possible to estimate trend growth across the half cycle - ie between each cyclical mid-point - with a greater degree of certainty.

2.4 Historical estimates of potential output and the output gap

Table 2.1 shows how indicators of capacity and labour market slack can be compared to their long-run averages in order to identify on-trend points. As outlined above, trend growth rates are identified over full cycles in the 1970s and early 1980s, then over half cycles in the late 1980s and early 1990s.

Table 2.1 - On-trend points and the survey indicators

	Capacity utilisation ¹	Skill shortages ²	Vacancies (000s)	Trend growth estimate (per cent pa)
Long-run average	43	14	182	
On-trend points				
1972Q4	41	13	180	1.9
1978Q1	34	18	190	1.6
1986Q2	43	13	178	2.8
1990Q4/1991Q1	43	8	139	2.2
1997Q1/1997Q2	48	10	270 ³	

Notes:

1. From the CBI survey of manufacturing industry. Percentage of firms reporting capacity utilisation at or above normal levels.
2. From the CBI survey of manufacturing industry. Percentage of firms reporting or skill shortages as a limiting factor on output.
3. Vacancy figures distorted by introduction of Jobseeker's Allowance.

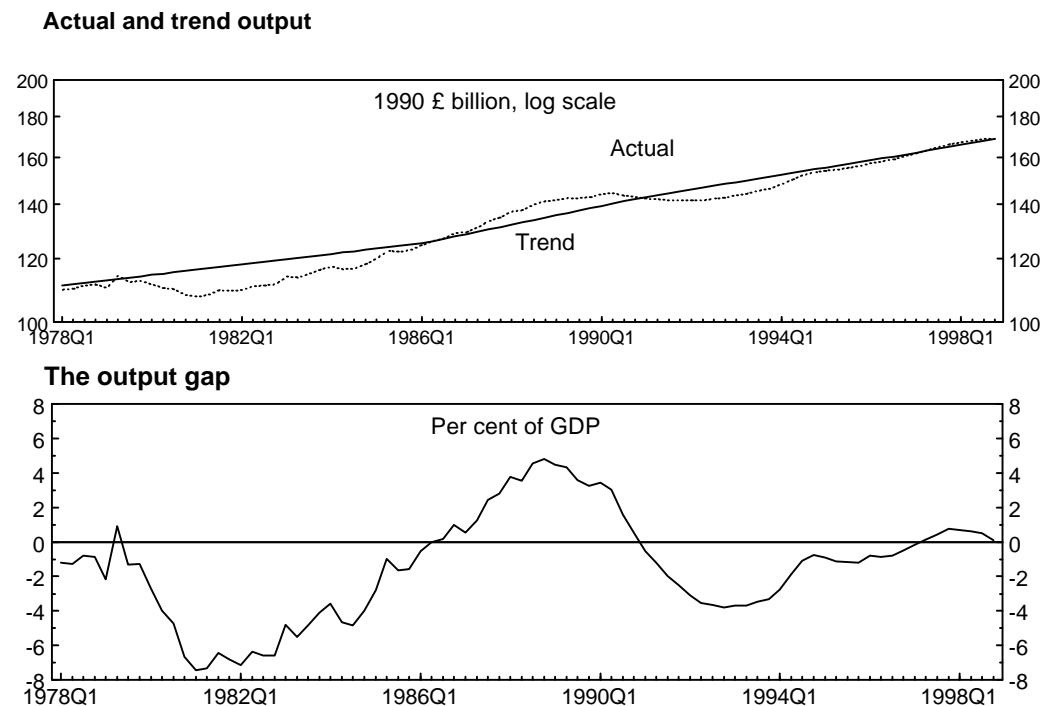
Survey indicators suggest that output returned quickly to trend after the boom in 1973, and remained relatively close to trend until the end of the 1970s, with the 1979 peak being quite modest. By contrast, after the recession of 1980-81, the economy probably did not return to trend until the mid 1980s. Rapid growth after 1986 then took the economy into its largest post-war boom. In the early 1990s, output again fell below its trend level, although probably not to the extent that it did in the 1980s recession.

Looking at the historical context, the immediate post-war period saw sustained fast growth of over 3 per cent a year. But this 'Golden Age' was very much the exception. Longer-run comparisons show that since the mid-nineteenth century growth has averaged 2¼ per cent. In comparison, growth averaged under 2 per cent across both the 1970s and the early 1980s cycles. The second half of the 1980s appeared to show a sharp upturn in underlying growth. But this was mostly reversed in the protracted recession of the early 1990s, when the premature scrapping of productive capacity and increases in unemployment damaged the UK economy's productive potential. Consequently, over the last full cycle (1986q2 to 1997h1), growth averaged almost 2½ per cent, not far above the long-term historical average.

2.5 The current output gap

Any estimate of trend growth over the present cycle, or of the current level of potential output, is likely to be subject to a large margin of error. In particular, it can be more difficult to measure potential output around the middle of an economic cycle than over complete cycles in the past, because this will be sensitive to the future path of growth and inflation. However, this difficulty is likely to be greater for estimates of trend output generated by purely statistical methods than for more judgmental approaches that take account of survey evidence. Chart 2.2 shows Treasury estimates of trend output and the output gap since 1978.

Chart 2.2 - Actual and trend output and the output gap



Capacity pressures rose in 1994

Taking the CBI survey, shown in chart 2.1, at face value suggests that the output gap could have turned positive as early as 1994. However, the labour market remained flat and it seems unlikely that the output gap of the economy as a whole had turned positive so soon after the early 1990s recession. The sharp increases in capacity utilisation are more likely to represent the economy running into speed constraints as a result of very fast output growth, first in manufacturing and then the service sector.

Economy on-trend in first half of 1997

With fast growth in late 1996 and through 1997, the remaining spare capacity in the economy is likely to have been brought into use by the first half of 1997. Most indicators of capacity utilisation marked time during the first half of 1997, while the

labour market continued to tighten. Weighing up the various indicators, it is difficult to discriminate between 1997q1 and 1997q2 as points when output might have been on-trend. The economy is therefore judged to have been on-trend, on average, in the first half of 1997, and above trend since the second half of 1997.

This interpretation also fits with other indicators. Unemployment - above 7 per cent (on the Labour Force Survey measure) until mid 1997 - remained higher than most estimates of the NAIRU. Moreover, earnings growth remained at sustainable rates until 1997.

If we assume that trend output grows at $2\frac{1}{4}$ per cent per annum, then the GDP path following the last on-trend point (1997h1) implies that the output gap peaked at around $\frac{3}{4}$ per cent at the end of 1997, with the economy returning to trend at the end of 1998.

Judging the point at which the economy comes back down to trend is made difficult by the divergence between manufacturing and service sectors of the economy. Survey evidence for the manufacturing sector (such as capacity utilisation and output prices) suggests that at the end of 1998 there was already a significant negative output gap in manufacturing. Survey evidence for the service sector has remained more positive, but became more pessimistic in 1999q1. More generally, margins have come under pressure, skilled labour shortages have eased and earnings growth has fallen back. Overall, this appears to be consistent with the economy as a whole having moved back close to potential at the end of 1998.

3 Public finances and the cycle

As discussed in the previous section, the economic cycle has an important short-term impact on the public finances. These effects need to be taken into account when assessing the underlying or ‘structural’ position of the public finances.

This is why the Government’s *Code for Fiscal Stability* requires future governments to provide analyses of the impact of the economic cycle on the key fiscal aggregates, and to publish estimates of the cyclically-adjusted fiscal position. It is also why this Government’s two strict fiscal rules are defined over the economic cycle.

3.1 The automatic stabilisers

Fiscal policy can help to stabilise the economy through the operation of the “automatic stabilisers”. For example, other things equal, lower unemployment when the economy is above its trend level means temporarily lower social security spending, higher income tax receipts and higher National Insurance contributions. Higher company profits generate higher corporation tax receipts, and higher spending by consumers yields higher VAT receipts and excise duties.

This implies that Government borrowing will tend to fall when output is above trend, and rise when output is relatively low. Rising government borrowing represents a net increase in domestic demand, so this automatic fiscal effect will tend to moderate economic downturns. Conversely, falling government borrowing helps to dampen economic booms. Over most economic cycles, the effects of these automatic stabilisers will come close to balancing out.

Setting the fiscal rules over the economic cycle means that the automatic stabilisers can continue to dampen economic cycles without endangering the long-term sustainability of the public finances. While their effect may be less visible than, say, changing interest rates, taking action to suppress the automatic stabilisers is likely to significantly increase fluctuations in output.

Allowing the automatic stabilisers to operate, however, must not jeopardise the underlying fiscal position. Experience has shown that serious policy mistakes can occur if purely cyclical improvements in the public finances are treated as if they represented structural improvements, or if a structural deterioration is thought to be merely a cyclical effect.⁷ When assessing fiscal prospects, it is essential to adjust fiscal indicators for the effects of the economic cycle.

⁷ See “Fiscal policy: lessons from the last economic cycle” (H M Treasury, November 1997).

3.2 Adjusting for the effects of the economic cycle

Methodology as set out in earlier paper

A Treasury Occasional Paper published in 1995 - Public finances and the cycle - set out in detail the methodology used for deriving ready reckoners for cyclical adjustment. In brief, spending and revenue totals are regressed against estimates of contemporaneous and lagged output gaps. The resulting estimates indicate the responsiveness of the public finances to an average cycle.

The Treasury regularly monitors its estimates of the cyclicity of the public finances, as new data is released and series are revised. The current re-estimation uses for the first time data on the basis of the new European System of Accounts (ESA95), and the Government's new fiscal aggregates.

The new 'ready reckoners'

The Treasury's latest ready-reckoners for calculating cyclically-adjusted estimates of key fiscal indicators - the surplus on current budget and public sector net borrowing - are calculated using estimates of the cyclicity of total managed expenditure (TME), public sector current expenditure (PSCE), and public sector current receipts (PSCR). These are set out in table 3.1 below.

Table 3.1 - Treasury 'ready-reckoners' for estimating cyclically-adjusted (CA) fiscal indicators

CA net borrowing	=	net borrowing	+	0.40 OG	+	0.30 lagged OG
CA current budget	=	current budget	-	0.40 OG	-	0.30 lagged OG
CA TME	=	TME	+	0.40 OG	+	0.10 lagged OG
CA PSCE	=	PSCE	+	0.40 OG	+	0.10 lagged OG
CA PSCR	=	PSCR			-	0.20 lagged OG

Notes:

1. OG is the output gap, defined to be positive when output is above trend.
2. All measures in this table are ratios to money GDP.
3. Cyclically-adjusted public sector net cash requirement can be calculated using the same parameters as for cyclically-adjusted net borrowing.

Further information is provided in the two annexes. Annex A compares the results of the latest re-estimation with those of the earlier Occasional Paper, and extends that approach to aggregates covering the whole of the public sector. Annex B gives the results in detail.

Re-estimation suggests a small reduction in cyclicity and shorter lag

The latest re-estimation suggests a very small reduction in the estimated effect of the cycle on tax receipts from that set out in the 1995 Occasional Paper. Overall, a 1 per cent increase in output relative to trend is estimated after two years to:

- reduce the ratios of Total Managed Expenditure and Public Sector Current Expenditure to GDP by about $\frac{1}{2}$ percentage point; and
- increase the ratio of Public Sector Current Receipts to GDP by just under $\frac{1}{4}$ percentage point; and so
- increase the ratio of surplus on current budget to GDP - the focus of the Government's golden rule - by just under $\frac{3}{4}$ percentage point; and
- reduce the ratio of public sector net borrowing to GDP - the Government's preferred measure of assessing fiscal stance - by just under $\frac{3}{4}$ percentage point.⁸

In terms of timing, the updated ready-reckoners suggest that the first year effects of higher output relative to trend are:

- a fall in the total spending/GDP ratio, due to the increase in GDP;
- current spending behaves in a similar way to total expenditure since public investment does not vary automatically with the cycle; and
- no change in the ratio of receipts to GDP - although receipts will, of course, rise in cash terms.

The effects of higher output in the second year are:

- expenditure/GDP ratios fall further due to falls in cyclical social security payments (mainly reflecting fewer claimants of Jobseeker's allowance) and debt interest payments; and
- additional tax receipts, which come some time after the increase in output, increase the ratio of current receipts to GDP.

The re-estimation also suggests that a greater proportion of the overall effect comes in the first year. In terms of the effect on net borrowing of a 1 per cent increase in output relative to trend:

- in the first year, the new estimates suggest a fall in net borrowing of 0.4 per cent of GDP, up from 0.25 per cent; and

⁸ The same applies to the ratio of public sector net cash requirement to GDP, as financial transactions are not expected to be cyclical, and also the Maastricht definition of deficit, GGFD.

- in the second year, the new estimates suggest a further fall in net borrowing of 0.3 per cent of GDP, down from 0.5 per cent; so
- overall, the new estimates imply that a 1 per cent increase in output relative to trend would reduce borrowing by 0.7 per cent of GDP after two years, down from 0.75 under the previous estimates.

These estimates are approximate and simplified representations of the true dynamic impact of the output gap on the public finances - for instance, we would not always expect the full effect to come through within two years. And they are subject to margins of error since estimates of the output gap are uncertain and are based upon a stylised cycle: in practice, every cycle is different and so will be the effect on the public finances. Nevertheless, other estimates of the cyclicity of the UK's public finances, for example those produced by the IMF, OECD and European Commission and based on slightly different methodologies, yield similar although not identical results⁹.

3.3 Estimates of cyclically-adjusted fiscal indicators

The Treasury's estimates of the output gap and cyclically-adjusted deficits were published for the first time in the July 1997 Financial Statement and Budget Report and have been published subsequently in other Budgetary documents and papers¹⁰.

The charts overleaf present historical series and projections from the March 1999 Budget for the key fiscal flow indicators - the surplus on current budget and public sector net borrowing - in actual and cyclically-adjusted terms, together with the projections of the 1999 Budget, excluding the effects of windfall tax receipts and associated spending.

Historical estimates

As the charts show, for much of the early 1980s both the current and the overall budget were in deficit. However, when the severity of the recession is taken into account, cyclically-adjusted estimates show net borrowing remaining reasonably close to balance, and a structural surplus on the current budget.¹¹

⁹ See 'Budgetary policies during recessions' by Buti, Franco and Ongena (European Commission Economic Papers, May 1997); 'Estimating potential output, output gaps and structural budget balances' by Giorno et al (OECD Economic Department Working Papers, 1995); IMF World Economic Outlook, October 1993.

¹⁰ These include the November 1997 Pre-Budget Report and the accompanying paper - Fiscal policy: lessons from the last economic cycle - the March 1998 Financial Statement and Budget Report, the June 1998 Economic and Fiscal Strategy Report, the November 1998 Pre-Budget Report, and the March 1999 Budget.

¹¹ The picture for the public sector net cash requirement looks very similar to net borrowing, with the exception of the late 1980s when privatisations contribute to a cyclically-adjusted surplus on PSNCR.

Chart 3.1 - Surplus on Current Budget: Actual and cyclically adjusted¹

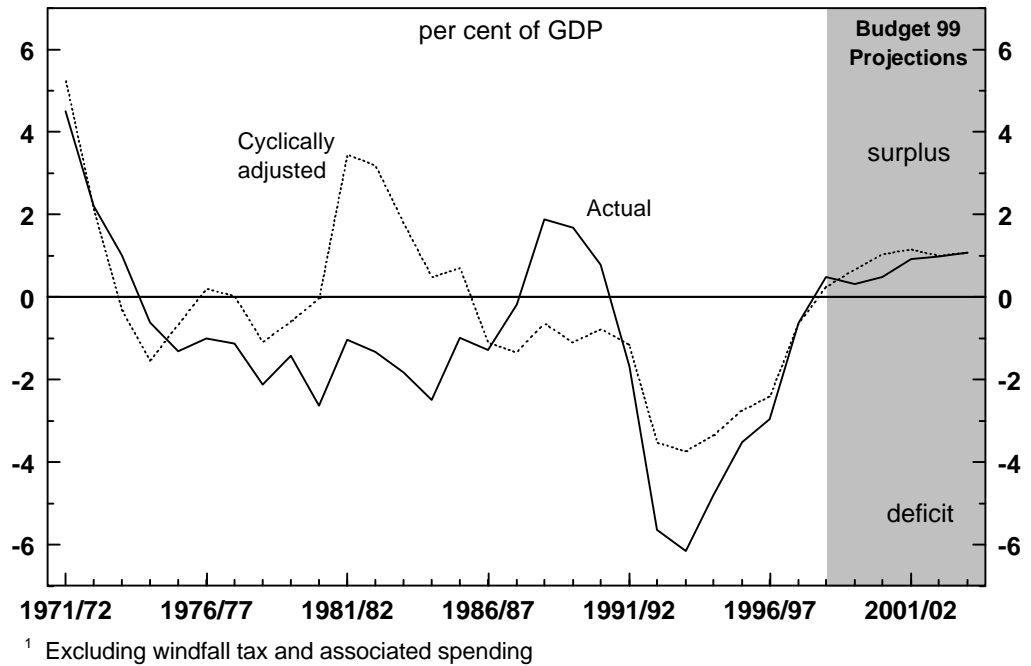
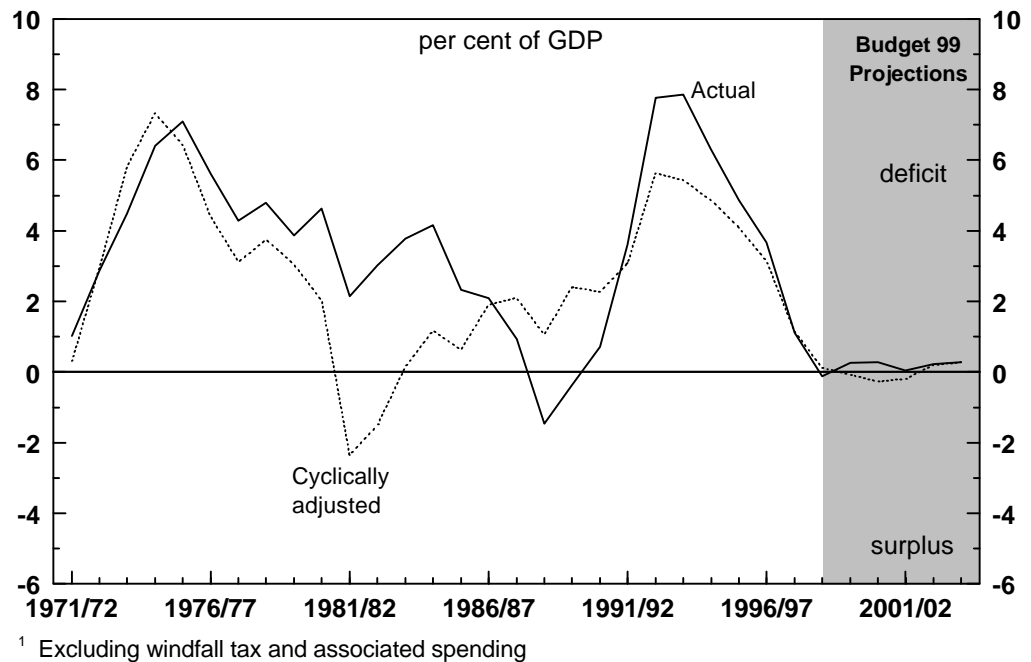


Chart 3.2 - Public Sector Net Borrowing: Actual and cyclically adjusted¹



As output moved significantly above trend in the late 1980s, the current and total budgets moved into surplus. However the cyclically-adjusted figures were in deficit, suggesting that the overall surplus was due to the effect of the cycle. As fiscal policy was relaxed in the light of the emerging surpluses, the

cyclically-adjusted fiscal position deteriorated markedly. And large deficits were recorded when the economy moved into recession in the early 1990s.

3.4 Meeting the fiscal rules

Meeting the golden rule means avoiding a deficit on the current budget on average over the economic cycle. The UK failed to meet this benchmark over the last cycle (mid-1986 to mid-1997), when there was an average deficit on current budget of just under 2 per cent of GDP.

In 1996-97, despite a number of years of consolidation, in both actual and structural terms, a significant deficit on current budget remained, falling significantly short of the balanced position that would be needed to meet the golden rule over the cycle; and net borrowing remained around 3 per cent of GDP in cyclically-adjusted terms.

In response to this unsatisfactory position, the Government introduced a deficit reduction plan in the July 1997 Budget to secure and accelerate the fall in the structural deficits. As a result, the deficit on current budget (excluding windfall tax and associated spending) fell to just £5 billion in 1997-98; and net borrowing fell by nearly £20 billion, or 2¼ per cent of GDP.

This large fiscal tightening was locked in by the March 1998 Budget and the aggregate spending totals announced in the June 1998 Economic and Fiscal Strategy Report. On the fiscal projections outlined in the March 1999 Budget:

- the current budget is projected to remain in surplus, which grows over the medium term, meeting the golden rule on average over the economic cycle; and
- net borrowing remains at very low levels, despite output being expected to be below trend in 1999.

The low levels of government borrowing mean that the public sector net debt ratio is forecast to fall consistently over the medium term, going below 40 per cent of GDP next year and meeting the sustainable investment rule.

Allowing for uncertainty

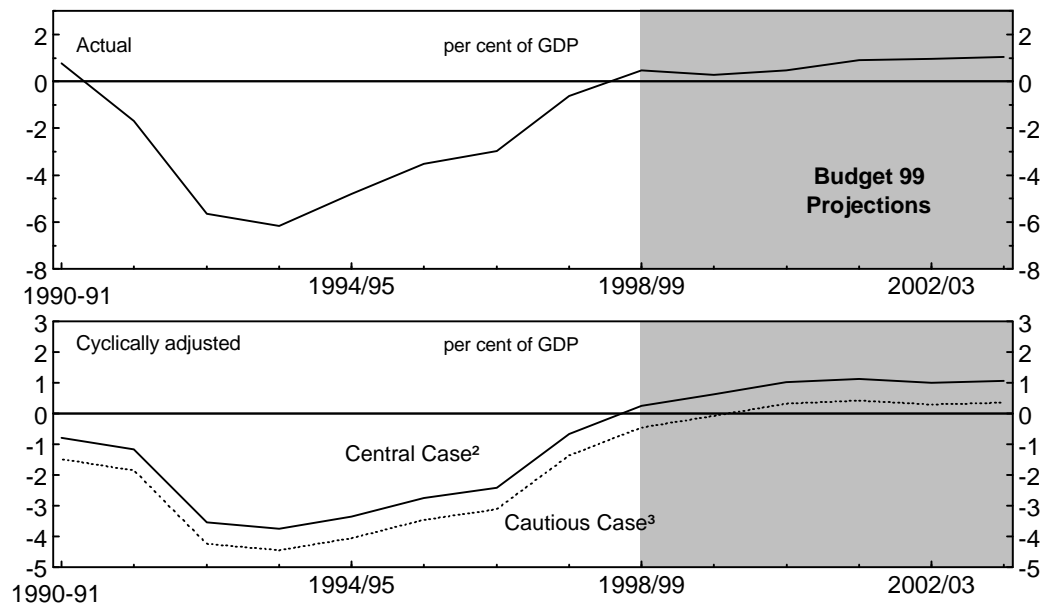
Projections of the public finances necessarily involve a significant element of uncertainty. This is because public revenue and spending projections depend heavily on economic growth and, in particular, on assumptions made about the position of the economy in relation to its sustainable long-term trend. The demand for public spending can also vary unpredictably in response to evolving needs and opportunities. In addition, effective tax rates can change in ways that are hard to predict with accuracy.

The medium-term projections presented in the 1999 Economic and Fiscal Strategy Report are based deliberately on cautious assumptions audited by the National Audit Office. In addition, they imply a small surplus on the current budget over the

economic cycle, providing a safety margin over what would strictly be necessary to meet the golden rule.

Chart 3.3 illustrates a still more cautious case in which trend output is assumed to be 1 per cent lower than contained in the central projection (the same degree of caution as in the 1998 PBR). This scenario would imply that a greater proportion of the projected surplus on current budget was due to cyclical strength in the economy. Nonetheless, even under this scenario, the Government would remain on track to meet the golden rule, and would meet the sustainable investment rule comfortably.

Chart 3.3 - Surplus on Current Budget: Actual and cyclically adjusted¹



¹ Excluding windfall tax and associated spending

² Cyclically adjusted Surplus on Current Budget - output on trend in 1997H1

³ Cyclically adjusted Surplus on Current Budget - output 1 per cent above trend in 1997H1

Annex A: Updated estimates of the effect of the cycle on the public finances

This annex summarises the results (set out in detail in Annex B) of updated econometric estimation of the cyclicalities of the public finances based upon the methodology set out in Treasury Occasional Paper number 4, Public Finances and the Cycle, but using:

- expenditure data for the main public sector aggregates, not only general government expenditure;
- outturns up to and including 1997-98, based on the new ESA95 national accounts data; and
- the Treasury's latest estimate of potential output, discussed in chapter 2.

A.1 Expenditure and the cycle

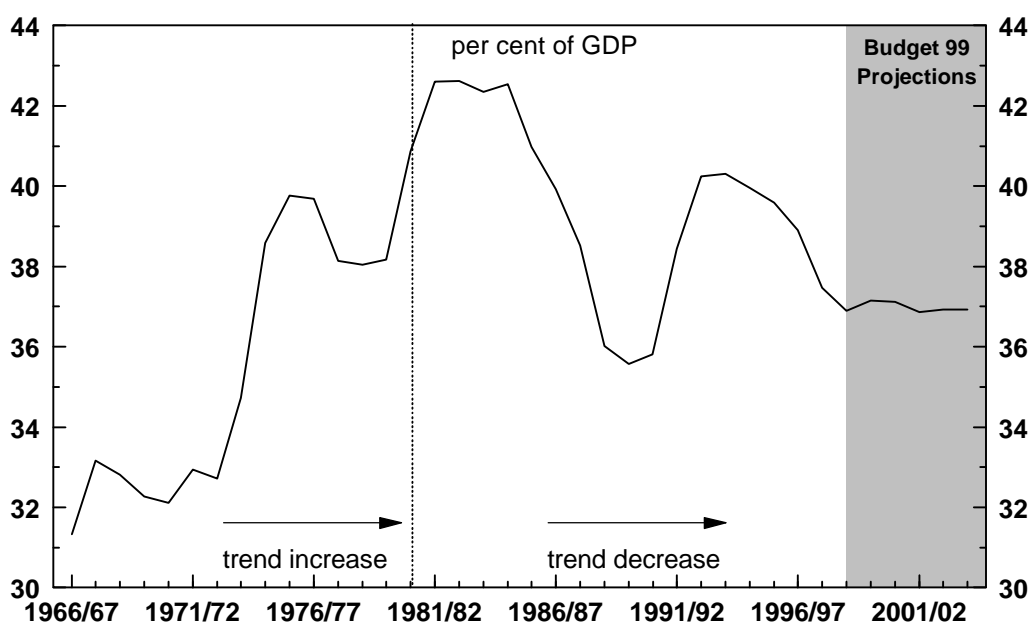
The earlier occasional paper examined the cyclicalities of the cash-based aggregate, general government expenditure excluding privatisation proceeds (GGEexPPS). However, the Government's fiscal rules focus on the public sector as a whole and are based on accruals figures, which provide a better picture of the underlying state of the public finances. It therefore seems sensible to consider also the cyclicalities of the main expenditure aggregates used in the new fiscal framework - Total Managed Expenditure (TME), together with public sector current expenditure (PSCE) which is relevant for the current budget. For comparison, however, this paper also reports results of re-estimation of the GGEexPPS equation of the Occasional Paper.

Although we do not have quantitative estimates of discretionary spending changes, examination of public spending data reveals clear trends over full cycles: both TME and PSCE grew markedly faster than GDP from the mid 1960s; and then slower than GDP from the second half of 1980s. Hence, split time trends are included in the regressions of TME and PSCE against the output gap. Introducing a structural change for TME in 1975, and for PSCE (which continued to show a strong rising trend in the second half of the 1970s) in 1980, as shown in chart A2, provides the best fit.

Departmental Expenditure Limits exclude cyclical items

The June 1998 Economic and Fiscal Strategy Report introduced a new regime for planning and controlling spending¹². Firm Departmental Expenditure Limits (DEL) were set in cash terms for the three years (1999-00 to 2001-02). Annually Managed Expenditure (AME), which includes both cyclical and non-cyclical social security and debt interest payments, will be managed separately on a year-to-year basis. Since the DEL is set in cash terms and excludes cyclical items, it is assumed to be independent of the movements in the output gap. Most public investment is within DEL, so we would expect the effect of the cycle on current spending and on TME to be very similar.

Chart A1a - Public Sector Current Expenditure¹

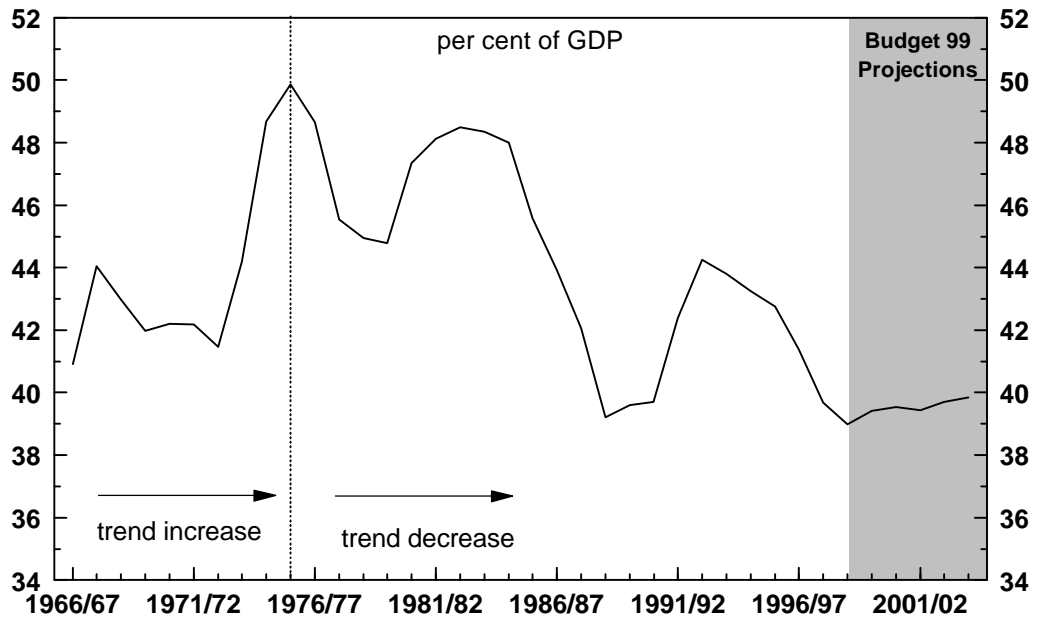


¹ Excluding windfall tax and associated spending

Similarly, a number of items within AME, for example CAP payments, can also be considered non-cyclical. So, when output rises relative to trend we would expect the ratio of TME to GDP to fall automatically, simply due to the increase in the denominator. With unemployment typically lagging the economic cycle, the effects of movements in output on cyclical spending items would be expected to operate with a lag.

¹² The previous regime, introduced in 1992, was based upon a less tightly drawn Control Total, which excluded 'Cyclical Social Security' (CSS) payments, debt interest payments and accounting adjustments. (CSS, however, actually included some non-cyclical items of social security spending, such as sick and disability payments. This explains why the occasional paper regressions of CSS showed a strong positive time trend.)

Chart A1b - Total Managed Expenditure (TME)¹



¹ Excluding windfall tax and associated spending

Occasional Paper results

The 1995 Occasional Paper used GGEexPPs as a measure of government expenditure. It estimated that a one per cent increase in output relative to trend would reduce the share of government expenditure as a percentage of GDP by 0.4 percentage points in the first year, and 0.15 percentage points in the second year. This implies a long-run effect of 0.55.

New results

The econometric results of the aggregate expenditure equations yield a range of coefficients on the contemporaneous output gap from 0.24 (current spending) to 0.38 (GGEexPPs). The implied long-run effects of the cycle range from 0.47 (current spending) to 0.58 (TME), compared to the previously used 0.55.

An equation was not estimated for public investment because the data is dominated by a downward trend and heavily distorted by changes in the composition of the public sector. Nevertheless, a comparison of the TME and PSCE equations may help us explain what has happened in the past.

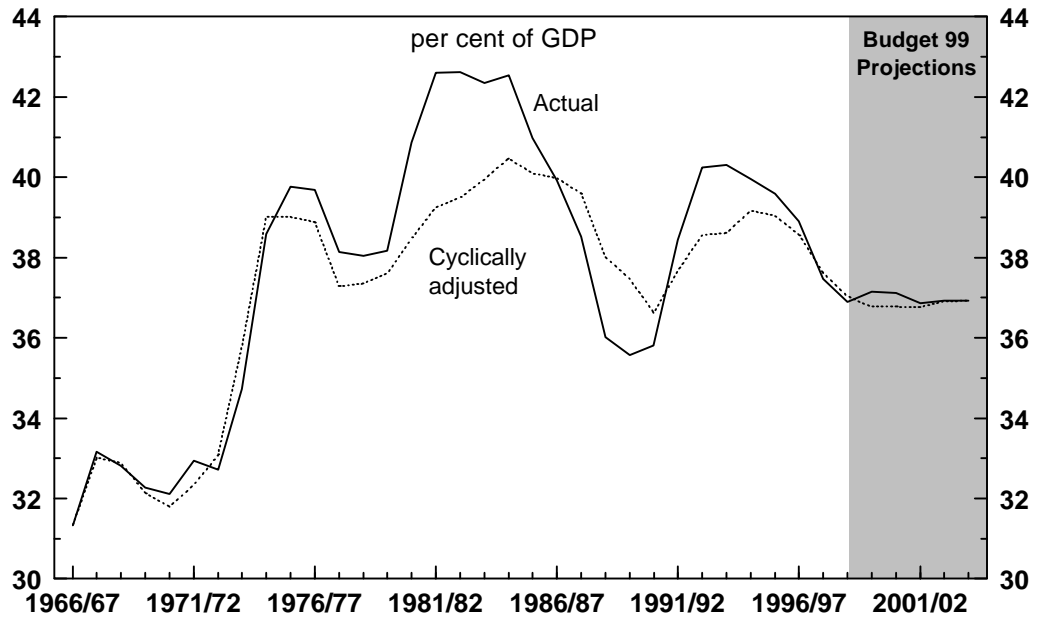
To some extent the lower impact coefficient in the PSCE equation will reflect the fact that current spending has been somewhat lower than TME, and so the “denominator effect” on current spending would be lower for total managed spending. However, this is unlikely to be the whole story, and the equations might suggest some pro-cyclical movement in public investment over the past - falling when growth is low and rising when growth is relatively high - which would dampen the effect on the spending/GDP ratio.

We have argued above that under the new planning and control framework public investment is within DEL, fixed in cash terms for three years, and will not therefore vary automatically with the cycle. And that much of the spending within AME would not be expected to move automatically with the cycle. It is possible that the equations are picking up some discretionary policy actions in the past, or simply a distortion from the other influences on public investment (eg effects of privatisation). The suggested cyclical coefficients therefore give greater weight to the TME equation than the PSCE one.

The revised equations based upon GGE, cyclical social security (CSS) and debt interest differ only slightly from the results of the occasional paper. The effect of the cycle on CSS is a little lower. The lower time trend probably reflects the effects of efforts in the 1990s to temper the rise in some of the non-cyclical elements that were included in CSS.

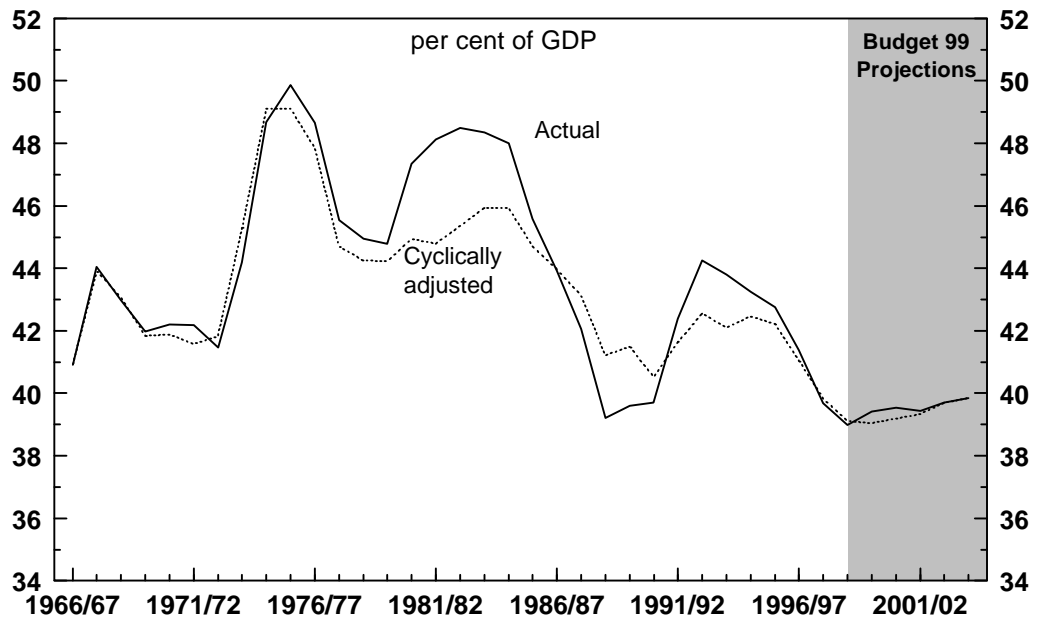
As before, the overall coefficients used to illustrate the impact of the economic cycle on expenditure are based on a combination of the econometric results and a consideration of the underlying behaviour that might explain cyclical movements. The initial impact coefficient is derived from an assumption that there is no significant change in public spending in cash terms - so with spending around 40 per cent of GDP, this implies an initial impact coefficient of 0.4 - simply from the "denominator effect". The second year effect is based on the results for debt interest and CSS equations, and imply a long-term impact close to that in the GGE and PSCE equations. **The new estimates are therefore that a 1 per cent increase in output relative to trend would reduce the spending/GDP ratio by 0.4 percentage points in the first year and 0.1 percentage points in the second year.**

Chart A2a - Public Sector Current Expenditure: Actual and cyclically adjusted¹



¹ Excluding windfall tax and associated spending

Chart A2b - Total Managed Expenditure: Actual and cyclically adjusted¹



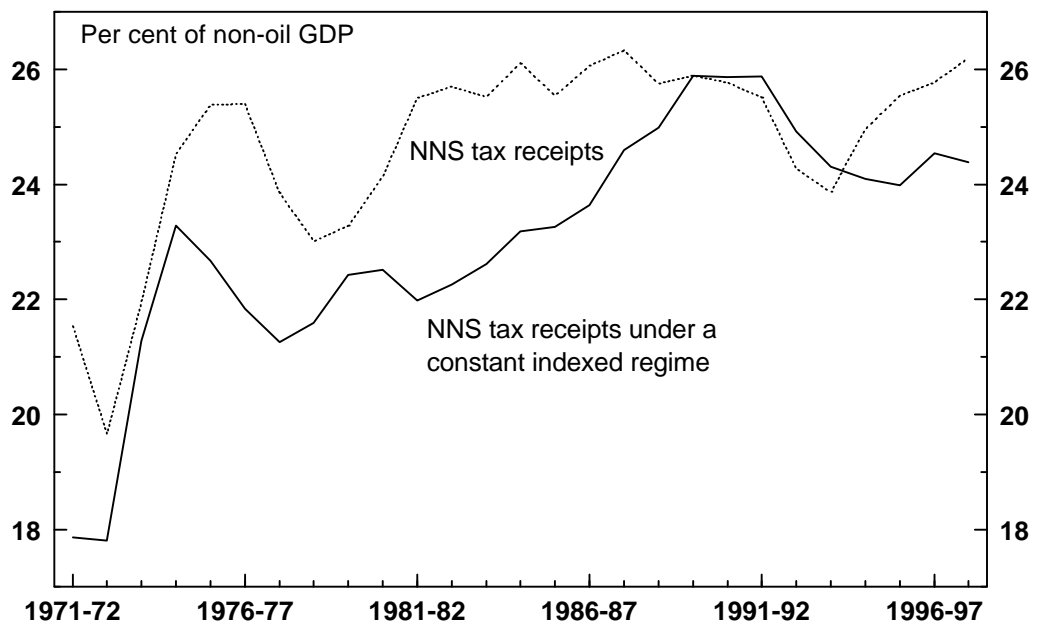
¹ Excluding windfall tax and associated spending

A.2 Receipts and the cycle

The Occasional Paper derived an estimate of the cyclicity of general government receipts (GGR) from looking at the effects of the cycle on tax receipts. This approach can equally be used to assess the cyclicity of public sector current receipts (PSCR), which in practice is very close to GGR.

Unlike spending, it is possible to construct estimates of the effect of discretionary policy changes on tax revenues, using costings of Budget tax measures published in successive editions of the Financial Statement and Budget Report. The following chart shows non-North Sea (NNS) tax receipts as a percentage of GDP before and after adjusting for discretionary changes.

Chart A3 - Tax/GDP ratios before and after adjusting for discretionary changes

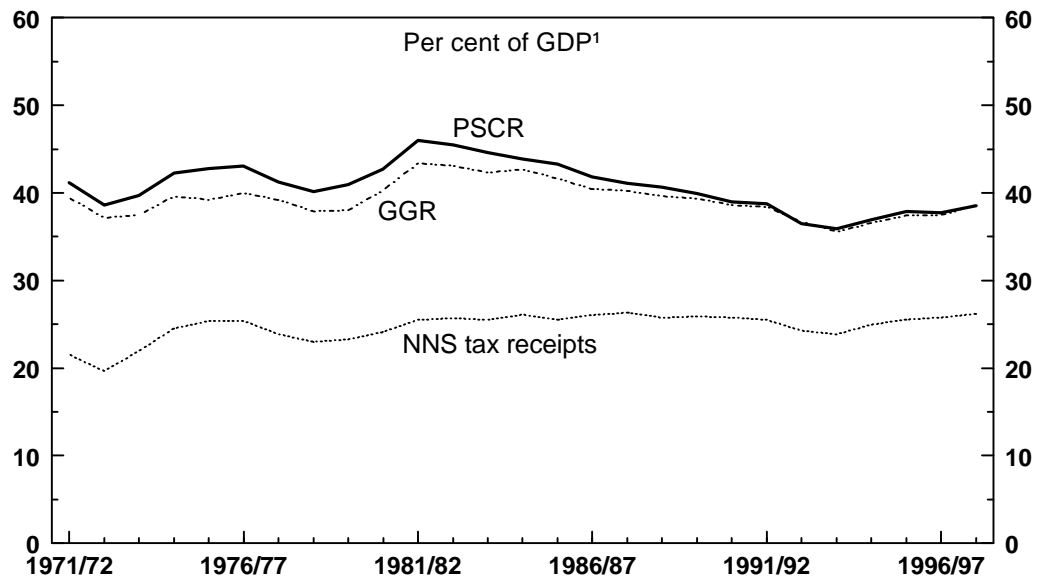


However, non-North Sea taxes account for only about two-thirds of GGR or PSCR, and costings for the other main elements - NICs and local authority taxes - are not available on a consistent basis. As in the Occasional Paper, we therefore do not estimate directly the cyclicity of these components, because they could be seriously distorted by the effect of policy changes. We assume that:

- NICs have an elasticity with respect to GDP of one; and
- local authority taxes and other non-tax receipts (mainly interest, dividends, trading surpluses and rent) have an elasticity with respect to GDP of between zero and one - so cash receipts do not rise as fast as national income, which acts as a slight drag on the ratio of receipts to GDP

Chart A4 shows that PSCR, GGR and non-North Sea taxes have moved in a broadly similar fashion over the past twenty-five years.

Chart A4 - PSCR, GGR and non-North Sea tax receipts



¹ PSCR and GGR expressed as a per cent of whole economy GDP;
NNS tax receipts expressed as a per cent of non-oil GDP

Occasional paper results

For cyclically-adjusting GGR, the Occasional Paper derived a coefficient on the current output gap (-0.12) from the sum of the impact coefficients in the individual disaggregate equations (in this case income tax and VAT, as there was no contemporaneous effect for the other main taxes).

The coefficient on the lagged output gap (+0.38) was taken from the rounded sum of the lagged coefficients in the disaggregate equations for income tax and corporation tax (there was no lagged effect from the other main taxes). The coefficient on the lagged output gap in the equation for aggregate receipts provided a check.

New results

Looking at the new results of the disaggregate equations, the income tax ratio shows very little change to the cyclical impact, but very slightly less real fiscal drag - indicated by the coefficient on trend GDP. However, both VAT (albeit a poorly determined equation) and corporation tax demonstrate slightly less cyclicity.

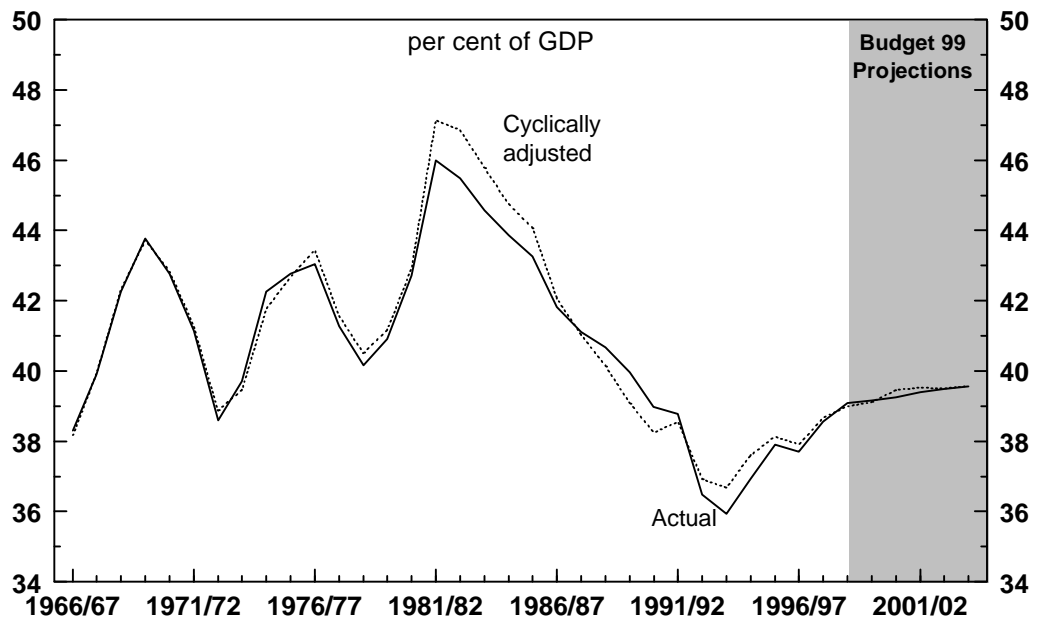
The new results for aggregate receipts confirm this suggestion of slightly reduced cyclicity. The disaggregate and aggregate approaches imply very similar long-run impacts - around 0.23 percentage points on the receipts ratio for each 1 per cent change in the output gap, down from 0.29 percentage points in the Occasional Paper results.

The implied increase in the negative first year effect in the disaggregate equations is puzzling - the high impact coefficient on the income tax equation would actually imply that cash receipts *fall* when incomes rise. And the introduction of self

assessment may reduce the lag with which income tax receipts respond to the cycle. The aggregate equation does not pick up a significant negative first year effect.

Reduced cyclicality might have been expected in the light of lower marginal tax rates - as part of the effect of the cycle comes because of the difference between average and marginal tax rates. The implied series for cyclically-adjusted current receipts is shown in the chart below.

Chart A5 - Public Sector Current Receipts: Actual and cyclically adjusted¹



¹ Excluding windfall tax and associated spending

Data for tax accruals, as well as receipts, are available for income tax and the aggregate tax series. Equations estimated using accruals data did not suggest a significantly different overall effect of the cycle, but did show a slightly greater proportion of the effect coming in the first year. However, this result appears to be a feature of the data in the 1970s and early 1980s, when accruals measures peaked at a higher level than receipts. This pattern was not repeated in cycles from the mid 1980s onwards, which might reflect the processes by which accruals data have been largely derived from cash receipts. So while in principle we might expect accruals measures to respond slightly quicker to the cycle, this does not seem to have been a feature of recent data, so the suggested coefficients are based on the receipts equations.

More light can be shed on the results by looking at the results of regressions of the cyclical behaviour of the tax bases, and the relationships between the tax bases and receipts, shown in tables B5 and B6 of Annex B. The new equation suggests less cyclical movement in the corporation tax base, although the equation is again less well-determined than that in the Occasional Paper. The new VAT equations

are not well determined, which might be expected in light of the VAT shortfalls experienced throughout the decade¹³.

Overall, the new results suggest that the long-term effect of a 1 per cent rise in output relative to trend could be an approximate 0.2 percentage point increase in the ratio of receipts to GDP, down from the approximate 0.3 suggested in the Occasional Paper. Before breaking down the split of this into first and second year effects, however, it is worth considering the impact of changes to the corporation tax regime.

Effects of tax changes in the 1998 Budget

Changes to the corporation tax system could over time bring forward some of the cyclicity of government revenues. Under the present corporation tax system, on average, mainstream corporation tax is paid 15 months after profits are earned; advance corporation tax is paid rather more quickly - probably around 6 months after profits are earned.

The abolition of ACT from April 1999, and the phasing in over the next five years of a system of quarterly payments of CT for large corporations, will shorten the average lag considerably, to only 5 months for the majority of tax receipts. The strong pro-cyclical movement of profits can therefore be expected to manifest itself more rapidly in corporation tax yields, shifting forward some of the cyclical effect from the second year into the first year, although the restriction of loss carry back from three years to one year in the 1997 Budget could temper the overall cyclical response.

Looking at the sum of disaggregate equation results in Table B4b, shifting most of the impact on corporation tax receipts into the first year from the second year would mean that the sum of the disaggregate coefficients would become very close to the aggregate equation result.

In the light of these reforms, which will clearly shorten the lags between the cycle and changes in the ratio of tax receipts to GDP, and the puzzling size of the income tax impact coefficients, it is therefore proposed to discount the negative first year effect implied by the disaggregate income tax equation. **So it is suggested that there is no initial impact on the receipts/GDP ratio, with a second year (and long-run) impact of 0.2 percentage points. This should, however, be monitored in the light of emerging evidence of the effects of tax reforms.**

¹³ For more information see Treasury Occasional Paper number 9, "The VAT shortfall: report of the working group on VAT receipts and forecasts" (September 1997).

Annex B: Econometric results

Table B1a - GGE (excluding privatisation proceeds) and the cycle.

Output Gap	E/Y	Constant	GGE(X) (-1)	GGE(X) (-2)	Gap	T66	T75	R ²	St. Error
OP		25.6 (5.21)	0.66 (3.40)	-0.34 (2.09)	-0.40 (-4.98)	0.56 (2.87)	-0.71 (2.92)	0.76	1.41
New	GGE excl. Private Proceeds	28.68 (6.46)	0.68 (4.23)	-0.42 (-3.23)	-0.38 (-3.74)	0.48 (3.42)	-0.61 (-3.67)	0.81	1.16

Notes:

1. Estimation period OP 1966-67 to 1992-93, estimation period new 1966-67 to 1997-98.
2. T-statistics in brackets.
3. E/Y = Ratio of GGE excluding privatisation proceeds to whole economy GDP.
Gap = output gap as per cent of GDP.
T66 = Time trend beginning in 1966-67; T75 = Time trend beginning in 1975-76.
4. Long-run effects of the output gap are -0.59 for OP and -0.51 for the new estimation.

Table B1b - Total Managed Expenditure (TME) and the cycle.

Output Gap	E/Y	Constant	TME(X) (-1)	TME(X) (-2)	Gap	T66	T75	R ²	St. Error
New	TME	23.72 (6.05)	0.83 (5.12)	-0.42 (-3.28)	-0.34 (-3.36)	0.45 (3.38)	-0.61 (-3.76)	0.87	1.10

Notes:

1. Estimation period new 1966-67 to 1997-98.
2. T-statistics in brackets.
3. E/Y = Ratio of TME excluding privatisation proceeds to whole economy GDP.
Gap = output gap as per cent of GDP.
T66 = Time trend beginning in 1966-67; T75 Time trend beginning in 1975-76.
4. Long-run effect of the output gap is -0.58.

Table B1c - Public Sector Current Expenditure (PSCE) and the cycle.

Output Gap	E/Y	Constant	PSCE(X) (-1)	PSCE(X) (-2)	Gap	T66	T80	R ²	St. Error
New	PSCE	15.43 (5.70)	0.94 (5.69)	-0.45 (-3.06)	-0.24 (-2.90)	0.34 (3.96)	-0.38 (-3.64)	0.94	0.87

Notes:

1. Estimation period new 1966-67 to 1997-98.
2. T-statistics in brackets.
3. E/Y = Ratio of PSCE excluding privatisation proceeds to whole economy GDP.
Gap = output gap as per cent of GDP.
T66 = Time trend beginning in 1966-67; T80 = Time trend beginning in 1980-81.
4. Long-run effect of the output gap is -0.47.

Table B2 - Cyclical Social Security and the cycle

Output Gap	E/Y	Constant	Gap(-1)	Time	R ²	St. Error
OP	Cyclical Social Security	-0.11 (0.27)	-0.12 (3.87)	0.08 (4.35)	0.61	0.27
New		1.08 (6.83)	-0.08 (-3.54)	0.05 (4.03)	0.51	0.30

Notes:

1. Estimation period OP 1978-79 to 1992-93, estimation period new 1978-79 to 1997-98.
2. T-statistics in brackets.
3. E/Y = Ratio of Cyclical Social Security (GB only) to whole economy GDP.
Gap = output gap as per cent of GDP.
Time = Time trend beginning in 1978-79.

Table B3 - Debt interest and the cycle

Output Gap	E/Y	Constant	GGDIP (-1)	GGDIP (-2)	Gap	T66	T75	R ²	St. Error
OP	GG Debt Interest Payments	0.24 (0.60)	1.07 (4.67)	-0.14 (0.55)	-0.02 (1.18)	0.02 (1.18)	-0.04 (1.31)	0.85	0.22
New		0.67 (2.21)	1.18 (6.49)	-0.35 (-2.04)	-0.02 (-1.34)	0.02 (0.77)	-0.03 (-1.04)	0.88	0.21

Notes:

1. Estimation period OP 1966-67 to 1992-93, estimation period new 1966-67 to 1997-98.
2. T-statistics in brackets.
3. E/Y = Ratio of general government gross debt interest payments to GDP.
Gap = output gap as per cent of GDP.
T64 = Time trend beginning in 1966-67; T75 = Time trend beginning in 1975-76.

Table B.4a - Aggregate Tax Burden and the cycle: occasional paper results

Eqn	T/Y	Constant	Gap	Gap(-1)	GDPT	Time	R ²	St. Error
1	Income	-82.9 (9.50)	-0.17 (4.40)	0.17 (3.80)	7.37 (10.44)	-	0.89	0.35
2	Corporation	2.09 (9.77)	-	0.21 (6.93)	-	0.03 (2.76)	0.76	0.32
3	VAT	5.65 (154.4)	0.05 (3.57)	-	-	-	0.41	0.15
4	Excise Motor	1.19 (7.66)	-	-	-	0.06 (7.32)	0.72	0.23
5	Excise Other	6.25 (42.12)	-	-	-	-0.15 (18.91)	0.94	0.23
	Sum(1-5)	-67.8	-0.12	0.38	7.37	-		
6	Aggregate	-83.8 (7.67)	-	0.29 (6.87)	8.63 (9.79)	-	0.91	0.44

Table B4b - Aggregate Tax Burden and the cycle: new results

Eqn	T/Y	Constant	Gap	Gap(-1)	GDPT	R ²	St. Error
1	Income	-72.25 (-11.14)	-0.18 (-4.21)	0.20 (4.54)	6.15 (12.44)	0.87	0.39
2	Corporation	-26.64 (-6.07)	-	0.17 (9.19)	2.25 (6.74)	0.84	0.27
3	VAT	5.58 (105.51)	0.03 (1.83)	-	-	0.10	0.22
4	Excise Motor	55.64 (8.87)	-	-	-3.97 (-8.44)	0.88	0.13
5	Excise Other	92.16 (19.05)	-	-	-6.77 (-18.38)	0.93	0.29
	Sum(1-5)	54.49	-0.15	0.37	-2.34		
6	Aggregate	-104.49 (-3.57)	-	0.23 (2.39)	9.74 (4.37)	0.88	0.70

Notes:

1. Estimation period 1971-72 to 1992-93 for OP results and 1971-72 to 1997-98 for new results, except for Vat (1975-76 to 1992-93 for OP results and 1975-76 to 1997-98 for new results).
2. T-statistics in brackets.
3. T/Y = Ratio of tax revenue (adjusted for discretionary changes) to non-oil GDP.
Gap = output gap as per cent of GDP.
GDPT = Trend GDP (in logs).
Time = Time trend beginning in 1971-72.
4. Excise motor regression also includes ratio of stocks of petrol to diesel vehicles, estimated coefficient was -0.05 with t statistic of -11.64.
5. The error term on the new aggregate equation is modelled as an AR(2) process to avoid serial correlation.

Table B5a - Tax Bases and the cycle: occasional paper results

Eqn	Base	Constant	Gap	Gap(-1)	Gap(-2)	Time	R ²	St. Error
1	Income	71.0 (68.80)	-0.54 (3.08)	0.74 (3.84)	-	0.08 (1.57)	0.47	1.54
2	Corporation	8.98 (9.57)	0.61 (5.04)	-	-	-0.08 (1.74)	0.55	1.42
3	VAT	30.2 (268.9)	0.15 (2.63)	-0.14 (2.28)	-	-	0.24	0.47
4	Excise Motor	1.43 (8.58)	-	-	-	0.01 (1.59)	0.45	0.19
5	Excise Other	8.17 (80.49)	-0.05 (4.05)	-	-0.06 (4.04)	-0.08 (14.94)	0.94	0.15

Notes:

1. Estimation period 1971-72 to 1992-93, except for VAT (1975-76 to 1992-93).
2. T-statistics in brackets.
3. Base = Tax Base.
Gap = output gap as per cent of GDP.
Time = time trend beginning in 1971-72.

Table B5b - Tax bases and the cycle: new results

Eqn	Base	Constant	Gap	Gap (-1)	Gap (-2)	Time	R ²	St. Error
1	Income	71.38 (83.92)	-0.61 (-2.63)	0.66 (2.85)	-	0.02 (0.46)	0.18	2.07
2	Corporation	9.18 (20.71)	0.51 (6.83)	-	-	0.04 (1.61)	0.65	1.08
3	VAT	33.95 (55.26)	-0.10 (-0.34)	0.07 (0.23)	-	-	-0.09	2.56
4	Excise Motor	2.01 (18.94)	-	-	-	-0.00 (-0.68)	-0.02	0.27
5	Excise Other	7.50 (125.39)	-0.04 (-3.47)	-	-0.05 (-4.33)	-0.09 (-24.35)	0.96	0.15

Notes:

1. Estimation period 1971-72 to 1997-98, except for VAT (1975-76 to 1997-98).
2. T-statistics in brackets.
3. Base = Tax Base.
Gap = output gap in per cent GDP.
Time = time trend beginning in 1971-72.

Table B6a - Receipts and the tax base: occasional paper results

Eqn	T/Y	Constant	Base	Base (-1)	Gap	Gap (-1)	Time	R ²	St. Error
1	Income	-0.43 (0.13)	0.09 (1.88)	-	-0.15 (3.40)	0.16 (3.16)	0.12 (10.5)	0.91	0.31
2	Corporation	0.88 (1.60)	-	0.13 (2.35)	-	0.12 (2.45)	0.05 (3.87)	0.80	0.29
3	VAT	1.09 (0.43)	0.15 (1.78)	-	-	-	-	0.11	0.19
4	Excise Motor	1.12 (1.86)	0.61 (2.00)	-	-	-	-	0.12	0.35
5	Excise Other	-7.42 (6.78)	1.64 (10.06)	-	-	0.13 (2.99)	-	0.83	0.40

Notes:

1. Estimation period 1971-72 to 1992-93, except for VAT (1975-76 to 1992-93).
2. T-statistics in brackets.
3. T/Y = Ratio of tax revenue (adjusted for discretionary changes) to non-oil GDP.
Base = Tax Base.
Gap = output gap as per cent of GDP.
Time = Time trend beginning in 1971-72.

Table B6b - Receipts and the tax base: new results

Eqn	T/Y	Constant	Base	Base (-1)	Gap	Gap (-1)	Time	R ²	St. Error
1	Income	-1.41 (-0.74)	0.11 (4.25)	-	-0.12 (-3.66)	0.14 (4.07)	0.12 (18.13)	0.94	0.27
2	Corporation	1.69 (3.50)	-	0.07 (1.36)	-	0.14 (4.15)	0.04 (5.48)	0.84	0.27
3	VAT	3.21 (6.41)	0.07 (4.66)	-	-	-	-	0.49	0.17
4	Excise Motor	1.12 (2.32)	0.61 (2.48)	-	-	-	-	0.17	0.33
5	Excise Other	-5.93 (-9.48)	1.46 (14.78)	-	-	0.11 (4.30)	-	0.89	0.36

Notes:

1. Estimation period 1971-72 to 1997-98, except for VAT (1975-76 to 1997-98).
2. T-statistics in brackets.
3. T/Y = Ratio of tax revenue (adjusted for discretionary changes) to non-oil GDP.
Base = Tax Base.
Gap = output gap as per cent of GDP.
Time = Time trend beginning in 1971-72.