6. Funding issues and debt management

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Summary

- In recent years, the UK government's cost of borrowing has been falling in both nominal and real terms, even though the amount it has borrowed has been rising and has consistently exceeded its own forecasts. In the light of this, we should not expect a big impact on the cost of debt if the government needs to issue a few billion pounds more in gilts than its central forecasts over the next few years.
- Modelling the impact of random factors on different debt issuance strategies provides strong reasons to favour a strategy involving greater issuance of long-dated conventional and long-dated indexed debt.
- Lengthening maturity and duration of public sector debt has not been offset by a shortening of the maturity or duration of private sector debt – in fact, quite the opposite. It is likely that this has affected – though probably not weakened – the transmission mechanism of monetary policy.
- Despite the potentially large cost that the ultimate holders of longevity risk might need to be compensated with, it is not at all clear that this reflects a market failure. There remains a rather weak case for government action in this area.
- Removing the ability of non-financial companies to deduct interest payments from the measure of profits on which they pay corporation tax might allow the rate of corporation tax to be cut from 30% to 20% with no net loss of revenue.

6.1 Introduction

This chapter begins by assessing the likely scale of gilt sales over the next few years and the likely demand from the Bank of England (Sections 6.2 and 6.3) and then considers how the Debt Management Office (DMO) might optimally choose what types of bond to issue (Section 6.4). We consider whether a significant change in the composition of bonds issued – including the possibility of issuing new types of instrument – might be sensible. The choice between shorter-dated and longer-dated debt, and between conventional debt and price-indexed debt, has an impact upon the way in which monetary policy affects the economy, and we consider the links between the evolution of the nature of public and private debt and the conduct of monetary policy (Section 6.5). We review the arguments for and against the DMO issuing longevity-indexed debt (Section 6.6). The stock of corporate debt is itself likely to reflect the tax treatment of debt and equity, and we consider how a change to the tax treatment of debt relative to equity might alter the balance sheets of the private sector (Section 6.7). Section 6.8 concludes.

6.2 The likely scale of debt issuance

Gross gilt issuance depends upon the central government net cash requirement (closely linked to public sector net borrowing) and the scale of redemptions. Based on the Treasury's December 2006 Pre-Budget Report (PBR) projections for borrowing and on the assumption that other factors (e.g. changes in the stock of Treasury bills) are neutral, gross and net gilt issuance would decline fairly significantly over the next few years as both public sector net borrowing and redemptions of outstanding government debt fall. On the PBR 2006 projections, gross gilt issuance rises again in 2010 as redemptions pick up, but net gilt issues level off at around £10 billion a year below recent levels.

Table 6.1 shows central estimates of the scale of public sector net borrowing under four scenarios:

- the DMO projections based on the Treasury's 2006 PBR forecast;
- the 'base case', which shows IFS's forecasts for borrowing if the economy evolves as the Treasury predicted in the 2006 PBR;
- IFS's forecast if the economy evolves according to the Morgan Stanley 'central case' (see Section 4.5);
- IFS's forecast if the economy evolves according to Morgan Stanley's 'pessimistic case' (see Section 4.5).

Table 6.1. Public sector net borrowing

£ billion	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
PBR	36.9	36.8	31.3	27.0	26.0	24.0	22.0
IFS base case	36.9	38.1	33.2	30.8	27.6	23.3	21.4
MS central case	36.9	37.9	34.3	30.9	26.4	21.1	16.7
MS pessimistic case	36.9	37.9	34.3	35.6	33.8	29.7	24.4

Sources: IFS; Morgan Stanley Research; HM Treasury.

Table 6.2 shows how the stock of debt relative to national income (GDP) might evolve in each case. Table 6.3 shows the DMO's illustrative projection of gilt issuance based on the Treasury's 2006 PBR forecasts. Table 6.4 compares these with the outlook for gilt issuance on the other three borrowing scenarios. Our three alternative scenarios show public sector net borrowing somewhat higher than the Treasury expects over the next three years, but then falling back towards (and ultimately dropping slightly below) the PBR projections. Assuming no offsetting changes elsewhere, the IFS base case and the Morgan Stanley central case imply gilt issuance between £2 and £4 billion a year higher than the DMO projections for most of the next three years. On the Morgan Stanley 'pessimistic case' scenario, borrowing is higher still and consistently remains above the PBR projections. If the alternative scenarios turned out to be accurate projections for the UK economy, and for the subsequent path of the public finances, the government might well change policy so that borrowing does not increase as much. This is more likely in the medium term than the short term. In particular, the £29.7 billion figure for public sector net borrowing for 2010–11 under the 'pessimistic'

Table 6.2. Public sector net debt

% of GDP	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
PBR	36.4	37.5	38.2	38.6	38.7	38.7	38.5
IFS base case	36.4	37.6	38.4	39.1	39.3	39.1	38.9
MS central case	36.4	37.3	38.8	39.2	39.3	39.1	38.5
MS pessimistic case	36.4	37.3	38.9	39.5	40.1	40.3	40.2

Sources: IFS; Morgan Stanley Research; HM Treasury.

Table 6.3. Gilt issuance: the DMO's illustrative projections based on Pre-Budget Report forecasts

£ billion	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
Central government net cash requirement	41.2	35	31	33	29	32
Redemptions	29.9	29	17	16	30	27
Financing requirement	71.1	64	48	49	59	59
Other sources of financing	–8.6*	–2	–2	–2	–2	–2
Illustrative gross gilt sales	*62.5*	*62*	*46*	*47*	*57*	*57*

Notes: 2006–07 financing requirement and estimate of gross gilt sales are from the PBR. * includes proceeds from restructuring balance sheet of British Nuclear Fuels (BNFL) and sales of national savings net of the reduction in the stock of Treasury bills. Other projections assume national savings and investments run at £2 billion a year and that other factors (for example, changes in the public sector net cash position and changes in the stock of Treasury bills) have zero net impact.
Sources: Debt Management Office; Morgan Stanley Research.

Table 6.4. Outlook for gross gilt issuance

£ billion	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
DMO/PBR illustrative gilt sales	62.5	62.0	46.0	47.0	57.0	57.0
IFS base case	63.8	63.9	49.8	48.6	56.3	56.4
Morgan Stanley central case	63.5	65.0	49.9	47.4	54.1	51.7
Morgan Stanley pessimistic case	63.6	65.0	54.6	54.8	62.7	59.4

Note: The alternative projections in Table 6.4 to the DMO/PBR illustrations are not really forecasts of what gilt sales would be since they are based on an assumption of unchanged spending plans and tax rates.
Sources: IFS; Morgan Stanley Research; HM Treasury.

scenario for the economy is not a very likely outcome since the Chancellor would very likely have cut spending and/or increased taxes if things turned out that badly.

Over the past few years, it has been striking how the UK government's cost of borrowing (illustrated in Table 6.5) has been falling – in both nominal and real terms – even though the amount it has borrowed has been rising and has consistently exceeded its own forecasts. In

Table 6.5. Gilt issuance and gilt yields

	Gross (Net) issuance (£bn)	15-year nominal yield	15-year real yield
2001–02	14 (–5)	4.86%	2.37%
2002–03	26 (9)	4.71%	2.21%
2003–04	50 (29)	4.70%	2.04%
2004–05	50 (35)	4.57%	1.78%
2005–06	52 (38)	4.24%	1.44%
2006–07	63 (32)	4.41%	1.37%

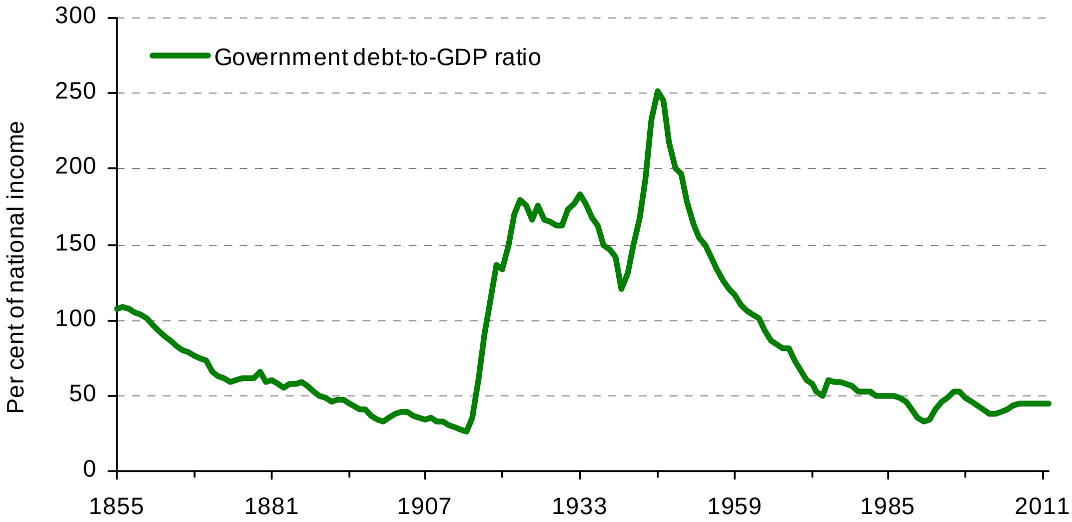
Notes: 15-year real and nominal yields are funding year averages of Bank of England estimated spot yields. 2006–07 estimates are calculated using spot yields up until 5 January 2007.
Sources: Bank of England; Debt Management Office.

the light of this, we should not expect a big impact on the cost of debt if the government needs to issue a few billion pounds more in gilts than its central forecasts in the next few years.

As discussed in Chapter 5, however, the Treasury expects the stock of debt to rise sufficiently over the next five years that a few years of borrowing £2–3 billion more than expected would probably be sufficient to take the net-debt-to-national-income ratio very close to the 40% limit – though it is only in the pessimistic scenario that we forecast net debt actually to exceed the 40% limit. Net debt being marginally above or below 40% of national income is in itself clearly not very significant from an economic point of view. So its impact upon gilt yields would be small, *unless* people came to see a breaching of the 40% limit as a signal that very substantially higher debt and deficits were now more likely in the future.

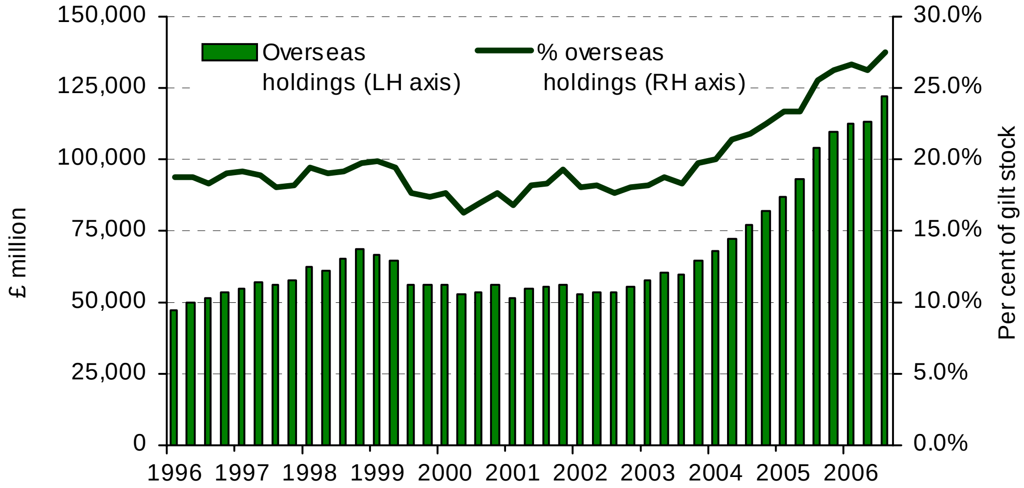
Even then it is a stretch to see that generating a significant sell-off in the market for government debt. UK government debt, given the size of the economy, is low relative to most other G7 economies and also to the UK's past history. Figure 6.1 shows an estimate of

Figure 6.1. National debt as a proportion of national income since 1855



Notes: Pre-1974 series is gross nominal liabilities of the National Loans Fund (formerly known as the national debt). 1974 onwards it is the general government gross debt.
Sources: HM Treasury, Office for National Statistics.

Figure 6.2. Overseas holdings of gilts



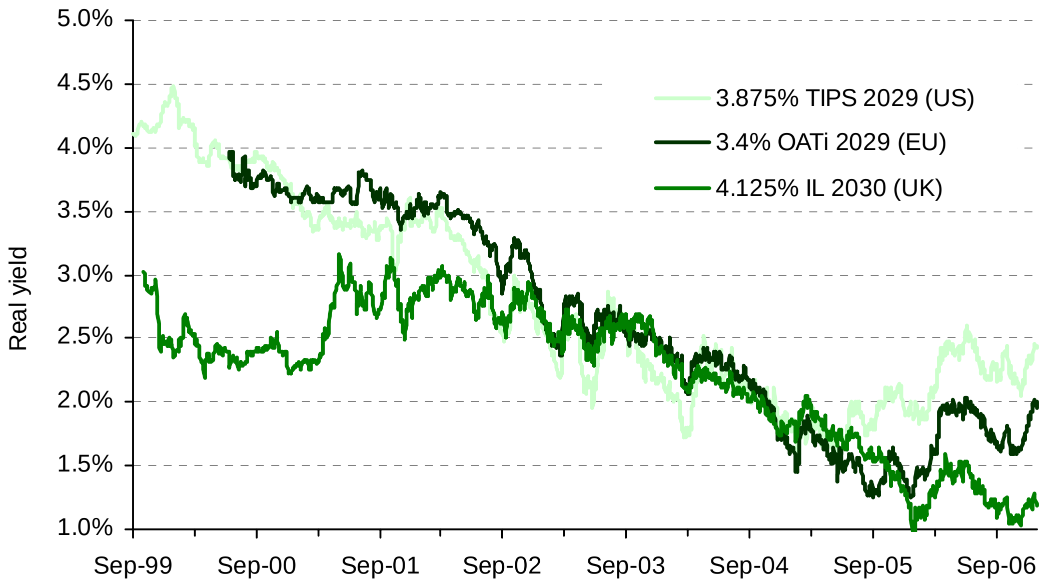
Source: Debt Management Office.

government debt relative to national income since the middle of the nineteenth century. Although rising, by the standards of the last 150 years debt is still not that far above the low point of 26% of national income reached on the eve of the First World War.

Furthermore, the cost of UK government borrowing is probably less influenced now by the scale of borrowing than it has been in the past. This reflects the increasing internationalisation of the bond market, evidence of which we can see in the increasing proportion of UK gilts that are now held overseas, as shown in Figure 6.2.

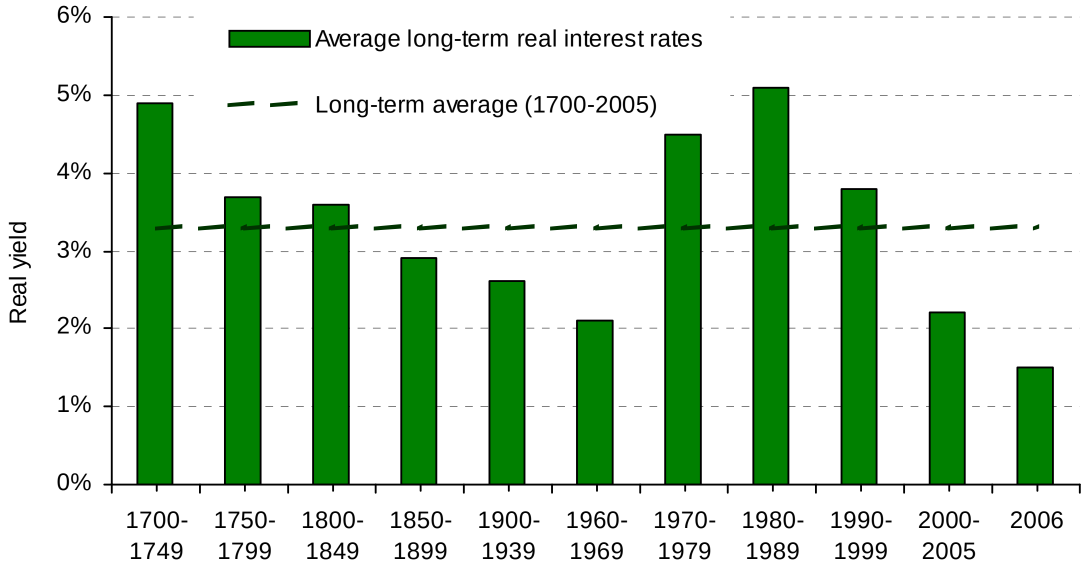
Another manifestation of this globalisation is the increasing tendency for the real cost of government debt for different developed countries to move together. Figure 6.3 shows that the fall in the real cost of government debt over the past six years has been similar in the US, the

Figure 6.3. International real yields on inflation-proof government bonds



Source: Bloomberg.

Figure 6.4. Long-term real interest rates on UK conventional debt



Notes: Nominal 2.5% consol rate less long-term inflation expectations. 1940–59 is omitted from the graph because rationing during this period made price data unreliable, leading to a negative real long-term interest rate.
Source: Morgan Stanley Research. Estimates of real yields are based on the nominal yield on consols net of a measure of expected inflation over the coming 10 years. For a detailed description of the method used to construct the real yields, see D. Miles, M. Baker and V. Pillonca, 'Where should long-term interest rates be today? A 300 year view', Morgan Stanley Research, March 2005.

Euro area and the UK. The synchronisation of movements in bond yields across the developed economies in the past few years has been exceptionally high.

Such has been the decline in the real cost of debt issued by the UK government that it is now able to issue debt at a real cost that is likely to be close to the lowest levels seen at any time in the past few hundred years (Figure 6.4).

The decline in real yields on sterling denominated debt issued by the UK government has in fact been somewhat more marked than for other countries. The yield curve on UK government bonds – the relation between the cost of debt and the maturity of that debt – is also more inverted in the UK than in other countries: in other words, relative to short-term interest rates, UK long-term interest rates are lower compared with other countries.

To an extent, this is likely to be a reflection of the importance of funded defined-benefit (DB) pension liabilities in the UK and gradual moves by UK pension funds to better match the interest rate (yield) sensitivity of their assets to that of their liabilities. This has plausibly generated a strong demand for long-dated gilts and an anticipation that it will continue. The scale of the mismatch between the interest rate sensitivity of assets held by DB pension funds and their (debt-like) liabilities remains very large. This means that the DMO is not likely to find it hard to sell a few billion more in gilts each year than it might now forecast – just as it has found little difficulty doing so over the past five years or so.

Any impact on gilt yields from an increase in supply arising from higher-than-expected government borrowing is likely to be small relative to the impact of the increase in demand likely to arise from the Bank of England's decision to start buying gilts outright to hold as assets against the issuance of bank notes.

6.3 Demand for gilts from the Bank of England

The Bank of England announced last year (jointly with the DMO)[1] that it would be an outright buyer of some £12 billion of gilts over the next three years, starting some time after September 2007. This is a consequence of reforms to the way the Bank operates in the money market. The Bank will use outright purchases of gilts (and foreign government bonds swapped into sterling) to provide longer-term finance to the banking system, partially replacing the liquidity currently provided via reverse repo operations (in which the Bank buys gilts from a bank with an agreement to sell them back to it later).

The bonds purchased outright by the Bank will be part of the portfolio of assets with which the Issue Department backs its banknotes. There are currently about £37 billion of banknotes in circulation, backed by £24 billion in reserve repo agreements and an advance of approximately £13 billion to the National Loans Fund. The Bank believes that, given the low volatility of the banknote issue, holding longer-term assets against a proportion of the banknotes in circulation would be a more structured approach to its asset/liability management.

Whilst this change will be significant for the gilts market as a whole, it will be neutral from the perspective of the Treasury, since the change in the composition of the Issue Department's balance sheet does not affect the size of the advance to the National Loans Fund or the value of gilts outstanding.

By switching to outright purchases from repos, the Bank will become an incremental buyer of gilts in the public market. The Bank intends to hold gilt tenders across the maturity spectrum from (initially) 3 to 20 years. The Bank intends to spread its buying to minimise the impact on gilt market liquidity. Each month (except December), the Bank will buy £400 million of gilts at tender. Relative to the size of the Treasury's expected new issuance in 2007–08, this amounts to some 7% of expected supply. But in relation to subsequent years (thanks to the fall in redemptions), Bank outright purchases are likely to amount to some 9–10% of new supply. In total over the coming three years, the Bank of England will buy about 4% of the stock of outstanding conventional gilts. This consistent buying has the potential to increase gilt prices and lower yields – and may to some extent have already done so – helping reduce the Treasury's financing cost at the margin.

The strategy of buying and holding gilts largely replaces the current practice of rolling forward repurchase agreements (that is, effectively making a series of collateralised loans). The difference between the Bank accepting gilts as collateral for reverse repos and buying outright (across the maturity spectrum, especially at the long end) is that the latter withdraws duration exposure (reducing the stock of debt whose value is sensitive to shifts in yields on longer-dated debt) from other market participants whereas the former leaves the duration exposure of the underlying collateral with the Bank's counterparties. Thus the prospective change in the Bank's open market operations will result in a withdrawal of duration from other market participants (that is, a fall in the stock of debt held in the private sector whose values are sensitive to shifts in the level of yields on longer-dated gilts).

[1] http://www.dmo.gov.uk/documentview.aspx?docName=/gilts/press/sa150506.pdf.

Is this something that should influence the DMO's issuance policy? Given the strength of demand for duration from pension funds evident in the very low level of long-term interest rates relative to short-term interest rates, the DMO may consider that the gradual withdrawal of duration that will happen as the Bank accumulates gilts to be undesirable. However, the withdrawal of duration available to other market participants caused by the Bank's outright purchases will be relatively small. Because the Bank will be purchasing gilts across the maturity spectrum from 3 to 20 years, we calculate that the effect over the first three years will be to reduce total duration available to other market participants by about 2¾%. This is the equivalent of removing about £4.75 billion of new 30-year bonds – just over two typically-sized 30-year auctions.

The DMO could therefore, if it decided to, create duration to substitute for what the Bank is going to remove by adding two or three more long auctions to its calendar over the next three years. To do so, it would have to increase the size of its gilt issuance and allow the size of the (short-dated) T-bill market to fall by about £4.75 billion over three years.

In principle, a reduction in the value of outstanding T-bills should not present an obstacle to increasing gilt issuance at the expense of bill issuance, at least as far as the Bank's repo operations are concerned, given the range of collateral available to the Bank's counterparties. (There are no data available on the composition of the collateral currently accepted in the Bank's repo operations.)

Alternatively, the DMO could adjust the composition of its issuance over the next three years, providing more long-dated bonds rather than short-dated bonds, and thereby reinstate the duration being absorbed by the Bank's outright purchases. This would not be a departure for the DMO, which has responded to pension fund demand in recent years by issuing a growing proportion of long-dated gilts.

If the DMO does decide to create duration to substitute for what will be removed by the Bank's purchases, it will have little difficulty in doing so – as long as strong demand for long-dated gilts persists. Whether that is the right strategy is part of the more general question of the optimal structure of government debt. We turn to this issue in the next section.

6.4 Optimal debt management

Debt management involves choosing the types of bonds to issue – longer or short dated, denominated in sterling or other currencies, with fixed nominal values or values that depend upon unknown future events (e.g. the level of consumer prices). The Debt Management Office (DMO) describes the operation of debt management thus:

> The UK Government borrows funds to finance the excess of cash payments over receipts, to pay interest on outstanding debt and to refinance maturing debt. The Government issues debt instruments in order to raise the cash it wishes to borrow. Currently, government debt instruments are issued with maturities ranging from one month (for T-bills) to 50 years (for gilts), and with interest payments (on gilts) that are

either fixed in nominal terms (conventional gilts) or linked to inflation (index-linked gilts).[2]

Here we consider how the stock of debt should be managed – what sort of bonds should be issued? We start with an overview of what the funding strategy has been to date and how the composition of the outstanding debt has evolved. We then look at what recent DMO modelling of different debt issuance strategies suggests about the best way to fund deficits.

The recent history of debt issuance and the structure of debt

In recent years, the government has issued about 25% of its new gilts in index-linked (inflation-proof) form whilst around 75% has been conventional (fixed, nominal value) debt. Most index-linked debt is relatively long term, with maturities of new indexed gilts generally being 20 years or more; since 2005, some indexed gilts have original maturities as long as 50 years. There has been a recent increase in the proportion of conventional debt that has long maturity – that is, an original maturity at issue of 15 years or more (Table 6.6).

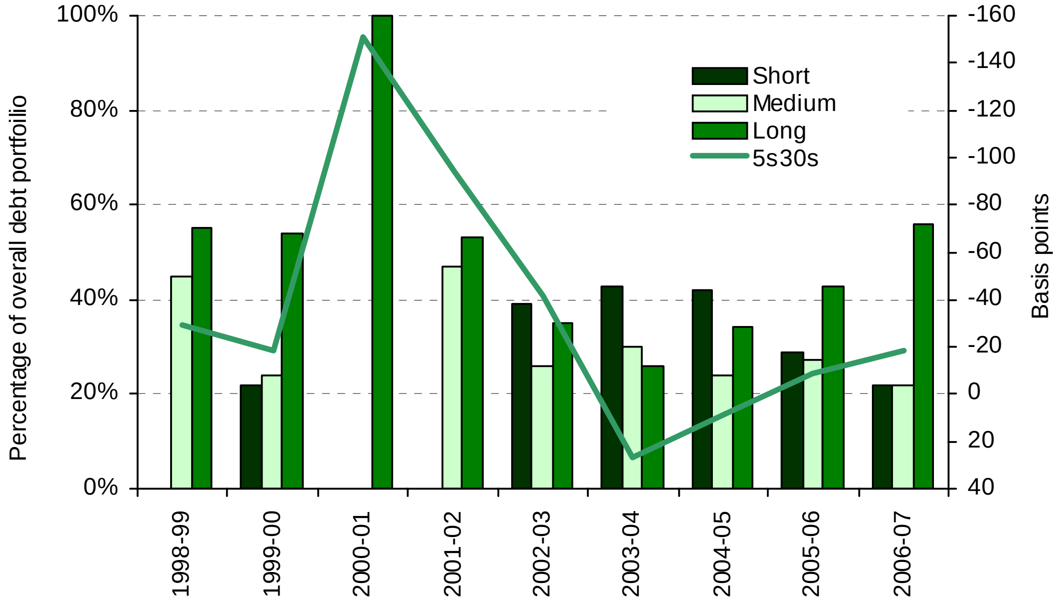
Table 6.6. Breakdown of gilt issuance by maturity and type

%	Conventional					Other		
	0–3 years	3–7 years	7–15 years	15+ years	**Total**	Floating	Undated	Index-linked
1990–91	17.7	22.4	33.1	8.0	**81.1**	0.0	2.6	16.2
1991–92	17.7	25.0	28.3	10.7	**81.6**	0.0	2.4	16.0
1992–93	13.1	25.5	27.6	14.7	**80.9**	0.0	2.0	17.1
1993–94	11.2	24.8	30.4	15.0	**81.4**	0.0	1.5	17.1
1994–95	14.9	19.8	29.3	15.3	**79.4**	2.2	1.4	17.0
1995–96	16.2	20.1	27.4	15.1	**78.9**	2.2	1.2	17.8
1996–97	16.0	21.0	25.2	15.9	**78.1**	3.0	1.1	17.8
1997–98	15.3	20.0	25.4	15.5	**76.2**	2.9	1.1	19.8
1998–99	16.2	21.6	24.0	14.7	**76.5**	1.0	1.1	21.4
1999–00	17.1	22.0	19.5	16.5	**75.1**	1.0	1.1	22.7
2000–01	16.9	22.0	16.1	17.4	**72.5**	1.1	1.1	25.3
2001–02	17.9	18.8	17.0	19.5	**73.2**	0.0	1.2	25.6
2002–03	16.2	19.4	17.7	19.0	**72.2**	0.0	1.1	26.7
2003–04	15.9	18.4	18.6	21.0	**73.9**	0.0	1.0	25.1
2004–05	20.3	16.9	14.1	23.0	**74.3**	0.0	0.8	24.8
2005–06	19.0	13.8	15.4	25.2	**73.5**	0.0	0.7	25.8
2006–07	15.7	13.1	18.2	23.7	**70.7**	0.0	0.6	28.7

Notes: Floating-rate gilts have coupons set in line with short-term interest rates. The redemption of undated gilts is at the discretion of the government.
Source: Debt Management Office.

[2] DMO, *Annual Review 2005–06*, August 2006 (http://www.dmo.gov.uk/index.aspx?page=publications/Annual_Reviews).

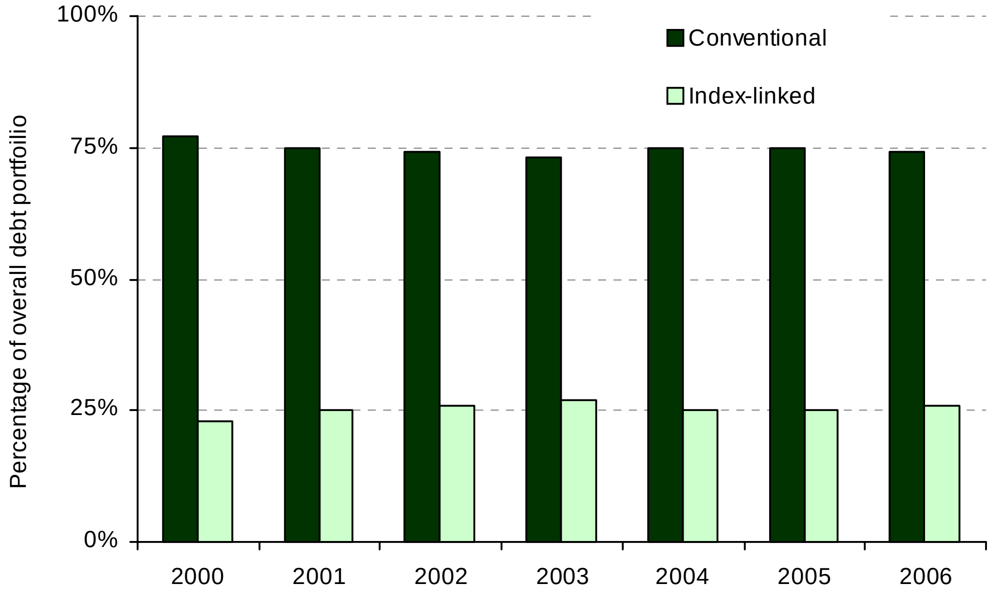
Figure 6.5. Conventional gilt sales according to maturity type



Note: 5s30s (right axis) is defined as the spread on a typical 5- and 30-year government bond.
Source: Debt Management Office.

The strategy of issuing about one-quarter of debt in price-indexed form has been fairly consistent for several years. As a result, the proportion of the outstanding stock of debt that is price indexed (or real) has been fairly steady and also settled down at around 25% (Figure 6.6).

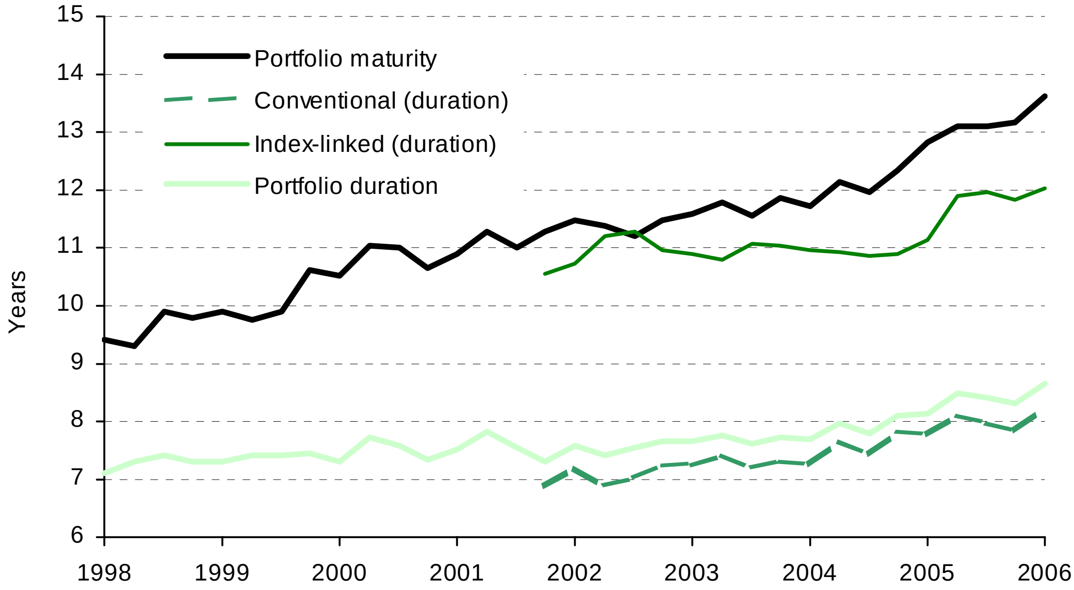
Figure 6.6. Composition of stock of UK government debt



Note: Measures based on nominal (uplifted) par amounts outstanding at end March.
Source: Debt Management Office.

But within the stock of both real and nominal debt, the average maturities of new issues have lengthened. Figure 6.7 shows that the average maturity of the outstanding stock of government debt has increased from about 9½ years a decade ago to about 13½ years today. A more relevant measure of the length of government debt is its duration, which takes account of the fact that interest (coupon) payments on gilts are generally paid every six months so that the maturity of the debt (the date until the final payment is made) overstates the period for which money is effectively lent.[3] Duration has also increased substantially over the past decade – from around 7 years to about 8½ years. The strategy of lengthening the maturity and duration of debt has occurred over a period when long yields have consistently been below shorter yields. The data shown in Figure 6.5 suggest there may have been a link between the degree of inversion of the yield curve and the amount of long issuance.

Figure 6.7. Gilt portfolio maturity and duration

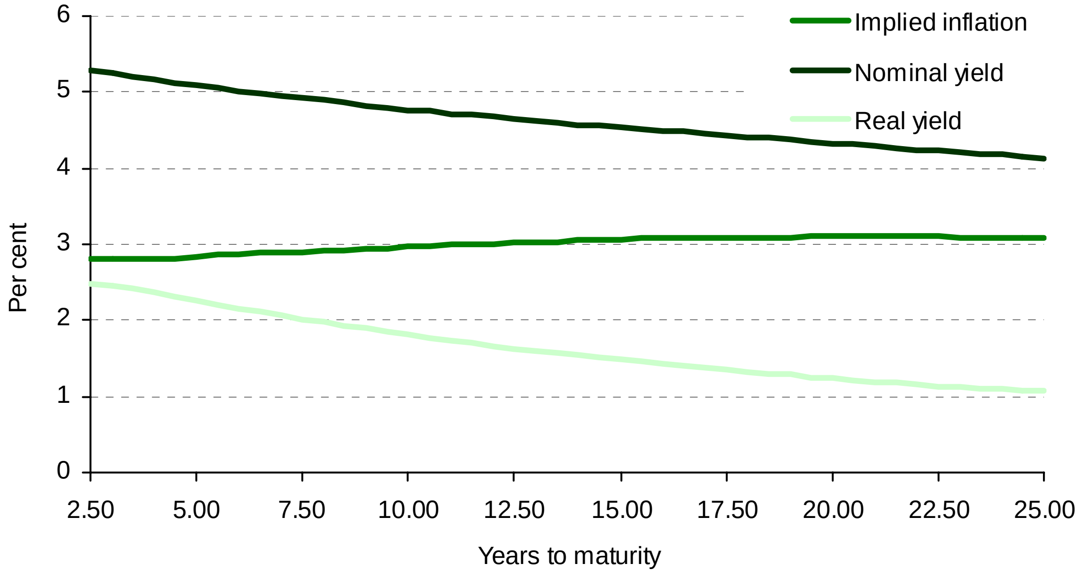


Source: Debt Management Office.

This strategy of lengthening the maturity and duration of debt has seemed intuitively sensible, given the level of yields on longer-dated debt relative to the yields on shorter-dated debt. Figure 6.8 shows what those yields looked like in early 2007. It reveals a pattern that has been typical in the UK for several years: yields on longer-dated bonds are substantially lower than yields on shorter-dated bonds, and to an extent which is unlikely to reflect a belief that short-term interest rates are likely to fall steadily over many years – indeed, the expectation in the market in early 2007 was that the Bank of England was likely to further increase short-term interest rates. The inversion of the yield curve is common to both conventional and real debt, and in both cases it has existed for some years.

[3] Duration also measures the sensitivity of the price of a bond to a change in its yield.

Figure 6.8. Average spot yield curves on 18 January 2007



Source: Bank of England.

Modelling the cost of government debt

Several questions are prompted by this pattern of yields and by the gilt issuance strategy that the DMO has followed. Is the intuitively sensible policy of issuing more long-dated debt in an environment of inverted yield curves actually optimal once we account for risk? Has it gone far enough? Given the exceptionally low level of yields on real debt, is the strategy of only issuing about 25% of bonds in indexed form actually too conservative?

To answer these questions, we need to model what drives yields over time and how those factors affect the balance between tax revenue and spending. Many of the factors that influence bond yields and the levels of government spending and tax revenues are volatile and uncertain, so any model that can tell us something about the mix of bonds that will optimally balance cost and risk considerations has to take account of random (or stochastic) factors. Recently, the DMO has developed a stochastic model to address the issues.

The model takes account (in a stylised way) of important common drivers of yields, output, inflation and government deficits. In the model, there are a set of random factors that affect inflation, output and the fiscal position and also affect prices of bonds of different maturities. The model can be used to simulate what the cost to the government of servicing the national debt would be under different gilt issuance strategies (which in each case are consistently followed over a long horizon). By averaging the cost of servicing government debt over many different paths for the realisations of shocks (that is, taking the ratio of debt interest to national income along many possible future histories), we can get an estimate of the average cost implications of different strategies. But risk may also matter, so the volatility of the cost of servicing debt is also relevant. The remit given to the DMO by government reflects the importance to government of both the average cost and the volatility of the cost of its debt. The remit is that the DMO should seek to '… minimise over the long term, the costs of meeting the Government's financing needs, taking into account risk, whilst ensuring that debt management policy is consistent with the aims of monetary policy'.[4]

The DMO states that:

> The debt management policy objective is achieved by:
>
> - pursuing an issuance policy that is open, transparent and predictable;
> - issuing benchmark gilts that achieve a benchmark premium;
> - adjusting the maturity and nature of the Government's debt portfolio, primarily by means of the maturity and composition of debt issuance and potentially by other market operations including switch auctions, conversion offers and buy-backs;
> - developing a liquid and efficient gilt market; and
> - offering cost-effective savings instruments to the retail sector through National Savings & Investments (NS&I).[5]

The stylised model developed by the DMO does not take account of some of these wider aims of debt management (for example, developing and preserving liquidity of gilts), but it nonetheless gets to the heart of the most important elements of an issuance policy by focusing on the average cost and risk implications of different strategies.

Table 6.7 summarises four strategies for gilt issuance which differ in the proportions of conventional debt issued (index-linked issuance is set to zero here) according to maturity. Table 6.8 shows the results of using the stochastic model developed by the DMO to generate paths for the cost of servicing the stock of debt under each of these strategies. It is assumed here that the yield curve slopes gently downwards, so that it is typically inverted (though to an extent that is probably less than seen in the UK in recent years).

Table 6.7. Composition of nominal issuance strategies

	1-year nominal bond	5-year nominal bond	10-year nominal bond	30-year nominal bond
Strategy 1	17.5%	17.5%	30.0%	35.0%
Strategy 2		35.0%	30.0%	35.0%
Strategy 3			50.0%	50.0%
Strategy 4				100.0%

Source: Debt Management Office.

Table 6.8 shows that if we assume that on average there is a slightly inverted yield curve, not surprisingly a strategy of just issuing long-dated conventional bonds (strategy 4) wins on average cost grounds. Much less obviously, however, the results suggest that such a strategy is also better on risk grounds, as the standard error and the 95th percentile are both very slightly lower than in the other three strategies considered. So a strategy of issuing only long-

[4] DMO, *Annual Review 2005–06*, August 2006 (http://www.dmo.gov.uk/index.aspx?page=publications/Annual_Reviews).

[5] DMO, ibid.

Table 6.8. Simulation results for nominal issuance strategies

	Strategy 1	Strategy 2	Strategy 3	Strategy 4
Debt cost/GDP at t=500				
Mean	1.41	1.43	1.41	1.39
Standard deviation	0.20	0.20	0.20	0.19
95th percentile	1.75	1.76	1.74	1.72
Debt cost/GDP over the interval t=400 to t=500				
Mean mean	1.42	1.43	1.41	1.39
Mean standard deviation	0.20	0.20	0.20	0.19
Mean 95th percentile	1.73	1.77	1.74	1.71

Note: Figures are quarterly, annualised and expressed in percentage points.
Source: Debt Management Office.

dated bonds generates a lower average cost of funding but that does not come at the cost of greater volatility.

If we were to assume a typically flat or upward-sloping yield curve, this dominance of the strategy of issuing only long bonds on both cost and risk grounds would no longer hold. But conditional on a typically inverted yield curve, the result is clearly in favour of having a very high proportion of conventional debt being long dated. Taken at face value, Table 6.8 would suggest it is optimal to issue *only* very long-dated gilts. Indeed, the assumptions made in the DMO stochastic modelling that generate the results in Table 6.8 actually imply a typical degree of inversion of the yield curve that is somewhat lower than we have seen over the past 10 years,[6] such that these results may understate the cost and risk advantages of long-dated conventional debt over shorter-maturity debt.

Introducing indexed real debt

It is not straightforward to show the impact of issuing indexed debt in the DMO stochastic framework. This is because we need to allocate the cost of the inflation uplift on the outstanding principal over time – which can either be done at the maturity of the bond or smoothly over the life of the gilt (on an accrued basis). For comparison with earlier tables, and given the criterion used in DMO modelling, we believe it makes sense to do this on an accrued basis, the justification being that the government could effectively generate cash-flow servicing costs that match the accruals path by buying back a part of the outstanding stock of indexed gilts as inflation varies.

Tables 6.9 and 6.10 show the results of introducing long-dated indexed gilts when we measure the cost of servicing debt on an accruals basis. The DMO results show that on cost grounds a strategy of just using long-dated index-linked gilts (strategy 8) is best. On risk grounds a strategy of only issuing long-dated conventional debt remains best (strategy 4). Once again, this set of results is based on the assumption of a continuation of a mildly inverted yield curve.

[6] Table 11 of DMO, *Annual Review 2005–06*, August 2006 (http://www.dmo.gov.uk/index.aspx?page=publications/Annual_Reviews).

Table 6.9. Composition of further issuance strategies

	1-year nominal bond	5-year nominal bond	10-year nominal bond	30-year indexed bond
Strategy 5	17.5%	17.5%	30.0%	35.0%
Strategy 6		35.0%	30.0%	35.0%
Strategy 7			50.0%	50.0%
Strategy 8				100.0%

Source: Debt Management Office.

Table 6.10. Simulation results for further issuance strategies with shares of inflation-linked bonds (with accrued compensation on principal)

	Strategy 5	Strategy 6	Strategy 7	Strategy 8
Debt cost/GDP at t=500				
Mean	1.42	1.42	1.41	1.38
Standard deviation	0.21	0.21	0.21	0.27
95th percentile	1.80	1.77	1.79	1.83
Debt cost/GDP over the interval t=400 to t=500				
Mean mean	1.41	1.42	1.41	1.39
Mean standard deviation	0.21	0.21	0.22	0.28
Mean 95th percentile	1.78	1.77	1.78	1.85

Note: Figures are quarterly, annualised and expressed in percentage points.
Source: Debt Management Office.

In interpreting these results, it obviously matters how much the government cares about risk relative to average cost. It is clear why a government should care about the average cost of debt. It is less clear why it should really care about risk as measured by the standard deviation of the ratio of the debt servicing cost to GDP, or by the cost in unusually bad cases. There would be a cost to having tax rates move sharply from one year to the next; but the volatility of debt servicing costs need not be costly, so long as shocks to those costs are not permanent and the government has the scope to let deficits rise and fall in response to temporary fluctuations in them. Because of this, we believe there is a case for attaching far more weight to the results on the average cost of different debt management strategies than to the results on the volatility of those costs. The DMO puts a rather different emphasis on its results:

> … consideration of the Government's risk preferences is also important when determining the issuance programme. Other things being equal, the Government would like to have a prudent debt portfolio structure such that in the event of adverse shocks to the government finances, the debt portfolio should not exacerbate further the strains on the Government's resources, but should help to mitigate some of those strains. In other words, the Government's debt portfolio should be structured so as to possess adequate fiscal-smoothing properties. The implication of taking into account the Government's risk preferences, as well as the other factors previously discussed, when determining its debt strategy is that the Government naturally has a proclivity to choose issuance strategies and a debt portfolio structure which are diversified both in terms of their maturity structure for nominal gilts and their composition in terms of the proportion of the various debt instruments, which in the present environment means the split between nominal and inflation-linked gilts. Such a well-diversified

> issuance and portfolio structure provide a prudent risk mitigation approach to debt management as, to the extent that different debt instruments have different risk and cost characteristics, they therefore help to insure the Government in the face of a variety of shocks to its finances. Hence, the preferred issuance strategies suggested by the simulation illustrations will need to be modified in practice.[7]

But even if one attaches weight to the risk profile of debt servicing costs, the DMO modelling provides strong reasons to favour a strategy involving greater issuance of long conventional and long indexed debt. If one believes that the inversion of yield curves is likely to be a persistent feature, there is not much reason to issue short-dated conventional debt. A sensible strategy might be overwhelmingly to issue long-dated conventional and indexed debt until the yield curve inversion ends.

There are, however, potentially important factors not reflected in the DMO stochastic model – it attaches no weight to the value of preserving liquidity (and thus avoiding volatility) across the yield curve and that might make issuing more short-dated bonds sensible (though it is not obvious that it would do so). But such factors really need to be quantified and modelled consistently. In the absence of that, increasingly moving duration and maturity higher is sensible, as is increasing the share of index-linked debt.

If that strategy is followed, it would of course affect the duration of the stock of overall debt in the UK – though it could be offset by the changing nature of household and corporate debt. In fact, the duration of such private debt has probably been going up along with that of government debt. We document and discuss the implications of this in the next section.

6.5 The impact of changing debt stock composition

The duration and maturity of the stock of government debt has been lengthening. We argued in the previous section that it makes sense for this process to continue. If it does, it will further insulate the cost of debt servicing from temporary movements in short-term interest rates. If this were to happen within the private sector as well, it would affect the impact monetary policy has on the economy. In this section, we examine whether there has been a change in the fixity of debt issued by companies and households and then consider the implications of shifts in the overall duration of debt issued by UK households, companies and the government.

Figure 6.9 shows how the stock of debt issued by UK non-financial companies has evolved since 1990. We also break this down into corporate loans and corporate bonds (which are overwhelmingly fixed rate). Total corporate debt and the stock of corporate bonds have both risen relative to national income.

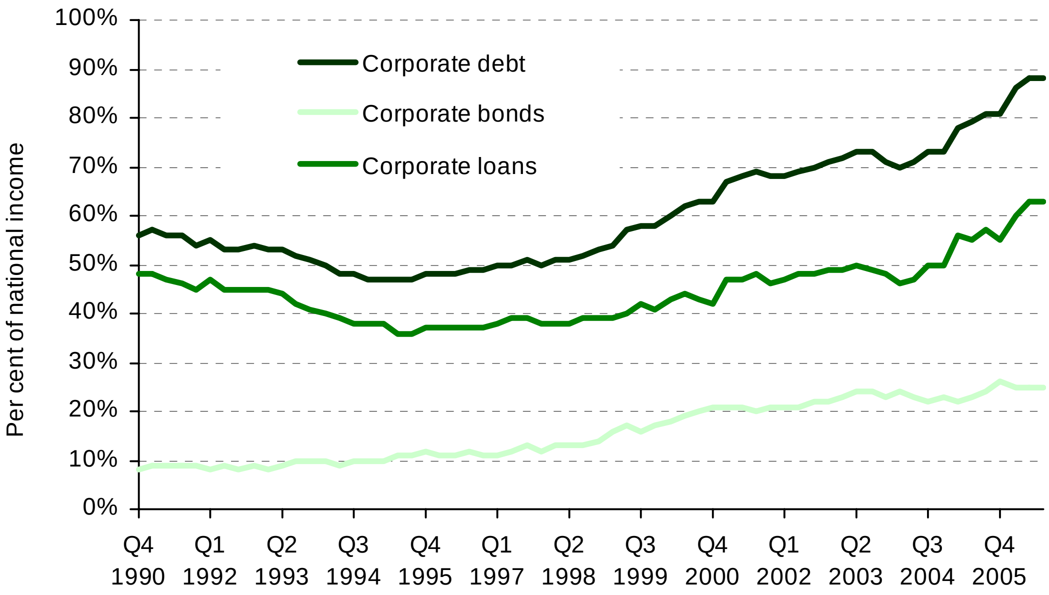
Since the early 1990s, the stock of fixed-rate corporate debt has likely risen relative to the stock of variable-rate debt – Figure 6.10 shows that in recent years the stock of corporate bonds makes up a larger share of overall company debt (and loans make up a lower share) than was the case at the start of the 1990s. That share may now be falling, but it is nonetheless

[7] DMO, *Annual Review 2005–06*, August 2006 (http://www.dmo.gov.uk/index.aspx?page=publications/Annual_Reviews).

plausible that the duration of corporate debt is now longer than it was at a time when companies relied more on bank loans and less on issuing debt securities.

There has also been some tendency for household debt to become more fixed, along with a very sharp rise in overall household debt relative to national income. Figure 6.11 shows that household debt – by far the largest part of which is mortgage debt – has risen much faster than national income since 2000.

Figure 6.9. Corporate debt as a proportion of domestic production

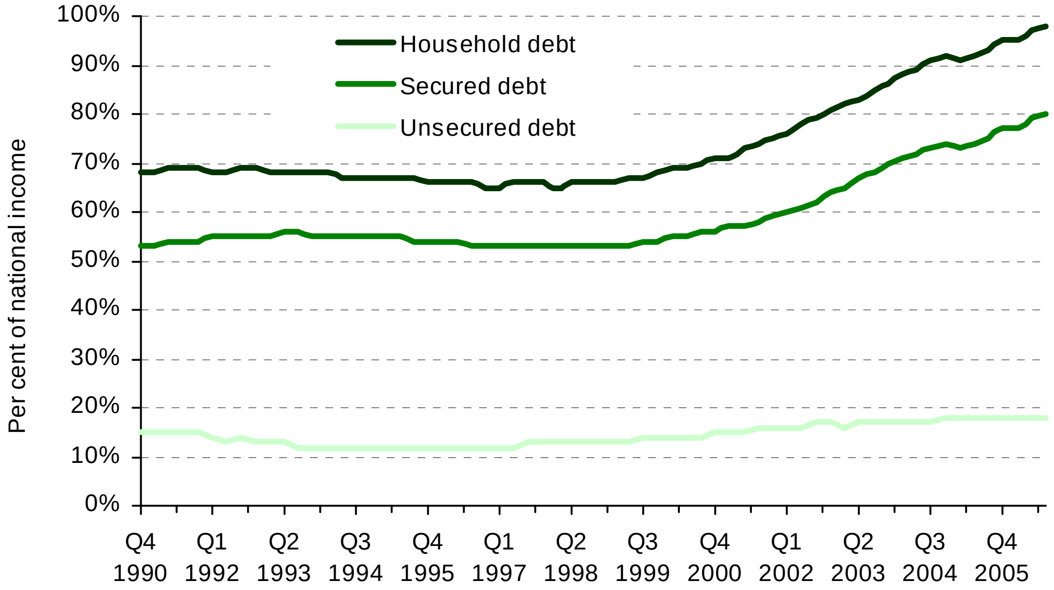


Source: Office for National Statistics.

Figure 6.10. Bonds issued as a proportion of non-financial institutions' debt

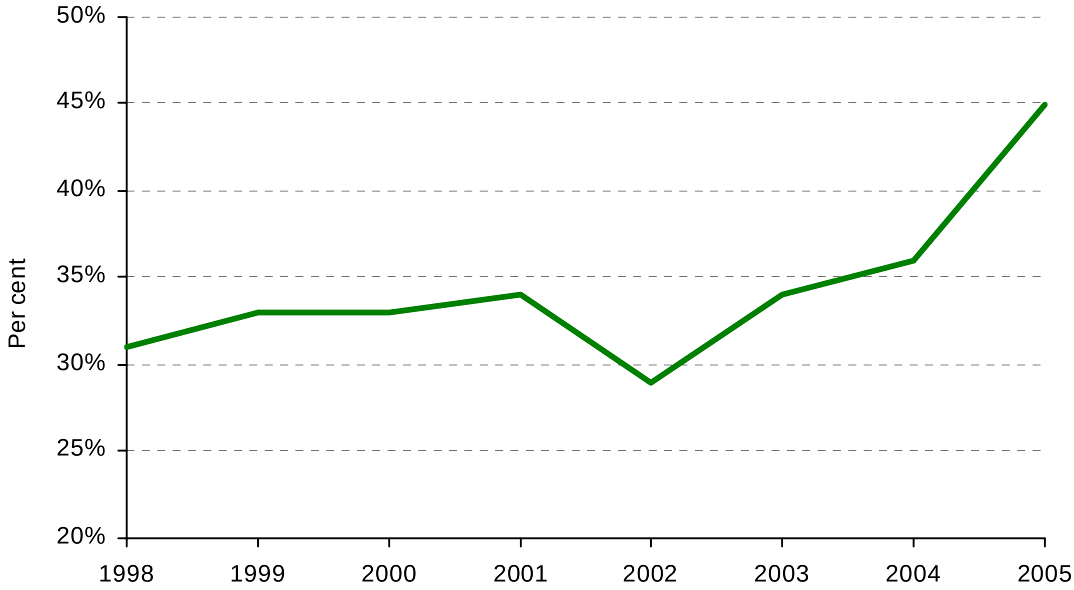
Source: Office for National Statistics.

Figure 6.11. Breakdown of household debt



Source: Office for National Statistics.

Figure 6.12. Value of fixed-rate mortgages as proportion of all mortgages



Note: Includes the stock of both capped and fixed-rate mortgages.
Source: CACI Mortgage Market Database.

Within mortgage debt, there has been an increase in fixed-rate debt. Figure 6.12 shows that in the late 1990s, about one-third of mortgage debt was at fixed rates; by the middle of 2006, that proportion was around 45%. Little of this debt is at rates of interest fixed for more than five years; nonetheless, the duration is likely to have risen.

In the light of these trends, it is clear that the lengthening maturity and duration of public sector debt has not been offset by a shortening of the duration of private sector debt – in fact, quite the opposite. This has probably affected – although not necessarily weakened – the transmission mechanism of monetary policy. Since the degree of fixity of the interest rates on debt issued by UK households, companies and government has risen on average, it is likely that monetary policy works proportionately more nowadays through the impact that changes in shorter-term interest rates have on longer-term interest rates.

But it is not clear that there has been an absolute reduction in the effectiveness of monetary policy. In part this is because the sensitivity of longer-term interest rates to shorter-term rates – or more generally to monetary policy actions (including words, i.e. Bank of England statements, reports and speeches) – is significant. But even if we ignore this channel, it is still the case that the absolute amount of variable-rate debt, relative to national income, has almost certainly risen. Figure 6.9 shows that corporate loans have risen significantly relative to national income, albeit at a slower pace since 1990 than the stock of corporate bonds. Figure 6.11 shows that the overall stock of household debt has risen so much relative to national income that it is likely that the variable part of it has also been increasing relative to the size of the economy.

We conclude that the rising maturity and duration of debt – increasing fixity of interest rates – has probably not reduced the effectiveness of monetary policy. It is plausible that this lengthening of maturity and duration will continue, driven in part by strong demand for long-dated debt to match pension liabilities that are debt-like and which have a duration that itself is lengthened by rising life expectancy. On the supply side, rising life expectancy – which should bring with it longer working lives – also makes longer-maturity debt desirable for households who are able to service the debt out of their earnings for longer.

6.6 Longevity and new types of debt instruments

One reason that the duration of debt can be expected to rise is that increasing life expectancy is likely to lengthen working lives and so lengthen the horizons over which those with debt can repay. Increasing life expectancy is also likely to lengthen the periods over which those with obligations to pay pensions have to make payments, and because of that it raises the duration of the debt assets they want to hold against those obligations.

But the scale of the increase in life expectancy is highly uncertain. UK companies face significant longevity risk because of the size of their defined-benefit pension obligations. An explicit market in hedging longevity risk through the trading of financial instruments whose values are linked to movements in longevity has been very slow to develop. Partly as a result, there have been calls for the government to help such a market develop by issuing 'longevity bonds' with values linked to life expectancy.[8]

We have argued in the past that there is no compelling case for the government to issue such debt – largely because it already has massive exposure to unexpectedly fast rises in life expectancy from its commitments to pay state and public sector pensions and from its role in heath and social care.[9] The DMO – having consulted on the issue in 2005 – has made it clear

[8] See, for example, the article by David Cule, principal at Punter Southall, 'How to deal with ever-improving mortality', *Financial Times*, 8 January 2007.

[9] See chapter 6 of R. Chote, C. Emmerson, R. Harrison and D. Miles (eds), *The IFS Green Budget: January 2006*, IFS Commentary 100 (http://www.ifs.org.uk/budgets/gb2006/index.php).

that it has no plans to do so.[10] But have developments over the last year meant that those assessments should be revised?

During 2006, the government has adopted the recommendation of the Pensions Commission to increase the age at which state pensions are normally received from 65 to 66 between 2024 and 2026, from 66 to 67 between 2034 and 2036 and from 67 to 68 between 2044 and 2046.[11] To the extent that such changes become linked to movements in life expectancy, the exposure of the public sector to changes in life expectancy is reduced and so its scope to issue longevity bonds might seem to have risen. But the very long time lag between announcements of changes to the state pension age and actual implementation means that the scale of exposure to changes in life expectancy – which can be very large in relatively short periods – remains huge.

One recent development rather weakens the case for government issuing longevity bonds. There has been a substantial increase in the number of life assurance companies willing to take on longevity risk by buying pension obligations from other companies. There is still a question as to whether the scale of the longevity risk held by non-financial companies is so large that the entrance of new players in the market to buy corporate pension obligations can make much difference. Even if much of the risk does come to sit with life insurance companies, the question remains as to whether that is the most efficient place for it to reside.

The scale of the exposure to shifts in life expectancy held in the corporate sector can be measured in various ways. The most obvious is to look at the value of defined-benefit (DB) pension liabilities – a number recently estimated to be around £700 billion.[12] The Purple Book, a joint publication of the Pensions Regulator and the Pension Protection Fund, contained an estimate that each year added to longevity assumptions adds between 3% and 4% to pension scheme liabilities, raising aggregate deficits by an amount likely to be £20 billion or more.

Given that realised longevity arises gradually over time (as opposed to assumptions about future longevity, which can change sharply in a short period), how much should DB schemes be prepared to pay to hedge against their long-term longevity risk? The regulatory capital required to be put against longevity risk held by financial firms should be some guide as to the cost of longevity exposure. Under life insurance regulations (PS04-16), there is no so-called Pillar I capital requirement related to longevity risk. Any longevity capital charge would arise only under so-called Pillar II, which is the internal capital assessment (ICA) and is not public information. We estimate, however, that for annuity companies, capital held against longevity risks might amount to about 6–7% of annuity reserves. According to FSA returns, annuity reserves among the major market participants amount to more than £160 billion. This would put the longevity capital charge in the region of £10–11 billion.

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[10] DMO, *Issuance of Ultra-Long Gilt Instruments: Consultation Document*, December 2004 (http://www.dmo.gov.uk/documentview.aspx?docname=publications/giltsmarket/consultationpapers/cons021204.pdf&page=Gilts/Consultation); DMO, *Issuance of Ultra-Long Gilt Instruments: Response to Consultation*, April 2005 (http://www.dmo.gov.uk/documentview.aspx?docname=publications/giltsmarket/consultationpapers/cons160305.pdf&page=Gilts/Consultation).

[11] Department for Work and Pensions, *Security in Retirement: Towards a New Pensions System*, May 2006 (http://www.dwp.gov.uk/pensionsreform/whitepaper.asp).

[12] *The Purple Book: DB Pensions Universe Risk Profile*, December 2006 (http://www.thepensionsregulator.gov.uk/pdf/PurpleBook.pdf).

The liabilities of DB pension schemes – which are in many ways analogous to the annuity exposures of life insurance companies – are around £700–800 billion (on an FRS17 basis). If we applied a capital charge of 6–7% against that, it would mean that extra capital held to handle the risk would amount to £45–55 billion. If the real cost of equity capital is about 7% (a plausible figure and one close to the typical earnings yield on large UK companies), the annual cost of that capital would amount to around £3–4 billion. But the value of pension liabilities might well be some 30% or more higher based on a buyout measure (that is, the amount a life insurance company might need to take on the liabilities), in which case the annual capital charge might be nearer £4–£5 billion.

This is a rough-and-ready calculation and there is great uncertainty about what the true cost to those who hold longevity risk is. But it is clearly not a small amount. The issue is whether it could be reduced and risk handled more effectively if government played a role in helping that risk be more effectively hedged. Risk that sits with life insurance companies and with large quoted companies is actually fairly well spread because they are widely owned by a diverse group of end investors. So despite the potentially large cost that the ultimate holders of longevity risk might need to be compensated with, it is not at all clear that this constitutes a market failure. There remains a rather weak case for government action in this area.

6.7 Tax deductibility of corporate interest payments

Fiscal and debt management policy can change the structure of assets and liabilities in the private sector through varying the type and quantity of government debt issued – we have considered various aspects of this in earlier sections. Another way in which government policy affects the structure of private sector balance sheets is through differential treatment of different financing instruments by the tax system. One change that has at various times been advocated is removing the tax advantage to corporate debt financing that comes from allowing interest payments to be deducted from gross operating surpluses before corporation tax is levied.[13] Companies in the UK, and indeed in nearly all developed economies, can deduct debt interest payments from gross operating surpluses in calculating taxable incomes. But it is not at all clear what the rationale for that is.

Companies are not able to deduct dividend payments on equities from their profits in calculating taxable income and there is no clear case for favouring debt financing over equity financing.[14] While capital gains on equities are, for many shareholders (at least individual shareholders), rather favourably treated relative to the taxation of interest received – and are in that sense an offset to the advantage that corporate debt financing otherwise enjoys – it is the expected flow of dividends received that ultimately generates the value of equities. Since the changes in the tax system introduced in the March 1998 Budget, which saw the end of the imputation system and an effective increase in the rate of tax on dividends, the tax advantage

[13] One reason for considering this is that the ability of the UK government to levy extra taxes on income re-patriated to the UK from overseas subsidiaries is threatened by rulings by the European Court of Justice. The issues involved, and the link between this and interest tax deductibility, are explored in Chapter 10.

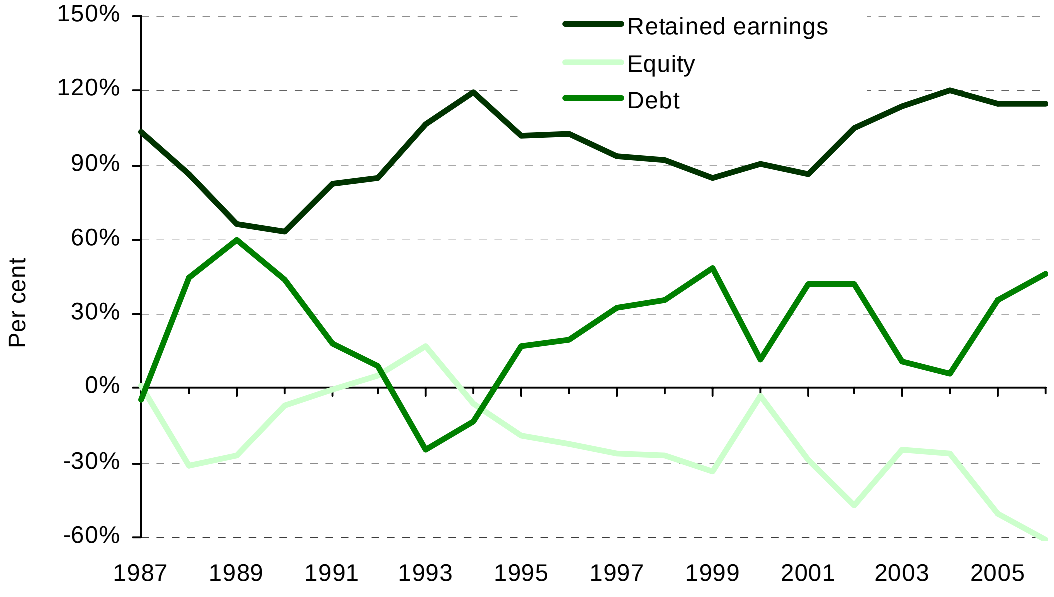
[14] For a thorough and recent review of the case for withdrawing tax deductibility of corporate interest payments, see M. Devereux, S. Mokkas, J. Pennock and P. Wharrad, *Interest Rate Deductibility for UK Corporation Tax*, 2006 (http://www.sbs.ox.ac.uk/Tax/publications/reports/reports.htm).

to companies distributing operating incomes in the form of interest on debt – rather than dividends on equity – has become even clearer. This change was made, paradoxically, at the same time as the last vestiges of tax privileges for household borrowing (the tax deductibility of some part of mortgage interest payments against income tax) were removed.[15]

Removing interest tax deductibility in itself would generate substantially more tax revenue. Such a policy could hardly be applied to financial institutions – most clearly in the case of banks for which debt liabilities are largely offset by debt assets. So it is likely that if a policy of levelling the tax playing field between debt and equity were to be applied, financial institutions would either need to be exempted or else the rules structured so as to reflect their unusual position.

A revenue-neutral way of implementing a change would be to offset the removal of interest deductibility for non-financial companies with a cut in the corporate tax rate. In 2006–07, non-financial corporations in the UK will have paid around £64 billion in interest. They will pay corporation tax of around £40 billion. The corporate tax rate (for all but small companies) is 30%. If we apply that 30% rate to all taxable corporate income (ignoring lower rates for companies earning small levels of profit), we would get an estimate of the flow of taxable profit of about £133 billion. If we add interest paid (about £64 billion) to that, we would get taxable profits of just under £200 billon. This means that the tax rate on this larger flow of taxable income could come down from 30% to around 20% and still generate tax receipts of £40 billion. (It should be noted that some tax experts argue that it is very hard to estimate accurately the revenue implications of removing interest deductibility. See Chapter 10.)

Figure 6.13. Composition of capital expenditure financing by non-financial companies



Source: Office for National Statistics.

[15] Several reductions in the mortgage relief rate culminated with the phasing out of MIRAS (or Mortgage Interest Relief at Source) programme in April 2000.

What might be the implications of a cut to 20% in the rate of corporate tax and a removal of deductibility of interest payments (all applied to non-financial companies)? To get some idea of them, it is helpful to look at the existing way in which companies finance their operations. Figure 6.13 shows the proportion of capital investment that has been financed from retained earnings (operating surplus after interest paid, tax and dividends), from issuing new equity and from issuing debt. The proportion of corporate spending financed from equity issues and from debt can be, and very frequently has been, negative as share repurchases can exceed new share issues, and repayment of existing debt can exceed new loans raised from banks and from new issues of corporate bonds. Companies find it harder to pay dividends in excess of post-tax equity profits, so retained earnings (or gross corporate saving) are rarely negative.

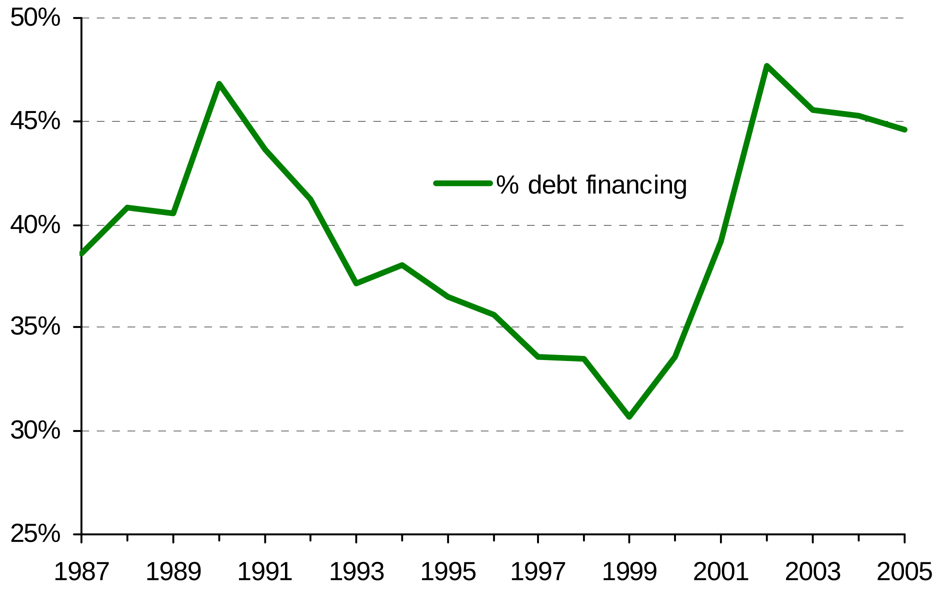
Figure 6.13 reveals that over the past 20 years, *on average*, new issues of equities and debt have hardly contributed to the aggregate financing of corporate investment. Share buybacks have more than offset new share issues. Debt issues have exceeded debt repayments in most recent years, though the share of corporate spending financed out of debt has only averaged around 20–30%. Retained earnings – a form of equity financing – have consistently financed by far the largest part of corporate spending. That might make it seem that any adverse consequences upon corporate spending from removing a tax advantage to debt might be small.

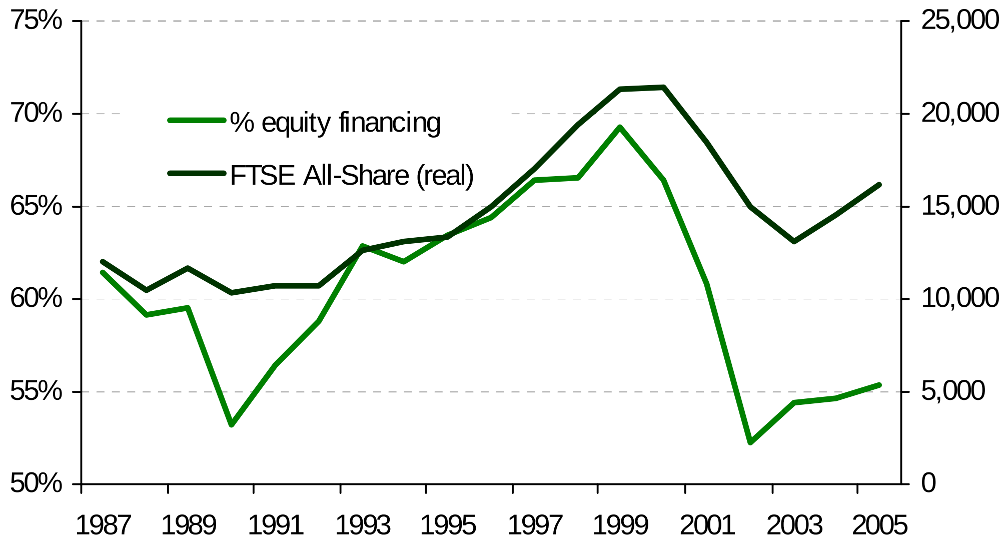
But looking at the *flows* of *net* debt (which is appropriate in looking at the overall contribution to financing investment) does not tell one much about the importance of the *stock* of corporate debt in the economy. That is better measured by gross corporate gearing – the ratio of gross debt to the sum of gross debt plus equity. Figure 6.14 shows that this ratio has fluctuated a good deal over the past 20 years, driven to a significant extent by movements in the value of equities. Aggregate gearing for UK non-financial companies is now just under 45%.

It is not easy to know how much smaller the existing stock of corporate debt might become if the tax advantage of corporate debt were removed. The growth of household debt since the final removal of tax deductibility of mortgage payments has been huge – but households have no opportunity to raise finances through equity and the effect of tax deductibility had already dwindled to a small level before it was finally removed in 2000. One interesting feature of Figure 6.14 is that the aggregate debt-to-equity ratio has fluctuated around a level of 40% over a relatively long period, during which time the relative tax advantage of debt over equity issues and retained profits has fluctuated greatly. The sharp movements in gearing have been driven more by changes in equity prices than by conscious decisions to retire equity and issue lots more debt. The lower panel of Figure 6.14 shows how close is the link between the equity share of total balance sheets (1 – debt gearing) and stock prices. So, whatever the impact of tax advantages on financing techniques, it is not likely to be the overwhelmingly powerful factor.

It is likely, however, that reliance on bank lending and upon debt issuance would be lower without interest tax deductibility – potentially so much so that corporates would embark on a strategy of buying back bonds and repaying loans on a substantial scale. Would that be a problem? Might it further reduce the cost of government debt?

Figure 6.14. Gearing of non-financial companies





Note: Debt (Equity) gearing is defined as the ratio of debt (equity) to the sum of debt and the market value of equity.
Sources: Office for National Statistics; Morgan Stanley Research.

We offer the following thoughts:

- We noted above the common trends in the real yields on bonds issued by governments (in different currencies) across the world and the increasing internationalisation of holdings of gilts. That suggests that the knock-on impact of any change in the supply of corporate debt from UK companies on the cost of government debt might be limited.
- There would be winners and losers: companies that have had small amounts of debt will find the benefit from lower corporation tax more than offsets the cost of losing tax deductibility; firms that have had unusually high gearing would be net losers.
- At a time when companies are looking to better match their portfolios of assets held within DB pension plans against liabilities whose values are calculated by reference to the

yield on an AA sterling corporate bond, a move that plausibly reduces the stock of such debt is hardly helpful.

The second and third points make this potential reform of the system of corporation tax problematic. So while we expect the issue to generate continuing debate, it is unlikely to be implemented by any government for some time.

6.8 Conclusions

The UK government is able to borrow at exceptionally low interest rates. Nominal and real interest rates on longer-dated government bonds are low relative to the rates that are demanded by investors buying long-maturity debt issued by the US government or long-dated, euro denominated bonds issued by European governments. This position has existed for some years. Whether it will persist is hard to judge, though the structure of bond prices implies that investors believe that it will. The government should continue its strategy of lengthening the maturity and duration of its debt. Taking advantage of low yields on longer-dated bonds does not harm investors; it merely provides more of the type of bonds that market prices suggest are most highly valued.