

6. Funding, debt management, and credit market problems

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Summary

- As in recent years, the government is likely to have to borrow more over the next five years than the Treasury currently thinks. But the government still faces an environment that is favourable for issuing gilts at relatively low cost.
- Yields on shorter-dated gilts are exceptionally low, which argues for skewing issuance away from medium-dated towards shorter-dated bonds.
- Short-dated gilt yields are low in part because of turbulence in financial markets – the so-called ‘credit crunch’. If this continues, it would pose significant difficulties for mortgage lenders. We consider a number of possible strategies to alleviate this problem, including the creation of an agency to buy or lend against the collateral of mortgage-based securities issued by banks and building societies.
- Mortgage contracts that (i) link monthly repayments to consumer prices or house prices, and (ii) involve borrowers and lenders sharing the risk of house price changes, could be both attractive and commercially viable.

6.1 Introduction

This chapter begins by assessing the likely scale of gilt sales over the next few years (Section 6.2). We then analyse how the yield curve has evolved and consider the impact of the recent market turbulence – the so-called ‘credit crunch’ – on the price of shorter-dated government bonds (Section 6.3). We consider the implications of this for how the Debt Management Office (DMO) might optimally choose what types of bond to issue (Section 6.4). We then consider the potential wider fallout from the credit crunch and some possible policy reactions to it – some of which are radical (Section 6.5). The fallout of the recent market turbulence on the mortgage market is potentially significant, and the structure of the mortgage market and the risks it generates are an issue the government was already considering before the recent dramatic market turbulence and the bank run at Northern Rock: in Section 6.6, we highlight some issues in the risk and cost characteristics of mortgages, and discuss the way they can be funded and how that interacts with gilt issuance. Section 6.7 concludes.

6.2 The likely scale of debt issuance

Gross gilt issuance depends upon the central government net cash requirement (which is usually closely linked to public sector net borrowing) and the scale of redemptions. Based on the Treasury’s October 2007 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 will be fairly steady over the next few years but then fall to a significantly lower level, in real terms, by 2012–13. In five years' time, the real net cash requirement of the central government – the main driver of net gilt issuance – is projected by the Treasury to be around 30% lower than in the current financial year. Gross gilt issuance five years ahead is projected to fall even more than the net cash requirement because redemptions fall markedly in 2012–13. Based on the PBR projections, 2012–13 gross gilt issuance would, in real terms, probably be only around one-half the level in the current financial year.

But these projections are based on assumptions on near-term growth in the economy that are marginally more optimistic than we consider plausible and, more significantly, rely on assumptions on the amount of tax revenue generated for a given level of economic activity that look high. Alternative profiles for the evolution of the level of public sector borrowing, gilt issuance and the stock of debt based on different assumptions about economic growth and the tax take out of national income are shown in Tables 6.1 to 6.4.

Table 6.1 shows central estimates of the scale of public sector net borrowing under four scenarios (see Chapter 5):

- the Treasury's 2007 PBR forecast;
- the IFS 'base case', in which the economy evolves largely as the Treasury expects, but where corporation tax and stamp duty land tax revenues are noticeably weaker;
- IFS's forecast if the economy evolves according to the Morgan Stanley 'central case' (see Section 4.4);
- IFS's forecast if the economy evolves according to Morgan Stanley's 'pessimistic case' (also see Section 4.4).

Table 6.1. Public sector net borrowing

£ billion	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
2007 PBR	31.0	38.0	36.4	30.6	27.2	25.0	23.0
IFS base case	31.0	40.5	41.2	41.5	38.6	33.9	31.8
MS central case	31.0	40.5	41.8	43.5	42.7	40.7	41.7
MS pessimistic case	31.0	40.5	46.6	57.4	62.3	64.0	68.1

Sources: IFS; Morgan Stanley Research; HM Treasury.

Table 6.2 shows how the stock of debt relative to national income might evolve in each case. Table 6.3 shows the DMO's illustrative projection of gilt issuance based on the Treasury's 2007 PBR forecasts. Table 6.4 compares this with the outlook for gilt issuance on the other three borrowing scenarios. Our three alternative scenarios show public sector net borrowing consistently higher than the Treasury expects over the next five years. Assuming no offsetting changes elsewhere, the IFS base case and the Morgan Stanley central case imply that over the five years from April 2008, gilt issuance on average would be between £9 and £14 billion a year higher than the DMO projections. On the Morgan Stanley 'pessimistic case' scenario, borrowing is higher still and consistently remains well above the PBR projections.

Table 6.2. Public sector net debt

% of GDP	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
2007 PBR	36.7	37.6	38.4	38.8	38.9	38.8	38.6
IFS base case	36.7	37.8	38.9	40.0	40.7	41.0	41.2
MS central case	36.7	38.0	39.7	41.6	42.6	43.4	44.2
MS pessimistic case	36.7	38.1	41.8	45.5	48.1	50.4	52.8

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	2012–13
Central government net cash requirement	41.2	37.3	42*	38	33	34	29
Redemptions	29.9	29.2	17	16	30	27	8
Financing requirement	71.1	66.5	59	54	63	61	37
Other sources of financing*	-8.6*	-8.1	-6	-2	-2	-2	-2
Illustrative gross gilt sales	62.5	58.4	53	52	61	59	35

Notes: * The DMO announced on 24 January that the government would repay £4 billion of its ways and means facility at the Bank of England. We assume that this £4 billion will be added to the central government net cash requirement in 2008–09. We assume that this will be met entirely by non-gilt financing (e.g. 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	2012–13
<i>DMO/PBR illustrative gilt sales</i>	62.5	58.4	53	52	61	59	35
IFS base case	62.5	60.9	58	63	72	68	44
MS central case	62.5	60.9	58	65	77	75	54
MS pessimistic case	62.5	60.9	63	79	96	98	80

Note: The alternative projections in this table 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.

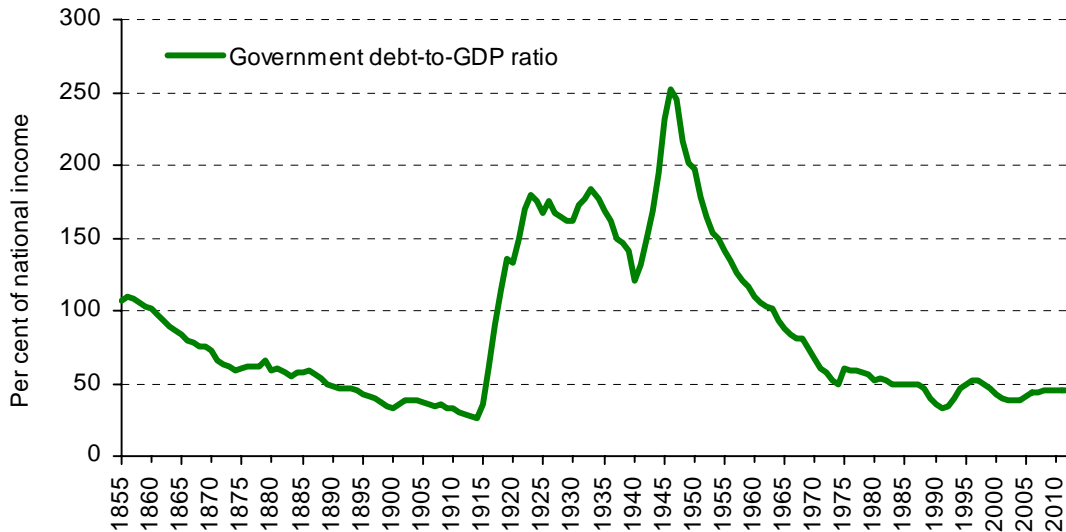
If the alternative scenarios turned out to be accurate projections for the UK economy, and for the subsequent path of the public finances, the government might well change policy so that borrowing does not increase as much. This is more likely in the medium term than the short term. In particular, the figure of over £55 billion for public sector net borrowing from 2009–2010 under the ‘pessimistic’ scenario for the economy is not a very likely outcome since the Chancellor would probably have to scale back his spending plans and/or announce new tax-raising measures if things turned out that badly. Failure to do so would imply that the ratio of net debt to GDP would substantially exceed 40% (see Table 6.2).

Even in the more favourable scenarios, it is clear that the stock of net debt to GDP would likely be very close to 40% for several years. Should the government place a high weight on keeping below the 40% figure, it would constantly need to be ready to adjust quickly the

balance between spending and revenue in response to even mild deterioration in the outcomes relative to its forecast (which would probably not be sensible). The safety margin between the stock of debt and the 40% of GDP level has essentially disappeared.

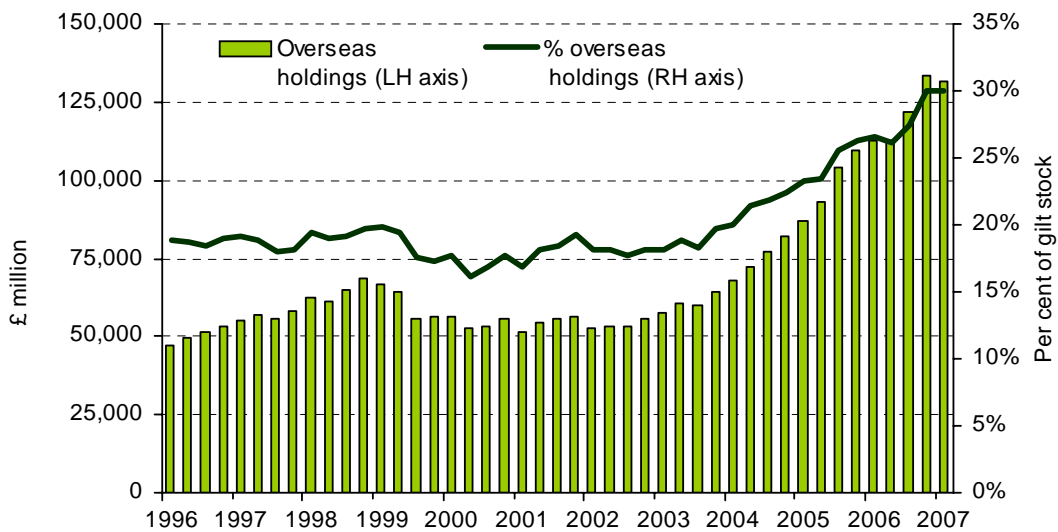
Net debt being marginally above or below 40% of national income is in itself not very significant from an economic point of view. So its impact upon gilt yields would be small, unless people came to see a breaching of the 40% limit as a signal that substantially higher debt and deficits were now more likely in the future.

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: Debt Management Office; HM Treasury; Office for National Statistics.

Figure 6.2. Overseas holdings of gilts



Source: Debt Management Office.

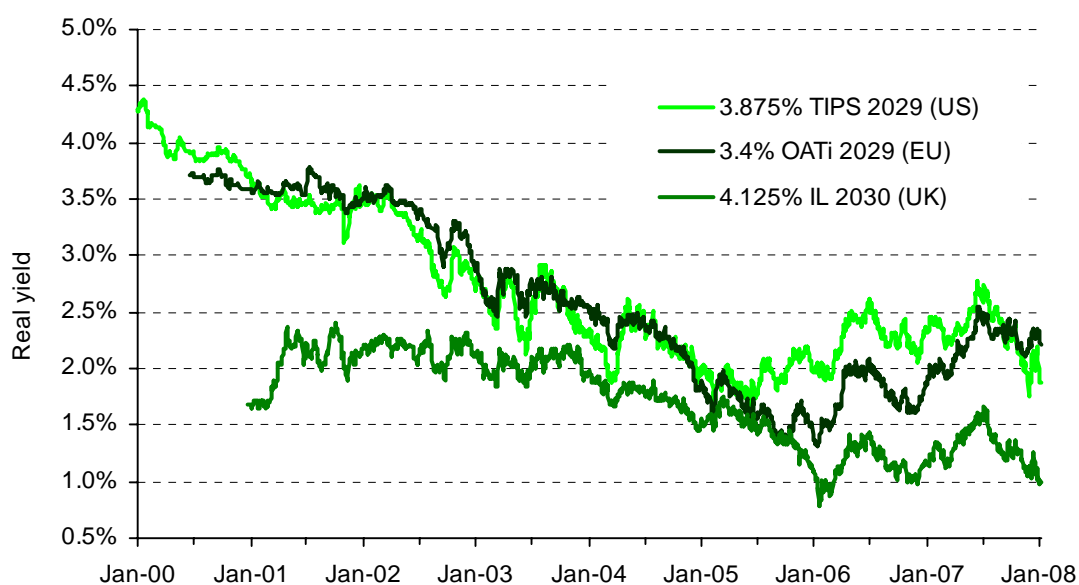
Even then, it is far from clear that this would cause a significant sell-off in the market for government debt. UK government debt, given the size of the economy, is low relative to most other G7 economies (although less so relative to that of some other industrial countries) and also relative to the UK's past history. Figure 6.1 shows an estimate of government debt relative to national income since the middle of the nineteenth century. Although rising, at well under 50% of national income the debt burden is not that far above the low point of 26% 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 even when their debt positions evolve in different ways. Figure 6.3 shows that the path for the real cost of government debt over the past seven or so years has been similar in the US, the Euro area and the UK. The synchronisation of movements in bond yields across the developed economies in the past few years has been high.

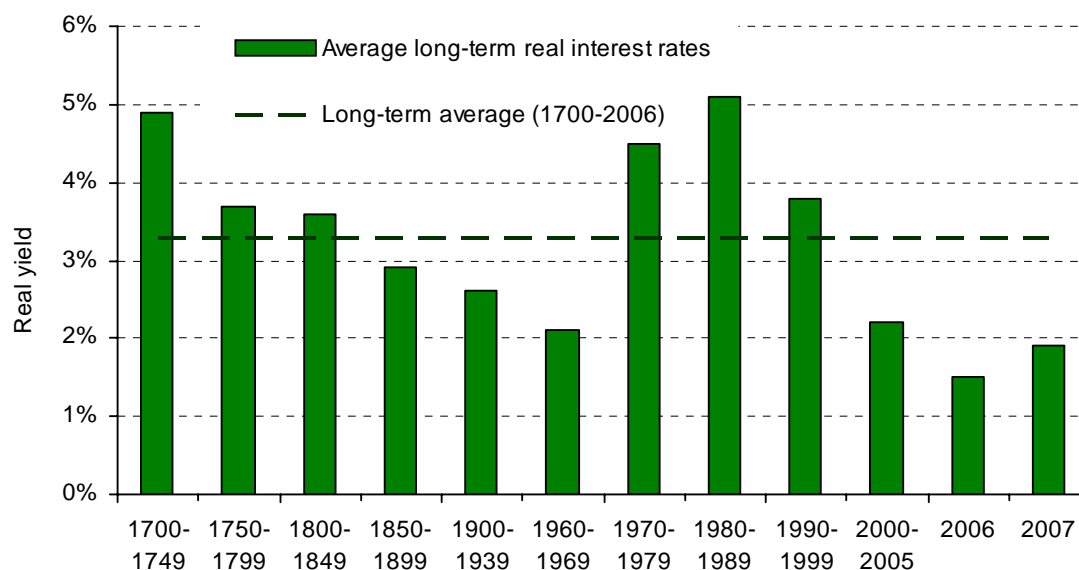
As shown in Figure 6.4, long-term real interest rates in the last couple of years have, by historical standards, been very low. Over the period from the turn of the century until 2006, it has been striking how the UK government's cost of borrowing (illustrated in Table 6.5) had been falling – in both nominal and real terms – even though the amount it has borrowed has been rising and has consistently exceeded its own forecasts. But that period of steadily falling real and nominal yields came to an end in the first part of 2007. Real and nominal yields moved up in the early part of 2007 before falling back quite sharply in the second half of the year as extreme turbulence in the money and bond markets increased the value placed on safe and highly liquid fixed income assets.

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 (but not from the long-run average, which otherwise would rise further to just under 3.6%) 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.

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%
2007–08	58 (29)	4.75%	1.50%

Notes: 15-year real and nominal yields are funding-year averages of Bank of England estimated spot yields. 2007–08 estimates are calculated using spot yields up until 11 January 2008.

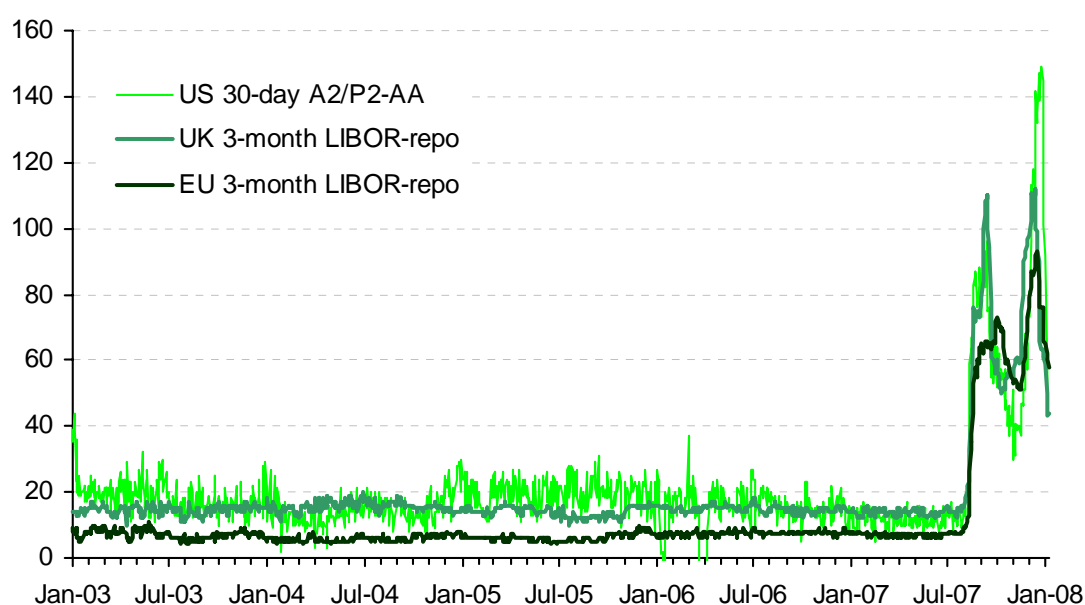
Sources: Bank of England; Debt Management Office.

On balance, it remains the case that the UK government can borrow at nominal and real rates that are, by the standards of recent decades, very low. But given the recent turbulence in markets, it is likely that the cost of debt will continue to fluctuate significantly. This raises important issues about the best way to fund the borrowing needs of the government. This question takes on unusual significance given the substantial changes in the shape of the yield curve that have occurred over the past few months, when conditions in the financial markets have driven yields on short-dated nominal gilts down sharply. We turn to those issues in the next two sections.

6.3 Government debt and the money market crisis

Systemic credit stresses erupted during August 2007, after several months of sporadic, apparently isolated credit problems centred on the US sub-prime mortgage market. The sea-change from individual credit concerns to systemic liquidity collapse was rapid and widespread. The first three weeks of August saw spreads between secured and unsecured interbank lending rates (i.e. the difference between the rate of interest charged on secured interbank lending – the repo rate – and that charged on unsecured interbank lending) more than quadruple across the sterling, US dollar and euro-denominated markets (Figure 6.5).

Figure 6.5. Secured–unsecured spreads in the UK and Europe, and the US Commercial Paper AA-A2/P2 spread



Source: Reuters EcoWin.

Stresses have been evident across a wide variety of financial instruments not directly connected with the US sub-prime mortgage market: corporate bonds; interest rate swaps; foreign-exchange forwards; and credit derivatives.

This systemic collapse in general liquidity conditions has also precipitated specific casualties – notably the run on the UK bank Northern Rock, which led to the Treasury’s announcement on 17 September 2007 that deposits there would be guaranteed by HM Government. But there have been significant specific failures elsewhere in the global financial system too. As financial market liquidity and credit conditions have tightened, the effects have been felt across the spectrum of financial markets.

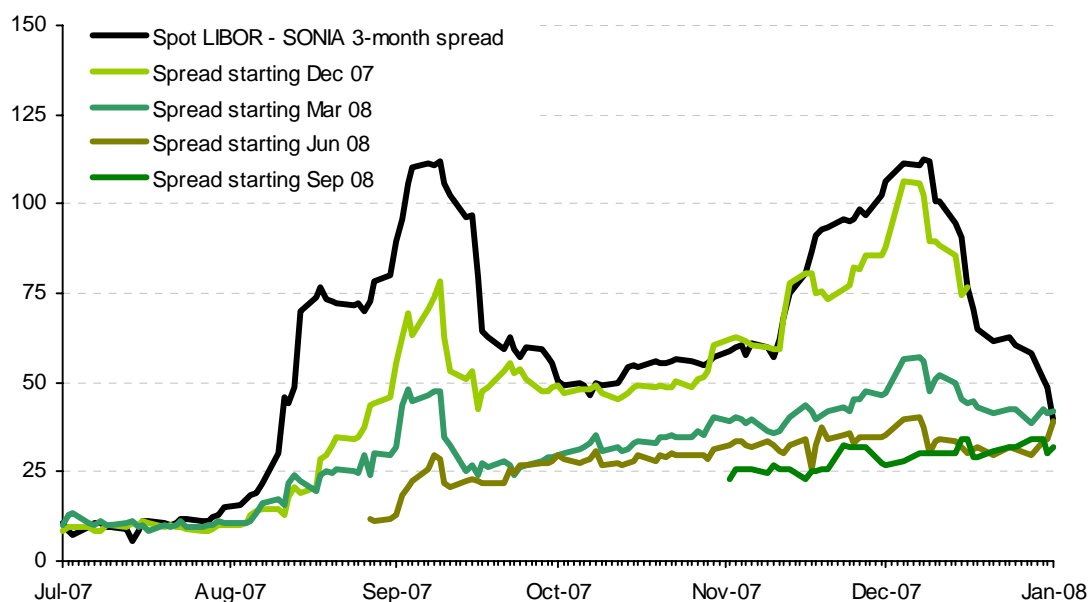
Markets have remained pessimistic about the prospects that the liquidity crisis will be quickly fixed, although sentiment has improved since calendar-year-end.

A visible expression of market expectations for the persistence of money-market stress lies in the difference between the interest rate charged for money over a given term and expectations

for where overnight interest rates will be over the same period.¹ This difference is known as the LIBOR–SONIA spread. In theory, the two rates – LIBOR and SONIA – should be very close together, as interest rates for loans over a given term such as LIBOR are themselves an expression of expectations for future short-term interest rates. The difference between LIBOR and SONIA, therefore, expresses counterparties’ reluctance to part with cash, either because of fears about credit risk or because of cash hoarding. As such, it is a good barometer of money-market stresses.

Before August, LIBOR–SONIA spreads were around a dozen basis points; but in August, the 3-month LIBOR–SONIA spread widened dramatically, more than eightfold, to more than 100 basis points (its equivalents in US dollars and euros followed suit, albeit to a lesser extent). This is shown in Figure 6.6.

Figure 6.6. Forward LIBOR–SONIA spreads



Notes: Spread between 3-month LIBOR and 3-month SONIA: the ‘spot LIBOR–SONIA spread’. Market prices also allow us to see what level the market expects the spread to be in the future, and how these expectations change over time. After calendar-year-end, the spot spread narrowed considerably (though remaining very elevated compared with pre-August 2007); but the forward spreads did not retreat much, reflecting persistent wariness about liquidity conditions throughout 2008.

Central banks including the Bank of England have made attempts to ease the liquidity crisis. The ECB, whose open market operations (OMOs) already permitted it to lend to banks against a wide range of collateral before August, seems to have become the bellwether. Other central banks, particularly the Bank of England, were initially reluctant to adopt as liberal an approach as the ECB, preferring less accommodative measures. But financial market stresses worsened during November and December; and in December the US Federal Reserve, the

¹ In the UK, the average overnight rate is referred to as the Sterling Overnight Index Average, or SONIA. Since August, SONIA swaps have become more actively traded. These are essentially no more than a contract for difference on what the average overnight interest rate will be for a certain period of time. As such, there is negligible counterparty risk, as neither party to the swap actually lends the other cash.

Bank of England and other central banks agreed to conduct a variety of term lending operations against a wide range of collateral.

Since calendar-year-end, money-market liquidity conditions have improved, and the LIBOR–SONIA spread has narrowed markedly (although it remains above the levels prevailing before August 2007). But in spite of the central banks' efforts, markets remain wary of another potential deterioration in money-market liquidity. In mid-January, the forward LIBOR–SONIA spreads starting in June 2008 and September 2008 were trading around 30bp, about three times what 3-month LIBOR–SONIA was before August last year, implying that stresses are expected to persist even into Q4 2008.

The liquidity crunch and the gilt market

Financial market stresses have had the effect of pushing gilt yields lower. Since risk aversion and liquidity concerns erupted in August, gilts – especially short-dated gilts – have commanded a premium.

Between the end of July 2007 and the end of December 2007, 2-year gilt yields fell by 120bp, and the slope of the yield curve between 2 years and 30 years steepened by 90bp, bringing 2- and 30-year yields to about the same level for the first time since 2005 (Figure 6.9). Long-dated breakeven inflation (the rate of RPI inflation that would make the returns on conventional and index-linked gilts the same – effectively a market forecast for inflation) pushed up above 3.50%, its highest level since the Bank of England was granted independent control of monetary policy in May 1997 (Figure 6.10). Swap spreads (the spread between gilt yields and swap rates of the same maturity) have widened, especially in shorter maturities (Figure 6.8).

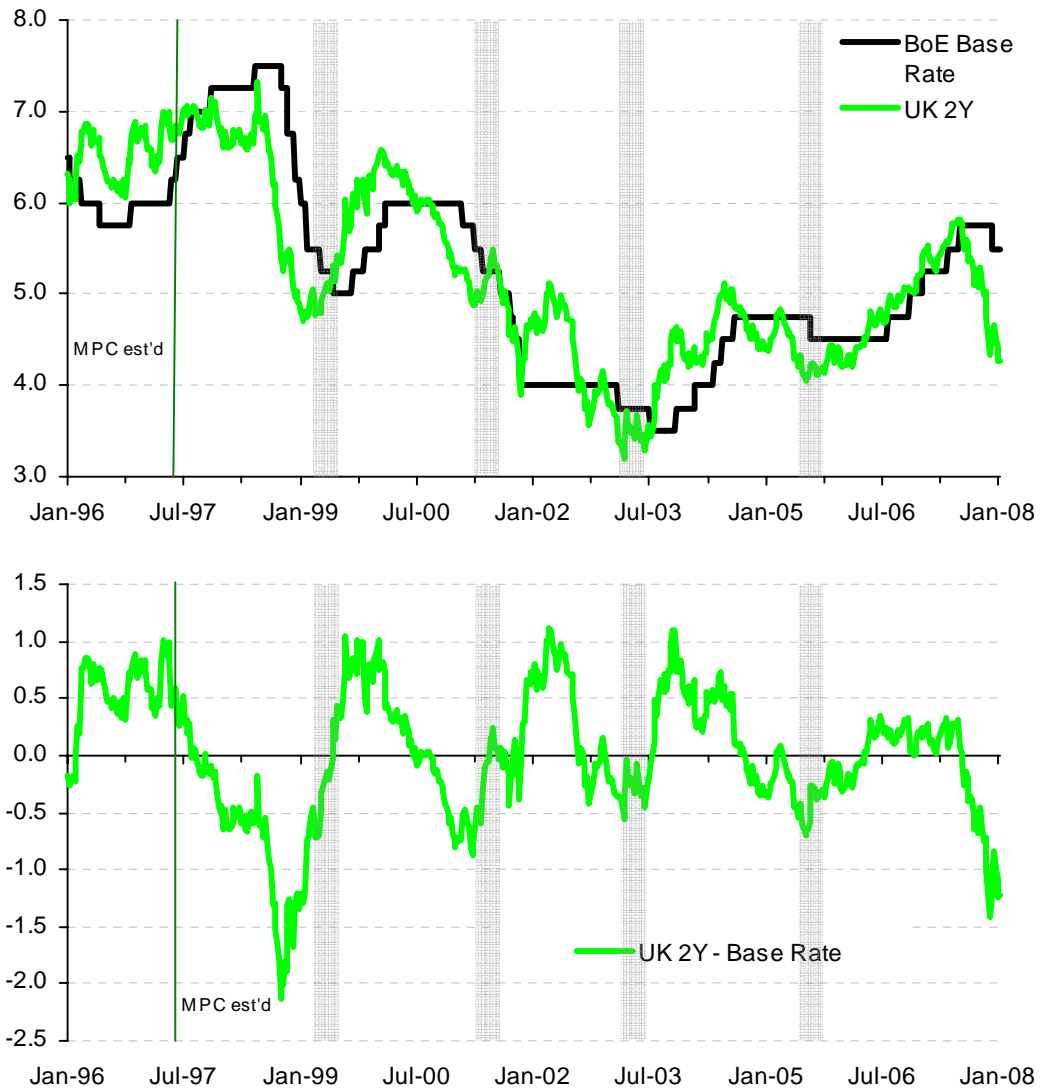
These yield moves create interesting questions for gilt market participants – including the Debt Management Office.

How much of the fall in short-dated gilt yields is attributable directly to a flight to safety, and how much reflects expectations that the Bank of England will cut official rates in response to the effect on the real economy of tightening credit conditions? Should the DMO consider issuing gilts shorter than 5 years to satisfy the market's increased demand for short-dated government debt? And does the dis-inversion of the yield curve evident in Figure 6.9 mean that the market's appetite for long-dated conventional gilts is finally on the wane? We briefly consider these questions before turning to the implications for funding.

Why has the yield curve shifted?

The fall in 2-year gilt yields since August, if it reflected only expectations of the future path of the base rate, would certainly be consistent with several interest rate cuts. Since the MPC was given independent responsibility for monetary policy in 1997, 2-year gilts have typically traded 40-60bp below the base rate when the market anticipated that the next policy move would be a rate cut. After August 2007, 2-year yields fell to more than 125bp below the base rate – a spread previously reached only in the wake of the 1998 emerging market/LTCM crisis (Figure 6.7).

Figure 6.7. 2-year gilt yield vs base rate (%)

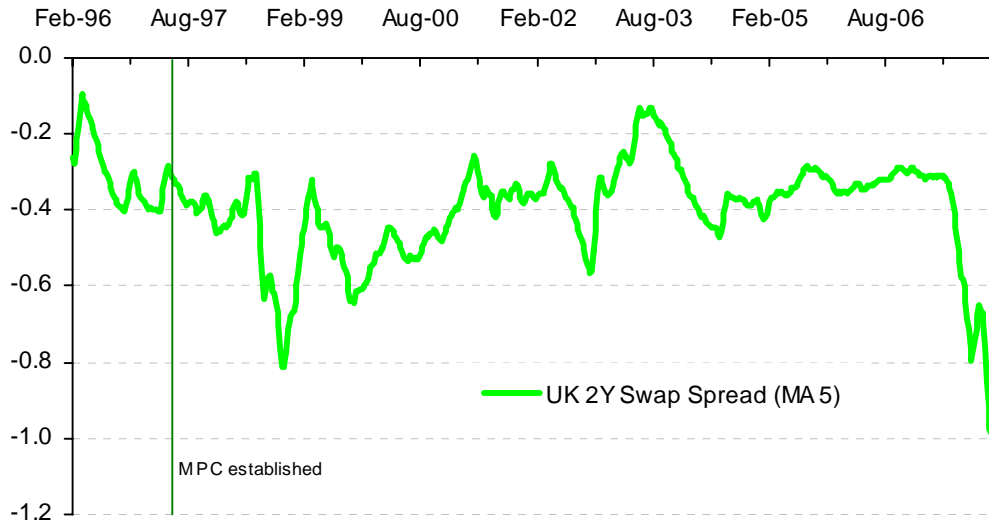


Notes: The upper panel shows the base rate and the 2-year gilt yield; the lower panel shows the spread between the two. When the market anticipates an official rate cut (shaded areas), the 2-year yield trades below the base rate. Source: Bloomberg.

But it seems clear that not all the rally in shorter-dated gilts is attributable to expectations of base rate cuts. Although short-dated gilt yields have fallen, short-dated swap rates – an expression of expectations of the future path of LIBOR – have not fallen nearly as much. The widening of this so-called swap spread suggests that at least some of the rally in short-dated gilts has been to do with a flight to safety rather than the anticipation of the level of policy rates (Figure 6.8).

So yields on short gilts have probably been driven lower by more than changing base rate expectations. The yield curve steepened during the second half of 2007, putting the spread between 2- and 30-year gilts back into positive territory for the first time in more than two years (Figure 6.9).

Figure 6.8. 2-year swap spread



Source: Bloomberg.

Figure 6.9. The gilt yield curve



Source: Morgan Stanley.

This steepening was mainly the result of a fall in yields on shorter-dated gilts, driven by a combination of weaker economic data and the liquidity crisis that arose in August. It does not signify a fall in demand for long-duration assets from pension funds, which has remained firm. Indeed, long-dated forward rates have remained rather stable. Even though real yields have moved up a little from the levels of 2006, they are still low relative to recent history (Figure 6.10). Given that long-dated breakeven inflation (the difference between nominal and real yields on conventional and indexed gilts of long maturity) is well above the MPC's target, this suggests that index-linked gilts remain a source of relatively cheap funding and it would make sense for the DMO to continue to supply them. Whether in the light of the sharp fall in yields on shorter-dated gilts the DMO should also skew issuance towards short-dated nominal bonds is the issue we consider in the next section.

Figure 6.10. 30-year index-linked real yield and breakeven inflation (BEI)



Source: Bloomberg.

6.4 Optimal debt management

Debt management involves choosing the types of bonds the government should 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).

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 the DMO's own modelling of different debt issuance strategies suggests might be the best way to fund deficits in the light of the current prices of different sorts of government debt.

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 new indexed gilts have had 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			Total	Other		
	0–7 years	7–15 years	15+ years		Floating	Undated	Index-linked
1990–91	40.1	33.1	8.0	81.1	0.0	2.6	16.2
1991–92	42.7	28.3	10.7	81.6	0.0	2.4	16.0
1992–93	38.6	27.6	14.7	80.9	0.0	2.0	17.1
1993–94	36.0	30.4	15.0	81.4	0.0	1.5	17.1
1994–95	34.7	29.3	15.3	79.4	2.2	1.4	17.0
1995–96	36.3	27.4	15.1	78.9	2.2	1.2	17.8
1996–97	37.0	25.2	15.9	78.1	3.0	1.1	17.8
1997–98	35.3	25.4	15.5	76.2	2.9	1.1	19.8
1998–99	37.8	24.0	14.7	76.5	1.0	1.1	21.4
1999–00	39.1	19.5	16.5	75.1	1.0	1.1	22.7
2000–01	38.9	16.1	17.4	72.5	1.1	1.1	25.3
2001–02	36.7	17.0	19.5	73.2	0.0	1.2	25.6
2002–03	35.6	17.7	19.0	72.2	0.0	1.1	26.7
2003–04	34.3	18.6	21.0	73.9	0.0	1.0	25.1
2004–05	37.2	14.1	23.0	74.3	0.0	0.8	24.8
2005–06	32.8	15.4	25.2	73.5	0.0	0.7	25.8
2006–07	28.0	19.0	25.0	72.0	0.0	1.0	27.0
2007–08	17.2	17.1	40.0	74.3	0.0	0.0	25.7

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.

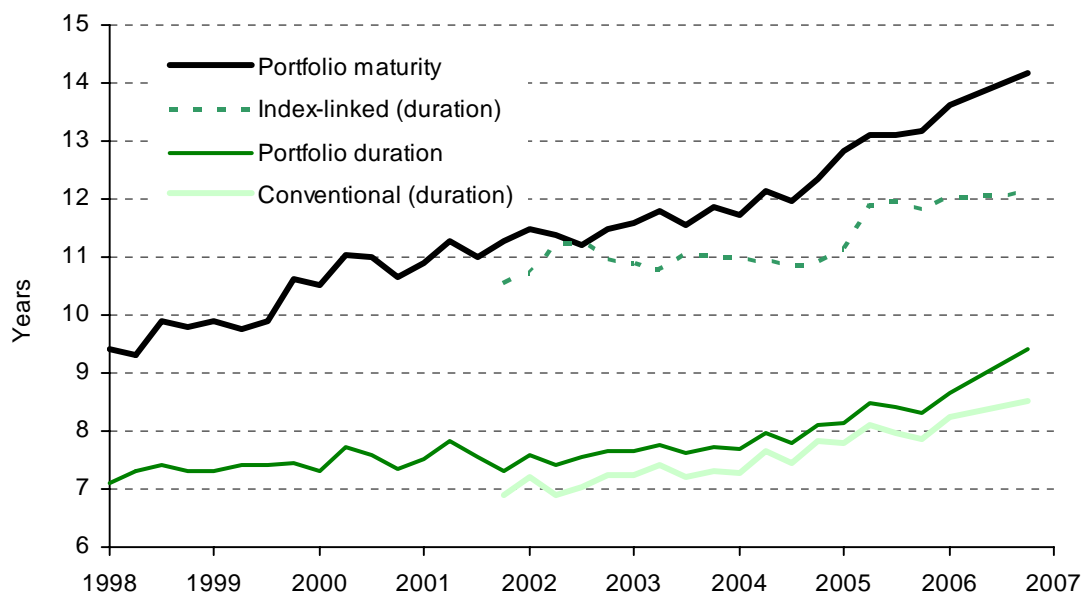
Source: Debt Management Office.

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

But within the stock of both real and nominal debt, the average maturities of new issues have lengthened. Figure 6.11 shows that the average maturity of the outstanding stock of government debt has increased from about 9½ years a decade ago to about 14 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.² Duration has also increased substantially over the past decade – from around 7 years to about 9½ years. The strategy of lengthening the maturity and duration of debt has occurred over a period when, until very recently, long yields have consistently been well below shorter yields.

Figure 6.11. Gilt portfolio maturity and duration



Source: Debt Management Office.

Optimal debt management looking forward

But that situation of long yields being well under short yields no longer holds (see Figure 6.9). Part of the sharp fall in yields on shorter-dated conventional gilts reflects expectations that the Bank of England may be cutting rates during 2008. But the extent of the implied cuts in Bank of England base rate seems to exceed the expectations of all but the most pessimistic economists and this suggests that the fall in 2-year gilt yields may also reflect a fall in the term premium on such gilts. What all this has meant is that the yield curve no longer consistently slopes downward in the UK.

How long the unusual – by recent standards – shape of the nominal gilt yield curve might last is very hard to judge. Is there a strong case for the DMO to tilt issuance towards shorter-dated conventional gilts while it does last? Such a strategy might seem to have the advantage of targeting issuance at parts of the yield curve that have moved in ways that potentially reflect shortages that have driven term premiums (which reflect risk and liquidity issues) down.

The DMO's own modelling work on optimal debt issuance provides one way of answering that question.³ It shows that optimal funding is indeed quite sensitive to the level of term

² Duration also measures the sensitivity of the price of a bond to a change in its yield.

³ For a description of the DMO work on modelling issuance strategies, see chapter 6 of Debt Management Office, *DMO Annual Review, 2005–06*, August 2006 (http://www.dmo.gov.uk/index.aspx?page=publications/Annual_Reviews).

premiums that affect the slope of the yield curve. When an assumption is made that the average level of interest rates on bonds of differing maturities is lower at maturities of 10 years and beyond than at 1 and 5 years (generating an inverted yield curve beyond 5 years) then the DMO model implied that more long-dated issuance is better on cost and volatility grounds. But if an alternative assumption is made that the yield curve mildly slopes up (so that the yield on 10-year nominal debt is on average about 40 basis points above the yield on 2-year debt) then a strategy of switching to fairly heavy short-dated issuance wins on cost and volatility grounds.

The results serve to show the sensitivity of calculations of optimal debt management to fairly small changes in assumption about the shape of the yield curve. But the DMO modelling is only suggestive, and in many ways it is not very well suited to the issue of whether the DMO should temporarily switch tactics during what may well be a temporary period where the yield curve is unusually steep, while retaining a hump at the longer end. The DMO's modelling considers alternative strategies that are consistently followed over a long period.

Nonetheless, its simulation results do serve to show sensitivity to shifts in slope, and support the intuitive appeal of targeting issuance where shortages appear significant – as revealed by slopes of the gilt yield curve that seem to go beyond the shape one would expect based on expectations about how very short-dated nominal rates (set by the Bank of England) and inflation will evolve. Right now, that implies a strategy of issuing short-dated conventionals, long conventionals and long index-linked bonds. Issuing medium-dated conventionals looks less attractive. So long as yields on 2- to 3-year gilts seem to have become somewhat separated from expectations of Bank of England rates (just as, arguably, long-dated yields have become somewhat separated from expectations of central bank policy and inflation over the long term), there is an argument for tilting issuance in that direction.

6.5 Government policy and the 'credit crunch'

The problems in financial markets that began in August last year – commonly referred to now as the 'credit crunch' – pose major policy questions for governments across the world. Those issues are particularly acute in the UK. In part, this is because the tightening in credit conditions has already had a significant impact on the price and availability of credit – particularly mortgages – to UK households and to some companies. More obviously, the policy issues in the UK are acute because the liquidity problems that hit Northern Rock caused a bank run and led to the extension of approximately £25 billion of credit to that bank from the Bank of England. The Bank of England is essentially a nationalised entity (and has been since 1946), so the loan to Northern Rock is effectively a government loan, although it does not count as government debt on the definition used for the fiscal rules.⁴

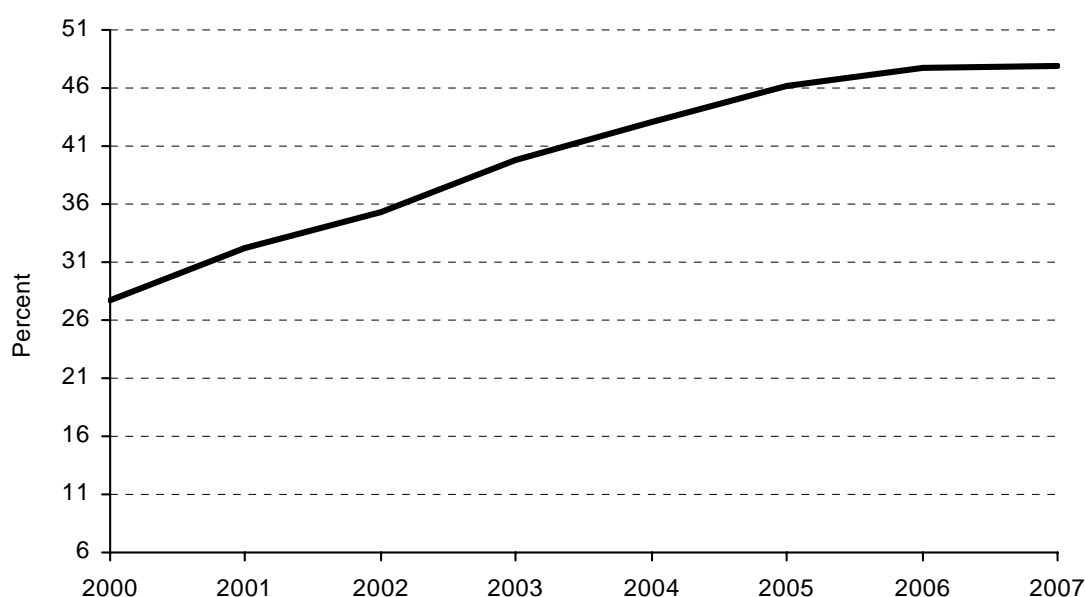
Conditions in the money market and in the markets where banks and building societies raise wholesale funds remain fragile, and participants remain nervous that liquidity could suddenly evaporate again. The market for issuing asset-backed securities has effectively been closed – the price that issuers would need to offer (in terms of yield) to raise new funds has been so

⁴ The Treasury would have to compensate the Bank of England were Northern Rock to default and, were this to happen, it would affect measures of the public finances.

high that it is not commercially attractive for almost any institution. If this situation persists for several more months, it would create major problems. UK banks rely on raising funds in the wholesale markets (Figure 6.12). A significant proportion of the stock of mortgage loans in the UK is funded by the issuance of mortgage-backed securities. A recent report by Morgan Stanley's banks analysts⁵ summarises the position thus:

... the UK banks have increasingly been using wholesale sources to fund customer lending. This is reflected in the widening customer funding gap – the difference between customer loans and customer deposits. At end-June 2007, this amounted to £564bn for the major UK banks ... or 22% of the stock of their customer loans. In recent years this gap has been largely filled by securitization.

Figure 6.12. Major UK banks' wholesale funding as a percentage of total funding, median^{a,b}



^a 2007 data are as at 2007 H1.

^b Wholesale funding is defined as interbank deposits plus debt securities in issue. Total funding is wholesale funding plus customer deposits.

Source: Bank of England.

Table 6.7 shows the gap between loans to customers and deposits from them for some of the major UK lenders. In all cases, that gap is substantial – both absolutely and relative to the size of their lending. Table 6.8 focuses on the mortgage market, showing what proportion of mortgage loans is financed from securitisations; that averages nearly 30% for the main UK mortgage lenders.

It is exceptionally hard to assess whether or not the market for issuing asset-backed securities will 'unfreeze' in the near future. But if it does not, banks and building societies would face severe problems: a source of funds which has financed a high proportion of recent growth in loans will be unavailable; potentially more serious is that, as existing asset-backed securities

⁵ M. Helsby and S. Hayne, *UK Banks: Life after Peak Earnings*, December 2007.

Table 6.7. Major banks' funding gaps at end June 2007

	Net customer loans (£bn)	Customer deposits (£bn)	Customer funding gap (£bn)	Customer funding gap to loans (%)	Loans to deposits (%)	Deposits to loans (%)
RBS	503	419	84	17	120	83
HBOS	395	227	168	43	174	57
Barclays	321	292	29	9	110	91
Lloyds TSB	200	145	56	28	138	72
Northern Rock	97	30	67	69	321	31
Alliance & Leicester	49	31	19	38	161	62
Bradford & Bingley	41	24	17	42	172	58
Total	1,607	1,168	439	27	138	73

Source: Company data, Morgan Stanley Research.

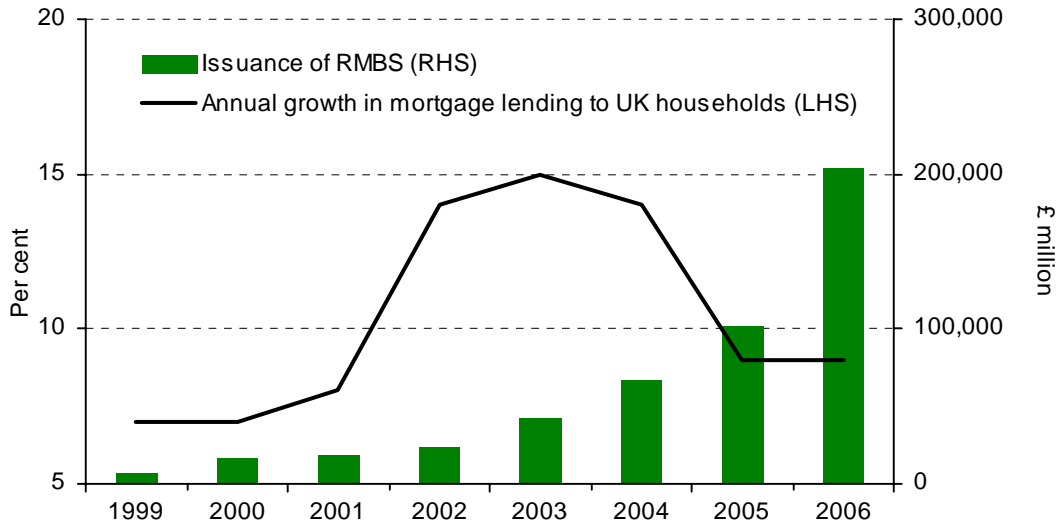
Table 6.8. Bank securitisation of mortgage loans

2006	Total mortgage loans outstanding (£bn)	Securitised (£bn)	Securitised (%)
HBOS	219.0	72.7	33
Abbey	101.7	29.1	29
Lloyds TSB	95.3	14.9	16
Northern Rock	77.3	47.2	61
RBS	69.7	15.7	23
Barclays	61.7	12.6	20
HSBC	37.4	3.7	10
Alliance & Leicester	38.0	3.4	9
Bradford & Bingley	31.1	6.7	22
Total	731.2	206.0	28

Source: Company data, Morgan Stanley Research.

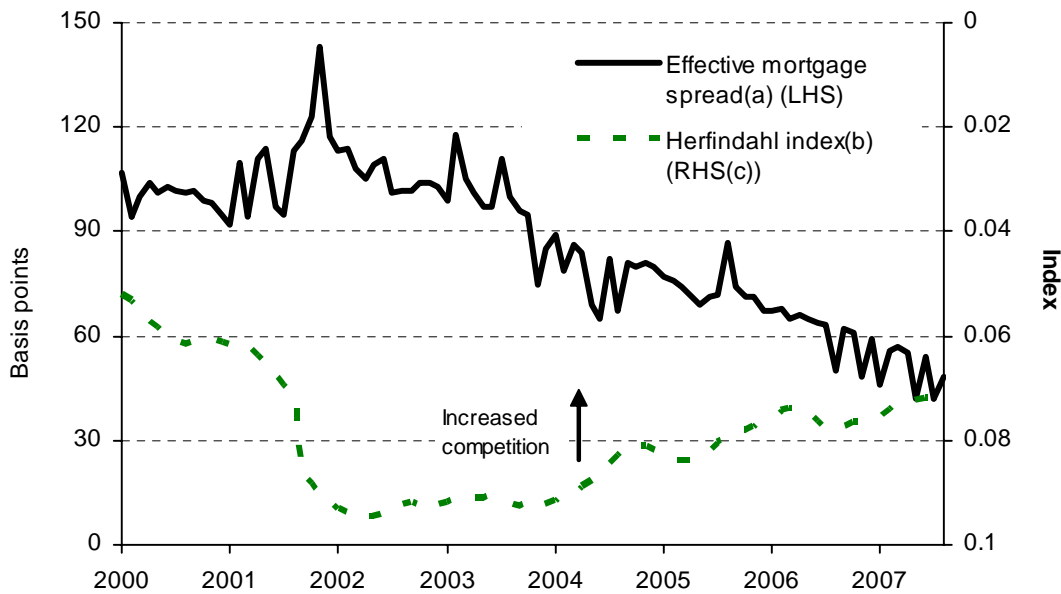
mature, they will have to be replaced with other sources of funding. There are around £250 billion of mortgage-backed securities outstanding. If banks and building societies have to replace a substantial part of wholesale funding with retail deposits, it is plausible that rates offered on savings will need to be high – potentially even higher than rates already offered by lenders (which have moved up sharply in recent months even as the Bank of England's base rate has fallen and yields on shorter-dated gilts have moved lower). That would mean that the cost of loans would itself have to move higher. Those pressures would likely be most acute in the mortgage market because it is there where margins of lending rates over the cost of funds had fallen to exceptionally (and probably unsustainably) low levels (see Figure 6.14). The impact of a further increase in the cost of mortgage debt in an environment where arrears and repossessions are already expected to climb fast is potentially severe. (The Council for

Figure 6.13. Major UK banks' issuance of residential mortgage-backed securities (RMBS) and growth in mortgage lending



Sources: Bank of England; Dealogic; FSA regulatory returns.

Figure 6.14. The effective mortgage spread



^a Effective interest rate on the stock of outstanding mortgages relative to an appropriate funding rate. For floating-rate mortgages, that is assumed to be the Bank Rate. For fixed-rate products, swap rates of similar maturities are used (averaged over the relevant horizon and lagged one month).

^b The Herfindahl index is a measure of concentration in an industry or sector. It is calculated as the sum of the squares of market shares for each firm.

^c Inverted scale.

Source: Bank of England.

Mortgage Lenders (CML) recently predicted that arrears and repossessions are likely to increase sharply in 2008, relative to 2007.⁶)

The Bank of England has taken measures to try to ease the situation. As part of a coordinated plan from the Fed, ECB, Bank of England, Bank of Canada and Swiss National Bank, it was announced in mid-December that the Bank of England would accept bids for funds – at a non-penal rate – against a broader range of collateral than was normal and for 3 months. The widened list of collateral included triple AAA tranches of mortgage-backed securities.

The Bank of England operation was not designed to provide substantial net new funding, though by widening the range of assets acceptable as collateral it nonetheless helped make the seriously blocked market for mortgage-backed securities more liquid. This will have eased some of the potential acute liquidity problems of the kind that caused a run on Northern Rock. But whether this is likely to open up the market for new issues of mortgage-backed securities is very far from clear. Inevitably, there is serious doubt about that, given the small scale of the operation (the auctions on 18 December and on 15 January were for £11.35 billion, of which £10 billion was for 3 months) relative to the stock of outstanding mortgage-backed securities.

What more can the government do if the market for mortgage-backed securities remains blocked? One option is to do nothing and wait, and hope, for the market to unfreeze. More pro-active action could involve some form of public sector lending, or support to lenders (for example, by provision of credit enhancement). This could be undertaken by the Bank of England, which could *very* substantially increase the scale of lending it would do – at non-penal rates – against a wide range of collateral that includes asset-backed (and particularly mortgage-backed) securities and perhaps also mortgages. This would be a major extension of the action undertaken in a coordinated way with other central banks in December. A more radical strategy would be for the government to set up a special lending facility using an entity that is not part of the Bank of England – a special mortgage lending agency.

The ‘do nothing’ strategy is best if things sort themselves out – but risky in case they do not. Having the Bank of England undertake massive lending puts the central bank in a difficult position because it looks more like a support operation for the banking sector than an attempt to preserve order in the money markets. And the scale of lending would potentially need to be enormous – far greater than the facility announced on 12 December. And if a massive extension in Bank of England lending were clearly done on behalf of the government, it could be seen to threaten Bank of England independence – which has great value in the sphere of setting interest rates. Although conceptually there is a distinction between operations in money markets to preserve order and liquidity, and decisions taken by the Monetary Policy Committee at the Bank of England about the policy rate, this risks becoming blurred. So government making policy on the former may seem to threaten Bank independence on the latter.

⁶ In October 2007, the CML forecast the number of 3+ months arrears cases to reach 145,000 (1.22% of all mortgages) by the end of 2007 and 170,000 (1.42% of all mortgages) by the end of 2008. The number of repossessions was forecast to be 30,000 (0.25% of all mortgages) in 2007 and 45,000 (0.38% of all mortgages) in 2008.

So the strategy of establishing a new agency to undertake lending may be the better way to deal with a situation where mortgage lenders cannot access wholesale funds. How might this work?

An agency could be established either to buy, or lend against the collateral of, mortgage-backed securities, and possibly mortgages, issued by banks and building societies. Lending for a given period against the collateral of mortgage-backed securities – a repo arrangement – has the advantage that the agency could apply haircuts, i.e., set a safety margin between the amount lent and the market value of the collateral. The repo route has many advantages: it reflects the temporary nature of the assistance; it means the agency does not need to take a view on the right price to pay for securities; and it means the agency can have conservative lending criteria without forcing institutions to sell at ‘fire-sale’ prices.

On the other side of the agency’s balance sheet could be loans from the government – an alternative is that the agency issues its own securities. But that may (unhelpfully) duplicate the role of the DMO. So the loan route could be better. It is possible that the DMO would issue short-dated securities to match the nature of the assets held by the agency.

How does the agency quietly exit the scene when the market is working again? If the average life of the repos is, say, 12 months then its balance sheet will shrink quite quickly after it stops repo’ing. This is a major advantage of the repo route rather than the outright purchase route. Under the latter, the stock would not naturally run off for several years, so the agency would have to make decisions about when, and at what price, to sell securities.

Such an agency is clearly not designed to shape the type of mortgages offered nor to influence directly the relative prices of different sorts of mortgage. But the government does have a long-standing agenda on the nature of mortgage loans and will be reporting in the Budget on its assessment of potential obstacles to more longer-term fixed-rate mortgages being sold. The repricing of mortgages underway now in the UK – which is partly a delayed reaction to the rate increases the Bank of England made in 2006 and in the first part of 2007 and, more significantly, a response to the more recent credit crunch – does show some of the very real risks with products where people expose themselves to uncertainty about future rates. The rationale for the establishment of an (emergency) agency to buy mortgages and mortgage-backed securities is to sort out a liquidity problem and not to shape the design of mortgages sold in the UK. But there is a common issue here – namely, a concern that mortgages where interest rates are uncertain can generate major problems when rates re-set unexpectedly higher. We consider the more long-standing concern of the government – reflecting the predominance of variable and very short-term fixed-rate lending in the UK – in the next section.

6.6 Mortgages and mortgage financing – the role of indexation

Uncertainty about where mortgage rates will move over the next few years has meant that UK borrowers – who now borrow a great deal relative to their incomes to enter the housing market and rarely fix the cost of the debt for more than a couple of years – do take on a lot of interest rate risk. The government has been concerned about the type of mortgage lending

undertaken in the UK. One potential way of reducing risk is to encourage the sale of more longer-term fixed-rate mortgages – or at least seek to remove potential obstacles to their sale. This is the strategy the government is exploring and on which it will report at the Budget.

Fixed nominal rate mortgages do have advantages in terms of creating certainty about the path of the nominal value of repayments. But they can create a degree of inflexibility and can mean that if inflation and nominal interest rates fall unexpectedly, borrowers can be paying what becomes a relatively high rate often with significant costs of remortgaging.

In this section, we ask whether there are alternatives to fixed or variable nominal rate mortgages that might create a better risk–cost balance.

Overwhelmingly across Europe, a mortgage remains a nominal contract with repayments unrelated to movements in consumer or house prices. Typically, capital is repaid over a period of 20 to 30 years, or at least it would be if people did not remortgage. In practice, people often remortgage when they move house and only a minority would gradually repay their original mortgage in line with the amortising schedule used to calculate the regular payments.

Sometimes the nominal rate is fixed, sometimes it is variable. Different mixes of fixed- and variable-rate mortgages are seen in different countries, though there have been some significant changes in recent years, with variable rates becoming more popular in some countries where in the past fixed-rate contracts were common (e.g. Denmark and the US), while in other countries fixed-rate contracts have become more common than they have been in the past (the UK).

The differences in the risk characteristics between fixed nominal and variable nominal rate debt contracts are well understood and much analysed (Campbell and Cocco, 2003; Leece, 2005; Miles, 1994, 2003, 2004).⁷

Neither the overall real value of the stream of payments nor its time profile is known with nominal debt contracts, either fixed or variable rate. Fixed and variable contracts nonetheless generate very different risks. Front-end loading (or the tilt effect) – whereby the real value of payments is higher earlier in the term of the mortgage and lower later – is less serious with the fixed nominal rate contract if inflation and nominal rates suddenly rise, but with fixed nominal rate mortgages the real cost of borrowing can nonetheless be highly variable if inflation deviates from what seemed likely when the nominal rate was set. With variable-rate nominal contracts, the real overall cost of borrowing would be less variable should the dominant driver of nominal rates be inflation; but shifts in inflation will create big shifts in the timing of payments, which can cause big problems for credit-constrained households.

So, in terms of risk, the problem with standard, nominal mortgages is threefold:

- They generate uncertainty about the real repayment profile.

⁷ J. Y. Campbell and J. F. Cocco, 'Household risk management and optimal mortgage choice', *Quarterly Journal of Economics*, 2003, 118(4): 1449–94.

D. Leece, *Economics of the Mortgage Market*, Blackwell Publishing, Oxford, 2004.

D. Miles, *Housing, Financial Markets and the Wider Economy*, John Wiley and Sons, Chichester 1994.

D. Miles, *The UK Mortgage Market: Taking a Longer-Term View – Interim Report*, HM Treasury, December 2003.

D. Miles, *The UK Mortgage Market: Taking a Longer-Term View – Final Report and Recommendations*, HM Treasury, March 2004.

- Because payments are unrelated to shifts in the value of the home, they create a highly levered investment position with substantial exposure of the home-owner's net worth to changes in the value of their specific property.
- With either fixed or variable nominal rates, typically the burden of repayments is highest when the debt is taken out and gradually declines, which is not obviously ideal given the typical profile of income for buyers, particularly first-time buyers.

In short, nearly all mortgages offered in Europe today do not afford certainty over real payments nor do they in any way link what is owed to the value of the underlying asset, the house.

All these problems – front-end loading, the impact of uncertainty over the profile of real burden of servicing the debt and the great exposure of net worth to unexpected movements in the price of the specific house purchased – get worse if house prices are higher relative to incomes and if movements in future house prices are caused by factors other than increases in productivity and incomes. This creates problems whether the rise in prices is permanent or transitory, but the problems are different.

If the big rise in prices is largely permanent, people will consistently need to borrow more, so the risk of unexpected rate movements or of locking in at a 'wrong' nominal rate will now be more serious. The burden of servicing debt will also be permanently higher.

If a very substantial part of the rise in house prices is transitory, then those who have bought very recently, and whose debt liability is independent of house prices, will experience very large shocks to net wealth, though they might still be gainers if they plan to trade up later.

Optimal mortgage contracts

What might an ideal contract look like? The careful analysis of Campbell and Cocco (2003) strongly suggests it should give more certainty about the real cost of repayments: it should have a strong (consumer) price-indexed element. To allow households to be less exposed to shifts in the price of the specific property they own, it might also have an element of true risk-sharing of movements in the price of the property. With greater life expectancy, and longer expected working lives, it might also have a somewhat longer repayment period than has been typical in the past.

We will now consider the characteristics of such mortgages using simulation analysis to see how they compare with standard mortgages.

Alternative mortgage contracts

Average house prices in the UK have more than doubled since 2000. Incomes have not increased by anything like as much. As a result, buyers, and particularly first-time buyers, are having to borrow far more relative to their incomes than was the case in the past. For recent first-time buyers in the UK, the average ratio between purchase price and incomes is above 4.5; ten years ago, it was 2.9. Mortgage advances relative to incomes are up sharply, on average now about 40% higher than was typical ten years ago. At the same time, most first-time buyers are now having to find a somewhat higher proportion of the purchase price as a deposit, and with prices having risen so much, many buyers are struggling to afford even the

most modest homes. All this is happening against a backdrop of very sharply rising personal insolvencies and increased bank write-offs of bad debts. Thus far, most of the defaults have been on unsecured lending: credit card debt and overdraft lending. But there has also been an increase in the rate of possession orders taken out by lenders as a first step towards possible repossession of homes from owners unable to make mortgage debt repayments.

In this environment, the type of mortgage that has been typical in the UK for many years becomes increasingly unsuitable for many aspiring home-owners. The typical UK mortgage has been a variable-rate debt contract (or one where the rate is fixed for a small part of its life, typically two years or so). The loan usually represents a high proportion of the purchase price – often 90% or more of the value of a house – but the liability is not linked to shifts in the value of the property.

This loan contract means that first-time buyers are taking a highly-leveraged investment in a highly-non-diversified portfolio of residential property. The concentration of investment in one property is, in itself, pretty extreme when viewed in the light of standard portfolio theory. And the protection against interest rate fluctuations created by fixing the rate for just two years or so is limited in a world where no-one knows where short-term, nominal interest rates will be a few years down the road.

What kind of financial contract would offer a better way to deal with affordability and risk issues for many first-time buyers? And could it be offered on a commercial basis? Two desirable features of a loan contract are:

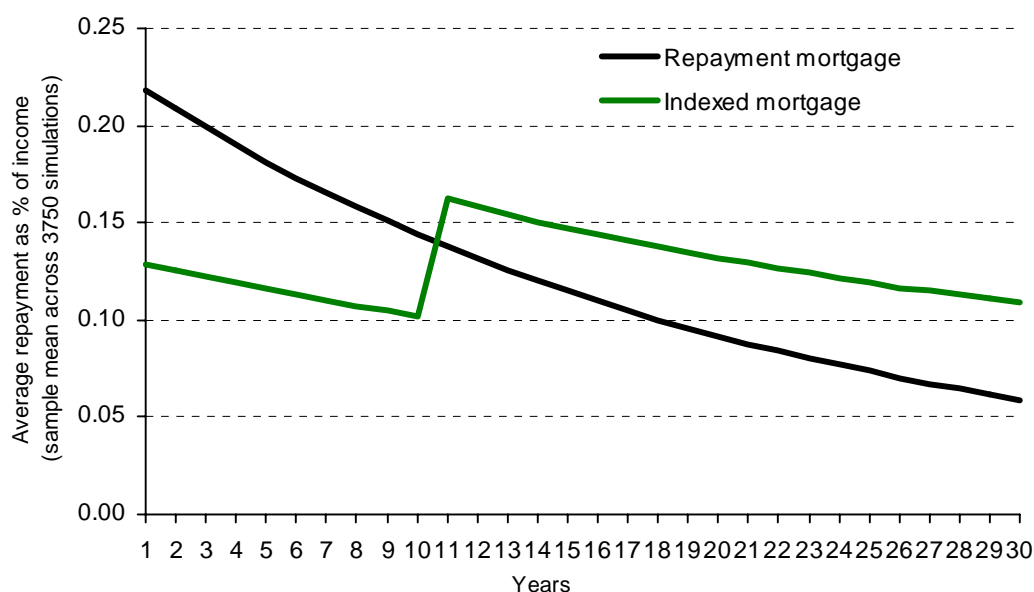
- that the burden of repayments on the loan is not fully exposed to shifts in nominal interest rates, which can cause severe problems to those who might only just be able to manage payments at current levels of interest rates;
- that it makes buyers less exposed to sharp swings in the value of the specific property that they buy and that it makes the value of the loan reflect, to some extent, shifts in the value of the home that is its collateral.

In the light of the first point, setting repayments by reference to a *real* interest rate, rather than to a *nominal* one, has advantages. Real interest rates are less volatile than nominal rates.

In the light of the second point, equity share (or equity loan) contracts, where a lender effectively takes an equity stake in a home and gains exposure to movements in the value of the property, are promising. The UK government has various initiatives in this area. But those schemes have an element of public subsidy and, as a result, are likely to be targeted at specific groups rather than to be available more widely to all potential borrowers. This is why it is interesting to ask whether financial contracts that have these features can be offered on commercial terms. Since the economic advantages – particularly in terms of risk-sharing between lenders and home-owners – of having a contract that has these features are potentially substantial, there is every reason to believe that they can be mutually beneficial and therefore commercially viable.

The idea behind indexed mortgages is simple: repayments in nominal terms would be linked to consumer prices and/or to house prices. Figure 6.15 illustrates the profile of repayments on a particular type of indexed mortgage contract and based on a particular set of assumptions about inflation, house price growth and real and nominal rates.

Figure 6.15. The repayment burden of standard and indexed fixed-rate mortgages: proportion of income taken by repayments



Notes: Both mortgages are for the same amount borrowed and are completely paid off after 30 years. The indexed mortgage illustrated here has two parts: the larger fraction (60%) is a standard repayment mortgage where payments are constant in real (consumer-price-adjusted) terms. The second (smaller) element is an interest-only mortgage, which also pays a fixed real rate on the outstanding balance; but the outstanding capital balance owed on this part of the mortgage is linked to house prices. That (house-price-linked) part of the outstanding balance begins to be repaid after 10 years and is gradually paid off by 30 years. This is why the payment profile moves back up after 10 years. Source: Morgan Stanley Research.

Index-linked mortgages have the twin benefit of generating a less downward-sloping real burden of repayments over time and also a much less volatile one. As Figure 6.15 shows, the burden of servicing the debt is much lower in the early years of the mortgage relative to a standard, nominal repayment mortgage. This is a desirable feature since that is when affordability issues are often most acute. But will lenders want to offer them? There are strong reasons to believe that innovation will come because the products that are right for borrowers create financial assets that should suit investors. As a result of this sort of indexed lending, securities can be created that allow investors to receive streams of income that are linked to consumer price inflation and to overall house price inflation. These could come to represent a useful addition to the supply of existing index-linked bonds that create a return that is some fixed amount in excess of consumer price inflation. The UK government has overwhelmingly been the main issuer of such sterling-denominated debt over the past 25 years. A security that generates a fixed return over house price inflation is likely to be one that many long-term investors would see as a useful addition to the existing pool of securities. It would naturally allow retail savings to be developed that allow people to hedge against the costs of buying houses in the future.

6.7 Conclusions

The economic and financial environment the government will face over the next few years is likely to be difficult. Growth will likely be slower than in recent years; conditions in credit

and money markets may remain stretched, increasing the cost and reducing the availability of funds to lenders. But this set of conditions may mean the cost of government debt remains at its recent very low levels, which is a helpful offsetting factor. There is an argument for issuing more short-dated debt than has been typical in recent years, with the yield curve having made short-dated gilts look unusually expensive.

The ongoing problems in financial markets create tensions and risks in the market for housing finance. In the near term, the serious risk is that issuing residential mortgage-backed securities remains problematic for lenders. There is a related, but more long-standing, set of issues on the type of mortgage contracts typically used by home-buyers. There are advantages – to both mortgage borrowers and lenders – in indexed mortgage contracts.